THE
ENCYCLOPEDIA
AMERICANA

A
LIBRARY
OF
UNIVERSAL
KNOWLEDGE

IN THIRTY VOLUMES

1918
THE ENCYCLOPEDIA AMERICANA
CORPORATION
NEW YORK CHICAGO
ARTIAL LIST OF CONTRIBUTORS TO VOLUME V

AYRES, HARRY MORGAN, Ph.D.
Assistant Professor of English, Columbia University
CANTERBURY TALES, THE

BUAT, P. A., S.T.L., LL.B.
Author of "Church and State in the United States of America," "The Roman Court," "Legal Formalities," "Tenure of Church Property in the United States," etc.
CANON LAW

BIGGAR, H. P.
Author of "The Early Trading Companies of New France"
CANADA — THE ERA OF EARLY DISCOVERY

BREWSTER, WILLIAM T., A.M.
Professor of English, Columbia University
CALEB WILLIAMS
CARLYLE, THOMAS

BRYCE, GEORGE, D.D., LL.D.
Member of Conservation Commission of Canada; Royal Commission on Technical Education (1910-13), and of Royal Society Committee on Research (1916)
CANADA — TECHNICAL EDUCATION
CANADA — HUDSON'S BAY COMPANY

BUCHANAN, MILTON A., Ph.D.
Professor of Italian and Spanish, University of Toronto
CALDERÓN DE LA BARCA, PEDRO

BURPEE, LAWRENCE J., F.R.G.S., F.R.S.C.
Secretary, Canadian Section of International Joint Commission, Ottawa
CANADA — LITERATURE

CAIRNS, WILLIAM B., Ph.D.
Assistant Professor of American Literature, University of Wisconsin
BUNKER HILL ORATIONS

CALLAHAN, JAMES M., Ph.D.
Professor of History and Political Science, West Virginia University
CANADA — DIPLOMATIC RELATIONS OF UNITED STATES WITH CARIBBEAN—AMERICAN INTERESTS AND DIPLOMATIC RELATIONS IN CANADA

CANDIDE

CARVER, THOMAS N., Ph.D., LL.D.
Professor of Political Economy, Harvard University
CAPITAL

COATS, R. H.
Dominion Statistician and Controller of Census

COCHRANE, CHARLES H.
Author of "Modern Industrial Progress"
CABLE, SUBMARINE
CANNING AND PRESERVING INDUSTRY
CAR BUILDING INDUSTRY
CARRIAGE

COLBY, CHARLES W., Ph.D.
Formerly Professor of History, McGill University
CANADA — UNDER FRENCH RULE (1632-1755)
CANADA — UNDER BRITISH RULE TO CONFEDERATION (1760-1864)
CANADA — JESUIT ESTATES ACT

COLEMAN, ARTHUR P., Ph.D.
Professor of Geology, University of Toronto
CANADA — MINERALS

CORNYN, JOHN HUBERT, B.A., LL.B.
Editorial Staff of The Americana
CAMPOAMOR Y CAMPOOSORIO, RAMON DE
CARDUCCI, GIOSUE

COURBIE, CLEMANT W.
Technical Art Expert
CAMEOS

COWIE, JOHN J.
Department of Marine and Fisheries, Ottawa
CANADA — FISHERIES

CREIGHTON, JAMES E., Ph.D., LL.D.
Professor of Logic and Metaphysics, Cornell University
BUTLER, JOSEPH
CAMBRIDGE PLATONISTS
CARTEESIANISM

CROSS, WILBER L., Ph.D.
Professor of English, Yale University
BULWER-LYTTON, EDWARD GEORGE EARLE

DAKE, CHARLES LAWRENCE, A.M.
Assistant Professor of Geology and Mineralogy, School of Mines and Metallurgy, University of Missouri
CAMBRIAN
CARBONIFEROUS

DE LEON, EDWIN W., LL.B.
President of The Canality Company of America
BURGLARY INSURANCE

DERRY, JOSEPH T.
Author of "History of Georgia"

CALHOUN, JOHN CALDWELL

DICKINSON, THOMAS H., Ph.B., Ph.D.
Associate Professor of English, University of Wisconsin
CANDIDA
Contributors to Volume V—Continued

DOUGHTY, ARTHUR G., Litt.D.
Dominion Archivist; Author of "The Battle of the Plains"

CANADA—BRITAIN'S FIGHT WITH FRANCE FOR NORTH AMERICA

DUNCAN, DAVID M.
Author of "The Story of the Canadian People";
Collegiate Institute, Winnipeg

CANADA—THE CANADIAN WEST

EVANS, W. SANFORD
Chairman of Georgian Bay Canal Commission, Ottawa

CANADA—SETTLEMENT OF THE CANADIAN WEST

FERRIS, RICHARD, C.E., D.Sc.
Editorial Staff of The Americana

CARBIDE
CARBOHYDRATE
CARBOLIC ACID
CARBOLINEUM
CARBON
CARBON COMPOUNDS
CARBON DISULPHIDE
CARBON DIOXIDE

FOURNET, A., S.S.,* and NEVEU, J.R., S.S., D.D.
Laval University, Montreal

CANADA—CATHOLIC CHURCH IN

GÉRIN, LÉON, LL.B.
Member de la Société Internationale de Science Sociale

CANADA—THE FRENCH CANADIAN

GODFREY, ERNEST H., F.S.S.
Editor, Census and Statistics Office, Ottawa

CANADA—AGRICULTURE
CANADA—THE GRAIN TRADE

HAGUE, DYSON, D.D.
Vicar of the Church of the Epiphany, Toronto;
Professor of Liturgics, Wycliffe College, Toronto

CANADA—RELIGIOUS CONDITIONS

HAMILTON, C. F., Lieut.-Col.
Department of Militia and Defense, Ottawa

CANADA—MILITARY SYSTEM

HALMEN, ALFRED D. F., A.M., L.H.D.
Professor of the History of Architecture, Columbia University

BYZANTINE ARCHITECTURE

HARRY, JOSEPH E., Ph.D.
Author of "The Greek Tragic Poets," etc.

BYZANTINE EMPIRE
BYZANTINE LITERATURE

HEDRICK, EARLE RAYMOND, Ph.D.
Professor of Mathematics, University of Missouri

CALCULUS OF VARIATIONS

INGERSOLL, ERNEST
Naturalist and Author

BUTTERFLY
CARIBOU
CASSOWARY

* Deceased.

ISAACS, LEWIS M., PH.B., LL.B.
Musical Critic and Composer

CARMEN (OPERA)

KELLOGG, VERNON L., A.B., M.S.
Professor of Entomology, Leland Stanford Jr.
University

BURBANK, LUTHER

JEMMETT, F. G.
Colonial Bank, London; formerly Secretary The Canadian Bank of Commerce

CANADA—BANKING SYSTEM
CANADA—CURRENCY, COINAGE AND LEGAL TENDER

KENNEY, JAMES F.
Public Archives of Canada, Ottawa

CANADA—CATHOLIC EDUCATION

KERR, WILLIAM A. R., Ph.D.
Dean of the University of Alberta

CALGARY, CANADA

KLEIN, HENRI F.
Staff of The Americana

BULGARIA
BULGARIAN LANGUAGE AND LITERATURE

LAMONT, HAMMOND
Editor of "New York Nation": "Burke's Speech on Conciliation with America"

BURKE, EDMUND

LANGTON, H. H.
Editorial Staff of "Review of Historical Publications Relating to Canada"

CANADA—GEOGRAPHY

LANGWORTHY, CHARLES F.D.Sc., Ph.D.
United States Department of Agriculture

CALORIMETER

LEACOCK, STEPHEN, Ph.D., Litt.D.
Professor of Economics and Political Science, McGill University

CANADA—CLERGY RESERVES
CANADA—LOCAL GOVERNMENT
CANADA—IMPERIAL FEDERATION
CANADA—PUBLIC EDUCATION
CANADA—THE ASHBYTOUN TREATY
CANADA—WASHINGTON TREATY
CANADA—GRANGER MOVEMENT

LENNOX, PATRICK JOSEPH, B.A., Litt.D.
Professor of English Language and Literature,
The Catholic University of America

CARLETON, WILLIAM

LUCKIE, M.
Nela Research Laboratory, Cleveland

CAMOUFLAGE

LUMMIS, CHARLES FLANDERS, Litt.D.
Founder Emeritus of the Southwest Museum,
Founder and President of Landmarks Club

CALIFORNIA
Contributors to Volume V — Concluded

LEONARD-STUART, CHARLES, B.A.
Editorial Staff of The Americas

BURMA

LIGHTHALL, WILLIAM DOUW, M.A.
Author of "The False Chevalier"; Founder of Chateau de Ramsay Historical Museum, etc.

CANADA — THE ACADIAN REFUGEES

LOISEAUX, LOUIS A., B.S.
Associate Professor of Romance Languages and Literatures, Barnard College, Columbia University

CARMEN

MACMECHAN, ARCHIBALD, Ph.D.
Professor of English Language and Literature, Dalhousie College, Halifax

CANADA — THE MARITIME PROVINCES TO CONFEDERATION

MAGIE, WILLIAM FRANCIS, Ph.D.
Professor of Physics, Princeton University

CAPILLARITY

McCrea, Nelson G., Ph.D.
Professor of Latin Language and Literature, Columbia University

CAESAR, GAIUS JULIUS

CAPTIVI

McINTRYE, W. A.
Normal School, Winnipeg

CANADA — PRIMARY EDUCATION

MOLDENKE, RICHARD, E.M., Ph.D.
Specialist on Metallurgy of Cast Iron and Expert in Malleable Castings

CAST IRON, MALLEABLE

MUNRO, WILLIAM BENNETT, Ph.D., LL.D.
Professor of Municipal Government, Harvard University

CANADA — THE QUEBEC ACT

— CANADA — SEIGNIORIAL TITURE

NEILSON, WILLIAM A., Ph.D.
Professor of English, Harvard University

BURNS, ROBERT

PANARONI, ALFRED G., B.S.
Instructor in Romance Languages, College of the City of New York

CANTICLE OF THE SUN, THE

PARKHURST, CHARLES H., D.D., LL.D.
Pastor of Madison Square Presbyterian Church, New York

CALVIN, JOHN

RINES, IRVING E.
Author of "History of United States"

CABINET AND CABINET GOVERNMENT

ROSS, ALEXANDER H. D., M.A., M.F.
Consulting Forest Engineer, Toronto

CANADA — FOREST AND LUMBER INDUSTRY

SCHMIDT, NATHANIEL, A.M.
Professor of Semitic Languages and Literatures, Cornell University

CANTICLES

SCOTT, W. D.
Superintendent of Immigration, Ottawa

CANADA — IMMIGRATION

SEATH, JOHN
Superintendent of Education, Ontario

CANADA — SECONDARY EDUCATION

SHORTT, ADAM, LL.D.
Chairman of Board of Historical Publications, Public Archives of Canada

CANADA — WAR ECONOMICS

— CANADA — COMMERCE, TARIFFS AND TRANSPORTATION

— CANADA — PUBLIC FINANCE

SMITH, GOLDWIN, LL.D.*
Formerly Regius Professor of Modern History of the University of Oxford, and Emeritus Professor of Cornell University

— CANADA — CONFEDERATION

— CANADA — THE CONSTITUTION

SMITH, WILLIAM BENJAMIN, Ph.D.
Formerly Professor of Mathematics, The Tulane University of Louisiana

CALCULUS, THE INFINITESIMAL

STUDEBAKER, JOHN M.
Manufacturer

CARRIAGE AND WAGON INDUSTRY

TRENT, WILLIAM P., LL.D., D.C.L.
Professor of English Literature, Columbia University

BYRON, GEORGE GORDON

UNDERHILL, JOHN GARRETT, Ph.D.
Representative of the Sociedad de Autores Españoles in the United States and Canada

CARTAS DE PEIJOO

WHITFORD, NOBLE E., A.B.
Author of "History of New York Canals"

— CANALS

WILCOX, MARRION, A.M., LL.B.
Co-editor of "Encyclopedia of Latin America"

— CARIB

— CARIBBEAN SEA

WOOD, FRANCIS CARTER, M.D.
Director of Cancer Research, Columbia University

— CANCER

WRONG, GEORGE M., M.A.
Professor of History, University of Toronto

— CANADA — OUTLINE HISTORY AND POLITICAL DEVELOPMENT

— CANADA — CANADA AND THE EUROPEAN WAR

— CANADA — SINCE CONFEDERATION

— CARTIER, SIR GEORGE ETIENNE

* Deceased.
### KEY TO PRONUNCIATION

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Pronunciation</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>à</td>
<td>far, father</td>
<td>êni, as in canón (cán'yóñ), piñon (pén'yóñ)</td>
</tr>
<tr>
<td>å</td>
<td>fate, hate</td>
<td>ng mingle, singing</td>
</tr>
<tr>
<td>a or ã</td>
<td>at, fat</td>
<td>nk bank, ink</td>
</tr>
<tr>
<td>a</td>
<td>air, care</td>
<td>ō no, open</td>
</tr>
<tr>
<td>ã</td>
<td>ado, sofa</td>
<td>o or ü not, on</td>
</tr>
<tr>
<td>å</td>
<td>all, fall</td>
<td>ö corn, nor</td>
</tr>
<tr>
<td>ch</td>
<td>choose, church</td>
<td>ó atom, symbol</td>
</tr>
<tr>
<td>e or ë</td>
<td>bed, end</td>
<td>ç book, look</td>
</tr>
<tr>
<td>ë</td>
<td>her, over: also Fr. e, as in de; eu, as in neuf; and oeu, as in bœuf, coeur; Ger. ö (or oe), as in ökonomie</td>
<td></td>
</tr>
<tr>
<td>ö or ø</td>
<td>oil, soil; also Ger. eu, as in butel</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>befall, elope</td>
<td>ö or oo fool, rule</td>
</tr>
<tr>
<td>ë</td>
<td>agent, trident</td>
<td>s satisfy, sauce</td>
</tr>
<tr>
<td>ff</td>
<td>off, through</td>
<td>sh show, sure</td>
</tr>
<tr>
<td>g</td>
<td>gas, get</td>
<td>th thick, thin</td>
</tr>
<tr>
<td>gw</td>
<td>anguish, guava</td>
<td>ð father, thither</td>
</tr>
<tr>
<td>h</td>
<td>hat, hot</td>
<td>û mute, use</td>
</tr>
<tr>
<td>h or ð</td>
<td>Ger. ch, as in nicht, wacht</td>
<td></td>
</tr>
<tr>
<td>hw</td>
<td>what</td>
<td>û or ü but, us</td>
</tr>
<tr>
<td>i</td>
<td>file, ice</td>
<td>ý pull, put</td>
</tr>
<tr>
<td>i or ï</td>
<td>him, it</td>
<td>ü between u and e, as in Fr. sur, Ger. Müller</td>
</tr>
<tr>
<td>i</td>
<td>between e and i, mostly in Oriental final syllables, as Perid-ud-din</td>
<td></td>
</tr>
<tr>
<td>j</td>
<td>gem, genius</td>
<td>v of, very</td>
</tr>
<tr>
<td>kw</td>
<td>quaint, quite</td>
<td>y (consonantal) yes, young</td>
</tr>
<tr>
<td>ñ</td>
<td>Fr. nasal m or n, as in embonpoint, Jean, temps</td>
<td></td>
</tr>
</tbody>
</table>

'(prime)', *(secondary)* accents, to indicate syllabic stress
BULGARIA, bul-gär'ē-ə, a Balkan state, an independent kingdom of the Balkan Peninsula (q.v.), southeastern Europe. Bulgaria is bounded on the north by the Danube and Rumania; on the east by the Black Sea; on the south by Turkey and the Aegean Sea; and on the west by Serbia and Greece. Before the Balkan Wars (q.v.) in 1912-13 the estimated area of the country was 24,380 square miles, and of South Bulgaria (formerly Eastern Rumelia) 13,700 square miles, total 38,080 square miles. According to the census of 1900 the total population was 3,744,283; in 1906, 4,028,260; in 1910, 4,337,516. By the Treaty of London (30 May 1913) Bulgaria had gained a large amount of territory from Turkey, but being discontented with her share, she turned against her former allies (29 June 1913) and was severely defeated in the second Balkan War and in consequence lost much of what she had won. Rumania intervened and acquired about 2,900 square miles of territory. Bulgaria finally secured only about 10,000 square miles from Turkey, while she lost nearly 3,000 square miles of her own territory to Rumania, with a population of about 273,000. Balkan statistics, however, should be accepted with considerable reserve, as it is rare to find any two authorities in agreement. The most recent figures obtainable give the kingdom of Bulgaria an area of 43,320 square miles, and a total population of 4,607,000, made up of Bulgarians, Turks, Rumanians, Greeks, Serbs, Gypsies, Jews, Russians, Germans and other nationalities. Before 1913 Bulgaria was divided into 12 districts, Saint Zagora, Bourgas, Vidin, Philippopolis, Varna, Rustchuk, Tarnovo, Choumen, Pleven, Sofia, Rustendil and Vratza. The capital is Sofia (q.v.), with a population of 103,000; other chief towns are Philippopolis, Varna, Rustchuk, Slivno, Shumla and Plevna.

Soil, Climate, Industry.—The surface of Old Bulgaria is a gradually sloping plain, broken by occasional mountains, which give rise to rapid tributaries of the Danube. The Balkan Mountains or Stara Planina are described under Balkan Peninsula and Balkan Mountains. There is little mining, although the mountains are rich in minerals, iron, gold, silver, manganese and copper. The soil is excellent and the slopes of the mountains are richly wooded. The climate is healthy, and the country enjoys the reputation of possessing more centenarians than any other in Europe. People stated to be 105 to 125 years of age are not uncommon, though it is not improbable that such remarkable longevity may be due rather to unreliable records and memories than to any virtues of climate. Over 70 per cent of the people are engaged in agriculture and most of them own freehold plots on which they pay a small land tax, while they enjoy free rights over communal grazing and timber lands. A considerable quantity of grain, chiefly wheat, is exported; fruit and vegetables are raised in abundance; roses are largely cultivated for the production of the attar, which is exported at the value of $1,500,000 per annum. Wine is plentiful and cheap; silkworms are bred in some regions and tobacco forms an important crop. Stone quarries and government coal mines are in operation; domestic industries are chiefly carpets, hosiery, woolen and cotton goods and ribbons. The highways are still in a backward condition; most of the traffic is carried on by the rivers, and export trade by the Black Sea ports of Varna and Bourgas; passenger and merchant steamers run between Varna and Constantinople (150 miles). Rustchuk, Vidin and Sistova are the chief Danube ports. There is a railroad system of nearly 1,500 miles in the kingdom; Sofia is connected with the general European system, and several new lines are projected or are in course of construction, one to run from the Danube to the Aegean Sea. The National Bank of Bulgaria (capital, $4,000,000) has over 60 branches; there is also a State Agricultural Bank, and a French, a German and an Austrian bank. On 1 April 1916 Bulgaria abolished the Julian calendar (old style), which is 13 days behind ours, and adopted the Gregorian calendar. Statistics of 1914 showed the Bulgarian revenue as $51,399,000; in 1915, $55,135,975; expenditure, 1914, $51,352,520; in 1915, $53,078,240; national debt, 1915, $231,496,540. Imports, 1914, $44,586,860; exports, 1914, $28,813,372.

Government.—Bulgaria is a constitutional monarchy. Legislative authority is vested in the Sobranje, a national assembly consisting of only one chamber, to which members are elected at the rate of one representative to every 20,000 of the population. The members are paid for their services; elections are held every four years unless the Sobranje is dissolved by the King before the expiration of its term. With certain exceptions every man over 30 is eligible. For decisions concerning highly important matters of state the Sobranje is doubled by special election and resolved into a "Grand Sobranje." The cabinet is composed of
eight ministers appointed by the King; they hold the usual portfolios—premier, finance, war, etc.

Bulgaria

The national religion of Bulgaria is the same as that of the orthodox Greek Church, but it is independent of that body. Over 75% of the population belong to that faith; the remainder are Mohammedans, Jews, Roman Catholics, Protestants and Gregorian Armenians, whose ancestors seceded from the Greek Church in the 5th century. The University of Sofia is open to women as well as men; the state subsidizes education, which is obligatory and free to those who cannot pay for it. There are also Greek, Turkish, American, Jewish, French, Armenian and German schools, and education is further promoted by free libraries, museums and technical schools.

Military Service.—Despite its small population, Bulgaria possesses a large and efficient army. It gave a good account of itself in the Serbian War of 1885, and a still better one in the Balkan Wars. Recruiting is by conscription; Moslems are exempt on payment of a tax of $100 each. Every other Bulgarian subject is liable to 26 years' service, and the army is composed of many different races. Besides the pure-bred Bulgars, there are Turks, who cannot pay the tax, Pomakes (settlers and nomads), Jews ("Spanioles" and Poles), Serbs, Greeks, Kumanians, Armenians, Gypsies, Circassians, and naturalized Russians, Germans and Levantines. The army actually dates from January 1878. From 1389, when the Turks defeated the Slav allies, till 1878, the Bulgarians, as Christian subjects of Turkey, had been exempt from military service. The soldiers are well-trained, though hard-worked, and very particular attention is paid to their spiritual welfare. Should a regiment contain but one Jew and one Mohammedan, a rabbi and a dervish are provided. The barracks are comfortably built and equipped with appliances calculated to promote the health of the troops. Large mirrors and framed pictures adorn the walls; drunkenness is practically unknown, and little smoking is indulged in. The Bulgarian officer takes his profession seriously, working and drinking hard with dogged pertinacity and living within his income. The basis of the army's theoretical teaching and science is German; drill, ranks and names are Russian. The corps of reserve officers—about 3,000—is composed of merchants, lawyers, teachers, etc. There is a military academy at Sofia. The war strength of the army is considerably over 300,000. A few gunboats and about a dozen small steamers make up Bulgaria's floating strength.

History.—The Bulgarians were originally a Tartar nation, which in the 4th century settled on the Volga. The ruins of their former capital may still be seen in the neighborhood of Kazan. Their kingdom, which occupied a part of the Asiatic Sarmatia of the Greeks, was carved out by the Bulgars under Peter of Orenburg. They afterward removed to the countries between the Bug and the Danube and called their territories Second Bulgaria. The first Bulgarian kingdom south of the Danube was founded in the latter half of the 7th century, but the Bulgarians who established it were comparatively few in number, and after their adoption of Christianity in the 9th century they became completely mixed up with the Slavic inhabitants, though the whole became known as Bulgarians. The western ruler of this kingdom was Symeon (888-927), who subjugated the greater part of the peninsula and raised the Archbishop of Bulgaria to a position independent of the Patriarch of Constantinople. Under the son of Symeon his empire fell to pieces. The western half broke off and formed a separate kingdom with Ohrida in Macedonia for its capital; and the eastern portion was subdued by the Byzantine Emperor, John Zimisces, who reorganized it with the empire. The western Bulgarian kingdom existed only till about 1018, when it also was subdued by Basil II, "the slayer of the Bulgarians." Toward the end of the 12th century, however, the Bulgarians revolted and managed to establish a third kingdom between the Balkan range and the Danube, which, sometimes weak and sometimes powerful, continued to exist till the advent of the Turks. The last ruler of this kingdom was conquered by Bajazet I about 1390, and for nearly 500 years the Turks ruled supreme in Bulgaria. An account of the atrocities of the Turkish soldiers, an inscription broke out. Russia took the part of Bulgaria against Turkey, and the war of 1877-78 followed. (See BATAK). By the first article of the Treaty of Berlin, 13 July 1878, the principality of Bulgaria was constituted, made tributary to Turkey and placed under the suzerainty of the Sultan. In 1879, Alexander of Battenberg, a German prince, was chosen sovereign of part of Bulgaria, the rest being made a separate province, called Eastern Rumelia, to prevent Bulgaria from becoming a strong state. In 1885 there was a revolution in Eastern Rumelia, which annexed itself to Bulgaria.

The annexation of Eastern Rumelia led to a quarrel with Russia; Tsar Alexander III withdrew all Russian officers who had been training the Bulgarian army and were still serving in it. King Milan of Serbia considered the moment ripe to realize the territorial aspirations of his country and declared war on Bulgaria, 14 Nov. 1885. (See SERVICES, BULGARIAN WAR). After a short struggle, the Bulgarians were defeated but saved from extinction by the intervention of Austria. Russian and Bulgarian conspirators abducted Prince Alexander and set up a government under Russian tutelage. A counter-revolution, headed by Stambuloff (v.g.), succeeded in restoring the Prince within a few days. Unfortunately Alexander made a false move when he telegraphed to the Tsar and offered to resign his crown into Russian hands. This step turned Bulgarian opinion against him; he was compelled to abdicate and leave the country on 9 Sept. 1886. For 11 months Bulgaria remained without a ruler, its affairs being managed by a regency under the leadership of Stambuloff. This statesman, an innkeeper's son, was a rude, violent man, of uncouth manners and incoherent patriotism. He had been largely responsible for throwing off the Turkish yoke, and now fought strenuously to resist the aggression of Russia. The Russian candidate for the throne was rejected and a Prince of Denmark was proposed to whom it was offered, refused the honor. Stambuloff sent a commission round the Euro-
pean capitals to find a prince for the vacant post. Their choice eventually fell upon Prince Ferdinand of Saxe-Coburg-Gotha, son of Prince Augustus of Saxony, and a great-grandnephew of King Louis Philippe of France. At the time of his election (7 July 1887), Prince Ferdinand was 26 and an officer in the Austrian Hussars. The task that lay before him was difficult and the enterprise most precarious. Though he never achieved the popularly of his predecessor, the new Prince brought his undoubted ability and ambition to the regeneration of Bulgaria. Aided by Stambuloff, who, like Bismarck, was the master of his sovereign, Ferdinand produced order from chaos with an iron hand. None of the Powers would recognize him, and it took nine years before he succeeded in wearing down the antagonism of those within and without his domain. He cultivated the friendship of Turkey and Rumania and combated the Russian influence permeating Bulgaria. It would perhaps be more correct to ascribe the strong anti-Russian policy to Stambuloff rather than to the Prince; the former was the forter in re to the suaviter in modo of the latter. With but one purpose in mind, however—Stambuloff labored ruthlessly and mercilessly for a master whom he despised, whom he would neither flatter nor betray. Stambuloff cared nothing for the man; only for the nationality he represented. With Sery, self-sacrificing energy Stambuloff developed the resources of his country—railways, financial reform, education—creating an efficient army and fostering every type of commerce and industry. During the seven years that Prince Ferdinand and his Minister "worked together" their personal relations grew from bad to worse, developing into sincere hatred. By describing his conduct in an official communication as "infamous," Prince Ferdinand goaded Stambuloff into resignation in 1894. Stambuloff's request that he be permitted to visit a foreign health resort was refused. He made a public declaration that he would be murdered, and on 15 July 1895 his prognostication was fulfilled; he was murdered, and mutineers took the fortifications and deserted the presence of the police. One of his hands, which was cut off in the struggle, is said to be still preserved in his home, to be buried on the day when his murder is avenged.

From the moment of Stambuloff's resignation Prince Ferdinand took the reins into his own hands. For the next 10 years a succession of premiers wrestled with the chaotic finances of the country and the thorny question of Macedonia. Efforts were made to establish friendly relations with Russia and Austria. Prince Ferdinand's eldest son, Boris (b. 30 Jan. 1894) had been baptized a Roman Catholic, the religion of his parents; at the age of two he was rebaptized and received into the Orthodox Greek Church, the Tsar standing as his sponsor. Russia then recognized Prince Ferdinand, and the other Powers followed suit. The Ministry for Public Works in Stambuloff's last cabinet (1892-94) was a Bulgarian journalist, M. Petkoff, who had previously been mayor of Sofia. Wallis was talking with Stambuloff at the time the latter was murdered. In 1903 General Petroff became Premier, and Petkoff joined the cabinet as Minister of the Interior. On the resignation of General Petloff (5 Nov. 1906), M. Petkoff was called to the helm of Bulgarian affairs. He belonged to the party known as the Demokrat, a dissatisfied section of the Liberals, distinguished by its indelible hostility to Russian influence in the Balkans. Less than five months (11 March 1907) later, Petkoff was shot dead on the street by a dismissed employee of the Agricultural Bank. The accession of Count von Aehrenthal (q.v.) as Austrian Foreign Minister in October 1906 was destined profoundly to influence Balkan affairs, and especially those of Bulgaria. For many years Bulgaria had been begging the Powers to relieve her of the burden of the "Capitulations," a relic of Turkish rule. According to these rules, a foreign subject could not be arrested except in the presence of a kavass, dragoman or some other consular official, or tried without similar supervision. Practically all the other Powers had signified their readiness to abolish the Capitulations if consent thereto could be obtained from every one of them. Austria-Hungary, however, had hitherto always objected to any change. Within a month of taking office, Count von Aehrenthal rendered the Tsar of Bulgaria, which cost Austria nothing and yet laid the principality under a great obligation. By this simple stroke the dual monarchy assured to itself the warm sympathy of Bulgaria to an extent long absent from their relations. For 10 years it had been the policy of Count Goluchowski (Aehrenthal's predecessor) to play off the Slav against the non-Slav Balkan States, e.g., Greece and Rumania against Bulgaria and Serbia, inclining toward the former and treating the latter in a magisterial manner that aroused bitter resentment. Austria's "graceful concession" paved the way for two important events profitable to both parties. Having gained the goodwill of Bulgaria, Austro-Hungary, despite the fierce opposition of Serbia, to Prince Ferdinand, the removal of the Capitulations was the first step toward the realization of his larger policy—complete independence from Turkey in the Balkans, and a royal crown. In September 1908, Prince Ferdinand was received with royal honors at Budapest; 12 days later (5 October) Bulgarian independence was proclaimed and the Prince took the title of Tsar of Bulgaria; two days later Emperor Francis Joseph issued a proclamation that Austro-Hungarian sovereignty was extended to Bosnia and Herzegovina. The moment was well chosen; the Young Turk revolution had just achieved its object; the Committee of Union and Progress ruled in Constantinople, and there seemed every prospect of Turkey becoming a united and enlightened nation, strong to reassert her claims on Bosnia-Herzegovina and suzerainty over Bulgaria. Shadowy indeed those claims were, for public opinion in western Europe had long ceased to consider them valid. The fact that Tarnovo (Tnovo) was chosen as the scene of the proclamation of the re-establishment of the Bulgarian kingdom added to the dramatic interest of the situation, for no portion of the Bulgarian soil is so intimately associated with the most stirring events of the national history. The church of the Forty Martyrs, wherein the Prince read the proclamation, was built in 1230.
by John Asen, "Tsar and Autocrat of the Bulgarians," whose inscription on one of the pillars reads: "I smote the Greek army . . . and all lands have I conquered, from Adri- anople to Durazzo, from Rumania to the Servian land." Here the Bulgarian Tsars were crowned and buried, and many inscriptions of those times still adorn the walls. Turkey claimed $24,000,000 as compensation; Bulgaria offered $7,600,000. An agreement was arrived at through the intermediary of Russia, who advanced most of the money; in April 1909, the Powers recognized Bulgaria as an independent, sovereign state.

The next important event in the history of Bulgaria was the formation of the Balkan League (q.v.) and the Balkan Wars in 1912 and 1913. However much Bulgaria was to blame for the second war, the Treaty of Bucharest (10 Aug. 1913), imposed upon her by Serbia, Montenegro, Rumania and Greece, was a colossal blunder on the part of those who dictated it. It left Bulgaria sullen and dissatisfied, and robbed her of the fruits of her early victories. She failed to receive any part of that district of Macedonia inhabited chiefly by Bulgarians. Serbia had obtained her spoils, and Rumania had rectified her frontier at Bulgaria's expense. This legitimate grievance was destined to affect the course of the great European War (q.v.) that broke out a year later. The sympathies of Rumania were with the Allies, but she could not enter the war without an understanding with Bulgaria. On behalf of Greece, M. Venizelos had promised the support of his country to Great Britain and France if the necessity should arise. In a communication to King Constantine (11 Jan. 1915) he pointed out that, if Greece allowed Serbia to be crushed to-day . . . we should have to submit to the disturbance of the Balkan equilibrium in favor of Bulgaria, who, thus strengthened, would either now or some time hence be in a position to attack us, when we should be entirely without either a friend or an ally." He proposed to make "adequate concessions" to Bulgaria; but he confessed, "on account of Bulgaria's greed, it is not at all certain that whatever can be done shall be able to satisfy her . . ." There was every indication that Bulgaria might have been won for the Allies had her price been paid, as her most distinguished generals favored a Russian alliance; but nothing was done to conciliate her. The Bulgarian Premier, M. Radoslavoff, declared in July and again in August that Bulgaria was prepared to enter the war as soon as she received the necessary guarantees. But the Russian disaster in the Carpathians and the failure of the Dardanelles campaign persuaded King Ferdinand that by joining Germany and Austria he would be on the winning side. A secret treaty was signed about 17 July 1915 between Bulgaria, Germany, Austria and Turkey. Bulgaria was promised help from the Triple Alliance in the event of Serbian Macedonia with Salonica and Epirus thrown in. During September began the Austro-German advance that was to deal the final blow to Serbia. On the 21st M. Venizelos asked the Allies for 150,000 men; they were promised on the 24th, and Greece began mobilizing. Bulgaria was also mobilizing; a deputation of ex-ministers waited on the King and warned him against joining the Central Powers. Serbia proposed on the 27th to attack Bulgaria, as the presence of German and Austrian officers in Sofia looked suspicious, but Great Britain opposed the plan, apparently the Albanians, and the Bulgarian declaration of "armed neutrality." Had the Serbians not counted till the last moment on Greece fulfilling her treaty obligations, it is probable that they would have disregarded the British advice. On the 3d of October the Russian government addressed a note to Bulgaria declaring that there was no longer any doubt as to the object of the present military preparations, and the Russian Minister was instructed to leave Sofia if the Bulgarian government did not "openly break with the enemies of the Slav cause and of Russia within 24 hours by sending away the officers belonging to the armies of states who are at war with the Powers of the Entente. An unsatisfactory reply led to a rupture of diplomatic relations, and Bulgaria formally entered the conflict on 5 Oct. 1915. On the 19th an imperial manifesto issued in Petrograd stated that "the Bulgarian troops have attacked our loyal ally Serbia, already bleeding in a struggle against a stronger enemy."  

Bibliography.— Abadie,  C.,  "Die Handelspolitik Bulgariens" (Munich 1910); Andrassy,  J.,  "La Bulgarie et la guerre générale" (Budapest 1916); Anon.,  "Ferdinand of Bulgaria: the amazing career of?" (London 1916); Anon.,  "Nationalism and War in the Near East" (Oxford 1915); Baker, Valentine (Pasha),  "War in Bulgaria" (London 1879);  "Balkanics" (pseud.),  "The Aspirations of Bulgaria," translated from the Serbian (London 1915);  "Barkeley,  H. C.,  "Between the Danube and the Black Sea: or, Five Years in Bulgaria" (London 1876), and "Bulgaria before the War" (London 1877); Beanam, H.,  "M. Stambuloff" (London 1895); Blanqui, J. A.,  "Voyage en Bulgarie pendant l'année 1841" (Paris 1843);  "Bousquet,  G.,  "Histoire du peuple Bulgare" (Paris 1909);  "Brailsford,  H. N.,  "Macedonia: its races and their future" (London 1906);  Buelens,  P.,  "La Bulgarie contemporaine" (Brussels 1905);  "Bulgaria of To-Day: official edition of the Bulgarische Nachrichten, trade and agriculture (London 1907);  "Calary de Lamaziere,  R.,  "Les Capitulations en Bulgarie" (Paris 1905);  "Caleb,  A.,  "La Bulgarie et le traité de Berlin" (Geneva 1909);  "Cambon,  V.,  "Autour des Balkans" (Paris 1880);  "Chamier,  A.,  "La Bulgarie: étude d'histoire diplomatique" (Paris 1909);  "Cheot,  count A. P. de,  "Étude sur la guerre Bulgaro-Serbe" (Paris 1891);  "Curtis,  W. E.,  "The Lost Provinces of Turkey" (Chicago 1903);  "Dicey,  E.,  "The Peaceable State: Bulgarie en 1894" (London 1894);  "Drander,  A. G.,  "Evénements politiques en Bulgarie" (Paris 1896), and  "Cinq ans de règne: le prince Alexandre de Battenberg en Bulgarie" (Paris 1884);  "Dupuy-Peyou,  L. L.,  "La Bulgarie aux Bulgares" (Paris 1896);  "Economie de l'Empire en Europe" (London 1908);  "Falkenegg,  Baron von,  "Bulgarien, Vergangenheit und Gegenwart" (Berlin 1900);  "Floeriricke,  K.,  "Geschichte der Bulgaren" (Stuttgart 1913);  "Forbes,  Toynbee,  Mitran, and Hogarth,  "The Balkan: a history of Bulgaria," etc. (Oxford 1913);  "Freudenthal,  E.,  "Bulgaria" (London 1915);  "Gladstone,  W. E.,  "Lessons in massacre: or, the conduct of the Turkish government in and about Bulgaria"
since May, 1876 (London 1877); Gubernatis, Comte de, 'Le Bulgarie et les Bulgares' (Florence 1889); Guechoff, J. E., 'The Politics of the Balkan League' (London 1892); H. G. F. G. J. P. Histoire de la Bulgarie (Paris 1912); Herbert, W. V., 'By-Paths in the Balkans' (London 1906); and 'The Chronicles of a Virgin Fortress, being some unrecorded chapters of Turkish and Bulgarian history' (London 1896); Hilferding, A. F., 'Geschichte der Serben und Bulgaren' (Bautzen 1864); Huhn, Maj. A. von, 'The Struggle of the Balkans for National Independence under Prince Alexander' (London 1888); Huyshe, W., 'The Liberation of Bulgaria: war notes in 1877' (London 1894); Jirecek, C. J., 'Gesichte der Bulgaren' (Prague 1876), and 'Das Fuerstenthum Bulgarien' (Prague 1891); Kizmitz, F. P., 'Donau-Bulgarien und der Balkan' (Leipzig 1882); Kaeznecz, N., 'Greeks and Bulgarians in the 20th Century' (London 1907); Koch, A., 'Prince Alexander of Battenberg: reminiscences of his reign in Bulgaria' (London 1887); Lamouchie, L., 'La Bulgarie dans le passé et le présent' (Paris 1892); Landemont, Comte A., 'L'élan d'un peuple à travers le traité de Londres 1886-1913' (Paris 1914); Leger, L., 'La Bulgarie' (Paris 1885); Launay, L. de, 'La Bulgarie d'hier et de demain' (Paris 1912); MacDonald, J., 'Czar Ferdinand and his People' (New York 1913); Macfee, R. A., 'With gypsies in the Balkans' (Liverpool 1913); MacGahan, A., 'The Turkish Atrocities in Bulgaria' (London 1876); Mach, R. von, 'The Bulgarian Exarchate' (London 1907); Mahoney, P. C., 'Bulgaria and the Powers' (Dublin 1915); Miklosich, F., 'Vergleichende Grammatik der bulgarischen Sprache' (Vienna 1879); Miller, W., 'Travels and Politics in the Near East' (London 1898); and 'The Balkans' (New York 1898); Moeller, R., 'Der Serbisch-Bulgarische Krieg 1885' (Hanover 1891); Moltke, 'The Russo-Bulgaria and Rumelia, in 1828 and 1829' (London 1854); Monroe, W. S., 'Bulgaria and her People' (Boston 1914); Moore, F., 'The Balkan Trail' (New York 1906); Morris, W. R., 'Grammar of the Bulgarian Language' (London 1897); Murray, W. S., 'Languages of the States' (London 1910); Muzet, A., 'Aux pays Balkaniques' (Paris 1912); Pears, Sir E., 'Fifty years in Constantinople' (London 1916); Price, W. H. C., 'Light on the Balkan Darkness' (London 1915); Pypin and Spasovitch, 'History of the Slavonic Literature' (Paris 1881); Report of the International Commission to inquire into the causes and conduct of the Balkan War' (Washington 1914); Rualand, W., 'Auszug der bulgarischen Geschichte' (Berlin 1912); St. Clair, S. G., and Brophy, C. A., 'A Residence in Bulgaria' (London 1900); Schurman, 'The Balkan War' (Princeton 1915); Sembler, B., 'Les Roumains et les Bulgares: le traité de Bucarest' (Paris 1914); Stoyanoff, Z., 'Autobiography of a Bulgarian Insurgent' (London 1913); Strauss, A., 'Die Bulgaren' (Leipzig 1898); Toulou, F., 'Reisen und geologische Untersuchungen in Bulgarien' (Vienna 1890); Vymazal, F., 'Die Bulgarische Sprache schnell und leicht zu erlernen' (Vienna 1888); Ward, Capt. M. C., 'Handbook of the Armies of the British Empire' (Office, London 1900); Wiesner, A. K., 'Aus Serbien und Bulgarien' (Leipzig); Woods, H. C., 'The Danger Zone of Europe' (London 1911); also, 'Washed by Four Seas' (London 1908); See also bibliography under BALKAN PENINSULA AND BALKAN WARS.

HENRI F. KLEIN.
Editorial Staff of The Americas.

BULGARIAN LANGUAGE AND LITERATURE. Bulgaria and the adjacent districts of Macedonia are considered to have been the cradle of the old Slavic languages. The ancient Bulgarian language was the richest of them all, and was the scriptural language of the Greek-Slavic Church and the great medium of ecclesiastical literature in the ancient Slavic lands. The Russian language is said to have been molded by missionaries of the Greek Church sent from Bulgaria after the tenth century, while the future empire was still in a state of semi-barbarism. The Russian tongue has preserved many inflections which the Bulgarian has lost. After the overthrow of the Bulgarian kingdom at the end of the tenth century, the grammatical structure and purity of the language became impaired by mixture with the Wallachian, Albanian, Rumanian, Turco-Tartar and Greek vernaculars; and the modern Bulgarian language has only the nominative and vocative of the old Slavic case, and the rest being supplied by prepositions. It has an article, which is put after the word it qualifies, like that of the Albanians and Wallachians. Among ancient Bulgarian ecclesiastical literature must be mentioned the translations of the Bible by Cyril and Methodius, and the writings of John of Bulgaria in the 10th century. Grammars of the Bulgarian language have been published by Neofyt in 1835 and by Christiaki in the following year. Venelin, a young Russian scholar, sent to Bulgaria by the Russian archæographical commission, published in 1837 a grammar and two volumes of a history of the Bulgarians, but died while he was engaged in preparing a third volume. A new grammar was given to the public by Bobojev in 1845, and finally, in 1849, by the Rev. E. Riggs, an American missionary stationed at Smyrna, who also sent a Bulgarian translation of Gallaudet's 'Child's Book on the Soul' to New York. Dictionaries of the Bulgarian language have been compiled by Neofyt Rilski, who also published a work on education, and Stojanowicz. A Bulgarian version of the New Testament was printed at Smyrna in 1840 for the British and Foreign Bible Society. The Bulgarian national songs are numerous, and are similar to those of the Serbians. Gorokhovsky's collection of Slavic songs contains a number of Bulgarian songs. Bobojev has published several historical poems. Among more recent writers the poet Christo Boteff (d. 1876), who exercised a powerful influence on the national spirit, is regarded as one of the greatest poets Bulgaria has produced; while the poet-novelist Ivan Vazoff is the most popular author to-day. He is also a dramatist and was at one time a soldier and a revolutionary. His best works were written during the years of his exile in
BULGARIA

— BULKELEY

Russia and Rumania. Many are translated into English and other languages. Ivan Vaiikoff depicts peasant life and writes psychological romances; Mikhailov is a brilliant political journalist, a mystical poet and a satirist of French education; Aleko Constantinov was a lawyer, literary critic and translator of French and Russian masterpieces, and a humorist of a high order. Perhaps the greatest literary artist of all was Pencho Slaveikov, philosopher, poet and revolutionist, who died in 1912 by the hand of an assassin. Competent critics have designated him "the Bulgarian Shakespeare" on account of his beautiful language and deep insight into the mysteries of the soul. His mantle fell on the shoulders of Petko Toddoroff, dramatist, poet and philosopher. Velitchkov translated from Shakespeare, Molière and Dante; he fought against the Turks in his younger days and later held a government position. Tserkovsky is to Bulgaria what Burns was to Scotland, the bard of the peasantry. Among the younger poets there are P. Yavorov, K. Christoff, C. Botef and A. Strashimirov; the last is intensely national in the spirit of their works. Bulgaria can also boast of a number of writers in other spheres. In history, law, philosophy and economics, V. Zlatarsky, M. Danev, the well-known statesman, S. Radev and Stepan Botchev; D. Ivanoff is the Tolstoy of the Bulgarian short story and has all the grim realism of the Russian master. In the scientific field are Ivan Georgoff, D. Michalcitch, F. Neukov, G. Botchev and Stepan Petkov. Literary criticism has its representatives in B. Pennaf, Balabanoff, Kristeff and Ivan Shishmanoff. There are several literary societies and important reviews dealing with all aspects of human culture.

Bibliography.—See also under Bulgaria.

— Constantinoov, A., 'Bai Gano' (Paris 1911);
Dorov, L., 'Chas Simeonov bulgares' (Paris 1875);
Leskien, A., 'Handbuch der albulgariischen Sprache' (Weimar 1886);
Milaschitch, F., 'Vergleichende Grammatik der Bulgarischen Sprache' (Vienna 1879);
Miladinoff Brothers, 'Philologische Pro-Song' (Agram 1861);
Miletitch, L., 'Starobulgarska Grammatika' (Sofia 1896);
Monroe, W. S., 'Bulgaria and Her People' (Boston 1914—an excellent, comprehensive work);
Morrill, W. R., 'Grammar of the Bulgarian Language' (London 1897);
Pye and Stanovitch, 'History of the Slavonic Literature' (Paris 1881);
Slaveikoff, P., 'The Shade of the Balkans' (London 1904);
Stauss, A., 'Bulgariische Volksdichtungen' (Vienna 1895);
Teodoroff, 'Bulgarija Literatura' (Philippines 1912);
Vazoff and Velitchkov, 'Bulgarischer Chrestomathie' (Philippines 1884);
Vazoff, I., 'Under the Yoke' (London 1912);
Vymazal, F., 'Bulgarisch' (Hartleben's Bibliothek der Sprachkunde, Vienna 1888);
Winlow, Clara, 'Our Little Bulgaria' (Boston 1913);
'World's Best Literature,' Vol. 24 (New York 1897).

HENRY F. KLEIN,
Editorial Staff of The Americana.

BULGARIAN, bol-gair-in, Raddi Venediktovich, Russian author: b. Minsk 1789; d. 13 Sept. 1839. He served in the Russian army, but, finding himself neglected, in 1810 joined Napoleon. In 1812 he returned to Saint Petersburg where his writings attracted no-
tice by their intense satire and servility. In 1825 he started the Severnyaja Pchela (Northern Bee), a daily paper, which for long was alone permitted to discuss political questions. A zealous supporter of reaction and of absolutism, he enjoyed, through relations with the secret police, an unlimited power. He was a witty and versatile author who lived in travel, histories, novels and statistical works, even signing his own name to the work of N. A. Ivanoff, professor at Dorpat.

BULGARIS, bool-gair-ez, Demetrios, Greek statesman: b. Hydra 1803; d. Athens, 11 Jan. 1878. While a young man he held office in his native city and agor, and his most notable act was the Grecian war for independence. In 1831, after the downfall of Cape d'Istria, he had charge of the administration of the Department of Marine, but on the accession of King Otho he retired from office. After the revolution of 1843 he was a member of the Senate, and from 1848 to 1849 was Minister of Finance in the cabinet of Canaris. During the Crimean War he was at the head of the cabinet and as Minister of the Interior put an end to internal disorder and conciliated the Powers when he resigned and entered the Senate as a leader of the opposition. At the outbreak of the revolution of 1862 he was made regent and chose Canaris and Rufos as his colleagues, but was deposited by the former. In 1865, 1872 and 1874-75 he was again at the head of the cabinet.

BULGARUS, Italian jurist: b. Bologna in the 11th century; d. 1166. He lived to a great age and was one of the trusted advisers of Emperor Frederick I. He was one of the famous group of writers known as the Four Doctors of Bologna, and his work, the Sex. Legum, is a legal commentary, 'De Regulis Juris.' It was edited at Bonn (1856) by F. G. C. Bechhaus.

BULGURU, Mount, on the Asiatic side of the Bosphorus, rises over Skutari to a height of 850 feet. From the summit a magnificent view may be obtained of Constantinople, the Bosphorus, the Sea of Marmora, the valleys of Thrace and the valleys and mountains of central Asia Minor. Most of the ascent can be made in an hour by carriage. An imperial kiosk near the summit was built in 1660 by Muhammad IV.

BULIMIA, a disease characterized by insatiable hunger. Persons suffering from this disorder are never satisfied. When the stomach is surfeited they throw off the food they have taken, half-digested, and with violent pain. It frequently occurs in the insane, in cases of paresis, and usually appears, as a concomitant of other diseases, as certain intermittent fevers and diseases of the stomach and bowels, particularly such as are produced by the tapeworm.

BULIMUS, a genus of land-snails of the family Helicidae, the species of which are mainly restricted to South America, especially Peru, Ecuador and Bolivia. Some of the species are very large, as are also their eggs, those of B. oblongus being about the size of a sparrow's. There is an egg of another species in the British Museum which measures exactly one and three-fourths inches in length.

BULKLEY, Morgan Gardner, American politician: b. East Haddam, Conn., 26 Dec. 1837. At the age of 15 he entered a mercantile
house in Brooklyn, N. Y., and in a few years became a partner in it. When the Civil War broke out he went to the front as a private in the 31st New York regiment, and served during the McClellan-Peninsula campaign under General Mansfield at Suffolk, Va. In 1872 he came to Hartford, organized and became president of the United States Bank in that city, and later (1879) was elected president of the Zeta Life Insurance Company, a position he has held for 30 years. He has been a prominent figure in local and State politics. He was four times elected mayor of Hartford (1880-88), and in 1889 was elected governor. At the State election in November 1890, in the first gubernatorial election under the new secret ballot law, the Democratic ticket received a considerable plurality over the Republican, but a majority being necessary to elect, there was some doubt whether there had been a choice by the people for governor or treasurer. Accordingly the matter went before the general assembly, which met in January 1891, and in which the Republicans had a majority of four on joint ballot, the senate being Democratic. A bill was introduced that the assembly adopted, the senate claiming the election of the recent Democratic candidates and refusing to recognize in any manner Governor Bulkeley and the other hold-over Republican officials. The matter was finally settled on 3 Jan. 1892, when the State Supreme Court, in the quo warranto suit brought against Governor Bulkeley by the Democratic candidate for governor, found "Morgan G. Bulkeley to be governor, both de facto and de jure," and his right to hold over till both houses of the general assembly should unite in declaring the election of his successor was affirmed. As the two houses could not agree, the governor remained in office for another full term. In November 1892 the Democratic ticket swept the State. He was United States Senator from 1905 to 1911. Governor Bulkeley has since, as chairman of the Connecticut highway and bridge commission, interested himself earnestly in trying to procure a fine stone bridge across the Connecticut at Hartford.

BULKELEY, Peter, American colonist and clergyman: b. Bedfordshire, England, 31 Jan. 1583; d. Concord, Mass., 9 March 1659. He was educated at Cambridge, and for 21 years was rector of a Bedfordshire parish. Being removed from this by Archbishop Laud, for non-conformity, he left England and became the first minister at Concord, in the colony of Massachusetts, of which famous town he was the chief founder. He was the author of some Latin poems, which are contained in Cotton Mather's 'History of New England'; also of some English verse and of a theological treatise, 'The Gospel Covenant Opened,' published in London in 1646. He was as remarkable for his benevolence and kind dealings as for the strictness of his virtues. Consult Tytler's 'History of American Literature' (New York 1878); Mather's 'Magnalia' (London 1702), and an article, 'Life and Times of Rev. Peter Bulkeley,' in the 'New England Historical and Genealogical Register' (Vol. XXXI, Boston 1877).

BULKHEAD, the name given to a variety of forms of partition. In its nautical sense a bulkhead is a wall or partition extending across the ship for the purpose of dividing the hold into compartments, for separating classes of merchandise, for strengthening the vessel, or more especially for containing water which may leak in to the compartment in which the breach occurs. In large vessels longitudinal bulkheads are employed, as well as those running athwartships, and communications between the compartments are maintained by means of doors which can be instantly closed in case of accident and for the purpose of maintaining forced draught. One of the most important bulkheads in a ship is the one farthest forward, which is built with great strength, being designed to withstand the shock of ramming and confining the damage to a small portion of the vessel. It is hence known as the collision bulkhead. Another form of bulkhead is a strong framework used in the construction of tunnels, to prevent the irruption of water, quicksand, etc., into the workings. The term is also applied to the facing (generally of timber) that supports the sea-wall of a harbor, and somewhat illogically to the sloping flap doors often used to cover the exit of a dwelling-house cellar. See SHIP-BUILDING.

BULKELEY, Lucius Duncan, American physician and author: b. New York, 12 Jan. 1845. He studied at Yale University and at the College of Physicians and Surgeons, and took courses in dermatology in Europe. He became attending and later consulting physician and dermatologist in various New York City hospitals. Among his works are 'Acne and Its Treatment' (1885); 'Syphilis in the Innocent' (1889); 'Manual of Diseases of the Skin' (1898); 'Eczema and Its Treatment' (1901); 'Compendium of the Diseases of the Skin' (1912); 'Diet and Hygiene and Diseases of the Skin' (1913); 'Cancer, Its Cause and Treatment' (1915).

BULL, Charles Stedman, American physician: b. New York 1846; d. there, 17 April 1911. He was graduated from Columbia College in 1864, and at the College of Physicians and Surgeons in 1868. He was physician and surgeon at Bellevue Hospital, New York, and later studied in Vienna, Heidelberg, Berlin, Utrecht, Paris and London, and was a pupil of Von Arlt, Graefe and Donders. He was surgeon to the New York Eye and Ear Infirmary, consulting ophthalmic surgeon to Saint Luke's and Presbyterian hospitals, and Saint Mary's Hospital for Children. He was professor of ophthalmology in Cornell University and ranked among the greatest oculists of his time. He became president of the American Ophthalmological Society in 1903-07. He wrote 'Eye Defects Which May Cause Apparent Mental Dunness and Deficiency in Children' (1901); 'Tuberculosis of the Eye' (1900); both in the 'Transactions' of the New York Academy of Medicine; 'Vascular Tumors of the Orbit' (1900), and other articles on his specialty in the 'Transactions' of the American Ophthalmological Society, the 'Medical News' and 'Medical Record.'

BULL, George Joseph, Canadian ophthalmic surgeon: b. Hamilton, Ontario, 16 Feb. 1848; d. 1911. He graduated at McGill University in 1869, studied in Paris, and began the
practice of medicine in Montreal, devoting himself especially to diseases of the eye. He made his residence in Paris in 1886, and won celebrity as an expert in ophthalmic subjects. He wrote "Ophthalmia and Optometry," and many similar works.

BULL, John, English musician: b. Somersetshire, about 1563; d. Antwerp, 12 March 1628. He was appointed organist in the Queen's Chapel in 1591; first music lecturer at Gresham College in 1596; and organist to James I in 1607. A Catholic, he fled beyond the seas in 1613, and entered the archduke's service. In 1617 he became organist at Antwerp Cathedral. Little of his music has been printed. The claim advanced for his authorship of "God Save the King," is unfounded.

BULL, John, the popular personification for the English nation. Its origin is obscure. Its first literary use appears to have been in Arbuthnot's famous "History of John Bull," written in ridicule of the Duke of Marlborough. The name is also used for an Englishman.

BULL, Ole Bornemann, Norwegian violinst: b. Bergen, 5 Feb. 1810; d. near there, 17 Aug. 1880. He went to Cassel in 1829, where for a short time he studied under Spohr, returning later to Bergen. He went to Paris in 1831, where at first he met with little success, being robbed of his few belongings, including his violin. His attempt at suicide at this time secured him a patroness, Mme. Villeminot, who provided him with a Guarneri instrument. He secured great triumphs both there and in Europe and in America by his remarkable playing, which won for him a distinct and unique position in the musical world as a virtuoso of extraordinary talent and a master of the violin. He overcame serious discouragements in preparing for his career, throughout which public interest and admiration were no less awakened by his manliness and grace of bearing than by his skill as a musician. At his debut (Paris 1833) he was honored by the presence of Paganini, and that marked his witness to the young aspirants for triumph. Bull afterward studied and turned to good account the method of Pagini. In business life he met with various successes and reverses. He lost all his money in a scheme to found a colony of his countrymen in Pennsylvania, and had to take to his violin to repair his broken fortunes. He afterward married in this country, settled at Cambridge, Mass., and retained a summer residence in Norway. He built a national theatre in Bergen and soon became involved in quarrels with the authorities. Consult "Ole Bull: A Memoir" by Sara C. Bull (Boston 1883), and the Norwegian biography by O. Vik (Bergen 1890).

BULL (Lat. bulla, a knob, boss), a seal, usually of lead, appended to state documents to prove their authenticity. Such seals were used by the Roman Emperors, and by various monarchs during the Middle Ages. They finally went out of use in the northern countries but were retained in southern Europe where wax seals did not keep well. In form, the bull resembled a coin, being round with an inscription on each face. The best known seal of this type is the papal bull (q.v.).

BULL, a ludicrous speech in which the ideas combined are totally incongruous or contradictory. A good example is Artemus Ward's saying of Jefferson Davis that "It would have been money in Jefferson Davis's pocket if he had never been born."

BULL, Golden. See GOLDEN BULL.

BULL, Papal, an authoritative letter issued by the Roman pontiff acting in his official capacity as head of the Church. A Papal Brief is also an official letter of the pontiff of a less formal and weighty character, and differs in sundry particulars from the Bull, especially in its seal. The seal of the Bull, from which comes the name of the instrument, is a bulla or globular mass of lead on which is impressed the name of the reigning Pope, also those of Saints Peter and Paul, abbreviated, S. Pe, S. Pa. The material of the Bull is parchment, but of the Brief, white paper; and the seal of the Brief is of red wax, stamped with the Fisherman's Ring, which gives the impress of Saint Peter in a boat, fishing. There are other peculiarities in matter and manner distinguishing the Bull from the Brief, but it suffices to note the foregoing. Of Papal Bulls that have played a signal part in Church, ecclesiastical or civil, especially worthy of mention are the Bull "Clerici laicos" (1296) of Boniface VIII by which the French clergy were forbidden to pay taxes to King Philip the Fair unless these were approved by the Pope; the Bull "Exsurge Domine" of Leo X against Martin Luther (1520); the Bull "In Coena Domini" against heretics and fautors of heresy, dating from the 15th century, but re-enforced by Pius V in 1571 and ordered to be publicly read in all parish churches yearly on Holy Thursday; the Bull "Unigenitus" (1713) against quietism and Jansenism; the Bull "Dominus ac Redemptor," of Clement XIV, abolishing the Jesuit order (1773), and the Bull "Pastor aeternus" (1870), which defined papal infallibility. The most complete collection of papal bulls is that by Cosquinelles, Barberi and Gaude (28 folio vols., 1739-44 et seq.). There are several general or special collections. Consult Giry, "Manuel de diplomatique" (Paris 1894).

BULL AND COW, the names given by English speaking races from time immemorial to the male and female respectively of bovine cattle. The words are probably imitative, the root-idea of *bull* being a suggestion of its bellowing; while *cow*—which in early English, as still in Scotch and some provincial dialects, is pronounced *coo*—is imitative of the lowing call to the calf. Since these animals have become domesticated, and most of the males have been castrated, the term has come to mean more particularly an uncastrated ox. On the other hand, the large size and robust qualities of the bull have led to a transference of the term to the males of various other animals having no zoological resemblance, or very little, to the cattle. Thus we speak of "bull and cow" elephants, moose, swine, pigs, seals, walruses and even alligators; while various animals, as the bullsnake, take the name as expressive of some bull-like quality, as a habit of snorting, or because of horn-like appendages (for example, bullhead catfish).
BULL-BAITING, the sport of setting dogs on a bull, which was tied to a stake and torn to death for the amusement of the spectators. In this case the dogs, which were set upon the bull singly, were trained to seize the bull by the muzzle, technically, *to pin* the bull; but they were very frequently tossed on the horns of the animal, using a bridle so the bull was allowed to run loose in the arena, and then several dogs were set upon him at once. Bull-baiting was a favorite sport in England till about the time of George IV.

**BULL-DOG,** a dog of moderate size, derived previous to the 13th century, from a cross between the old British mastiff and the large pug of extreme southeast Asia. Both its ancestors still exist as separate breeds. An average mature specimen will weigh 40 to 50 pounds. They are squat and muscular in build, with short legs, rather higher behind than in the front, especially if the front legs are very much bowed. Their chests and heads are abnormally broad for their size. The lower jaw overlaps the upper and is of extraordinary strength. The head parts with a large nose, and very strongly fixed in the jawbone, giving the dog a holding power beyond that of any other breed. The coat is close and short. The most variable feature is the color, which ranges from all black to all white among dogs bred for show purposes, but a brindle is more natural. For many centuries this dog was used for *baiting,* or biting at, the bull, as a popular recreation; and up to more recent times men of brutal disposition used it for public dog-fights. It was through these exhibitions that the bull-dog got his bad name for temper, but now he is mainly kept as a watchdog. In that capacity he is invaluable, and so gentle is his disposition that he is the safest canine companion for children. About the year 1800 a small variety of the bull-dog was evolved in the neighborhood of Brussels, but as it was first shown in Paris it has always been known as the *French* bull-dog. It is in the main a miniature of the English bull-dog. The difference, other than that of size, being that the ears are shaped like those of a bat, and are carried erect, or *pricked,* giving the animal a very alert, sharp look.

**BULL-FIGHT,** a contest between men and bulls, conducted as a public spectacle. Once popular in Greece and Rome, this form of entertainment was introduced by the Moors into Spain and universally adopted in the cities of the kingdom, where, as well as in Mexico and some other parts of the world, it is still much in favor. The bull-fight is held in an arena of greater or less magnificence, called in Spanish the *plaza de toros,* a vast open space, open to the sky, and surrounded by seats. The bull is turned out one by one, with many forms of pomp and solemn ceremonial, into the open space, where they are assailed, first by horsemen, called *picadores,* who attack them with the lance; then, with long lances, with short lances, and one or more men have met with injury or perilous mishap—in which case a crowd of active footmen, called *chulos,* provided with crimson banners, take off the attention of the bull—the *banderilleros,* armed with sharp-barbed sticks with barbs on the blade. Should they strike him to them, worry the bull until he is covered with shafts, bleeding and scorched and his glossy hide becomes black and crisp from the explosion of the fire-works. Then comes the last act of the tragedy, when the skilful *matador* enters the arena slowly and alone, clothed in plain black and armed with a long, straight sword and a stick, called a *muleta,* with a piece of red silk fastened to it. With his sword he seldom fails to give the *coup de grâce* to the tortured bull, sheathing the blade, with one sure thrust, up to the hilt in his body just at the juncture of the neck and spine. Mules drag out the slaughtered carcass, amid the sound of trumpets and acclamations of the spectators; the dead or dying horses are removed, the arena is strewed with fresh sawdust, another bull is introduced, and so goes on the combat, until perhaps a dozen bulls and a larger number of horses have been slaughtered to delight the spectators. About 1,300 bulls and 6,000 horses are sacrificed annually in Spain to this sport. The Spanish settlers of Mexico and South America introduced bull-fighting to the New World. Consult Sancho, *Machuquito y el remenimiento del toro* (Madrid 1806).

**BULL-FROG,** a widely distributed amphibious North American frog (*Rana catesbeiana*) found in sluggish waters throughout the eastern half of the United States and Canada, and so called because of its loud, bass voice. It is from five to eight inches long, and of various shades of green, with the legs spotted. It lays its eggs in strings and the tadpole does not reach maturity until two years old. The same name is given by English-speaking people in various parts of the world to other large bellowing frogs, as the *bullfrog* of Siam and Malaya (*Caluwia pulchra*). See *Frog.*

**BULL MOOSE,** a name applied to Theodore Roosevelt in 1912 and arising from his remark, *I feel as fit as a bull moose.* Through constant use of this animal's figure by the cartoonists in connection with Roosevelt's political campaign as the presidential nominee of the Progressive party, he became known as the *Bull Moose candidate* and *Bull Moose party.* See *Progressive Party.*

**BULL RUN,** First Battle of. The first great battle of the Civil War occurred Sunday, 21 July 1861, in the vicinity of Manassas, Va. The Union forces were commanded by Brigadier-General Irvin McDowell, the Confederates by General Joseph E. Johnston, who had arrived from Winchester at noon of the 20th with nine regiments of his army and assumed command. The battlefield was west of Bull Run and near the crossing of that stream by the turnpikes running nearly west from Alexandria to Warrenton. This road, a mile and a half west of the Stone Bridge by which it crossed Bull Run, unexpectedly to the Confederates, became the axis of the battle. Bull Run is a narrow, winding stream with rugged and mainly precipitous banks, but with numerous fords, flowing southeastward, being about 20 miles west of Alexandria and from three to five miles west of Manassas.

McDowell marched from his camps in front of Arlington and Alexandria on the afternoon of the 16th of July, with five divisions, commanded respectively attached to Generals Irvin McDowell, four brigades; Colonel David Hunter, two brigades; Colonel S. P. Heintzelman, four
brigades; Brigadier-General Theodore Runyon, two brigades, and Colonel Dixon S. Miles, three brigades. The Fourth Division was left as a reserve in the region of Fairfax, guarding the lines of communication. The advance division, Tyler's, reached Centreville the morning of the 18th and sent a brigade to Blackburn's Ford in reconnaissance. After a sharp skirmish in which both sides lost about 60 men, it withdrew toward Centreville, to which point McDowell, hearing of the operations at Blackburn's Ford, concentrated four divisions.

Ford, Longstreet's at Blackburn's Ford, Bonham's between Mitchell's and Ball's fords, Cocke's at Lewis' Ford, and Evans' demi-brigade at the Stone Bridge forming the Confederate left. Of Johnston's Army of the Shenandoah, Jackson's brigade supported Bonham, and Bee and Bartow supported Cocke.

From each of these fords fair roads led to Centreville. General Beauregard had planned an attack upon Centreville which involved an advance of his whole force upon that point. This was officially approved by General John-

The Theatre of First Bull Run Battle.

The Confederate “Army of the Potomac” had been concentrated at Manassas under General Beauregard. In expectation of a Union advance it occupied the south bank of Bull Run for eight miles from Union Mills Ford, at the crossing of the railroad to Alexandria, to the Stone Bridge, at the Warrenton turnpike, three brigades being thrown forward of that position, one of them to Fairfax Court House. These brigades fell back before the Union advance, skirmishing slightly. Ewell's brigade, the right of the line, was at Union Mills, with Holmes in support, Jones' brigade at McLean's ston before daylight of the 21st, but at sunrise it was rendered impossible by McDowell's initiative. The plan was then changed to an attack on the Union left from Blackburn's Ford. This also was abandoned from the same cause.

McDowell, who had first intended to attack the enemy's right, after the affair at Blackburn's Ford, finding the ford at Sudley Spring two miles beyond the Confederate left, decided to attack from that direction. While Tyler feinted before the Stone Bridge, Hunter and Heintzelman, by a long detour, crossed at Sudley Spring and moved south toward the Warrenton turn-
pike in the enemy’s rear. Evans, at the bridge, discovering the movement, withdrew 11 companies and formed them on a ridge half a mile north of the road as the head of Hunter’s column entered the open fields which extended a mile north of the Warrenton road. Evans made stubborn resistance and was soon supported by Bull’s brigade and theender battle. While the position was hotly contested, the Confederates were pressed back down the hill, across the valley of Young’s branch, a tributary of Bull Run, to the plateau south of it upon which were the Robinson and Henry houses. Two of Tyler’s brigades expressed about the squares and joined Hunter and Heintzelman in their advance. The fighting continued desperate until noon, and for new troops was, for both sides, most remarkable, but the Confederate line, though stubbornly contesting the ground, began to disintegrate, and the road to Manassas was crowded with retiring soldiers.

General Johnston describes the Confederate situation at two o’clock as “critical”; General Beauregard terms it a “pressing exigency” and speaks of the situation of his forces “in dire straits” and of the fighting line as having “lost its cohesion.” Dr. Jones, Jackson’s distinguished biographer, records that “the retreat became every moment more disorder,” that Bee’s quick eye “now told him that all was lost” and that he could not reform his line.

At that hour a Union victory seemed assured. Johnston and Beauregard reached the position together. The troops on the line of Bull Run that had been held there by the demonstrations of two Union brigades designed to mask McDowell’s attack were ordered in haste to the new line which was at right angles to the first. Jackson soon arrived with five regiments and two batteries. Hampton’s Legion joined him and the Union advance was checked. Other arrivals strengthened the line. Kirby Smith’s brigade of Johnston’s army appeared about three o’clock, having just arrived on the field from Manasses, and pushed its three regiments toward the right of the Union line. Early’s brigade of Beauregard’s force, from the extreme right of his line, hastened beyond Smith’s brigade, now commanded by Colonel Elzey, and, supported by Stuart’s cavalry, appeared directly on the Union right flank. Two regiments from Bonham and two from Cocke also arrived upon the Union right. These also were of Beauregard’s army. This turned the check which that portion of the Union line had received, first into retreat and then into a disorganized withdrawal, except that the rear guards maintained fair order till the columns were well off the field, the right retraction its long detour by Sudley Springs. At Cub Run, half-way to Centreville, the batteries of a pursuing column broke up the wagons and batteries on the bridge, compelling the abandonment of 13 guns. From this point the movement to the rear was still farther disorganized, to which condition the vehemence of many visitors, correspondents and officials largely contributed. The attempt to rally the troops at Centreville failed, though General Johnston reported that the “apparent firmness” of the Union reserves at this point checked the pursuit. The army, in great part disorganized, streamed on to Washington.

After the severe stress under which the Confederate leaders found themselves from 11 o’clock until about 3, the sudden change on the Union side, first from assaulting to cessation of fighting; next, to a general retreat, and later to widespread panic, was as much a surprise to the enemy as to the Union commanders. It was not until after the day that the Confederates ascertained the full extent of the Union stampede. Upon this point President Davis wrote General Beauregard: “You will not fail to remember that, so far from knowing that the enemy was routed, a large part of our forces was moved by you in the night of the 21st to repel a supposed attack upon our right, and the next day’s operations did not fully reveal what has since been reported of the enemy’s panic.”

McDowell’s strength at Centreville appears to have been about 28,000 men and 49 guns. His report says he crossed Bull Run with 18,000 men. A very careful estimate made from official records in 1884, by Gen. James B. Fry, McDowell’s adjutant-general at the battle, gives the number actually engaged at 17,648.

General Beauregard reported his strength on the field when the battle opened as 27,833 and 49 guns; and after Johnston’s delayed troops and Holmes’ brigade had arrived in the afternoon as 31,972 and 57 guns. A very careful estimate by Gen. Thomas Jordan, his adjutant-general, fixed the number actually engaged at 18,053, thus showing the two sides to have been about equal on the firing line.

The Union loss as reported was: killed, 460; wounded, 1,124; missing, 1,312; total, 2,896. Union guns captured or abandoned, 29.

The Confederate loss reported was: killed, 387; wounded, 1,582; missing, 13; total, 1,982.


H. V. BOYNTON.

BULL RUN, Second Battle of, 30 Aug. 1862. When McClellan on the peninsula had reached the vicinity of Richmond, Lee, to prevent McDowell’s corps at Fredericksburg from reinforcing McClellan, ordered Jackson in the Shenandoah to make a demonstration that should detain all available troops for the defense of Washington. Jackson advanced, and in a brilliant campaign drove Banks out of the valley and forced him across the Potomac. By a masterly retreat, he regained the upper valley in spite of McDowell and Fremont, and soon after appeared on McClellan’s flank at Mechanicsville and participated in the seven days’ battles.

On 27 June the Union authorities united the three corps of McDowell, Fremont and Banks into the Army of Virginia under the command of Maj.-Gen. John Pope. He had concentrated his forces between Sperryville and Warrenton, and began to operate with his cavalry against Lee’s railroad lines about Gordonsville. His mission also was to concentrate upon McClellan, when he should withdraw from the peninsula. Lee promptly sent
Jackson's Division, followed by Ewell's and A. P. Hill's, to Gordonsville. On 7 August these moved from Gordonsville toward Pope's position at Culpepper, and 9 August encountered Banks at Cedar or Slaughter Mountain. Banks attacked, instead of holding his position as Pope's plan contemplated, and while at first brilliantly successful, he was at last defeated. Jackson, however, retreated on the 11th across the Rapidan.

On the 13th Lee ordered Longstreet, with his own and Hood's divisions, to Gordonsville. R. H. Anderson's division was ordered to follow. Upon their arrival Pope was largely outnumbered. Lee planned a move for the 18th and Manassas with its immense supplies on the night of 26 August. Pope moved to attack him at Manassas. On the night of the 27th and early on the 28th, Jackson's three divisions withdrew by different roads, and soon after noon of the 28th assembled on the battlefield of the first Bull Run.

On the night of the 25th Pope's headquarters were at Warrenton Junction. Reynolds' Division had joined him on the 23d. On the 25th the advance of Heintzelman's corps arrived from the Army of the Potomac, Hooker's and Kearny's divisions, and Fitz-John Porter, with the divisions of Sykes and Morell of his corps. These two corps with Reynolds' Divi-

against Pope's left, but this officer learned of the plan through the capture of Stuart's adjutant-general, recrossed the Rappahannock, and took position behind it on the 20th. Lee next arranged to cross at Sulphur Springs, turn Pope's right, and move upon his communications. This failed. Pope, at the same time, had planned to cross the river and attack Lee's right and rear, but a sudden flood prevented the movement. Lee then sent Jackson's corps far beyond Pope's right by way of Salem and Thoroughfare Gap to cut Pope's railroad line at Manassas. Jackson succeeded, passing around Pope's right, capturing Bristoe Station

sion were the only reinforcements that Pope received from the Army of the Potomac until after the battle of Manassas.

On the night of the 27th: Pope, supposing Jackson at Manassas, ordered general concentration in that direction. Porter's failure to move promptly under this order constituted one of the charges under which he was subsequently court-martialed and cashiered. Ricketts' Division, the rear of McDowell's corps, upon the information from the cavalry that Longstreet's forces were entering Thoroughfare Gap, moved to the gap and held Longstreet back during the day, and into the evening of the 28th. In the
afternoon of the 28th, Pope, supposing Jackson east of Bull Run, ordered his army to Centre-
ville, Heintzelman and Reno by the fords of Bull Run, McDowell, Sigel and Reynolds by the
Warrenton turnpike. The advance along the
turnpike was begun without the knowledge
that Jackson was just north of it on the first
Bull Run field. The Union approach led Jack-
son to attack, thus revealing his position, which
Pope had been vainly seeking. This was the
battle of Gainesville, being a very bitter fight
between stubborn soldiers with great losses. Not
all of Pope's forces had been put in north of
the turnpike and had been seriously repulsed.
All Union support was now directed to defend
the position against Longstreet's forces south
of the Warrenton pike. The whole of Long-
street's line went forward toward the road with
a rush. There were five divisions—Wilcox
on the left, then Evans (Hood), Anderson,
Kemper and Jones. As soon as Jackson, north
of the road, saw the advance of Longstreet, he
ordered his own line forward. The corps of
Heintzelman and Reno resisted this attack, but
were gradually forced back. The supreme
struggle of the Union forces was to hold two
elevated positions near the Henry and Chinn
houses. The latter, known as Bald Hill, was
carried by the Confederates after two days of
and sanguinary fighting. The Henry house hill
was held against repeated assaults. The Union
army was in retreat across Bull Run, and the
possession of the hill was necessary to main-
tain an orderly retreat.

The Union troops remained in possession
until eight o'clock, when the last of Pope's
army moved unmolested toward the Stone
Bridge, crossing Bull Run about midnight.
The bridge was then destroyed and the Union
army concentrated at Centreville. It was a
Union defeat, but not a rout. While there
was much straggling, the main army had re-
treated in good order, and Lee did not pursue.
In the management of the battle Lee had dis-
played his eminent generalship in a striking
manner. Pope's chief error had been in per-
sisting, before his attack was delivered, that
the enemy was in retreat.
Pope was reinforced at Centreville by the
strong corps of Sumner and Franklin from the
Army of the Potomac. Here also he found sup-
plies. His army was then almost entirely
without food or forage. Lee began
pursuit the afternoon of the day after the
battle, Jackson leading from Sudley Ford and
marching by a circuitous route toward Fairfax
Court House, seven miles in rear of Centreville.
Passing Chantilly, he turned toward the War-
renton turnpike and formed in front of Ox
Hill, his right extending toward the pike. He
was far in advance of Longstreet, and wholly
without support. He was attacked by the two
divisions of Reno under Stevens, and later by
 Kearny. Stevens and Kearny were killed, and
Jackson was repulsed.

Longstreet came up at night, and at noon
the next day (2 September), Pope's army was
ordered by the authorities at Washington to
withdraw within the city. Pope's losses through-
out the campaign from 16
August to 2 September were: Army of Vir-

ginia, killed and wounded 5,318, missing 2,787;
Army of the Potomac, killed and wounded
5,613, missing 1,115; 9th Army corps, killed
and wounded 1,204, missing 319; Kanawha
division, killed and wounded 64, missing 42;
total killed and wounded 10,199; captured or
missing 4,263. The Confederate losses were
not fully reported, but the best estimates
placed them at about 8,500. There are no official returns which enable a presentation of the exact strength of either army during the campaign up to 30 August, but the best estimate places the Union forces at about 63,000 to 70,000 and the Confederates at 54,000.


H. V. BOYNTON.

BULL-SNAKE, See PINE SNAKE.

BULL-TERRIER. See Terrier.

BULL-TRout. 9) A salmon-like trout of North America. See SALMON-TRout. (2) The Dolly Varden trout (q.v.).

BULLA, a genus of mollusks called, from the thinness of their shells, bubble-shells. The shell is oval, ventricose, convoluted externally, or only partially invested by the animal. The animal has a large cephalic disc bi-lobed behind; the lateral lobe is much developed. It occurs in temperate and tropical seas from 25 to 30 fathoms. Over 50 recent species are known and 70 fossil, the latter from the Oolite onward.

BULLACE, a small tree or shrub of the genus Prunus, Prunes. It is a kind of plum, related to the sloe. In England its fruit is used for making jam. The tree is seldom found in America.

BULBÉ, miniature blisters, or blebs. They are larger than vesicles, with a large portion of cuticle detached from the skin and a watery transparent fluid between. The skin beneath is red and inflamed.

BULLANT, bō-lian, Jean, French architect: b. probably in Ecouen about 1515; d. Paris, 10 Oct. 1578. He studied at Rome and after his return to France became supervisor of the royal buildings. He was connected with the erection of the Tuileries and built the pavilion named for him. He was also the architect of the Hotel de Saisons for Catherine de Medici. In 1570 he succeeded Primaticcio at Fontainebleau.

BULLBAT, a name in the Southern States for the night hawk (q.v.), a bird which flies in the dusk like a bat, and makes a booming sound.

BULLE, bül-le, Konstantin, German historian: b. Minden, 30 March 1844. He studied philosophy and history at Jena and Bonn, taught in the gymnasium at Bonn and became director of the gymnasium there in 1879. In 1887-90 he was a member of the Reichstag. After some philosophical studies he devoted himself to historical work and wrote 'History of Recent Times 1815-71'; 'History of the Years 1871-77' and 'History of the Second Empire and the Italian Kingdom.' The first two were combined and published as 'History of Recent Times' in 1886.

BULLEN, Frank Thomas, English author and lecturer; b. Paddington; d. Madeira, 5 April 1857; d. Madeira, 26 Feb. 1915. He received but scanty schooling, and after a few years' experience as errand boy, etc., went to sea as ordinary seaman in 1869, becoming chief mate after several years. He left the sea in 1883 and was usher clerk in the English mercantile office, 1883-99. His contributions to nautical literature have attracted widespread attention, the earliest of these, 'The Cruise of the Cachalot' (1898) being the most noted. His other works include 'Tidbits of the Sea'; 'The Log of a Sea Wait' (1899); 'The Men of the Merchant Service'; 'With Christ at Sea'; 'A Sack of Shakings' (1901); 'The Apostles of the Southeast'; 'Deep Sea Plunderings' (1901); 'A Whalman's Wife' (1902); 'A Sea Wrack'; 'Sea Puritans'; 'Our Heritage, the Sea'; 'The Call of the Deep' (1907). A volume of 'Recollections' was published posthumously.

BULLER, Sir Redvers Henry, English general: b. Devonshire, 1839; d. London, 2 June 1908. He joined the 60th Rifles as ensign in 1858; in 1862 was promoted lieutenant, and eight years later captain. He was major in 1874, lieutenant-colonel in 1878, colonel in 1879 and major-general in 1884. He served with his regiment in the Chinese campaign of 1860, and in the Red River expedition in 1870. During the Ashantee war he acted as quartermaster-general and head of the intelligence department, and gained special mention for his behavior in several engagements. He also served with distinction during the Kaffir War of 1878, and the Victoria Cross was conferred on him in 1879 for his gallant conduct in saving the lives of two officers and a trooper of the Frontier Light Horse, during the retreat at Inhlobane in the Zulu campaign. He was chief of the staff to Sir Evelyn Wood in the war against the Boers in 1881 and in Egypt in 1882, gaining special distinction for his services at Kassassin, Tel-el-Kebir and elsewhere. In the Sudan campaign of 1884-85 he was chief of the staff to Lord Wolseley, and was in command at the battle of Abu-klea after Sir Herbert Stew- art had been wounded. From 1887 till 1890 he held the post of quartermaster-general of the army, and from 1890 to 1897 he acted as adjutant-general to the forces. In 1886-87 he was under-secretary to the lord-lieutenant of Ireland, and in 1891 was promoted to the rank of lieutenant-general. He was created K.C.M.G. in 1882, K.C.B. in 1885 and G.C.B. in 1894. In 1899 he went to Natal as commander in the war with the Boer republics, and succeeded in relieving Ladysmith after it had been besieged 118 days. His various reverses during this event caused him to be superseded by General Roberts, and on his return to England he was placed on the retired list in consequence of an unwise speech. The publication of official documents, still hypothetical, destroyed his reputation as a commander, it being shown by these that he had advised General White, the defender of Ladysmith, to give up the defense and surrender to the Boers.
BULLERS OF BUCHAN—BULLET

BULLERS OF BUCHAN, a large oval cavity in the rocks on the east coast of Aberdeenshire, about six miles to the south of Peterhead, forming a sort of pot or caldron about 150 feet deep, open to the sky above and communicating with the sea below by a natural arch or horizontal passage into which the waves often rush with a tremendous noise.

BULLET. A projectile discharged from a musket, fowling-piece, pistol or similar weapon. When the smooth-bore arms alone were used, the bullets were made by casting. Molten lead was poured into molds and the molds were dipped in cold water, to hasten the solidification of the lead. The molds were cooled after using a few times, and the lead was heated only just to the degree for maintaining fluidity. Bullets are now, however, made more expeditiously, and more truly spherical in form, by compressing the lead. The lead is first fashioned into a rod about a yard long by five- or six-eighths of an inch thick; this rod is passed between rollers to condense it; then between other rollers to press it into a row of nearly globular pieces; then a sphenooid die gives the proper form to each of these pieces; and, lastly, a treadle-worked punch separates them into bullets. With one of these machines and two dies, nine boys can make 40,000 bullets in a day.

Kinds and Sizes.—Spherical bullets for the old muskets, carbines and pistols varied from 14 to 20 to the pound, and from .60 to .68 of an inch in diameter. There is a particular ratio, depending on the specific gravity of lead, by which the number to the pound will give the diameter, or vice-versa. Such bullets are, however, becoming every year less and less used, being superseded by other forms better suited for rifles. Robins' bullet was egg-shaped, with the centre of gravity at the larger end; Beaufroy's was ovoid, with a plug of mixed metal driven into a hole barely large enough for it; Norton's, Delvigne's, Minie's, and others of various related shapes, mostly with some kind of plug, which, driven into the lead by the force of the explosion, causes it to fill up the grooves in the rifling of the barrel.

Since the advent of powder and ball, there have been thousands of varieties of all sizes and imaginative shapes, round and long, with points of every conceivable curve that can be geometrically figured, some with a flat base, others with depressions of all depths and shapes, some to be patched with paper, or covered with steel, copper or nickel, others with grooves, the width, depth and number of them varying according to the theories of many scientific men. The manufacturers of the various arms have by a long series of experimenting decided upon a standard size of bullet to be used in their different calibres, and the manufacturers of ammunition make the bullets to that standard and they will not vary .001 of an inch as they come from the factory. There are, however, some who differ in their opinions as to what diameter of a bullet is used in their rifles, and they will push a bullet through the barrel, and if the impressions of the rifling on it are not deep enough to suit their ideas, they decide that a bullet of the standard size is not large enough and may condemn the mold. Others there are who desire to have their bullets smaller than the standard size and point to their fine records to prove that they are correct. Of course, a bullet should fit so as absolutely to prevent the escape of the gas by the side of the bullet, and pressure generated by the ignition of the powder should be kept at the base of the bullet to expel it. If gas escape through the barrel past the bullet, so much force is lost, and if the escape is greater on one side than on the other, it will deflect the bullet and make the flight irregular, and accuracy under such conditions is out of the question. A bullet when seated in the barrel by hand should fit to the bottom of the rifling so as to shut off all gas before the powder is ignited. As to how a bullet of the standard size will fit a barrel depends wholly upon the bore and the depth of the rifling. Variations in both of these points are found, as well as in everything else; there are no two rifle barrels alike any more than there are two human beings; each has its own individuality and must be handled with regard to its peculiarity. The bore of a rifle is the size of the smooth hole in the barrel before it is rifled, which is commonly called the calibre; this, however, is not the size of the bullet. The diameter of the bullet is determined by the depth of the rifling and should be large enough to shut off the gas. The depth of the grooves in the ordinary rifle barrel is from .001 to .004 of an inch according to the ideas of the various manufacturers. It must be remembered that it is the barrel, not the shells, that the bullet should fit properly to get good results. A reloading tool should have a bullet sizer as well as a bullet mold combined with the loading chamber in a convenient and handy form. The molds thus can be made so as to cast the bullets a trifle above the standard size, allowing the use of any mixture of metal that the shooter desires; and, after the lubrication in the grooves, they can be forced through the sizing die, this will press the lubrication solidly into the grooves, wipe off all surplus grease and at the same time make the bullet perfectly round.

Bullets to be patched with paper are smooth, without grooves. They are from three- to six-thousandths of an inch smaller than the standard size. The diameter is increased to the size desired by having a thin paper patch rolled around them, covering about two-thirds of the bullets from the base up. This paper is of fine, strong texture, similar to bank-note paper. It is specially prepared for this purpose, and is made in different thicknesses, which are known to the manufacturers of ammunition as extra-thin, thin, medium and thick. The extra-thin is about one and one-half thousandths of an inch thick and there is an increase of about one-half thousandth in each successive grade. shooters wishing to increase or decrease the diameter of their bullets can do so by selecting the proper thickness of paper. There is a difference of opinion relative to the superiority of patched bullets over grooved, yet for hunting or military purposes the grooved ball is generally preferred, as such ammunition can be carried and exposed to wet weather without injury, while a part of the patch being exposed is liable to get wet and injured so as to impair
its accuracy. Still, for fine target-shooting, the patched bullet properly handled is, without doubt, preferable.

Explosive Bullets.—Explosive bullets, more appropriately called deforming bullets, alter their shape upon impact with the tissues of the body. All unsheathed lead bullets are of this class, and sheathed bullets are often made deforming by various devices. Among these are the split-nosed, hollow-nosed and soft-bottomed bullets. They are often erroneously called "dum-dum," from the fact that the original deforming bullets were made at Dum-Dum, the fact that principally hard-nosed bullets are made at that place being overlooked.

Explosive Bullets.—Explosive bullets contain a charge of explosive which is detonated on impact, and, exploding, cause great wounds, instantly fatal. They are used only in big-game hunting. Stories of their use in warfare are mistaken due to ignorance of what constitutes such a bullet. The modern Spitz-Geschoss bullet of the Germans produces less dangerous wounds than the Mauser of 1888. It has a remarkably flat trajectory, its height being only 11.75 inches at a range of 400 yards, and only 0.26 inches for the Lee-Metford of the English.

Bullets are now made with extraordinary speed, by machinery of beautiful construction. The machine draws in a coil of leaden rod, unwinds it, cuts it to the required length, stamps out the bullets with a steel dies, drops them into boxes and conveys them away. Each machine, with four dies, makes 7,000 bullets per hour; and four such machines, in an easy day's work, turn out 300,000 bullets. So nearly are the machines automatic that one man can attend them all. Modern rifle bullets have a pressed leaden or steel core, and a thin covering of steel, copper or nickel. A combination of copper and nickel, known as cupro-nickel, is very generally employed, as it is without the poisonous qualities of copper commonly used alone. See Ammunition; Cartridges; Projectiles; Small Arms.

BULLET-TREE, or BULLY-TREE (Minmosops balata), a forest tree of Guiana and neighboring regions, family sapotaceae, yielding an excellent gum known as balata, having properties giving it in some respects an intermediate position between guuta-percha and India-rubber, and making it for certain industrial purposes more useful than either. The timber of the tree also is valuable.

BULLFINCH, a European finch (Pyrrhula Europea), of plump form, and a favorite cage-bird. It is a soft gray above, with shining black cap, wings and tail, and, in the male, has a rich rose breast (gray in the female). Its native call is a clear piping; and birds in captivity are trained to whistle simple tunes and imitate words, and are very popular in the bird market.

BULLHEADS, or "horned-pouts," are small, dark-colored catfish, abundant everywhere east of the plains, and, by introduction, in California and Oregon. They are mud-loving fishes, remaining on the bottom and feeding for food with the barbels, one on each side of the head and two under the chin. The "common bullhead" (Ameliusus Nebulosus) varies in length, at full age, from 18 to 24 inches and occasionally weighs five pounds. It is brownish-black in color, with a fine, scaleless, rubber-like skin, a big head and a long upper jaw. It is a gluttonous biter, gorging the bait, so that the hook must often be cut out of its interior. A smaller species, the black bullhead (A. melas), may be distinguished by the smaller anal fin and its nearly white rays. The southern flat-headed cat (A. platyccephalus) has an eel-like form and a greenish brown hue, and is almost entirely herbivorous. Several of the large "catfish" (q.v.) of the western lakes belong to this genus.

BULLIER ADVERTISING AGENCY, the most noted concern for the handling of advertising in France. In 1856 it entered into a working agreement with the Havas agency for the mutual selling of news and advertising together. This agreement strengthened both companies and made of them the strongest institution of the kind in Europe. See Press Associations.

BULLINGER, Heinrich, Swiss reformer: b. Bremgarten, 18 Aug. 1504; d. Zürich, 17 Sept. 1575. He studied first at Emmerich, in the duchy of Cleves, and afterward at Cologne. His intention was to become a Carthusian monk, but after perusing the works of Lachethon and other reformers he changed his views, formed a close connection with Zwingli, became one of the most strenuous supporters of his views, and ultimately succeeded him in his charge of Zürich. He was one of the authors of the first Helvetic Confession, drew up in concert with Calvin the formulary of 1549, by which the differences between the churches of Zürich and Geneva on the subject of the Lord's Supper were happily terminated, and kept up a close correspondence with the principal English reformers. The Zürich Letters lately published by the Parker Society contain part of this correspondence, and, among others, letters addressed to him by Lady Jane Grey. The most important of his many writings is a 'History of the Reformation.' See lives by Hess (1828-29); Pestalozzi (1858); also Heinrich, 'Bullinger und seine Gattin' (1875); Zimmermann, 'Die Züricher Kirche und ihre Antistes' (1877).

BULLION, uncoined gold or silver in bars, plate or other masses, which has been reduced to the standard fineness of the coinage of a country, but is sometimes used to designate the metals generally, whether coined or uncoined. United States standard bullion contains 900 parts of pure gold or pure silver, and 100 parts of copper alloy. The coinage value of an ounce of pure gold is $20.67183, and the coinage value of an ounce of standard gold is $18.60465. The coinage value in standard silver dollars of an ounce of pure silver is $1.2929, and the coinage value of an ounce of standard silver is $1.1630. The word bullion was of frequent use in the proceedings respecting the Bank of England from 1707, when the order of council was issued that the bank should discontinue the redemption of its notes by the payment of specie to 1823, when specie payments were resumed; for, by a previous law, the bank was authorized to pay its notes in uncoined silver or gold, according to its weight and fineness. The investigations of the bullion committee, and the various speculations on the subject of bullion, related to the supply of
BULLIONS — BULLOCK

17

gold and silver, whether coined or not, as the basis of the circulating medium. The discovery of the mines in America did not at first add materially to the stock of bullion in Europe. The total addition for the first 54 years was about $85,000,000; not quite so great an amount of value (in gold at least) as Russia has obtained from the Ural mines in less than half the time. The average annual supply from all the American sources during the 54 years from 1546 to the end of the 16th century was rather more than $10,000,000. During the 17th century the annual average was about $16,250,000; in the next half century it was $27,500,000; and in the years 1750 to 1803 it was $38,000,000. In the decade 1901–10, imports of gold, chiefly bullion, into the United States ranged from a minimum of $43,330,906 in 1910 to a maximum of $148,337,321 in 1908. The extremes of exports were $38,573,891 in 1906 and $118,563,215 in 1910.

BULLIONS, Peter, American philologist: b. Moss Side, Scotland, December 1791; d. Troy, N. Y., 13 Feb. 1864. Educated at Edinburgh University, where he studied theology, he came to America in 1817. He was pastor of the Presbyterian church at Argyle, N. Y., for six years, and from 1824 to 1848 taught languages in the Albany Academy and was, from 1832 to his death, pastor of the United Presbyterian congregation at Troy, N. Y. His published works include ‘Life of Alexander Byllions,’ (1840); ‘Principles of English Grammar’ (1834); ‘Principles of Greek Grammar,’ ‘Analytical and Practical English Grammar’ (1853); ‘Principles of Latin Grammar’ (1853); ‘Latin and English Dictionary’ (1862).

BULLOCK, Charles Jesse, American economist: b. Boston, 21 May 1826. He was graduated at Boston University in 1889, taught in secondary schools for four years and then pursued graduate studies in political economy and political science, receiving the degree of Ph.D. in 1895 from the University of Wisconsin. After holding an instructorship in political economy at Cornell University from 1895 to 1899, he was appointed assistant professor, and later professor, of political economy at Williams College, where he taught from 1899 to 1901. In 1901 he became assistant professor, and in 1908 professor, of political economy at Harvard University. He served as a member of the commission appointed to codify and revise the taxation laws of Massachusetts in 1907, and of the commission appointed in 1913 to draft a forest tax law, which was enacted in 1914. In 1916 he was elected vice-president of the National Tax Association. His best writing is in the field of financial history and theory, especially the finances of the United States between 1775 and 1789 (‘University of Wisconsin Bulletin,’ 1895); ‘Introduction to the Study of Economies’ (1897); ‘Essays on the Monetary History of the United States’ (1900); ‘The Finances and Financial Policy of Massachusetts’ (1907); and has edited ‘Currencies of the British Plantations in North America’ (1897); ‘Selected Readings in Public Finance’ (1906); ‘Selected Readings in Economics’ (1907).

BULLOCK, Rufus Brown, American statesman: b. Bethlehem, Albany County, N. Y., 28 March 1834; d. Atlanta, Ga., 27 April 1907. He was graduated at Albion Academy in 1850, and, after various pursuits, was sent during 1859–60 to organize the business of the Adams Express Company in the South Atlantic States. His headquarters were at Augusta, Ga., where he formed the Southern Express Company and became one of its active managers. During the Civil War he continued this occupation under the direction of the Confederate government establishing railroad and telegraph lines on interior routes. Later he was placed in charge of contributions for the officers and men of the Army of Northern Virginia, and at Appomattox he gave his parole as acting assistant quartermaster-general. After the cessation of hostilities he resumed the general management of express affairs and was elected one of the trustees and secretary of the Southern Express Company. He was also associated in the organization of the First National Bank of Georgia and was elected president of the First and Augusta Railroad. In 1867 he was chosen a delegate to the convention called to frame a constitution under the reconstruction laws then recently passed. His course at that convention met with the approval of its progressive members and he was their unanimous choice as candidate for governor. After a bitter canvass in the spring of 1868 the new constitution was ratified and Bullock was declared elected. But the reactionists obtained a majority in the legislature and expelled the colored men who had been elected and seated. Against this action the governor protested, and after its accomplishment brought the matter to the attention of Congress, by which he was empowered to reassemble the old legislature, including the expelled colored members. This struggle for the rights of negroes to hold office rendered him very unpopular in his State, and he was overwhelmed with abuse. At the next regular election the opposition seated a large majority of the general assembly, and it convening in November 1870 Governor Bullock resigned his office. Charges of corruption were made against him, and, after a hearing in the State courts at Atlanta, he was acquitted and thoroughly vindicated. He resided in Georgia and became president of one of the largest cotton mills in Atlanta. For several years he was prominent in public service; as a trustee of Atlanta University, president of the Atlanta Chamber of Commerce, vice-president of the Cotton States Exposition and government director of the Union Pacific Railroad.

BULLOCK, Shan F., Irish novelist: b. Crom, Fermanagh, Ireland, 17 May 1865. He has written a number of popular works. Among them are ‘The Awkward Squad’s’ (1893); ‘By Them Some’ (1895); ‘The Rushes’ (1896); ‘The Charmer’ (1897); ‘The Barry’s’ (1899); and ‘Irish Pastoral’s’ (1901); ‘The Squireen’ (1903); ‘Dan the Dollar’ (1905); ‘A Laughing Matter’ (1908); ‘Thomas Andrews, Shantyman’ (1911). His fiction is remarkably individual and his studies of life in the north of Ireland are faithful reflections of Irish life and character.

BULLOCK, William A., American inventor: b. Greenville, Greene County, N. Y.,
BÜLOW, Dietrich Adam Heinrich von, German military writer; b. Falkenberg, in Altmark, about 1757; d. Riga, Russia, 1807. He studied in the military academy at Berlin, and afterward entered the Prussian service. But he soon retired and occupied himself with the study of Polybius, Tacitus and J. J. Rousseau, and then served for a short period in the Netherlands. He afterward undertook to establish a theatre, but immediately abandoned his project, and visited the United States, whence he returned poor in purse but rich in experience, and became an author. His first work was on the 'Art of War,' in which he displayed uncommon talents. He wrote a book on 'Money,' translated the 'Travels of Mungo Park,' and published, in 1801, his 'History of the Campaign of 1800.' He lived a time in London, was there imprisoned for debt, and afterward removed to Paris, whence he was banished in 1804. In 1804 he wrote 'Lehrsätze des neunm. Krieges' ('Theory of Modern Warfare') and several other military works, among which is his 'Tactics of the Moderns as They Should Be.' In the former he points out the distinction between strategy and tactics, and makes the triangle the basis of all military operations. This principle he borrowed from Homini and other French writers. His history of the war of 1805 occasioned his imprisonment in Prussia, at the request of the Russian and Austrian courts. He died in the prison of Riga. He was a follower of Swedenborg. Consult Cammerer, 'Development of Strategical Science' (London 1905).

BÜLOW, Friedrich Wilhelm (Count von Dennewitz), Prussian general; b. Falkenberg, 16 Feb. 1755; d. Königsberg, 25 Feb. 1816. In his 14th year he entered the Prussian army. In the war of 1806 he was a lieutenant-colonel at the siege of Thorn, and distinguished himself in various battles. In 1808 he made major-general and general of brigade. When the war against France broke out in 1813 he fought the first successful battle at Möckern, 5 April; 2 May took Halle, and protected the left of the army from the danger which threatened it, by his victory at Luckau 4 June. He saved Berlin a second time by the memorable victory over Oudinot of Grosbeeren, 23 August, and relieved the same city a third time by the great victory over Ney at Dennewitz. For this service the King made him one of the few grand knights of the Iron Cross, and after the end of the campaign bestowed on him the title Count Bülow of Dennewitz, and made the same hereditary in his family. At the storming of Leipzig, 19 October, he took an important part. At the opening of the campaign of 1815 he received the chief command of the fourth division of the army, with which he contributed so essentially to the victory of Waterloo, that the King gave him the command of the 15th regiment of the line, which was to bear in future the name of the Regiment of Bülow von Dennewitz. Consult Bülow, 'Generalfeldmarschall Graf Bülow v. Dennewitz' (Vienna 1910).

BÜLOW, Hans Gusto von, German pianist and composer; b. Dresden, 8 Jan. 1830; d. Cairo, Egypt, 12 Feb. 1894. He studied the piano under Liszt, and made his first public appearance in 1852. In 1855 he became leading professor in the Conservatory at Berlin; in
1838 was appointed court pianist; and in 1867 became musical director to the King of Bavaria, followed by a series of concerts in Germany, Italy, Russia, England and the United States, which he first toured in 1875–76. In 1878 he became musical director at Court Theatre; from 1880–85 was Hofmusikantent to the Duke of Meiningen. From 1886 till his death he was conductor of the Philharmonic Society, Hamburg. His compositions include overture and music to ‘Julius Caesar,’ ‘The Minstrel’s Curse’ and ‘Nirvana;’ songs, choruses and pianoforte pieces. He was considered one of the first of pianists and orchestral conductors remarkable for the range of his repertoire and for his retentive memory, playing and conducting without book. He was the greatest living authority on Beethoven, and edited an edition of his works. His ‘Letters,’ edited by his widow, appeared 1895–97; and ‘Lives’ by Rau- mann (Berlin 1906) and La Mara (Leipzig 1911).

BÜLOW, Karl Eduard von, German author: b. Berg vor Eilenburg, Saxony, 17 Nov. 1803; d. Ottishausen, 16 Sept. 1853. He studied at the University of Leipzig, and became the tutor of Ludwig Tieck. His literary fame rests mainly on his ‘Book of Tales,’ after ancient Italian, Spanish, French, English, Latin and German originals (4 vols., 1834–36), which was followed by a supplementary volume (1841). (Of his own original composition, the ‘Springtide. Wandering Among the Hartz Mountains’ is one of the best. He wrote also the very interesting story of ‘The Youth of a Poor Man of Toggenburg,’ founded on the autobiography of Ulrich Briste, a Swiss weaver. He published the original later.

BÜLOW, Margarete von, German novelist: b. Berlin 1860; d. near there, 2 Jan. 1885. Her early years were spent partly in Thuringia and partly in Smyrna, where her father was Prussian consul. Her published works include ‘Stories’ (1885); ‘Jonas Briccius’ (1886); ‘Herr im Hause’ (1886); ‘Chronicle of the Rißelhausen Folks’ (1887); ‘New Stories’ (1890). She delineated character with great precision, and displayed true insight into the human heart. She lost her life in an attempt to rescue a boy from drowning in the Rummelsburger Lake.

BULOZ, bu-lô, Françoise, French publicist: b. Vulbens, Savoy, 20 Sept. 1803; d. Paris, 12 Jan. 1877. In 1831 he became editor of the Revue des Deux Mondes, the celebrated French fortnightly literary magazine, which, under his direction, increased its subscription list from 330 to 18,000. It published the works of de Vigny, de Musset, George Sand, and rendered remarkable service to the encouragement of contemporary literature. From 1835–45 he also edited the Revue de Paris. For 10 years (1838–48) he was director of the Comédie Française.

BULRAMPUR, bōl-rüm-poor’, a town of India, in the Fyzabad division of Oudh, the residence of the Maharaja of Bulrampur. It has a trade in rice, etc., besides manufactures of cotton and other articles.

BULRUSH, a popular name for tall, reed-like grasses, which are in marshy places, and which for the most part belong to the genus Scirpus. The common bulrush is frequent in clear waters and about the borders of rivers throughout Europe, as well as in North America and New South Wales. The roots are thick and stout, creeping under water in the deep mud; the stems are of a dark-green color, and four or five feet or more in height, and are naked, smooth, round, tough, plant and spongy within. Their base is covered with several sheathing scales, partly ending in leafy points. They are useful for packing and thatching, and especially for plaiting into the bottom of chairs.

BULTHAUP, buhlt-houp, Heinrich Alfred, German poet and dramatist: b. Bremen, 26 Oct. 1849; d. 1905. On quitting the university he was for a while a private tutor; then traveled in the East, Greece and in Italy. He was a lawyer in his native town for some years, and in 1879 became custodian of the city library. Of his dramatic compositions the list is very long, comprising tragedies, ‘Saul’ (1870); ‘A Coriscan Tragedy’ (1871); plays dealing with the questions of the time, ‘The Workmen’ (1876); comedies, comic operas, including ‘Die Kopisten’ (1875); ‘Lebende Bilder’ (1875); ‘Ahasyer’ (1904). He wrote the text for oratorios by Bruch and Vierling, adaptations of Shakespearean dramas (‘Cymbeline’ 1883; ‘Timon von Athen’ 1894); he also wrote ‘Durch Frost und Gluten’ (1892, new ed. 1904), and several works of criticism, especially ‘Shakespeare und der Naturalismus.’ His special distinction, however, is as author of ‘Dramaturgie des Theater’; ‘Dramaturgie der Klassiker’ (1882 et seq.), a work of exceeding value which has been reprinted frequently under the title ‘Dramaturgie des Schauspiels’; also ‘Dramaturgie der Opera’ (2 vols., 1887). Consul Kraeger, H., ‘Litterarische Vorträge aus dem Nachlass ausgewählten und durchge- schen’ (Oldenburg 1912).

BULWER, John, English physician and author. He flourished in the 17th century and appears to be entitled to the honor of having first pointed out a method of instructing the deaf and dumb. His works include ‘Phallos,’ or the Deaf and Dumb Man’s Friend’ (1648); ‘Chironomia, or the Art of Manual Rhetoric;’ ‘Chirologia, or the Natural Language of the Hand’ and ‘Anthropometamorphosis.’

BULWER, William Henry Lytton Earle (BARN DALLING and BULWER), English author and diplomat, brother of Sir Edward Lytton (q.v.) b. London, 13 Feb. 1801; d. Naples, 23 May 1872. He was educated at Sun- burg, Harrow and Cambridge. He became agent for the London Greek Committee in 1824, and made a journey to the Morea, which he later described in ‘A Journey to Greece.’ He entered the army, but resigned to enter the diplomatic service, and after 1827 was successively in Berlin, Brussels and The Hague. In 1830 he was elected to Parliament as an advanced Liberal and in 1837 was made secretary of the embassy at Constantinople. Here he concluded an important commercial treaty with Turkey. He was Minister to Madrid in 1843, and concluded the peace between Spain and Morocco in 1844. Disliked by Narvaez, the soldier-dictator, Bulwer was ordered to leave Spain. Parliament approved of his conduct and
he was awarded the highest decoration of the Order of the Bath; in 1849 had a diplomatic mission to Washington, and was one of the negotiators of the Bulwer-Clayton Treaty (q.v.). In 1852 he was envoy extraordinary to Tuscany and in 1856 was sent to Bucharest to investigate the conditions of the Danubian principalities, and was Ambassador to Turkey in 1858-65. He was created Baron Dalling and Bulwer in 1871. His works include 'An Autumn in Greece' (1826); 'France, Social, Literary and Political' (1834-36); 'Life of Byron' (1836); 'Historical Characters' (1869-70); 'Life of Palmerston' (1870-74).

BULWER-CLAYTON TREATY, a treaty negotiated at Washington, D. C., in April 1850, by John M. Clayton, Secretary of State under President Taylor, and Sir Henry Bulwer, British Minister to the United States. It provided that neither the United States nor Great Britain should attempt to control a proposed canal across Nicaragua. The treaty provided further for the neutrality of the canal and it guaranteed encouragement to all lines of interoceanic communication. The terms of the treaty were a masterpiece afterward much disputed. In 1882 the United States government intimated to Great Britain that the canal having become impracticable because of reasons for which Great Britain alone was responsible, the United States considered the treaty as no longer binding, but Great Britain continued to hold it as in force. On 3 March 1899, Congress passed a bill providing for the construction of a canal on the Nicaragua route, which also authorized the President to open negotiations with Great Britain for the abrogation of the Bulwer-Clayton Treaty, and under the last clause a convention between the two countries, abrogating portions of the treaty deemed to be against the interests of the United States, was signed in Washington, 5 Feb. 1900. For a complete account see CLAYTON-BULWER TREATY.

BULWY-LYTTON, Edward George Earle Lytton, Earl of Lytton, English politician and novelist: b. London, 25 May 1833; d. Torquay, Devonshire, 18 Jan. 1873. The Bulwers, long settled at Heydon Hall, Norfolk, claimed descent from the Normans and Vikings, perhaps as a ready explanation of their bold and turbulent spirit. The novelist's father, William Earle Bulwer, was colonel of the 106th regiment or Norfolk rangers. His mother, Elizabeth Barbara, was the only daughter of Richard Warburton Lytton of Knebworth in Hertfordshire, the family seat since the time of Henry VII. From her and her father, who was a learned scholar, Bulwer claimed to have derived his love for letters. As a boy he lived much among his grandfather's books and read through three circulating libraries. He wrote volumes of Byronic verse, some of which was published at the age of 17. Prepared for the university at various private schools, he entered Trinity College, Cambridge, at Easter in 1822; but soon migrated to Trinity Hall, where it was not necessary to attend lectures. At Cambridge he was a companion of the Union; he won the Chancellor's medal in 1825, and sketched two novels. At this time he also read enormously in history and began the practice of keeping those huge commonplace books which afterward became useful in preparing his historical novels. Before receiving his bachelor's degree in 1820, he published more Byronic verse, fell desperately in love, made a tour of Scotland and the English lakes, and passed a season in Paris, where he was received into the most brilliant salons. Returning to London he finished dandyly; he married on 29 Aug. 1827, Rosina Doyle Wheeler, a beautiful Irish girl of some accomplishments. The marriage led to an estrangement from his mother and the young man was consequently compelled to seek his own resources. He settled with his wife at Woodcot House in Berkshire, where he attempted to live in style from what he could earn with his pen. The marriage proving uncomfortable, a legal separation was obtained in 1836 after years of a life apart. On the death of his mother in 1843 he inherited Knebworth and assumed the surname of Lytton.

To pass by Bulwer's numerous contributions to novels and periodicals, he published in 1827, 'Falkland,' a sentimental novel in imitation of Rousseau's 'Nouvelles Études.' After a quick passage through the sentimental stage, he came out with 'Pelham' in 1828, a brilliant novel founded upon what he had seen of high life in London and Paris. It was likewise Bulwer's first excursion into crime. Late in the same year followed 'The Disowned,' a curious novel which the author called 'metaphysical,' inasmuch as the characters are intended to stand for 'certain dispositions influential upon conduct.' After 'Devereux' (1829), an experiment in romance, Bulwer took up the criminal novel, publishing 'Paul Clifford' (1830) and 'Eugene Aram' (1832), which are among his most characteristic books. By this time a popular novelist, he displayed during the coming years extraordinary versatility. With the Napoleons of the Rhine (1834) he began a series of fantastic tales which he called ideal and poetic, announcing that they should be judged 'by the rules rather of poetry than prose.' The chapter entitled 'The Life of Dreyfus' elegantly shows a clever system of dreaming, evidently made use of in our day by Du Maurier in 'Peter Ibbetson' and by Kipling in 'The Brushwood Boy.' Occult philosophy was cleverly employed in 'Zanoni' (1848) and speculation about the future age of electricity in 'TheComingRace' (1871). A series of ghost stories culminated in 'The Haunted and the Haunters' (1861) hardly surpassed in its kind. Historical romance, resumed in 'The Last Days of Pompeii' (1834), was continued in 'Rimini' (1835), 'The Last of the Barons' (1843), 'Harold' (1848), and the incomplete 'Pausanias' (posthumous, 1876). The best of these novels stand for an attempt to get near to the facts of history. In the midst of this work was planned a comprehensive history of 'Athens, its Rise and Fall,' of which two volumes appeared in 1837. Another idealization of the criminal in 'Lucretia' (1847) provoked considerable criticism, to which he replied with 'A Word to the Public' (1848). The last of his poetic romances was published anonymously in 'Blackwood's Magazine' three experiments in 18th century humor. The series comprises 'The Caxtons' (1849), 'My Novel' (1853), and 'What Will He Do
With It' (1858). Though a little too obviously in the manner of Sterne, the novels are among Bulwer's best work. They were, curiously enough, as well received by the public as if they had borne the author's name. Somewhat like them is 'Kenelm Chillingly' (1873), interesting besides for its infusion of autobiography.

Throughout his career, Bulwer never ceased to cultivate his muse. From the Byronic influence that marked his poems down to 1830, he worked into satire, addressing himself *to the humors rather than to the passions of men.* The 'Siamese Twins' (1831), a poem of four books in the metre of 'Hudibras,' appeared in a volume of miscellaneous poems, of which the longest is one on Milton. 'The New Timon; A Poetical Romance of London' (1846), a satire on men then prominent in politics and literature, is memorable for the reference to Tennyson as 'Schoolmiss Alfred,' and for Tennyson's caustic stanzas in a reply contributed to *Punch,* 28 Feb. 1846. Among Bulwer's other collections of verse as 'Poems and Ballads,' translated from Schiller (1844); an epic in two books: 'King Arthur' (1848-49); 'The Lost Tales of Miletus' (1866); and a translation of the 'Odes and Epodes of Horace' (1869). If Bulwer did not gain much fame as a poet, he exactly hit popular taste in three plays—'The Lady of Lyons' (1839), 'Richelieu' (1838) and 'Money' (1840)—which still keep the stage.

Bulwer's rôle in letters has obscured for later times the part he played in politics. From 1831 to 1841 he sat in Parliament as a Liberal member of Saint Ives, Harvard, and then for Lincoln. After making his maiden speech in support of the Reform Bill, he devoted his energies largely in favor of copyright on original works, cheap postage on newspapers and the laws affecting dramatic literature and the stage. His early speeches on these subjects are still worth reading. In 1834, he issued a spirited pamphlet on the 'Present Crisis,' which went through 20 editions and influenced greatly the election that brought Lord Melbourne into power. The new Premier offered him a lordship in the Admiralty but the post was declined. In 1841, Bulwer lost his seat owing to his willingness to accept a slight tax on corn. Ten years later he advanced to this extent in 'Letters to John Bull, Esq.;' and in 1852 he returned to Parliament as a Conservative member for Hertfordshire. His numerous speeches of this period relate to the excise duties, the Crimean War, China and the East India Company. In the formation of the Derby Ministry in 1846, he became Secretary to the Colonies. While holding this office he organized the new colony of British Columbia. He spoke in support of Disraeli's reform bill of 1859, but against the measures introduced by Lord Russell and Gladstone in 1860 and 1866. As a reward for his services, he was elevated to the peerage in 1866, as Baron Lytton of Knebworth. Before this he received the degree LL.D. from both of the great English universities. In 1854 he was installed honorary fellow of the Royal Society of Edinburgh University, and he was twice elected lord rector of the University of Glasgow. To the last he kept up his literary work: 'The Parisians' was running in *Blackwood's Magazine* when the end came at Torquay on 18 Jan. 1873. He was buried in Westminster Abbey.

As a novelist Bulwer was subject to fierce assaults from the critics throughout his career. Thackeray, for example, in a review of 'Ernest Maltravers' ridiculed and scorned his bad art, affected style, 'his eternal white hair', his 'lame sort of style', the good and the beautiful and the dulness of his moral sense. Still there is the other side. In various prefaces to his novels and especially in two papers contributed to the *Monthly Chronicle* for 1838, Bulwer carefully elaborated his views on the art of fiction, drawing clear distinctions between the novel and the drama as he understood and practised them. He never aimed at the dramatic novel wherein each incident and conversation must contribute to the working out of a logical plot. It is often desirable, he said with reference to the novel, 'to go back instead of forward,—to wind, to vary, to shift the interest from person to person' that the reader may not become fatigued. In that aim he succeeded. However much his novels may fail in technical details, they have never failed to excite the interest of the public.

Bibliography.—Unfortunately there is no adequate life of Bulwer or critical edition of his novels, indicating the many important changes he made in the text from time to time. Uncritical editions of the novels are numerous. To his 'Speeches' (2 vols., Edinburgh 1874), his son, the Earl of Lytton, prefixed a memoir dealing with his political career. The period of his life from 1803 to 1832 is covered by a most interesting autobiography, half fact and half fiction, and several supplementary chapters by his son, published together under the title 'Life, Letters and Literary Remains' (2 vols., London 1883). After the death of Lady Lytton, her executrix, Louisa Devey, published in vindication of her memory 'Letters of the Late Edward Bulwer, Lord Lytton and his Wife' (New York 1889). Consult also Cooper, 'Life of Edward Bulwer, First Lord Lytton' (London 1873); Escott, 'Edward Lytton' (London 1910); Ten Brink, 'Edward Lytton' (Leyden 1882); and Second Earl of Lytton's 'Memoirs of Edward Bulwer, First Lord Lytton' (2 vols., New York and London 1913).

Wilbur L. Cross,
Professor of English, Yale University.


BUM-BOAT (perhaps originally "boom-boat," from the boom rigged out from the side of a man-of-war at anchor, to which boats may make fast), employed by hucksters to visit ships lying at anchor, with supplies of provisions, trunks, clothing, etc., for sale to the sailors.

BUMBLEBEE, a wild bee of some species of the genus *Bombus,* of which upward of 50 species inhabit North America. Few occur in the southern hemisphere or tropical regions, and none in Africa south of the Sahara or in Australia, while they are the only bees inhabiting the Arctic and Alpine regions. The humble or humble, bee is recognized by its large, thick, hairy body and long bass hum. The colonies of bumblebees are not numerous compared with those of wasps, or the stingless or the honey bee. A populous colony in England and
Bumblefoot — Bunce

America may number from 300 to 400 individuals. The proportion of sexes and castes of Bombus muscorum in England were found by Smith to be, in a colony of 120, 25 females, 36 males and 59 workers. The roundish oval cells differ in size and have no exact arrangement. Besides the cells containing the young, the old discarded ones are made to serve as honey tubs or pollen tubs, and there are also the cells of the guest or Pithyrus bees. In good weather and when flowers are plentiful the bees collect and store honey in abundance, and in bad weather, the cells are used to form special cells made entirely of wax and these are filled with honey, and left open for the benefit of the community (Sharp). Hofer states that special tubs for the storing of pollen are sometimes constructed. Putnam says that the larvae make their own cells of silk, which are finally strengthened with wax by the old bees. Bumblebees have been seen working in warm moonlight nights. About two centuries ago Godart stated that a trumpet bee is kept in some hives to cause the colony to work by three or four o’clock in the morning, and this has been recently confirmed by Hofer, who observed the fact in his laboratory. If the trumpet was removed its place was filled the next morning.

There is a great deal of variation in our bumblebees, and, besides the local and climatic varieties, polymorphism is apparently marked, as Packard has (in Bombus fervidus) detected two sets of males and females, the large and the small; but whether there are two sizes of workers has not yet been ascertained. The queen bees lay their eggs in masses of bee-bread attached to the top or sides of the old cells, in little enclosures formed by thin partitions set up by the bee after the eggs have been deposited. Thus placed, says Packard, in a mass of food, the young larvae, on hatching, begin, by eating the food, gradually to construct their cells in the manner described by Putnam, who gives the following account of the economy of the bumble bee: The queen awakes in early spring from her winter’s sleep beneath the leaves or moss, or in deserted nests, and selects a nestling-place, generally in an abandoned nest of a field-mouse, or beneath a stump or sod, and immediately collects a small amount of pollen mixed with nectar, and in this deposit from 7 to 14 eggs, gradually adding to the pollen mass until the first brood is hatched. She does not wait, however, for one brood to be hatched before laying the cell of another; but as soon as food enough has been collected, she lays the eggs for the second. As soon as the larvae are capable of motion, and commence feeding, they eat the pollen by which they are surrounded, and, gradually separating, push their way in various directions. Eating as they move, and increasing in size quite rapidly, they soon make large cavities in the pollen mass. When they have attained their full size, they spin a silken wall about them, which is strengthened by the old bee brushing it with a thin layer of wax, which soon becomes hard and tough, thus forming a cell. The larvae now gradually attain the pupa stage, and remain inactive until their full development. They then cut their way out, and are ready to assume their duties as workers (small females), males or queens.

The cells vary in size and are known as queen, worker and drone cells. Of the first brood only workers are permitted to survive. These now supply the colony with honey and pollen and the queen remains in the nest, laying eggs from which emerge new workers until the colony is strong. About mid-summer males or drones are permitted to develop, and in July or August eggs are laid in the queen cells. The young queens are fertilized by the drones in the fall, the latter dying after the effort. On the approach of cold weather all the workers die, leaving the heavy cells to the queen. The queen who sleeps through the winter to awaken in spring, when the process begins anew. See Bee; Beekeeping.

Bumblefoot, a corn or abscess on the feet of domestic fowls, thought to arise from roosting on narrow perches or walking on sharp pebbles. The disease is sometimes incurable, but in other cases yields to the daily application of lunar caustic.

Bummaloti, a fish (Harpodon nehereus), related to the salmon, but marine, which is caught in large quantities on the western coast of India, dried, salted and exported all over the East. A trade-name is Bombay duck. It is a very long fish, with a long mouth containing slender teeth, an indication of its voracity.

Bumping Posts, constructions at the ends of railroad tracks in shifting yards, intended to prevent cars from running off the track. They are usually strong wooden frames with buffers placed at such a height as to receive the blow of the platform or coupler of the car. Banks of earth or cinders are sometimes utilized for this purpose and portable metal posts known as shipblocks are frequently employed as bumping posts.

Bumpo, Natty. See Leatherstocking Tales.

Bumpus, Hermon Carey, American educator: b. Buckfield, Me., 5 May 1862. He was graduated from Brown University in 1884, was professor of biology at Olivet College, Michigan, 1886-89; professor of zoology in Clark University, Worcester, Mass., 1890-91; and professor of comparative anatomy in Brown University from 1892. In 1898 he was appointed director of the biological laboratory of the United States Fish Commission at Wood’s Hole, Mass., and was assistant to the president and curator of the department of invertebrates in the American Museum of Natural History in New York in 1901-02, when he became director of the Museum. He was chosen business manager of the University of Wisconsin in 1911; chosen president of Tufts College in 1914. He is the author of ‘A Laboratory Course in Invertebrate Zoology’ (1893); also numerous monographs and articles on biology and educational subjects.

Bunce, Francis Marvin, American naval officer: b. Harpers Ferry, 25 Dec. 1836; d. there 19 Oct. 1901. He entered the naval service in 1851 and was graduated from the Naval Academy in 1857. In 1862 as executive officer of the Penobscot he took part in the engagement with the rebel batteries at Yorktown, Va. Assigned to temporary duty with the army, he
had charge of the disembarkation of the heavy artillery and mortars for use in the investment of Yorktown by General McClellan, April 1862. He commanded a successful expedition up Little River, between North and South Carolina, destroying several schooners and large quantities of cotton, turpentine and resin, together with extensive salt works. With the monitor Powhatan he took part in the action in which she was engaged during the siege of Charleston, and was wounded by the premature explosion of a cartridge. Later he was chief of scouts on the staff of Admiral Dahlgren. On 5 Sept. 1865 he was placed in command of the monitor Monitor and took that vessel from Philadelphia to San Francisco, the first extended sea voyage ever made by a monitor. On 1 March 1895 he was selected to command the North Atlantic squadron, with the rank of active rear-admiral. On 1 May 1897 he went to the Brooklyn navy yard and there superintended the conversion of many fast ships and yachts for war service. It is said that the government's policy of furnishing the navy with abundant ammunition for target practice and for special purposes, a policy which produced such admirable results in the Spanish-American War, was due to the efforts of Admiral Buncy. He was commissioned rear-admiral 6 Feb. 1896, and retired from active service 25 Dec. 1898.

BRIDGES, John Bell. American author. b. New York, 8 Feb. 1828; d. there, 15 May 1890. After spending several years as clerk in a stationery store, and bookseller and publisher on his own account, he became manager of the publishing house of James G. Gregory, which he conducted successfully for many years. It was at his instigation that the fine edition of Cooper's works, with steel and wood engravings by F. O. C. Darley, was planned and published. For a short time he was a reader for Harper & Bros., but in 1869 he formed a connection with D. Appleton & Company, that ended only with his death. He edited 'Appleton's Journal,' and largely planned and carried through for the firm some of their most famous illustrated publications, such as 'Picturesque America,' 'Picturesque Europe,' 'Picturesque Palestine,' etc. In addition to office business his literary aptitudes and ambitions kept him at work in spite of chronic invalidism. He wrote, among other works, 'Romance of the Revolution' (1852); 'A Bachelor's Story' (1859); 'Life Before Him' (1860); 'Bachelor Bluff. His Opinions, etc.' (1881); 'Don't: A Manual of Mistakes and Impropricities' (1883), of which over 100,000 copies have been sold; 'My House: An Ideal' (1884), a graphic study of a country home; and 'The Adventures of Timias Terrystone: a Novel' (1885). As a very young man he wrote three plays which were accepted and produced on the stage with success: 'Fate, or the Prophecy,' a tragedy; 'Love in '76,' a comedy; 'Marco Bozzaris,' an heroic tragedy. The second of these was played by Laura Keene, the other two by James W. Wallack.

BUNCO, a familiar term applied to the practices of a certain class of swindlers. The trickster trades upon the credulity of the apparently well-to-do stranger in the city, under pretense of some connection with the latter's friends or native place, or by similar expedi-

ents. After confidence is secured, counterfeit money is imposed upon him, he is induced to cash 'bogus' checks, etc., or even becomes the victim of more direct robbery.

BUNCOMBE, or BUNKUM, swollen political oratory not directed to the point in hand or the audience present, but to the achievement of a charlatanic reputation outside. "Twisting the tail of the British lion," and other like feats of windy chauvinism, are specimens of bunkum; the object of the speaker being, not so much to impress the hearers, but to make the general populace admire his swaggering patriotism. The reputed origin of the story is an anecdote of a member of the North Carolina legislature, from Buncombe County in that State, who told the thin remnants of a house he had nearly emptied by his dull and pointless remarks, that they might go, too, as he was only "speaking for Buncombe." Consult Wheeler, 'History of North Carolina.'

BUNDELKUND, bún-del-kúnd', or BANDELKHAND, bún-del-kúnd', India, a tract, consisting partly of certain British districts connected with this province, and partly of a number of small native states subordinate to the central Indian agency. Politically, there are nine states, 13 estates and the pargana of Alampur belonging to the Indore state, making an area of 9,851 square miles. Diamonds are found, especially near Panna. Its surface is considerably diversified, and there are several ranges of hills, some of which reach the height of 2,000 feet. It has soil of every variety, which yields almost every grain and plant of India. The Jumna and the Ken are the only two navigable rivers. The lesser waters are carried by different streams to the Jumna and so on to the Ganges. A branch of the Great Indian Peninsular Railway traverses the north of the country. A garrison of all arms is stationed at Nowgong. Pop. about 1,400,000. The people represent various races, the Bendas still remaining chieftains. The prevailing religion is Hinduism. In 1817 the British government, by the Treaty of Poona, acquired all territorial rights over Bundelkund. There was a mutiny in 1857.

BUNDESRATH, boon'der-srät, the German Federal council which represents the individual states of the empire, as the Reichstag represents the German nation. It consists (1916) of 61 members, who are appointed by the governments of the individual states for each session, while the members of the Reichstag are elected by universal suffrage and ballot for the term of five years, and its functions are mainly those of a confirming body, although it has the privilege of rejecting measures passed by the Reichstag.

BUNDESTAAT, a German term denoting a political form created by the union of several independent states into a single sovereign state with a Federal government. Examples are the United States, Switzerland and Germany.

Bundi, boon'dé', or BOONDI, India, a native state of Hindustan, in the southeast of Rajputana, under British protection; area 2,220 square miles. A double line of hills running from southwest to northeast, penetrated by few
passes and rising to the height of 1,793 feet, divides the state into two almost equal portions, that of the south bearing the name of Bunion, and that of the north bearing the name of Koiash. Much of the state is under wood. The chief river is the Mej, which penetrates the central range and joins the Chambal near the northeast extremity of the state. It was much more extensive before Koish and its territory were separated from it. The inhabitants are of the Hara tribe, which has given birth to many famous men, and, among others, to Ram Singh Hara, one of Aurungzebe's most renowned generals. The ruler is practically absolute in its own territory. Pop. 218,731. Buniu, the capital, is picturesque situated on a steep slope in a gorge in the centre of the hills above mentioned, 190 miles southwest of Agra, and its antiquity, numerous temples and magnificent fountains give it a very interesting appearance. It is crowned by a fort and surrounded by fortified walls. For picturesque effect its main street is almost unequaled. At its upper extremity stands the palace, built of stone, with turreted windows and battlements, supported partly by the great rock, and partly by solid piers of masonry 400 feet high. At its lower extremity is the great temple dedicated to Krishna. Pop. 31,000.

BUNGALOW, an East Indian term for a kind of country house with a thatched or tiled roof. Bungalows are generally of one story, though sometimes of two, and have verandas running round them to afford shelter from the sun. Public bungalows for travelers (daks) are maintained by government on the main highways. In the United States the term means any small cottage of one story usually, or else with a second story in the roof, with dormer windows. It usually has large porches. Consult Saylor, 'Bungalows: their Design, Construction and Furnishing' (New York 1913).

BUNGAy, England, a market town in Suffolk, on the right bank of the Waveney, 30 miles northeast of Ipswich. It is well built; the streets, spacious and well paved, diverge from a moderate-sized area in the centre of the town, and a large market-place, in which is a handsome cross. It has two fine churches. The principal trade is in corn, flour, lime and malt, in which a considerable amount of business is done. There is also an extensive printing office. Adjoining the town is a very spacious common. Pop. 3,359.

BUNG, boon'gë, Alexander, Russian botanist: b. Kiev, 24 Sept. 1803; d. 1890. He was educated at Dorpat, and after taking the degree of M.D. in 1825 he traveled in Siberia and the eastern part of the Altai Mountains, and then joined the mission of the Academy of Saint Petersburg to Persia, where he remained eight months and procured an extensive herbarium. In 1883, by invitation of the Academy of Saint Petersburg, he made a second Asiatic journey, and in 1836 settled as professor of botany at Dorpat. His principal publications are catalogues of the plants which he collected in China and near the Altai Mountains.

BUNG, Friedrich Georg von, Russian legal historian (brother of the preceding): b. Kiev, 13 March 1802; d. 1897. He was educated at Dorpat, and for many years was professor of law there. His writings, principally upon the history of law and rights in the countries around the Baltic Sea, are numerous and valuable.

BUNGENEB, boon-ge-nà, Louis-Félix, French writer and critic: b. Marseilles, 29 Sept. 1814; d. Geneva, June 1874. He was educated from the theological school in Geneva and afterward continued in the same institution as professor until 1846, when he began to devote his time to literature. His works, most of which were published at Geneva, are quite numerous. Among the most notable of them are 'Deux Soirées à l'hôtel de Rambouillet' (1839); 'Essai sur la Poésie moderne' (1840); 'Histoire du concile de Trente' (1846); 'Voltaire et son temps' (1850); 'Julien, ou la fin d'un siècle' (1853, 4 vols.); 'Rome et la Bible' (1859); 'Rome et le cœur humain' (1861); 'Saint Paul, su vie, son œuvre et ses épîtres' (1867); 'Lincoln' (1867). At his death he left a great deal of work still unpublished.

BUNGERT, boon-gär't, August, German composer: b. Müllheim, and partly by solid piers of masonry 400 feet high. At its lower extremity is the great temple dedicated to Krishna. Pop. 31,000.

BUNGAY, England, a market town in Suffolk, on the right bank of the Waveney, 30 miles northeast of Ipswich. It is well built; the streets, spacious and well paved, diverge from a moderate-sized area in the centre of the town, and a large market-place, in which is a handsome cross. It has two fine churches. The principal trade is in corn, flour, lime and malt, in which a considerable amount of business is done. There is also an extensive printing office. Adjoining the town is a very spacious common. Pop. 3,359.

BUNG, boon'gë, Alexander, Russian botanist: b. Kiev, 24 Sept. 1803; d. 1890. He was educated at Dorpat, and after taking the degree of M.D. in 1825 he traveled in Siberia and the eastern part of the Altai Mountains, and then joined the mission of the Academy of Saint Petersburg to Persia, where he remained eight months and procured an extensive herbarium. In 1883, by invitation of the Academy of Saint Petersburg, he made a second Asiatic journey, and in 1836 settled as professor of botany at Dorpat. His principal publications are catalogues of the plants which he collected in China and near the Altai Mountains.

BUNG, Friedrich Georg von, Russian legal historian (brother of the preceding): b. Kiev, 13 March 1802; d. 1897. He was educated at Dorpat, and for many years was professor of law there. His writings, principally upon the history of law and rights in the countries around the Baltic Sea, are numerous and valuable.

BUNGEB, boon-ge-nà, Louis-Félix, French writer and critic: b. Marseilles, 29 Sept. 1814; d. Geneva, June 1874. He was educated from the theological school in Geneva and afterward continued in the same institution as professor until 1846, when he began to devote his time to literature. His works, most of which were published at Geneva, are quite numerous. Among the most notable of them are 'Deux Soirées à l'hôtel de Rambouillet' (1839); 'Essai sur la Poésie moderne' (1840); 'Histoire du concile de Trente' (1846); 'Voltaire et son temps' (1850); 'Julien, ou la fin d'un siècle' (1853, 4 vols.); 'Rome et la Bible' (1859); 'Rome et le cœur humain' (1861); 'Saint Paul, su vie, son œuvre et ses épîtres' (1867); 'Lincoln' (1867). At his death he left a great deal of work still unpublished.

BUNGERT, boon-gär't, August, German composer: b. Müllheim, and partly by solid piers of masonry 400 feet high. At its lower extremity is the great temple dedicated to Krishna. Pop. 31,000.

BUNGAY, England, a market town in Suffolk, on the right bank of the Waveney, 30 miles northeast of Ipswich. It is well built; the streets, spacious and well paved, diverge from a moderate-sized area in the centre of the town, and a large market-place, in which is a handsome cross. It has two fine churches. The principal trade is in corn, flour, lime and malt, in which a considerable amount of business is done. There is also an extensive printing office. Adjoining the town is a very spacious common. Pop. 3,359.

BUNG, boon'gë, Alexander, Russian botanist: b. Kiev, 24 Sept. 1803; d. 1890. He was educated at Dorpat, and after taking the degree of M.D. in 1825 he traveled in Siberia and the eastern part of the Altai Mountains, and then joined the mission of the Academy of Saint Petersburg to Persia, where he remained eight months and procured an extensive herbarium. In 1883, by invitation of the Academy of Saint Petersburg, he made a second Asiatic journey, and in 1836 settled as professor of botany at Dorpat. His principal publications are catalogues of the plants which he collected in China and near the Altai Mountains.

BUNG, Friedrich Georg von, Russian legal historian (brother of the preceding): b. Kiev, 13 March 1802; d. 1897. He was educated at Dorpat, and for many years was professor of law there. His writings, principally upon the history of law and rights in the countries around the Baltic Sea, are numerous and valuable.

BUNGEB, boon-ge-nà, Louis-Félix, French writer and critic: b. Marseilles, 29 Sept. 1814; d. Geneva, June 1874. He was graduated from the theological school in Geneva and afterward continued in the same institution as professor until 1846, when he began to devote his time to literature. His works, most of which were published at Geneva, are quite numerous. Among the most notable of them are 'Deux Soirées à l'hôtel de Rambouillet' (1839); 'Essai sur la Poésie moderne' (1840); 'Histoire du concile de Trente' (1846); 'Voltaire et son temps' (1850); 'Julien, ou la fin d'un siècle' (1853, 4 vols.); 'Rome et la Bible' (1859); 'Rome et le cœur humain' (1861); 'Saint Paul, su vie, son œuvre et ses épîtres' (1867); 'Lincoln' (1867). At his death he left a great deal of work still unpublished.

BUNGERT, boon-gär't, August, German composer: b. Müllheim, and partly by solid piers of masonry 400 feet high. At its lower extremity is the great temple dedicated to Krishna. Pop. 31,000.
become popular. In Russia it is used as a vegetable.

**BUNION**, a small, hard, painful tumor formed in any part of the foot, but especially in the metatarsal joints. It consists in a swelling of the bones themselves, which fact distinguishes bunions from corns. It appears to be caused by the pressure of a boot or shoe which is too tight, especially when the feet are a little deformed. The best means to relieve the pain is to remove the causes of the tumor as soon as possible, to give rest to the foot and to apply lotions and emollient poultices.

**BUNKER HILL**, Mass., an eminence, 110 feet high, in the Charlestown district of Boston, connected by a ridge with another elevation, 75 feet high, named Breed's Hill. These heights are memorable as being the scene of a battle, 17 June 1775, commonly known as the battle of Bunker Hill. The city of Boston was occupied by the British under General Gage, who had resolved to begin offensive operations against the rebels. This design becoming known in the American camp, it was determined to seize and fortify the heights of Charlestown on the night of 16 June. The execution of this perilous mission was confided to Colonels Prescott and Pepperell at the head of a brigade of 1,000 men; and at dawn of day a strong redoubt was already completed on Breed's Hill. About 1,500 Americans advanced successively to the relief of Prescott, and General Warren entered the redoubt as a volunteer, refusing the command which was tendered to him. At about 2:30 o'clock, two columns of the British advanced to a simultaneous assault; they were received with a terrific fire, and were twice repulsed in disorder. When the Americans had exhausted all their ammunition, Prescott gave the order for retreat. They received a destructive volley as they left the redoubt, and Warren fell, shot through the head with a bullet. The retreat was harassed by a raking fire from the British ships and batteries, but there was no pursuit beyond Charlestown Neck. The British loss was 226 officers and men killed and 828 wounded; that of the Americans 145 killed or missing and 304 wounded. Although defeated, the moral result of this action was important. The Americans had seen superior numbers of the disciplined soldiers of England retreat before their fire, and had given the proof they were able to defend their liberties. On Breed's Hill, and near the spot where Warren fell, stands the Bunker Hill Monument, the corner-stone of which was laid by the Marquis de Lafayette, 17 June 1825. This monument was inaugurated 17 June 1843. It consists of a plain granite shaft, 220 feet high, 31 feet square at the base and 15 at the top. The monument affords a magnificent panoramic view of the surrounding country. Consult Ellis, G. E., 'History of the Battle of Bunker's (Breed's) Hill' (1875); Adams, C. F., Jr., in *American Historical Review* (Vol. 1); Frothingham, P., 'Siege of Boston' (Boston 1902).

**BUNKER HILL ORATIONS.** The first of the so-called 'Bunker Hill Orations' of Daniel Webster was pronounced 17 June 1825, the 50th anniversary of the Battle of Bunker Hill, when the cornerstone of the Bunker Hill Monument was laid. The second was delivered 18 years later at the exercises to commemorate the completion of the monument. The earlier address is, justly, the better known, and ranks as one of the most notable examples of American oratory, if indeed it is not the greatest occasional oration delivered in America during the first half of the last century. Though Webster substituted a weighty dignity of utterance and sheer personal force for the more exuberant figures, the classical allusions and quotations which were in vogue in the public speaking of his day, he belonged after all to the old school, which regarded oratory as something apart from the simple expression of natural thought and feeling. A comparison of the 'First Bunker Hill Oration' with Lincoln's 'Gettysburg Address' will make this plain; and it may help in explaining why, notwithstanding the clearer recognition of Webster's honesty and ability, his orations are less read and admired now than they were in his day. The most valuable part of the 'First Bunker Hill Oration' is the discussion of the American government and the ideals for which the fathers fought—a feeling exposition which have renewed pertinency in each new national crisis; but the most popular passage is perhaps the moving address to the veteran survivors of the battle, who were seated on the platform. The second oration is filled with felicitations and compliments, and contains no very notable passage, though the tribute to Washington has often been quoted.

**WILLIAM B. CAIRNS.**

**BUNODONT,** a term applied to animals in which the crowns of the molar teeth are composed of a number of low rounded cones or cusps. The pig is one of the best examples among living animals; the teeth of monkeys and other omnivorous or frugivorous animals, including man, are also of this type. It is probable that the molars of many if not all modern mammals have been evolved from bunodont teeth, for the ancestors of many races of the modern hoofed animals, carnivora, and some other groups, show a series of stages in the evolution of the teeth leading from the omnivorous bunodont type into the specialized grinding or cutting teeth (selodont) of the modern animals. See **Teeth.**

**BUNSEN, Christian Karl Josias (Chevyler),** German statesman and philosopher: b. Korbach, Waldeck, 25 Aug. 1791; d. Bonn, 28 Nov. 1860. He studied philology under Heyne at Gottingen, and subsequently went to Holland and Denmark, to acquire a critical knowledge of the Danish and Dutch languages. In 1815 he made the acquaintance at Berlin of the celebrated Niebuhr, and in 1816 proceeded to Paris, where he studied Persian and Arabic under Sylvestre de Sacy. The same year he visited Rome, where he married, and renewed his intimacy with Niebuhr, then Prussian Ambassador to the Papal court. Niebuhr procured him the appointment of secretary to the Prussian legation, and in 1823 Bunsen assumed Niebuhr's duties, being later, and in 1827, formally accredited as resident Prussian Minister. In this capacity he continued till 1838, when conducted several important negotiations with the Papal see, the result of one of which was the brief of Leo XIII relative to mixed marriages. His next mission was to Berne, as Ambassador to
the Swiss Federation. During his residence at Rome Bunsen had industriously pursued his philological and historical studies, including more especially that of the Platonic philosophy, and investigations into the religious and ecclesiastical history of mankind. The liturgies of the Church received his especial attention, and a service of his own framing, introduced by him into the chapel of the Prussian embassy at Rome, was printed by order of the King of Prussia, who wrote a preface to it. This work was published without the author's name at Hamburg in 1846, under the title of Allgemeines Evangel, Gesang-und Gebetbuch (Generall Hymn and Prayer Book of the Evangelical Lutheran Church), and may be regarded as a new edition of the Versuch eines Allgemeinen Evang. Gesang-und Gebetbuchs, published at Hamburg in 1833.

In 1841 Bunsen was summoned to Berlin from Switzerland to proceed to England in charge of a mission for the establishment, in conjunction with that country, of a bishopric at Jerusalem. Shortly afterward he was nominated Prussian Ambassador to England. In 1844 he was consulted on the subject of granting a constitution to Prussia, and is said to have drawn up and submitted to government the form of one which bore a very close resemblance to that of Great Britain. In the Schleswig-Holstein affair he strenuously opposed the claims of Prussia and the German Confederation in opposition to those of Denmark. From the opposite views taken by him to those of his government in relation to the Russian War he was recalled from London in 1854, and, abandoning politics, retired to Heidelberg to devote himself exclusively to literary pursuits. The results of these have established his reputation as one of the most profound and original critics in the department of Biblical and ecclesiastical history. Among these are Die Verfassung der Kirche der Zukunft (The Constitution of the Church of the Future) (1845); Agyptens Stelle in der Weltgeschichte (Egypt's Place in the World's History) (1845); Hippolytus und Seine Zeit (Hippolytus and His Time) (1851), and lastly, his greatest work, Bibelwerk für die Gemeinde (Bible Commentary for the Community), the first part of which was published in 1852 and was intended to be completed in 1862. It had occupied his attention for nearly 30 years, and, as he informs us, was regarded as the grand centre-point to which all his literary and intellectual energies were to be devoted. Death interposed to prevent him completing his undertaking. Ill health caused him to spend the winters of 1858-59 and 1859-60 at Cannes, in the south of France, returning thence in the spring of 1860 to Bonn (whither he had recently transferred his abode from Heidelberg), where he died. Three volumes of his Bibelwerk had been published at his death (the first, second and fifth), and this great work was completed in his spirit and by the aid of his manuscripts under the editorship of Holtzmann and Kamphaussen, in nine volumes (1868-70).

**BUNSEN, Robert Wilhelm Eberhard, German chemist:** b. Göttingen, 31 March 1811; d. 16 Aug. 1899. He studied at Göttingen University and at Paris, Berlin and Vienna; was appointed professor at the Polytechnic Institute of Cassel 1830; extraordinary professor at the University of Marburg 1838, and ordinary professor there 1841; professor at Breslau 1851; and finally, for some years, at Heidelberg 1852. Among his many discoveries and inventions are the production of magnesium in quantities, magnesium light, spectrum analysis, and the electric pile and the burner which bears his name (see below). Among his works are 'Chemische Analyse durch Spektrobelobachtung' (with Kirchhoff, 1861; new ed., 1895); 'Gasometrische Methoden' (1857; English by Roscoe); and 'Anleitung zur Analyse der Aschen und Mineralwasser' (1874). He retired from active teaching in 1889.

**BUNSEN BATTERY**, a modification of the Grove battery, plates or bars of gas coke being used instead of platinum. The electromotive force is slightly less than that of the Grove battery.

**BUNSEN BURNER**, a form of gas-burner especially adapted for heating, consisting of a tube in which, by means of holes in the side, the gas becomes mixed with air before consumption, so that it gives a non-illuminating, smokeless flame. Burners of this nature are part of the indispensable outfit of a chemical laboratory.

**BUNT**, sometimes called SMUT BALL, PEPPER BRAND and BRAND BLADERS, the most formidable disease, perhaps, to which wheat is subject, but which one may in most instances be greatly modified, and which seldom in the present day does material injury except where there is careless cultivation. Like many other of the diseases to which the cereal plants are subject, it arises from the attack of a parasitic fungus (Uredo aries). It is generated in the ovary of wheat and a few other Gramineae, and very rarely on the stem. It is formed at an early stage of growth, before the ear is free from the sheath; and indeed the plants which are affected by the parasite may be readily recognized by their unusual luxuriance, being generally several inches higher than plants not affected, larger in bulk, and often producing a greater number of stems from the same root. The bunted grains are shorter and blunter than the sound, of a dark-green when young, but with old, a yellowish or sometimes nearly black. The contents of the ovary are reduced to a uniform black powder or paste, which has an offensive smell like that of decayed fish. Various substances have been used by cultivators to prevent the growth of bunt, such as salt, quicklime, arsenic, corrosive sublimate, etc. Careful washing and a selection of good seed will alone prevent much mischief, but it is advisable to take some more stringent measures with a view to destroy the vitality of the bunt spores. For this purpose Dombasle's method is the most successful. It consists in thoroughly wetting the grain with a solution of sulphate of soda (Glauber's salts), then drying the wheat with quicklime, which combines with the water to make sulphate of lime (gypsum), which acts as a manure, while the organic acid destroys the vegetative powers of the bunt spores.

**BUNTER SANDSTONE**, one of the three divisions of the Triassic. It is the lowest, that is, the oldest of the series. It corresponds to the grès bigarré (variegated free-
BUNTINGS, CANARIES, ETC.

1 Lapland Longspur Bunting
2 Chaffinch
3 Wild Canary
4 Meadow Bunting
5 Cardinal
6 Rose-breasted Grosbeak (Male)
7 Reed Bunting (Male and Female)
stone or grit) of the French. In the Hartz it is more than 1,000 feet thick; in Cheshire and Lancashire, England, it consists chiefly of red sandstones, and fossils are very rare. The rocks are highly porous and afford an important source of water supply. The footprints formerly known as those of chirotherium, now known to be labyrinthodont, are found there. These plants are chiefly ferns, cycads and conifers. 

BUNTING, Jabez, English clergyman: b. Monyash, Derbyshire, 1778; d. London, 16 June 1838. His parents were members of the Wesleyan Church and removed to Manchester when he was a child. While at school he attracted the attention of Dr. Percival, who employed him as his amanuensis, and at his death made him one of his executors. He early joined the Church; became a traveling preacher in 1799; joined the Conference after the death of Mr. Wesley, and was appointed to the Oldham circuit. After traveling four years he was sent to London, where he gained great popularity as a pulpit and platform orator. After remaining two years in London he was removed to Manchester, where he distinguished himself as an advocate of ecclesiastical order and discipline in a controversy with some dissatisfied Methodists. In this controversy he gave such evidence of a knowledge of the polity of Wesleyan Methodism as secured for him the favor of the entire body to which he belonged. He was four times president of the Methodist Conference; 17 years missionary secretary, and three years as editor. In 1835 he was chosen president of the theological school, and was looked upon as the acknowledged leader of the Methodists, superintending the interests of the body at home and abroad, while, at the same time, his influence was felt in other evangelical denominations, and also in the political world, statesmen frequently resorting to him for advice. Yet he derived only the ordinary emoluments of a Methodist minister—a yearly salary of £150, with house-rent and taxes. During all the distractions connected with the secessions that have taken place in the Wesleyan body, Dr. Bunting remained a firm, unwavering adherent and advocate of the doctrines and discipline of the Church as they came from the hands of John Wesley, and to his influence and indefatigable zeal are largely to be ascribed the permanency and prosperity of the Wesleyan connection. 

BUNTING, Sir Percy (William), English journalist: b. Manchester 1836; d. 22 July 1911. He was educated at Owens College, Manchester, and Pembroke College, Cambridge, and was called to the bar. He was editor of the Contemporary Review from 1882 until his death and was concurrently editor of the Methodist Times from 1902. He was knighted in 1908. 

BUNTING, William Maclardie, Wesleyan minister: b. Manchester, 23 Nov. 1805; d. Highgate Rise, 13 Nov. 1866. He began to preach at the age of 15. In 1826 he was a spiritual writer and very active in the Evangelical Alliance and also in the British Society for the Propagation of the Gospel among the Jews. After his death his selected sermons and other writings were published under the editorship of G. Stringer Rowe (1870). 

BUNTING, one of a group of cone-billed birds, forming the genus Emberiza, represented in Europe by the corn-bunting, reed-bunting, and meadow bunting. It is marked by its cone-shaped bill and a hard knob on the inner surface of the upper mandible. The corn-bunting has a black head and throat and the nape and sides of the neck are white. The head of the corn-bunting is olive-green, with bright yellow patches on the cheek and over the eyes. The term is used in the United States for two or three similar birds, such as the dick-cisella and snow-bunting (qq.v.). All the buntings are good singers, and the term is applied by dealers in cage birds not only to the true European buntings, but to many other seed-eaters, such as the ortolan and our indigo-bird. 

BUNTING, a thin woolen stuff, of which flags are usually made; hence, flags, collectively. 

BUNYA-BUNYA, the native Australian name of Araucaria cunninghamii, a podocarp tree with cones larger than a man's head, containing seeds that are eagerly eaten by the natives. 

BUNYAN, John, English preacher and author: b. Elstow, near Bedford, Bedfordshire, England, 1628; d. Swan Hill, 31 Aug. 1688. The Bunyans were an old family in Bedfordshire but Bunyan's immediate ancestors for several generations had been obscure, and Bunyan's own father, Thomas Bunyan, was a tinker. Of his mother, Margaret Bentley, little is known. In spite of their lowliness, however, these parents trained Bunyan with some care and sent him to the Bedford schools. Then he took up the trade of tinker, at which, until he became an established preacher, he worked industriously. In the latter part of 1645 and the early months of the following year he fought in the Civil War, but on which side is uncertain. Froude maintains that he was in the Royalist army, whereas Macaulay and Brown, to whom the weight of authority must be given, state that the evidence goes to show that Bunyan was with the Parliamentarians. In 1646, he returned to his trade in Elstow, and at about the age of 20 married a wife, whose goodness of character is the accepted proof that Bunyan was better than he represented himself. Of far more importance in giving character to Bunyan's career was his spiritual life. Besides being brought up religiously and at a time of peculiarly strong belief in the literal truth of hell and heaven, of damnation and atonement, of devils and evil spirits, Bunyan's boyhood and early manhood were not only a continual struggle between the inclinations of an active, pleasure-loving youth and the terror lest he be doomed to eternal perdition, but also a spiritual anguish, a man of the most imaginative of minds of which there is record. "He was," says William James ('The Varieties of Religious Experience'), "a typical case of the psychopathic temperament, sensitive of conscience to a diseased degree, beset by doubts, fears and insistent ideas, and a victim
of verbal automatisms, both motor and sensory. These were usually texts of Scripture which, sometimes damnable and sometimes favorable, would come in a half-hallucinatory form as if they were voices, and fasten on his mind and buffet it between them like a shuttlecock. Though in most ways a wholly respectable character, he speaks of himself, in his autobiography, ‘Grace Abounding,’ as a most blasphemous youth, in return for which he was warned and tormented by visions to which he gave little heed. When the visions left him, he tells us that he became worse, nor were some narrow escapes from death sufficient to make him repent. His marriage had a good effect on him; he went to church regularly and was repentant, though, he says, in a formal way. He still liked his sports and was in the habit of playing cat on the village green Sunday afternoons. The effect of a peculiarly vivid vision of a warning voice from heaven while he was in the act of striking the cat was to make him determined to alter his wicked ways and be redeemed from his wicked courses. Yet he began to mend his ways, first giving up his profanity, then his love of bellingring, and lastly his dancing, though it took him nearly a full year before he could quite leave that behind him. He became esteemed as a good man, but he feared that he had no depth of repentance. Overhearing some poor old women talking of the new birth and of the ways of resisting the devil, he became convinced that he wanted the true tokens of a truly godly man. Though he meditated much on their saying, though he gave up all his evil companions and once or twice had visions of the way to salvation, two questions troubled themselves, ‘Whether he was elected?’ and ‘How if the day of grace should now be past and gone?’ After much questioning, distress of mind and manifold temptations that Satan put in his way, he gained some comfort from the Scriptures. The preaching and talk of Gifford, the Bedford minister, made him feel worse and worse; he seemed to himself to be utterly base and corrupt. Temporary comfort came in the Song of Solomon, but about a month after, a very great storm came down upon me, which handled me twenty times worse than all I had been before. Slightly was continually with him; he feared that he had blasphemed against the Holy Ghost. This temptation lasted about a year, but partly from texts in the Bible, and partly from the ministrations of Gifford and Luther’s ‘Comment on the Galatians,’ he received some comfort. Even so, he was subject to another temptation, which endured a year, “to sell and part with the most blessed Christ.” He feared that he had committed the unpardonable sin, and he was so torn between despair and hope that, after another conflict of three-quarters of a year, he fell into sickness. Even then he was tempted, but his mind and body grew whole together, and from this time on, about 1655, he seems to have felt himself redeemed.

In 1653 Bunyan joined the Bedford churh, and two years later, “after I had been about five or six years awakened,” he began preaching at the suggestion of some of the most able of the town. He was first appalled by the gravity of his mission, but finding that he gave comfort to many he grew more confident. The secret of his success lay in the fact that he preached what I felt, what I smartingly did feel; even that under which my poor soul did groan and tremble to astonishment. So great was the sincerity and success of his mission that he raised for himself much opposition among the Anglican divines, and was much slandered. Almost simultaneously with the launching of his literary career as author with a book of controversy directed against the Quakers, ‘Some Gospel Truths Opened’ (1666).

On 12 Nov. 1660, shortly after the return of Charles II, Bunyan was arrested for preaching. Refusing to flee or to agree not to preach, he was lodged in the Bedford county jail. Failing to get his case heard, he remained there for 12 years, except for a few weeks of liberty in 1665. During his unjust imprisonment, Bunyan had some access to the outside world, frequently visiting his church and once going as far as London. In the sense that he had much leisure to write, his confinement was of advantage to him. He composed and had published many books of which the most famous was ‘Grace Abounding to the Chief of Sinners’ (1666). On his release, in 1672, from jail, in accordance with the Declaration of Indulgence of Charles II, he became minister of the Bedford church. In 1675-76, Bunyan was again imprisoned, this time for six months in the small jail on Bedford bridge. The fact is important because it is probable that there he wrote, among other books, at least two-thirds of the first part of ‘Pilgrim’s Progress.’ This part was first published in 1678, and a second edition with some additions, as the case of Mr. Worldly Wiseman, appeared the same year. The third came out early in 1679 and since then editions have been numerous. The second part appeared in January 1685. In the interval between the two were published the other books for which Bunyan is best known next to ‘Pilgrim’s Progress’ and ‘Grace Abounding’—‘The Life and Death of Mr. Badman’ (1680) and ‘The Holy War’ (1682). Aside from the imprisonment of 1665 and some persecution Bunyan’s last years were quiet. His influence from his preaching and his writing was very widely diffused, and he was, in these respects, second to scarcely any man in England. He met his death in doing a characteristic act of charity: having successfully reconciled a father and son at Reading, he was, while continuing his journey to London, overtaken by a rain storm and died from the effects of the exposure, in his 60th year.

Bunyan ranks among the most popular of English authors: his ‘Pilgrim’s Progress’ is said to be read more widely than any other book in the language, except the Bible. It has been translated into over 70 foreign tongues. The reasons for its extraordinary vogue lie in the simplicity of the style, the fervor of the imagination, the universality of its spiritual appeal; no book is more widely intelligible or freer from sectarian dogmas. In all his books he appears as an unsurpassed master of a simple, direct, vernacular style. See ‘Holy War; The; Pilgrim’s Progress.’

Bibliography.—Editions. Bunyan’s four more important works are numerous, and there are several of his collected works. Altogether he wrote about 60 books. Among the many lives that of the Rev. John Brown, ‘John Bun-
van. His Life, Times and Work (1885), is the most complete and authoritative. Froude's life in the 'English Men of Letters' (1880); and that by Canon Venables in the 'Great Writers Series' are also good; to the latter a full bibliography is added. Consult also Dowden, 'Puritan and Anglican Studies' (1901) and Jones op. cit. BUNZLAU, boons'low, Germany, the name of several European towns, chief of which are:

1. A town of Prussia, in the province of Silesia, near the Bober, 25 miles west of Liegnitz. It is a flourishing town, rich in manufactures, and has a trade in coal, iron, and other products.

2. Jung Bunzlau, a town of Bohemia, 31 miles northeast of Prague, the capital of the circle of Bunzlau. It stands on the left bank of the Vltava, and has an old castle, an ancient town house, and other interesting buildings. Its inhabitants are chiefly engaged in manufacturing cottons, woollens, starch, sugar, spirits, beer, etc. Pop. 11,500.

3. Alt Bunzlau, a small town of Bohemia, situated on the Elbe.

BUOL-SCHAUENSTEIN, bwol-shawn-en-stin, Karl Ferdinand (COUNT), Austrian statesman: b. 17 May 1797; d. Vienna, 28 Oct. 1855. He was Minister in succession at Carlsruhe, Stuttgart, Turin and Saint Petersburg. He was second Austrian plenipotentiary at the Dresden Conference (1850), after which he was appointed to London until the death of Schwarzenberg recalled him to Vienna to hold the portfolio of foreign affairs. He presided at the Vienna Conference in 1855, and represented Austria at the Congress of Paris.

BUONAPARTE. See BONAPARTE.

BUONARROTI, bwon-rah-rot-te, Filippo: b. Pisa, 11 Nov. 1761; d. Paris, 15 Sept. 1828. He received an excellent education under the auspices of the Grand Duke Leopold, but forfeiting the friendship of that prince on account of his sympathies with the French revolutionists, he resorted to Corsica, where he commenced his career as a character actor and returned to Paris in 1814. The cask buoy is in the form of a cask; the larger are employed for mooring, and are called mooring buoys. Spar buoys are wooden poles weighted at the thick end, by which they are moored. They are used in inland waters and in situations where, by reason of ice, a norbuoy's anchor would be damaged in winter. Whistling buoys are provided with apparatus, operated by a bell, which sounds a signal in foggy weather. The life or safety buoy is intended to keep a person afloat till he can be taken from the water. Its most usual form is a ring of cork covered with a signal device such as a light or bell.
buoys serve as a guide at night. Some buoys are fitted for generating and burning acetylene gas, and are often made to carry a charge to last six months or more. Electric buoys are illuminated by connection with power on shore by means of a cable.

**Bupalus**, Greek sculptor fl. at Chios about 500 B.C. He and his brother Athenis are best known for their satirical conflict with the poet Hipponax. Augustus adorned many of the Roman temples with works of the two brothers, who used the pure white marble of Paros. Pausanias represents Bupalus as being an elegant architect as well as a sculptor.

**Buphaga**, bū'fa-ga, a genus of birds of the starling family (*Sturnidae*), whose species are found in various parts of Africa, where they are of great use from their habit of feeding on the parasites infesting cattle. They are popularly known as beef-eaters or ox-peckers, and are distinguished from the true ox-peckers by their shorter beak, bare nostrils, more curved claws and some other characters. The South African ox-pecker (*B. africana*) inhabits Natal, while farther north the genus is represented by a red-billed species (*B. erythrophthalmus*). The third species is found still farther north and also in the Transvaal.

**Buphagus**, in ancient mythology, a son of Japetus and Thornax, who was killed by Diana for an attempt upon her chastity. A river of Arcadia was named after him. Buphagus was also one of the surnames of Hercules, which was given to him on account of his gluttony.

**Buphonia**, bū-fō'nē-a (Gr. ἐβοσφόνα ox-killer), an ancient Athenian festival in honor of Zeus, celebrated every year on the 14th of Scirophorion, on the Acropolis. Barley and wheat were placed on the altar, and the ox destined for the sacrifice was permitted to go and eat the grain, when a priest armed with an axe and slewed the ox, and then secreted himself. The other priests, as if not knowing the author of the deed, made inquiry, and, failing to ascertain anything, for lack of a better victim arraigned the axe, found it guilty and condemned it. The Buphonia were also called Diopilia.

**Buprasium**, a town of ancient Greece, in Elis, often mentioned by Homer as one of the chief cities of the Epians. It had ceased to exist in the time of Strabo, but the name was still attached to a district situated on the left bank of the Larissus, and on the road leading from Dyme to Elis. The region is now identified with the plain of Bakouma.

**Buprestideae**, bu-prē'stī-dē, a family of coleopterous insects (bettle), many of which are remarkable for the splendor of their appearance. This family is included in the pentameric section of Coleoptera, which was formed by Latreille, and so named because the members of both five-jointed in the tarsi. The characters of the Buprestide are: body ovate, elongated, somewhat broad and obtuse in front, but pointed behind; eyes oval, with the antennae finely serrate inserted between them; jaws powerful. The larvae are mostly wood-borers although some of the smaller species live in leaves or galls. They walk slowly, but fly with great rapidity, especially in warm weather. They are very fond of sunning themselves on bushes or the branches of trees. When one attempts to seize them, sometimes even when one approaches them, they allow themselves to fall suddenly to the earth, or fly rapidly away. There are several hundred species known to this family, over 200 species occurring in North America, and the tropical species are those which are chiefly distinguished by the brilliancy of their colors. The prevailing color appears to be green, but species are often found of a blue, red, golden or other color. The most injurious is the *Chrysobothris fermonata*, an apple borer. The largest are the *B. Chalcephora*, which bore into pines. The *B. gigas* of Linneus, which is about two inches in length, and one of the largest of the family, has bright golden elytra, or wing-cases, which are often used as ornaments by the inhabitants of South America, of which continent it is a native.

**Bur-marigold**, a large genus of annual and perennial herbs (Bidens) of the family Asteraceae, mostly natives of North America, but widely distributed in other countries, chiefly as weeds, but some as garden plants. The best-known ornamental species is *B. grandis* or *B. floridana*, a native of Mexico. Several species are common in eastern North America, where they are variously known as devil's bootjack, stick-tight, beggar-tick, Spanish-needle, etc. They are especially troublesome in wool and on clothing, to which the seeds stick like burs. Some species are valuable as honey plants.

**Bura**, in ancient mythology, a daughter of Jupiter, or, according to some authorities, the offspring of Ion and Helice, from whom Bura, or Buris, once a flourishing city of ancient Greece, on the Bay of Corinth, received its name.

**Bura**, in ancient Greece, one of the 12 original Achaean cities, which stood formerly close to the sea, on the Bay of Corinth, but, having been destroyed, with the neighboring town of Helice, by a terrible inundation, the surviving inhabitants rebuilt it afterward about 40 stadia from the coast, and near the small river Buraicus. Bura was situated on a hill, and contained temples of Ceres, Venus, Bacchus and Lucina, the statues of which were sculptured by Euclidas of Athens. On the banks of the river Buraicus was a cave consecrated to Hercules, and an oracle usually consulted by the throwing of dice. The ruins of Bura are close to the road from Megastenia to Vostitza, and the cave of Hercules Buraicus is visited by tourists.

**Burbank, Luther**, American naturalist, author and plant originator: b. Lancaster, Worcester County, Mass., 7 March 1849; of English-Scotch ancestry; educated in the common schools and local academy; worked as a boy for the Ames Plow Company, agricultural implement manufacturers, Worcester, Mass., where he exhibited marked inventive abilities, but soon began market-gardening and seed-raising in a small way, developing the well-known Burbank potato in 1873; removed to Santa Rosa, Cal., 1 Oct. 1875, where he has since resided and carried on his work. His many and important new creations of fruits, flowers, vegetables, timber trees, grains and
grasses have made him the best known plant-
orticulturist in the world. The characteristics
which are the special factors in the success of
his work are, the large extent of his experi-
ments, his keenness of perception of slight
variations in plant qualities and the rapidity
with which he develops new qualities, the
rapidity being due to a combination of multiple
hybridizing, selection and grafting of seedling
plants on mature stocks, so that immediate re-
results as to flowers and fruits are obtained from
seedling stems. But the final and most import-
ant factor in Burbank's success is the inherent
personal genius of the man, whose innate
sympathy with nature, aided by the practical
education in plant biology derived from 50
years of constant study and experiment, enable
him to perceive correlations and outcomes of
plant growth which seem to have been visible to
no other man. As the history of Burbank's
life is the history of his work, the remainder of
his biographical sketch may advantageously be
devoted to a brief consideration of the character
and career of this remarkable man, with some
of the new plant varieties. Burbank has originated
and introduced a remarkable series of plums and
prunes. No less than 60 varieties are in-
cluded in his list of offerings, and some of
them, notably the Gold, Wicken, Apple, Oc-
tober, Chako, America, Climax, Formosa, Bart-
lett, Santa Rosa and Beauty plums and the
Splendor, Sugar, Giant and Standard prunes are
among the best known and most successful
kinds now grown. He has also perfected a
stoneless prune, the Abundance, and has created
an absolutely new species, the plumcot, by a
combination of the common plum and the apri-
cot. The Sugar and Standard prunes promise
to supplant the French prune in California.
The Bartlett plum, cross of the bitter Chinese
simoni and the Delaware, a Burbank hybrid,
has the exact fragrance and flavor of the Bart-
lett pear. The Climax is a cross of the simoni
and the Japanese triflora. The Chinese simoni
produces almost no pollen, but few grains of
it ever having been obtained; but these few
grains have enabled Burbank to revolutionize
the whole plum shipping industry. Most of
Burbank's plums and prunes are the result of
multiple crossings, in which the Japanese var-
eties have played an important part. Hundreds
of thousands of seedlings have been grown and
carefully worked over in his 40 years' exper-
iments with plums and single trees have been
made to carry as many as 600 varying seedling
grafs.
Burbank has originated and introduced the
Van Deman, Santa Rosa, Alpha, Pineapple,
*No. 80,* Dazzle and other quinces; the Leader,
Opulent and National peaches, cross-bred from
the Muir, Wager and White nectarine; the
Winterstein and Goldridge apples; and has
made interesting, although not profitable,
crosses of the peach and almond, and plum and
almond.
Next in extent, probably, to his work with
plums is his long and successful experimentation
with berries. This work has extended through
33 years of continuous labor, and has in-
volved the use of over 50 different species of
Rubus, and has resulted in the origination and
introduction of 10 new commercial varieties,
mostly obtained through various hybridizations
of dewberries, blackberries and raspberries.
Among these may especially be mentioned the
Phenomenal, a hybrid of the Western dewberry
(R. urginsus) and the Red raspberry (R. ideous),
fixed in the first generation, which ripens its
main crop far ahead of most raspberries and
blackberries and that this pro-
portions and exquisite quality; the Iceberg, a
cross-bred white blackberry derived from a
hybridization of the Crystal White (pistillate
parent) with the Lawton (staminate parent)
and with beautiful snow-white berries so nearly
transparent that the small seeds may be seen
in them; the Balloon berry, selected from a
complicated cross of many species; the Him-
laya, the most rapid growing and by far the
most productive blackberry in existence, of
unequalled quality and of great value in Cali-
ifornia and other mild climates; also a wonder-
ful series of absolutely thornless blackberries
of great productiveness and superior quality.
The thornless berry has not yet been generally
introduced, but will no doubt supplant the
thorny varieties nevertheless, as one of the
most interesting feature of Mr. Burbank's brief account,
in his "New Creations" catalogue of 1894, of
the berry experimentation, is a reproduction
of a photograph showing *a* sample pile of
brush 12 feet wide, 14 feet high and 20 feet
long, containing 63,000 two- and three-year-old
seedling bushes (40,000 Blackberry X
Raspberry hybrids and 25,000 Shaffer X Gregg
hybrids) all dug up with their crop of ripening
berries. The photograph is introduced to
indicate the reader some idea of the work neces-
sary to produce a satisfactory new race of
berries. Of the 40,000 Blackberry-Raspberry
hybrids of this kind 'Paradox' is the only one
now in existence. From the other 25,000
hybrids two dozen bushes were reserved for
further trial.
Leaving Burbank's other fruit and berry
creations unmentioned, we may refer to his
curious cross-bred walnut results, the most
astonishing of which is a hybrid between
Juglans californica (staminate parent) and
J. regia (pistillate parent), which grows with
an amazing vigor and rapidity, the trees in-
creasing in size at least twice as fast as the
combined growth of both parents, and the
clean-cut, glossy, bright-green leaves, from two
to three feet long, having a sweet odor like
that of apples. This hybrid produces no nuts,
but curiously enough the result of a nearly
similar hybridization (i.e., pollen from nigra
on pistils of californica) produces in abundance
large nuts of a quality superior to that pos-
sessed by either parent. These new species of
walnut are now known as "Paradox" and
"Royal" respectively.
Of new vegetables Burbank has introduced,
besides the Burbank and several other new
potatoes, new tomatoes, sweet and field corn,
squashes, asparagus, etc. Perhaps the most in-
teresting of his experiments in this field is the
successful production of a whole series of
giant spineless and spiculeless cactus, both for
forage and fruit (the spicules are the minute
spines, much more difficult to get rid of than the
conspicuous long, thorn-like
spines), edible for stock, and indeed for man.
This work is chiefly one of pure selection, for
the cross-bred forms often seem to tend

BURBANK
strongly to revert to the ancestral spiny condition.

Among the many new flower varieties originated by Burbank may be mentioned the Peach-blow, Burbank, Coquito and Santa Rosa roses, the Splendor, Fragrance (a fragrant form) and Dwarf Snowflake callas, the enormous Shasta and Alaska daisies, the Ostrich plume, Waverly, Snowdrift and Double clematis, the Hybrid Wax myrtle, the extraordinary Nicotunia, a hybrid between a large, flowering Nicotiana and a petunia, numerous hybrid Nicotianas, a hundred or more new gladliots, an amelopsia, numerous amaryllis, various dahlias, the Fire poppy (a brilliant flame-colored variety), striped and carnation poppies, a blue Shirley (obtained by selection from the Crimson field poppy of Europe), the Silver lining poppy (obtained by selection from an individual of *Papaver umbrosium* showing a streak of silver inside) and a silver interior and crimson exterior, and a crimson California poppy (*Escholtzia*) obtained by selection from the familiar golden form. Perhaps his most extensive experimenting with flowers has been done in the hybridizing of lilies, a field in which many botanists and plant breeders have found great difficulties. Using over a hundred varieties as a basis of his work, Burbank has produced a great variety of new forms. "Can my thoughts be imagined," he says, in his *New Creations* of 1893, "after so many years of patient care and labor (he had been working over 16 years) as, walking among them (his new lilies) on a dewy morning, I look upon these new forms of beauty, on which other eyes have never gazed? Here a plant six feet high with yellow flowers, beside it one only six inches high with dark red flowers, and further on one of pale straw, or snowy white, or with curious dots and shadings; some delicately fragrant, others faintly so; some with upright, others with nodding flowers, some with dark green, woolly leaves in whorls, or with polished, light green, lance-like, scattered leaves."

So far no special reference has been made to the more strictly scientific aspects of Burbank's work. Burbank has been primarily intent on the production of new and improved fruits, flowers, vegetables, trees, grains and grasses for the immediate benefit of mankind. But where biological experimentation is being carried on so extensively it is obvious that there must be a large accumulation of data of much scientific value in its relation to the great problems of heredity, variation and species-forming. Burbank's experimental gardens may be looked on from the point of view of the biologist and evolutionist as a great laboratory in which, at present, masses of valuable data are, for lack of time and means, being obtained. In a *Burbank's Own* particular scientific beliefs touching the "grand problems" of heredity we have space to record but two; first, he is a thorough believer in the inheritance of acquired characters, a condition disbelieved in by the Weismann school of evolutionists; second, he believes in the constant mutability of species, and the strong individuality of each plant organism, holding that the apparent fixity of characteristics is a phenomenon wholly dependent, for its degree of reality, on the length of time this characteristic has been ontogenetically repeated in the phylogeny of the race. See *PLANT-BREEDING*.

For other accounts of Burbank and his work, consult articles in the illustrated magazines: *New Creations in Plant Life* by W. S. Harwood. Burbank has written 12 large volumes, *Luther Burbank, His Methods and Discoveries and Their Practical Application*; *The Training of the Human Plant*; and his series of catalogues, 1893-1901, called *New Creations*; and has several shorter volumes under preparation covering an enormous amount of experimental data on plant life in all its aspects.

VERNON L. KELLOGG, Professor of Entomology, Leland Stanford Junior University.

BUBOT, a fresh-water fish (*Lota lota*) of the cod family, inhabiting northern Europe and America. It is numerous in the inland waters of the Northern States and Canada, where it displays the nocturnal voracity of its race. It ordinarily weighs about five pounds, but has small market value. It is more often called cusk, ling or loche among us, than burbot, which is the British designation.

BURBRIDGE, Stephen Gano, American soldier: b. Scott County, Ky., 19 Aug. 1831; d. 1894. He organized the famous 26th Kentucky Regiment, which he led for the Union at Shiloh, where he was promoted to the rank of brigadier-general of volunteers. He was engaged in the Vicksburg campaign, and led the charge at Arkansas Post and at Port Gibson, being the first to enter each of these places; was retired with the brevet of major-general in 1865.

BURCH, Charles Sumner, American Protestant Episcopal bishop: b. Pincnery, Mich., 30 June 1855. A graduate of the University of Michigan in 1875; after engaging in publishing business in Chicago; he was editor of the Grand Rapids Evening Press from 1897 to 1905. He had taken deacon's orders in 1895 and was ordained to the priesthood in 1905. He was rector of Saint Andrew's, Staten Island, N. Y., until 1911, when he was consecrated suffragan bishop of New York.

BURCHARD, Samuel Dickinson, American clergyman: b. Steuben, N. Y., 6 Sept. 1812; d. Saratoga, N. Y., 25 Sept. 1891. He was graduated at Centre College in 1836 and became a prominent lecturer in Kentucky on the anti-slavery and temperance questions. He was for many years a Presbyterian pastor in New York. In 1885 he became pastor emeritus. During the presidential campaign of 1884 a company of clergymen, about 600 in number, called on James G. Blaine, the Republican candidate, at the Fifth Avenue Hotel, New York. Dr. Burchard made an address, in which he affirmed that the antecedents of the Democracy were "Dum, Romanism and rebellion," and this denunciatory speech on the very eve of the election created intense excitement throughout the United States and alienated from Blaine many Democratic votes upon which he had reckoned. It is generally conceded that Burchard was thus largely instrumental in electing Grover Cleveland.
BURCHIELLO, doo-ché'ël'ló, Domenico, Italian poet: fl. 15th century at Florence, where he was probably born. He died at Rome, about 1449. He was the son of a barber named Giovanni, and was called originally only Domenico. He assumed the name of Burchiello afterward for reasons that cannot be assigned. His fame began about 1425. He was first registered as a barber in 1432. Some writers have reproached him for shameless vices, and represented him as a low buffoon who did everything for money. Others have defended him. His shop was so famous that learned and unlearned, high and low, assembled there every day, and Cosimo the Great caused a picture of it to be painted on one of the arches of his gallery. It appears here divided into two portions; in one Burchiello is acting the part of a barber; in the other that of a musician and poet. The portrait of Burchiello himself is painted over his shop. It is extremely difficult to decide upon the absolute value of his satires, as the local and personal allusions in them are obscure. They were composed of his contemporaries, with a studied aim at security and extravagance of expression. His style is, nevertheless, pure and elegant. His burlesque sonnets are enigmas, of which we have no intelligible explanation, notwithstanding what Doni has done. The descriptive arts are very easily understood; but the wit they contain is, for the most part, so coarse, that the satire fails of producing its effect. They are, on the whole, lively, but licentious. The best editions of his sonnets are those of Florence (1568) and of London (1767).

BURCKHARDT, Max Eugen, Austrian writer on jurisprudence, poet, novelist and dramatist: b. Korneuburg 1854; d. 1912. He studied at the University of Vienna, rendered efficient service for several years as a member of the ministry of education, and received in 1890 his appointment as director of the Hoftheater (court theatre) in Vienna, an office so well suited to his talents that it called forth a series of appropriate works. Thus, in 1896 he published 'Das Recht der Seelen' (Berlin 1905); 'Gottfried Wunderlich' (1906); 'Das Theater' (Frankfurt am Main 1907); 'Im Paradies' (Wien 1907); 'Die verflixten Frauenzimmer' (1909); 'Jene Asra' (Salzburg 1910); a novel of distinction entitled 'Trucarla' in 1910; and in 1912 his 'Cillis — Sina — Gabrielle: Briefe von und an Carl Rahl.' It should be noted that, before his appointment as director of the court theatre, he had published his 'Gesetze und Verordnungen in Kultussachen' (1887) and the poem entitled 'Das Lied vom Tannhäuser' (1888).

BURCKHARDT, boork'hart, Jakob, Swiss author, eminent as a student and critic of Italian art and as an historian: b. Basel 1818 d. 1897. At the university of his native town, and later at the University of Berne, he became interested in history and theology. His first appointment was as professor of the history of art and civilization at the University of Basel, and this connection he maintained to the end of his life, with the exception of a few years spent at Zürich as an instructor in the University College. His most important works are 'Die Zeit Constantins des Grossen' (Leipzig 1880); 'Der Cicerone; Eine Anleitung zum Genuss der Kunstwerke Italiens, 4 Auflage, unter Mitwirkung des Verfassers und anderer Fachgenossen bearbeitet von Dr. Wilhelm Bode' (parts 1 and 2, Leipzig 1879) with its English versions, 'The Cicerone, or Art Guide to Painting in Italy' (ed. by A. von Zahn and trans. by Mrs. A. H. Clough, London 1873; 2d ed. 1875); 'Geschichte der Renaissance in Italien' (1st ed., 1860, 8th ed., 1902, and English translation, 'The Civilization of the Renaissance in Italy,' London 1890); 'Geschichte der Renaissance in Italien und ihres Nachfolgers und der Aufklärung' (1890—91); 'Griechische Kulturgeschichte' (3 vols., 1898—1900). Material additions to and enhancement of the value of 'Der Cicerone' must be credited to Dr. Bode and the other editors.

BURCKHARDT, Johann Karl, German astronomer: b. Leipzig, 30 April 1773; d. 22 June 1825. He acquired a fondness for astronomy from the study of the works of Lalande, and made himself master, at the same time, of nearly all the European languages. He wrote a Latin treatise 'On the Combinatory Analytic Method' (Leipzig 1794) and studied practical astronomy with Baron von Zach at the latter's observatory on the Seeberg, near Gotha, and assisted his patron, from 1795—97, in observing the right ascension of the stars. Von Zach recommended him to Lalande, who invited him to Paris, where he received him at his house 15 Dec. 1797. Here he distinguished himself by the calculation of the orbits of comets; participated in all the labors of Lalande and those of his nephew, Lefrançois Lalande; took an active part in the observatory in the Île de France; and translated the first two volumes of Laplace's 'Mécanique Céleste' into German (Berlin 1800—02). Being appointed adjunctastronomer by the board of longitude, he received letters of naturalization as a French citizen 20 Dec. 1799. His important treatise on the comet of 1770, which had not been visible for nearly 30 years, although, according to the calculations of its orbit, it should have returned every five or six, was rewarded with a gold medal by the Institute in 1800. This treatise, which contained some improvements in Dr. Ober's mode of calculation, is contained in the 'Memoires de l'Institut' for 1800. During this year he was made a member of the department of physical and mathematical sciences in the Academy; in 1818 made a member of the board of longitude; and, after Lalande's death, astronomer in the observatory of the Ecole Militaire. In 1814 and 1816 he published in French, at Paris, 'Tables to Assist in Astronomical Calculations.' He also wrote some treatises in Von Zach's 'Geographical Ephemerides.'

BURCKHARDT, John Lewis, English African explorer: b. Lausanne, Switzerland, 24 Nov. 1794; d. Cairo, 17 Oct. 1817. He was educated at Neuchatel, Leipzig and Göttingen. In 1806 he went to London and was introduced to Sir Joseph Banks, who accepted his proffered services on behalf of the African Association, founded to explore the interior of Africa. After studying at Cambridge, and inuring himself to hardship and exposure, he sailed for Malta in 1809; and from Malta he proceeded to Tripoli as an Oriental, and studied there for two years Arabic and Mohammedan law. In 1810 he
BURDEKIN — BURDETT

made a tour of Palmyra, Damascus and Baalbek; in 1812 he journeyed through Palestine and Arabia to Egypt; in 1813 he traversed the Nile above Assouan; in 1814 he visited Mecca, successfully personating a Moslem pilgrim; 1815 saw him at the Prophet's tomb at Medina, and he journeyed to Suez and also made the ascent of Mount Sinai in 1816. He died with the main purpose of his life unfulfilled, the exploration of the sources of the Niger, and was buried in his assumed character of a devout Moslem pilgrim. His collection of 150 volumes of manuscript he bequeathed to Cambridge University. His works were all published posthumously: travels in Nubia (1819), in Syria (1822), in Arabia (1829); Notes on the Bedouins and Wahabys (1830); 'Arabic Proverbs' (1830).

BURDEKIN, a river of the northeast of Queensland, with a course of about 350 miles. With its affluent it waters a large extent of country, but it is useless for navigation.

BURDEN, Henry, American inventor: b. Dumblanc, Scotland, 20 April 1791; d. Troy, N. Y., 19 Jan. 1871. He was brought up on a farm, and at an early age showed his inventive genius by making a variety of labor-saving machines, including a threshing-machine. He came to the United States in 1819 and engaged in the manufacture of agricultural implements. He invented an improved plow; the first cultivator made in this country; machines for making horse-shoes and hook-headed spikes used on railroads; a self-acting machine for rolling iron into bars, and a new machine for making horse-shoes, which received a rod of iron and turned out completed shoes at the rate of 60 a minute.

BURDEN OF PROOF, in legal procedure, the obligation to establish by evidence certain disputed facts. As a general rule this burden lies on the party asserting the affirmative of the issue to be tried or question in dispute, or on the party who would fail if no evidence were adduced on either side. Burden of proof is to be distinguished from prima facie evidence or presumptive evidence. Generally, when the latter is shown, the duty imposed upon the party having the burden will be satisfied; but it is not necessarily so. In criminal cases, on the two-fold ground that a prosecutor must prove every fact necessary to substantiate his charge against a prisoner, and that the law will presume innocence in the absence of convincing evidence to the contrary, the burden of proof, unless shifted by legislative interference, will, in criminal proceedings, be on the prosecuting party, though in order to convict he must necessarily have recourse to negative evidence. The burden of proof throughout is on the government. This subject is treated by all writers on Evidence, as Taylor, Roscoe and Powell in England; Dickson in Scotland and Greenleaf in the United States. Consult also Bentham's 'Rationale of Judicial Evidence.'

BURDER, George, Congregational minister: b. London, 5 June 1752; d. 5 June 1832. He started life as an engraver and artist and drifted partially into journalism. He began preaching in 1777 but not publicly recognized until 1784. In the meantime he had been doing the work of a traveling preacher throughout England and Wales. He initiated Sunday schools at Coventry (1785) and he was chief founder of the 'Association of Ministers for the Spread of the Gospel at Home and Abroad' (1793), now called the 'Warwickshire County Association,' which has done much to encourage foreign work among British Congregationalists. In 1803 he became secretary of the London Missionary Society, a post he held until 1827. He also edited the Evangelical Magazine for several years, and in 1804 he was in the foundation of the British and Foreign Bible Society. Among his works are 'The Welsh Indians, a Collection of Papers Respecting a People whose Ancestors Emigrated from Wales to America in the year 1710 with Prince Madoc' (1797); 'Missionary Anecdotes'; 'The Pilgrim's Progress, an Epic Poem,' and several volumes of poems. Consult Bennett's 'History of Dissenters' (1839).

BURDETT, Sir Francis, English politician: b. 25 Jan. 1770; d. 23 Jan. 1844. He was educated at Westminster and after two years at Oxford made a continental tour. In 1796 he obtained a seat in Parliament by the patronage of the Duke of Newcastle; but he soon abandoned the Tory party and made himself conspicuous by his advocacy of liberal measures. In 1802 he stood for Middlesex but though at first elected he finally lost his seat in 1806 after much costly litigation. He was more successful in 1807 at Westminster where his election at the head of the poll was hailed as a great popular triumph. In 1810 he published a letter in Cobbett's Political Register, denying the right of the House of Commons to discuss for libel, as they had recently done in the case of John Gale Jones. This letter, having been brought under the notice of the House, was declared a gross breach of its privileges, and a warrant was issued by the speaker for the committal of Sir Francis to the Tower. He denied the legality of the warrant and declared his determination to surrender only to force. The public mind was strongly agitated, but prorogation of Parliament relieved him from his imprisonment in the Tower, and he perhaps the most popular man in the kingdom. In attaining this popularity he was greatly aided by the graces of his appearance and the talents which he undoubtedly possessed. Ultimately, however, his fervor cooled, and he owed his last seat in Parliament to the Conservatives of Wiltshire.

BURDETT, Sir Henry, K.C.B. (1897), K.C.V.O. (1908), English author, publicist and statistician: b. 1845. Was superintendent of the Queen's Hospital, Birmingham, and the Seaman's Hospital, Greenwich, and secretary of the share and loan department of the London Stock Exchange. He was founder and editor of The Hospital. His works are numerous and cover a wide range. Among them are 'The Sinking Fund of the National Debt'; 'The Patriotic Fund'; 'How to Become a Nurse'; 'Dwellings of the Middle Classes'; 'Helps in Sickness'; 'Health'; 'The Future of Hospitals'; 'Official Intelligences of British, American and Foreign Securities' (17 vols.); 'The National Debts of the Worlds Beyond our Tires'; 'The National Debts of England and Wales'; 'Seventeen years of Securities'; 'Colonial Loans and Development'; 'The Admiralty and the Country'; 'Hospitals and Asy-
lums of the World' (4 vols.); 'Hospitals and Charities'; 'Hospitals and the State'; 'Architec-
tons, Hospitals and Asylums'; 'The Practical Scheme for Old Age Pensions'; 'The Nursing
Profession'; 'Housing of the Poor'; 'Official Nursing Directory'; 'London Water Com-
pany'; 'Light Railways'; and 'Municipal, County and Indian Finance.'

BURDETT-COUTTS, Right Hon. An-
gela Georgina (Baroness) English philanthro-
pert. b. 21 April 1814; d. London, 30 Dec.
1906. In 1837 she inherited much of the prop-
erty of her grandfather, Thomas Coutts, the
banker, on the death of his widow, the Duchess
of Saint Albans (formerly the actress, Miss
Mellon). Besides expanding large sums of
money in building and endowing churches and
churches, she endowed the three colonial bish-
oprics of Cape Town, Adelaide and British Co-
olumbia. She founded an establishment in Saf-
ter Australia for the improvement of the abori-
gines, and established a fishery school at the
Irish village of Baltimore (1887). To the city
of London she presented, besides several hand-
some fountains, the Columbia Market, Bethal
Green (1870), for the supply of fish in a poor
district. She also built Columbia Square, con-
sisting of Model dwellings at low rents, for
about 300 families. The home established by
her at Shepherd's Bush has rendered great as-
sistance to many unfortunate women, and the
People's Palace owes much to her generosity.
In 1871 she was created a peeress in her own
right as Baroness Burdett-Coutts. In 1877 she
organized the Turkish Compassionate Fund, to
relieve the sufferers of the peasants in Turkey,
and in recognition of her services the Sultan
conferred upon her the Order of the Medjidie.
In 1881 she was married to William Ashmead-
Barlett, who in 1882 obtained the royal license
to assume her name.

BURDETT-COUTTS, William Lehman
Ashmead-Barlett, English philanthropist; b.
in the United States in 1851, the son of the
late Ellis Barlett of Plymouth, New England.
He was graduated at Keble College, Oxford,
in 1874, and married in 1881 Angela, Baroness
Burdett-Coutts, whose name he assumed. As
commissioner for the Baroness' Turkish Com-
passionate Fund he proceeded to the theatre
of the Russo-Turkish War in 1877; and sub-
sequently largely developed her schemes for
relieving Irish distress and aiding Irish fisher-
men. The food supply for the poor of London
is a subject that has deeply interested him, and
he has been instrumental in carrying through
some useful acts of Parliament, notably the
Hempstead Heath Act of 1885. He has repre-
sented Westminster in the House of Commons
since 1885.

BURDETTE, Robert Jones, American
humorist, lecturer, writer, preacher: b. Greens-
boro, Pa., 30 July 1844; d. Pasadena, Cal., 19
Nov. 1914. Removed in boyhood to Peoria, Ill.
He was educated in public schools; D.D.,
Reformed University, Michigan City, Ind., M.
Ls. D., Occidental College, California, 1913. Served
as private in the 47th Illinois Volunteers,
1862-65. In 1869 he became night editor of
the Peoria Transcript, and afterward was
associated with other Peoria papers. He be-
came associate editor of the Burlington, Iowa,
Hawkeye in 1872, where he made a reputation
as a humorist. Later he was on staff of the
Brooklyn Eagle, and was editorial contributor
to the Los Angeles Times, and many periodi-
cals. Began to lecture in 1876. He became a
licensed minister of the Baptist Church in 1887,
was ordained in 1903, and became pastor of the
Temple Baptist Church, Los Angeles; pastor
emeritus, July 1909; and was city commissioner
of Pasadena, Cal. He published 'Hawkeye-
tems' (1877); 'Rise and Fall of the Moustache'
(1879); 'Life of William Penn' (1882); 'Innach
Garden' (1897); 'Sons of Asaph' (1876); 'Chimes from a Jester's Bells'; 'Temple and
Temples'; 'Smiles Yoked with Sighs' (poems,
1900); 'Silver Trumpets' (poems); 'Old Time
and Young Tom' (1912); 'Drums of the Forty-
Seventh' (1914).

BURDICK, Francis Marion, American
jurist and author: b. De Ruyter, N. Y., 1 Aug.
1843. He was graduated at Hamilton College
in 1869, and at its law school in 1872. He prac-
tised law in Utica, N. Y., from 1872 to 1883,
and was later professor of law at Hamilton
College and at Cornell. From 1891 he was
professor of law at Columbia University, and
in 1907 was appointed commissioner on uniform
State laws for New York. Besides numerous
articles in law journals his published works
include 'The Law of Sales' (3d ed, 1913); 'The
Law of Torts' (1905; 2d ed., 1908); 'Law of
Partnership' (2d ed., 1906); 'Essentials of
Business Law' (1908).

BURDOCK, a small genus (Arctium) of
course perennial or biennial herbs of the family
Asteraceae, natives of temperate Asia and Eu-
rope, but widely distributed as weeds through-
out the world. Common burdock (A. lappa),
which often attains a height of four feet, is
sometimes planted in Japan, where it has been
improved by cultivation, for its enlarged pars-
nip-like roots, which are eaten as a boiled
vegetable. Formerly the roots were used in
medicine, but they seem to have been supplanted
with many other domestic remedies of doubtful
value. The plant is best known as a weed in
waste land, but usually on good soil. Its globu-
lar burs become attached to the wool of sheep
and to clothing. Their presence injures the
price of wool.

BURDON-SANDERSON, Sir John
Scott, English physician: b. Jesmond, New-
castle-on-Tyne, 21 Dec. 1828; d. 23 Nov.
1905. He was graduated at Edinburgh University
in 1851 and afterward studied at Paris, settling
in London as a practising physician in 1853.
In 1856, while medical officer for Paddington,
his first gave proofs of the eminence to which
he was to attain. In 1870 he gave up his hos-
pital appointments and a valuable private prac-
tice to devote himself exclusively to scientific
research. He held the appointment of profes-
sor of practical physiology and histology at
University College, London, 1871-77; was Jordrell
professor of physiology, 1874-82; Waynfee
professor of physiology at Oxford, 1882-95; and
regius professor of medicine at Oxford univer-
sity, 1895-1903. He is regarded as the
virtual founder of the medical school at Ox-
ford. His methods of research into the diseases
of animals occasioned the violent opposition of
the anti-vivisectionists. He accomplished much
in the way of elucidating the true character
of cholera and tuberculosis. He was created a baronet in 1899, and died without issue. He contributed many papers to scientific publications, and a 'Memoir,' which contains some of his addresses, edited in part by his widow, was published in 1911.

BURDWAN, or BARDWAN, India, town and capital of a division of the same name in the lower provinces of Bengal, on the left bank of the Damoda, 68 miles northwest of Calcutta, with which it is connected by railway. There is a titular rajah of Burdwan, who resides here in a spacious palace, with gardens, etc.; and there are also a large collection of temples and a shrine of Pirba-haram. Pop. 34,477. The division has an area of 13,956 square miles, and a population of about 8,250,000, and is divided into the districts of Burdwan, Bankura, Birbhum, Hugli, Midnapur and Howrah. The chief crops are sugar, indigo, tobacco, cotton and the usual cereals. Mulberry-trees are cultivated and coal is raised.

BUREAU, the chamber or official apartments of an officer of government, and the body of subordinate officials who labor under the direction of a chief. The term "bureau system," or "bureaucracy," is applied to the systems of government in which the business of administration is carried on in departments, each under the control of a chief; and is opposed to those in which the officers of government have a co-ordinate authority. Sometimes a mixture of the two systems is found. Thus the business of the executive branch of government may be carried on by bureaus, while the administration of justice is in the hands of co-ordinate judges. In the United States, bureau is the universal word for a chest of drawers.

BUREAU OF ANIMAL INDUSTRY, The. See Agriculture, Department of.

BUREAU OF BIOLOGICAL SURVEY, The. See Agriculture, Department of.

BUREAU OF CHEMISTRY, The. See Agriculture, Department of.

BUREAU OF CROP ESTIMATES, The. See Agriculture, Department of.

BUREAU OF ENTOMOLOGY, The. See Agriculture, Department of.

BUREAU OF PLANT INDUSTRY, The. See Agriculture, Department of.

BUREAUCRACY, bu-ru-kra-sē, a form of political organization through which the government is carried on by means of bureaus, each of which manages a particular branch of state business. This form of organization is admirably adapted to securing responsibility, since each bureau is hierarchically organized with a chief at its head on whom rests the final responsibility, whereas in the collegial or board system a number of persons of coequal authority divide the responsibility. While the officials of bureaucracies are usually trained and experienced administrators, little affected by public opinion, their tendency is to develop a caste spirit, to overemphasize administrative routine and to become more and more formal and exquisitely formal. They fail to stimulate interest in public affairs or to cultivate patriotism among the masses, thus becoming "pedantocracies." Consult Garner, J. W., 'Introduction to Political Science' (New York 1910); Goodnow, F. J., 'Comparative Administrative Law' (New York 1903).

BURETTE, a graduated glass tube occasionally used for dividing a given portion of any liquid into small quantities of a definite amount.

BURG, boorg, Adrian van der, Dutch painter; b. Dordrecht 1693; d. 1733. He studied under Arnold Houbraken, distinguished himself by his portraits, and acquired a reputation which would have procured him an independence. But intemperate habits rendered his talents of no avail, and hurried him to a premature grave. His freedom of touch and fine coloring are his distinguished excellences. His best-known pieces are two large pictures at Dordrecht, one of which gives a single canvas portraits of the managers of the orphan hospital, and the other portraits of the officers of the Mint.

BURG, Johann Tobias, Austrian astronomer; b. Vienna 1766; d. 1834. He attracted the notice of Van Swieten, who was then at the head of the commission appointed to reform the scholastic establishments of Austria, and through his patronage obtained the means of prosecuting the study of mathematics, and more especially of astronomy, for which he showed a decided inclination. In 1791 he became professor of physics at Klagenfurt, and in 1792 was appointed colleague of Trinecker at the Observatory of Vienna. In 1798, the French Institute having proposed a prize for the determination, by at least 500 observations, of the mean place of the apogee and ascending node of the moon, Burg sent in a memoir in which the determination was made by a most accurate and ingenious method, not from 500 but 3,322 observations. The tables contained in it were afterward published by the Institute, and constitute the chief foundation of his fame. In 1813 he became almost entirely deaf and retired from public life to Wiesenau, Carinthia.

BURG, Prussia, a town in the province of Saxony, 12 miles northeast of Magdeburg, on the Ihle, where it joins a canal uniting the Havel with the Elbe. It has four churches, a hospital, a gymnasium and a well-endowed institution for the bringing up of orphan children, and is the seat of civil and judicial administration for the circle. Its manufactures are extensive, especially of woollens, for which it was a centre as early as the 12th century. Cloths for army purposes are largely made. There are also spinning mills, dye works, machine works, tanneries, oil works, brick kilns, foundries and a large trade in farm produce. The prosperity of Burg dates from the end of the 17th century, when a large number of French, Palatinate and Walloon refugees took shelter there. Pop. 24,074.

BURGAGE TENURE, in England, a tenure in socage, whereby burgesses, citizens or townsmen hold their lands or tenements of the King or other lord for a certain yearly rent. In Scotland this tenure has been known as "red heart," but in royal burghs is held under the Crown, proprietors being liable to the (nominal) service
of watching and warding, or, as it is commonly termed, "service of burgh, used and wont."

Burgas, boor-gas, or Bourgas, Turkey, a seaport of the province of eastern Rumania, situated on the Black Sea. The bay on which it stands is of sufficient depth for large vessels, and the exports are grain, iron, butter, wine and also wooden goods. For a considerable distance from the terminal of the Sofia-Burgas Railway, and contains several mosques and Christian churches. The principal source of the prosperity of the town is the manufacture of pottery, pipe-bowls, cups, etc., for which a superior clay is found in the neighborhood. Pop. about 12,000.

Burgdorf, boor-deeorf, Switzerland, a town in the canton of Bern, situated on the Aar. It is the market for the linen goods and cheeses of the Emmental, and manufactures linen, wool, tobacco and chocolate. The castle which stands here was formerly a place of great strength. Pestalozzi resided from 1798 to 1804 in the château of Burgdorf, and converted it into an educational institution. In the vicinity are the baths of Sommerhaus. Pop. 9,381.

Burgeo Islands, Newfoundland, a group of islands on the southern coast, much visited by summer tourists and artists from the Eastern States and Canada, lat 47° 33' N. and long. 57° 44' W. The population is chiefly engaged in fishing. Burgeo, the principal town, has a population of less than 1,000. In 1765 Captain Cook made an observation of the sun's eclipse here.

Burger, Gottfried August, German poet: b. 1 Jan. 1748, at Wolmerswende, near Halberstadt; d. Göttingen, 8 June 1794. He showed an early predilection for solitary and gloomy places and the making of verses, for which he had no other model than hymnbooks. He learned Latin with difficulty. In 1764 he studied theology at the University of Halle, and in 1768 he went to Göttingen, in order to exchange theology for law, but soon found that his connections here were equally disadvantageous to his studies and his morals, so that his grandfather, who had hitherto maintained him, withdrew his support. The friendship of several distinguished young men at the university was now of great service to him. He studied the ancient classics and the best works in French, Italian, Spanish and English, particularly Shakespeare, and the old English and Scottish ballads. Percy's 'Reliques' was his constant companion. His poems soon attracted attention. In 1772 he obtained the office of bailee in Alten-Gleichen, but throughout his life he was involved in pecuniary difficulties. In 1774 he married the daughter of a neighboring bailiff, named Leonhart, but his marriage was unfortunate. He conceived a violent passion for the sister of his wife and married her in 1784, soon after his first wife's death. She also, his celebrated "Molly," died the first year of their marriage. At the same time he was obliged, by intrigues, to resign his place. He was made professor extraordinary in Göttingen, but received no salary, and this favorite poet of the nation was obliged to gain his living by poorly rewarded translations for booksellers. A third marriage in 1790, with a young lady of Swabia, who had publicly offered him her hand in a poem, completed his misfortunes; he procured a divorce from her two years afterward. The government of Hanover afforded him some assistance shortly before his death. His songs, odes, elegies, ballads, narrative poems and epigrams hold a very high place in German literature, especially commending his work, though Schiller criticised him very severely. The first collection of his poems appeared in Göütingen in 1778. His complete works were first published by Reinhard at Göütingen in four volumes between 1796-98, and this edition has been repeatedly published since. Other editions of his works and letters have also been published, and his life has been written by Döring; Pröhle, 'G. A. Bürger: Sein Leben und Seine Dichtungen' (Leipzig 1865), and others.

Burger, Ludwig, German historical painter and illustrator: b. Cracow, 19 Sept. 1825; d. Berlin, 22 Oct. 1884. He studied at the Berlin Art Academy, at the same time working at book-illustrating; he was also a pupil of Couture in Paris. Among his best drawings are the illustrations for the works of La Fontaine and a collection of 20 plates known as 'Die Kanone.' After 1869 he devoted himself to decorative painting, his most important work in this line being the walls and ceilings in the Berlin City Hall (1870) and the colossal figures symbolizing the warlike virtues at the School of Cadets at Lichterfelde (1878).

Burgers, Thomas Francis, Transvaal statesman: b. Cape Colony 1834; d. 1881. He was educated for the ministry at Utrecht and was pastor of the Dutch Reformed Church at Hanover, Cape Colony. Some of the rationalistic views he expressed led to his trial for heresy, but he was acquitted. He was elected President of the Transvaal republic in 1872 and held the office until 1877, when the republic was annexed by Great Britain.

Burgers, Tristan, American statesman and orator: b. Rochester, Mass., 26 Feb. 1770; d. Providence, R. I., 13 Oct. 1853. While 15 years old he attended a school in the vicinity for six weeks, and again the next year for six weeks more. This was all the instruction he received from others until he reached the age of 21. In September 1793, he entered Rhode Island College, now Brown University, graduated three years later with the first honors of his class and was admitted to the bar in 1799. He became a leader of the Federal party, and in 1811 was elected to a seat in the State legislature. In 1815 he was made chief justice of Rhode Island, and afterward became professor of oratory and belles-lettres in Brown University. In 1825 he was elected to Congress, and almost immediately achieved a national reputation by his speech on the judicial branch. He continued in Congress until 1835. Many of his most brilliant efforts were in defense of the American tariff system, and his logic and sarcasm won for him an unrivaled reputation as a debater. Consult Bowen, 'Memoirs of Tris- tan Burgers.'

Burgess, Alexander, American Protestant Episcopal bishop: b. Providence, R. I., 31 Oct. 1819; d. Saint Albans, Vt., 8 Oct. 1901. He was a younger brother of George Burgess, first bishop of Maine. He was graduated from
Brown University in 1838, and from the General Theological Seminary in 1841. He was successively rector at East Haddam, Conn., 1842–43; at Saint Mark's, Augusta, Me., 1843–54; at Saint Luke's, Portland, Me., 1854–62; and at Saint John's, Brooklyn, N. Y., 1867–69; and Christ Church, Springfield, Mass., 1869–78. In 1878 he was consecrated first bishop of the diocease of Quincy, Ill. He wrote a popular religious textbook, Questions for Bible-Classes and Sunday-Schools (1855), and a Memoir of the Life of George Burgess, First Bishop of Maine (1869).

BURGESS, Charles Frederick, American electrochemical engineer: b. Oshkosh, Wis., 5 June 1873. A graduate of the University of Wisconsin, he became instructor and assistant professor of electrical engineering there 1895 to 1900, organized the department of applied electrochemistry and chemical engineering. He developed several electrolytic processes and was appointed, in 1904, investigator of electrolytic iron alloys for the Carnegie Institute and president of the North American Electroplating Laboratories. He is author of ‘The Strength of the Alloys of Nickel and Copper with Electrolytic Iron’ (1910).

BURGESS, Daniel, English ecclesiastical writer: b. Staines, England, 1645; d. London, 26 Jan. 1713. He studied at Oxford but was not graduated because he would not conform to the established church. In 1667 he went to Ireland with Roger Boyle, Earl of Orrery, where he became head of a school established by the latter at Charleville. In 1685 he went to London where he soon attracted attention on account of his humor, vivacity and oratorical power. His publications include ‘Directions for Daily Holy Living’ (London 1690); ‘The Golden Snuffers’ (1697); ‘Proof of God’s Being and of the Scriptures’ Divine Origin’ (1697).

BURGESS, Edward, American naval architect: b. West Sandwich, Mass., 30 June 1848; d. Boston, 12 July 1891. He was educated at Harvard, whence he was graduated in 1871, and became secretary of the Boston Society of Natural History, being editor of the publications of that society. He was instructor of entomology at Harvard from 1879 to 1883. He then became a designer of sailing-yachts. In 1884 he designed the Puritan, the winner of the America’s cup in 1885; and a year later the Mayflower, the winner in 1886. He was also the designer of the Volunteer, which won the cup in 1887.

BURGESS, [Frank] Gelett, American humorist and satirical writer, novelist and illustrator: b. Boston, 30 Jan. 1866. He was graduated from the Massachusetts Institute of Technology in 1887; was a draughtsman with the Southern Pacific Railroad 1887–90, and instructor in topographical drawing in the University of California. He was a designer 1893–94, and in 1895–97 he came prominently before the reading public as a publisher and writer of eccentric and humorous literature, such as his journals and The Lark, and poem, ‘The Purple Cow’ (1897). In 1898 he removed to London, but returned to America in 1900; in 1914–16 he was in Paris as correspondent of Collier’s Weekly. He edited ‘Petit Journal des Refusés’ (1897), and has written ‘The Lark Almanac’ (1898); ‘Vivette’ (1898); ‘The Nonsense Almanac’ (1898); ‘The Lively City o’ Ligg’ (1898); ‘Goops and How to be Them’ (1900); ‘A, B, C, D, E, F, G’ (1901); ‘Romance of the Commonplace’ (1902); ‘A Gage of Youth’ (1901); ‘Burgess Nonsense Book’ (1901); ‘More Goops’ (1903); ‘The Reign of Queen Isy’l’ (with Will Irwin, 1903); ‘The Picaroons’ (with Will Irwin, 1904); ‘A Little Sister of Destiny’ (1905); ‘Are You a Bromide?’ (1906); ‘The White Cat’ (1907); ‘The Heart Line’ (1907); ‘The Maxims of Methuselah’ (1907); ‘Blue Goops and Red’ (1909); ‘Lady Méchante’ (1909); ‘Find the Woman’ (1911); ‘The Master of Mysteries’ (1912); ‘The Goop Directory’ (1912); ‘Love in a Hurry’ (1912); ‘The Master of Mysteries’ (1912); ‘Burgess Unabridged’ (1914); ‘The Romance of the Commonplace’ (new version, 1915).

BURGESS, George, American Protestant Episcopal bishop: b. Providence, R. I, 31 Oct. 1809; d. Hamlet, 23 April 1864. After graduating at Brown University, and holding a tutorship in that college, he traveled in Europe, and studied for two years in the universities of Göttingen, Bonn and Berlin. He was rector of Christ Church in Hartford from 1826 to 1847, when he was consecrated first bishop of the diocease of Maine and became, at the same time, rector of Christ Church in Gardiner. Both offices he filled with great ability. He published two academic poems, a metrical version of a portion of the Psalms; Pages from the Ecclesiastical History of New England (1847); ‘The Last Enemy Conquering and Conquered’ (1850), and various sermons.

BURGESS, George Kimball, American physicist and author: b. Newton, Mass., 4 June 1874. He studied at the Massachusetts Institute of Technology and at the University of Paris, later, in the former institution, and at the universities of Michigan and California, becoming instructor in physics. He was appointed associate physicist in the National Bureau of Standards in 1903, and editor of the Journal of the Washington Academy of Sciences. He translated Le Chatelier’s ‘High Temperature Measurements’ (1901), and Duhem’s ‘Thermodynamics and Chemistry’ (1901). His original work includes ‘Recherches sur la constante de gravitation’ (1901); ‘Experimental Physics, Freshman Course’ (1902); ‘The Measurement of High Temperatures,’ collaboration with H. Le Chatelier (1911; 3d ed. rev., 1912); ‘A Micropymometer’ (1913).

BURGESS, James, Scottish archaeologist: b. Kirkmaho, Dumfriesshire, 14 Aug. 1832. He went to India in 1855, and there entered upon educational work in Calcutta and Bombay. From 1886–89 he was director-general of the archaeological surveys of India. From 1872 to 1884 he published the ‘Indian Antiquary.’ His works include ‘The Temples of Shatriunjaya’ (1869); ‘The Rock Temples of Elephanta’ (1871); ‘Scenery and Architecture in Gujarat and Rajputana’ (1873); and other books; also many writings in the ‘Epigraphia Indica,’ and ‘Archaeological Reports (1874–87).

BURGESS—BURGKM A IR

was educated at Cumberland University, Lebanon, Tenn., and at Amherst College, Mass., where he was graduated in 1867; studied law, and began to practise in 1869. During this year he was appointed professor of English literature and political economy at College, Galesburg, Ill. Two years later he studied in Göttingen, Leipzig and Berlin. On his return in 1874, he became professor of history and political science at Amherst, in 1876 professor of history, political science and international law at Columbia College, and in 1880 professor of constitutional and international history and law. In 1890 he became dean of the faculty of political science; also dean of the faculties of philosophy, pure science and fine arts, holding all of these offices until 1912, when he retired from the active service of the university. In 1906 he became Roosevelt professor of American history and institutions at Berlin University. He received the degrees of A.B., M.A. and L.L.D. from Amherst College, the degree of LL.D. on the burgess roll of Phi th. from Princeton, and from the University of Leipzig, Germany, and the degree of J.U.D. from the University of Berlin. In 1907 he received the order of the Prussian Crown from the Emperor of Germany, and the Albrecht’s Order from the King of Saxony. He has published ‘Political Science and Comparative Constitutional Law’ (1890); ‘The Middle Period of United States History’ (1897); ‘The Civil War and the Constitution’ (1901); ‘Reconstruction and the Constitution’ (1902); ‘The European War of 1914’ (1915); ‘The Reconciliation of Government and Liberty’ (1915); ‘The Administration of Rutherford B. Hayes’ (1915); ‘America’s Relations to the Great War’ (1917), and contributions to reviews on historical, political and legal topics.

BURGESS, Neil, American comedian: b. Boston 1846; d. 19 Feb. 1910. Not long after entering the theatrical profession, he undertook in a stage emergency to fill the place of an actress, and his success in the humorous female role assumed led to his entering that line permanently. He acted in ‘Josiah Allen’s Widow’ and in ‘Widow Bedrot.’ The latter was very popular, as was also ‘Vim,’ produced in 1883. ‘The Country Fair,’ a play which he brought out in 1889, ran for more than two years. Mr. Burgess finally undertook vaudeville acting, Consult Clapp and Edgett, ‘Players of the Present’ (Dunlap Society Publications, New York 1899).

BURGESS, a word used in somewhat varying senses, but generally meaning a freeholder, or a person invested with all the privileges of a citizen in a borough or corporate town. Those entered on the burgess roll of English boroughs are householders who have resided and paid rates for 12 months prior to July in any year. In the United States the uses of the word have undergone some specific changes, and in States having boroughs as political divisions, as Jersey and Pennsylvania, it carries an implication of magisterial authority. See Borough; Burg.

BURGH, berg, a corporate town or borough, more especially the Scottish term corresponding to the English borough, applied to several different kinds of corporations and to towns and cities in Scotland. There are three classes of burghs: (1) A burgh of barony is a certain tract of land created in a barony by the feudal superior and placed under the authority of magistrates. The right of electing these magistrates is vested by the charter of erection sometimes in the baron or superior of the barony and sometimes in the inhabitants themselves. (2) A royal burgh is a corporate body created by a charter from the Crown, the corporation consisting of the magistrates and burgesses of the territory embraced within the burgh. The magistrates are generally a provost and bailies, dean of the guild, treasurer and common council. (3) A burgh of regality is a kind of burgh of barony which had legal jurisdiction (i.e., exclusive over its own territory. The right of free trade in return for bearing certain public burdens was sometimes given to a burgh of barony, in which case it was known as a free burgh. In the United States, the termination "borough" was for generations added to the names of places, as in England. But under a decision of the United States Board on Geographic Names, the form "boro" was adopted, as in "Bristleboro."

BURGHER, the name applied to a former subdivision of the Scottish Seccession Church. The Secession, which originated through the withdrawal of Ebenezer Erskine and some other ministers from the Scottish establishment in 1732, split in two in 1747, part having felt free to take, while others refused, what they deemed an ensnaring burgess oath. They reunited in 1820 under the name of the Associate Synod, and, joining with the "Rele" in 1847, formed the United Presbyterian Church. The name "burgher" is also applied to any citizen of a borough or town.


BURGKMAIR, boork’mär, Hans, German painter and engraver: b. Augsburg 1473; d. about 1531. He is supposed to have been a pupil of Albert Dürer, but studied principally under Schongauer in Colmar, Alsace. Several of his frescoes and paintings in oil and wood are still preserved in his native town; but though possessed of considerable merit, they have contributed far less to his fame than his woodcuts, in which he at least equaled Dürer, and has scarcely been surpassed by Holbein. In 1501 he executed three pictures of Roman basilicas, with scenes from the lives of patron saints, etc. He was one of the first exponents of the Renaissance in Germany. Among his most famous works are the Triumph of the
Emperor Maximilian I, embracing 135 cuts, with a text written by that Emperor; and a series, 'The Wise King,' including 237 cuts, in which the deeds of the same ruler are represented; Consult Wolfsheim in Döhmen's 'Künstler' (Vol. I); Dornhöfer, Uber Burgkmair und Dürer' (1903).

BURGLARY, at common law, the breaking and entering the house of another in the nighttime, with intent to commit a felony therein, whether the felony be actually committed or not. Burglary at common law, and in its first degree, in the statutes of the various States, must, in general, be committed in a dwelling-house actually occupied as a dwelling, but if it be left by the owner animo revertendi, though no person resides in it in his absence, it is still his mansion. But at common law burglary may be committed in a church. In New York (Penal Code § 496), and in some other States in which the New York statute has been adopted, burglary at common law, or in the first degree, must be committed in the nighttime, but in New York and in some other States burglary in the second and third degrees may be committed in the daytime, and it is burglary in the third degree in New York feloniously to enter a building, whether inhabited or not, either in the daytime or night. Before the offense is complete there must be both a breaking and an entry or an exit. An actual breaking takes place when the burglar breaks or removes any part of the house, or the fastenings provided for it, with violence. Constructive breakings occur when the burglar gains an entrance by fraud, conspiracy or threats. The least entry, with the whole or any part of the body, hand or foot, or with any instrument or weapon, introduced for the purpose of committing a felony, will be sufficient to constitute the offense. Burglary is a felony in all of the States, and in North Carolina it may be punished with death or imprisonment. In New York it is punishable as follows: Burglary in the first degree, imprisonment for not less than 10 years; second degree, not exceeding 10 years; third degree, not exceeding five years.

BURGLARY INSURANCE. A contract of indemnity: (1) against direct loss by burglary, or by burglary, theft or larceny of any of the assured's property, occasioned by its felonious abstraction from the interior of the house, building or apartment occupied by the assured as a residence by any domestic servant or other employee of the assured, or by any person or persons, excepting a person whose property is insured; also against direct loss by damage to property insured, and to the premises, caused by burglars or thieves; known as residence burglary insurance; (2) against direct loss by burglary of merchandise owned by the assured, or held in trust or on commission, or sold but not delivered, occasioned by its felonious abstraction from the premises, occupied by the assured for business purposes, by persons, after entry into the premises by the use of force and violence, of which there are visible marks upon the premises; also for direct loss by damage to the merchandise, furniture, fixtures or premises caused thereby; known as mercantile burglary insurance; (3) against direct loss by burglary of money, post office and revenue stamps, bullion, negotiable securities, drafts, promissory notes and merchandise, in consequence of the felonious abstraction of the same from a safe or safes in Döhme's 'Künstler' (Vol. I); Dornhöfer, Uber Burgkmair und Dürer' (1903).

BURGLARY—BÜRGLEN

BÜRGLEN, Switzerland, village in the canton of Uri, about a mile from Altorf, is the traditional birthplace of William Tell. The supposed site of the patriot's house is now

EDWIN W. DeLEON.
BURGOMASTER — BURGOYNE

occupied by a chapel, erected in 1522, upon the walls of which are represented certain well-known scenes from his history. Pop. 1,852.

BURGOMASTER, the title of the chief magistrate of a city or a large town in Germany and the Netherlands, practically equivalent to mayor. It is held by the people, but in most German towns he must have the confirmation of the government.

BURGOMASTER, a sailor's name for certain large domineering gulls of the genus Larus.

BURGON, John William, English Biblical scholar and critic: b. Smyrna, 21 Aug. 1813; d. Chichester, 4 Aug. 1888. He was the son of a Turkish merchant, was sent to study at London University, and later was graduated at Oxford in arts and finally in theology (1848). He became vicar of Saint Mary's, Oxford (1863), Gresham professor of divinity (1867) and dean of Chichester (1876). He was the bitterest and at the same time ablest and most learned of the critics and opponents of the revised New Testament including the revised Greek text. His publications, which are very numerous, include, in addition to controversial tracts and periodical literature, 'The Life and Times of Sir Thomas Gresham' (2 vols., London 1839); 'A Plain Commentary on the Four Holy Gospels' (8 vols., 1855); 'Ninety Short Sermons for Family Reading' (2 series, 2 vols. each, 1855-57); 'Portrait of a Christian Gentleman' (1859); 'The Revision Revised' (London 1883); 'The Lives of Twelve Good Men' (2 vols., 1888); 'The Traditional Text of the Holy Gospels Vindicated and Established and Causes of the Corruption of the Traditional Text' (1890).

BURGOS, boor-góz, Francisco Javier de, Spanish statesman and poet: b. Motril, Granada, 1778; d. 1845. In his dramatic compositions he sought to restore the classical Spanish comedy. Among them are 'The Three Equals'; 'The Masked Ball'; and 'The Optimist and the Pessimist.' He wrote a celebrated 'Ode to Reason.'

BURGOS, Spain, city, the capital of the province of Burgos, and formerly of Old Castle, and once the residence of its kings. It stands on the declivity of a hill, on the right bank of the Arlanzon. The streets are narrow and dark, the finest in every respect being that called the Huerto del Rey. Places of promenade are numerous; the one most frequented, and justly forming the boast of the town, being the Espolon. The most remarkable structure is the cathedral, one of the finest buildings of the kind in Europe. It was begun in 1221, but was not finished for several centuries. It is built of white marble in the form of a Latin cross, and is about 300 feet long by 200 broad, and its size is such that it can be performed in eight chapels at once without confusion. Its interior, as well as its exterior, is of great magnificence, is adorned with fine carvings and paintings, and contains numerous monuments, particularly the tombs of Don Fernando and the Cid, both natives of Burgos, and celebrated throughout Spain for their heroic achievements in the wars with the Moors. There are several other fine churches, but the rest of the public buildings are not deserving of notice. The wool of Old Castle passes principally through Burgos, and it has some woolen manufactures and hat making. Burgos is the see of an archbishop, and at one time contained a university. It was founded about the close of the 9th century as the capital city of the county of Leon and soon became a flourishing city, reaching the height of its prosperity in the 15th century, when it shared with Toledo the prestige of being occupied as a royal residence. It declined rapidly after the removal of the court to Madrid in 1560. To-day, despite its decay, the city is dominated by the grand old cathedral and the personality of the national hero, the Cid Campeador. Pop. about 31,400. The province of Burgos is bounded on the north by Santander, east by Alava, Logroño and Soria, south by Segovia and west by Palencia and Valladolid. The area is 5,650 square miles. Pop. about 340,000.

BURGOYNE, ber-goin', John, English general and dramatist: b. 24 Feb. 1723; d. London, 4 Aug. 1792. He was the son of Capt. John Burgoyne, and grandson of Sir John Burgoyne of Bedfordshire, although he never was a natural son of Lord Bingley. Educated at Westminster, he entered the army at an early age, and while a subaltern eloped with Lady Charlotte Stanley, daughter of the Earl of Derby. Soon after his marriage he sold his commission to pay his debts. He then lived abroad for seven years, but entered the army again in 1758 as captain of the Foot Guards. In 1759, as lieutenant-colonel of the Coldstream Guards, he served at Belle Isle. After an election to Parliament in 1761, he served with distinction in Portugal, and was sent to America in 1775. He joined General Gage at Boston, with large reinforcements, and witnessed the battle of Bunker Hill, of which he has left an animated description. After proceeding to Canada as governor, he returned to England, but in 1777 was despatched to take command of that expedition from Canada against the United States, the failure of which so largely contributed to the establishment of American freedom. Indeed, few battles have led in their ultimate influence to results so great as did the surrender of Burgoyne with 5,791 fighting men, well provided with artillery, at Saratoga, to the army of General Gates. On his return home, he was received by the King with marked disfavor. His wife died in 1776. He had several natural children by Susan Caulfield, an opera singer, one of whom was Field Marshal Sir J. F. Burgoyne. Burgoyne did not possess the genius of a great general, and was in many respects utterly inadequate to the tasks imposed upon him, yet no one can read his work written in his own defense, 'State of the Expedition from Canada' (London 1780), without acknowledging his courage, and detecting qualities which in a less successful career have been of much service to his country. Disgusted with his treatment by the government, he retired to private life, and devoted his leisure to the production of dramas, some of which, as 'The Maid of the Oaks,' 'The Lord of the Manor,' etc., were highly popular in their day. His best play, 'The Heiress,' has been successful not only in its original tongue, but also in several foreign versions. He was made commander-in-chief in Ireland in 1782, and in 1787 was one of the managers of the impeachment of
BURGOYNE — BURGUNDY

Warren Hastings, whose trial lasted through several years after Burgoyne's death. He was born at Saratoga. (See BATTLE OF BURGONY.) Consult De Fomblander, 'Episodes from the Life and Correspondence of Burgoyne' (London 1876); O'Callaghan (editor), 'Orderly Book of Lieutenant General John Burgoyne' (Albany 1860); and Stone, 'Campaign of Death of his father, he became heir apparent to the throne. He was called the Grand Dauphin. Throwing himself into the party of St. Simon and his old teacher, Fénélon, he boldly advocated liberal measures that would have removed many of the worst evils of the old régime. But before his party had more than barely outlined their scheme, he was stricken with smallpox. With him perished the hopes of the party. His wife died two days previous to his death. His second son became Louis XV of France. Consult St. Simon, 'Memoirs' (Paris 1829-30), and Farmer, 'Versailles and the Court under Louis XV' (New York 1896).

BURGOYNE, Sir John Fox, English officer of engineers: b. 24 July 1782; d. 7 Oct. 1871. He was the son of Gen. John Burgoyne; was educated at Eton and at the Royal Military Academy at Woolwich; entered the Royal Engineers in 1796; served at Malta in 1800, in Sicily with General Stewart in 1806, in Egypt in 1807 and in the Peninsula with Sir John Moore and Wellington from 1809 to 1814. He shared in the celebrated retreat on Corunna and was present at all the sieges, generally as first or second in command of the engineers, and at most of the battles of the Peninsula War, in which he was twice wounded. During the War of 1812 he assisted as lieutenant-colonel and chief engineer in the attack on New Orleans. In 1823 he accompanied the army of General Clinton to Portugal in the same capacity. He was appointed chairman of the board of public works in Ireland in 1830 and in 1845 became inspector-general of fortifications in England. He was made a lieutenant-general in 1851, and on the outbreak of the Crimean War was sent to Turkey to provide for the defense of Constantinople. After returning to England he was again sent out to Sebastopol, where he was chief of the engineering department till recalled in 1855. He received the order of the Medjidie from the Sultan of Turkey, was made a general in 1855, the following year was created a baronet, in 1808 a field-marshall and for some years, up to his death, held the appointment of constable of the Tower of London. In 1859 a work was published in London under the title of 'Military Opinions of Gen. Sir J. F. Burgoyne,' in which many of his official writings were collected.

BURGRASS. See SANDBUR.

BURGRAVE (cf. Ger. Burg, town, + Graf, count, governor), a count who in the Middle Ages had command of a castle or burg. Burgraves were appointed to their office by the Emperor or by the bishops, and belonged to the nobility by virtue of their office, which became hereditary. Their powers differed in different places, but as a rule they were entrusted with keeping the public peace, the oversight of trade and the market, and the command of the troops and the police in their districts. As the free cities grew in power they were separated from the jurisdiction of the burgrave. The office lost its significance in the course of the 13th century, but the title is retained by some princely families to the present day, as, for instance, by the Kings of Prussia, who have the title of Burgrave of Nuremberg.

BURGUNDY, Louis (Duke of), Dauphin of France: b. Versailles, 6 Aug. 1682; d. 18 Feb. 1712. He was grandson of Louis XIV and of his famous unobtrusive passions and temper, great haughtiness of bearing and sensuality of life, he is said to have been much corrected in character and conduct by the influence of his preceptor, the saintly Fénélon. At the age of about 15 he married Princess Adelaide of Savoy, was made colonel-in-issimo of the army in 1701, but he failed to show any ability and the result of the unfortunate campaign of 1708 was laid at his door, after which he returned, disgraced, to Paris. On the death of his father he became heir apparent to the throne. He was called the Grand Dauphin. Throwing himself into the party of St. Simon and his old teacher, Fénélon, he boldly advocated liberal measures that would have removed many of the worst evils of the old régime. But before his party had more than barely outlined their scheme, he was stricken with smallpox. With him perished the hopes of the party. His wife died two days previous to his death. His second son became Louis XV of France. Consult St. Simon, 'Memoirs' (Paris 1829-30), and Farmer, 'Versailles and the Court under Louis XV' (New York 1896).

BURGUNDY, a region of western Europe, so called from the Burgundians, a Teutonic people originally from the country between the Oder and the Vistula rivers. In consequence of the wars against the Alamanni, in which they were defeated, they migrated to the region of the upper Rhine and in the beginning of the 5th century they passed over into Gaul, and, as allies of the Romans, after a long struggle obtained possession of the southeastern part of this country. Here they founded a kingdom, which had as its seat of government sometimes Lyons and sometimes Geneva; but having become engaged in a war with the Franks, they were at last wholly subdued in 530. More than one kingdom of Burgundy, so called, subsequently arose, as well as the important county of Burgundy (Upper Burgundy, Franche-Comté); but the most important state of this name was the duchy of Burgundy (Lower Burgundy), consisting principally of the French province Bourgogne (Burgundy, properly so called). The long line of ancient dukes of Burgundy became extinct in 1361 with the death of Duke Philip, and Burgundy was immediately united by King John of France to the French crown. The dignity of Duke of Burgundy was restored in 1363 by his grant of the dukedom to his youngest and favorite son, Philip the Bold (q.v.). In 1368 he married Margaret, the widow of the last Duke Philip of the old line, only daughter and heiress of Louis III, Count of Flanders, and thereby greatly augmented his possessions, which now included Flanders, Mechlin, Antwerp and Franche-Comté. In 1402 he was made regent of France, an appointment which gained him the hatred of the King's brother Louis, Duke of Orleans, and led to the struggle between the Orleanists and the Burgundian factions. In 1404 Philip died and was succeeded by his son, John the Fearless, who was stabbed by the companions of the Dauphin in 1419. His son and successor, Philip the Good (q.v.), gained great acquisitions of territory, including Hainault, Holland, Zeeland, Namur and. in 1431, Brabant and Limburg, which reverted to him from a younger branch of his family. In 1441 he also obtained the duchy of Luxemburg. On his marriage with his third wife, Isabella, daughter of King John of Portugal,
he founded the order of the Golden Fleece (1429). His son, Charles the Bold (q.v.), who succeeded him in 1467, became the inveterate enemy of Louis XI of France, and one of the most powerful princes in Europe. He acquired Guelders in 1475, but perished in the fatal battle of Nancy in 1477, leaving behind him a daughter, Maria, the sole heiress of his states. She married Maximilian of Austria, who thus obtained the Netherlands and Upper Burgundy. The King of France received the dukedom of Burgundy, which he assumed as a male fief. Henceforth the territories that had belonged to Charles shared the fortunes either of France or of the empire. In the empire what was called the circle of Burgundy for a time embraced Franche-Comté and the Netherlands. In the Peace of Madrid, in 1526, Francis I was obliged to agree to the cession of the duchy of Burgundy to Charles V of Germany, but the cession was never carried out, and in the Peace of Cambray, in 1529, Charles renounced his claim to it. Franche-Comté was conquered by Louis XIV and retained by him at the Peace of Nimeguen in 1678. After this time the name Burgundy is best known as designating one of the few provinces of France. The name is now applied to one of the four departments of Yonne, one of the most productive regions in France. Consult Plancher, U., 'Histoire générale et particulière de Bourgogne' (Dijon, 1739-41); 'Geschichte der Burgundionen' (Halle 1874); Barante, B. de, 'Histoire des ducs de Bourgogne de la maison de Valois' (Paris 1833-36).

BURGUNDY (called also Burgundy Proper or Lower Burgundy), formerly a province in the east of France, lying on the west of Franche-Comté and on the south of Champagne. It now forms the four departments of Yonne, Côte-d'Or, Saône-et-Loire and Ain. It is one of the most productive regions in France. The principal product is wine. See BURGUNDY Wines.

BURGUNDY PITCH, the resinous exudation of the stem of the spruce fir (Abies excelsa on old and sun-exposed parts. It is obtained from Switzerland, but is seldom genuine. It is hard and brittle, opaque, of a dull reddish-brown color, empyreumatic odor and aromatic taste. It gives off no water when heated, is not bitter and is free from vesicles. It consists chiefly of resin and a little volatile oil, whence its odor. The resin resembles that of turpentine. The resin is melted in hot water to remove some of the oil and is then strained through a coarse material. Pitch plaster acts as a sweat stimulant to the skin. Burgundy pitch enters also into the composition of the iron plaster. It takes its name from Burgundy in France, where it was first prepared. A pitch resembling it can be prepared from common resin and palm oil, which, unlike Burgundy, is non-soluble in glacial acetic acid.

BURGUNDY Wines, famous French wines, deriving their name from the ancient province of Burgundy. They have a reputation superior to their present popularity. They are nevertheless wines of delicious flavor and bouquet. It has been supposed that they would not well bear a sea-voyage, but it is now set-tled that when transported to America and back, their quality is greatly improved. Burgundy has a medium content of alcohol, acids and solids, is very low in tannin and resembles red in color. The vineyards, consisting of Pinot, Gamay Noir and Meunier grapes, are located half-way up the hillsides (800-1,000 feet high) in the Côte d'Or, between Dijon and Châlons. Three classes of red Burgundy and two of white are recognized, a red wine and a white wine and a red wine and a white wine. The most renowned red wines of Burgundy are Romanée-Conti, Clos-Vougeot, Chambertin and Richebourg. Chambertin was the favorite wine of Louis XVI and Napoleon. Chablis, a white wine, has many admirers but is inferior to the best growths of the Garonne and the Rhone.

BURHÁNPUR, boor-han-poor', a town of the Nimar district, Central Provinces, British India, formerly the capital of Khandesh, is situated on the Tapti River about 300 miles northeast of Bombay, 210 miles east of Surat. It is situated on high ground and is well planned and built, with a rampart of brick and a palace of brick, known as the Red Fort, built by Akbar, who adorned the town with marble halls. It has a mosque and other buildings worthy of note, and was once famous for its manufactures of gold and silver brocade, muslin and silks, which still exist to some extent, though the town has long been declining. Pop. 22,777.

BURHEL. See BAHRI.

BURI, the grandfather of Odin, in Norwegian mythology. According to the legends, 12 streams flowed from the spring Hvergelmir (the roaring cauldron) in Niflheim (the region of shadows), and later in their course were frozen, thus surrounding the region of elemental fire (Muspelheim) with blocks of ice. In the conflict of the ice with the fire, the rime, or frosty snow, was melted and the drops formed the giant Ymir and the cow Audhumla (darkness); from the cow's udder came four streams of milk with which the giant was fed. Audhumla was nourished by licking the salt ice-blocks, and as she licked them a man's hair appeared on the first day, a man's head on the second day and the whole man on the third day; this was Buri. He was the most renowned in strength; he had a son Bor through whom he was the grandfather of Odin, Vili and Ve. Consult Anderson, 'Norse Mythology' (Chicago 1901).

BURIAl, the ordinary method of disposing of the dead, a practice which varies among different people. Among savage races, and even among some civilized peoples of the East, exposure to wild animals or birds of prey is not uncommon. The careful embalming of the dead by the ancient Egyptians may be regarded as a special form of burial. But by far the most common forms of disposing of the dead have been burning and interring. Among the Greeks and Romans both forms were practised, though among the latter burning became common only in the later times after the Phrygian. In this form of burial the corpse, after being borne in procession through the streets, was placed upon a pyre built of wood, and profusely sprinkled with oils and perfumes. Fire was set to the wood, and after the process of cremation was complete, the bones and ashes were carefully gathered together by the relatives and
BURIAN VON RAJEČZ—BURIN

placed in an urn. With the introduction of the Christian religion, consecrated places were appropriated for the general burial, and the Roman custom of providing the sepulchre with a stone and inscription was continued by the Christians. The practice of cremation now declined and finally disappeared, but has recently to some extent been revived. See BURYING-PLACES; CREMATION; FUNERAL RITES; MOUND BUILDERS; MUMMIES.

BURIAN VON RAJEČZ, Baron Stefan, Austro-Hungarian diplomat and statesman: b. near Pressburg, Hungary, 15 Jan. 1851, a Hungarian of Slovak extraction. Educated in his native town and Vienna, he served in various consular capacities at Alexandria, Bucharest, Belgrade, Sofia and Stuttgart. As Austro-Hungarian Consul-General at Moscow, he acquired a thorough knowledge of the Russian language and country; later, as Ambassador to Greece, he became intimately acquainted with the complexities of Balkan politics. He was also for a time Finance Minister of the Dual Monarchy, and in 1903 succeeded von Kallay as chief administrator of Bosnia-Hercegovina, in which office he came into close touch with the vexed southern Slav question. On the resignation of Count Berchtold, the Austro-Hungarian Foreign Minister, in January 1915, Baron von Burian, known as a man of conciliatory temperament and firm character, in addition to his wide experience, was called to succeed him. His appointment at that juncture was regarded as evidence of a desire to make some political changes at a moment when affairs had become extremely critical. The policy of Count Berchtold (q.v.) had precipitated the great war; and Berchtold was now involved in a diplomatic duel with Baron Somnino (q.v.), the Italian Foreign Minister, over the interpretation of Article VII of the Triple Alliance (q.v.), on the strength of which Italy demanded certain territorial concessions. It was believed that Baron Burian would be more disposed than Count Berchtold to make the sacrifices necessary to assure a continuance of Italian neutrality. Almost from the beginning, however, he declared the cession of territory to be impossible, though he afterward agreed, on the advice of Germany, to cede almost the whole of the Italian-speaking territory of Austria. The only important Italian demand he rejected was the cession of certain islands along the Dalmatian coast. The negotiations, at which Prince Buellow assisted in Rome, broke down owing to the inflexible demand of Baron Somnino that the transfer be effected immediately and not, as was proposed, after the end of the war. Italy declared war on Austria-Hungary, 23 May 1915. The undiplomatic activity of the Austrian Ambassador to the United States, Dr. Dumba (q.v.), revealed by the British seizure of a private letter addressed by him to Baron Burian, and resulted in the Ambassador's dismissal. In the Ancona and Arabic (q.v.) controversies with the American government, Baron Burian experienced further diplomatic misfortunes. Reports of his resignation were current on several occasions, the first appearing a few days after his acceptance of office.

BURIATS, boò-re-ats, a Mongolian people, numbering some 300,000 who were conquered by the Russians in 1664 and have since developed the peaceful arts. They resemble the Chinese in certain general habits of life and in retaining the queue. They inhabit the southern part of Irkutsk and the trans-Baikal territory. Their principal occupation is the breeding and rearing of cattle and horses, the latter being especially famous for their endurance and for the masters' attachment to them. They are good agriculturists, being adept at manuring and irrigation, and are also clever fishers and trappers. They are active in the mechanical arts. Their religion is partly Buddhist, with a Khambo Lama at their head who resides at the Goose Lake; partly Shamanistic with headquarters at the river Angar; and some thousands near Lake Baikal have been converted to Christianity. They have three dialects of their own, and some literature. Many are educated. Consult Melinkoff, Dr. N. 'Internationales Archiv für Ethnographie' (1899); Gmelin, 'Siberia'; Howorth, Sir H. H., 'History of the Mongols' (1876-88).

BURIDAN, bù-rè-dân, Jean, French scholastic philosopher: b. Bèthune, Artois, about 1300; d. after 1358. He studied at Paris, where he attached himself as a disciple of Occam to the party of the Nominalists, and at a later time became himself a teacher. In the end he was forced by his opponents to flee from Paris, when he betook himself to Vienna, where he is said to have been influential in bringing about the establishment of the university. Here also he wrote some logical and ethical treatises, in which he appears as a zealous adherent of the Aristotelian philosophy. Buridan was a supporter of the doctrine of Determinism (q.v.), and is now chiefly known through having his name attached to an illustration that he is said to have used in support of his views, and known as 'Buridan's Ass.' He is said to have supposed the case of a hungry ass placed at an equal distance from two equally attractive bundles of hay, and to have asserted that in the supposed case the ass must inevitably perish from hunger, there being nothing to determine him to prefer the one bundle to the other. This illustration, however, is not found in any of his works, and from its nature it would appear more likely to have been used by the assailants of the doctrine of Determinism. He wrote 'Compendium Logicae' (1489); 'In Aristotelis Metaphysicae' (1518); 'Questiones in Decem Libros Ethicorum Aristotelis' (1489). Consult Prantl, 'Geschichte der Logik' (Vol. IV, Leipzig 1855-70); Townsend, 'Great Schoolmen of the Middle Ages' (New York 1905), and Rickaby, 'Scholasticism' (London 1908).

BURIN, or BRAVER, the principal instrument used in copper engraving, is made of tempered steel, and is of prismatic form, the graving end being ground off obliquely to a sharp point. The distinctive style of a master is frequently described by such expressions as a soft burin, a graphic burin, an alert burin, etc. It is fixed in a handle, the end of which is rounded to fit the hand. Pushed forward by the hand it cuts a shallow or deep furrow, according to the pressure exerted. When in sticking, bitten lines or lines of the point are imperfect or weak, the burin is used to repair or strengthen them.
BURITI, or tucu, PALM, a lofty, fan-shaped palm,  *Caryota umbratica*, common in swamps in northern Brazil. It bears abundant crops of scaly nuts about two inches long, from the reddish oily pulp of which a confection is made by boiling with sugar. The nuts also yield an oil which is emulsified to make a paste that is used in the preparation of numerous cuplike holes are made in the prostrate trunk. These become filled with a reddish fluid, which is used as a beverage. Its taste resembles some sweet wines.

BURRE, Edmund, political philosopher and orator: b. Dublin, 12 Jan. (possibly) 1729; d. Beaconsfield, England, 9 July 1797. He was the son of a solicitor in good practice. His mother was a Roman Catholic, but he and his two brothers adopted the religion of their Protestant father. Always, however, he was tolerant of Catholicism. At the age of 14 he entered Trinity College, Dublin, where he took his bachelor's degree in 1748. In this period, as his letters show, he had fits of enthusiasm over various studies — a *fureor mathematicus*, succeeded by a *fureor logicus*, a *fureor heroicus*, and a *fureor poeticius*. The 17 years between 1748 and 1765, when his career was finally determined by his election to Parliament, he spent in different employments. Going to London with the intention of taking up law, he succumbed to the attractions of literature, science, and philosophy. He traveled in England and on the Continent, frequented debating clubs and theatres and did more or less hack work for publishers. He printed nothing, however, with which his name is connected till the two books of 1756: *A Vindication of Natural Society* and *A Philosophical Inquirie into the Origin of Our Ideas on the Sublime and Beautiful*. In the first he attempted to refute Bolingbroke's arguments against revealed religion by showing that they might be urged with equal force against the organization of society. In the second he took up a subject much discussed at the time; and though his speculations have been superseded, he has the credit of stimulating Lessing to the production of *Laokoon*.

Burke also wrote an *Account of the European Settlements in America* (1757), and an *Abridgment of the History of England* (1758). In 1759 he began to edit the *Annual Register*, with which he was connected for 30 years. In 1761 he went to Ireland, attached in some indefinite way to William Gerard Hamilton — *Single-speech* Hamilton — who was secretary to the lord-lieutenant. After two years in Dublin he returned to England; there he joined the famous Literary Club, with which are associated the names of Johnson, Goldsmith, Sir Joshua Reynolds and Garrick.

In recognition of his abilities and of the knowledge of politics which he had shown in the *Annual Register*, he was offered the post of private secretary to Lord Rockingham when the latter became Prime Minister in 1765. In the same year he was elected member of Parliament from Wendover. Within a week or two he made a strong impression with two speeches for and against the South America Bill. The fall of the Rockingham ministry, Burke, who might have had a place with the new administration, remained with his friends. Turning to their account his literary powers, he began his series of great political tracts. In 1769 he put forth 'Observations on the Present State of the Nation,' a reply to a pamphlet by George Grenville. In this controversy Burke showed himself a master of the details of revenue and finance. At this time he took part in some transactions which afforded his enemies a handle against him. Though he had been living almost from hand to mouth till he entered Parliament, he bought in 1768 an estate worth upwards of $100,000. The underlying facts have never been determined with complete satisfaction. This much, however, is clear: Burke lived on terms of intimacy with his brother Richard and a distant kinsman, William Burke. Richard and William, together with Lord Verney, a political patron of Edmund, speculated in stock of the East India Company; and later Richard was engaged in questionable dealings in West Indian lands. That these ventures were shared by Burke has been charged but never proved. On the other hand it can be shown that most of the money for the purchase of his estate he borrowed from Lord Rockingham. After getting the place, he had to borrow right and left to maintain it. Probably his faults were neither dishonesty in speculation nor venality in Parliament, but undue ambition to live as he thought became his position, carelessness and improvidence, and adherence to 18th century standards of propriety, which in such matters were lower than ours.

Whatever his shortcomings in managing his private affairs his services to the public were very great. He was on the side of the people in the long contest over John Wilkes. Since his sentiments on this subject were in general those of the 'Letters' of Junius, he was suspected of being Junius. This accusation he denied; and his 'Thoughts on the Cause of the Present Discontents' (1770) showed so many differences on minor points that — were no other evidence available — it must be concluded that Burke was not Junius. In the 'Thoughts' Burke argued that the King and a small knot of advisers were building up power for themselves, which, if not checked, would have changes more gradual. During the years immediately following 1770 Burke devoted his energies to keeping the Rockingham Whigs united against the efforts of the King to win them over. Without Burke, says John Morley, *the Rockingham connection would undoubtedly have fallen to ruin, and with it the most upright, consistent and disinterested body of men then in public life*.

From his political activity Burke withdrew for a time in 1773, for a trip to France. There he observed two things which he strongly dreaded: atheism and an eager questioning of the 'allowed opinions which contribute so much to the public tranquillity.' This atheism and speculation, he perceived — and he was one of the few who were so clear-sighted — were working toward revolution. His fear of these tendencies he expressed in Parliament not long after his return.
By this time Burke had won a substantial reputation throughout the United Kingdom. Indeed, as early as 1766 at least one Irish municipality had voted him the freedom of the city; and in succeeding years English mercantile organizations passed resolutions commending his labors in behalf of commerce. Finally in 1774, when troubles with America were thickening, Bristol, the trading centre of the west of England, a city which had everything to lose and nothing to gain from a war with the colonies, elected him to Parliament. At the conclusion of the poll his colleagues had promised obedience to the instructions of his constituents. Burke, however, declared his independence: 'Your representative owes you, not his industry only but his judgment; and he betrays you instead of serving you if he sacrifices it to your opinion.' To this declaration he adhered when in 1778 a bill was proposed relaxing restrictions upon Irish commerce. The English merchants, including those of Bristol, protested; but Burke replied: 'England and Ireland may flourish together. The world is large enough for us both. Let it be our care not to make ourselves too little for it.' ('Two letters to Gentlemen in Bristol'). For this liberality Burke was never forgiven, and in the election of 1780 he was forced to seek a new constituency.

It was during his six years as member for Bristol that, in the contest over America, he rose to his full height as a statesman. He was almost alone among the speech-makers of that time in always going below the superficial considerations of the moment to the fundamental fact that in the long run restraint and violence defeat themselves. In addition to many minor speeches scattered through the 'Parliamentary History,' he made three great contributions to the subject—'Speech on American Taxation,' 19 April 1774; 'Speech on Conciliation,' 22 March 1775, and 'Letter to the Sheriffs of Bristol,' 3 April 1777. In the first he argued that the tea duty was of no use to England for revenue; that it served only to irritate the Americans, and that by winning the loyalty of the colonists England would get more than she could ever take by force. In the second speech Burke maintained that England must conciliate, and that the only way was by yielding. In the 'Letter' he reviewed the struggle and in the light of events justified his own position. Of the three pieces that on 'Conciliation' is the best. Not even when dealing with India does Burke excel in grasp of details, in lucid presentation of a large mass of facts, and in ripened political wisdom. Then, too, he saw what so many failed to observe, that the real cause of the contest lay deeper than the casual orders of a governor or the retaliation of a mob, and that America, in resisting the encroachments of royal prerogative, was fighting a battle for the liberties of Englishmen at home.

Though Burke could not win over Parliament to his views on America, he had better success with his 'Speech on the Plan for Economical Reform' (1780). People were staggering under the debt from the American war and agitating for a general reform of Parliament. Burke opposed such radical changes; he proposed to abolish some offices, consolidate others, reduce so that he reformed, that of paymaster of the forces, he himself occupied in 1782. At that time the North ministry yielded to the Whigs, who were temporarily united under Lord Rockingham, Charles James Fox and Lord Shelburne. Burke, owing in part to infirmities of his temper and the suspicions against him, got only this third-rate position, instead of a place in the cabinet, in their seats when Lord Rockingham died and Lord Shelburne became head of the administration. At once Fox and Burke refused to work with him, and by joining their old enemy, Lord North, in what is known as the Coalition, they broke up the Whig party at Bute as accused of deserting his principles for purely personal motives. His conduct is hard to defend, for he attacked Shelburne with asperity, and under the Coalition resumed for a few months the office of paymaster.

Against this dubious course we may set his strenuous advocacy of reform in India. That country was victim of the corrupt and cruel system of the East India Company. Burke was familiar with the subject, for he had been a member of select committees which had drawn the two important reports. He is also supposed to have framed the East India bill commonly known as Fox's. At any rate he defended it, 1 Dec. 1783, in one of his best speeches. The bill, however, was defeated and the Coalition, which supported it, was out of office. Early in 1785 Burke renewed the attack in his 'Speech on the Nabob of Arcot's Debts'—a preliminary to the proceedings against Warren Hastings. In 1786 Burke drew the articles against Hastings. The trial dragged on till 1795, and though the Crown had drawn away from the men with whom he had been allied against the encroachments of the Crown in England and America. In 1790 he widened the breach still further by aggressive proclamation of his opinions in 'Reflections on the Revolution in France.' The book had for that day an enormous sale and divided Great Britain into two parties—one composed of Burke and an uncongenial company of Tories; the other of Liberals, many of whom had been Burke's lifelong associates. Burke himself violently quarreled with his old friend Fox. The seeming contradiction between his early position and his later is accounted for in part by the fact that he grew more conservative with age, in part by his desire to preserve the balance between monarch and subject. In England and the Crown had been the aggressor; in France, he thought, the people. Moreover, he had always insisted that liberty is inseparable from order; and in France he saw nothing but disorder. As the Revolution progressed, Burke became more and more wrong on the whole of his succeeding utterances—'Letter to a Member of the National Assembly' (1791), 'Appeal from
Among his important writings or speeches not already mentioned are 'Address to the King' (1777); 'Letter to Sir Hercules Langrishe' (1792); 'Thoughts and Details on Scarcity' (1795). See Reflections on the French Revolution; On Conciliation with the Colonies; On the Sublime and Beautiful.

Bibliography.—There are in the market three or four editions of Burke's writings and speeches, substantially complete. The best short life is in the 'Dictionary of National Biography.' John Morley's 'Life of Burke' (in the 'English Men of Letters,' 1879) is excellent; also his 'Burke, a Historical Study' (1867).

Of the earlier lives, James Prior's (2d ed., 1826) is the best. Of course Burke bulked large in the standard histories and memoirs of England in the 18th century.

Hammond Lamont,
Editor New York Nation; Editor of Burke's Speech on Conciliation with America.

Burke, Jane, better known as Calamity Jane, American army scout and mail carrier: b. Princeton, Mo., 1852; d. Deadwood, S. D., 1 Aug. 1903. She was reared on the plains and early became an Indian scout and was an aide to General Custer and General Miles in numerous campaigns. For several years she was the government mail carrier between Deadwood, S. D., and Custer, Mont.

Burke, John, Irish genealogist: b. near Parsonstown, Ireland, 1786; d. Aix-la-Chapelle, 27 March 1848. His life was devoted to genealogical research. In 1826 he began to publish a 'Genealogical and Heraldic Dictionary of the Peerage and Baronetage of the British Empire,' and subsequent works by him were 'A Genealogical and Heraldic History of the Commons of Great Britain and Ireland' (1833–38), which in subsequent editions appeared as 'A Dictionary of the Landed Gentry.'

Burke, John, State governor and national treasurer: b. Keokuk County, Iowa, 25 Feb. 1859. He studied at the University of Iowa, receiving the LL.B. degree in 1886, when he removed to North Dakota and was county judge during several years of Rolette County. After being elected member of the North Dakota House of Representatives (1893–95), and State Senator (1893–95), in 1906, 1908 and 1910, on three occasions, he was elected Democratic Governor of North Dakota. President Wilson in 1913 appointed him Treasurer of the United States.

Burke, Sir, John Bernard, English herald and genealogist, son of John Burke (q.v.): b. London 1815; d. Dublin, 13 Dec. 1892. He was educated at Caen in Normandy, was trained as a lawyer and called to the bar in 1839. Besides editing the successive issues of the 'Peerage' founded by his father (4th ed., 1887), he published other works on the 'Landed Gentry' (1846); 'Extinct Peerages' (1846); 'Anecdotes of the Aristocracy' (1849); 'Family Romance' (1853); 'The Vicissitudes of Great Families' (1859); 'The Rise of Great Families' (1873); 'The Book of Peerage' (1881); and 'Reminiscences' (1882).

Burke, Maurice Francis, American clergyman: b. Ireland, 5 May 1845. He came to the United States in childhood and was educated in
BURKE—BURLEIGH

Chicago and Notre Dame, Ind., and in the American College, Rome, where he was ordained to the Roman Catholic priesthood in 1875. Returning to the United States, he took charge of St. James, Philadelphia, a parish. In 1887 he was consecrated bishop of Cheyenne, Wyo., and in 1893 was transferred to the see of Saint Joseph, Mo. Bishop Burke is known as a fine linguist.

BURKE, Robert O'Hara, Australian explorer: b. County Galway, Ireland, 1820; d. Australia, 28 June 1861. After serving in the Austrian army he went to Australia, and after seven years' service as inspector of police was appointed commander of an expedition to cross the continent of Australia from south to north. He and his associate, Wills, reached the tidal waters of the Flinders River, but both perished of starvation on the return journey. They were among the very first white men to cross the Australian continent from south to north.

BURKE, Thomas, American statesman: b. Ireland, about 1747; d. Hillsborough, N. C., 2 Dec. 1783. He left Ireland about 1764 and lived for a time in Virginia. He entered the study and practice of medicine. He received a degree in medicine in 1774 and removed to Hillsborough, N. C. Of a bold and impetuous temper, a ready writer and speaker, he became one of the leading spirits in the Revolutionary struggle. While he was in Virginia, his writings in opposition to the Stamp Act had brought him into notice, and he had a large share in the formation of the constitution of North Carolina. He was a member of the provincial congress at Halifax in 1776 and a volunteer at the battle of Brandywine. He was a member of Congress from December 1776 to 1781, when he was chosen first governor of North Carolina under the new constitution. In September of that year he was surprised and seized by the Tories and retained at James Island, S. C., as a prisoner on parole. Obnoxious to the Tories from his previous course, he was in daily apprehension of assassination, to escape which he ventured unavailing to obtain an exchange or a parole to some other State, he effected his escape in the night of 16 Jan. 1782, after an imprisonment of four months. In a letter to General Leslie, Burke gave his reasons for withdrawing and said that he still considered himself subject to the disposal of the British authorities. He was regularly exchanged soon afterward and resumed his duties as governor, but was defeated the following year, when a candidate for re-election, it being urged that he had violated his parole.

BURKE, Thomas Martin Aloysius, American clergyman: b. Ireland, 10 Jan. 1840; d. 20 Jan. 1915. He came in childhood to Utica, N. Y., and was educated at the College of Saint Michael, Toronto, and at Saint Mary's Seminary, Baltimore, and was ordained to the Roman Catholic priesthood in 1864. He was appointed to labor in Albany and became successively vicar-general and administrator. In 1894 he was consecrated bishop of Albany.

BURKE, Thomas Nicholas, Irish clergyman and orator: b. Galway 1830; d. 1883. He was educated in Italy, where he entered the Order of Saint Dominic. Going to England, he preached in that country and later in Ireland, gaining a high reputation as an orator and becoming familiarly known as "Father Tom." In 1872 he made a visit to the United States and lectured in reply to Froude, his addresses appearing in print under the title of 'English Misrule in Ireland.'

BURKE AND HARE, two miscarreens, of whom William Burke, a native of Ireland, was detected, tried and executed at Edinburgh, in 1829, for the murder of numerous individuals, his accomplice, Hare, escaping the hangman by turning king's evidence. At this time the resurrectionists were busy at their nefarious trade, but the vigilance with which the burying-grounds throughout the country were watched rendered a supply of subjects for anatomical schools almost impracticable, and the demand for dead bodies consequently became great. This led Burke and Hare to murder, by suffocation, many poor waifs who were decoyed into Hare's lodging-house, and when they ceased to be useful they were sent to Dr. Robert Knox, proprietor of an anatomical theatre in Edinburgh. The case of Burke and Hare brought home to the public mind more clearly than ever before how necessary it is that schools of anatomy should receive a regular supply of subjects for dissection, and in 1832 an act was passed for supplying the anatomical schools throughout the kingdom from the unclaimed dead in the hospitals.

BURKEL, bür'kël, Heinrich, German painter: b. Pirmasens, 30 March 1813; d. Munich, 10 June 1869. He was educated at Munich and in Italy; he is chiefly known for his religious scenes from the Bavarian and Tyrolean Alps were among the first of their kind, and his village and tavern scenes rank among the best in modern art. Among his paintings are 'Scenes in an Inn' and 'Winter Scenes in the Tyrol.'

BURKITT, Francis Crawford, English Biblical scholar: b. London, 3 Sept. 1804. He was graduated at Trinity College, Cambridge, was lecturer in palaeography at Cambridge University 1804—5, and since 1805 has been Norriston professor of divinity and head of the same institution. He has published 'Early Christianity Outside the Roman Empire' (1899); 'Fragments of Aquila' (1897); 'The Rules of Theomitos' (1894); 'Two Lectures on the Gospels' (1900); 'Early Eastern Christianity' (1904); 'The Gospel History and Its Transmission' (1906); 'Earliest Sources for the Life of Jesus' (1910); 'The Failure of Liberal Christianity' (1910); 'Jewish and Christian Apocalypses' (1914).

BURLEIGH, bér'lë, Bennet, war correspondent: b. Glasgow, Scotland, 1841; d. 17 June 1914. He fought in the American Civil War, during which he was twice condemned to be shot. As war correspondent he served in the Egyptian campaign of 1882, in the Sudan, Madagascar, Ashanti, South Africa, the Russo-Japanese War, Tripolitan War and the Bulgarian War of 1912-13. He was the author of 'Two Campaigns' and 'The Empire of the East' (1905).

BURLEIGH, Edwin Chick, United States Senator: b. Linneus, Me., 27 Nov. 1843. A student of Houlton Academy, he became State
land agent and assistant clerk in the Maine House of Representatives 1876–78, clerk in the office of the State treasurer in 1880 and treasurer in 1884. He was elected Governor of Maine 1888–92; member of Congress 1897–1911; and United States senator 1913–19.

BURLEIGH, George Shepard, American writer, brother of William H. Burleigh: b. Plainfield, Conn., 25 March 1821; d. Providence, R. I., 21 July 1903. He has published 'The Maniac and Other Poems'; 'Signal Fires on the Trail of the Pathfinder', a metrical romance in six cantos, several dramas and a very considerable volume of fugitive poetry which appeared in newspapers and magazines for half a century. His work is characterized by simplicity, naturalness and forcefulness; but it is very uneven in quality, though generally euphonic. Burleigh early developed a facility in verse which gained for him distinction in his native State where he was known as the farmer poet. He received only such education as the district school afforded in the winter months, and he continued to work on the farm until middle life. All his spare time was given to literary pursuits from his boyhood days.

BURLEIGH, William Cecil (Lord) English statesman: b. Bourn, Lincolnshire, 13 Sept. 1520; d. London, 4 Aug. 1598. He was Secretary of State under Edward VI and Elizabeth, and Prime Minister of England for 40 years. In 1588 Parliament was assembled, and, by his advice, a plan of religious reform was laid before it. In this he had a considerable share; and he also took the leading part in the establishment in the Thirty-nine Articles of faith which form the basis of the reformed religion of the State. To him is due also the regulations of the coinage, which had been altered since Henry VIII's time. He was created Baron Burleigh, in 1571, and in 1588 concluded an advantageous treaty with the Netherlands. His policy was both cautious and comprehensive and he was unaffected by personal prejudices in his management of public affairs. Consult NG, 'Notices of Lord Burleigh' (1829–31); Charlton, 'Life' (1847); Hume, 'Great Lord Burleigh' (1898).

BURLESON, Albert Sidney, United States Postmaster-General: b. San Marcos, Tex., 7 June 1863. A graduate in 1884 of the University of Texas, he became a lawyer, and was assistant city attorney of Austin, and attorney of the 24th judicial district of Texas during several years. From 1899 he was several times elected member of Congress, and in 1913 was appointed Postmaster-General by President Wilson.

BURLESQUE, the comic effect arising from a ludicrous mixture of things high and low. High thoughts, for instance, are clothed in low expressions, or noble subjects described in a familiar manner, or vice-versa.

BURLINGTON, Edward Livermore, an American editor, son of Anson Burlingame (q.v.): b. Boston, 30 May 1845. He studied at Harvard and was later elected as private secretary to his father, who was United States Minister to China. Since 1879 he has been associated with the publishing house of Charles Scribner's Sons, and from 1880 to 1914 was editor of Scribner's Magazine. He has received the degrees Hon. A.M., Harvard, 1901; Litt.D., Columbia, 1914.

BURLINGAME, Cal., city in San Mateo County, situated on a peninsula, 20 miles south of San Francisco, on the Southern Pacific and the United of San Francisco railroads. It is
BURLINGTON, England. See BRIDINGTON.

BURLINGTON, Iowa, city and county-seat of Des Moines County, 206 miles west-southwest of Chicago on the west bank of the Mississippi River at the intersection of the Chicago, Burlington and Quincy, the Chicago, Rock Island, and Pacific, the Muscatine North and South and the Toledo, Peoria, and Western railroads. Burlington, sometimes called the Orchard City, occupies a natural amphitheatre, formed by the limestone bluffs that slope down from the river, and on which many of the residences are built. The river here is broad and deep and is spanned by a railroad bridge. The city is connected by steamboat lines with important points on the Mississippi, and its river commerce is of considerable importance. The industries include the manufacture of agricultural tools, pearl buttons, wheels, desks, furniture, screens, boilers, mattresses, soap, flour, candy, burial caskets, Corliss engines, sleigh bells, novelties and the manufacture of lime and salt. The city has a large iron works. The extensive machine and repair shops of the Chicago, Burlington and Quincy Railroad are located here. The city contains among its important buildings an opera house, courthouse, public library, hospitals, schools of various kinds and the Burlington College of Commerce. Crapo Park, of 100 acres, is in the southern part of the city and is noted for its beauty. The city is governed by a mayor, elected for two years, and a city council, which has the power of appointment to all city offices (the commission form of government). It was named for Burlington, Vt., by its first settlers. A fur trading post was established there in 1829; its earliest buildings were erected in 1833, and its river commerce was founded in 1834. The city was incorporated in 1837 and received its city charter in 1838. Pop. 24,800.

BURLINGTON, Kan., city and county-seat of Coffey County, 60 miles south of Topeka, on the Atchison, Topeka and Santa Fe, and Missouri, Kansas and Texas railroads, on the Neosho River. It has extensive agricultural and stock-raising interests; is in a district rich in natural gas, and contains grain elevators, flouring mills, cigar factories and manufactories of electric appliances, tiles and carbohydrates, and a Carnegie library. Pop. 2,180.

BURLINGTON, N. J., city and port of entry in Burlington County, on the Delaware River and the Pennsylvania Railroad, 18 miles northeast of Philadelphia. It is a manufacturing trade centre for surrounding towns, and contains Saint Mary's Church, endowed by Queen Victoria, the oldest Church school for girls in the country; the State Masonic Home; Burlington College, and many fine old residences; and has manufactories of shoes, stoves, iron pipe, canned goods, silk, hollowware, braid, typewriter ribbons and carbon paper, carriages and structural iron. There is a national bank and a trust company, with combined resources amounting to $2,356,959. The corporation is divided into five wards. The city is a favorite residential suburb of San Francisco. It is progressive in the matter of improvements, with miles of permanently paved streets and walks, well-lighted, and with a municipal water plant. Pop. 3,500.

BURLINGTON, N. C., city in Alamance County, 20 miles east of Greensboro, on the Southern Railroad. It contains casket factories, hosiery and overalls establishments, manufactories steal bridges and has extensive cotton interests. Settled in 1850 Burlington was incorporated in 1876. The government is vested in a mayor and council, the former being chosen for a term of two years. The city owns the waterworks. Pop. 4,808.

BURLINGTON, Vt., city, port of entry and county-seat of Chittenden County, on Lake Champlain and the Central Vermont and Rutland railroads, 40 miles northwest of Montpelier. It has a very large lake commerce and manufactories of lumber, cotton and woolen goods, furniture, boxes, refrigerators, brushes, paper, toys, medicines and iron. In the neighborhood are large quarries of marble and limestone. The environment is picturesque. The city is the seat of the State University of Vermont and of the State Agricultural and Medical colleges; Bishop Hopkins Hall; the Roman Catholic Cathedral; the Fletcher, Billings and Burlington Law Libraries, a courthouse, United States government building and a Young Men's Christian Association hall. Burlington is noted for its benevolent and educational institutions, which include the Mary Fletcher Hospital, Home for Aged Women, Home for Friendless Women, Home for Destitute Children, Adams Mission House, Louis Howard Mission, Providence Orphan Asylum, Cancer Relief Association, Lake View Retreat, several sanitariums, the Vermont Episcopal Institute, Saint Joseph's and Saint Mary's academies (Roman Catholic) and high and graded schools. The city was settled in 1763, was a garrison post during the War of 1812 and was incorporated in 1865. It is governed by a mayor, elected for two years, a council and a board of aldermen. The waterworks, incandescent lighting plants, the property of the city. Its material development has been largely due to its great lumbering industries. The famous Col. Ethan Allen is buried beneath a handsome monument in
Greenmount Cemetery. Pop. (1910) 20,468. Consult Allen, 'About Burlington, Vermont' (Burlington, Vt., 1905); Possoms, 'Burlington, Vt., as a Manufacturing, Business and Commercial Centre' (Glens Falls, N. Y., 1890); 'Vermont Historical Gazetteer' (Vol. 1, 4 vols., Burlington and Rutland, 1865-72), and New England Magazine (Vol. XI, 20 vols.).

BURLINGTON, Wis., city in Racine County, 35 miles southwest of Milwaukee, on the Chicago, Milwaukee and St. Paul and the Minneapolis, St. Paul and Sault Sainte Marie railroads. It is a prosperous dairying centre and has brickyards, tileyards, brassworks, condensed milk factory and manufactories of baskets, horse blankets and veneer. The waterworks are the property of the municipality. Consult Wood, 'Burlington: Its Early Growth, History and Progress' (Burlington 1908). Pop. 3,212.

BURLINGTON LIMESTONE, a limestone of sub-Carboniferous (Mississippian) Age, named for its occurrence near Burlington, Iowa. It is also found in other parts of the Mississippi Valley. This limestone is of light color, commonly tessellated and fine-crystalline, resembling lithographic stone. It has important industrial value.

BURMA, India, the largest province of British India, on the east side of the Bay of Bengal, at one time formed the greater portion of a native kingdom or empire, which is said to have extended from lat. 9° to 28° N., and from long. 92° to 104° E. Its greatest length was about 1,000 miles and its breadth 600, its area being then about 270,000 English square miles. In 1826 the provinces or divisions of Arracan and Tenasserim were occupied by the British, and in 1852 Pegu and the province of Martaban shared the same fate. This portion was then known as British Burma and continued to be so till in 1886 the rest of the kingdom was annexed by Great Britain, when the two portions came to be designated Upper and Lower Burma, respectively. They now form together one province under a lieutenant-governor and legislative council. Total area, about 231,000 square miles; population, over 12,000,000, mainly Buddhists.

Ler Loi Burmese is a large extent mountainous in character, the only extensive level being in Pegu, where the valleys of the Irrawaddy and Sattaung form an alluvial tract of about 10,000 square miles. The rainfall varies from less than 60 inches in some places to 190 or more in others. About half the soil is believed to be cultivable, but a comparatively small portion is as yet under cultivation, though agriculture is extending year by year. Since the occupation of the country by the British it has rapidly increased in prosperity, and the revenue is generally greater than the expenditure. The imports and exports together exceed £84,500,000, the bulk of the trade being with Great Britain. The capital and principal port is Rangoon. Other towns are Moulmein, Akyab and Bassein. Upper Burma is on the whole similar in character to Lower Burma, but less productive, and has generally a smaller rainfall. It is rich in minerals, including gold, silver, precious stones, marble, iron, lead, tin, antimony, arsenic, sulphur and petroleum. Only a few of these are worked. The chief precious stones are the ruby and the sapphire; amber and jade are also found. All precious stones used to be sent to the royal treasury and strangers were prohibited from approaching the places where they were found. These districts are still the subject of special regulation under the British rule. The whole country is intersected by numerous streams, which, following the direction of the chief mountain chains, flow generally eastward into the Indian Ocean. The chief of these are the Irrawaddy, the Salween and the Chindwin, which joins the Irrawaddy, the combined stream being of great volume. The Irrawaddy is of great value as a highway of communication and traffic, being navigable beyond Bhamo, near the Chinese frontier. In their upper courses the rivers flow through narrow valleys; in their lower courses they traverse low-lying districts, and in the rainy season often overflow their banks. Among the wild animals of the country are the elephant, rhinoceros, tiger, leopard, deer of various kinds and the wild hog. The rivers abound with fish. Of domestic animals we may mention the ox, buffalo, horse, elephant and cat. In the southern districts, owing to the numerous rivers, the soil is most productive of rice, sugar cane, tobacco, cotton, indigo and all the tropical fruits. Tea is cultivated in many of the more elevated parts. The forests produce timber of many sorts, including teak. A great part of the trade of the country is carried on by means of the Irrawaddy River. From Bhamo goods are conveyed to China. Rice is the great crop (occupying about 80 per cent of the cultivated area), and this grain forms the chief export, others being teak, cotton and silk stuffs, petroleum, saltpetre, lacquered ware. About 12,446 miles of roads are maintained, and the number of railway miles open is now about 1,000. From Rangoon two lines proceed north, one along the left bank of the Irrawaddy to Prome and Meaday, the other through the Sittang Valley to Mandalay, and from that on the other side of the Irrawaddy to Bhamo and Mogau.

The Burmese have many skilful weavers, smiths, sculptors, workers in gold and silver, joiners, etc. Among industrial establishments are rice-mills, saw-mills, a few works for iron goods, ship-building yards, cutch works, etc. Other industries include boat-building, weaving, pottery, lacquerwork and brasswork. The weaving of cotton and silk goods is carried on by the women everywhere. The pottery of the country is strong and durable, if not especially artistic; and the gold and silver work finds numerous purchasers outside the country. Wood-carving is extensively practised for the adornment of houses, boats, etc. The native vessels plying on the Irrawaddy and other rivers are often of 100 to 150 tons burden, while thousands of small craft are engaged in trade or fishing. Large numbers of good cigars are made by women, and are partly used in the country, partly exported. The buildings among the Burmese are very slight, the Burmese women to require them to be chiefly of wood or bamboo, and prohibited the use of stone or brick except for pagodas, and other important structures.

People.—The Burmese are divided into several tribes, and belong to the common Indo-Chinese stock. Among the tribes other than the Burmese proper are the Karen, Kakhys,

BURLINGTON—BURMA 51
Shans, etc. The Burmese proper are of a brown color, with lank, black hair, and vigorous, well-proportioned frames. No Burmese can have more than one wife; but he may have as many mistresses as he will. The latter live in the same house with the wife, and are her servants. The Burmese between Ayer it and the Irrawaddy enjoy a good deal of freedom; are not shut up as in some parts of the East, and can even engage in a lawsuit in their own name. The chief amusement of the Burmese is their theatre, where declamation, dancing and music are given by turns. The new year (which begins in April) is celebrated with what is known as the "water feast," when young men and women throw water on each other and the passers-by. The Burmese usually write on palm leaves with an iron style or on black tablets, with a pencil; the rich have libraries, with books, the leaves of some of which are thin pieces of ivory, with gilt edges. Their materia medica is chiefly confined to herbs, spices and mercury; with vaccination they have long been acquainted. The language is monosyllabic, like Chinese; and the alphabet (derived from India), the characters of which are more or less circular. Among the common people the principal part of the male dress consists of a double piece of cloth about five yards long, loosely wrapped about the body. Over this is worn a long robe, with sleeves open in front, and reaching below the knees. The lower classes of women wear only a single garment, resembling a sheet, wrapped round the body and fastened under the arms. Men of rank wear a long robe of flowered velvet or satin, with open sleeves. In winter they wear a sheepskin, being thrown over this. On the head is worn a high velvet or silk cap, plain or embroidered, according to rank. The men wear earrings, often of large size. Women of the higher classes generally wear a shift which reaches only to the pit of the stomach, where it is drawn tight and fastened by strings. This is covered by a loose jacket, with tight sleeves. A piece of silk or cloth encircles the waist and descends to the feet. When a woman wishes to be particularly gorgeous she strews her hair with palm leaves of a red color, and tinges her teeth and the edges of her eyelids with black. Both sexes wear the hair long; the men tying it in a knot on the crown of the head, the women on the back. Sandals are often worn, but neither boots, shoes nor stockings; every man, woman and child, however, carries an umbrella. The chewing of betel and smoking of tobacco are universal. The Kachyens or Singfo are a courageous people inhabiting the upper basin of the Irrawaddy above Bhamo. They practise a sort of nature worship, and are active as traders, though at present rather lawless. Their villages are ruled by hereditary chiefs. Chinese from Yunnan have settled in considerable numbers as traders and agriculturists in the Kachyens country, and in Lower Burma. The most highly important element in the population as traders and otherwise. In the hilly districts of Tenasserim and Pegu we find the Karens, a somewhat secluded people, less intelligent and more ignorant than the Burmese, and not so purely Mongol in physical character. The Talaings or Mons of the Irrawaddy delta resemble the Burmese, but speak a distinct language. The Shans are a numerous people closely allied to the Siamese, and inhabiting eastern and northeastern Burma, together with portions of the neighboring countries.

The native government was an absolute monarchy, the King having unlimited power over life and property. The seat of government, after osculation, was first at Prome, but it was transferred to Rangoon in 1530, and is now at Mandalay. The country was divided into provinces, the chief of which was the King himself, who was assisted by a council of state known as the Htaik-daw, to which belonged at once the functions of a legislature, a cabinet and a supreme court of justice. It was composed of officials of 14 grades, the president being the King himself, some other member of the royal family or the Prime Minister. The King had power to punish at his pleasure anyone, including even the great officers of state. The public revenue was derived from taxes levied in a very irregular and capricious manner, and as the officials received no fixed salary, the tax-gatherers were extremely prevalent. The criminal laws were barbarously severe. Capital punishment was commonly inflicted by decapitation, but crucifixion and disemboweling were also practised. Torture might be applied to principals or witnesses; and in the case of their relations, the penalty of death was inflicted. The standing army was small. Levies were made, in case of war, by way of conscription; and a specified number of houses was required to furnish a soldier or pay a fine. The religion of the country is that of Buddha, which is said to have existed in the greatest purity. The tutelary divinities worshipped in various Buddhist countries are unknown, and the vows of poverty and chastity taken by the monks are said to be less frequently broken here than elsewhere. The Burmese possess a complete system of education so far as male children are concerned. All boys are required to reside in a religious house for three years and there they act as servants to the priests who instruct them in reading, writing and arithmetic, as well as in the doctrine and practice of Buddhism. Up to the present time only 962 in 1,000 against 1,006 and 1,022 in Bengal and Madras. But the explanation probably lies in the preponderance of the male element among the numerous immigrants into the province. Marriage in Burma is a purely secular ceremony, and elementary education is far more widely dispersed than in India, one individual in five being able to read and write.

History.—The Burmese empire is of little note in ancient or general history. Buddhism and Hinduism may have been introduced into the country from Assam and Tenasserim as early as the 1st century B.C. But the real history of the country begins with the establishment of the Burmese dynasty a little later in the 5th century A.D. The Burmese are the most ancient and most powerful nation in the Peninsula, and their language and literature are the most ancient and the most civilized of the Peninsula. The Burmese are a people of ancient origin, and their language and literature are the most ancient and the most civilized of the Peninsula. The Burmese are a people of ancient origin, and their language and literature are the most ancient and the most civilized of the Peninsula.
1 Kyaiuteyo Pagoda miraculously balanced by a hair of Buddha

2 The 300 Lion steps leading to the Sagaing prayer temple
introduced various reforms and useful measures. Shembaun (Tshen-bo-yen), the Emperor's brother, became regent as guardian for his nephew, Mon, and he passed through himself and conquered Siam. In 1771, however, Siam recovered its independence, while the principal part of the Burmese forces were engaged in a war with China. In this war they were victorious, and compelled the Chinese, whom they took prisoners to intermarry with Burmese females, and to remain in their territory. In 1776 Shembaun left his empire, much enlarged, to his son, Chengua. This prince lived in the unrestrained indulgence of every appetite till in 1782 he was dethroned and put to death. In consequence of the revolution, Mentaraygi, the fourth son of Alompra, ascended the throne. He ordered his nephew, Momien, who was a state prisoner, to be drowned, and in 1783 subdued the kingdom of Arracan. He then engaged in a war with Siam, which continued till 1793, when peace was made on certain conditions. About this period, it happened that some robbers fled from the Burmese empire, and took refuge in the territory of the East Company. The Burmese demanded that they should be delivered up, and on their demands not being immediately complied with, marched with a strong force into the offending country. At the same time they carried on a friendly negotiation with the government in Calcutta, which resulted in the surrender of the criminals, and the conclusion of a treaty of amity and commerce between the two governments, negotiated by Captain Symes. The last victory of the Burmese was in 1825 over the province of Assam. The party driven from Assam, together with the Burmese rebels, fled to the British territories, whence they intended to invade Burma. The British government directed the insurgents, but refused to deliver them up or to drive them from the island of Shapuri, which they had occupied. At length the Burmese sovereign demanded of the government at Calcutta the cession of northern Bengal as being a part of Ava, and in January 1824 his forces marched into Cachar, which was under British protection. Lord Amherst, as governor-general of the British East Indies, now declared war against Burma, and Gen. Archibald Campbell prosecuted it so successfully that after the victory at Prome (1-3 Dec. 1823), he obliged the monarch to conclude a peace at Pansawar in 1825. As the treaty was not ratified on the part of the Burmese Emperor by the time specified (18 Jan. 1826), Campbell renewed the war and stormed the fortress of Munnum. On 24 February the peace was ratified, and the war concluded with the cession of Arracan, Mergui, Tavoy, etc. In 1852 a second war broke out at the conclusion of which Rangoon and the whole of Pegu fell into the hands of the British. About 1860 the new city Mandalay supplanted Amarapura as the capital. In 1867 British steamers were permitted by treaty to navigate Burmese rivers, and not long after traffic was carried on up the Irrawaddy as far as Bhamo. In 1885 the outrageous proceedings of King Theebhaw provoked another war, and the British force proceeded to Rangoon up the Irrawaddi River, took Mandalay and sent King Theebhaw a prisoner to Rangoon. On 1 Jan. 1886, Theebhaw's dominions were annexed to the British empire by proclamation of the viceroy of India (the Earl of Dufferin). After the annexation there was a considerable amount of scattered fighting with dacoits and others, but this has ceased since 1890 and the country is now opened up to commerce, and is rapidly advancing in prosperity. In 1897 Burma was constituted a province, and placed under a lieutenant-governor instead of a chief commissioner.

References:
- "Further India" (New York 1904); Coxon, S. W., "And That Reminds Me" (London 1915); Dautremer, J., "Une colonie modéle- la Birmanie" (Paris 1912); Kelly, R. T., "Burma, Painted and Described" (London 1912); White, T., "A Civil Servant in Burma" (London 1913).

**CHAS. LEONARD-STUART, Editorial Staff of The American**

**BURMEISTER, boor'mis-tér, Hermann**, German scientific writer: b. Stralsund, 15 Jan. 1807; d. Buenos Aires, Argentina, 2 May 1892. In 1842, he became professor of zoology at Halle. He distinguished himself as a geologist and zoologist in his native country and permanently in Argentina, where he continued his investigations. He traveled in South America, and was for a time director of the Museum of Natural History at Buenos Aires. Among his works are "Handbuch der Paläontologie" (5 vols., Berlin 1831-53); "Geschichte der Schöpfung" (Leipzig 1843); "Systematische Übersicht der Tiere Brasilien's" (3 vols., 1854-56); and many contributions to scientific periodicals.

**BURMEISTER, Richard**, German-American musical composer: b. Hamburg, Germany, 7 Dec. 1860. He received an academic education in Hamburg; studied with Franz Liszt, and in Rome, Budapest and Weimar; made concert tours in Europe in 1883-85 and in the winter of 1893; was at the head of the piano department of Peabody Institute, Baltimore, Md., 1885-97; and settled in New York in the latter year. He made concert tours all over the United States and was director of the Scharwenka Conservatory, New York, in 1897-99. In 1903 he became the first head of the piano department of the Royal Conservatory of Dresden. Since 1907 he has been living in Berlin. He has composed "The Sisters" (a dramatic tone poem), numerous songs, and piano, violin and orchestra pieces; and arranged Liszt's "Concerto Pathétique," originally for two pianos, for the piano and orchestra.

**BURN, Sir George**, Canadian banker: b. Thurso, Scotland, 10 April 1847. He was educated in Scotland and was trained in the Royal Bank of Scotland. He joined the staff of the Royal Canadian Bank in 1866; in 1880 was appointed general manager of the Bank of Ottawa. He was elected president of the Canadian Bankers' Association in 1915; has been prominently identified with philanthropic and patriotic work, and was knighted in 1917.

**BURNABY, Frederick Gustavus**, English soldier and traveler: b. Bedford, England, 3 March 1842; d. 17 Jan. 1885. He was educated at Bedford and Harrow, and entered the Royal Horse Guards in his 18th year as cornet. In 1861 he became lieutenant, in 1866 captain, major in 1879, lieutenant-colonel in 1880, and finally, in 1881, was appointed colonel, a rank which he held till his death. He was military
correspondent for the London Times with Don Carlos in Spain, and joined Gordon in the Sudan. In 1875 he made his famous ride to Khiva—a journey that presented great difficulties. During the ride, which he undertook partly because he had learned that the Russian government kept Europeans out of central Asia, he suffered severely from the intense cold and thirst at the time when he crossed the steppes. In 1876 he rode through Asiatic Turkey and Persia. Of these two journeys he published narratives, namely, 'Ride to Khiva' (1876, 11th ed., 1877, new ed., 1884), and 'On Horseback Through Asia Minor' (1877). In 1880 he was the unsuccessful candidate for the Birmingham seat in Parliament. While serving as lieutenant-colonel of the Royal Horse Guards in the Egyptian campaign, he was killed at the battle of Abu-Klea. Consult Mann, 'Life of Burnaby' (London 1882) and Wright, 'The Life of Colonel Fred Burnaby' (London 1908).

BURNAND, Sir Francis Cowley, English author: b. 29 Nov. 1837; d. 21 April 1917. He was educated at Eton and Trinity College, Cambridge, and at first studied with a view to entering the Church of England, but when in 1858 he became a Roman Catholic he devoted himself to legal studies, and was called to the bar in 1862. By that year he had already achieved some success as a writer, and in consequence he seldom practised. After about a year's connection with Fun he joined the staff of Punch in 1863, and was editor from 1880 to 1900. His book 'Happy Thoughts,' republished from Punch went through several editions, and was followed by 'More Happy Thoughts' (1871); 'Happy Thought Hall' (1872); 'Quito at Home' (1890). Other successful productions of his are the extravaganzas, 'New Light on Darkest Africa,' and 'Ride to Khiva' (making fun out of Stanley and Colonel Burnaby respectively), the parody on Ouida's novel, 'Strathmore,' which he published under the title of 'Strapmore,' and 'The Modern Pilgrim.' Numerous plays have come from his pen, mostly of the nature of burlesques and light comedies, such as the plays 'Black-eyed Susan' (a burlesque of Douglas Jerrold's drama), and 'The Colonel.' He issued a history of the dramatic art in America, and had founded at Cambridge University. He collaborated with Sir A. Sullivan in the light operas 'The Chieftain,' produced in 1894, and 'Contrabandista.' He was knighted in 1902, and published an interesting volume of 'Records and Reminiscences.'

BURNE-JONES, Sir Edward, English painter: b. Birmingham, 28 Aug. 1833; d. London, 17 June 1898. In 1852 he went to Exeter College, Oxford, where he was a fellow student of William Morris, and afterward became acquainted with A. C. Swinburne (who dedicated his 'Poems and Ballads' to him). His first intention was to enter the Church of England, and it was not till he had reached his 22nd year that he seriously devoted himself to art studies; but, going to London in 1855, he came under the influence of D. G. Rossetti and the Pre-Raphaelites; most of this time he was occupied with the most absorbing work, and soon attained considerable success in various departments of artistic work. In 1859 he set out on a journey through Italy in order to see the productions of the early Italian painters and sculptors, and on his return to England he gave in his stained-glass designs and his pictures splendid promise of his subsequent triumphs. In 1866 he began a series of illustrations to Morris's 'Earthly Paradise,' and he also executed some 70 designs for the 'Story of Cupid and Psyche,' besides pictures dealing with the same subject. He was elected a member of the Old Society of Painters in Water Colour in 1864, and associate of the Royal Academy, a position which he resigned in 1893 (having only exhibited one picture at the Academy, 'The Depths of the Sea'), and he was created a baronet in 1894. His most important pictures are 'Day Night'; 'Spring, Summer, Autumn, Winter' (1867-68); 'The Wine of Circe' (1869); 'Chant d'Amour' (1873); 'Be guiling of Merlin' (1877), an illustration of Tennyson's 'Merlin and Vivien'; 'Six Days of Creation' (1877); 'The Golden Sun' (1878); 'The Wheel of Fortune' (1883); 'Wood nymph'; 'King Cophetua' (1884); 'Ia Luia Venitra'; 'The Depths of the Sea' (1886); and 'The Briar Rose' series (1890). He holds a specially high place as a designer for stained-glass windows, and in many other departments of decorative art. His leading characteristics as a painter are his fertile imagination and fine poetic feeling, qualities which no painter of the century has possessed in anything like the same degree. The Old-World quality of his work is strongly aided by his wonderful power as a colorist. In common with his friends, Morris and Rossetti, he exercised a most potent influence on Victorian art. Consult Bell, 'Edward Burne-Jones' (1902).

BURNELL, Arthur Coke, English Orientalist: b. Gloucestershire 1840; d. 1882. He was educated at Eton, Sandford, and Merton. Numerous plays have come from his pen, mostly of the nature of burlesques and light comedies, such as the plays 'Black-eyed Susan' (a burlesque of Douglas Jerrold's drama), and 'The Colonel.' He issued a history of the dramatic art in America, and had founded at Cambridge University. He collaborated with Sir A. Sullivan in the light operas 'The Chieftain,' produced in 1894, and 'Contrabandista.' He was knighted in 1902, and published an interesting volume of 'Records and Reminiscences.'

BURNES, Sir Alexander, Scottish soldier and traveler: b. Montrose 1805; d. Cabul, 2 Nov. 1841. Having obtained a cadetship, he joined the Bombay native infantry in 1821.
Here his proficiency in Hindustani and Persian procured him two regimental appointments as interpreter, and contributed greatly to his future promotion. In 1830 he was appointed to proceed to Lahore, ostensibly for the purpose of delivering a present of horses from the King of England to Ranjit Singh, but really for the purpose of acquainting himself with the lower Indus, with the view of opening it up to commercial enterprise. On returning from this mission, which he successfully accomplished, he proposed the establishment of cotton factories, having obtained the sanction of the government, set out in January 1832, descended the Sudjel to Lahore, and proceeded thereafter to Peshawur, Cabul and Bokhara. He afterward traveled with a caravan across the desert of Merv, visited the Shah of Persia in his capital of Teheran, traveled southward to the Persian Gulf and reached Bombay after a year's absence. He published an account of this journey in 1834, under the title of 'Travels into Bokhara.' He was afterward sent to England as the bearer of his despatches, received the special thanks of the court of directors and was presented with the gold medal of the Royal and the silver medal of the French Geographical Society. He returned to India in 1835, and in the following year was sent on a commercial mission to Cabul. While there he discovered that Russia was intriguing to detach the Emir, Dost Mohammed, from the British alliance, and on finding the Emir disposed to be friendly to Great Britain, he urged Lord Auckland to come to terms with him. His advice was heeded, and was rejected, and a force was dispatched in 1839 to reinstate Shah Sujah on the throne. Burnes accompanied the force as second political officer, and received the honor of knighthood. On the breaking out of an insurrection in Cabul, he was mured in with his brother and several other Europeans.

BURNET, Gilbert, British prelate and historian; b. Edinburgh, 18 Sept., 1643; d. London, 15 March 1715. Having graduated at Marischal College, Aberdeen, he zealously devoted himself to the study of law and divinity. In 1661 he qualified as a probationer in the Church, and took his orders into Holy Orders in 1664. On his return he was made fellow of the Royal Society in London, and ordained to the living of Saltoun, Haddingtonshire, in 1665. In 1669 he was made a professor of divinity at Glasgow, where he published his 'Modest and Free Conference between a Conformist and a Nonconformist,' and wrote his 'Memoirs of the Dukes of Hamilton' (1676); and was offered a Scottish bishopric, which he refused. His 'Vindication of the Authority, Constitution, and Laws of the Church and State of Scotland,' in which he maintains the cause of episcopacy, was much approved of at court, and several bishoprics were successively offered him and refused. In 1673 he was made chaplain in ordinary to the King, and was in high credit both with Charles and the Reformation in England. He gave a first volume to the public in 1679, when the affair of the popish plot was in agitation. It procured for the author the unprecedented honor of thanks from both houses of Parliament. The second appeared in 1681; the third, which was supplementary, in 1714. The high character of Burnet as a divine caused him to be sent for by the witty and prudish Sir Richard Steele. When, exhausted by a course of libertinism, he was sinking into the grave. The result of his conferences with the dying nobleman he gave to the world in his celebrated 'Account of the Life and Death of Sir Richard Steele.' About this time he wrote a letter to the King censoring his public misgovernment and private vices. His connection with the opposition party was now very intimate, and he attended Lord William Russell to the scaffold, when executed for his share in the Rye House plot. He published during this period several works in favor of liberty and Protestantism, and wrote the lives of Bishop Bedell and Sir Matthew Hale (1682); and in 1683 made his translation of More's 'Utopia.' On the accession of James he made a tour in France, and in 1684 he published an account of his travels in a series of letters to Robert Boyle. When at Utrecht he was invited to The Hague by the Prince and Princess of Orange, and had a great share in the councils relative to Britain. James caused a prosecution for high treason to be commenced against him in Scotland, and demanded his person from the States, who refused to deliver him up. In the revolution he took an active part, accompanying the Prince of Orange to England as chaplain, and was rewarded for his services by the bishopric of Salisbury. On taking his seat in the House of Lords, he displayed his usual moderation in regard to the non-juring clergy and dissenters. As a prelate, Bishop Burnet distinguished himself by fervor, assiduity, tolerance and charity. In 1697 he published his 'Exposition of the Thirty-nine Articles.' The scheme for the augmentation of poor livings out of the first-fruits and tenths due to the Crown, known as Queen Anne's Bounty, originated with Burnet. He left behind him manuscript his well-known 'History of His Own Times' (1723-34), upon which the best judgment to-day is that nothing could be more admirable than his general candor, his accuracy as to facts, the fullness of his information and the justice of his judgments, both of those whom he vehemently opposed and of those whom he greatly admired. The value of the work, says a recent authority, 'as a candid narrative and an invaluable work of reference, has continually risen as investigations into original materials have proceeded.'

BURNET, Jacob, American jurist; b. New-ark, N. J., 22 Feb. 1770; d. Cincinnati, Ohio, 10 May 1853. He was graduated at Princeton 1791, was admitted to the bar in 1796, removed to Cincinnati, then a village with about 500 inhabitants, and was a member of the territorial government from 1799 till the establishment of a State government in 1803. In 1806 he was appointed judge of the Supreme Court of Ohio, and was elected United States senator in 1828, and was prominent in the legislation to remove the national debt of the Middle West for public lands; and for the completion of the Miami Canal. Burnet was elected a member of the French Academy of Sciences upon the recom-
BURNET, John, Scottish engraver, painter and art-critic: b. Musselburgh, near Edinburgh, 20 March 1874; d. 1868. He learned etching and engraving, and, with Sir William Allan and Sir David Wilkie, was a student in drawing and painting at the Trustees' Academy, Edinburgh. In 1806 he went to London, where he engraved Wilkie's 'Jew's Harps'; 'Blind Fiddler'; 'Two Days'; 'Rabbit on the Wall'; 'Chelsea Pensioners Reading the Gazette of the Battle of Waterloo' (his largest and most elaborate work); 'Letter of Introduction'; 'Death of Tippoo Sahib'; and 'Village School.' He also engraved plates from several recent paintings, among them Rembrandts in the National Gallery and from several of his own paintings. Among his written works, for which he still maintains a reputation, are 'Practical Treatise on Painting' (1839) and 'His Works' (1849). 'Life and Works of J. W. M. Turner,' with Cunningham (1852). He was a sound and careful painter, but possessed little originality. He was made a fellow of the Royal Society, and in 1860, receiving a civil pension, he retired. Captured Fye, 'Patronage of British Art' (in Art Journal 1850, 1868).

BURNET, John, Scottish classical scholar: b. Edinburgh, 9 Dec. 1863. He was educated at the Royal High School and University, Edinburgh, and Balliol College, Oxford, and has been professor of Greek in Saint Andrews University since 1892. His works include 'Early Greek Philosophy' (1892); 'Greek Rudiments' (1897); 'Platonic Opera' (5 vols., 1899-1907); 'Plato's Phaedo' (1911); 'Greek Philosophy, Part I' (1914).

BURNET, Thomas, English divine and philosopher: b. Croft, Yorkshire, about 1635; d. London 27 Sept. 1715. He was educated under Dr. Ralph Cudworth at Cambridge, and afterward traveled as tutor to several young noblemen. In 1681 he made himself known by his 'Telluris Theoria Sacra,' which he subsequently translated into English. In 1683 he became master of the Charterhouse and after the revolution of 1688 was appointed chaplain in ordinary and clerk of the closet to King William. In 1692 he published 'Archaeologia Philosophica, sive Doctrina Antiqua de Kerum Origenibus,' but the freedom of opinion displayed in this work led to the removal of the author from the clerkship of the royal closet. Two posthumous works of this author appeared in 1727—the treatise 'De Fide et Officiis Christianis'; and 'De Statu Mortuorum et Resurgentium.' All the works of Burnet exhibit him as an ingenious speculator, rather than as a patient and sober inquirer concerning the moral and natural phenomena of which he treats. His great work, the 'Theory of the Earth,' started the systems of cosmogony in which Christian philosophers have attempted to reconcile the Mosaic account of the creation, paradise and the deluge, with the traditions of the ancient and the principles of modern science. His speculations are recommended by sublimity of description and eloquence of style. In his 'Archaeologia Philosophica' he has combated the literal interpretation of the history of the fall of man, and to expose its improbability he has introduced an imaginary dialogue between Eve and the serpent, which, as coming from the pen of a divine, is singular enough. It is only to be found in the first edition of

BURNET, William, American colonial governor: b. The Hague, Holland, 1688; d. Boston, 7 Sept. 1729. He was a son of Gilbert Burnet (q.v.) and was appointed governor of New York and New Jersey in 1720. Two years later he founded at Oswego the earliest English trading post on the Great Lakes as the first step in his able Indian policy in New York which accomplished very much for the interests of the mother country and the colonies. In 1728 he was transferred to the governorship of Massachusetts and New Hampshire, and was involved in disputes with the assembly of the former colony over the question of salary. He was fond of astronomical studies and published observations in the 'Transactions' of the Royal Society.

BURNET, the popular name of two genera of plants of the family Rosaceae. (1) Garden Burnet ('Sanguisorba'), a perennial plant which grows to the height of about two feet; leaves smooth, alternate, imparipinnate, composed of serrate leaflets; flowers arranged in rounded heads of a purplish color, with the female flowers above and the male flowers below. It is a native of Europe but has become naturalized in sunny places among rocks and in open fields, from New York to Maryland. It is cultivated in kitchen gardens for its aromatic leaves, which are used to season salads. (2) Canadian Burnet ('S. canadensis') is also a perennial plant; calyx of four divisions; stamens four; its stem is straight, from three to six feet in height; leaflets are oval, small. This plant grows chiefly in bogs and wet places from Labrador to Georgia, and west to Michigan.

BURNET MOTH, the name for the genus of hawkmoths, called Anthrocera, or, by some, Zygana. Anthrocera filipendula is the six-spot burnet moth. The six spots, which are on the superior wings, are red, while the rest of the wings are green. Its caterpillar, which feeds on the plantain, trefoil, dandelion, etc., is yellow, spotted with black. A. loti is the five-spot burnet moth. It is less common. The caterpillar feeds on honeysuckle, bird's foot, trefoil, etc.

BURNETT, Frances Eliza Hodgson, Anglo-American novelist: b. Manchester, England, 24 Nov. 1849. In 1856 went to Tennessee with her widowed mother, and lived there until her marriage in 1873 to Dr. S. M. Burnett. She has since lived in Washington and Europe. Between the ages of 16 and 20 Mrs. Burnett wrote numerous stories for magazine publication—including 'Vagabondia'; 'Theo'; 'The Fortunes of Philippa Fairfax,' etc. This girlish work was collected later by Charles Scribner's Sons in an edition known as 'Mrs. Burnett's Earlier Stories.' Her first serious
literary success was 'That Lass o' Lowrie's' (1877), a novel founded on collier life in Lancashire. This appeared serially in Scribner's Magazine and in book form in 1877. This was followed rapidly by 'Haworths of the Dales' (1878); 'Louisa ana' (1880); 'A Fair Barbarian' (1881); 'Through One Administration' (1883); 'A Lady of Quality' (1886); 'His Grace of Osborne'; 'The De Willoughby Claim' (1899); 'Tennyson and Fox-Seton'; 'The One I Knew the Best of All'; 'The Shuttle'; 'T. T. T.' (1913), etc. Her books for children are 'Little Lord Fauntleroy' (1886); 'A Little Princess' (1905); 'Two Little Pilgrims' Progress'; 'The Secret Garden'; 'The Lost Girl', etc. Her dramatic work comprises plays founded upon 'Little Lord Fauntleroy'; 'A Little Princess'; 'Esmeralda' (1881); 'Phyllis'; 'A Lady of Quality'; 'The Dawn of a To-morrow', etc.

BURNETT, James (LORD MONBODDO), Scottish judge: b. at the family seat of Mon- boddo, in Kincardineshire, 1714; d. Edinburgh, 26 May 1799. After studying at Aberdeen and Edinburgh he went to the University of Groningen, whence he returned in 1737, and commenced practice as an advocate at the Scottish Bar. In 1761 he was sent to the bench on the decease of his relative, Lord Milton. He distinguished himself by his writings as a metaphysician, having published a work on the 'Origin and Progress of Language' (1773-92), and 'Ancient Metaphysics' (6 vols. 1779-99). Lord Monboddo was an enthusiastic admirer of ancient literature, and especially of the works of Plato and other Grecian philosophers. His works contain many interesting observations, but also exhibit some strange and paradoxical opinions. Thus he seriously advocates the existence of satyrs and mermaids, and has advanced some pre-Darwinian speculations on the affinity between the human race and the monkey tribe, which exposed him to a good deal of ridicule on the first publication of his theories. Both his official and his private character were of high standing, and he was, notwithstanding some eccentricities, a man of learning and ability.

BURNETT, Peter Hardeman, first state governor of California and author: b. Nashville, Tenn., 1807; d. San Francisco, 1885. After residence in Missouri and Oregon, where he practised as a lawyer and assisted in the organization of territorial government, serving two terms in the legislature, he went to California in 1848 with one of the first bands of gold diggers, and became prominent in organizing State government without waiting for Congressional sanction. He was elected governor on the adoption of the constitution, but resigned in 1851. In 1857-58 he was judge of the Supreme Court and from 1863 to 1880 president of the Pacific Bank of San Francisco. His published works, marked by lucid exposition and clear logical thinking, include 'The Path which led a Protestant lawyer to the Catholic Church' (1890); 'The American Theory of Government contrasted with reference to the Present Crisis' (1861); 'Recollections of an old Pioneer' (1878); 'Reasons why we should believe in God, Love God, and Obey God' (1884).

BURNETT PRIZES, The. Two prizes in theology founded by John Burnett, of Dens, Aberdeen, Scotland, for the two best treatises on 'The evidence that there is a Being all-powerful, wise and good, by whom everything exists; and particularly to obviate difficulties regarding the wisdom and goodness of the Deity; and this independent of written revelation, and of the revelation of the Lord Jesus; and from the whole to point out the inferences most necessary and useful to mankind.' Burnett, who was born in 1729 and died in 1784, was a merchant of Aberdeen, and was known for his benevolence to the poor. On his death he bequeathed his fortune to found the prizes above referred to, and to establish funds for the relief of the poor and of pauper lunatics. He ordered the prize fund to be accumulated for 40 years at a time, and the prizes (not less than $6,000 and $2,000) to be awarded as above. In 1883 the fund was applied to found a lectureship on natural theology in the University of Aberdeen. Awards of the prizes were, first prize to William Laurentce Brown in 1815; second prize to John Bird Summer in 1848; first prize to Robert A. Thomson in 1855; second prize to John Tulloch in 1860.

BURNLEY, Charles, English composer and writer on music: b. Shrewsbury, 12 April 1726; d. Chelsea, London, 12 April 1814. He studied music under the organist of Chester Cathedral there, and at Shrewsbury, under the direction of his half-brother, an organist. He succeeded in London between 1744 and 1747, under Dr. Arne. In 1751 he obtained the place of organist at Saint Margaret's Church, Lynn Regis, in Norfolk. Here he commenced his 'General History of Music.' In 1760 he returned to London, where his compositions and the musical skill of his eldest daughter, then eight years of age, excited admiration. In 1769 he took the degree of doctor of music at Oxford. In 1770 he visited France and Italy, and two years afterward the Netherlands and Germany, for the sake of his great work. He published accounts of both tours. After his second return he became a fellow of the Royal Society. In 1776 appeared the first volume of his 'General History of Music from the Earliest Ages to the Present Period' (4 vols.). The second was in 1782, and the third and fourth in 1789. He was the author of several other valuable works, among which are the 'Memoir of Handel,' and a 'Life of Metastasio.' He died in the office of organist at Chelsea Hospital, and in receipt of a pension of $1,100. He wrote most of the musical articles in Rees' Cyclopedia. His 2d daughter, Frances or Fanny (Madame D'Arblay, q.v.), well known as an authoress, published a memoir of her father.

BURNLEY, Charles, English classical scholar and critic, son of Charles Burnley (q.v.): b. Lynn, Norfolk, 9 Dec. 1757; d. 28 Dec. 1817. He received his education at the Charter-house School, at Caius College, Cambridge, and King's College, Aberdeen, where he took the degree of M.A. He carried on a private school, distinguished himself as a writer in the Monthly Review and the London Magazine, to which he contributed articles on classical literature; subsequently entered into holy orders, and obtained some preferment in the Church. His valuable collection of books, many of them enriched with manu-
burnish with one end and to erase blemishes with the other.

BURNJIRD, Persia, town of the province of Irak-Ajemi, in the Tahtj River Valley, about 190 miles north by west of Isphahan. It has manufactories of cottons, felt hats, caps, etc., and a trade in skins, most of which are exported to Russia. Roads connect the town with Isphahan and Hamadan. It boasts a castle and numerous mosques. Pop. 25,000.

BURNLEY, England, a parliamentary and county borough in Lancashire, about 29 miles north of Manchester by rail, situated on the small river Brun, near its confluence with the Calder. The town presents a modern appearance, and is, generally speaking, well built, mostly of stone. The town-hall is a large, handsome building, erected in 1887; there is also a commodious exchange, and a convenient market hall. Among the churches the chief place is due to Saint Peter's, an ancient building restored in 1867. A splendidly equipped technical school was opened in 1881. The public utilities are nearly all publicly owned. The manufactures and commerce of Burnley have rapidly increased in recent years. The staple manufacture is cotton goods, and there are large cotton-mills, worsted, and woollen manufactories, several extensive foundries and machine-shops, with collieries, quarries and other works in the vicinity. Burnley is situated on the Leeds and Liverpool Canal, has a good water supply and has fine railway stations. It seems to have been a Roman station, and various Roman remains have been dug up in and around it. Burnley returns one member to Parliament. Pop. 106,765.

BURNOOSE, a large kind of mantle in use among the Bedouin Arabs and the Berbers of northern Africa, commonly made of white or undyed wool, but sometimes also of red, blue, green or some other color, and having a hood which may be drawn over the head in case of rain. In Spain also a similar garment is worn which bears the similar name of albornoz, and the name has also been applied to different kinds of upper garments worn by women of other European countries.

BURNOUF, bûr-noof, Émile Louis, French Orientalist, cousin of Eugène Burnouf (q.v.); b. Valognes, Manche, France, 25 Aug. 1821; d. 1907. After a normal school training, he became professor of ancient literature in the faculty of Nancy, and in 1867 director of the French School in Athens. Among his works are *Essay on the Vedā* (1863) ; *Sanskrit-French Dictionary* (1863-65), the first of its kind in France; *History of Greek Literature* (2 vols., 1868); *Science of Religions*; *The Athenian Legend*; Essays on *Antiquity* (Paris 1879); *Method of Studying Sanskrit* (1859, 3d ed., Paris 1885); *The Mythology of the Japanese*, according to the *Koku-si-Ryakeki*, the first translation of the work on Japanese mythology (1875); *The City and the Acropolis of Athens* (Paris 1877); and *Contemporary Catholicism* (1879). He also edited the letters of his cousin, Eugène Burnouf.

BURNOUF, Eugène, French Orientalist: b. Paris, 12 Aug. 1801; d. there, 26 May 1852. He commenced his studies at the Collège de Louis-le-Grand, became a pupil in the École,
des Chartes in 1822, passed as a lawyer in 1824 and so soon after devoted himself to the study of Oriental languages. In 1826 he attracted the attention of men of learning throughout Europe by his translation in collaboration with his friend, Lassen, an "Essay on the Pali," or the sacred language of the Buddhists in Ceylon and the Eastern Peninsula, and in 1827 by furnishing an explanatory text to the series of lithographic plates prepared by Géringer and Charrière to illustrate the religion, manners, customs, etc., of the Hindu nations inhabiting the French possessions in India. This work was not completed till 1835. In 1832 he was admitted into the Academy of Inscriptions, and in the same year was appointed to the professorship of Sanskrit in the Collège de France, an office which he held till his death. His fame is chiefly due to his having, so to speak, restored to life an entire language, the Zend or old Persian language, with which the Vedas were composed. Anquetil-Duperron had obtained the text of the extant works of this sacred language of the Persians. It is the glory of Burnouf to have interpreted those works with the aid of the Sanskrit. To this part of his labors was attached the "Extrait d'un commentaire et d'une traduction nouvelle du Vendidad-Sadé" (1830); "Observations sur la grammaire de M. Bopp" (1833); "Commentaire sur le Yâṣa" (1833-35). Burnouf also distinguished himself by his labors on Buddhism. On this subject he published the text accompanied by a translation of the "Bhâgavata Purâna" (1840-47); "Introduction à l'histoire du Bouddhisme Indien" (1st vol., 1844), etc. A fortnight before his death the Academy of Inscriptions elected him secretary for life. Consult Lenormant, "Eugène Burnouf" (Paris 1852); Barthélémy-St.-Hilaire, "Notice sur les travaux de M. E. B." (in the 2d ed. of the "Introduction à l'histoire du Bouddhisme" (1876); "Choix de Lettres d'Eugène Burnouf" (1891).

BURNOUF, Jean Louis, French classical scholar: b. Ussel, Marche, 1775; d. Paris, 1844. He was appointed assistant professor at the Collège Charlemagne in 1807 and professor of Latin there in 1816. In 1840 he became university librarian. He exercised a profound influence on classical learning in France. He published a translation of "Tacitus" (6 vols., 1827-33, 1881) and a "Méthode pour étudier la langue grecque" (1814, 1893).

BURNS, Anthony, American fugitive slave: b. Virginia, about 1830; d. Saint Catherine's, Ontario, 27 July 1862. Escaping from slavery he worked in Boston during the winter of 1853-54; but on the 24th December the day after the repeal of the Missouri Compromise and the passing of the Kansas-Nebraska Bill had inflamed the North against the slave power — was arrested on warrant of Charles F. Suttle through his agent Brent. The next day he was taken before United States Commissioner Edward G. Loring for examination; but Wendell Phillips and Theodore Parker secured an adjournment for two days. Burns, meanwhile, was confined in the courthouse under a strong guard, and on the evening of the 26th a great mob of rioting动手 held at Panmure Hall. T. W. Higginson and others had planned to stampede the meeting into storming the courthouse and rescuing Burns, and at the appointed time battered in a door and attempted the rescue themselves, relying upon assistance in their undertaking. The size of the meeting, however, prevented the signals from working well and the leaders from emerging, and after a scuffle in which a deputy was fatally stabbed and several assailants wounded, the latter retired. The next day Loring, an ardent upholder of the Fugitive Slave Law, delivered Burns to his claimant on evidence entirely illegal and worthless even under that law. Escorted by a strong military guard, Burns was taken to a government cutter, through streets draped in mourning and crowds ready to stone the soldiers. A riot at the wharf was only prevented by the action of Rev. Daniel Foster upon his saying "Let us pray!" The crowd uncovered and stood quiet while Burns was taken on board. Indictments were drawn against his would-be rescuers, but quashed for want of evidence. Burns afterward gained his liberty, studied theology at Oberlin College and was eventually settled over a Baptist colored church in Saint Catherine's, Ontario, where he died. Consult Stevens, "Anthony Burns: a History" (1856); Adams, "Richard Henry Dana: a Biographie" (1891); Higginson, "Cheerful Yesterdays" (1898).

BURNS, John, English labor organizer and statesman: b. London, October 1838. He was of humble birth and became a factory employee at the age of 10. He was an omnivorous reader and imbued his socialistic views from a French fellow laborer. By working a year as engineer on the Niger River, he earned enough for a six months' tour of Europe. He constantly addressed audiences of workingmen, and was a persistent labor agitator. He was one of the leaders in the West End riot in London, February 1886, and was imprisoned the same year for maintaining the right of public meeting in Trafalgar square. He, in conjunction with Ben Tillett, organized the successful dock strike in London in 1889. He has been thrice elected to the London county council and has sat in the House of Commons as Labor member for Battersea since 1892. From 1905-14 he was president of the Board of Trade, and in the latter year he became president of the Board of Trade. On the outbreak of the Great European War in August 1914, on account of the war policy of the Asquith cabinet, he resigned his place in the government.

BURNS, Robert, Scottish poet: b. near Ayr, Scotland, 25 Jan. 1759; d. Dumfries, 21 July 1796. His father, William Burns of Burnswark, a native of Kincardineshire, had been a gardener, but at the time of the poet's birth was a nurseryman on a small piece of land on the banks of the Doon in Ayrshire. He was a man of strong intelligence and deep piety, but unsuccessful in his struggle with poverty. His mother was Agnes Brown, a woman of ability, and, though of meagre book education, well versed in folk-song and legend. Robert, the eldest of seven children, went to school for three years, 1765-68, under John Murdoch of Whitehall. At paren Hall. T. W. Higginson and others had planned to stampede the meeting into storming the courthouse and rescuing Burns, and at the
more important part of his education he received from his father and his own reading. In 1766 William Burns himself mortgaged and sold his farm of Mount Oliphant; and the future poet by the time he was 16 was doing a man's work, overstraining his immature physique in performing his share in the vain effort of the family to keep its head above water. The same year he entered in 1777 to Lochlea, about 10 miles distant, where in 1784 his father died. During the Lochlea period, Burns, ambitious to improve his position, went to the neighboring town of Irvine to learn flax-dressing. Nothing came of this move; but while resident there he formed that acquaintance with a dissipated sailor to which he himself ascribed the beginning of his licentious adventures. On his father's death, Robert and his brother Gilbert rented the farm of Mossgill, but this experiment was no more successful than those previously made. While here he contracted an intimacy with Jean Armour, which brought upon him the censure of the Kirk-session. Finally, the poet, dissatisfied with the success of his attempts to satisfy his proclivities by the attempts of his father-in-law to cancel his irregular marriage with Jean and to hand him over to the law, determined to emigrate. For 10 years he had been composing verses, some of which had brought him considerable local fame, and these he collected and published in order to raise money for the voyage; but the unexpected success of this venture (Kilmarnock 1778) roused his literary ambition, gave him fresh courage and led him to change his plans. Instead of sailing for the West Indies, he went to Edinburgh in November 1786, and during that winter was the literary lion of the season. Here he met such celebrities as Dugald Stewart, the philosopher; Blair, the rhetorician; Henry Mackenzie, the author of 'The Man of Feeling'; Lord Glencairn; the Duchess of Gordon, and Creech, the publisher. The last named undertook an enlarged edition of his poems (Edinburgh 1787), and while awaiting for the profits of this venture, Burns made several tours through the country, traces of which are to be found in a number of occasional poems. Creech finally paid him enough to enable him to give substantial help to his brother in Mossgill, and to rent and stock the farm of Dumfries. Having married in 1788 he brought Jean Armour, to whom he was now regularly married, his success and fame having reconciled her parents to the match; and for three years he tried farming. But failure still dogged him, and in 1791 he moved to Dumfries, where he lived on a position in the excise service which he had obtained while still at Ellisland through the influence of some of the powerful acquaintances he had made in Edinburgh. He had, however, lost heart; and after a few years of drudgery, varied with the drinking bouts to which he was constantly tempted both by habit and by the invitation of foolish admirers, he died at Dumfries in his 38th year.

Biographies of Burns have frequently been crossed with the desire to disentangle or to explain away the facts of his numerous amours. There is much controversy over the identity of the semi-mythical Mary Campbell, the "Highland Mary" of the songs; much curiosity over the precise degree of Platonism in his feeling for Mrs. McLeseo, the "Clarinda" of his letters, and the inspirer of a number of lyrics; much difficulty over the information of how long he was in love with his wife. Into these details we do not enter. It is clear enough that Burns was a man of exceptionally powerful passions, that the extreme and depressing hardships of his youth, and, indeed, of the greater part of his life, served to strengthen and to tend his tendencies to conviviality, drove him to excesses of self-indulgence; and that while he strove often and painfully after better things, his strivings were many times without avail. The sport, he calls himself, the miserable victim of rebellious pride, hypochondriac imagination, agonizing sensibility and bedlam passions. These phrases are true enough, though they do not imply the further explanation of his pitiful career that is found in the habits of his class and time, and the untoward nature of his environment.

Something of his education has already been indicated. His schooling left him with a good grammatical knowledge of English and a reading knowledge of Latin, Greek, and to a certain extent of his own century, Addison, Steele, and Pope; Ramsay, Fergusson, Thomson and Beattie; Fielding, Smollett, Sterne and Mackenzie; Shenstone, Gray, and Goldsmith; Hume, Robertson and Adam Smith, and a number of philosophical and theological works. This list is by no means complete, but it is sufficient to correct the impression that Burns's was an "untutored Muse." The literary influences apparent in the work of Burns are of two main classes: English and Scottish. So far as he fell under the former of these he was an inferior poet of the school of Pope, an ardent admirer and imitator of such a minor master as Shenstone. In this field his critical judgment was never more than commonplace, the country, traces of which are to be found in a number of occasional poems. Creech finally paid him enough to enable him to give substantial help to his brother in Mossgill, and to rent and stock the farm of Dumfries. Having married in 1788 he brought Jean Armour, to whom he was now regularly married, his success and fame having reconciled her parents to the match; and for three years he tried farming. But failure still dogged him, and in 1791 he moved to Dumfries, where he lived on a position in the excise service which he had obtained while still at Ellisland through the influence of some of the powerful acquaintances he had made in Edinburgh. He had, however, lost heart; and after a few years of drudgery, varied with the drinking bouts to which he was constantly tempted both by habit and by the invitation of foolish admirers, he died at Dumfries in his 38th year.

Biographies of Burns have frequently been crossed with the desire to disentangle or to explain away the facts of his numerous amours. There is much controversy over the identity of the semi-mythical Mary Campbell, the "Highland Mary" of the songs; much curiosity over the precise degree of Platonism in his feeling for Mrs. McLeseo, the "Clarinda" of his letters, and the inspirer of a number of lyrics; much difficulty over the information of how long he was in love with his wife. Into these details we do not enter. It is clear enough that Burns was a man of exceptionally powerful passions, that the extreme and depressing hardships of his youth, and, indeed, of the greater part of his life, served to strengthen and to tend his tendencies to conviviality, drove him to excesses of self-indulgence; and that while he strove often and painfully after better things, his strivings were many times without avail. The sport, he calls himself, the miserable victim of rebellious pride, hypochondriac imagination, agonizing sensibility and bedlam passions. These phrases are true enough, though they do not imply the further explanation of his pitiful career that is found in the habits of his class and time, and the untoward nature of his environment.
in which he achieved his greatest triumphs. Their influence was both general and particular. They showed him by their own success what could be done in the native idiom; and they gave him models of which he was not slow to avail himself. Verses and poems, all but imitations of productions, usually inferior, by Ramsay and Ferguson, and to them and their poetical ancestors he was indebted not only for suggestions as to theme and method of treatment, but also for his most characteristic verse. There is a tenderness and loveliness of the poet's heart in his relation to animals; 'Hallowe'en' gives a vivid picture of rustic mirth and manners, and preserves a mass of folk-lore. Of the additional poems that appeared in the Edinburgh editions, the most notable was 'Tam o' Shanter.' Burn's love of nature and his fondness for the part of Burns to accept from his predecessors all that they had to give, and to seek to maintain loyalty a national tradition rather than to strive after mere novelty, has much to do with his success in carrying that tradition to its highest pitch, and in becoming, in a sense almost unique, the poet of his people.

The first kind of poetry which Burns thoroughly mastered was satire; and the most important of his successful efforts in this form, 'The Jolly Beggars,' from 'The Holy Fair,' 'The Holy Fair,' the 'Address to the Unco Guid,' 'The Holy Fair,' the 'Address to the Deal,' were all written within less than a year (1785–86). Whatever Burns's feelings may have been about what his predecessors and himself, what he loved in them, is, the deeper life and their influence was something much larger than mere personal grudge. Against the narrow, dogmatic, and tyrannical conduct of the so-called 'Auld Licht' party in the Scottish Church, there had sprung up the 'New Lights,' demanding some relaxation of Calvinistic bonds and preaching charity and tolerance. Though not a member of this or any ecclesiastical faction, Burns sympathized strongly with their protest; and the shafts of his satire were directed against both the doctrines of the orthodox party and their local leaders. For some time after the Reformation the Scottish people seem to have submitted willingly to the rigorous domination of the Presbyterians; but, after the struggle against Rome and the persecutions of the Covenanters, there began to appear a more critical attitude toward their spiritual leaders. The spokesmen for the Presbyterians, that spread throughout Europe in the latter part of the 18th century manifested itself in Scotland in a growing disposition to demand greater individual liberty in matters of conduct and belief. It was this disposition that Burns voiced in his satire, the local conditions determining the precise direction of his attack. The substantial justice of his cause, the sharpness of his wit, the vigor of his invective, and the imaginative fervor of his verse, all combined to bring the matter home to his countrymen; and he is here to be reckoned a great liberating force.

Several of the satires were published in the Kilmanock volume, and along with them a variety of other kinds of poetry. In the words of his preface, 'I sang the sentiments and manners he felt and saw in himself and his rustic companions around him.' Some of these are descriptive of sides of humble Scottish life with which he himself was in the closest contact. 'The Cotter's Saturday Night' describes with affectionate reverence the order of his father's house; 'Fuir Maikle,' 'The Auld Mare Maggie,' 'To a Mouse,' and others. 'Burn's love of nature and his fondness for the part of Burns to accept from his predecessors all that they had to give, and to seek to maintain loyalty a national tradition rather than to strive after mere novelty, has much to do with his success in carrying that tradition to its highest pitch, and in becoming, in a sense almost unique, the poet of his people. The first kind of poetry which Burns thoroughly mastered was satire; and the most important of his successful efforts in this form, 'The Jolly Beggars,' 'The Holy Fair,' 'The Holy Fair,' 'The Address to the Unco Guid,' 'The Holy Fair,' 'The Address to the Deal,' were all written within less than a year (1785–86). Whatever Burns's feelings may have been about what his predecessors and himself, what he loved in them, is, the deeper life and their influence was something much larger than mere personal grudge. Against the narrow, dogmatic, and tyrannical conduct of the so-called 'Auld Licht' party in the Scottish Church, there had sprung up the 'New Lights,' demanding some relaxation of Calvinistic bonds and preaching charity and tolerance. Though not a member of this or any ecclesiastical faction, Burns sympathized strongly with their protest; and the shafts of his satire were directed against both the doctrines of the orthodox party and their local leaders. For some time after the Reformation the Scottish people seem to have submitted willingly to the rigorous domination of the Presbyterians; but, after the struggle against Rome and the persecutions of the Covenanters, there began to appear a more critical attitude toward their spiritual leaders. The spokesmen for the Presbyterians, that spread throughout Europe in the latter part of the 18th century manifested itself in Scotland in a growing disposition to demand greater individual liberty in matters of conduct and belief. It was this disposition that Burns voiced in his satire, the local conditions determining the precise direction of his attack. The substantial justice of his cause, the sharpness of his wit, the vigor of his invective, and the imaginative fervor of his verse, all combined to bring the matter home to his countrymen; and he is here to be reckoned a great liberating force.

Several of the satires were published in the Kilmanock volume, and along with them a variety of other kinds of poetry. In the words of his preface, 'I sang the sentiments and manners he felt and saw in himself and his rustic companions around him.' Some of these are descriptive of sides of humble Scottish life with which he himself was in the closest contact. 'The Cotter's Saturday Night' describes with affectionate reverence the order of his father's house; 'Fuir Maikle,' 'The Auld Mare Maggie,' 'To a Mouse,' and others. 'Burn's love of nature and his fondness for the part of Burns to accept from his predecessors all that they had to give, and to seek to maintain loyalty a national tradition rather than to strive after mere novelty, has much to do with his success in carrying that tradition to its highest pitch, and in becoming, in a sense almost unique, the poet of his people. The first kind of poetry which Burns thoroughly mastered was satire; and the most important of his successful efforts in this form, 'The Jolly Beggars,' 'The Holy Fair,' 'The Holy Fair,' 'The Address to the Unco Guid,' 'The Holy Fair,' 'The Address to the Deal,' were all written within less than a year (1785–86). Whatever Burns's feelings may have been about what his predecessors and himself, what he loved in them, is, the deeper life and their influence was something much larger than mere personal grudge. Against the narrow, dogmatic, and tyrannical conduct of the so-called 'Auld Licht' party in the Scottish Church, there had sprung up the 'New Lights,' demanding some relaxation of Calvinistic bonds and preaching charity and tolerance. Though not a member of this or any ecclesiastical faction, Burns sympathized strongly with their protest; and the shafts of his satire were directed against both the doctrines of the orthodox party and their local leaders. For some time after the Reformation the Scottish people seem to have submitted willingly to the rigorous domination of the Presbyterians; but, after the struggle against Rome and the persecutions of the Covenanters, there began to appear a more critical attitude toward their spiritual leaders. The spokesmen for the Presbyterians, that spread throughout Europe in the latter part of the 18th century manifested itself in Scotland in a growing disposition to demand greater individual liberty in matters of conduct and belief. It was this disposition that Burns voiced in his satire, the local conditions determining the precise direction of his attack. The substantial justice of his cause, the sharpness of his wit, the vigor of his invective, and the imaginative fervor of his verse, all combined to bring the matter home to his countrymen; and he is here to be reckoned a great liberating force.

Several of the satires were published in the Kilmanock volume, and along with them a variety of other kinds of poetry. In the words of his preface, 'I sang the sentiments and manners he felt and saw in himself and his rustic companions around him.' Some of these are descriptive of sides of humble Scottish life with which he himself was in the closest contact. 'The Cotter's Saturday Night' describes with affectionate reverence the order of his father's house; 'Fuir Maikle,' 'The Auld Mare Maggie,' 'To a Mouse,' and others. 'Burn's love of nature and his fondness for the part of Burns to accept from his predecessors all that they had to give, and to seek to maintain loyalty a national tradition rather than to strive after mere novelty, has much to do with his success in carrying that tradition to its highest pitch, and in becoming, in a sense almost unique, the poet of his people. The first kind of poetry which Burns thoroughly mastered was satire; and the most important of his successful efforts in this form, 'The Jolly Beggars,' 'The Holy Fair,' 'The Holy Fair,' 'The Address to the Unco Guid,' 'The Holy Fair,' 'The Address to the Deal,' were all written within less than a year (1785–86). Whatever Burns's feelings may have been about what his predecessors and himself, what he loved in them, is, the deeper life and their influence was something much larger than mere personal grudge. Against the narrow, dogmatic, and tyrannical conduct of the so-called 'Auld Licht' party in the Scottish Church, there had sprung up the 'New Lights,' demanding some relaxation of Calvinistic bonds and preaching charity and tolerance. Though not a member of this or any ecclesiastical faction, Burns sympathized strongly with their protest; and the shafts of his satire were directed against both the doctrines of the orthodox party and their local leaders. For some time after the Reformation the Scottish people seem to have submitted willingly to the rigorous domination of the Presbyterians; but, after the struggle against Rome and the persecutions of the Covenanters, there began to appear a more critical attitude toward their spiritual leaders. The spokesmen for the Presbyterians, that spread throughout Europe in the latter part of the 18th century manifested itself in Scotland in a growing disposition to demand greater individual liberty in matters of conduct and belief. It was this disposition that Burns voiced in his satire, the local conditions determining the precise direction of his attack. The substantial justice of his cause, the sharpness of his wit, the vigor of his invective, and the imaginative fervor of his verse, all combined to bring the matter home to his countrymen; and he is here to be reckoned a great liberating force.

Several of the satires were published in the Kilmanock volume, and along with them a variety of other kinds of poetry. In the words of his preface, 'I sang the sentiments and manners he felt and saw in himself and his rustic companions around him.' Some of these are descriptive of sides of humble Scottish life with which he himself was in the closest contact. 'The Cotter's Saturday Night' describes with affectionate reverence the order of his father's house; 'Fuir Maikle,' 'The Auld Mare Maggie,' 'To a Mouse,' and others. 'Burn's love of nature and his fondness for the part of Burns to accept from his predecessors all that they had to give, and to seek to maintain loyalty a national tradition rather than to strive after mere novelty, has much to do with his success in carrying that tradition to its highest pitch, and in becoming, in a sense almost unique, the poet of his people. The first kind of poetry which Burns thoroughly mastered was satire; and the most important of his successful efforts in this form, 'The Jolly Beggars,' 'The Holy Fair,' 'The Holy Fair,' 'The Address to the Unco Guid,' 'The Holy Fair,' 'The Address to the Deal,' were all written within less than a year (1785–86).
phrase of the old song, to fix upon an idea or situation for the new poem; then, humming or whistling the melody about the fields or the farmyard, as imagination and emotion warmed within him, he worked out the new verses, coming into the house to write them down when the inspiration began to flag. Careful consideration of this process, for the reality of which we have his own authority as well as the evidence of the raw material and the finished product, will explain much of the peculiar quality and function of Burns as a song-writer. In George Thomson's collection of 'Scottish Airs' he had a share similar to that in Johnson's undertaking, his work for these two publications constituting the greater part of his poetical activity during the last eight or nine years of his life.

It was characteristic that, in spite of his financial stringency during these years, he refused to accept any recompense, preferring to regard this as a patriotic service. And a patriotic service it was of no small magnitude. By birth and temperament he was singularly fitted for just such a task, and his fitness is proved not only by the impossibility of separating, by a mere examination of the finished songs, the new from the old, but by the unique extent to which his productions were accepted by his countrymen and have passed into the life and feeling of his race. See TAM O' SHANTER; COTTER'S SATURDAY NIGHT; JOLLY BEGGARS, THE.


WILLIAM A. NEILSON,
Professor of English, Harvard University.

BURNS, William Chalmers, Scottish Protestant missionary; b. Dun, Forfarshire, 1815; d. 1868. He received his education at Aberdeen University and entered on the practice of law, which he soon abandoned to enter the missionary field in 1839. For about seven years he led great revivals throughout the British Isles, but set out for China in 1846. He was very successful, having adopted the native costume and manner of life and becoming a fluent speaker in the native tongue. Consult Burns, 'Memoir of William Chalmers Burns' (1870).

BURNS, William Wallace, American soldier; b. Coshocton, Ohio, 3 Sept. 1825; d. Beaufort, S. C., 19 April 1892. He was graduated at West Point in 1847. He served in the war with Mexico and also in the Union army during the Civil War, becoming major-general of volunteers. In 1865 he was brevetted brigadier-general and was for many years afterward in the Commissary Department at Washington, until 1889, when he retired, with the regular rank of colonel.

BURNSIDE, Ambrose Everett, American soldier: b. Liberty, Ind., 23 May 1824; d. Bristol, R. I., 13 Sept. 1881. He served an apprenticeship to a tailor, but received his commission to West Point, where he was graduated in 1847. After serving some years in garrison duty, he left the army as first lieutenant in 1852, and from 1853 to 1858 was engaged in the manufacture of firearms at Bristol, R. I., during this period, in 1856, inventing the Burnside breech-loading rifle. On the outbreak of the Civil War (q.v.) in 1861, he returned to the army as colonel of volunteers, serving from May to August of that year as colonel of the Rhode Island Volunteers, and as such taking part in the first battle of Bull Run (q.v.). On 6 August he was promoted brigadier-general of volunteers and from October 1861 to January 1862 supervised the organization of the "Coast Division" of the Army of the Potomac. From January to July 1862 he commanded the Department of North Carolina; in February captured Roanoke Island, occupied Newbern, N. C., and took Fort Macon, Beaufort. He was raised to the rank of major-general of volunteers on 18 March 1862 and placed in command of the troops that subsequently constituted the 9th Army Corps. In July 1862 and again after the second battle of Bull Run (q.v.) he was offered the command of the Army of Virginia which, after the battle of Bull Run, had been merged into the Army of the Potomac, but each time declined the offer and served with the 9th Army Corps under McClellan. In this capacity he participated in the Maryland campaign (q.v.) against Lee, rendering important services in the battles of South Mountain and Antietam (q.v.), in the latter action on 17 September commanding the left wing. On 10 November of that year he superseded General McClellan in command of the Army of the Potomac. On 13 December he crossed the Rappahannock and attacked General Lee near Fredericksburg, when he was repulsed with a loss of over 10,000 men, and was soon after transferred to the Department of Ohio. In November 1863 he successfully held Knoxville against a superior force, and in 1864 he led a corps, under General Grant, through the battles of the Wilderness and Cold Harbor. Resigning in April 1865, he was elected governor of Rhode Island (1866-68), and United States senator in 1875 and 1881. Consult Poore, 'Life and Public Services of Ambrose E. Burnside' (Providence 1882); Woodbury, 'Major General Burnside and the Ninth Army Corps' (Providence 1867).

BURNSIDE, Helen Marion, English artist and poet: b. Bromley Hall 1844. She published a book of poems in 1864, which made her widely known. From 1890 to 1899 she was designer to the Royal School of Art Needlework. She has published 'The Lost Letter,' 'Tales for Children,' 'The Penny' and many occasional contributions in prose and verse to leading magazines.

BURNSIDE, Ky., town in Somerset County on the South Fork River, and on the C. B. & C. R. and Cincinnati & Southern rail-
roads. The chief industries are lumber manufactures and roller mills. Taxable property amounts to $800,000. Pop. 1,500.

BURNT OFFERING, one of the sacrifices enjoined on the Hebrew Church and nation. It is called, in their language, olah, from the root alu, to ascend, because, being wholly consumed, all but the refuse ashes, was regarded as ascending in the smoke to God. In the New Testament it is called holokia, meaning a whole burnt offering, an offering wholly burnt. In the Vulgate it is called holocaustum, which has the same meaning. Stated burnt offerings were presented daily, every Sabbath, at the new moon, at three great festivals, on the day of atonement and at the feast of trumpets. Private ones might be presented at any time.

BURNT SIENNA, an ochreous earth known as sienna earth (terra di Siena) submitted to the action of fire, by which it is converted into a fine orange-brown pigment used in both oil and water-color painting.

BURNT STONES, a kind of carnelian often met with in ruins. The red color displayed by holding it up to the light is believed to be the result of fire and artificial methods toward the same end have been tried with more or less success.

BURNT UMBER, a pigment of reddish-brown color obtained by burning umber, a soft earthy mixture of the peroxides of iron and manganese, deriving its name from Umbria in Italy.

BURNT WOOD WORK. See PYROGRAPHY.

BURNTISLAND, buirnt-land, Scotland, a royal burgh and seaport of Fife, on the north shore of the estuary of the Forth, ¾ miles north by west of Edinburgh and five miles by steam ferry north of Granton. It is a favorite summer residence and bathing-place as well as a busy port. Its parish church dates from 1594, and close by is Rossend Castle, where Chastelard's indiscreet love affair with Mary Queen of Scots was followed by his execution. The harbor is capacious, of great depth and of easy access, and the docks are extensive and well equipped. Vegetable oil and oil-cake are made, and there are railway repairing works and a distillery. It unites with Kinhorn, Dysart and Kirkcaldy in sending a member to Parliament. Pop. 4,708.

BURFEE, Lawrence Johnston, Canadian author: b. Halifax, Nova Scotia, 5 March 1873. He entered the Canadian public service in 1890; in 1905 he was appointed librarian of the Carnegie Public Library, Ottawa. In 1912 he was appointed secretary of the Canadian section of the International Joint Commission. In addition to editorial work for the publications of the Canadian Archives and the Royal Society of Canada, contributions to various encyclopedias, and its publication, others, the following works: 'Bibliography of Canadian Fiction' (1904); 'The Search for the Western Sea' (1907), a notable contribution to the history of exploration; 'By Canadian Streams'; 'Songs of French Canada' (1909); 'Dictionary of Canadian History' (with A. G. Doughty); 'La Verendrye and the Western Sea' (1911); 'Canadian Humour' (1912); 'Among the Canadian Alps' (1914); 'Sandford Fleming, Empire Builder' (1915).

Burr, Aaron, American clergyman: b. Fairfield, Conn., 4 Jan. 1716; d. Princeton, N. J., 24 Sept. 1757. He was graduated at Yale and was settled as pastor of the Presbyterian Church of Newark, N. J. in 1748 he became president of the College of New Jersey, now Princeton University, succeeding the first president, Dickinson, who held office only a few months. He married a daughter of Jonathan Edwards, and was the father of Aaron Burr (q. v.), third Vice-President of the United States. He published a Latin grammar, known as the 'Newark Grammar,' and 'The Supreme Divinity of Our Lord Jesus Christ.'

Burr, Aaron, American statesman: b. Newark, N. J. (son of the preceding), 6 Feb. 1756; d. Fort Richmond, Staten Island, 14 Sept. 1836. Before he was three years old his parents died, leaving him a considerable estate. He entered the sophomore class of Princeton College in 1769, and was graduated in 1772. At the outbreak of the Revolution Burr enlisted as a private and joined the force before Boston. He volunteered for the expedition to Canada and took part in the attack upon Quebec. For this service he was raised to the rank of major. As aide-de-camp to General Putnam, Burr was engaged in the defense of New York, and shortly after (1777) was promoted lieutenant-colonel with the command of his regiment, the colonel being a civilian. He was at Valley Forge, and distinguished himself at the battle of Monmouth, where he commanded a brigade in Lord Stirling's division. During the winter of 1778 he was stationed in Westchester County, N. Y., but early in the following spring he resigned his commission, partly on account of ill health, and partly through disappointment at not being more rapidly promoted. Burr belonged to the Lee and Gates factions; he always affected to despise the military talents of General Washington; and it is not improbable that these circumstances interfered with his professional career. In 1782 he was admitted to the bar in Albany, and in July of the same year he married Mrs. Provoost, the widow of a British officer who had died in the West Indies. In 1783 he began to practise in New York, and soon obtained a lucrative business. In politics his success was rapid and brilliant. In 1784 he was elected to the State legislature; he was appointed attorney-general of New York in 1789 and United States senator in 1791. While in the Senate several influential members of Congress recommended him for the mission to France, but Washington, with marked emphasis, refused to appoint him. He left the Senate in 1797, and the following year was returned to the State legislature. Some aspersions upon his conduct while in that body, which were thrown out by John B. Church, led to a duel between Burr and that gentleman, in which, however, neither party was injured. Burr was very efficient in the presidential canvass of 1800. To his efforts may be attributed the success of the Republicans in New York, and the action of the State that resulted in the Union depended. On account of the prominence he thus obtained the friends of Jefferson brought him forward for the Vice-Presidency. An equal number of votes having been thrown
for Jefferson and Burr in the Electoral College, the election of a President devolved upon the House of Representatives. Most of the Federal members, taking advantage of the singular turn in affairs, supported Burr. The contest lasted several days. Upon the 36th ballot Jefferson was chosen President, and, in accordance with the provisions of the constitution at that time, Burr became Vice-President. His conduct in permitting himself to be used by his political opponents in order to defeat the candidate of his party, whom he himself had supported, dissolved his connection with the Republicans and destroyed his political influence. The Federalists nominated him for governor of New York in 1804. Some of the leading men of that party refused to support him, and he was defeated. The contest was bitter and led to a duel between Burr and Alexander Hamilton (q.v.), 11 July 1804, in which the latter was killed. Burr was compelled to give up his residence in New York after his removal from the Vice-Presidency in April 1805, he made a journey to the Southwest. His conduct gave rise to the suspicion that he was organizing an expedition to invade Mexico, with the purpose of establishing an empire there which should embrace some of the southwestern States of the Union. He was arrested in Mississippi and taken to Richmond, Va., for trial upon an indictment for treason. After a protracted investigation before Chief Justice Marshall the prosecution was abandoned and Burr was acquitted in September 1807. In 1808 he went to Europe, expecting to get means to carry out his Mexican design. He was disappointed; and after being abroad four years, part of the time in extreme poverty, he returned to America in 1812. He resumed his profession in New York, but never regained his former position at the bar. In 1833 he married Mme. Jumel, a wealthy widow, but they soon separated. Mr. Burr had but one child, the accomplished Theodosia Allston. (See BURR, Theodosia). In person he was below the medium height, but his manners and presence were very attractive. He was an adroit, persevering but not a great lawyer. He cannot be said to have been an orator, yet he was an effective and ready speaker. It has been said of Burr that he was a brilliant, and even a great, man, who was led astray by moral obliquity. In regard to the looseness of his principles, there can be no doubt; but there is a growing tendency to relieve his name of much of the odium that formerly attached to it. He survived nearly all his contemporaries. His body was laid beside his father's at Princeton. Consult Adams, 'History of the United States' (9 vols., New York 1889-91); Davis, 'Memoirs of Aaron Burr' (2 vols., New York 1856); Orth, S. R., 'Five American Politicians: A. Burr' (Cleveland 1906); Parton, 'Life of Aaron Burr' (New York 1858); Schouler, 'History of the United States of America under the Constitution' (6 vols., last ed., New York 1899); Tompkins, 'Burr Bibliography' (Brooklyn 1892); Todd, 'The True Aaron Burr' (ib. 1902); McCaleb, 'The Aaron Burr Conspiracy' (ib. 1903).

BURR, Edward. American soldier; b. Boonville, Mo., May 1859. He studied at Washington University 1874-78, and at the United States Military Academy 1878-82, and on graduation at the latter was assigned to the corps of engineers with the rank of second lieutenant. He was promoted first lieutenant in 1883 and captain in 1894; and as lieutenant-colonel of volunteers commanded the battalion of engineers in the campaign against Santiago de Cuba in June-July 1898. He was appointed colonel 2 March 1912. He is a member of the American Society of Civil Engineers.

BURR, Enoch Fitch, American mathematician and clergyman; b. Green's Farms, Fairfield County, Conn., 21 Oct. 1818; d. 1907. He was graduated at Yale in 1838 and became pastor of the Congregational Church in Lyme, Conn., in 1850. From 1866 till his death he was a lecturer at Amherst College. Among his works are 'A Treatise on the Application of the Calculus to the Theory of Neptune' (1848); 'A Song of the Sea' (1852); 'Aleph, the Chaldean' (1851); 'Pater Mundi' (1869); 'Ad Fidem' (1871); 'Ecce Terra' (1884); 'Cedestrial Empires' (1885); 'Universal Beliefs' (1887); 'Supreme Things in their Practical Relations' (1889); besides several historical stories.

BURR, George Lincoln, American historian; b. Oramel, N. Y., 30 Jan. 1857. He was educated at Cornell University, where he was graduated in 1881, and studied also at Leipzig, the Sorbonne and at Zurich. He became professor of ancient and medieval history in Cornell in 1888 and in 1898 was appointed librarian of the White Historical Library. In 1896-97 he served as historical expert of the Venezuelan Boundary Commission. He has made an especial study of the history of superstition. He has published 'The Literature of Witchcraft' (1890) and 'The Fate of Dietrich Fhade' (1891). He edited the 'Century Historical Series' and is a member of the editorial staff of the 'American Historical Review'.

BURR, Theodosia (Mrs. Joseph Allston), daughter of Aaron Burr, b. New York 1783; d. 1813. She was carefully educated and became very accomplished, showing particular linguistic talent. After the death of Mrs. Burr she presided over her father's household until her marriage in 1801 to Governor Allston of South Carolina with whom she corresponded with her father after her removal to the South in great interest and shows continued devotion to his interests. Her beauty, brilliant personality and relationship to the famous statesman drew public attention to her, especially during her father's trial, and had the effect of enlisting the public sympathy on his behalf. In 1812 she sailed from Charleston in the 'Patriot' for New York, but the vessel was never heard from and was believed to have been lost in the storm or sunk by pirates.

BURR, William Hubert. American educator; b. Watertown, Conn., 14 July 1851. He was graduated at Rensselaer Polytechnic Institute 1872; was employed by the Wrought Iron Bridge Company of New York, and later on the water supply and sewerage systems of Newark, N. J. He was assistant professor and later professor of rational and technical mechanics at Rensselaer Polytechnic Institute 1876-84; became assistant engineer of the Phoenix Bridge Company 1884, and subsequently its general manager; was professor of engineering in the Lawrence Scientific School of Harvard
University 1892-93; consulting engineer to the New York city department of public works 1893-95; of parks and of docks 1895-97; and later of highways. Since 1893 he has been professor of civil engineering at Columbia, and in 1904 became a member of the Isthmian Canal Commission. He is author of the "Stresses in Bridge and Roof Trusses" (1879); "Arched Ribs and Arched Truss Bridges" (1913); "Elementary Electricity of the Materials of Engineering" (1883); "The Theory of Masonry Arches," "Ancient and Modern Engineering and the Isthmian Canal" (1902), etc.

BURRAGE, Henry Sweetser, American clergyman: b. Fitchburg, Mass., 7 Jan. 1837. He was graduated from Brown University, 1861, and entering the 36th Massachusetts as a private, rose to the rank of captain and brevet-major of volunteers. After the war he resumed his studies, graduated at Newton Theological Institution, 1867, was at the University of Halle, Germany, 1868-69, and became a Baptist clergyman in 1869. He was pastor at Waterville, Me., 1869-73; editor of Zion's Advocate, 1873-1905; recording secretary of the American Baptist Union, 1876-1904; recorder Maine Conference, 1889-1912; chaplain National Soldiers' Home, 1905-12; trustee Colby College, 1881-1903; Newton Theological Institution, 1889-1906; fellow of Brown University since 1901. He has edited "Brown University in the Civil War" (1888); "Henry W. Longfellow's 75th Birthday" (1882); "History of the 30th Regiment of Massachusetts Volunteers" (1884); and has written "The Act of Baptism in the History of the Christian Church" (1879); "History of the Anabaptists in Switzerland" (1882); "Rosier's Relation of Waymouth's Voyage to the Coast of Maine in 1605" (1887); "Baptist Hymn Writers and their Hymns" (1888); "History of the Baptists in New England" (1894); "History of the Baptists in Maine" (1904); "Gettysburg and Lincoln" (1906); "Early English and French Voyages" (1906); "Maine at Louisburg in 1745" (1910); "The Beginnings of Colonial Maine" (1914).

Burrard Inlet, an inlet at the southwest corner of British Columbia, a little north of the mouth of the Fraser River. It is more than 40 miles long, and one of the finest harbors on the Pacific coast, and has Vancouver, the terminus of the Canadian Pacific Railway, on its southern shore.

Burrell, David James, American clergyman and author: b. Mount Pleasant, Pa., 1 Aug. 1844. He was graduated at Yale in 1867 and at Union Theological Seminary in 1870. He spent four years in mission work at Chicago and thereafter was successively pastor at Dubuque, Iowa, 1876-87, Westminster Church, Minneapolis, 1887-91, and the Marble Collegiate Church, New York. He has published "Religions of the World" (1891); "Gospel of Gladness" (1892); "The Early Church" (1897); "The Religion of the Future" (1894); "The Wonderful Teacher" (1902); "Teachings of Jesus" (1904); "The Life of the City" (1908); "The Cloister Book" (1909); "In David's Town" (1910); "At the Gate Beautiful" (1911); "The Home Sanctuary" (1911); "The Gateway of Life" (1912); "The Old-Time Religion" (1913); "The Sermon" (1913); "The Church in the Upper Room" (1913); "We Would See Jesus" (1914); "The Apostles' Creed" (1915); "Why I Believe the Bible" (1917). Burrell, Martin, Canadian legislator: b. England 1858. He was educated at Saint John's College, Hurstpierpoint, Sussex, and came to Ontario in 1886, where for 14 years he engaged in fruit growing near Niagara. He removed to British Columbia in 1900, and continued at fruit growing and began to take an interest in local politics. He became widely known as an authority on horticulture, and in 1907 the government of British Columbia appointed him fruit commissioner and sent him as lecturer to England. In 1908 he was elected as a Conservative to the House of Commons and re-elected in 1911. In the latter year he was appointed Minister of Agriculture in the Borden administration.

Burriona, Spain, town in the province of Castellón, eight miles south of the town of Castellón, on the river Seco, and about one mile from the Mediterranean. It is situated in a fertile region. Agriculture and fishing are the principal industries and it has a trade in oil, wine and fruit. Pop. 14,243.

Burrill, Thomas Jonathan, American naturalist: b. Pittsfield, Mass., 25 April 1839. He was graduated at the Illinois State Normal University in 1865, and in 1867, was botanist of Powell's first Rocky Mountain Expedition. Since 1868 he has been a member of the faculty of the University of Illinois and has held the following offices in the university: professor of botany and horticulture since 1868; dean of the College of Science, 1877-84; vice-president since 1879; acting president, 1889-90, 1891-94 and 1904; dean of the Graduate School since 1894. The degree of LL.D. was conferred upon him in 1893 by the Northwestern University. He is a member of several American and foreign scientific societies, and is well known from his writings under more than 100 titles, mostly upon the parasitic diseases of plants, bacteriology, microscopy, fruit growing, forestry, landscape gardening and modern education.


Burritt, Elihu ("The Learned Blacksmith"). American reformer: b. New Britain, Conn., 8 Dec. 1811; d. 7 March 1879. The son of a shoemaker, he was educated in the common schools of his native village, and at the age of 16 was apprenticed to a blacksmith. An early conceived project of reading the scriptures in their original language led him to philological studies in the intervals of labor, and by diligence and a remarkable facility he was soon able to understand works in several languages. He removed to Worcester to take advantage of the library of the Antiquarian Society there, and while still plying his trade became acquainted with the principal ancient and modern languages. In 1846 he went to England, where he formed the "League of Universal Brotherhood," whose object was to
employ all legitimate means for the abolition of war throughout the world. He was constantly engaged in writing and lecturing, and took a prominent part in all the European peace congresses. He returned to America in 1853. He was consul agent at Birmingham, 1865-68. The promotion of temperance, cheap ocean postage and the abolition of American slavery were leading objects of his continued efforts. His publications included 'Sparks from the Anvil' (1848); 'Thoughts and Things at Home and Abroad' (1854); 'Chips from Many Blocks,' etc.

**BURROUGH, BOROUGH, BURROWES, or BORROWS, Stephen, or Stefan, English navigator:** b. Devonshire, 23 Sept. 1525; d. 1584. In 1553 he took a very active part in the expedition dispatched from the Thames under Sir Hugh Willoughby to look for a northwest passage to Cathay and India. There were three ships in the expedition, one of which was under the command of Burrough, who got separated from the other craft during a storm. He continued the voyage alone, reaching Nova Zembla and the island of Wain-gats. In 1556 he made a second voyage into the Arctic region, in 1560 he took charge of another expedition to Russia. In 1563 he was appointed chief pilot and one of the four masters of queen's ships in the Medway, a position which he held for many years. Burrough, who reached 70° 30' N. on one of his Russian expeditions, was looked upon, in his day, as a noted explorer. He seems to have been a very active and intelligent sailor.

**BURROUGHS, George, American clergyman:** d. Salem, Mass., 19 Aug. 1892. He was graduated at Harvard College in 1870, was a preacher at Plymouth, Mass., in 1871, and at Salem in 1880. In consequence of some dispute with his people he returned to Portland in 1863, but, when that town was destroyed by the Indians in 1890, came back to Salem. Though a person of unblemished character, he became one of the victims of accusation by the confessing witches. It was testified that two of his wives had appeared to the witnesses, saying that he was the cause of their death, and threatening, if he denied it, to come in court in person. He was also accused of performing feats of extraordinary strength by diabolical assistance, such as carrying a barrel of molasses, holding out a gun by a finger placed in the muzzle, and of having tortured, afflicted, pined, consigned, wasted and to mention a Mary Wolcott. Although he asserted his innocence so as to draw tears from the spectators, and recited the Lord's Prayer, which it was supposed no witch could repeat without mistake, he was condemned and executed.

**BURROUGHS, John, American essayist and literary naturalist:** b. Roxbury, N. Y., 3 April 1837. In his youth he taught school for about 10 years; he began early to write for the magazines; in 1863 he became clerk in the Treasury Department at Washington, D. C., where he worked for 10 years, carrying on his literary activities simultaneously. Later he became a national bank examiner. In 1873 he built "Riverby," his home at West Park, on the Hudson, where he has since lived, devoting himself to fruit culture, nature study and literature. In 1862 Mr. Burroughs wrote the poem, 'Waiting,' by which he is perhaps more widely known than by any of his books. His first book, 'Walt Whitman, Poet and Poem,' was written in 1886, when he was being the first person of note in the United States to give public recognition of Whitman. His later book on the 'Good Gray Poet,' 'Whitman, a Study,' was published in 1896, and was the result of many years of comradeship with the poet. Mr. Burroughs has gathered most of the harvest for his nature books near at home, either at "Riverby," in his bark-covered study, or in the region of "Slabsides," his retreat back from the Hudson, near West Park, or in later years at "Woodchuck Lodge," on the farm in the Catskills where he was born. He has, however, wandered away from these haunts occasionally, as his books testify—to many parts of the United States, to Bermuda, the West Indies, the Canadas, twice to Europe, on the Alaskan expedition of 1899 with E. H. Harriman, in the Yellowstone in 1903 with President Roosevelt, through the Southwest and Yosemite with John Muir, in 1909, and also to Hawaii. The personal and social life of the region is given in his writings, and the charm of his easy familiar style, with his remarkable observation and interpretation of nature, has done much to popularize the study of nature in our day, while his work on literary criticism, his character studies and his philosophical essays are eagerly welcomed by lovers of good literature. His books, with the dates of their publication, are 'Walt Whitman, Poet and Person' (1867); 'Wake Robin' (1871); 'Winter Sunshine' (1875); 'Birds and Poets' (1877); 'Locusts and Wild Honey' (1879); 'Peace' (1881); 'Fresh Fields' (1884); 'Signs and Seasons' (1886); 'Indoor Studies' (1889); 'Riverby' (1894); 'Whitman, a Study' (1896); 'The Light of Day' (1900); 'Literary Values' (1902); 'Life of Audubon' (1902); 'Far and Near' (1904); 'Ways of Nature' (1905); 'Bird and Bough' (1906); 'Camping and Tramping with Roosevelt' (1907); 'Leaf and Tendril' (1908); 'Time and Chance.'

**BURROWING BEE, any of the species that burrow in the ground and form their nests there. Among the principal kinds are the _Adrena_ and _Halictus_. See Bee.

**BURROWING OWL, a small owl (Speotyto cuvieri) common on the open plains of both North and South America, where it makes its nest in burrows. It is mottled gray in color, has very long legs, scantily feathered and stands, much as a man does from the weight of that of owls generally. It is gregarious, and is especially prevalent on the North American plains in the "towns" of the prairie dogs, and in South America it lives with the vizcachas and cavies, and is thought to warn them by
its excited notes whenever an enemy approaches. Among the many unowl-like traits of this curious little exile from the woods is its cry, which has no resemblance to the ordinary hoot of an owl, but more nearly resembles the chattering of a cuckoo. This owl makes its home wherever it can in some abandoned burrow of a ground-squirrel or other animal, but, finding this, it digs a little cave-like hole of its own, which it furnishes with a bed of soft materials, whereon are laid about eight globular white eggs. The food of these owls consists almost entirely of insects and mice. Consult Coes, E. 'Birds of the Northwest' (Washington 1874); Sclater and Hudson, 'Argentine Ornithology' (London 1888).

BURROWS, William, American naval officer: b. near Philadelphia, Pa., 6 Oct. 1785; d. at sea, 5 Sept. 1813. He served in the war with Tripoli and commanded the sloop Enterprise in its successful action with the British brig Boxer off the coast of Maine. Both Burrows and the British commander were killed in the fight, and they were buried side by side at Portland. Congress struck a medal in honor of the victory and its hero.

BURSA, in anatomy, a sac containing a clear fluid between surfaces which move one upon the other. There are two varieties—mucous, or simple cavities between the skin and bony protuberances, as at the knee, and synovial, or sacs between the muscles or tendons and bony protuberances.

BURSAR, or BURSARY, an endowment in one of the Scotch universities, corresponding to an exhibition in an English university, and intended for the support of a student during his ordinary course and before he has taken a degree in the faculty in which he holds the bursary. Each of the four universities of Scotland has a greater or smaller number of bursaries. As yet the University of Aberdeen is better provided than any of the others with this class of endowments. Bursaries are in the gift sometimes of the Senatus Academicus of the university to which they belong, sometimes of the town council of the city in which the university is situated and sometimes of private individuals. With regard to the manner in which they are bestowed, some are obtained after competitive examination and others are given by the patrons for special reasons. As the former method of bestowing them is found to be the more beneficial in its results, it is gradually becoming the prevailing one, as at Aberdeen it has always been. Bursaries which are in the gift of the Senatus Academicus are all bestowed in this way. In a monastery, the bursar was the one who held and disbursed the income. In the sense of subtreasurer, the term is still used in English universities and in Harvard University and elsewhere. In England it is also applied to candidates for the elementary school-teaching profession receiving maintenance from the state.

BURSCHENSCHAFT, boor-shen-shaft (Ger.), an association formed in 1815 among students in German universities for the liberation and union of Germany.

BURSERACEE (named after the botanist, Joachim Burser), a family of dicotyledonous plants, of which there are about 13 genera and 300 species. The family belongs to the tropics and yields varieties of balsams and resins.

BURSITIS, inflammation of a bursa, most commonly caused by injury. The well-known housemaid's knee is a good example of bursitis. See JOINTS, DISEASES OF.

BURSLEM, England, market town and municipal borough in Staffordshire, within the parliamentary borough of Hanley, in "The Potteries." It is the oldest of the six towns forming the Potteries and is known as "The Mother of the Potteries." It is well built, chiefly of brick; has electric tramways, a fine town-hall, covered market, public baths, hospital and the Wedgwood Institute, comprising a free library, a museum and a school of art. It was founded in 1730. The building is an excellent exemplification of the structural application of ceramics. It has extensive manufactures of china and earthenware, and carries on coal mining. Pop. 41,556.

BURT, Mary Elizabeth, American educator: b. Lake Geneva, Wis. She studied at Oberlin College and entered the teaching profession. For three years she was a member of the Chicago board of education. Later she undertook editorial work and lecturing. She edited 'Little Nature Studies for Little People'; 'Seed Thoughts from Robert Browning,' etc.; has contributed frequently to periodical literature and is the author of 'Browning's Women' (1889); 'Literary Landmarks' (1889); 'The World's Literature' (1890); 'German Idyls (Siegfried)' (1892); 'Stories from Plato and Other Classic Writers' (1893), and collaborated in writing 'The Literary Primer' (1901); 'The Boy General' (1901); 'Poems Every Child Should Know' (1904); 'Poems for Every Child Should Know' (1907); 'Adventures of Pinocchio' (1908).

BURT, Thomas, English labor leader: b. Northumberland, 12 Nov. 1837. He began work in the coal mines at 10 years of age. He early became immersed in the labor movement; was secretary for the miners' union from 1855-1913; has represented Morpeth as a Liberal since 1874; was parliamentary secretary of the Board of Trade from 1892-95, and in 1906 was made a privy councillor.

BURT, William, American Methodist Episcopal clergyman: b. Cornwall, England, 23 Oct. 1852. He was graduated at Wesleyan University in 1879 and at Drew Theological Seminary in 1881. He spent five years in churches at Brooklyn, N. Y., and in 1886 was appointed presiding elder of the district of Milan in the Italian conference. He was in Rome from 1890 to 1904, and there founded schools and a publishing house. In 1904 he was made a bishop. His work has been looked upon with disfavor by the Papal Curia because of the proselyting methods adopted. He has published 'Europe and Methodism' (1909).

BURTON, Edwin Hubert, English clergyman and writer: b. London, 12 Oct. 1870. He was educated at Ware, Ushaw and Oscott; studied law 1888-93; solicitor, High Court of Justice, 1893. He was ordained a Catholic priest in 1898; was curate at Saint Mary and Michael's, London, 1898, when he was appointed
BURTON, Ernest De Witt, American Biblical scholar: b. Granville, Ohio, 4 Feb. 1856. He was graduated at Denison University in 1876 and at Rochester Theological Seminary in 1882, and went to Europe for further study in 1887 and 1888. From 1887 to 1889 he taught in the Rochester Theological Seminary and from 1883–92 in the Newton Theological Institution, first as associate professor and later as professor of New Testament interpretation. In 1892 he was appointed head professor of New Testament literature at the University of Chicago. Among his works are 'Syntax of the Moods and Tenses in New Testament Greek'; 'Harmony of the Gospels for Historical Study,' and 'Handbook of the Life of Christ' (1901); 'Life and Times with A. A. Chavannes'; 'Records and Letters of the Apostolic Age'; 'Handbook of the Life of Paul'; 'Constructive Studies in the Life of Christ' in collaboration with Shailer Mathews (1901); 'Principles and Ideals of the Sunday-School' (1903); 'Biblical Ideas of Atonement' (1909); 'Studies in Mark' (1904), and 'Some Principles of Literary Criticism and their Application to the Synoptic Problem' (1904). In 1892 he became associate editor of the Biblical World and in 1896 was made Assistant Journal of Theology.

BURTON, John Hill, Scottish historian: b. Aberdeen, 22 Aug. 1809; d. 10 Aug. 1881. He was educated at the grammar school and Marischal College in that city. He studied law and was admitted to the bar in 1831. He never succeeded in gaining much practice and soon turned his attention to literature, contributing to the Westminster, the Edinburgh and North British Reviews; and acted for a short period as editor of the Scotsman, and committed that journal to a free-trade policy. With Sir John Bowring he edited Bentham's works, as well as an illustrious 'Benthamiana,' with the aim of making more widely known the opinions of the great apostle of utilitarianism and radicalism. His first original work of importance was the 'Life and Correspondence of David Hume' (1846); in 1849 he published the 'Political and Social Economy'; in 1852 he compiled 'Narratives from Criminal Trials in Scotland.' He commenced in 1853 the publication of his chief work, the 'History of Scotland,' in two volumes covering the period from the revolution of 1688 to the extinction of the last Jacobite rebellion in 1746. This was afterward completed by seven volumes commencing with Agincourt's invasion and ending with the Revolution of 1688. A second edition of the complete history was published in eight volumes in 1873. A series of literary and historical sketches contributed to Blackwood's Magazine formed the basis of two smaller works, 'The Scots Abroad' and 'The Book Hunter.' His last important historical work was the 'History of the Reign of Queen Anne' (1880). In 1854 Mr. Burton was appointed secretary to the Scottish Prison Board, and he continued his connection with this department as a commissioner of prisons until his death. The success of his 'History of Scotland' brought him the appointment of historiographer royal for Scotland. Consult article in Blackwood's Magazine for September 1881, and the memoir by his widow prefixed to 'The Book Hunter.'

BURTON, Lewis William, American clergyman: b. Cleveland, Ohio, 9 Nov. 1852. He was first honor graduate in 1873 of Kenyon College, with A.B., later A.M. and D.D. from Case Western Reserve University 1886 of the South. He was ordained deacon 1877 and priest in 1878, in the Protestant Episcopal Church; was successively in charge of parishes in Cleveland, Richmond, Va., and Louisville. He was consecrated bishop of the diocese of Lexington (eastern half of Kentucky) 1896. He has published sermons, Episcopal charges and addresses and was author of 'Annals of Henrico Parish' in J. S. Moore's 'Virginiana' (1904). He traveled abroad as a member of the Lambeth conferences of the bishops of the Anglican Communion in 1897 and 1908. He is a member of the Phi Beta Kappa Society and of the Society of Colonial Wary; a trustee of Kenyon College and of the University of the South. He is Episcopal head of Margaret College, Versailles, Ky., and of Saint John's Collegiate Institute and Industrial School, Corbin, Ky.

BURTON, Marion Le Roy, American clergyman and educator: b. Brooklyn, Iowa, 30 Aug. 1874. He was educated at Carleton College and at Yale, receiving a B.D. from the latter institution in 1907. He became assistant professor at Yale for one year and in 1908 was in charge of the church of the Pilgrims, Brooklyn. After a year's travel in Europe, he was inaugurated president of Smith College, Northampton, Mass., in 1910. He has written 'The Problem of Evil' (1909); 'The Secret of Achievement' (1913); 'Our Intellectual Attitude in an Age of Criticism' (1913); 'Life Which is Life Indeed' (1914); 'First Things' (1915); also various addresses and reports.

BURTON, Richard, American poet and journalist: b. Hartford, Conn., 14 March 1859. He was graduated from Trinity College, Hartford, and took a degree at Johns Hopkins University in 1881. He became managing editor for the Churchman 1889–90, literary editor of the Hartford Courant 1890–97 and professor of English literature in the University of Minnesota 1893–1902; now in charge of the English department of the University of Minnesota. He has published 'Ode in Time' (1869), 'Midsummer Day' (1897), 'Literary Likings' (1898),
BURTON, Sir Richard Francis, English traveler, linguist and author: b. Barham House, Hertfordshire, 19 March 1821; d. Trieste, Austria, 20 Oct. 1890. He was educated at Oxford with the intention of entering the Church, but in deference to his own urgent request his father obtained a commission for him in the East India Company's service. He joined the army in 1842, served for some years in Sind under Sir C. Napier, explored the Neilliherry Hills, published an important work on Sind and acquired a complete knowledge of the Persian, Afghan, Hindustanee and Arabic languages. Returning to England in 1851, he soon after set out to explore Arabia disguised as an Afghan pilgrim. He published on his return a 'Personal Narrative of a Pilgrimage to El-Medinah and Mecca' (1855) as the result of this daring adventure. His next expedition was into the Somali country in East Africa, from whence he proceeded to the Crimea, where he was chief of the staff of General Beaton, and organized the irregular cavalry. After peace was proclaimed, Burton set out in 1856 along with Captain Speke to explore the lake region of central Africa and discovered Lake Tanganyika. Subsequently he made a journey in the Western States of North America and published an account of the Mormon settlement at Utah in his 'City of the Saints.' In 1861 he married, and he received the same year an appointment as consul at Fernando Po. While fulfilling his duties there he explored the Bight of Biafra, visited the Kamerun Mountains and conducted a dangerous mission to the King of Dahomey. Afterward he was transferred to the consulate of Santos in Brazil, and there he explored his own province, visited the Argentine Republic, crossed the continent to Chile and Peru, returned home after exploring the Pacific coast and published his 'Explorations of the Highlands of the Brazil.' He was now (1871) made consul of Damascus but was soon recalled, and in the following year, after a journey to Iceland, an account of which he wrote, he was appointed consul at Trieste. While occupying this position he led two expeditions into Midian (1876–78), and in company with Commander Cameron he conducted an expedition into the gold-producing country behind the Gold Coast. He remained English consul at Trieste until his death. In his latter years his services to geographical science were acknowledged by the gold medals of the French and English Geographical societies, while in 1886 his services to his country were tardily recognized by the honor of K.C.M.G. Besides the books of travel already mentioned, he was the author of many others, such as 'Sind, or the Unhappy Valley' (1851); 'Goa and the Blue Mountains' (1851); 'Falconry in the Valley of the Indus' (1852); 'First Footsteps in East Africa' (1856); 'The Lake Regions of Equatorial Africa' (1860); 'Abeokuta, or an Exploration of the Kamerun Mountains' (1863); 'Narrative of a Mission to the King of Dahomey' (1864); 'The Nile Basin' (1884); 'Vikram and the Vampires' (1886); 'Zanzibar' (1872); 'Gorilla Land' (1875); 'Ultima Thule, or a Summer in Iceland' (1875); 'Etruscan Bologna' (1876); 'Sind Revisited' (1877), and 'The Gold Mines of Minid.' (1878). In 1885–88 he published a remarkable literal translation of the 'Arabian Nights,' entitled 'Ten Thousand Nights and a Night,' on which his reputation is firmly established. His manuscript translation, with notes, from the Arabic of 'The Scented Garden,' of great value to scholars, was burned by his widow, who deemed it an immoral work. Consult 'Lives' by Hitchman (1887), Lady Burton (1893), Stistized (1897), Wright (2 vols., 1906).

BURTON, Robert, English clergyman and author: b. Lindley, Leicestershire, 1577; d. 1640. He was educated at Oxford, took orders and became rector of Seeky, Leicestershire. His learning, which was varied and extensive, is copiously displayed in the 'Anatomy of Melancholy, by Democritus Junior,' first published in 1621 and repeatedly reprinted. He was a man of integrity and benevolence but subject to strange fits of sadness and melancholy which rendered his conduct flighty and inconsistent. He is reputed to have undertaken the composition of his 'Anatomy of Melancholy' with a view to the dissipation of his morbid feelings. Among those who have been most deeply indebted to Burton is Sterne, as may be seen in his 'Tristram Shandy.' See Anatomy of Melancholy.

BURTON, Theodore Elijah, American statesman: b. Jefferson, Ohio, 20 Dec. 1851. He received his education at Ohio College and at Oberlin; entered the practice of law, which he later abandoned for the political field. In 1889–91 he was in Congress and again in 1895–1909. He was re-elected in 1909–11 but resigned to become senator. While in the House he rendered important services as chairman of the Committee on Harbors and Ports, and at one time served as delegate to the Republican conventions of 1904 and 1908, nominating William H. Taft to the Presidency at the latter. In 1913 he became chairman of the senatorial Committee on Canadian Relations and has also been president of the American Peace Society. His published works are 'Financial Crises and Periods of Commercial and Industrial Depression' (1902); 'Corporations and the State' (1911); 'Life of John Sherman' (1906).

BURTON, a special form of tackle, known either as top burton or sail burton. The former are used aboard ship to support the yards when these are rigged for hoisting heavy loads; the latter are used to hoist sails up to the yard where they are to be bent. They consist of a guide-block, fastened to the under purchase-block and traveling on the hauling line. They help to keep the tackle straight and prevent the sail from yawing as it is hoisted aloft. See Tackle.

BURTON-UPON-TRENT, England, a municipal and county borough in Staffordshire, 11 miles southwest of Derby, on the north bank
of the Trent, in a low, level situation. It is substantially built. Malting and iron-founding are carried on to a considerable extent, but it is chiefly celebrated for its excellent ale, of which vast quantities are made for both home consumption and exportation. For nearly three centuries Burton ale has been known and celebrated, but the latter-day development of the trade dates from the opening of the Midland Railway in 1849. There are about 30 breweries at work, giving employment in the various departments of the trade to about 5,000 men. The largest brewing establishments are those of Messrs. Bass & Co. and Messrs. Allsopp, the former of which covers considerably more than 500 acres of ground, brews 1,400,000 barrels of ale and stout annually and employs 3,000 men. Contrary to common usage, the brewers employ hard water obtained from wells instead of soft water. There are in all about 50 places of worship in the town, which also possesses a grammar school, girls’ high school, almshouses, a dispensary and infirmary, a public library and reading-rooms, school of science and art, handsome public baths, etc. A bridge of 34 arches, built in pre-Norman times, was replaced in 1894. Pop. 40,266.

BURTSCHIEID, bërt’sheid, Germany, southern suburb of Aix-la-Chapelle, and until 1897 an independent municipality of the Rhine province. It is noted for its thermal springs and has manufactures of iron, steel, needles and woolen goods. The woolen industry is the largest of all.

BURTSELL, Richard Laor, American clergyman: b. New York, 14 April 1840; d. Kingston, N. Y., 4 Feb. 1912. He studied in Rome and was ordained to the priesthood in 1862. After returning to the United States and having charge of parishes in New York he was appointed “defender of the marriage tie,” being the first to fill this office, which in 1884 was instituted in the Catholic Church in the United States. Having become connected with the movement headed by Rev. Dr. McGlynn, he was retired from his parish to one of less prominence in 1890. In 1904 he was elevated to the dignity of domestic prelate by Pope Pius X, and in 1905 was made rector of Saint Mary’s Church, Kingston, N. Y.

BURU, one of the Dutch East India islands, in the Indian Archipelago, west of and belongs to the residency of Amboyna. It is oval in shape, 92 miles long and 70 broad, and an area of 3,400 square miles. It has several bays, of which Cajeli is the largest, and contains a safe harbor sheltered from the monsoons. Viewed from this bay the island has a very fine appearance. In the foreground the minaret native houses are seen through the openings of the rich tropical vegetation; while lofty mountains of valuable cinnamoms and balsams rise in the view. The island is watered by 125 streams, large and small. On the northwest side there are vast swamps swarming with crocodiles. The island contains some high mountains—Mount Tumahu having an altitude of 8,330 feet. Buru produces a variety of valuable cinnamons, balsams, resins and odoriferous flowers. The chief article of export is cajeput oil, of which about $50,000 worth is exported yearly; most being sent to Java. The tree from which it is obtained (Melaleuca cajuput) grows also upon the islands of Amboyna, Ceram, Celebes and Sumatra; but the best oil is procured in Buru. The population (about 15,000) consists of Chinese in the interior, and Malays on the coast.

BURWASH, Nathaniel, Canadian educator: b. Argenteuil, near Saint Andrews, Quebec, 25 July 1839, of a loyalist family, who left Vermont during the American Revolution. He was educated at Victoria College, Cobourg, and Yale University, and entered the Methodist ministry in 1860. He was professor in Victoria College, 1867—73; dean of faculty of theology in 1873, and has been president and chancellor of Victoria University, Toronto, from 1887. He was secretary of education for the Methodist Church in Canada, 1874—86, and devoted much time toward bringing about university federation in the province of Ontario. He has published ‘Wesley’s Doctrinal Standards’ (1881); ‘Handbook on the Epistle to the Romans’ (1887); ‘Inductive Studies in Theology’ (1896); ‘Manual of Christian Theology’ (1900); ‘Edgerton Ryerson’ (1902).

BURY, Sir George, Canadian railway official: b. Montreal, 6 March 1866. He was educated at Montreal College, entered the Canadian Pacific Railway service in 1883 as clerk in the purchasing department, rose to be the general superintendent of the Central Division, Winnipeg, and in 1911 was appointed vice-president of the company and manager of their western lines. He was knighted in 1917.

BURY, John B., Irish scholar: b. 16 Oct. 1861. He was graduated from Trinity College, Dublin, in 1883 became professor of modern history in Dublin University, professor of Greek there in 1888, and Regius professor of modern history at Cambridge University since 1902. He has written ‘History of Greece to Death of Alexander the Great’ (1902); and has edited Pindar’s ‘Isthmian Odes’; and ‘Ne- mean Odes’; Freeman’s ‘History of Federal Government in Greece and Italy’; and Gibbon’s ‘Decline and Fall’; ‘Life of Saint Patrick’ (1905); ‘The Ancient Greek Historians’ (Harvard Lectures 1908); ‘Constitution of the Later Roman Empire’ (1909); ‘History of the Eastern Roman Empire’ (1912); ‘History of Freedom of Thought’ (1913); and Freeman’s ‘Historical Geography of Europe’ (1913).

BURY, Richard de. See AUNGERVILLE, RICHARD, PHILOBOSIBON.

BURY, England, a municipal and parliamentary borough, in Lancashire, 10 miles north-northwest of Manchester. It is well situated on rising ground between the Irwell and the Roche, and, being much improved in recent times, now presents the appearance of a clean and well-built town. It has a handsome town hall and Athenæum, a technical school and art gallery, Trevelyan Club, and Philips Hall, etc. Among the churches, Saint Mary’s (the parish church) and Saint Thomas’ are perhaps the finest, being highly ornate Gothic buildings with tower and spire. Bury was at one time the seat of a woollen industry protected by the Flemings in the 14th century. The staple manufacture is that of cotton, and it was here that John Kay invented the fly-shuttle. There are also large woollen factories, bleaching and printing works, dyeworks, foundries, etc. The
borough owns and operates the water supply, gas and electric undertakings. Sir Robert Peel was born at Chamber Hall in the vicinity in 1788; and a bronze statue of him adorns the town. Bury returns one member to Parliament. Pop. 59,040.

BURY SAINT EDMUNDS, England, parliamentary and municipal borough in West Suffolk, situated on the Lark, 26 miles north-west of Ipswich. It contains two fine churches, the Nunnery and Saint Mary. Among other buildings a shire-hall, a guild-hall, a corn exchange, athenaeum with library, etc. Agricultural implements are manufactured, and there is a large trade in agricultural produce. Of many benevolent institutions the principal is a free grammar school founded by Edward VI. Bury Saint Edmunds sends one member to Parliament. It is an ancient place, and derived its name from Saint Edmund, a king of the East Angles, who was buried here. The barons in John's reign met here and swore to obtain the ratification of Magna Charta. Bury Saint Edmunds contains the remains of an abbey, once the most wealthy and magnificent in Great Britain, of which all that remains is the Nunnery tower or Church Gate, one of the best specimens of early Norman architecture in England, and the western gate, decorated in style. Pop. 16,785.

BURYING-BEETLES, coleopterous insects of the family Silphidae. The carrion or sexton beetles are useful in burying decaying bodies of birds, mice, etc., in which they lay their eggs. The larvae are crustacean, flattened, with the sides of the body often serrated, black and of a fetid odor. They undergo their transformations in an oval earthen cocoon. In Necrophorus the antennae have 10 apparent joints, and the rounded club is four-jointed. The genus Silpha, of which S. lapponica is a common species, differs in the third joint of the antenna being no longer than the second but shorter than the first. In Necrophilus the third joint is as long as the first. S. surinamensis has a yellow thorax with a central irregular black spot. Catops and its allies live in fungi, carrion and ants' nests, and are small, black, oval insects. There are between 800 and 900 species of the family, many of which are small and live in caves (see CAVEDWELLING ANIMALS) or in nests of ants.

BURYING-PLACES, localities of seclusion of the dead. The custom of burying the dead in public places prevailed among the most ancient nations, including the Romans, who afterward, in the flourishing periods of the republic, burned their dead and kept the ashes in tombs, collected in urns. The ancient Germans buried their dead in graves consecrated by their priests. With the introduction of Christianity and its burial customs among the Romans, those who were cremated were reserved for the purpose of general burial; and it was regarded as ignominious not to be buried in consecrated earth. The deprivation of the rites of burial was therefore part of the punishment of excommunication. The Romans provided their grave-stones, upon which were inscribed the name of the deceased, and the wish, Sit illi terra levix (*May the earth rest lightly upon him*). This custom was preserved by the Greeks, the Egyptians, and Romans erected over the graves of men of rank, or persons otherwise remarkable, pyramids, mausoleums or temples. After the introduction of Christianity little churches, called chapel, were erected over the graves. Early Christian martyrs were often buried in caverns, which by degrees were enlarged to spacious subterranean vaults. Subsequently others considered themselves happy if their bones were allowed to repose near the ashes of a martyr. As early as the 5th century the Christians built churches over the sepulchres of the holy martyrs; and in the belief that a place was sanctified by their ashes they anxiously sought out, on the erection of new churches in cities, or the transformation of heathen temples into Christian churches, the remains (relics) of the martyrs, and buried them under the altar of the new church to communicate to it a character of greater sanctity. The Emperor Constantine, who died in 337, is supposed to have been the first person who ordered his tomb to be erected in a church. This was done in the Church of the Apostles at Constantinople, of which he was the founder, and therefore probably considered himself as peculiarly entitled to this privilege, and by the style of his sepulchre soon imitated by the bishops, and later all those who had enriched the Church were distinguished by this honor. The Emperors Theodosius and Justinian, indeed, forbade the erection of sepulchres in churches, but in vain. The Philosopher again permitted them to everybody. At present interment in churches is almost everywhere suppressed, or at least permitted only under certain restrictions. Even in Naples and Rome the general practice of erecting sepulchres in churches was forbidden in 1809, and the foundation of burial places without the city was provided for. The custom introduced by the communities of Moravian Brothers, who form their burial places into gardens, is now becoming general; and cemeteries, instead of exhibiting merely dull ranges of tombstones, are adorned with flower plots and ornamental shrubbery. The celebrated burying-place of Père la Chaise, near Paris, is one of the most beautiful and interesting spots in the world. See also BURIAL; CREMATION; CATOPHRAGY.

BUSACO, boo-sä'kô, a hamlet in the province of Beira, on the north side of the river Mondego. It is memorable for the battle, 27 Sept. 1810, between Wellington and Masséna. Wellington, with about 40,000 men on a retreat before Masséna, with a force of 65,000, availed himself of the favorable position of the sierra or ridge here for checking the pursuit.

BUSBEQ or BUSBEQUIUS, Ogier Ghiselin de, Flemish diplomat and author: b. Comines 1522; d. 1592. After having studied in the most celebrated universities of Flanders, France and Italy, he entered the service of Ferdinand, King of the Romans, who in 1555 sent him as Ambassador to Constantinople. In 1562 he returned home, after spending several years as tutor and guardian to the sons of Maximilian II, was sent to accompany the Archduchess Elizabeth (who was to be married to Charles IX) on her journey to France. Busbecq lived there as steward to Elizabeth, and when she left France, after the death of her husband, he remained as Ambassador of Rudolph II. Two important works of his survive, 'Legationes Turcicae Epistolae Quatuor,'
in which the policy, the power and the weakness of the Porte are so profoundly and clearly explained that even at present information may be drawn from them; and 'Epistole ad Rustolphum II.,' a very important work for the history of those times. His style is pure, elegant and simple. During his stay in Turkey he collected Greek inscriptions and manuscripts. In 1823 Forster and Daniell, 'The Life and Letters of Ogter Ghiselin de Busbecq' (London 1881), which contains his most important writings: De Thou, 'Histoire de mon temps' (Paris 1604); St.-Genois, 'Les voyageurs belges' (Brussels 1847); Dupuis, 'Etude sur l'ambassade d'Augier de Busbecques en Turquie' (in Memoriales de la Societé des Sciences de Lille).

BUSBY, Richard, English schoolmaster: b. Lutton or Sutton, Lincolnshire, 22 Sept. 1605; d. 6 April 1695. He was educated at Westminster School and at Oxford, where he entered Christ Church in 1624 and was graduated B.A. four years later, and received his M.A. in 1631. He became a tutor of his college and at the age of 33 was appointed prebendary and rector of Cudworth, in Somersetshire. In 1638 he was elected to a fellowship and later was appointed headmaster of Westminster School and two years later was confirmed in this appointment, which he held continuously till his death. He was strict in discipline and a successful teacher, and among his pupils were many of the greatest men of his time—Dryden, Locke, Atterbury, South, Henry, Hooper and others. His published works were mainly school books, now long out of date. He was buried in Westminster Abbey.

BUSBY, a military headress worn by hus- sars, artillerymen and engineers, consisting of a fur hat, with a bag of the same color as the facings of the regiment hanging from the top over the right side. The style and material of the busby vary in the different branches of the military service. The bag appears to be a relic of a Hungarian headress, from which a long padded bag hung over and was attached to the right shoulder as a defense against sword cuts. It is worn only in times of peace.

BUSCH, Moritz, German publicist: b. Dresden, 13 Feb. 1821; d. 1899. He was educated at Leipzig and in 1847 began his literary work by translating a number of the novels of Dickens and Thackeray. As a member of the Radical party he was disappointed by the failure of the revolutionary movement of 1848 and came to the United States in 1851, but returned to Germany in 1852. He also traveled in the Orient in behalf of the Austrian Lloyds. In 1856 he became editor of the Grenzboten, and in this paper defended the policy of Bismarck. In April 1870 he was appointed to a position in the Foreign Office and accompanied Bismarck to Frize at the time of the Franco-Prussian War as reporter for the press. In 1873 he gave up his official position to become the editor of the Hannoverschen Kuriers, but continued to be a confidant of Bismarck and strongly advocated the Chancellor's policy in his article. After his visit to the United States he wrote 'Wanderungen zwischen Hudson und Mississippi' (1853), and 'Die Mormonen' (1857). Other works of his are 'American Humorists' (translations of selections from Mark Twain, Bret Harte, etc.); 'The History of the International'; 'The Humor of the German People'; 'Count Bismarck and His People During the War with France'; 'Our Chancellor' (a life of Bismarck), and 'Bismarck; Some Secret Pages of His History' (translated into English 1898).

BUSCHING, Anton Friedrich, German geographer: b. Stadthagen, Schauenburg-Lippe, 27 Sept. 1724; d. Berlin, 28 May 1793. He studied theology in Halle from 1744 and was for a time minister of a Protestant church in Saint Petersburg. When acting as a traveling tutor he became convinced of the defects of existing geographical treatises and resolved to write a new one, which he began on his return to Germany in 1752 by publishing a short description of Schleswig and Holstein as a specimen. In 1754 he was made professor of philosophy in Göttingen. In 1766 he was made director of the united gymnasia of Berlin and the suburb Kölln. Before his great 'Erdebe- schreibung,' which he began in 1764 in separate volumes, and which, though not entirely completed by the author, passed through eight editions during his life, neither the Germans nor any other nation had a thoroughly scientific geographical work. Among his important writings is the 'Magazin für Historiographie und Geographie' (25 vols., 1767–83).

BUSCHNAUM, Hermann, German Jesuit: b. Notteln 1600; d. Münster, 31 Jan. 1668. He taught moral philosophy at Cologne and was rector of the Jesuit College at Münster. He is best known through his casuistical work, 'Medulla Theologie Moralis, Facili ac Perspicua Methodo Resolvens Casus Consentientis,' in which he treats of the principles of the Jesuit morals in a detailed and systematic manner. This book passed through 45 editions between 1645 and 1670, and has been reprinted in modern times. After Damien's attempt to assassinate Louis XV of France, the charge was made that it had taught the Jesuits' approval of murder and regicide, it was therefore publicly condemned by the order and burned by the Parliament of Toulouse.

BUSH, Katharine Jeanette, American zoologist: b. Scranton, Pa., 30 Mar. 1855. She received her education in public and private schools at New Haven, Conn., studied zoology under the direction of Verrill at Yale University and in 1879 was appointed assistant of the Yale Zoological Museum. She became a member of the United States Fish Commission, a member of the American Society of Naturalists and the American Society of Zoologists. She was joint editor of 'Webster's Dictionary' (1890 ed.), and is the author of 'The Tuberculose Annels of the Tribes Sabelidas' and 'The Explorers of Harriman Alaska Expedition Series, Vol. XII, 1905); 'Deep Water Mollusca' (1885); 'New Species of Turbonilla' (1890), and contributions to the principal scientific journals.

BUSH, Hans, English lawyer: b. 1815; d. 1882. He received his education at King's College, London, and at the University of Cambridge. He was called to the bar in 1841. He attracted public notice through his advocacy of the establishment of rifle clubs as a means of defense of the nation. While still at the university, he published 'The Rifle and How to Use It' and instituted a rifle club among
the undergraduates. In 1853 he reorganized
the Victoria Rifles, then England's only volun-
teeer body, and lectured, in and out of the
army, on the details of his great hobby. To him belongs
the honor of first suggesting life-saving stations and
of organizing a model station. His prin-
cipal work is 'The Navies of the World: Their
Present State and Future Capabilities' (1859).

BUSH-BROWN, Henry Kirke, American
sculptor; b. Philadelphia, N. Y., 21 April 1837.
He studied art in Paris and Italy and has a
studio in New York. His most important works
are equestrian statues of Generals Meade and
Reynolds and the Lincoln Memorial at Gettys-
burg; the statue of Justizian, Appellate Court,
New York; 'Indian Buffalo Hunt,' Chicago
World's Fair; statues for Hall of Records,
New York. He was elected a member of the
National Sculptural Society and was prominent
in the movement for municipal art.

BUSH CREEPERS, the English name of
the Unicollina, a subfamily of the Sylviidae.
These birds have sharp, conical bills and long,
pointed wings. They are usually diminutive in
size, active in habits, have a twittering note and
build their nests in thickets, solitary bushes or
trees. They are found in the warmer parts of
both hemispheres, some of them, however, being
migratory.

BUSH-DOG, a small wild dog (Icticyon
venaticus), resembling a fox in appearance,
found in Guiana and Brazil. It is distinguished
by its one molar tooth in the upper jaw, has
close hair and a short, stubby tail. Compare
Fox-dog.

BUSH-QUAIL, the Anglo-Indian name
for the button-quail (q.v.).

BUSHBUCK, any of several African antel-
opes, frequenting thickets and bushy regions.
The name applies especially to the diminutive
antelopes of the genus Cephalophus, which the
Dutch of South Africa called "duykers" (q.v.).
These include the smallest members of their
race, some of the males having horns only
3 inches high at the shoulders. They haunt the rocky hill-
sides, leaping with extraordinary agility from
stone to stone and diving into the thickets at
the first alarm. They feed upon berries, leaves,
buds and similar food, rather than upon grass,
and their flesh has a delicate flavor. The name
"bushbuck" is also given, especially in South
Africa, to the larger antelopes of the genus
Tragelaphus, more distinctively known as "har-
nessed" antelopes, because their hides, often
richly colored, are conspicuously marked with
whitish stripes, suggesting a harness thrown
over the back. The largest of these handsome
antelopes is the West African bongo (T. eury-
ceros), of the forests of the Gaboon region,
which stands nearly 5 feet high and has horns
30 inches long. On the opposite side of the
continent the nyala (T. angasi) frequents the
fever-stricken swamps of the East African
coast. Another well-known species of the
swamps of southern and eastern Africa is
Speer's antelope (M. speeri), native names for
which are "nakong" and "sititunga." It differs
from its fellows in having a uniform grayish-
brown silky coat, without any "harness," but
the young are faintly striped and spotted. This
species is one of the best known of African an-
telopes wherever rivers or swamps occur, and
still survives in considerable numbers. That
species most often called the guib (T. scriptus),
still to be found in the jungles along the African
rivers from Abyssinia to the Cape. It is remarkable for its
inferior size, which is about that of a goat, and
for the variability of its markings, which has
led to much confusion in describing it. The
variety most common in Cape Colony is uni-
formly dark brown, with no stripes whatever,
and only a few spots on the haunches. This
genus of antelopes is closely allied to that of
the koodooos (q.v.), and resembles them in that
the females are hornless and usually differ in
color from the males. Consult Lyddeker,
'Game Animals of Africa' (London 1908).

BUSHEL, a dry measure containing eight
gallons or four pecks. The standard bushel in
the United States (originally known as the
Winchester bushel) contains 2150.42 cubic
inches, and holds 77.627 pounds of pure water
at a temperature of 39.8° F, and 30 inches at-
mospheric pressure. The English standard, the
imperial bushel, has a capacity of 2218.20 cubic
inches and holds 80 pounds of pure water at
62° F. See Weights and Measures.

BUSHIDO, boo-shé'dó ("the way of
the warrior"); the ethical code of the Samurai, the
Japanese order of knighthood. It is in some
ways like the code of the knights of the Middle
Ages, demanding courage, honor and loyalty
to country and rulers; it also enjoins the duty of
suicide by hari-kari (q.v.) to avoid loss of
honor. Although the formal code was given up
when feudalism was abolished in Japan, its
ideals still have great influence on the people,
and many of the most prominent of the nation
were educated according to its principles. It
has given women a remarkable position in
Japan and even yet instills in the young lofier
ideals. See SAMSAR.

BUSHING, a piece of metal placed in ma-
achinery to reduce the wear of the major parts
of the machine. It is also used to decrease the
size of perforations and generally to re-
duce friction, eliminate roughness and wearing
parts and to prevent clogging. Bushings gen-
erally are inserted in the machine frame at
those points where axles or other moving parts
are to be inserted and are made of a harder
material than the machine frame.

BUSHMAN, or BOBSESMAINS, a dwarf
African race inhabiting the Kalahari Desert and
some of the more northerly portions of Cape
Colony. Their average height seems to be
rather less than five feet, but the Bushmen of
the Cape are more stunted than those living
farther north. The skin is of a dirty yellowish
color, and they have repulsive countenances,
with a somewhat prominent forehead, thick
lips, large ears and small, deep-set, restless
eyes. They are essentially a nomadic people,
neither tilling the soil nor rearing domestic
animals, but subsisting on the flesh of various
wild animals, and on wild bulbs, roots, fruits,
etc. They live in rock caves or in caves cut
like structures in a bush. Consult Bleek, 'Re-
vard the Fox in South Africa' (London 1864);
Stow, 'Native Races of South Africa' (New
York 1905); Bleek and Lloyd, 'Specimens of
Bushman Folklore' (London 1911).
BUSHMASTER, a large pit-viper (Lachesis mutus) of the rattlesnake family, numerous in northeastern South America, and called by the natives surucuri. It is the largest and most venomous snake known, sometimes reaching a length of nine feet. Its ground color is pale yellow, darker on the back, and marked with a chain of jagged brown spots, and lighter on the belly. It has no rattle, but its tail terminates in a horny spur, which, when the tail is vibrated, strikes against the ground, producing a rattling noise, which can be heard several feet. It is similar to the rattlesnake in its habits, dwells wholly upon the ground, and its poisonous apparatus is greatly developed, making it a very deadly serpent, and one much feared. Consult Hopley, 'Snakes' (London 1882); Bates, 'A Naturalist on the River Amazon' (New York 1884); Molee and Urlich, 'Serpents of Trinidad' in Proceedings Zoological Society of London (London 1894); Ditmars, 'Reptiles of the World' (New York 1910).

BUSHNELL, Horace, American theologian. D. Litchfield, Conn., 14 April 1802; d. Hartford, 17 Feb. 1878. He was graduated at Yale in 1827, engaged in journalistic and educational work, then studied law and theology at Yale, where for a time he was tutor, and in 1833 he began his brilliant pastorate of the North Congregational Church in Hartford, from which he retired owing to failing health in 1853. His writings on theological subjects were as remarkable for the interest and discussion which they aroused among religious scholars and thinkers as for their originality and independence of thought and vigor of utterance. Both as writer and preacher he was a commanding figure, and his influence was far-reaching. His works include 'Principles of National Greatness: Christian Nurture' (1847); 'God in Christ' (1849); 'Christian Theology' (1851); 'Sermons for the New Life!' (1858); 'Nature and the Supernatural' (1858); 'Character of Jesus' (1861); 'The Vicarious Sacrifice' (1865); 'Women's Suffrage, the Reform Movement' (1869); 'Forgiveness and Law' (1874). He also contributed to several periodicals, and propounded many original views, even to the extent of being accused of heresy. However, he maintained his standing and commanded an ever increasing influence until his death. Consult Cheney, Mary B., 'Life and Letters of Horace Bushnell' (New York 1880); Munger, T. T., 'Horace Bushnell, Preacher and Theologian' (Boston 1899). The public services of Dr. Bushnell as a citizen were such as to make him long remembered for his civic pride and devotion to the interests of the city where his life-work was performed. Bushnell Park, Hartford, named in his honor, is a monument to his initiative and persistent efforts, whereby mainly the city came into possession of one of its chief adornments.

BUSHNELL, Ill., city, in McDonough County, 60 miles west of Peoria, on the Chicago, Burlington and Quincy and the Toledo, Peoria and Western railroads. The city has manufactories of wood and steel tanks, pumps, wagons, buggies, brick and garden tools. Poultry farming is an important source of employment. Large quantities are shipped annually and there is a good trade in farm implements. The waterworks are the property of the municipality. Pop. 2,619.

BUSHRANGERS, a name originally applied to desperadoes in Australia who took to the bush and supported themselves by levying contributions on property and persons. Not long after the establishment of penal settlements in Van Diemen's Land and Southern Australia by the British government the bushrangers began to make conditions disagreeable for the settlers in these colonies and their operations finally became so bold that martial law was proclaimed in Van Diemen's Land in 1815; and 15 years later a very stringent act was passed in New South Wales to do away with the nuisance. During the early days following the discovery of gold in Australia, these desperadoes obtained immense sums by robbing the diggers, stage coaches and metal convoys on their way from the mines to the cities and towns. In one haul a notorious gang headed by Capt. Frank Gardiner gathered in £7,490 in bank notes and more than 5,000 ounces of gold. Gardiner afterward came to the United States in 1874. 'Jacky' Jacky, in Tasmania headed six bushrangers and disorders, establishing something very like a reign of terror in parts of the island. They finally made an attack on the governor's quarters on Norfolk Island. Hundreds of these malefactors were captured, tried and imprisoned; while many more were killed by the government police, troops and armed civilians; but the country was not able to rid itself of them until roads were opened up and railways and telephones came, bringing with them rapid and sure communication. Consult Boxall, 'History of the Australian Bushrangers' (London 1908).

BUSHTIT, a very small titmouse of the genus Ptilidryas, two species of which inhabit the western United States. One, the least bushit (P. minimus), is found in summer from the Rocky Mountains to the Pacific coast, and is noted for its nest, which is a form of moss down, lint of plants and similar materials, and is shaped like an old-fashioned purse, 8 or 10 inches in length, suspended from the branch of a bush and entered by a small hole near the top. The lining is of feathers of many varied materials, and the eggs are 8 to 10 in number and pure white. A southern variety of this is the lead-colored bushit. A Mexican species (P. melanois) is distinguished by black patches on each side of the head. The resemblance in the nesting habits of these birds to those of the European titmouse will be noted. See Titmouse.

BUSHWHACKER, a term applied during the Civil War to men living in the States where military operations were carried on, who professed to be neutrals and to be solely occupied in their ordinary vocations, but who seized opportunities to harass or attack individual soldiers or small bodies of their guard.

BUSINESS COLLEGES. See Education, Commercial.

BUSINESS LIFE INSURANCE. See Commercial Life Insurance.

BUSINESS MANAGER, Municipal. See City Manager.

BUSINESS SCHOOLS. See Education, Commercial.
BUSIRIS, boo-së'-ris, in Egyptian mythology, a being of whom the most contradictory accounts are given by ancient writers, some making of him as a king, others affirming that the name meant simply the tomb of Osiris.

BUSKIN (Latin cothurnus), a kind of high-soled shoe or half-boot, worn upon the stage by the ancient actors of tragedy, in order to give them a more heroic appearance. The Greek word kothornos denoted a sort of closed boot, fitting either foot, worn by women; the tragic boot being the embates or embar. The word is figuratively employed by the Latin authors for tragedy itself, or for a lofty and elevated style. Consult Smith, K. K., 'The Use of the High-Soled Shoe or Buskin in Greek Tragedy of the Fifth and Fourth Centuries B.C.' in Harvard Studies in Classical Philology (Vol. XVI, 1905).

BUSONI, Ferruccio Benvenuto, Italian composer: b. Empoli, Florence, 1 April 1846. His parents, both of whom were skilled musicians, superintended his early musical training. He went to Leipzig in 1866 and in 1868 was appointed teacher at the Conservatory of Helsingfors. He was professor at the New England Conservatory, Boston, in 1891-93 and in 1894 settled in Berlin, where he has continued to reside. He made several very successful concert tours of Europe and also in the United States in 1910-11. He is an excellent performer on the piano. He was made chevalier of the Legion of Honor by France in 1913, the third of his race thus honored. His compositions include a concertstück for piano and orchestra, concerto for violin; 'Pojohlas' Daughter,' a symphonic poem; two suites for orchestra; 'Lustspiel Ouverture'; two string quartets, and the opera, 'Die Brautwahl' (1912).

BUSSA, boos'sâ, or BUSSANG, British Northern Africa, central Africa, capital of Borgu, a wall-encircled town on the Niger at the rapids marking the head of river navigation from the sea. Here, attack by the natives, Mongo, the explorer, was drowned in 1806. Pop. 12,000.

BUSSEY, Benjamin, American merchant: b. Canton, Mass., 1 March 1757; d. Roxbury, 13 Jan. 1842. He was a soldier in the Revolutionary War, became a silversmith in Dedham, afterward a merchant in Boston, where he acquired a large property, from which he bequeathed about $350,000 to Harvard College, one-half for founding the Bussey Institute, a school of agriculture and horticulture, and one-half for the support of the law and divinity schools of the college.

BUSSI, bußë, D'AMBOISE, Louis de Clermont D'Amboise (Stitus pe.): b. 1549; d. 19 Aug. 1579. He acquired an infamous notoriety by the prominent part he took in the massacre of Saint Bartholomew. He afterward attached himself to the Duke of Anjou, and obtaining the command of the cavalry, Anjou made himself universally odious by his pride and oppression. He had the meanness to pander to the low passions of the Duke, and undertook to seduce the wife of the Count of Montmoreau. He tricked cost him his life. Montmoreau, having come to the knowledge of it, obliged his wife to write Bussi, giving him a rendezvous at the castle of Concarneau. Bussi arrived with a single confidant, and was immediately met by Montmoreau, who killed him.

BUSSON, bü-sô, Charles, French painter: b. Montoire, Loir-et-Cher, 15 July 1822; d. 1909. He studied under Rémond and François and devoted himself to landscape painting. His style was not marked by the characteristics of the "open air school," but recalled the canvases of earlier masters in his chosen branch of art. Among his paintings are ‘Les Ruines du château de Lavardin" and ‘La chasse au marais."'BUSSU PALM, a plant (Manicaria succifera), common in the swamps of northern Brazil. Though it rarely exceeds 15 feet in height, it has huge leaves, said to be the largest undivided leaves produced by any palm, even reaching 30 feet in length by 4 or 5 feet in width. After splitting the midrib from end to end the leaves are laid obliquely upon rafters to form thatch for houses. This position makes the spaces between the veins of the leaf carry off water. The spathes are used by the Indians for caps and bags and for cloth-making. The large, hard, three-seeded, olive-green fruits do not seem to be used commercially.

BUSSY-RABUTIN, bü-see-ra-bu-tën, or ROGER DE RABUTIN, COMTE DE BUSSY: b. Épisy, Nivernois, 1618; d. Autumn 1693. He entered the army at the age of 13, and served in several campaigns. Turenne, in a letter to the King, describes him as the best officer in his army, as far as songs were concerned. His scandalous chronicle, entitled ‘Histoire Amoureuse des Gaules," cost him the loss of his official appointment and a year's imprisonment in the Bastille. He was a correspondent of Madame de Sévigné, and is often mentioned in her letters. He had the vanity to suppose that he excelled her in her peculiar art, and his letters were afterward published in seven volumes.

BUST (French buste, Italian busto, of uncertain origin), in sculpture, the representation of that portion of the human figure which comprises the head and the upper part of the body. The bust did not become common among the Greeks until the time of Alexander, nor among the Romans till the time of the empire. Among the Greeks, the portrait busts of the learned formed an important branch of art. The artists in these works exhibited a singular power of expressing character, and in this way we possess what are probably faithful likenesses of Socrates, Plato and other distinguished persons. The first Roman bust that can be depended upon as giving a correct likeness is that of Scipio Africanus the elder. The number of busts of the time of the Roman empire is very considerable, but those of the Roman poets and men of letters have not been preserved in so large numbers as those of the Greeks. A collection of drawings of antique busts was made by Fulvius Ursinus, and published with the title, ‘Virium Illustrium;’ Imhoof (1560; Antwerp 1606); subsequently a similar collection was published in the ‘Iconographie Grecque' of Visconti (Paris 1811), which was followed by his 'Iconographie Romaine' in 1817.
BUSTAMANTE—BUTCHER-BIRD

BUSTAMANTE, boo-sta-mân-tâ, Ana-tasio, Mexican statesman and revolutionist; b. Tiquipan, Michoacan, 27 July 1780; d. San Miguel Allende, 6 Feb. 1853. In 1808 he joined the Spanish army, and for a time fought against the party of the revolutionists, but in 1821 he acted with Iuribe. He was made Vice-President, in command of the army, in the administration of Guerrero, 1829. He afterward revolted and led the Centralist party, and in 1830 became acting President of Mexico. In 1832 Santa Anna opposed him at the head of an army, and he was conquered and banished 1833. When the Centralist party returned to power he was recalled, and in 1837 was elected President of Mexico. In 1842 he was obliged to retire from the Presidency, and was succeeded by Santa Anna. He served in the Mexican army in the war with the United States, retiring from military service in 1848.

BUSTAMANTE, Carlos Maria, Mexican historian; b. Oaxaca, 4 Nov. 1774; d. 21 Sept. 1848. He studied law and in 1801 began its practice. In 1805 he became editor of the Diario de México. He held a command under Mina, in 1812, and was captured at Vera Cruz. He was released, and became a member of Congress and held other public offices. He founded a weekly newspaper, La Avispa de Chilpancingo, whose articles twice led to his imprisonment. His works treat of various periods of Mexican history, and are of special value, as he was an eye-witness of much that he describes. He published a history of the Mexican revolution (1823-32), and histories of the times of Iuribe and of Santa Anna.

BUSTARD Quail, the name given by Anglo-Indians to the button-quail (q.v.).

BUSTARDS, a family of game birds (Otididae) of the Old World, which, however, are not gallinaceous, but are related in structure on the one hand to the cranes, and on the other to the plovers. They are inland birds, haunting dry, grassy and sandy plains, and in the more settled districts resorting to stubble-fields and pasture-land. They have strong legs and feet, as well as good wing-power, and spend more of their time on the ground than in flight. Most of them are birds of handsome plumage, the upper parts being mottled with brown and reddish-brown, with white and black. Ornamental plumages are characteristic of the group, and often form crests, or ruffs, about the head, neck and breast. Bustards are known in the Mediterranean regions, and throughout southern Asia to China and Japan. They also abound all over Africa, and one species (Eupodotis australis) inhabits Australia, where it is called "native turkeys." Those of North Africa and western Asia are known as "houbaras," and form the favorite game-birds of that semi-desert, the oases of Indus and the oases of India; favorites with sportmen, are called "floricans." The typical, and best-known bustard, however, is Otis tarda, now extinct in Great Britain, but numerous throughout the Mediterranean countries. It has somewhat the size and form of a large turkey, and is the species of India, favorites with sportmen, are called "floricans." A remarkable feature of this species is the fact that a great pouched, opening under the tongue, is developed in the throat of the male of some examples during the breeding season. This phenomenon is restricted to adult birds, and the pouch disappears at other times of the year. Its utility is unknown. A much smaller but otherwise similar species, the little bustard (Otis tetrao), is another favorite with European sportmen. The term is sometimes erroneously applied to other large birds, such as the Magellanic penguin (with which consult Afalio, "Sport in Europe" (London 1901); Beebohm, "Birds of Asia" (London 1901); Bryden, "Nature and Sport in South Africa" (London 1897).

BUSTO-ARISIZIO, ar-sîts'îo, Italy, city in the northern division, 21 miles northwest of Milan. It contains a church, designed by Bramante, and containing frescoes by Gaudenzio Ferrari. It has manufactures of cotton goods and a trade in wine. Pop. 25,992.

BUSYBODY, The, a pen name under which Benjamin Franklin wrote a series of papers, modeled on 'The Spectator' of Addison; also a comedy by Mrs. Centlivre, 1769.

BUTADES. See DUBITATES.

BUTANE and IsoButANE, two gaseous compounds of carbon and hydrogen with the same molecular formula, C4H10, yet differing in their chemical properties. They are similar to marsh gas. Crude petroleum contains dissolved butane.

BUTCHER. See ABATTOIR.

BUTCHER, Samuel Henry, Irish classical scholar; b. Dublin, 16 April 1850; d. 29 Dec. 1910. He was educated at Marlborough College, and Trinity College, Cambridge, and was a lecturer at University College, Oxford, 1876-82. From 1882-1903 he was professor of Greek in the University of Edinburgh, and in 1906 he was elected one of the members for Cambridge University. In 1904 he visited the United States to deliver a series of lectures at Harvard University and other places. He has published a 'Prose Translation of the Odyssey' (with A. Lang q.v.) (1879); 'Demosthenes' (1881); 'Some Aspects of the Greek Genius' (1893); 'Aristotle's Theory of Poetry and the Fine Arts, with a Critical Text and Translation of the Poetics' (1895); 'Demosthenes' Orations' (1903, 1907); 'Harvard Lectures on Greek Subjects' (1904).

BUTCHER-BIRD, a shrike of the family Laniidae, representatives of which range throughout the northern hemisphere. They are birds of moderate size, and gray and white in color, with black markings on the head, wings and tail, which are properly included among the insect-eating birds, but have developed certain falcon-like traits. They are of powerful build, with hooked beaks, and strong claws, and in winter, when insect prey is not easily obtained, they are accustomed to strike down small birds, and to tear pieces out of their flesh. These they carry off in their claws to some thorn-tree, or to a fence with spikes, and impale them one by one upon the thorns, or other sharp points, in order to fix them firmly while they feed upon their flesh. It often happens, however, that the largest and one of the most valuable of European game-birds, whose frozen bodies remain hanging upon the thorns, like meat in a butcher's shop; the Germans have a popular belief that nine victims are thus stored at a
time, and call the birds "nine-killers." These shrikes make rude nests in trees and lay four or five eggs, which are incubated except in winter. A typical species, common over northernmost North America, is the great northern shrike (Lanius borealis), which is rarely seen in the United States except in winter. Another species, the loggerhead (L. ludovicianus), dwells in the Southern States and is somewhat smaller in size. Consult Ingersoll, 'Wild Life of Orchard and Field' (1902); Newton, Alfred, 'Dictionary of Birds' (New York 1890); Evans, A. H., 'Birds' in 'Cambridge Natural History' (Vol. IX, ibid., 1900). See SHRIKE.

**BUTE**, bpt, John Patrick Crichton-Stuart, 3d Marquis of: b. Mountstuart, 12 Sept. 1847; d. 9 Oct. 1900. He was educated at Harrow and Oxford. He was mayor of Cardiff in 1891–92, and did much to advance the commercial prosperity of that city. From 1892 to 1898 he was lord rector of Saint Andrew's University, which benefited greatly by his munificence. He donated Bute Hall to Glasgow University. He was deeply interested in Scottish history, and was the author of 'Early Days of Sir William Wallace'; 'The Burning of the Barns of Ayr'; and 'Altus of Saint Columbia.' His succession from the Scottish Presbyterian to the Roman Catholic Church in 1888 caused a sensation in Scotland. He figures as the hero in Disraeli's novel, 'Lothair.' He was the author of an adequate and scholarly translation of the Roman 'Breviary.'

**BUTE, John Stuart**, 3d Earl of, British statesman: b. Edinburgh, 25 May 1713; d. 10 March 1792. His grandfather was created a peer in 1703, and the family was connected with the royal Stuart line. In 1737 he entered Parliament as one of the Scottish representative peers, but was not re-elected in 1741. He then retired to his estates, and lived there wholly secluded till the landing of the Pretender in Scotland in 1745 induced him to go to London and offer his services to the government. He soon gained influence with the Prince of Wales, and succeeded in making himself indispensable to him. At his death, in 1751, he was appointed by the widowed Princess chamberlain to her son, and was intrusted by her with his education. But he never lost sight of his pupil, and possessed so much more influence with the Prince of Wales than her son's particular tutors, the Earl of Harcourt and the bishop of Norwich, that they resigned their offices. George II died 25 Oct. 1760, and two days after Butte was appointed member of the privy council. In March 1761 the Parliament was dissolved and Butte was made Secretary of State. Pitt, who saw his influence in the new council annihilated, resigned the same year. This event made an unfavorable impression on the nation; but Butte, possessing the unbounded confidence of his King, stood at the head of the state. After a severe contest in Parliament, he concluded a peace with France. The terms for England were perhaps not disproportionate to the successes obtained during the war; but Butte was obliged to bear the most bitter reproaches. He, however, succeeded in winning the popular favor, and everything seemed to promise the power of the minister a long continuance. The influence of Butte seemed unbounded, where it was made known, that he had resigned his office as Prime Minister, and intended to retire into private life. In 1766 Butte declared in the House of Lords that he had wholly withdrawn from public business and no longer saw the King; still it was not doubted that his great influence continued. It was only on the death of the Princess of Wales, 1772, that he seems first to have given up all participation in the affairs of government. He spent his last years on his estate. A costly botanical garden, a library of 30,000 volumes, excellent astronomical, philosophical and mathematical instruments, afforded him occupation. His favorite study was botany, with which he was intimately acquainted. For the Queen of England he wrote the 'Botanical Register,' which contained all the different kinds of plants in Great Britain (9 vols. 4to). This work is remarkable, both for its splendor, in which it excels all former botanical works, and for its rarity. Only 12 copies were ever in the pounce of more than $50,000. Consult A. von Ruville, 'William Pitt and Gref Butte' (Berlin 1855); Lovat-Fraser, 'John Stuart, Earl of Butte' (New York 1912).

**BUTE, Scotland, an island in the estuary of the Clyde, with an area of 30,000 acres, belonging principally to the Marquis of Bute. It is about 16 miles long, and the average breadth is 3½ miles. Agriculture is in an advanced state, and there are about 20,000 acres under cultivation. The herring fishery is also a source of considerable profit. The only town is Rothesay, whose ancient castle is one of the many interesting antiquities of the island. Mount Stuart, the seat of the Marquis of Bute, is four miles south of Rothesay. The climate of Bute is milder than that of almost any part of Scotland. The county of Bute comprises the islands of Bute, Arran, Great Cumbrae, Holy Isle, Little Cumbrae, Inchmarnock and Pladda, with a total area of 139,658 acres, but only a small part is under cultivation. Arran is about double the size of Bute, but the other islands belonging to the county are small. The county returns one member to Parliament. Pop. of Bute, 11,835.

**BUTEA, a small genus of trees or woody vines of the family Fabaceae, natives of China and India, noted for their racemes of large, rich, usually scarlet, papilionaceous flowers, for which they are cultivated in warm countries and to a small extent in warm greenhouses. The best-known species (B. frondosa) is called the dhak or pulas tree in India, and is grown out of doors in California. It is a leafy tree, attains a height of 50 feet and bears very slowly orange-crimson flowers, which are used in the Orient under the name keesoo or teesoo for dyeing yellow or orange. Its fibrous roots and bark are used for caulking boats, making rope, etc. Its red, resinous gum, with which the twigs are frequently covered, is said to be very rich in tannin, and is found in the market of India. The seeds are used as a vermifuge.

**BUTESHIRE, Scotland, county in the West Midlands division. It includes Bute, Arran, Pladda, Marnoch, Cumbraes, Iona and several smaller islands; has a total area of 220
square miles and a population of 18,186. Agriculture and fishing are the only industries of any extent. Rothesay, Bute, is the county-seat.

BUTIN, bô-tän, Ulysses Louis Auguste, French painter: b. Saint Quentin 1838; d. Paris, 9 Dec. 1883. He was a pupil of Picot and Pils. His subjects are mostly from the life of the French fishermen, and his work shows remarkable truthfulness and nature. Among his best paintings are 'The Departure'; 'Fishing'; and 'Burial of a Sailor at Villerville.'

BUTLER, Alban, English writer on religious topics: b. 1711; d. Saint Omer 1773. He received his education at that famous centre of English Catholicism, the English College of Douai, was ordained to the priesthood and was successively professor of philosophy and theology at Douai. Later he traveled throughout Europe and was appointed chaplain to the Duke of Norfolk. He became afterward president of the College of Saint Omer. He spent 30 years in compiling his great life-work, 'The Lives of the Saints.' It appeared in four volumes (1756-59) and after his death in 12 volumes with annotations omitted from the former edition.

BUTLER, Amos William, American ornithologist, sociologist and philanthropist: b. Brookville, Ind., 1 Oct. 1860. He was educated at Hanover College and at Indiana University; was one of the founders of the Indiana Academy of Science, and became its president in 1895; became general secretary American Association for the Advancement of Science 1891; vice-president of the section of Anthropology, 1900; president of the National Conference of Charities and Corrections, 1906-07; president of the American Bird Association, 1909-10; chairman of the American Committee on International Prison Congress, 1909-10; vice-president of the International Prison Congress, 1910; secretary of the Indiana Board of State Charities since 1897. He has published 'Birds of Indiana' (1891) and many other papers on ornithology, anthropology and charities and corrections, which have appeared in the publications of scientific societies.

BUTLER, Andrew Pickens, American politician: b. Edgefield District, S. C., 7 Nov. 1796; d. near Edgefield Court-house, 5 May 1857. He was admitted to the bar in 1819, and in 1824 was elected to the legislature as the representative of his native district. In 1831, a period marked by the apprehended collision of South Carolina with the Federal government, on the nullification issue, he was elected colonel of a regiment of cavalry. In 1838, still a member of the legislature, he was made a judge of the Courts of General Sessions and Common Pleas. Subsequently, when a change was made in the judiciary system, he was transferred to the supreme bench of the State, where he continued until 1846, when he was elected a senator in Congress. Soon after taking his seat in this body, he was appointed chairman of the Judiciary Committee. One of his earliest speeches was against making Colonel Benton lieutenant-general of the army. The Kansas question, the action of the secretary of war in withdrawing the order, the abolition question and all others affecting the peculiar interests of South Carolina, and the general welfare of the South, engaged him in frequent debate, in which he always took a conspicuous part. His last speech was in reply to Mr. Sumner, and in defense of South Carolina.

BUTLER, Benjamin Franklin, American lawyer and soldier: b. Deerfield, N. H., 5 Nov. 1818; d. Washington, D. C., 11 Jan. 1893. He was graduated at Waterville College (now Colby University); studied law, was admitted to the bar in 1841, and beginning practice at Lowell, Mass., became distinguished as a criminal lawyer and politician. He was a member of the State legislature in 1853, of the State senate in 1859-60, and a delegate to the Democratic National Convention of 1860, which met at Charleston and afterward at Denver. In 1864 he supported the nomination of John C. Breckenridge, which rendered him so unpopular in the North that he was defeated for governor of Massachusetts in that year. Butler had risen to the rank of brigadier-general of militia; and at the outbreak of the Civil War, he marched with the 8th Massachusetts Regiment, and, after a check at Big Bethel, was appointed to the command of Baltimore and of eastern Virginia, with his headquarters at Fort Monroe. In February 1862 he commanded the military forces sent from Boston to Ship Island, near the mouth of the Mississippi; and, after New Orleans had surrendered to the naval forces under Farragut, he held military possession of the city. His administration was vigorous and while mostly just was severely criticized. Especial notoriety attached to his order directing that women who should publicly insult United States officers be regarded as women of the street. The order was bitterly resented in the South and caused Jefferson Davis to order that Butler be considered a traitor and if captured, that he be hanged. Relieved of his command, he acted under General Grant in his operations against Petersburg and Richmond in 1864. Returning to Massachusetts at the end of the war, he took an active part in politics as an extreme radical, advocated the impeachment of President Johnson, and in 1866-75 was a member of Congress. In 1877 and 1879 he was defeated as candidate for governor of Massachusetts, but in 1882 was elected by a large majority. In 1884 he ran for the Presidency as the candidate of the Greenback and Anti-Monopolist parties, but was defeated, carrying no State. He published 'The Autobiography and Personal Reminiscences of Maj.-Gen. Benjamin F. Butler.' (1892). Consult Parson, 'Butler in New Orleans' (New York 1863): Bland, 'Life of Benjamin F. Butler' (1879); 'Private and Official Correspondence of General Benjamin F. Butler: During the Period of the Civil War' (5 vols., 1918). Consult also Rhodes, James F., 'History of the United States, from the Compromise of 1850' (Vol. V, New York 1902).

BUTLER, Charles, English Roman Catholic historian: b. London, 15 Aug. 1750; d. there, 2 June 1832. He was nephew of the Rev. Alban Butler (q.v.). He was called to the bar in 1791, and was the first Roman Catholic who was admitted, in 1794, to the King's Bench, being the first Roman Catholic to sit as a judge of the Court of King's Bench since the dissolution of the old College of Q. C. during the reign of the last Queen. He wrote 'Hors Biblicae,' giving a history of the original text, early versions and printed editions of the Old and New Testaments, and also of the 'Koran,'
Zend-Avesta and the Edda. This first appeared in 1797, and was followed by Horae Subsecivae, a series of notes respecting the geography, chronology and literary history of the principal codes and original documents of the Grecian, Roman, feudal, and canon law. He continued and completed Hargrave's Cod. Urban. Littletoni; supervised the 8th ed. of Fearon's Essays on Contingent Remainders; wrote a history of the geographical and political revolutions of Germany, and a Historical and Literary Account of the Formularies, Confessions of Faith, or Symbolic Books of Roman Catholic, Greek and Principal Protestant Churches. During the last 25 years of his career he principally devoted his pen to the vindication of the Roman Catholic Church. He published numerous biographies of eminent Roman Catholic divines and authors; continued his uncle's Lives of the Saints, and produced Historical Memoirs of the English, Irish and Scottish Catholics. When Southey's ultra-Protestant Book of Church appeared, it was replied to in Butler's Book of the United Catholic Church, which gave rise to six answers on the Protestant side, two of which were replied to by Butler. His Reminiscences appeared 1822-27. As a constitutional lawyer his reputation was very high.

Butler, Ellis Parker, American humorist: b. Muscatine, Iowa, 5 Dec. 1869. His first great success Pigs is Pigs (1868), was followed by others equally successful. These include The Incubator Baby (1906); Perkins of Portland (1906); Great American Pie Coot (1907); Scotland's Ruined Abbeys (1907); Kilo (1907); That Pup (1908); Cheerful Smugglers (1908); Mike Flannery (1909); Thin Santa Claus (1909); Water Goats (1910); Adventures of a Suburbanite (1911); Jack Knife Man (1910); Donatian Dean, A Tale of the Mississippi (1917). He is secretary and treasurer of the Authors' League of America.

Butler, Howard Crosby, American educator: b. Croton Falls, N. Y., 7 March 1872. He was educated at Princeton University, at the Columbia School of Architecture and at the American schools of classical studies in Rome and in Athens. In 1899, 1904 and 1909 he led three archaeological expeditions in Syria. In 1905 he was appointed professor of the history of architecture at Princeton. His publications are Scotland's Ruined Abbeys (1890); The Story of Athens (1902); Architecture, part II of Publications of American Expedition to Syria (1903); Ancient Architecture in Syria, in Division II of Publications of Princeton Expedition to Syria; also papers in archaeological journals.

Butler, James (Duke of Ormonde), English statesman: b. London, 19 Oct. 1610; d. Kingston Hall, Dorsetshire, 21 July 1688. When Strafford became lord-lieutenant of Ireland, Butler was made commander of the army, but as it consisted of only 3,000 men, and he was surrounded by the English jades, he could do little more than keep the enemy in check, and was obliged to agree to a cessation of hostilities; after which, having been created a marquis, he was appointed lord-lieutenant. On the ruin of the royal cause he retired to France. After the execution of Charles he returned to Ireland with a view to raising the people; but on the landing of Cromwell returned to France. While abroad he exerted himself to further the restoration of Charles; and when that event was brought about by Monk, returned with the King. Before the coronation he was created duke, and assisted at the ceremony as lord high-steward of England. In 1662 he was again appointed lord-lieutenant of Ireland, which country he restored to comparative tranquility, and was an active benefactor of it by encouraging various improvements, particularly the growth of flax and manufacture of linen. On the exile of Lord Clarendon, his attachment to that nobleman involved Butler in much of the odium attached to him, and although, on his recall from Ireland, nothing, on the most rigorous inquiry, could be proved against him, he was removed through the machinations of Buckingham. For seven years he was deprived of court favor, but at length was again appointed lord-lieutenant of Ireland, which place he held until, shortly before the death of Charles, he was recalled to England in which gave rise to six answers on the Protestant side, two of which were replied to by Butler. His Reminiscences appeared 1822-27. As a constitutional lawyer his reputation was very high.

Butler, James Glentworth, American Presbyterian clergyman: b. Brooklyn, N. Y., 3 Aug. 1821; d. Boonton, N. J., 28 Dec. 1916. He was the son of one of the five founders of the First Presbyterian Church in Brooklyn. He was educated at Yale, the Union Theological Seminary and Yale Divinity School, and was ordained in the Presbyterian ministry in 1852. He served in Williamsburg and then at the Walnut Street Presbyterian Church in Philadelphia from 1852 to 1868. Next he became secretary, treasurer and editor of the American and foreign Christian Union, remaining in that field 11 years. He spent the following 20 years compiling a series of 11 volumes entitled The Bible Work, which constitute what some authorities regard as the most comprehensive and valuable commentary on the Bible that has ever been written. It had a wide circulation in many languages. Other works issued by Dr. Butler are Topical Analysis of the Bible (1896); Vital Truths Respecting God and Man (1904); and Present Day Conservatism and Liberalism (1911).

Butler, John, American royalist leader in the American Revolution: b. Connecticut; d. Niagara 1794. He became a leading resident of Tryon County, N. Y.; commanded the Indians in the Niagara campaign (1759) and in the Montreal expedition (1760). At the outbreak of the Revolution he sided with the Tories and became deputy superintendent of Indian affairs. In 1776 he organized a band of marauders, chiefly Indians, and fought the battle of Oriskany (1777); in July 1778, he commanded at the battle of Wyoming. In 1780 he took part in Sir John Johnson's raid on the Mohawk settlements. At the end of the war he fled to Canada, and was appointed Indian agent.

Butler, Joseph, English philosopher and theologian: b. Wantage, Berkshire, England, 1692; d. 1752. Although reared a Presbyterian,
he became a member of the Episcopal Church, and entered Oriel College, Oxford, in 1714. After receiving his degree he took orders and was appointed preacher at the Rolls Chapel, where he preached the famous "Sermons on Human Nature" which gained him a leading place among moral philosophers. These (of which the first three are of fundamental importance) were published in 1726. Ten years later (1736) appeared his famous "Anatomy of Religion, Natural and Revealed," to the Corp of which he contributed. He also gained the friendship of Queen Caroline who at her death left a request that he should receive promotion in the Church. In 1738 he was appointed bishop of Bristol, and in 1750 was promoted to the bishopric of Durham.

Butler's "Sermons on Human Nature" have given him a foremost place among ethical writers, and have had an important place in the instruction at the English universities. His ethical teachings are directed at what might be called "natural" moralities which is a naturalization with clearness by Hobbes in the previous century and which still seemed sufficiently dangerous in the 18th century to require repeated refutation. The doctrines of Hobbes as against which the later moralists directed their attacks were: (1) That moral distinctions are not "natural," founded in the nature of things, but conventional, resting upon the authority of a state founded by social contract; and (2) that human nature is essentially egoistic. These positions had been controverted by Cudworth, Samuel Clarke and others who sought to show that moral relations belong to the very nature of things. Butler chose a more concrete method of inquiry. There are two ways, he says, in which moral questions can be treated. One begins from inquiring into the abstract nature of things, the other from a matter of fact, namely, what the particular nature of man is, its several parts, their economy or constitution; from whence it proceeds to determine what course of life it is which is correspondent to this whole nature. It was this psychological method which Butler adopted. Human nature, he maintains, is to be regarded as a whole or system, which is made up of parts, but whose character is understood until we consider the relations and respects which these parts have to each other. In addition to particular affections and instincts, Butler finds that there is in man a natural instinct which makes for his own preservation and happiness, and also a natural principle of benevolence whose object is the good of others. These are the two general principles which he names self-love and benevolence. Against Hobbes, he argues that the latter is just as fundamental and natural as the former. The constitution of our nature proves therefore that we are made for society. But, on the other hand, Butler will not deny the legitimacy of self-love, or identify, as had been done, the content of morality with benevolence. The self-love which is approved, however, is not a particular affection, but a general principle of regard for one's own happiness and interests. It is "cool" or "rational" self-love which is justifiable. This type of self-love may be perverted into selfishness or egoism by being allowed to operate without due reference to the elements of human nature. It then loses its authority and ceases to be a general principle. Men constantly sacrifice their most evident interest to fancy, inquisitiveness, love, hatred or any vagrant inclination, and thus violate their nature no less in regard to their individual happiness than to their public good. Butler has accordingly a regulative control over the particular passions and inclinations: it possesses higher authority, and this authority is something quite distinct from the question as to which in any given case happens to be stronger. There are no some particular out of which the public good is made up. Butler intends to identify morality with what he calls "rational self-love," and to subordinate benevolence as a particular affection to it. Yet it is evident from the whole context of his ethical system that he rather intends to show that self-love and benevolence are co-ordinate, but not contradictory principles, both superior to what he calls the "particular affections," and both in turn harmonized and systematized in human nature by the supreme principle of conscience. "The self-love of the individual is the ever-regulating principle of benevolence in man, which is in some degree to society what self-love is to the individual." By insisting as he does upon the presence in human nature of these two principles, and their necessary harmony, Butler finds the explanation of making one or other of these principles supreme in conduct, as well as the necessity of denying or explaining away the other. He transcends the fundamental conflict between "interested" and "disinterested" conduct, in which his predecessors and many of those who came after him found themselves involved; and he goes far in suggesting the conception of the complementary character and essential unity of these principles in the idea of a "social self." But Butler's ethical system receives its completion in the idea of conscience as the supreme authoritative principle to which both self-love and benevolence are subordinate. He defines conscience as that "principle of reflection in men by which they distinguish between approvable and disapprovable actions." Moreover, "conscience not only offers itself to show us the way we should walk in, but it also carries its own authority with it, that is our natural guide." The conclusion is that from the very make or character of man, there is a strictest sense a law unto himself. "Had conscience strength, as it has right; had it power, as it has manifest authority, it would absolutely govern the world." Two objections have been brought against Butler's view of conscience by modern writers. In the first place, it is urged that it involves a falling back upon mere intuition, upon a principle that can give no account of itself or of its mode of operation. There are doubtless some passages in his writings which, taken by themselves, might seem to justify this interpretation. But it is necessary to remember that for Butler conscience is reason or reflection, that is, that it is the action of the whole moral constitution of man, and that in following its requirements we are acting in the light of the whole. The second criticism is that for him conscience seems to pronounce infallible judgments, taking no account of circumstances, and not providing for the growth or develop, however, become perverted into selfishness or egoism by being allowed to operate without due reference to the elements of human nature. Yet it is not
for him any mechanically acting faculty; the due proportion between self-love and benevolence is different in different cases, and "can be judged only from our condition and nature in this world." Conscience itself develops with use and practice, becoming more and more adequate to deal with the changing conditions of life. Without actual moral habits and fixed modes of character. Morality for him is no set of fixed axiomatic truths, infallibly perceived once for all; but it is what the moral reason perceives in particular situations to be correspondent to the new conditions of our Constitution when this is seen in its true perspective.

Butler's 'Analogy' is the most famous and most carefully reasoned defense of revealed religion which appeared in England during the 18th century. It was directed against deism (qv.) and sought to meet the attacks which this school of writers brought against the traditional view of theology. Butler undertakes to show that the course of nature suggests not only the conclusions, which the deists admitted, of the existence of God and the duty of worshiping Him, but at much closer, natural occurrences and laws seem to furnish evidence for the doctrines of revealed religion which the deists discarded and denied as immoral. Butler's candor in pointing out what might be called imperfections and injustice in nature, which the deists were inclined to neglect, has led to the remark that his treatment tends to raise doubts rather than to settle them, and that his conclusions might be read by a skeptical mind in a different way. However this may be, one can say that Butler's 'Analogy' together with Hume's 'Dialogues on Natural Religion' served to undermine, long before the appearance of Kant's systematic criticism, the rationalistic conclusions of 'natural religion.' It should be noted that Butler did not profess to furnish a demonstration for the doctrines of revealed religion, but only to show their probability by pointing out their analogy with the course of nature. For man, as he says, in all such matters, "probability is the very guide of life."

There are many editions of Butler's works; the most recent being that of Gladstone in two volumes, 2d ed., 1898. Mr. Gladstone also published a volume entitled 'Subsidiary Studies on Butler.' Consult also Collins, W. L., 'Butler' (Blackwood's 'Philos. Classics'); Stephen, Leslie, 'English Thought in the 18th Century' (Vol. I); Sidgwick, H., 'History of Ethics'; Lefevre, A., articles in the 'Philosophical Review,' Vols. VIII and IX.

JAMES E. CREIGHTON, Professor of Philosophy, Cornell University.

BUTLER, Josephine Grey, English philanthropist: b. Milfield, Gloucestershire, about 1828; d. 30 Dec. 1906. Married George Butler, afterward Canon at Winchester, 1852. She was prominent in efforts for the higher education of women, and for moral reform, and published 'Life of John Grey of Dilston'; 'Life of Catherine of Siena'; 'Recollections of George Butler'; 'Life of the St. Benen'; 'Perspectives and Reminiscences of a Great City'; 'Prophecy and Prophetesses'; 'Nature Races and the War'; 'Silent Victories'; 'The Hour Before the Dawn'; 'Government by Police'; 'The Constitution Violated'; 'Women's Work and Women's Culture'; 'Life of Oberlin'; 'A Voice in the Wilderness.'

BUTLER, Marion, American legislator: b. Sampson County, N. C., 20 May 1863. In 1889 he was admitted to the bar and practised successively in Raleigh and Washington. He was elected to the senate of North Carolina in the late eighties and took a prominent part in railroad regulation legislation. He abandoned the Democratic party in 1892, became one of the organizers of the Populist party and from 1896 to 1904 served as chairman of its executive committee. In 1896 he was elected United States senator, serving until 1902. He successfully piloted through the Senate a bill providing for rural free delivery in the postal service. He also advocated the establishment of postal savings banks. Being defeated for the Senate in 1902, he thereafter allied himself with the Republicans.

BUTLER, Matthew Calbraith, American army officer: b. near Greenville, S. C., 8 March 1836; d. 1900. He studied law at Stonelands, near Edgefield County, South Carolina, and was admitted to the bar in December 1857. He was elected to the legislature of South Carolina in 1860; entered the Confederate service as captain of cavalry in the Hampton Legion in June 1861, and became a major-general through the regular grades; lost his right leg at the battle of Brandy Station on 9 June 1863. He was elected to the legislature of South Carolina in 1865; was elected United States senator in 1877-95; commissioned a major-general of volunteers for the war with Spain, 25 May 1898; and was appointed one of the American commissioners to arrange and supervise the evacuation of Cuba.

BUTLER, Nicholas Murray, American educator: b. Elizabeth, N. J., 2 April 1862. In 1882 he was graduated at Columbia University with the highest honors. In 1882-94 he served as fellow in philosophy and studied in Berlin and Paris for one year. In 1885 he became assistant professor of philosophy and in due time held the chair of philosophy, psychology and ethics. In 1890 on the reorganization of the university he became dean of the Faculty of Philosophy. He founded the New York College for Training Teachers, in 1887, which later became Teachers' College, and is now known as Hunter College, under Columbia University. In 1901 Dr. Butler succeeded Seth Low as president of Columbia. His administration has been most successful in extending the influence of the university in the educational field and in its relation to the life of the country at large. Dr. Butler has taken a deep interest in politics and in 1912 was the Republican candidate for Vice-President of the United States on the ticket with William H. Taft. He has done much for the cause of education, founding the Educational Review in 1891 and editing it for the intervening interval as well as 'The Great Education Story;' 'The Teachers' Professional Library;' and 'Columbia University Contributions to Education and Philosophy.' Dr. Butler has been decorated by several foreign rulers and is the recipient of honorary degrees from a great number of prominent universities at home and abroad. He has published 'The Meaning of Education' (1898, rev. enlarged ed., 1900); 'True and
False Democracy' (1907); 'Philosophy' (1908; 3rd ed., 1911); 'The American as He Is' (1908); 'The International Mind' (1912); 'Why Should We Change our Form of Government?' (1912); 'What a Man Is' (1913); 'Mongolism and Education in the United States,' exhibited at the Paris Exposition (1900); 'A World of Fenriment' (1917).

**BUTLER, Samuel**, English satirical poet:
- B. Strenshead, Worcestershire, 12 Feb. 1612;
- d. London, 25 Sept. 1680. He passed some time in his youth at Cambridge, but never matriculated at the university. He was afterward clerk or steward to several country gentlemen, and later lived in London. He resided some time with Sir Samuel Luke, a commander under Cromwell. In this situation Butler acquired materials for his 'Hudibras' (q.v.) by study of those around him, and particularly of Sir Samuel himself, a caricature of whom constituted the celebrated knight Hudibras. The first edition of 'Hudibras' was published in 1663 and was brought under the notice of the court by the well-known Earl of Dorset. It immediately became highly popular with the prevailing party in Church and state, and served as a general source of quotation; the King himself perpetually answering his courtiers out of 'Hudibras'. Though it rendered its author, it did nothing toward extiricating him from indigence. He was buried in Saint Paul's Church, Covent Garden, at the expense of his friend, Mr. Longueville, of the Temple, and a monument was, 40 years after, erected to his memory, in Westminster Abbey, by Alderman Barber, the printer. 'Hudibras,' both in its style and matter, is one of the most original and witty works that were ever written. As a work intended to ridicule the Puritans its attraction was great but temporary, but as applicable to classes of character found in all ages, its satire will always be relished. Butler's 'Remains in Verse and Prose' appeared in 1759.

**BUTLER, Samuel**, English author and composer:
- b. Langar, 4 Dec. 1835;
- d. London, 18 June 1902. He was educated at Shrewsbury School and Cambridge University, and in preparation for the ministry he did parish work among the poor of London. In 1839 he sailed for New Zealand and became a successful sheep farmer. He returned to England in 1844 and studied art. With Henry Festing Jones, he composed many gavottes, figures, etc., and the cantata of 'Narcissus.' He was also an artist of merit, and for several years exhibited at the Royal Academy. He is best known as a brilliant, original writer in more than one field, and as a master of irony, and few equals among his contemporaries, in this particular more nearly approaching Swift than anyone else. His published books include 'A First Year in Canterbury Settlement' (1863); 'Research on the History of the Phrygian Cap' (1861); 'Luck or Cunning as the Means of Organic Modification' (1886); 'Ex Veto' (1888); 'Life of Dr. Samuel Butler, Bishop of Lichfield' (1896); 'The Authoress of the Odyssey' (1897); 'The Iliad of Homer, Rendered into English Prose' (1900); 'Erewhon Revisited' (1901); and 'The Way of All Flesh' (New York 1903), published posthumously, his best and most popular work. Consult Brewer, 'Samuel Butler: the Man and His Work' (New York 1916).

**BUTLER, William**, English polemical writer:
- d. about 1410. He was the 30th provincial of the Minorites in England. At Oxford in 1401 he wrote a tract against the translation of the Bible into the vulgar tongue. He also wrote a tract, 'De Indulgentia,' four books of commentaries on the 'Sentences of Peter Lombard,' and several tracts against the Wycliffites. He removed to Reading from Oxford. Consult Brewer, 'Monumenta Franciscana' (London 1858).

**BUTLER, William Archer**, Irish clergyman and philosopher:
- b. Annerville about 1814;
- d. 5 July 1848. He was baptized and educated as a Roman Catholic, but became a convert to the Established Church before entering Trinity College, Dublin. He was graduated in 1834 and spent the next two years as a student scholar. In 1837 he was appointed to the new chair of moral philosophy at Trinity, was ordained a minister of the Established Church and was presented to the prebend of Clondeekhorka, Down. In 1842 he was promoted to the rectory of Raynagho. He was an able preacher and an indefatigable pastor. In 1845 the Roman Catholic controversy occupied Butler and he contributed to the 'Irish Ecclesiastical Gazette' a series of 'Letters on Mr. Newman's Theory of Development.' Four years of 1846-47 Butler's efforts were untried as relief officer of his parish. His lectures were issued after his death as 'Lectures on the History of Ancient Philosophy' (2 vols., Cambridge 1850). Other works are 'Sermons, Doctrinal and Practical' (3d ed., Cambridge 1855); 'Eternal Life of Christ in Heaven' (1845). Consult the memoir by the Rev. Thomas Woodward (Dublin 1849) and *Dublin University Review* (July 1849).

**BUTLER, Sir William Francis**, British general:
- b. 8 May 1827; Combe, Devon, 31 Oct. 1838; d. London, 7 June 1910. He was educated at Dublin, and joined the army in 1858. In 1863 he became lieutenant, and in 1874 was promoted to the rank of major. He served on the Red River expedition of 1870-71, and about the same time was sent on a special mission to the Saskatchewan territories. He accompanied the Ashantee expedition in 1874, and in 1879 acted as staff officer in Natal. He also served in Egypt in 1882, and held important commands under Lord Wolseley in the Sudan campaign of 1884-85. From 1890 till 1893 he was in command at Alexandria, and in 1892 was raised to the rank of major-general. He had command of the 2d Infantry Brigade at Aldershot, 1893, and of the southern district at Dongola 1896-98. In 1898 he became commander of the forces in South Africa, and for a time, during the absence of Lord Milner, was acting high commissioner. He was strongly opposed to Milner's policy in the Transvaal, and refused to transmit their petition to the home government,—an action which, among other causes of friction, led to his recall. He had command of the western district, 1899-1905, and concurrently
that of the Aldershot district, 1900-01. He published 'The Great Lone Land: A Narrative of Travel and Adventure in the Northwest of America' (1872); 'The Wild North Land' (1873), the story of a winter journey across northern North America; 'Akim-Foo' (1873), a story of the Ashantee War; 'Far Out' (1876); 'Red Cloud, the Solitary Sioux' (1882); 'The Campaign of the Cataracts' (1887). He was created K.C.B. in 1886 and in 1900 was appointed lieutenant-general. His wife (née Elizabeth Thompson) is famous as a painter of battle scenes. His autobiography, edited by his daughter, was published in 1911.

**Butler, William Morris**, American physician: b. Maine 1850. He was educated at Hamilton College, the New York College of Physicians and Surgeons and at the École de Medicine, Paris; has been professionally connected with several homeopathic hospitals, and has been professor of nervous diseases at the Metropolitan Postgraduate School of Medicine, New York; is professor of mental diseases at Flower Hospital, New York, consulting alienist at the Middletown State Insane Hospital. He has published 'Home Care for the Insane' and 'Mental Diseases and Their Homeopathic Treatment.'

**Butler, William Orlando**, American general: b. Jessamine County, Ky., 1791; d. Carrollton, Ky., 6 Aug. 1880. He was about devoting himself to the legal profession when the War of 1812 broke out. Enlisting as a private soldier in Captain Hart's company of Kentucky volunteers he gained distinction in the battles at Frenchtown and the river Raisin. Subsequently he took a conspicuous part in the battles of Pensacola and New Orleans, was brevetted major, 25 Dec. 1814, acted as aide-de-camp to General Jackson from 17 June 1816 to 31 May 1817, when he tendered his resignation, resuming for the next 25 years the profession of the law. From 1839 to 1843 he served as a representative in Congress from that district, in the interests of the Democratic party. Nominated as a candidate for governor of Kentucky in 1844, he was defeated by the influence of Clay. Created major-general, 29 June 1846, he led with great spirit the daring charge at Monterey, and although wounded on that occasion, still remained for several months with the army. On 18 Feb. 1848 he succeeded General Scott in command of the army in Mexico. The most important operation during his tenure of this office was the defeat of Padre Jarauta and his guerrilla forces by General Lane. His military administration in Mexico was brought to a close on 29 May 1848, when he announced the ratification of the treaty of peace. After his return to the United States he was nominated in 1848 by the Democratic party as candidate for the vice-presidency. He was the author of 'The Elements of History and Other Poems.' Consult Blair, 'The Life and Public Service of William O. Butler' (Baltimore 1848).

**Butler, Zebulon**, American military officer: b. Lyme, Conn., in 1731; d. Wilkesbarre, 28 July 1795. He served in the French and Indian War, and in the Revolution. He commanded also the garrison at Wyoming Valley at the time of the massacre of 3 July 1778, and in 1779 served in Sullivan's expedition against the Indians.

**Butler, Mo.**, city and county-seat of Bates County, 75 miles southeast of Kansas City, on the Missouri Pacific Railroad. Agriculture and coal-mining are the principal industries. The city owns and operates the sewerage system and the electric-lighting plant. Pop. 2,894.

**Butler, Pa.**, borough and county-seat of Butler County, situated on the Connequossing Creek, and on the Pennsylvania and other railroads, 30 miles north of Pittsburgh. It is the centre of a region having coal, iron, oil and natural gas. The chief industry is glass manufacture, and there are also flouring and planing mills, oil-well supply manufactories, also of silk, buttons, carriages, paint, beds of metal. Its noteworthy buildings are a hospital, courthouse and public library. Butler was first settled in 1778 and was incorporated in 1863. The government is vested in a burgess and council, the former being chosen for a three-year term. Pop. 20,728.

**Butler University**, a coeducational (non-sectarian) institution in Irvington, a suburb of Indianapolis, Ind.; organized in 1835 as Northwestern Christian University. Its departments include an undergraduate college, a normal course, departments of art and education, a summer school and extension courses. It has about 540 students, 19 instructors, a library of 13,000 volumes, an endowment of $395,000, an income of $45,000 and property valued at $212,000.

**Butlerov, Alexander Mikhailovich**, Russian chemist: b. Tchistopol, Kazan, 1828; d. Saint Petersburg 1886. He received his university training at Kazan, and was successively professor of chemistry and rector there after 1858. After 10 years at Kazan he removed to Saint Petersburg as professor of chemistry at the university there. He did very important work in organic chemistry, discovered the tertiary alcohols and wrote a masterly treatise on organic chemistry. He believed in spiritualism and is the author of a French work entitled 'Etudes psychiques.' He also contributed to the literature of apiculture.

**Buto**, an Egyptian goddess whom the Greeks identified with Leto or Lathos. She was represented under the guise of a serpent, and the city of Buto, which took its name from her, is supposed to have occupied a site on an island in the modern Lake Burlos in the delta of the Nile.

**ButoN**, boot'ôn, BOETON, or BU-TUNG, an East Indian island, southeast of Celebes, belonging to Holland. Its area is about 1,700 square miles. It is fertile and densely wooded, and is governed by a native chief, subject to the Dutch government. The chief products are copra, rice and maize. The population, mainly Malays, is about 100,000. The chief town is ButoN at the southwestern end of the island.

**Butschli, bút'lesh, Otto**, German zoologist: b. Frankfort-on-the-Main 1848. Since 1878 he has been professor of zoology in the University of Halle. He was the first to establish knowledge of nucleus and cell division, and his writings upon protoplasm
and bacteria have been widely read and discussed. He has published 'Protozoen'; 'Untersuchungen über mikroskopische Schäume und das Protolasma' (1892); 'Untersuchungen über die Mikrostruktur künstlicher und natürlicher Kieselsäuregallerten' (1900); 'Mechanismus und Vitalismus' (1901); 'Vorlesungen über die vergleichende Anatomie' (1910).

BUTT, Archibald Willingham, American army officer: b. Augusta, Ga., 26 Sept. 1866; d. 15 April 1912. He received his education at the University of the South, became a newspaper correspondent for some years and in 1900 was made captain of volunteers. Afterward he received a commission in the regular army, served as quartermaster in the Philippines, Washington and Havana. In 1911 he was made a major. He was personal aide to President Roosevelt in 1908, and to President Taft from 1909 till his death on the Titanic, returning from Europe. Washington is graced with a fountain in memory of him.

BUTT, Isaac, Irish politician; the first to make political use of the phrase "Home Rule"; was the son of a Protestant rector: b. County Donegal, 16 Sept. 1813; d. 5 May 1879. Educated at Raphoe and at Trinity College, Dublin, he gained a brilliant reputation for his accomplished scholarship. In 1852 he was elected to Parliament as a Liberal Conservative for Youghal, for which constituency he sat until 1865. He defended Smith O'Brien and others in the state trials of 1848, and with equal fearlessness and self-devotion all the Fenian prisoners between the years 1865 and 1869. In 1871 he was elected for the city of Limerick to lead the Home Rule party. He published 'History of Italy' (1860) and 'The Problem of Irish Education' (1875).

BUTTE, but, Mont., city and county-seat of Silver Bow County, on the Great Northern, the Northern Pacific, the Chicago, Milwaukee and Saint Paul and other railroads. It is on the high plateau between the Rocky Mountains and the Bitter Root Mountains, 5,800 feet above the sea-level. The city is well-built, the more imposing buildings being the city hall, courthouse and jail, opera-house, the Federal building and at the public high school, completed at a cost of $125,000. The Montana State School of Mines is located here. It has several fine theatres and a good public library. The Columbia Gardens also deserve mention. The public school system is excellent, and there is a public library of more than 35,000 volumes. Butte is the largest mining town in the world, employing thousands of persons in this industry alone. Copper is the chief production, although there are valuable deposits of gold and silver, lead and zinc. The Great Anaconda Copper mine is here, and many other valuable mining properties are within a radius of a few miles of the city. The copper production alone is about 25 per cent that of the United States and 13 per cent that of the world, and the total annual mining output is over more than $60,000,000. Probably no city of equal size in the country is so exclusively given over to a single industry. It has also manufactories of candy, cigars, mattresses and other minor industrial industries. There were 108 establishments with $2,393,000 capital, employing 904 persons. The salaries and wages amounted to $890,000.

The products were valued at $2,907,000 and were made from materials costing $1,317,000.

Butte is the trade and shipping center for southern and western Montana; has an extensive trolley system; gas and electric lights; national and other banks; and several daily and weekly newspapers. Butte is governed by a mayor, elected biennially, and a city council. It spends annually about $300,000 for schools and about $50,000 each for the fire, police and street-cleaning departments. Butte was settled as a gold-placer camp in 1863, laid out as a town in 1866, and grew rapidly after the successful opening up of quartz mining in 1875. It was incorporated by the territorial legislature in 1879, and reincorporated in 1888. In 1881 it was made the county-seat of Silver Bow County. Pop. in 1870 about 300; (1880) 3,363; (1890) 10,725; (1900) 30,470; (1910) 39,165; (1918) about 75,000. If suburbs are included, Consult Davenport, 'Butte and Montana beneath the X-ray' (Butte 1909); Freeman, A Brief History of Butte (Chicago 1900).

Butte, a hill which rises abruptly from the surrounding ground. Such hills are common in the region of the coal-fields, and the term is sometimes applied to high mountains which are more or less isolated from other peaks. See Mesa.

Butter, a product of milk, particularly cow's milk, consisting chiefly of its fatty constituent. It is obtained by churning or otherwise violently agitating milk, or by working the product to remove water and other constituents. Butter fat is not a simple fat, but is a mixture of several fats, which are individual compounds of glycerine and several distinct fatty acids. The principal fats in butter are olein, which constitutes 35 per cent; palmitin, 26 per cent; and myristin, 20 per cent. Laurin, butylin and caproin are present in much smaller proportions, and there are also very small percentages of caprin, stearin, caprylin and other constituents. It has a specific gravity of 0.91 and a melting point of about 92° F.

Butter has been in use from early historic days. It is first mentioned in the Bible in Gen. xxviii. 8. It was used as food and medicine, as an ointment and for the purification of the Greeks probably learned of it from the Scythians or Thracians, and the Romans from the Germans. It was made from the milk of sheep and goats, and later of cows, the method of making being to jear the milk roughly by placing it in skin bags or pouches hung over the backs of trotting horses. Formerly butter was prepared by direct churning of the whole milk; this was both laborious and wasteful of butter fat. To reduce labor and loss the system of setting the milk and skimming off the cream was evolved; since 1877 this method has given way in considerable measure to the use of centrifugal force for the separation of the cream and milk.

The making of good butter begins with the cow. She must be healthy and be well fed. The essential next in importance is absolute cleanliness in the care of the milk. The dairy utensils should be of tin, and never used for any but dairy purposes. They should not be continued in use after the tin plating begins to wear off. They should be washed with a brush,
sever with a cloth, and with hot water and salt soda or borax, and not with soap. The final rinsing should be with boiling water, after which they should be drained and allowed to dry without washing. The process of making butter is divided into the operations of creaming, churning, working and finishing. The fat exists in the form of small globules in the milk, in suspension. In the setting system the milk is placed in shallow pans about four inches high, or in deep ones of about 18 inches, and advantage is taken of the fact that the fat globules, being lighter than water and other constituents of the milk, rise to the surface by the action of gravity. Large fat globules will rise more rapidly than small ones, and the size of the globules varies with different breeds of cattle. In the milk of Jersey cattle they are 1/8000 of an inch in diameter; in Holstein cattle 1/12000 of an inch in diameter. In the shallow pan system the milk is set as soon as possible after it is drawn, and the cream is skimmed off in 2 1/2 to 30 hours. This system is wasteful in that the skim-milk often contains 0.5 to 1.5 per cent of fat. The deep-setting system is less wasteful; the fat in the milk being often reduced to 0.2 per cent. The new-drawn warm milk is placed in cans surrounded by or submerged in water of about 40° F., and the rapid reduction in temperature causes the globules to rise quickly. It is best to skim the cream at the 30th hour; that is, 10 gallons of milk should yield 1 1/2 gallons of cream. The cream is removed by dipping it off, or the skim-milk is drawn off from the bottom of the can. The fat left in the skim-milk consists of the smallest fat globules.

The introduction of the separator and use of centrifugal force has resulted in a more perfect and rapid separation. This force exceeds that of gravity a thousand-fold. The system of separation is continuous, a constant, uniform flow of milk being conducted into a bowl or drum revolving at 5,000 to 9,000 or more revolutions per minute. The inlet tube is in the center of the bowl and reaches almost to the bottom; here the constituents in the milk separate, the heavier serum gravitating to the circumference of the bowl and the lighter portion — remaining in the center. These are forced upward by the incoming milk, and the separated milk escapes through a side tube, while the cream passes through a small outlet in the center. This last outlet can be closed or opened in some machines, thus regulating the percentage of fat in the cream. The machines are of various sizes, from those worked by hand power and doing 200 to 500 pounds of milk per hour, to power machines of 2,000 pounds and over per hour capacity. Some makes have appliances within the bowl to increase the efficiency. A good separator, well run, will not leave more than from 0.05 to 0.1 per cent of fat in the separated milk. The temperature should be kept between 85° and 95° F. for the best results and the speed should not lag.

The cream may be churned at once if sweet cream butter is desired, or "ripened" or soured. The aim of ripening is to develop certain flavors and to produce a kind of acidity which aids in churning and influences the texture. Since the discovery that the changes which commonly take place in milk are due to the action of micro-organisms, it has become part of the butter maker's task to make use only of such organisms as will aid in his work, and eliminate those which tend to impair the product. It has been found that the flavor of butter depends in very large degree upon the kind of bacteria which accomplishes the souring of the cream preliminary to churning. The scientific butter maker, therefore, prepares a "culture" of the beneficial bacteria, keeping it free from all others. In the usual procedure of butter-making on the farm, a "starter" used to start the acid fermentation in the newly skimmed cream, is saved from the preceding batch of sour cream, or from the buttermilk of the preceding churning. This naturally contains a mixture of many bacterial ferments, and too often a large proportion of those which are injurious to butter quality. It is advisable to make the starter out of sweet skim-milk, two or three gallons for each 10 gallons of cream, to be soured. Place it in a covered vessel in a temperature between 75° to 85°. It will require from 18 to 24 hours to become thick. It should be distinctly but pleasantly acid. The top inch should be rejected, as it contains the undesirable bacteria. It is not always possible to obtain the starter from the milk of a mixed herd. In this case it is best to make the starter from the milk of one cow chosen after experiments as to which milk makes the finest flavored butter. Or, as is the habit in many dairies, a pure culture may be purchased (by mail) from the nearest agricultural experiment station and a "mother culture" established from that. One of the essentials in making good butter is the proper care of the cream after churning; if it is to be churned the next day it should be mixed at once with the starter and placed in a temperature of 65° to 70°. If it is to be churned the second day, it should be cooled to 55° to 60°; and if not till the fourth day, it should be cooled to 40° F. Warm cream, fresh from the separator, should never be added at once to the cooled cream; it should first be cooled to the proper keeping temperature. The starter should be mixed in at such a time that the cream will reach the desired degree of acidity by the time it is desired that the degree of acidity may be determined by various tests. The most effective acidity is from 0.6 to 0.7 per cent. When possible it is advisable to pasteurize the milk or cream. This is accomplished by heating the milk to 145° F. for 30 minutes, then rapidly raising it for a moment to 185°, and then rapidly cooling it to 75° or 80°. This destroys about 98 per cent of all the bacteria. It does not, however, destroy the spores, and when making pure cultures of lactic acid bacteria, it is the rule to repeat the pasteurization daily for four days. Into the pasteurized cream is stirred the starter, 18 to 24 hours before the churning is planned, the cream meanwhile being held at a temperature of 52° to 54° in summer, and 58° to 62° in winter. The cream should be strained into the churn, and the churn should be not more than one-third full. A box or barrel churn is the best, and the churning should not be too fast, the idea being to keep the liquid measurably in one body which is thenmercifully from one end of the churn to the other. In the dasher churns much of the cream is overchurned, producing a greasy butter. When the granules of
butter are fairly uniform in size and have the general appearance of cracked corn, the churning is done. It takes about 30 minutes. The buttermilk should be separated quickly, and the butter washed with about the same quantity of water as there was cream in the beginning. Too much water will yield a tasteless butter. The butter is then to be worked by pressure, newly by a rubbing motion, which destroys the grain. A wedge-shaped or square butter-worker is preferable. The butter is usually salted immediately after washing, and before working, the amount of salt used being about one and one-half ounces to the pound of butter. When the washing is done in the churn, the salt is sometimes added in the form of brine composed of one pound of salt to two pounds of water for each 10 pounds of butter. The churn is then set in operation for two or three minutes, and the butter is allowed to stand 15 minutes in the brine before working.

The most common defects of farm-made butter are: (1) Rancidity, due to the cream being too old, or too sour, or having been kept too warm before churning; (2) foul flavor, from the being allowed to absorb bad odors; and (3) "mottles," from buttermilk being worked into the butter instead of having been worked out. Scrupulous cleanliness and attention to details from the feeding of the cows to the placing of the product on the market are imperative. See Butter Worker; Churn; Dairy Industry.

The composition of butter varies. It ranges from 78.88 per cent to 88.41 per cent of milk fat; 7.22 per cent to 15.62 per cent of water; 1.03 per cent to 3.32 per cent of casein, and 1.34 per cent to 4.16 per cent of salt. The best butter has a content of 85 to 86 per cent of milk fat and from 13 to 14 per cent of water.

The quality of butter is judged by its flavor, texture, color, amount of salt and general appearance. Flavor counts about 45 per cent of the points, and varies with the market. Some markets require a mild, delicate butter; for the supply of such the cream is often pasteurized: others require a high flavor, almost verging on rancid. Whitening of the milk or to absorb bad odors should be pronounced, with an absence of rancidity or other flavors. Texture carries 25 per cent of the points and depends upon the granular condition of the fats. The more distinctly the granules show up when the butter is broken the better the texture. The right color depends upon the market requirements; usually a bright golden yellow, as naturally yielded when cows are on grass, is considered ideal. It should be uniform. To ensure this, it is sometimes necessary to use some butter-color: formerly the main one used was arnott; now the coal-tar colors, aniline yellow and butter yellow are used. The vegetable coloring matter is usually dissolved in some oil, and this often gives a peculiar flavor to the butter, so that the coal-tar colors are preferred. Some South American countries require the butter to be a deep orange or red color. A small quantity of salt is often added to improve the palatability; it has little influence on the keeping qualities. The amount varies with trade requirements. Unsalted or slightly salted butter is largely used in Europe and the United Kingdom. The finish and packing of the butter should be attractive and neat. The styles are numerous, but attempts are being made to standardize them. The American butter-tub is generally used here. It holds from 50 to 70 pounds. In Canada and Australia a box holding 56 pounds is used for the export trade. The Danes ship their butter in firkins containing 112 pounds. For local trade the standard rectangle pound print is 4½ x 2½ x 2½ inches. These are wrapped in parchment paper and packed in specially made boxes.

Oleomargarine is the most common adulterant, and its detection, especially when present in only small amounts, is difficult. Cottonseed and other oils have been used. Glycogen has been added to increase the water-holding capacity of the butter, and in butters for South America glucose has been added as a preservative. The various preservatives, as borax, boracic acid, etc., sold under their own and other names, are now prohibited as adulterants.

Renovated or process butter is but low-grade butter which has been melted and put through a chemical process to remove the disagreeable odors and taste; sometimes it is then mixed with soured or separated or whole milk or cream; and from 6 to 10 per cent of fat is added. If the primary article is not too inferior, the resulting product can be sold as good creamery butter; generally its keeping qualities are impaired. In some States and in the United Kingdom all butter so treated must be distinctly branded "Renovated."

During the year 1850 the amount of butter made on farms in the United States was 313,345,306 pounds. As reported by the United States Census of manufactures for 1914 the production of butter in that year amounted to 786,013,489 pounds, valued at $223,179,254, as compared with 627,145,865 pounds, valued at $180,174,790, in 1909, representing an increase of 25.3 per cent in quantity and 23.9 per cent in value.

The farm production of butter (including that made for home consumption) is probably greater than the factory output, and a relatively small quantity of cheese is also manufactured on farms. Statistics in regard to the farm output of these cheese is not sufficiently collected. If the annual cheese output is not less than 200,000 pounds per year once in 10 years. At the census of 1909, 994,650,610 pounds of butter were reported as made on farms. These amounts represented decreases in the decade of 7.2 per cent and 42.6 per cent, respectively, as compared with 1899.

The value of that made on farms ranged in 1919 from 21 cents to 32 cents per pound, depending on location more than upon quality. Creamery-made butter brought from 24 cents for ordinary to 38 cents for extra fancy. The lower prices were generally those in the summer months and the highest ones of midwinter. The cost of transporting the milk to factories is about 1.5 cents per pound of butter. Denmark is at present the leading butter-exporting country of the world, with a record of almost 165,000,000 pounds, valued at $37,000,000, the average price being the highest on the market. The butter exports of the United States in 1915 amounted to 9,850,704 pounds.

The coefficient of digestibility of butter-fat is 96 per cent or over. It is well assimilated, and, like other fats, is a source of heat and energy. Its value as a food and methods of usage are well known. Butter containing 82.4 per cent butter-fat has a fuel value of per pound of
of 3,475 calories, and in a number of dietary studies butter furnished 1.9 per cent of the total food, and 19.7 per cent of the total fat of the daily food. Further information is given in Professor Atwater's reports on dietary studies. Fresh and salt butter are equally valuable. Clarified butter is used in cooking. It is ordinary butter freed from water by heating.


**BUTTER, Artificial.** See OLEOMARGARINE.

**BUTTER-BUR** (*Petasites petasites*), a composite plant, with large rhubarb-like leaves and purplish flowers, growing by the side of streams, allied to coltsfoot. The flowers appear before the leaves. It is a native of Europe, but has become naturalized in a few localities in the eastern United States.

**BUTTER-COLOR,** a preparation employed to color butter and its imitations. Anatto was formerly largely used for this purpose, but is now superseded by coal-tar colors and other coloring substances such as tumeric, saffron, marigold leaves, carrot juice and chrome yellow. Owing to the small quantities used in coloring butter they are quite harmless.

**BUTTER AND EGGS,** a troublesome weed. See TOAD-FLAX.

**BUTTER-FISHES.** The two best known butter-fishes in American waters are denizens of the coast of Massachusetts and New York, the harvest-fish of New Jersey, the dollar-fish of Maine, the sheepshead of Cape Cod, the pumpkinseed of Connecticut and the star-fish of Norfolk. It swims mostly in company with large jelly-fish, whose streamers, while often protecting it from other depredators, are frequently the cause of its death from their stings. The body is ovate and flat, the dorsal and anal fins are each very pointed, and the tail is long and widely forked.

The harvest-fish (*Pepirilus paru*) is another *butter-fish* found from Cape Cod southward to Brazil, but it is most abundant about the mouth of Chesapeake Bay, where it is locally called 'poop].' It has the habit of swimming beneath the Portuguese man-of-war. It is a delicious little pan-fish, about six inches long. On the Pacific coast there are three species, one of which (*P. simillima*) is the Californian 'pompono,' abundant during summer about Santa Cruz, where it is highly prized for its rich and delicate quality, and reaches 10 inches in length. Consult Jordan and Evermann, 'American Food and Game Fishes' (1902).

**BUTTER-MAKING.** See BUTTER.

**BUTTER-TREE,** various tropical or subtropical trees of different genera and even families. Their seeds yield fixed oils which resemble butter and are similarly used or are employed for lighting. The leading group is perhaps the genus *Butyrospermum* of the family *Sapotaceae.* Of this genus the best-known species are *B. longicorne,* the butter-tree, whose wood resembles teak, and is in use in the East; *B. butyricum,* the Indian butter-tree, whose light wood is of no commercial importance; and *B. latifolium,* the East Indian Mahowa, Mahwa or Madhuca. Besides the oil obtained from each of these trees, *B. butyr- cecum* yields an edible fruit, and the corollas of *B. latifolium* are either eaten raw or are used for making a liquor or for distilling their essential oil. *Butyropermum parkii* is the butter-tree of central Africa. It yields the galm or shea butter, obtained by boiling the seeds, which is locally an important article of commerce. The oil is obtained by boiling the kernels of the sun or kiln-dried seeds in water. It possesses long keeping qualities. Various species of the genus *Caryocar* (q.v.), natives of South America, are known as butter-trees.

**BUTTER-WORKER,** a machine designed to unite the small particles of butter, remove the buttermilk and water and incorporate the salt, giving the product a uniform appearance. Hand and power machines are made, the large power workers being also used for blending butters to make them uniform. The makes are variable and numerous; some being combined with a churn, the butter not being removed until it is finished. The former method of working by the hands injured the texture of the product and was too slow. With the present machinery the butter is untouched by hand, can be held at a temperature of 45° to 55° F. during working and is handled expeditiously. They are a necessity in all creameries and dairies where butter is made in large quantities. See also BUTTER; CREAMERIES; DAIRYING.

**BUTTERCUP,** the popular name of two or three species of the *Ranunculus* (q.v.).

**BUTTERFIELD, Daniel,** American soldier: b. Utica, N. Y., 18 Oct. 1831; d. Cold Spring, N. C., 17 July 1901. In 1849 he was graduated at Union College, and for some years engaged in the transportation and express business. At the outbreak of the Civil War he was colonel of the 12th New York Militia. He served in the Peninsular campaign and under Pope and McClellan in 1862. At Fredericksburg he commanded the 5th Corps, and at Chancellorsville and Gettysburg was chief of staff. He served as chief of staff to Hooker at Lookout Mountain, and Ringgold and Pea Vine Creek, and commanded a division at Buzzard's Roost, Resaca, Dallas, New Hope Church, Kenesaw, Lost Mountain and other battles. He was brevetted major-general in the regular army. He resigned in 1882, and served as chief of the United States sub-treasury in New York. He organized and commanded the Washington centennial parade in New York city in 1889, in which over 100,000 persons took part. He was author of 'Camp and Outpost Duty' (1862). He is buried at the U. S. military cemetery, an elaborate and costly marble tomb marking the spot. Consult Butterfield, (Mrs. J.), 'Biographical Memorial' (New York 1904).
BUTTERFIELD, Kenyon Leech, American educator: b. Lapeer, Mich., 11 June 1868. He was educated at the University of Michigan and at the Michigan Agricultural College, and became assistant secretary of the latter in 1883 and later professor of entomology. In 1892 he began to edit the Michigan Groge Viscan and in 1896 became head of a department of the Michigan Farmer. From 1893 to 1899 he also served as superintendent of the Michigan Farmers' Institute and field agent for the Michigan Agricultural College. In 1902-03 he was instructor in rural sociology at the University of Michigan, and in the latter year was named president of the Rhode Island College of Agriculture and Mechanical Arts. In 1906 he was made president of the Agricultural College of Massachusetts. He published 'Chapters in Rural Progress' (1906); 'The Country Church and the Rural Problem' (1911) and contributions on professional topics in agricultural periodicals.

BUTTERFIELD, William, English architect: b. 7 Sept. 1814; d. London, 25 Feb. 1900. He first attained distinction by the introduction of color into ecclesiastical buildings with the aid of bricks and mosaic. Among the notable structures designed by him are Saint Augustine's College at Canterbury; Keble College, Oxford; All Souls' Church, Margaret street, London; and the cathedral at Melbourne.

BUTTERFLY, one of the day-flying Lepidoptera of the sub-order Rhopalocera (compare Moth). This group is distinguished from the moths by the slender, knobbed antennae, which are never hairy or pectinated. The body is small, but there is a greater equality in the size of the three regions (head, thorax and abdomen) than in the moths, the abdomen being much shorter and smaller, as a general rule, than in the lower families of Lepidoptera. The ocelli are usually wanting; the spiral tongue is long, and the broad wings are carried erect when in repose, and are not held together during flight by a bristle (frenum) and socket as in most of the moths.

The caterpillars (larvae) vary greatly in shape and in their style of ornamentation, but they uniformly have, besides the thoracic legs, five pairs of abdominal legs. The pupa is called a *chrysalis* or *aurellan* from the bright golden hues that adorn it in many species, but disappear as the wet tissues beneath the pupa-skin harden, just before the fly appears. A few species, such as those of the genus Vanessa, hibernate, while several species, such as P. antipa, are social as young larvae. Butterflies also occasionally swarm while in the perfect state, such as species of Colias, Cynthia and Danais, multitudes of which are sometimes seen passing overhead in long columns. One of the North American species, and others elsewhere, are migratory, flying southward in autumn.

Butterflies are found in all parts of the world except the coldest, wherever plants exist suitable for food for the caterpillars, but they are most numerous both in species and in individuals within the tropics, and especially in South America. In 1300 species have been described, and it is believed that twice or three times this number are in existence. About 1,000 species inhabit North America. Butterflies are especially liable to local variation, and to seasonal and dimorphic changes, so that entomologists have recorded many sub-species and temperature-forms.

Certain Nymphalidae have glands at the end of the body secreting a repulsive fluid (see Mimicry); in others there are remarkable differences between the sexes; in certain butterflies (Androconia) some of the scales arebattle-dored-shaped, and secrete a special odor. The species of Agrippa, a South American genus, make a clicking noise when flying. While caterpillars are plant-eaters, those of several Lycaenidae are known to be carnivorous, feeding on plant-lice and scale-insects.

The eggs of butterflies have a membranous shell, and exhibit much variety in form and character of surface. Sometimes, they are ribbed. Between these ribs there is frequently found a fine network of raised lines, variously arranged. Sometimes the surface is covered with small pits, sometimes with a series of minute elevations variously disposed. The color is most often greenish white, but many are brightly colored, or have lines and dots of color. Another peculiarity is the minute opening (micropyle) in every egg, by which the spermatozoon may enter. The eggs are laid by the female on a plant that will afford suitable food for the caterpillar when it hatches. They may be deposed singly or in small or large masses; and those that will not hatch until after the following winter are protected in some way, as by a varnish, or otherwise, against the weather. Some butterflies are *single-brooded* others lay eggs twice or more in a season, the early layings hatching quickly and the last lot surviving the winter to establish the species in the succeeding spring. Few adult butterflies survive the advent of the cold season in the North, the species continuing through the survival of eggs, larva or pupa, the last sometimes by burial in the ground.

The caterpillars of butterflies are typically cylindrical and worm-like in form; but some are short and slug-shaped, or irregular in outline. The head is distinct, often large and formed of hard (chitinous) plates, and it bears horn-like projections or protrusible appendages. The thin skin is in many cases brightly ornamented with colors similar to those worn later by the adult fly (imago); but green and gray prevail — tints inconspicuous among the leaves and grasses on which most of the species feed. Most caterpillars live solitary lives; but in some species they are gregarious, and even weave large silken dwelling-places in which they live as a colony.

Caterpillars secrete a cocoon or chrysalis, covering the skin, which from time to time cracks, enabling the creature to crawl out of it, and to begin another period of growth with a new and elastic skin that has formed beneath the old one. Four or five of these molts take place as a rule. When the larva is to hibernate, it usually does so after the first or second molt, and resumes feeding and growth when it wakes up in the spring.

One great distinction between moths and butterflies is in the form and structure of the pupa — that quiescent stage of development in which the caterpillar is transformed to the imago. The term chrysalids is usually applied to the pupa of butterflies, because no such a
1 Amblypodia Amantes
2 Ornithopera Pompeus
3 Morpho Cypris
4 Ornithopera Pramunus
5 Papilio Hector
1 Mulberry Silkworm, Caterpillar and Adult
2 South American Silk Moth
3 Chinese Silk Moth
4 Ailanthus Moth
coconut as is common among moths enwraps them. They are naked and hang free from the underside of some support, as a twig or stone, on trees, or trees, in every continent of a tree-trunk, attached to a "button" of silk, and held in place by a girdling thread of silk. Chrysalids are usually protectively colored.

The families of butterflies are few, and all of them, except one small tropical group (Libytheid), are represented in every continent. Following is a list of the five families recognized by American entomologists, beginning with the most primitive and ending with the most specialized: (1) Hesperidae, (2) Papilionidae, (3) Lycaenidae, (4) Lemonidae, (5) Nymphalidae. In the last three families, which comprise the majority of butterflies, the first pair of legs is more or less modified, differing from the two hinder pairs, especially in the male nymphalids, in the more or less aborted tarsi, or toe-joints.

The Hesperidae, or "skippers," have a worldwide range except New Zealand, and are largely represented in the United States. This family contains small, prevalently brown butterflies, with slender bodies and broad, pointed heads, the feelers hooked at the tip. The fore-wing is triangular and pointed in shape, and the prevailing color is brown. The hesperids are remarkable for their short, jerky flights. The pupa is enclosed in a light, silky cocoon called "swallow-tails" from the prolongation of the hind wing in many of them. Yellow is a prevailing color, usually ornamented with black, red-brown or some other dark tint. The wing-neuration differs characteristically from that in other families. All six feet are present in both sexes. The caterpillar is cylindrical, elongate and never hairy, but often tuberculate, and is provided with a retractile tentacle behind the head, which in some species emits a highly disagreeable odor of protective value. The pupa has two anterior projections called "nosehorns," and hangs to its food-plant by its anal extremity, sustained by a loose girdle. This family is distributed throughout the world.

The Lycaenidae are a very large family of small or moderately sized butterflies with slender bodies, the feelers placed close together, and the front feet aborted in the males. The caterpillars are short and hairy, resembling woodlice in shape. The pupa has a well-marked "waist," is clothed with hairs or bristles, is attached to a pad of silk by the cremaster, and is girdled with a silken thread. This family occurs in all parts of the world, and its members are known, on account of their prevailing hues, as "blues," "coppers" and "hair-streaks." In alighting they always fold their wings upright.

The Lemonidae are a small family related to lycænids, which contains brilliant butterflies mostly confined to tropical America, a few bright-brown species, the "metal-marks" of the subfamily Erycinina, occurring in the southwestern United States.

The Nymphalidae embrace a group called "four-footed" or "brush-footed" butterflies, because the foremost pair of feet in both sexes are dwarfed, hairy and held folded up against the body. This is the largest and most prominent of butterfly families, is very ancient and is much subdivided in classification. The caterpillars vary much in form, and some are hairy, or armed with spines or tubercles. The pupa hangs by its "tail," but is not sustained by a silken girdle-thread. The nymphalids are represented in all countries, but most unusually and strikingly in tropical America.


ERNEST INGERSOLL.

BUTTERFLY-FISH, or CORAL-FISH. These beautiful fish represent the large family Chaetodonidae and its allies of the scaly-finned group (Squalidae), and they obtain their English names from their oval form, brilliancy and their quickness of movement, and the fact that their principal habitat is in and around the tropical coral-reefs. They are so compressed as to resemble the "pumpkinseed" sunfishes of the ponds, and are aided in keeping their balance by a very high, arched dorsal fin and an anal fin extended beyond the tail. Their colors are always gay, usually rich orange-yellow, as a ground tint, set off by broad, black bars and thin ornament of variety, besides blue and red touches. The type-genus Chaetodon is represented by several species in the West Indies, and southward, some of which occasionally drift northward in the path of the Gulf Stream. More numerous in American waters is the "black-angel" (Pomacanthus arcuatus), common around Porto Rico and at Key West, where it is caught in traps, or sometimes speared. The "blue-angel" (Holacanthus ciliaris) represents a genus containing several West Indian species, of which the most important is the "rock beauty" (H. tricolor), often exceeding a foot long, and good food, as well as most beautiful. The name "angel-fish" is also given in Bermuda to several similar fishes of the genus Angelichthys, called in Spanish "isabelitas." All these fishes are carnivorous, and Jordan remarks that their excessive quickness of sense and motion enable them to maintain themselves in the struggle for existence in the close competition of the coral reefs, notwithstanding that they are made so conspicuous to their enemies by their bright colors. Consult Jordan and Evermann, 'Food and Game Fishes of America'.
**BUTTERFLY PLANT** — BUTTMANN

**BUTTERFLY PLANT**, an orchid (*Oncidium papilio*) brought from Trinidad. It is so called because its large yellow and red blossoms, poising on slender flower stalks and vibrating with every breath of wind, resemble butterflies hovering on the wing. It is also applied to the Indian butterfly plant, *Phalaneopsis amabilis*, which is another orchid.

**BUTTERFLY-WEEED** (Pleurisy-root), a handsome American perennial herb (*Asclepias tuberosa*) of the family *Asclepiadaceae*, common in dry ground almost throughout the United States and southern Canada. The large, irregular, yellowish-brown, tuberous roots have a nauseous, bitter taste when fresh, merely bitter when dried, and are reputed useful in lung and throat troubles, rheumatism, etc., but seem to be less popularly used than formerly. It is usually administered as a decoction, fluid extract or at times as a powder. The hairy stems, which rise to a height of two or three feet, bear alternate oblong-lanceolate leaves, and several umbels of short-peduncled, bright orange-yellow flowers followed by erect pubescent pods. Unlike other members of the genus, this plant has not a milky sap.

**BUTTERINE**, a substance prepared in imitation of butter, from animal or vegetable fats. The fat is first freed from all impurities, and by heat converted into olein. The olein is then transferred to a churn containing a small quantity of milk and churned into butterine. Sometimes it is colored in imitation of butter. Freshly prepared, it is sweet and palatable, and when spread on bread or cold toast is but slightly inferior to a fair quality of butter. The process has attained such perfection in the matter of manufacture in the United States that it takes an expert to distinguish it from genuine butter, and laws have been passed compelling tradesmen to label each package containing it so that no one may be deceived. See OILMARIGARINE.

**BUTTERMILK**, the fluid left behind after churning milk for butter. It possesses a specific gravity somewhat higher than ordinary milk, owing to the removal of most of the fat, and varying between 1.032 and 1.035 per cent at 59° F. It may be fresh or sour, according to the method of churning. It should not contain more than 0.5 to 0.6 per cent of butter-fat. Its composition is variable, an average of 85 analyses being: Water, 90.1 per cent; casein, 3.0; fat, 1.1; protein, 4.0; milk sugar and lactic acid, 4.0; ash, 0.7 per cent. Its chief matter is usually all digestible, and it is a healthy and nutritious beverage, much relished by many people. Its fuel value per pound is 165 calories. It has about the same value as skim-milk for pig-feeding, and is used in conjunction with corn meal or some other grain, excellent pork being produced. It is also used for calf-feeding, although failures are reported in the undertaking. In fattening poultry it is highly esteemed. See BUTTER.

**BUTTERNUT** (White Walnut), a large spreading tree (*Juglans cinerea*) of the family *Juglandaceae*, native of America, where it ranges from New Brunswick to Georgia and westward to the Dakotas and Arkansas. It sometimes attains a height of 100 feet but usually varies from 50 to 80. It has smooth, gray bark, large compound pubescent leaves, small flowers, followed by oblong, pointed, ribbed green nuts covered with viscid hairs. The ripe nuts when dried have very hard shells and are highly prized for dessert in regions where the trees grow; and the green nuts are used for making pickles. The bark of the stems has been used in dyeing and that of the root in medicine. The wood is used to some extent for cabinet work and interior finish of houses, but is less popular than black walnut. An inferior sugar can be made from the sap. The tree is not quite so attractive as the walnut and is less densely covered with foliage, but is less attacked by insects.

**BUTTERWORT**, a genus of about 30 species of small succulent plants (*Pinguicula*) of the family *Lentibulariacae*, widely distributed throughout the world in bogs and other wet ground. The species have rosettes or tufts of leaves, from among which single-flowered scapes rise to a height of a foot or less. The short, thick, stick-haired leaves attract small insects which are covered by the in-rolling leaf-margins and digested. The leaves of certain species, especially of the common butterwort (*P. vulgaris*) are used like reconstitute milk, and thus form a favorite food in Lapland and the Alps. The milk (reindeer milk in Lapland) is poured upon the leaves, strained, allowed to stand 48 hours, or until creamy and somewhat acid, when it is ready for use as food or for impregnating other purposes. This property is said by some authorities to account for the English name, but others attribute the name to the buttery feeling of the leaves. Several species are cultivated for their dainty flowers, and as curiosities on account of their carnivorous habits, but they are rather difficult to manage unless conditions are naturally right. They are less popular in America as greenhouse plants than in Europe. Several species are natives of the United States.

**BUTTERWORTH**, Hezekiah, American story writer and poet: b. Warren, R. I., 22 Dec. 1839; d. there, 5 Sept. 1905. He was editor of the *Youth's Companion*, 1871-74. He published many popular juvenile stories and travels, including *Zig-Zag Journeys* (1876-90); *Songs of Historical Domes and Baliads Upon Important Episodes in American History* (1887); *The Wampum Belt, or the Fairest Page of History* (1896); *A Knight of Liberty*; *The Patriot Schoolmaster*; *Poems for Christmas, Easter, and New Year*; *The Boyhood of Lincoln*; *Boys of Greenway Court*; *In Old New England*; *Traveler Tales of China*; *Over the Andes*; *Great Composers*; *South America*; and many others.

**BUTTMANN, Philipp Karl**, German scholar: b. Frankfort-on-Main 1764; d. Berlin, 21 June 1829. He was educated at the University of Göttingen and in 1789 was made assistant at the Berlin Royal Library, later becoming secretary and librarian. From 1796 to 1808 he also held a chair in the Joachimsthal Gymnasium at Berlin and on the establishment of the University of Berlin he was appointed professor there. He published *Gründe der Geschichte* (1792; 2nd ed., 1805); *Grundzüge der Geschichtslehre* (1793; 2nd ed., 1805); *Griechische Schlager* (14th ed., 1852); *Textiologus* (1818; 2nd ed., 1860); a glossary of difficult Homeric
words; 'Ausführliche griechische Sprachlehre' (1827); 'Mythologus' (1828); a continuation of Spalding's edition of Quintilian, and editions of various Greek classics.

**BUTTON, Sir Thomas**, English navigator in the 17th century, the successor of Hudson in exploring the northeastern coast of North America. He sailed in 1612 with two vessels, the *Resolution* and the *Discovery*, passed through Hudson Strait, and was the first to reach land on the western coast of the bay. The point which he touched was in lat. 62° and was named by him Careys Swan's Nest. Being obliged to winter in this region, he selected a position near the mouth of a river, first named by him Nelson's, after the master of his ship. Every precaution was taken against cold and icebergs, yet the severity of the climate occasioned much suffering to his crew, and was fatal to a few of them. During the next summer he explored and named several places on the coast of Hudson Bay, and advancing to lat. 65°, became convinced of the possibility of the Northwest Passage.

**BUTTON, a small circular disc or knob of mother of pearl, horn, metal or other material, with a shank or perforations through its centre for attachment to an object, and made to fit into a hole formed in another one for its reception, the two fastening the objects together. Its chief use is to unite portions of a dress together. The ancient method of fastening dresses was by means of pins, brooches, buckles and tie-strings. Buttons of brass are found on dresses of the 10th century. Gilt buttons were first made in 1768 and those of papier-mâché in 1778. Buttons of vegetable ivory are now all but universally used for tweed coats and vests. The palm fruit which yields it is called corozo nut. It is not unlike true ivory but softer, and is easily turned and dyed. These buttons are often mottled with some stain to suit the common patterns of tweed stuffs. Recently a substitute vegetable ivory has been found in the seeds of a common palm of north-east America (Hyphaene theca). These seeds are known to the trade as gingerbread doum, doom or dum nuts. They are much cheaper than the tagua, corozo or South American ivory nuts, and are available in much larger quantities. The difficulty at present is the adaptation of existing machinery to the manufacture of buttons from this African nut, but it is believed that within a short time manufacturers will see the advisability of installing machinery especially designed to make buttons, trinkets and toys in the most efficient manner from this new and less expensive material. Mother of pearl buttons are formed of the beautiful substance of which the large flat shell of the pearl oyster consists, and this has long been a favorite material for buttons. Small cylinders are first cut out of the shells with a turnsaw. These are then split into discs, which are shaped by a steel tool, drilled with holes, and finally polished with rotten stone and soft soap, or by a more recent method with ground charcoal and turpentine. Shells of small kinds of oyster, the *Strombus*, and *Germaea* buttons with metal shanks are also made of this substance.

Among other animal substances used for buttons are ivory, bone, horn, and hoof. From this last so-called horn buttons were some years ago made in enormous numbers by pressing them in heated dies in which the design was cut. There are many kinds of composition buttons, glass buttons, and shells of various variety. For pinched buttons small rods of colored glass are heated at the ends, and pressed into shape by means of a pair of rather long hand pliers, on the ends of which are a die and its counterpart, likewise kept hot. Other kinds are cut out of soft sheet glass, which is coated on the back with tin amalgam like a mirror. With other varieties, some beautiful glass buttons are made in Bohemia, either partly or wholly of aventurine glass; and of this gold-spangled material artistically wrought with other colors, studs and solitaires still more remarkable for their beauty and minute patterns are made at Venice. Porcelain buttons were a few years ago nearly all of French manufacture, but are now made principally at Prague. The plastic clay is pressed into molds of plaster of Paris in the same way as small objects are usually produced in earthenware. Some are plain and others are painted or printed with patterns. More or less expensive buttons are made of jet, hard stone, such as agate, Jasper and marble. Occasionally they are formed of amber, jade or of still more costly materials, as pearls and gems. In recent years, improved methods and machines have been introduced for the shaping as well as for the polishing and finishing of bone, corozo and wood buttons. In England, Birmingham is the seat of the button trade, which, however, is much more largely developed in France. Brass buttons were made in Philadelphia in 1750, and hard-wood buttons were made there soon after. The button factory in Waterbury, Conn., now the seat of the metal button manufacture, was established about 1800. Horn buttons were made in the United States as early as 1812, and the production of buttons covered by machinery was begun at Easthampton, Mass., by Samuel Williston in 1827. The making of composition buttons was begun at Newark, N. J., in 1802, and there have been about 1,500 patents for buttons issued by the patent office of the United States. In 1850 there were in the United States 59 establishments for the manufacture of buttons, with an output whose value was placed at $964,359. According to the returns of the United States census of manufactures for 1914 the button industry comprised 517 establishments, producing in that year 60,602,359 gross of buttons valued at $16,293,198.

The most important branch of the button industry was the manufacture of pearl buttons, either from mother of pearl or ocean pearl or from the shells of the Unios or fresh-water pearl.

In 1914 there were manufactured 26,181,405 gross of pearl buttons, with a value of $509,409, representing 43.2 per cent of the total quantity and 45.4 per cent of the total value. Of this amount, 21,664,436 gross, valued at $4,879,844, were made from fresh-water pearl and 4,516,969 gross, valued at $2,489,304, from mother of pearl glandular buttons with metal shanks are also made of this substance.

Next in importance was the manufacture of buttons from vegetable ivory, the output of this kind amounting to 5,128,005 gross, valued at $2,885,503, or 8.5 and 17.6 per cent of the total in quantity and value, respectively.
The others of the more important classes in point of value were covered buttons, $1,600,178; celluloid, $724,354; shoe, $610,796; bone, $329,934; horn, $299,487; and ivory, $283,484. In addition various other kinds and parts, having a total value of $2,130,254, were manufactured.

Of the 317 factories reporting in 1914, there were 224 located in New York, 81 in Iowa, 60 in New Jersey, 31 in Illinois, 21 in Pennsylvania, 18 in Connecticut, 14 in Massachusetts, 12 in Indiana, 9 each in California, Missouri and Ohio, 5 in Arkansas, 4 in Kentucky, 3 each in Minnesota and Washington, 2 each in Michigan, Rhode Island, Tennessee, West Virginia and Wisconsin, and 1 each in Colorado, Kansas, New Hampshire and Oregon.

Statistics compiled in July 1916 by the Bureau of Foreign and Domestic Commerce showed that American expert traders in buttons indicated an increase of 79 per cent and prospects of further advancement. This was owing to the fact that the normal European production of buttons, the largest in the world, was curtailed by the war. Under usual conditions United States manufacturers enough to meet about nine-tenths of its own requirements and more than half the supply of Canada, which has some factories of its own, and ranks next to the European nations in production. The American export trade in buttons amounting to $654,372 in 1914, more than half of which was with Canada, expanded to $1,171,232 in 1915, with England, Canada, Australia and Cuba the largest purchasers. The bibliography of the button industry is varied and interesting. The most important work on the industry in Europe is Consular Reports Vol. 52, pp. 801-91 (Washington, D. C., 1888); 'The Emilio Collection of Military Buttons, American, British, French and Spanish, with some other countries' (Essex Institute, Salem, Mass., 1911); Ray's, A. R., 'Buttons,' Art Journal, Vol. 71, pp. 7-14 (London 1909); Smith, H. W., 'The Pearl-Button Industry of the Mississippi River,' Scientific American, Vol. 81, pp. 86-87 (New York 1899); Petroi, W. F., 'Buttons from Egypt,' Antiquary, Vol. 32, pp. 134-136 (London 1896) (covered and Celluloid Button Factories in New York City, New York Commission Report (Albany 1915); 'Art in Buttons'—German-American Button Company (Rochester 1906-16).

**Button-Bush, Honey-Ball, or Globeflower.** A North American shrub (Cephalanthus occidentalis) of the madder family, which grows in wet places, and bears extremely fragrant flowers whose small florets are folded or packed into balls, while the long styles and capitate stigmas remind us of pins stuck in a cushion.

**Button-Quail.** A small quail-like bird of the genus Turnix, family Turnicidae, order Hemipodei, of which there are some 20 species in various parts of the Old World, some of which are termed bustard-quail, bush-quail, ortygian and hemipode. They frequent wooded places and afford good sport for the gunner. The males, as well as the females, are brightly colored. They are one of the smallest game birds known, inhabit woody places and feed generally on berries and insects.

**Buttonwood,** a name often given to the North American plane (Platanus occidentalis). See PLANE.

**Buttress,** in architecture, a structure of masonry used to resist the thrust of an arch or vault. It takes the form of a great proportionate thickening of the walls at the point where the thrust affects the wall, the thickness sometimes increasing until the mass of masonry is set across the general direction of the wall. Thus in the developed Gothic style it nearly replaces the wall, because all the space between button and buttress is occupied by a great window. In the case of an archway in a single wall it often happens that the two sides or outer edges of the wall are carried up in such a way that they are spread wider toward the base and approach one another at the top, by means of certain offsets or steps, and these extensions of the wall are called buttresses, although they are mere widenings of the wall. In like manner some English Gothic church towers have curious diagonal spurs projecting on the front and sides, in the form of short pieces of wall built on a prolongation of a diagonal of the square plan, and these are considered as buttresses, although they have very rarely any thrust to resist, because the tower is not often occupied by vaulted chambers, and because the meeting of the two walls would provide sufficient masonry for the practical purpose. It is a vice in that style that these considerations are lost sight of.

Historically, the real buttress begins to show itself in Romanesque work along the walls of the aisles, and is at first a slight projecting pilaster-like thickening of the wall, or a rounded projection like an engaged shaft of a column. These are called by special names, as buttress-pier, pilaster-strip, etc. They were very inadequate for their purpose (see ROMANESQUE ARCHITECTURE) and their presence shows the uneasiness of the early builders in trying to dispense with the precautions taken by their masters, the Romans of the empire, and their hesitation in building what alone would do the work. As the vaulting within became more and more elaborate, the need of the buttress became more evident, and in some Romanesque churches they have been built up after the walls being stayed up with great cost and trouble after they had begun to spread under the thrust of the vault. It was not until the ribbed vault came in and the Gothic style came into being that the buttress took its permanent shape of a piece of wall, thin in comparison to projection; that is to say, having by far its greatest dimension in the direction of the thrust of the vault and therefore at right angles with the wall of the church. Except in modern Gothic exterior buttressing is seldom employed nowadays. It is, however, employed in railway stations and factories, where strong vibration of the floors necessitates the reinforcement of the walls at regular intervals. See FLYING BUTTRESS.

**Buttz,** Henry Anson, American educator: b. Middle Smithfield, Pa., 18 April 1835. He was graduated at Princeton in 1858, and entered the Methodist ministry the same year. He was president of Drew Theological Semi-
nary, 1880–1912, president emeritus since 1912, and has written much on polemics, exegetics and homiletics.  

**BUTYRIC ACID**, an acid obtained from butter; it also occurs in perspiration, in cod liver oil and other fats, and in meat juice. When obtained, as it may be from butter and from sugar, it is in the form of a clear, oily, volatile fluid. It combines with bases, and forms crystals; it is colourless, and possesses no taste. Butyric acid is a colorless liquid, having a smell like that of rancid butter; its taste is acrid and biting, with a sweetish after-flavor. Formula, normal butyric acid $\text{C}_6\text{H}_{12}\text{CH}_2\text{CH}_2\text{COOH}$.  

**BUTYROSPERMUM**, a genus of tropical trees found in the East Indies and Africa, of the family Sapotaceae. One species (B. parkii) is supposed to be the shea-tree of Park, the fruit of which yields a kind of butter that is highly valued and forms an important article of commerce in the interior of Africa. There are several other species of which B. longifolium, or Indian oil-tree, and B. butyracenum, or Indian butter-tree, are well-known examples, yielding a large quantity of oleaginous or butyrous matter. The wood is as hard and incorruptible as teak. See also BUTTER-TREE.  

**BUخار, buk'sár, or BAXAR**, a town of British India, in the district of Shahabad, presidency of Bengal, situated on the south bank of the Ganges, about 60 miles below Benares. It is celebrated for a victory which confirmed the British in possession of Bengal and Bahar, 23 Oct. 1764.  

**BUXTEHUEDE, buk-tè-hoo'de, Dietrich, German organist**: b. Helsingør 1637; d. 9 May 1707. His father was organist at Helsingør for 32 years, and no doubt imparted the art to his son. In 1668 Buxtehude was appointed to the important post of organist at the Marienkirche (Mary's Church) in Lübeck. In 1673 he introduced special church concerts after the evening services on the five Sundays before Christmas. He wrote the music for these concerts, producing new compositions with much rapidity. The great Bach tramped a long distance hear Buxtehude play and to learn from him.  

**BUXTON, Sidney Charles**, 1st Viscount of Newtimber (cr. 1914), G.C.M.G., LL.D., 1916; high commissioner and governor-general of South Africa since 1914: b. October 1853. He was educated at Clifton College and Trinity College, Cambridge; was member of the London school board from 1876 to 1882; of the Conciliation Committee of the Dock Strike, 1889; of the Royal Commission on Education, 1886–89; of the Income Tax Committee, 1904; Under-Secretary for the colonies, 1892–95; M.P. for Petersborough, 1883; and from 1905–10 he was Postmaster-General. While in this latter office he succeeded in introducing penny postage to the United States and reduced magazine postage to Canada. The Insurance Act and the Copyright Act, both passed in 1911, were largely his work, as were the Bankruptcy Act and Extension of Trade Boards Act, 1913, and the Pilotage Act of 1912. He was M.P. for Poplar, 1886–1914. His published works include: 'Political Manual' (5th ed.); 'Finance and Politics' (1783–1885); 'Handbook to Death Duties'; 'Mr. Gladstone as Chancellor of the Exchequer'; 'The Fiscal Question'; 'Fishing and Shooting'; 'Recreations'.  

**BUXTON, Sir Thomas Powell**, English philanthropist: b. Earl's Colne, Essex, 1 April 1786; d. 19 Feb. 1845. He was educated at Trinity College, Dublin, and in 1808 joined the firm of celebrated brewers, Truman, Hanbury & Company, and took an active part in the management; but withdrew from the business in 1811, on the occasion of the Spitalfields distess, he made his first public effort in a speech at the Mansion House, and afterward succeeded in organizing an extensive system of relief. He next proceeded, in concert with his sister-in-law, the celebrated Mrs. Elizabeth Fry (q.v.), to examine into the state of prisons; and as the result of his inquiries produced in 1818 a work entitled 'An Inquiry Whether Crime and Misery are Produced or Prevented by Our Present System of Prison Discipline,' which attracted great attention, and led to the formation of the Prison Discipline Society. In 1818 he was elected member of Parliament for Weymouth, and continued to sit for it in success until 1837. He distinguished himself by his enlightened zeal in the cause of humanity, and was long the right-hand man of Wilberforce, who, on retiring from public life, selected Buxton as the person best qualified to carry out those of his benevolent schemes which remained uncompleted. In 1823 he moved and, with a slight modification, carried a resolution to the effect that slavery, being repugnant to the Christian religion and the British constitution, ought to be abolished. Subsequently in 1831 he made such an impression on the House and country by an admirable speech that the government were glad to take the matter into their own hands and give full effect to emancipation. After his retirement from Parliament the slave trade occupied much of his thoughts, and he published in 1839 a work entitled 'The Slave-trade and Its Remedy.' In 1840 he was created a baronet. Consult 'Memoirs of Sir T. F. Buxton, Bart.' (1872).  

**BUXTON, England**, a town in Derbyshire, 36 miles northwest of Derby and 25 south-southeast of Manchester. The highest town in England and the centre of the Peak District. Buxton has long been famous for its calcareous springs, the waters being taken for indigestion, gout, rheumatism and nervous and cutaneous diseases. The locality was known to the Romans, who had baths here. The season extends from May to October. The town is 1,025 feet above sea-level and is situated in a deep valley. Much of the splendor of Buxton is due to the Dukes of Devonshire, one of whom in 1780, at the cost of $600,000, erected an immense three-storied pile of buildings, called the Crescent. Near Buxton is the Diamond Hill, famous for its crystals; and Poole's Hole, a gas-lit stalactite cavern 790 yards long. Many streets of Scots made several visits to the baths at Buxton while a prisoner in the custody of the Earl of Shrewsbury. Pop. (1911) 10,024.  

BUXTORF — BYBLOS

which he obtained the assistance of many learned Jews, he was engaged by the magistrates of Basel to become professor of those languages, which he taught with great success. His chief works are: 'Lexicon Chaldaicum, Talmudicum et Rabbinicum' (1639); 'The saurus Lingua Hebraica'; 'Biblica Hebraica Rabbinica'; 'Synagoga Judaica hoc est Schola Judeorum' (1604); 'Institutio Epistolariis Hebraica'; 'Concordantiae Bibliorum Hebraicorum.' Consult Kautsch, 'Johann Buxtorf der Ältere' (Tübingen 1880).

BUXTORF, Johann (The Younger), German Hebraist: b. Basel, 13 Aug. 1599; d. there, 16 Aug. 1664; son of the preceding. He entered the University of Basel at 12, became master of arts at 16, and proceeded to Heidelberg and afterward to Geneva. In 1629 he succeeded his father in the chair of Hebrew at Basel and occupied it for 34 years, until his death. The same chair was filled by his son and his nephew successively during 68 years longer, making a combined occupancy of this professional chair by the Buxtorf family for an unbroken period of nearly a century. He spent a great part of his life in controversy with other scholars regarding disputed biblical and theological questions, and especially regarding the antiquity of the vowel system in Hebrew. He completed and published two of his father's principal works, the 'Lexicon Chaldaicum, Talmudicum, et Rabbinicum' (Basel 1639) and 'Concordantiae Bibliorum Hebraicorum' (Basel 1632), the most important publication of his own being the 'Lexicon Chaldaicum et Syriacum' (Basel 1622).

BUXUS, the genus name of a number of shrubs or small trees. See Box.

BUYS-BALLOT, bu-is-ba-lot, Christophorus Henricus Didericus, Dutch meteorologist: b. Kloeinge, Zeeland, 10 Oct. 1817; d. Utrecht, 2 Feb. 1890. He studied at the University of Utrecht, where he became professor of mathematics in 1847, and professor of experimental physics in 1870. In 1854 he was elected director of the Royal Meteorological Institute at Utrecht. He was one of the initiators of the new system, under which, by daily synoptic weather reports, and simultaneous observations by land and sea, meteorologists are kept informed of forecasting changes. His own observations have resulted in the determination of a general law of storms, known as the Buys-Balott law. The inventor of a system of weather signals, he was largely instrumental in bringing about an international uniformity in meteorological observations. His works include 'Changements périodiques de la température' (1847); 'Eeneig reglen voor te wachten van weververandering in Nederland 1860'; in English, 'Suggestions on a Uniform System of Meteorological Observations,' (1872-73); and 40 volumes of the Annual of the Meteorological Institute.

BUYUKDEREH, bi-yook'de-rah, a little town on the western side of the Bosporus 10 miles north-northeast of Constantinople, situated in the midst of a large, deep-boomed valley that separates the Russian and European embassies at Constantinople, and its gardens and palaces, not less than its natural beauty and coolness, make it a favorite promenade ground. The tradition that Godfrey of Bouillon encamped here with his army is not alluded to in the original records of the Crusades.

BUZFUZ, Sargeant, a character introduced by Dickens in the 'Pickwick Papers.' He is the barrister who becomes counsel for the plaintiff in Mrs. Bardell's breach of promise suit against Mr. Pickwick, and is remarkable for the ingenuity he displays in drawing incriminating inferences from ordinary and inconsequential occurrences.

BUZZARD, a term given in America to two distinct groups of birds—buzzard-hawks of the genus Buteo and buzzards, also familiar to Europeans, and the turkey-buzzard—a vulture. The buzzard-hawks are closely related to the eagles, from which they are distinguished by the smaller size in the majority of cases, the smaller and rounder head and a slow and heavy manner of flight. They feed chiefly upon the smaller mammals and reptiles, seldom catching or disturbing poultry, although popularly accused of it and styled 'hen-hawks.' Important North American species of the genus Buteo are the red-tailed hawk, the broad-winged hawk, and the turkey buzzard, all of which are elsewhere described under their names. The most important of the genus Cathartes is the rough-legged hawk (q.v.), and the handsomest one, the Redtail hawk of California. In the southern United States the name usually refers to the common black vulture (Cathartes aura). See Turkey-Buzzard.

BUZZARD'S BAY, on the southeast coast of Massachusetts, is about 30 miles long, and has a mean breadth of seven miles. It is sheltered from the ocean from Vineyard Sound by the Elizabeth Islands. Its chief harbors are those of New Bedford, Wareham, Mattapoisett, Nasketucket and Sippican.

BUZZING, the sounds produced by many insects, other than by mechanical means, that is, by friction. How the buzzing of bees, flies, etc., is produced has been a disputed question. Two distinct sounds may be distinguished—one, a deep noise, is due to the vibration of the wings, and is produced whenever a certain rapidity is attained; the other is an acute sound, and is said to be produced by the vibrations of the walls of the thorax, to which muscles are attached. In Diptera and Hymenoptera, because the integument is of the right consistence for vibration. In both of these, observers agree that the spiracles are not concerned in the matter. Lautodius tells us that the wing-tone of the honey bee is A;' its voice, however, is an octave higher, and often goes to B' and C'. The sounds produced by the wings are constant in each species, except where, as in Bombus, there are individuals of different sizes; in these the larger ones generally give a higher note. Thus, the comparatively small male of B. terrestris hums on A, while the large female hums an entire octave higher. Consult Sharp, 'Insects' (New York 1899); Packard, 'Textbook of Entomology' (New York 1889).

BYBLOS, bib'blos, an ancient maritime city of Phoenicia on the coast of Syria called Jебail, a little north of Beyrouth. It is often mentioned in inscriptions under the form G B L and it also appears in cuneiform documents as
early as the 15th century A.D. either as Gubli or Gublo. It was the chief seat of the worship of Adonis of Thammuz, and of Astarte as Baalat-Gublu. In Ezek. xxvi, 9 the town is called Gebal. To Strabo and the Greek authors it was always Byblos. Philo Byblius was born there. There are extensive remains dating from the Phoenician period and from the times of the Crusades.

BYERLY, William Elwood, American mathematician: b. Philadelphia, 13 Dec. 1849. He was graduated at Harvard College in 1871; was assistant professor of mathematics at Cornell University and at Harvard University from 1876-81, when he became professor. He became professor emeritus in 1913. He is a fellow of the American Academy of Arts and Sciences. Among his works are 'Elements of Differential Calculus' (1879); 'Elements of Integral Calculus' (1881); 'Fourier's Series, Partial Differential Calculus' (1895), and a 'Treatise on Fourier's Series and Spherical, Cylindrical and Ellipsoidal Harmonics' (1893).

BYERS, Samuel Hawkins, Marshall, American writer: b. Pulaski, Pa., 23 July 1838. Educated in schools in Iowa. He served four years in Union army, was captured at battle of Chattanooga. While in prison at Columbia, S. C., he wrote 'Sherman's March to the Sea,' a song that gave its name to the great campaign, and of which 1,000,000 copies were sold. In 1865 he escaped from prison, rejoined the army and served on General Sherman's staff in the Carolinas; was sent down to Cape Fear River and brought the first news north of Sherman's success. After the war he went to Switzerland and in 1889-94 was consul-general to Rome. Later, he was consul-general to Switzerland under President Harrison. Altogether he was some 20 years in the foreign service. He wrote 'Switzerland and the Swiss' during this time, and published a volume of poems, 'The Happy Isles.' On leaving the service he published 'Iowa in War Times'; 'The March to the Sea, or the story of the Great Campaign,' in verse; 'The Honeymoon,' a volume of verse; 'With Flavor of the Earth,' a prose account of his adventures in the Civil War; 'A Layman's Life of Jesus'; 'Twenty Years in Europe, or the Life of a Consul-General' (1896), which contained 50 personal letters to the author from General Sherman; 'Complete Poems' (1914); 'The Bells of Capistrano' (1915), a love poem of the old mission days in California; also 'Glorieta, or The City of Fair Dreams' (1916), a poetical romance of Monterey, Cal., in the Spanish days.

BYERS, William Newton, pioneer, journalist, publicist and capitalist: b. Madison County, Ohio, 22 Feb. 1831; d. 1901. As a civil engineer he served in the capacity of United States deputy surveyor in Iowa, Oregon, Washington, Nebraska and Colorado. He was a member of the first and retiring legislature, and of the first Colorado constitutional convention. In 1864-66 and from 1879-83 he was postmaster of Denver. In 1859 he founded the Rocky Mountain News, of which he was editor and publisher for 20 years. A man of modest and retiring disposition, he was one of the most constructive personalities in the history of Colorado.

BYESVILLE, Ohio, a village of Guernsey County on the Pennsylvania Railroad, 95 miles east of Columbus. It is the commercial center of a large bituminous coal mining region, and has manufactures of bricks, tiles, glass and gas engines. Pop. 3,156.

BYINGTON, Cyrus, missionary among the Indian: b. at Stockbridge, Mass., 11 March 1793; d. Belpre, Ohio, 31 Dec. 1882. His educational advantages were limited, but in his youth he was taken into the home of Joseph Woodbridge in his native town, under whose tuition he studied Latin and Greek and with whom he afterward read law. He was admitted to the bar in 1814 and began to practice, but soon after entered the theological seminary at Andover, Mass., at which he graduated in 1819. Having been ordained to the ministry, he entered the service of the American Board of Commissioners for Foreign Missions (Congregational) and was assigned labor among the Choctaw Indians in Mississippi. Journeying overland from Massachusetts to Pittsburgh, he descended the Ohio and Mississippi rivers in a flatboat to his destination. After working among the Choctaw people in Mississippi for a dozen years, he accompanied them on their westward migration to the Indian Territory, opening up and building a new mission station near Eagle-town, in the southeastern part of the Choctaw Nation, which he named in honor of his native town—Stockbridge. His health failing, in 1851, he went to New York, but later returned and resumed his work among the Choctaw people, which he continued until the outbreak of the Civil War put an end to all missionary enterprises in that section. Early in his missionary career he began to make an exhaustive study of the Choctaw language, a grammar of which was completed in 1834. He also compiled a Choctaw-English dictionary, upon the seventh revision of which he was engaged at the time of his death, nearly half a century after the beginning of his missionary labors. This work, entitled 'A Dictionary for the Choctaw Language,' was issued by the Bulletin 46, of the Bureau of American Ethnology, in 1915.

BYELAW, a particular or private law, as the local or subordinate law of a city, town, private corporation or other organization. The power to make bylaws is usually conferred by express terms of the charter creating the corporation; though, when not expressly granted, it is given by implication, and it is incidental to the very existence of a corporation. The constitution of the United States and acts of Congress made in conformity to it, the constitution of the State in which a corporation is located, and all acts of the legislature constitutionally made, together with the common law as there accepted, are of superior force to any bylaw; and any bylaw, when contrary to either of them, is void, whether the charter authorizes the making of such bylaw or not, because no legislature can grant power larger than it possesses. A valid bylaw of a municipality is a true law, for it has the authority of the State behind it. Bylaws of corporations and societies are merely working agreements between the members than laws, in the true sense. Consult Boisot, 'By-Laws of Private

BYLES, Mather, American clergyman: b. Boston, 26 March 1706; d. there, 5 July 1788. He was graduated at Harvard in 1725; was ordained to the ministry in 1733 and was placed over the church in Hollis street, in Boston, in the year 1733, and obtained a distinguished position among the contemporary clergy. He was learned after the manner of those times, and was more addicted to literary recreations, and had a keener relish of the later humanities than was then common among the members of his profession. As a proof of his recognized excellence in polite letters, we may accept the fact that he was the correspondent of some of the chief poets and authors of England. He was himself a vortary of the muses in a small way, and a volume of his miscellaneous poems was published in 1744. He gave an early expression, too, to the loyalty which distinguished his character through life, in a poem on the death of George I and the succession of his son, in 1727, when he was but 21 years of age. He also tempered the bereavement which Governor Belcher had suffered in the loss of his wife in 1734, by such consolation as an elegiac epistle could convey. It is not likely, however, that his name would have been preserved to this time had his reputation depended on the merits of his poetical effusions. The cheerful flow of his spirits and frank gaiety of his conversation seem to have been something out of the common way, and to have left an enduring mark on the memories of that generation. His piety was tinctured with no asceticism, and the lively sallies of his sprightly imagination, always kept within the limits of decorum, were restrained by no fear of injuring his personal or clerical dignity. He was an ardent Royalist and in 1777 was sentenced to banishment, but was allowed to remain under guard in his own house. This severity was soon relaxed for a while, and afterward renewed. One of the stories told of him is, that wishing to have an expression of it at a distance, he asked the sentry to undertake it. The man objected on the ground that he could not leave the door unguarded; on which the doctor volunteered to be his substitute, and, accordingly, was seen by some, in a powdered wig and cocked hat, with a musket on his shoulder, walking up and down before his house, keeping guard over himself. His release from custody soon followed, on which occasion, alluding to these changes of treatment, he said that he had been "guarded, regarded and disregarded." He, son, Mather, b. 1736; d. 1814, was also a clergyman and became the rector of the Tories, who, expelled from Boston, founded Saint John, New Brunswick.

BYLLYNGE, b'il-ling, Edward, English provincial governor: d. 1687. He became joint purchaser with John Fenwick of a large tract of land in what is now the State of New Jersey. Upon the occasion of a dispute between the two proprietors, nine-tenths remained, by Penn's decision, with Byllinge and was long known as "the Byllinge Tents." He was governor of the Province of West Jersey in 1677. Consuelo Tamer, 'The Province of New Jersey, 1664-1738' (New York 1908); Myers, 'Narratives of Early Pennsylvania, West New Jersey and Delaware, 1630-1707' (New York 1912).

BYNG, George Viscount Torrington, English admiral: b. Wrotham, Kent, 27 Jan. 1663; d. 17 Jan. 1733. He entered the navy at the age of 15. In 1688 he recommended himself to William of Orange, and for his gallant conduct at the battle of Malaga was knighted by Queen Anne. In 1706 he was elected to Parliament from Plymouth. Two years later he commanded a squadron sent out to oppose the Pretender's invasion. He followed the French fleet and forced it to take refuge at Dunkirk. In 1718 he commanded the English fleet sent to Sicily for the protection of the neutrality of Italy, and on 31 July utterly destroyed the Spanish fleet off Messina. Later he became naval treasurer and attained the rank of rear-admiral. In 1715 he was created Knight of the Bath and was First Lord of the Admiralty after the accession of George II in 1727. He was created Viscount Torrington in 1721.

BYNG, John, English admiral: b. 1704; d. 14 March 1757. He was the son of Viscount Torrington, and by his own name the influence of his name, was raised to the rank of admiral. His attempts to relieve Fort Saint Philip, in Minorca, when blockaded by a French fleet under La Galissonnière, proved abortive, and his hesitation in engaging the enemy, when a bold attack might have perhaps gained him the victory, excited the clamor of the nation against him. The ministry, who wished to avert the public odium from their unsuccessful measures, beheld with seeming satisfaction the unpopularity of Byng, and when he was condemned by a court-martial they suffered him, though recommended to mercy, to be sacrificed to the general indignation, and he was shot at Portsmouth. The historical controversy as to his guilt is undecided.

BYNG, Sir Julian Hedworth George, K.C.B., K.C.M.A., M.V.O., English soldier, the 7th son of the 2d Earl of Stafford: b. 11 Sept. 1862. He passed through the Staff College and became lieutenant in the 10th Royal Hussars in 1883. He saw his first service in the Sudan campaign 1884, was present at the capture of Tamai, and received the Khedive's Star for gallant conduct. He rose to captain in 1890, major in 1898, served through the South African War 1899-1902, during which he commanded the South African Light Horse and several flying columns in various parts of Cape Colony and Orange Free State. He was mentioned in despatches five times, received the Queen's and King's medals with six clasps and was brevetted colonel in 1902. For the next two years he commanded his old regiment, was in charge of the Cavalry School at Netheravon 1904-05; commanded the 2d Cavalry Brigade 1905-07; the 1st Cavalry Brigade in 1909; promoted major-general in that year and placed in command of the East Anglian Division, 1910-12. In the latter year he was appointed first commander-in-chief of the Egyptian army under the administration of Lord Kitchener, who undoubtedly influenced the appointment. At the outbreak of the European War he was recalled from Egypt and appointed first officer of the Cavalry Division, which was attached to the 7th Division of the 4th Army Corps. The
Byng family history now repeated itself. General Byng's grandfather, General Sir John Byng, 1st Earl of Strafford, had served as a youth in the disastrous campaign in Flanders under Colonel Wellesley (afterwards Duke of Wellington) in 1793–95. Over 120 years later Sir Julian Byng stood on the same battlefields, but at the side of his grandfather's enemies, the French. Under his command covered the Belgian stronghold of Gravenstegen and he was the first to receive the news of the French defeat. Sir John French, 4th Assistant Adjutant General (20 Nov. 1914). General Byng commanded the 9th Army Corps in the Gallipoli campaign of 1915, and at the end of May 1916 he succeeded Lieut.-Gen. Sir Edwin Alderson in the command of the Canadian corps on the western front. Under his lead the Canadian troops performed prodigies of valor in the great Somme battles (q.v.), and again in the crossing of the German stronghold, Vimy Ridge. In June 1917 General Byng was placed in command of the 3d Army in Belgium under General Allenby, and on 20 Nov. 1917 his army opened what has been described as the most dramatic episode on the western front since the battle of the Marne, namely, the great drive on Cambrai (q.v.). Before the enemy realized what had happened, the so-called 'Hindenburg Line' had been shattered and thousands of prisoners captured. The distinguishing feature of this brilliant exploit was the utter absence of the customary artillery preparation. Accompanied by the formidable 'tanks,' the British infantry advanced at dawn and stormed the enemy's trenches with remarkably few losses. See War, European, Western Front.

BINKERSHOEK, bin'kærz-hoek, Cornelius van, Dutch jurist: b. Middleburg, Zeeland, 29 May 1673; d. 16 April 1743. He studied at the University of Leiden, and was called to practise as a barrister at The Hague, became professor of law at Leyden, and president of the supreme council of Holland. He was one of the most learned among modern citizens. His book De Lexis, 1699, and his treatise De Parole Legatorum Competente was translated by Barbevricq into French under the title of 'Du Juge Compétent des Ambassadeurs' (1728). His most important writings are the 'Observationes Juris Romanis; 'De Domino Maris; 'Questiones Juris Publici; and a digest entitled 'Corpus Juris Hollandici et Zelandici.' A complete account of his works was published at Geneva in 1761, and at Leyden in 1766.

BYR, bár, Robert, pseudonym of KARL ROBERT EMMERICH BAYER (q.v.).

BYRD, bîrd, William, American lawyer and author: b. Westover, Va., 1674; d. there, 26 Aug. 1744. He received a liberal education in England, possessed one of the largest libraries in the colonies, and, having a large property, lived in a splendid style, unrivalled in Virginia. He was a member and a last president of the King's Council. To French Protestants fleeing to him from persecution in France, he extended the most generous assistance. The towns of Richmond and Petersburg were laid out by him, and he was one of the commissioners for establishing the boundary line between Virginia and North Carolina. He was a member of the Royal Society, and as a patron of literature and art deserved remembrance. His own writings include the 'Westover Manuscripts,' embracing 'The History of the Dividing Line,' 'A Journey to the Land of Eden,' and 'A Progress to the Mines.' In The Virginian Magazine of History and Biography (1902) appeared his letters, revealing much of interest concerning his life and career. Consult Trent, 'English Culture in Virginia' (1889); 'A History of American Literature' (New York 1903).

BYRD, William, composer. See Bird, William.

BYRGIUS, bër'ji-üs, Justus (properly Jürg vom Bürg), Swiss mathematician: b. Liechtenstein, Canton of Saint Gall, Switzerland, 28 Feb. 1552; d. Cassel, Germany, 31 Jan. 1632. He was invited to Cassel by the Landgrave of Hesse to superintend the observatory which he had there erected, and constructed a number of astronomical instruments, some curious clocks and other machines, including the proportional compasses. A discovery involving that of the logarithms, and another exhibiting an application of the pendulum to clocks, have been attributed to him. He is eulogized by Kepler for his talents, but censured for his indolence and undue reserve, which kept back his discoveries from the public. Consult Gieswald, 'Justus Byrg als Mathematiker' (Dantzeg 1856).

BYRNE, Thomas Sebastian, American clergyman: b. Hamilton, Ohio, 29 July 1841. He was graduated from Saint Mary's College of the West in 1865. In youth he was an expert machinist, but deciding to enter the priesthood of the Roman Catholic Church, he went, after preparatory training, to the American College in Rome. In 1869 he was ordained in Cincinnati. He devoted himself to literature and teaching in Mount Saint Mary's Seminary; for a time had charge of the Cincinnati Cathedral and again became connected with the seminary, acting as rector until 1894. He wrote 'Man from a Catholic Point of View' (1903), which was read at the Parliament of Religions in Chicago. He has published many other religious works and pamphlets. In collaboration with the Rev. Dr. Pahlisch, he translated Dr. Alzog's 'Church History' (3 vols., 1874–78).

BYRNES, Thomas, American detective and chief of police: b. New York city 1842; d. there 7 May 1910. In young life a gas-fitter, he served in the Civil War with the Ellsworth Zouaves, in 1863 joined the police force of New York city, was promoted captain in 1870, inspector in 1880, superintendent in 1892, and chief of police in 1895. He early became famous for his detective work, and despite great corruption in the police department, maintained an unblemished reputation. The nature of his work is well brought out in two books, one by himself, 'Professional Criminals of America' (New York 1896), and in collaboration with Campbell, H. S. T., and Knox, T. W., 'Darkness and Daylight, or Lights and Shadows of New York Life' (Hartford 1889).

BYRON, George Gordon, 6th lord, English poet: b. London, 22 Jan. 1788; d. Misso-
longhi, Greece, 19 April 1824. He was the son of "Mad Jack Byron," a good-looking profligate soldier, who first married the divorced Mary Hume, and then, in 1797, a daughter Augusta, later Mrs. Leigh. Captain Byron became a widower in 1784 and, a little more than a year later, married a Scotch heiress, Catherine Gordon of Gight. Their only child, the poet, was born at No. 16 Holles street, Cavendish Square, and was lame from birth, owing to a defect in one of his ankles. The influences surrounding the child were deplorable. John Byron, to escape his creditors, had to flee to France, where he died in 1791. Mrs. Byron, with a much reduced income, resided in Aberdeen and proved to be a most indiscreet mother, now fondly petting her child, now reviling him. She was actually guilty of reproaching him for his lameness. The boy himself was capable of great affection for his nurse and for a cousin, Mary Duff, and his schoolmates seem to have regarded him as warm-hearted. His education was not neglected during his early years, but tutors and schools could not make up for his lack of training at home. However, to love nature amid the Scotch hills.

In 1794 the grandson of the then Lord Byron died, and the six-year-old boy became heir to the peerage, which he inherited in 1796. Then his mother obtained a pension and left Scotland. Byron being made a ward in chancery and Lord Carlisle being appointed his guardian, though his mother's lawyer, John Hanson, really looked after his welfare. A quack tortured his foot, and schoolmasters tried to make him studious, his main mental nutriment consisting, apparently, of the Bible and poetry. He wrote love verses to a young cousin, endured his mother's caprices and was doubtless glad to be entered at Harrow in 1801, where, however, he was at first discontented and not liked. He could not make a scholar of himself, though, as Mr. Coleridge has shown, his classical attainments have been much underrated; but he was a good declaimer and through his pluck in fighting and in athletics, despite his deformity, he became a leader in the school. He was romantically devoted to his friends, and once offered to take half the threashing a bully was giving to the boy who later was known as Sir Robert Peel. Impulsiveness characterized both his inordinate attitude toward the school authorities and his love affair with his cousin and senior, Mary Anne Chaworth, who soon married and left him disconsolate. His affection for her seems never to have been entirely effaced. Altogether, his childhood and youth were well adapted to produce a wayward man.

In October 1805 he went into residence as a nobleman at Trinity College, Cambridge. He took full advantage of his privileges, ran into debt, though he had an allowance of £500 a year, gambled, consorted with pugilists, won fame as a swimmer, traveled about in style, and, last, but not least, after stormy quarrels with his mother, successfully asserted his claim to be his own master. He formed some warm friendships with promising students, notably with John Cam Hobhouse, afterward Lord Broughton (q.v.); he dabbled in literature and wrote verses, and he received his M.A. "by special privilege as a peer," in July 1808. Nearly two years previously he had printed "Fugitive Pieces," a volume of poetry, but had destroyed all save two or three copies because a clergyman, a Mr. Braham, had found them as too free. A small edition of what was practically the same book, "Poems on Various Occasions," appeared early in 1807. A few months later this was reissued with considerable alterations as "Hours of Idleness," which was again altered in a second edition of March 1808, two months after the now famous slashing review from the pen of Brougham had appeared in the Edinburgh Review.

Byron's youthful volume certainly gave little indication of the genius he was soon to display, but it called for no severe chastisement. Hence, the editor of the Edinburgh, Jeffrey, got only what he deserved when Byron apologized him in "English Bards and Scotch Reviewers," which appeared anonymously about the middle of March 1809, and was at once successful. It is still decidedly readable in parts and ranks with the best satires of its kind. It went through five editions in two years, the last being suppressed by its author, because he had become the friend of many of his victims.

Meanwhile Byron had settled—if such a word may be used of his riotous occupation of his domain—at Newstead Abbey, and had repaired it on borrowed money. In March 1809 he took his seat in the House of Lords. Then he prepared himself for a tour of the Continent, which was begun with Hobhouse and three servants in July. That Byron was to any marked extent disapproved and misanthropical as his own Harold does not seem likely.

The traveler sailed to Lisbon and saw something of Portugal, Spain, Malta, Albania and Greece. At Athens Byron finished the first canto of 'Childe Harold' and celebrated the charms of his landlady's daughter, Theresa Macri, the "Maid of Athens." Then the friends visited Asia Minor and reached Constantinople shortly after Byron's famous swim from Sestos to Abydos (3 May 1810). About two months later Hobhouse returned to England and Byron to Athens, where, after he spent the winter of 1810-11 apparently studying and writing and making excursions. He reached England, by way of Malta, about 20 July 1811.

Throughout his travels he had been in severe financial straits, which his mother had shared. Immediately on his return she was taken ill, and before he could reach her she died. He mourned for her in a passionate way, and the practically simultaneous deaths of three friends also afflicted him and gave him an excuse for writing melancholy verses. He had brought to England the first and second cantos of 'Childe Harold' and his paraphrase of the 'Ars Poetica,' the 'Hints from Horace.' The latter, which he is said to have preferred, was immediately accepted; for some reason it did not appear during Byron's life. 'Childe Harold,' after some delay, was the means of uniting its author with his famous publisher, John Murray. It appeared in March 1812, after Byron had made a successful speech in the House of Lords. As all the world knows he awoke one morning and found himself famous as a poet; it is no wonder that he put a parliamentary career, in
which he might have done great good, forever behind him.

It has been for some years fashionable to sneer at the earlier cantos of 'Childe Harold'; but they are at least effective poetry, and their novel theme and romantic tone fitted them for the early readers who went wild over them. Melancholy and cynicism in a youth were more likely to attract than to disgust the young and womanly who were subjects of the Regent and contemporaries of Napoleon. Byron, who had previously made a fast friend of his would-be adversary, Thomas Moore (q.v.), became the social lion of the day. He was young and reckless, and unfortunately gave occasion for scandal through his relations with the notorious Lady Caroline Lamb and the equally frail Lady Oxford. People could also gossip about his handsome face and his drinking, and his strange diet for the reduction of his disfiguring obesity. His pecuniary difficulties, too, and his folly in presenting the money from his copyrights to his connection, Dallas, doubtless caused tongues to wag. He enjoyed his vaunts, and even his rustic pursuits, but he was not the ideal. After the failure of the anonymous 'Waltz,' he gave the world 'The Giaour' in May 1813, 'The Bride of Abydos,' in December of the same year, and 'The Corsair' two months later. All were dashed off, all were very popular, all deepened the atmosphere of mystery about him. Scott's supremacy as a romantic poet passed to the newcomer, and although the lines on the Princess Charlotte caused some hard feeling and he threatened to quit poetry, Byron continued for two years to have his fling both as a poet and as a gay man of the world. 'Lara' appeared in August 1814; 'Hebrew Melodies' in January 1815; 'The Siege of Corinth' and 'Parisa' in January and February 1816. The sums paid by Murray for these poems—Byron, harassed by debt, at last began to be businesslike—show plainly how well the poet continued to hold his public. Except for such lyrics as 'She walks in beauty like the night,' the work of this period has in the main failed to hold later generations. This is due no doubt to an unhomely desire on the part of a puritanical race to take it out upon Byron's far from impeccable character and career, as well as to a natural change of taste. Leslie Stephen has remarked upon the work of this period, and to the effect of such a story as that its author wrote the first sketch of 'The Bride of Abydos' in four nights after coming home from balls. That latter-day criticism has been altogether wrong in correcting the excessive praise given by Byron's contemporaries to this facile group of poems cannot be maintained; but it is well to remember that copious power is a good sign of genius, that Byron managed to put into 'The Giaour' not a little narrative vigor and into the whole group of Oriental tales much of the color and the spirit of the East, and that English literature would have been deprived of many beautiful lyric and descriptive passages if he had allowed society completely to turn him to his writing verse.

Meanwhile Byron had seen much of Moore and Rogers and had met, after many years, his half-sister, Mrs. Leigh, the 'Augusta' of some of his best poems, and the being of all others to whom his heart went out most fondly. In after years his memory and hers were to be clouded by a dark suspicion which, whether true or false, would probably never have soiled the ears of the world but for another woman—his wife. Whether the scandal which Mrs. Stowe (q.v.) spread and which Byron's own grandson, Lord Lovelace, unaccountably revived will ever be substantiated or laid completely to rest is a matter upon which the data for a decision are not forthcoming. In the interim generous minds and hearts will prefer to believe in the purity of the 'Epistle to Augusta.'

The story of Byron's courtship and marriage, while less mysterious than that of Milton, is not a clear one. In 1812 he seems to have been rejected by an heiress in expectation, Miss Anna Isabella Milbanke, four years his junior and a connection of his flame, Lady Lamb. The young woman appears to have been fond of mathematics and theology, to have written poems, to have been somewhat priggish and prudish and very self-centred. Some correspondence was kept up between the pair and, as a marriage seemed likely to steady his habits and better his fortune for the time to come, she proposed to him by letter in September 1814. This time he was accepted. Miss Milbanke was apparently proud of her catch and Byron of his. They were married on 2 Jan. 1815 and they seem to have got on well at first, though each later made reports to the contrary. The young wife soon inherited money and promised him a child; the poet behaved himself well on the surface, took an interest in the management of Drury Lane, saw something of Sir Walter Scott (always his defender) and helped Coleridge to publish 'Christabel.' But the pair were evidently incompatible, and after the birth of their only child, Augusta Ada, on 10 Dec. 1815, a separation was arranged for. Lady Byron believing that her husband was insane—a notion obviously stupid, but possibly charitable from her own point of view. The doctor, the lawyer and the father-in-law she let loose upon Byron may have irritated him into conduct that did not allay her suspicions. It is all a tangle; perhaps the easiest way out is to censure Byron and resolutely refrain from admiring his wife.

The separation was followed by an astonishing public clamor against Byron, whose friends seem to have thought his life in danger. Sir Leslie Stephen has contended that the public indignation was not unnatural. Perhaps it was not, in the sense that it represented some of the worst elements of human nature. For a society that tolerated the Regent and his boon associates to fall upon a man and then to condemn him unheard on the score of practically unspecified charges was simply to put an indelible blot upon Englishmen of the upper and middle classes—a blot the blackness of which may be somewhat gauged from the depth of the vindictiveness with which Byron's fame has been since attacked by many of his countrymen. It by no means follows, however, that Byron was at all justified in writing and publishing his numerous poems and passages relating to the separation—though literature without 'Fare Thee Well,' and would like to have had a chance to see his destroyed novel on the 'Marriage of Belphegor'—or that he can be excused for much of his conduct during the exile that began at the end of April 1816 and lasted for the rest of his spectacular life. One
can, however, pardon his constant desire to shock the British public; and, taking account of his temperament, of his varying moods of conciliatory tenderness and defiant scorn toward his implacable wife.

Byron first visited Belgium, traveling luxuriously. Then he went, by the Rhine, to Geneva, where he met the Shelleys and Claire Clairmont, who had made up her mind in London to be his mistress. She bore him in January 1817 a daughter, Allegra, with whom he charged himself and whose death in 1822 grieved him deeply. The intercourse with the Shelleys at Geneva was probably more beneficial to Byron than to Shelley. 'The Prisoner of Chillon,' the most popular of his poems of the type, the third canto of 'Childe Harold' which, thanks to Shelley, showed the influence of Wordsworth, the stanzas 'To Augusta' and other poems are memorials of the period and proofs that his experiences had ripened Byron's poetic powers. After the Shelleys returned to England, Byron, with Holhouse, crossed into Italy.

He was in Milan in October 1816 and then went, for the winter, to the French capital, where he practically remained for three years. His excursions in the Palazzo Macenigo are unfortunately but too well known; yet, although his health and his character suffered from them, to say nothing of his reputation, he did not a little reading, and his poetical genius continued active. The fourth cantos of 'Childe Harold' and 'Manfred,' which date, in part at least, from 1817 and reveal the effects of a visit to Rome, show his genius almost at its zenith, and 'Beppo,' suggested by Frere's 'Whistlecraft Cantos' precluded the greatest of his works—perhaps the greatest of modern English poems—the incomparable medley, 'Don Juan,' the first canto of which was written in September 1818. The first two cantos, between which he wrote 'Mazeppa,' were published, without indication of either author or publisher, in July 1819.

Meanwhile Byron had met the Countess Teresa Guiccioli, the young, beautiful and accomplished daughter of Count Gambas of Ravenna. They became passionately attached to each other, and, aided by the customs of the country, were constantly together at Ravenna and other places, Venetian society finally giving them up when she resided under his roof. At first he treated her with the respect accorded with the lady's elderly husband, it looked as if the temporarily weary lover might regain his freedom; but finally the affection of the Countess prevailed, and Byron, yielding to an influence higher and better than any he had known of late, established himself near her at Ravenna at the end of 1819. Here for a time, at her request, he gave up 'Don Juan,' and, after some translating from the Italian poets, began to write dramas.

His first play was 'Marino Faliero,' in writing which Byron departed from English models and made a diligent study of authorities. It was finished in the summer of 1820 and played unsuccessfully at Drury Lane the next year. The next, 'The Two Foscari,' the powerful, though not stylistically adequate 'Cain: a Mystery,' 'Heaven and Earth,' another 'Mystery,' and the inception of 'Werner,' his best acting play, taken largely from Harriet Lee's (q.v.) story 'Krutzner.' That Byron had little dramatic genius is generally admitted; the literary power which he could not avoid putting into any composition is not, in the case of these experiments, sufficiently recognized.

While writing his dramas, Byron had more trouble with Count Guiccioli, who was finally separated from his wife, and he was led by the Gambas to take a deep interest in the Carbonari conspiracies. He had already in his poetry given evidence of liberal political sentiments; now he subscribed for the patriotic cause, headed a section of the conspirators, and, but for his birth and fame, would have got into trouble with the Austrian authorities. The Gambas and the Countess were exiled from Ravenna, and Byron, after some lingering, joined them at Pisa in November 1821. Here he saw much of Shelley, Medwin, Trelawny and other Englishmen, and here some time in 1822 he wrote an ineffectual drama, 'The Deformed Transform'd.' The same year he made with Shelley and Leigh Hunt (q.v.) the fortunate arrangements which induced the latter to come to Italy and bring the publication of the quarterly journal, 'The Liberal.' The details of this affair are too complicated to be entered upon without ample space. Shelley was imprudent. Byron rather brutal, Hunt exasperating. Shelley's death completed the task still further, and 'The Liberal' expired after four numbers. Its most memorable item was Byron's masterly satire upon Southey, 'A Vision of Judgment,' written in 1821. This Murray had been chary of publishing after the trouble he had had with the orthodox on account of 'Cain'—an episode which had a good deal to do with Byron's willingness to establish a journal the chief expense of which he knew would fall on himself.

Meanwhile 'Don Juan' had been taken up once more, in a deeper vein, and the Gambas had been ordered to leave Tuscany. Byron, whose health and spirits were impaired, followed them to Genoa in the autumn of 1822. Here he wrote his satire 'The Age of Bronze' upon the political reaction of the time, as well as his poor narrative poem 'The Island' and the later cantos of 'Don Juan.' He was growing restless and feared that he was losing his powers; but, fortunately, for his fame at least, a new bustle filled his days. The Whig and Liberal committee was formed in London to aid the Greek revolutionists and at Trelawny's suggestion Byron was made a member. He proposed to go in person to the Levant, and by midsummer of 1823 he completed his elaborate preparations for the expedition. Sailing from Genoa, with rising spirits, he reached Cephalonia early in August. Here he remained four months writing excellent letters of advice and sensibly waiting for a clear opportunity for action, not, in all likelihood, for an offer of the Greek crown. At the end of December 1823 he accepted the invitation of Prince Alexander Mavrocordato to co-operate in the organization of western Greece and sailed for Corfu. He was kindly welcomed. He appears to have shown great tact in harmonizing opposing factions and considerable practical genius as an organizer. He had no chance to lead into action the wild troops over whom he was placed as commander-in-chief, but he did hold out success-
fully against a mutiny, owing by his courage the Sultotes that broke into his tent while he was ill. He recovered somewhat, but exposure to fatigue and the constant rains told heavily upon him, and he took no care of himself. At last he was prostrated with ague and received only the crudest medical attention. After much delirium he passed into a long slumber, which ended in his death at six o'clock in the evening of 19 April 1824. The news was a shock to the world. His body was sent to England and was buried, not in Westminster Abbey, but at Hucknall Torkard, near Newstead Abbey. The Greeks would have liked, more appropriately, to bury him at Athens, and, fortunately, they did secure his heart for interment at Missolonghi. There is no incongruity, however, in thinking of him as reposing, after his stormy life, in company with his passionate mother and his long line of wild ancestors.

Byron's position in English literature is a most fortunate one. It is an inspiration, a spell, a virtue, a retribution. He is the spell cast by his genius upon the romantic writers of their own countries as well as by his devotion to freedom and by the fact that his work in translation does not offend by its slipshod features, almost unanimously—whether, for example, the Frenchmen, or Germans, or Spaniards, or Russians,—place him only below Shakespeare. The English-speaking world knows the work of Chaucer, Spenser and Milton too well to admit such a high estimate of his genius; but it seems to have gone farther astray in depreciation than foreigners have in appreciation of his extraordinary gifts and achievements. With a few honorable exceptions like Matthew Arnold, English critics have magnified Byron's plain moral and artistic delinquencies and have minimized his powerful intelligence, his great range of work—he is one of the best of letter writers and the most brilliant of satirists, as well as the arch-romantic and revolutionary poet, and a notable descriptive and lyric one—his copious crea-tive power, and his great sincerity and strength. They have judged him as somewhat finicky connoisseurs of verse rather than as impartial appraisers of literature. They have under-estimated the hold he has kept upon youth and the attraction which his later work, especially Don Juan, so frequently exercises upon intelligent men of mature years. Whether he will ever receive his due from the more cultured of his countrymen is problematical; but there have been indications of late that a less banal attitude is being taken toward both him and his works. He may not be the greatest English poet of modern times, but he is certainly the most effective of all the enemies of cant. Seapots, Harps, Poets, Priests, Don Juan; Manfred; Vision of Judgment.

Bibliography.—The bibliography of Byron is naturally immense. His memoirs, given to Moore, were burned, after many family complications, in 1824. Moore's 'Life, Letters and Journals of Lord Byron' (1830) is the standard biography. It was included in Murray's edition of the collected 'Life and Works' (1832–35; 17 vols., 1837). The number of separate editions of the poems and of translations of them by others has been superseded by Murray's edition of the works in 13 volumes (6 of prose, edited by R. E. Prothero, 1898–1901; 7 of verse, edited by E. H. Coleidge, 1898–1904). The best one-volume edition of the poems is that by Cole-ridge (1905); the [American] Cambridge edition by P. E. More (1905) is also good. The large list of memoirs and books of biographical value may be represented here by Karl Eitel's 'Lord Byron' (1870), Emilio Castelar's 'Vida de Lord Byron' (1873), J. C. Jeaffreson's 'The Real Lord Byron' (1883), John Nichol's 'Byron' in the 'English Men of Letters' (1880); and Roden Noel's volume in the 'Great Writers' series (1887). Reminiscences by Lady Blessington, Medwin, the Countess Guiccioli, E. J. Trelawny, Hobhouse, Leigh Hunt and many others should also be consulted. Of critical essays, favorable and unfavorable, those by Matthew Arnold, Charles Kingsley, Mazzini, Macaulay, John Morley, J. A. Symonds and Swinburne may be mentioned. Among more recent studies are Byrons: The Last Phase,' by Richard Edgcumbe (1909) and a work in two volumes on Lord Byron's Colours of Fainy (1912–13). The mass of continental criticism is very large and is steadily increasing.

William P. Trent.

Professor of English Literature, Columbia University.

BYRON, Harriett, a character in Richardson's novel, 'Sir Charles Grandison.' She was attached to the hero and was the writer of the greater part of the letters comprising the novel.

BYRON, Henry James, English dramatist and actor: b. Manchester, January 1834; d. London, 11 April 1884. He studied at first for the medical profession, and afterward for the bar, but his passion for the stage caused him to abandon them. He was the first editor of Fun, and also started another paper entitled the Comic Times, which soon ceased to appear. He wrote an immense number of pieces, including a great many farces, bur-lesques and extravaganzas, besides comedies or domestic dramas, such as 'Fra Diavolo' (1858); 'Cyril's Success,' probably his best work; 'Dearer than Life'; 'Blow for Blow'; 'The Lady of Lyons'; 'Uncle Dick's Darling'; 'The Prompter's Box'; 'Partners in Misery' and 'Our Boys' (1878), which had a run of four years and three months, the longest on record.

BYRON, John, English naval officer: b. Newstead, 8 Nov. 1723; d. 10 April 1786. At the age of 17 he sailed with Lord Anson on a voyage round the world, but was wrecked on the coast of the Pacific, north of the Straits of Magellan. Byron, with some of his unfortunate companions, was conducted by the Indians to Chile and remained there till 1744, when he embarked on board the ship Bank of France. George III, who wished to explore the part of the Atlantic Ocean between the Cape of Good Hope and the southern part of America, gave Byron command of a frigate, with which he set sail in June 1764. After having circumnavigated the world, he returned to England at the end of two years to England, where he arrived in May 1766. Although Byron's voyage was not fruitful in discoveries, it still deserves an
W. J. Dawson

**ABBREVIATIONS.**

**The**.

**EYSSUS**. A kind of fish, and...

**SYNOPTIC**... A...
BYZANTINE ARCHITECTURE

PALATINE CHAPEL AT PALERMO
honorahle place in the history of voyages round the world, since he was the first of those renowned circumnavigators of the globe, including Wallis, Carteret and Cook, whose enterprisings were not merely meritorious, but were directed to scientific objects. In 1769 Commodore Byron was appointed to the government of Newfoundland, which he held till 1772. He was raised to the rank of vice-admiral in 1778, was signalised by d'Estaing in an indecisive battle off Grenada in 1779 and died of illness in 1786. Such was his general ill fortune at sea that he was called by the sailors "Foul-Weather Jack."

BYRON BAY, a bay on the northeastern coast of Labrador, situated about lat. 55° N., and long. 58° W., and north of Hamilton Inlet. The width of the bay is about 50 miles.

BYRON ISLAND, Micronesia, a small island of the Gilbert group, in the Pacific Ocean, about 12 miles in length, abounding in cocoanuts. It was discovered by Commodore Byron in 1765, and belongs to Great Britain.

BYRON'S LETTERS. The letters of Lord Byron are numerous. In Moore's 'Life of Byron' 560 appear. It is reasonable to suppose that his biographer did not select the least interesting, and we are thus able to form a tolerably accurate judgment of Byron's merits as a letter-writer. The chief qualities revealed in these letters are naturalness, good sense and straightforward sincerity. He writes much about himself, as every good letter-writer must, but with no more egoism than is usually displayed in a frank communication between friends. The character thus revealed is at total variance with the character invented for him by his critics and his enemies, and partially sustained by the nature of his poems. He appears as the very reverse of a sentimentalist. There are few passages of tenderness; even when he speaks of the death of his daughter, Allegra, for whom he had a deep affection, he does little more than record his loss in the simplest language. In speaking of the death of Shelley the same restraint is practised; beyond a brief picture of the romantic scene on the shore near where the body was burned, there is nothing that reveals the poet. He is at his best when describing his own daily life, his literary aims and ideals and his opinions of his contemporaries. In describing his fellow-writers he sometimes has a flash of true illumination, but his habitual attitude is hostile and satiric. For Walter Scott he has a genuine appreciation; but the rest move him only to contempt — "Southey twaddling, Wordsworth dawdling, Coleridge muddling, Bowles quibbling, squabbling and squelling — Barry Cornwall will do better by and by, if he don't get spoiled by green tea and the praises of Pentonville and Paradise Row."

It is the pervading quality of robustness which is the chief characteristic of the 'Letters.' There is nothing of the delicate word-felicity of Edward Fitzgerald, nor of his fine literary discrimination. There are none of those passages of wild imagination and prophetic passion which give to Carlyle's letters a place in literature equal to that attained by his most deliberate essays and histories. Nevertheless he can strike out memorable phrases, as when he speaks of the unpublished letters of Burns as revealing a strangely antithetical mind — "dirt and deity — a compound of inspired clay."

Nor are his thoughts upon life and religion without value, though to the modern mind, familiar with the problems of philosophic doubt, his reflections may appear to have little depth or originality. They are, however, the sincere utterances of a mind in revolt against the sluggishness of conventional opinion, and intent upon a freedom which few were bold enough to seek. Upon the whole, it may be said that the real Byron is more faithfully depicted in his letters than in his poetry. We cannot read them without being aware of a mind possessing great natural force, character, and tenderness, and, in its criticism, sanity, a hard, clear vision of material facts and a justness of apprehension which belong more frequently to the great critic than the popular poet.

W. J. DAWSON.

BYSSUS, bē'sus, a kind of fine flax, and the linen made from it, used in India and Egypt at a very early date. In the latter country it was used in embalming, and mummies are still found wrapped in it. As an article of dress it was worn only by the rich. Dives, in Christ's parable, is"'

BYSTRÖM, Johan Nikolai, Swedish sculptor: b. Filipstad, Wermland, Sweden, 1805; d. Rome, 11 March 1848. He studied art under Sergell in Stockholm, and in 1810 went to Rome. In 1815 he returned, and winning the favor of the Crown Prince by his statue of the latter, received several important commissions. Several years before his death he again took up his residence in Rome. Among his more important works are 'Drunken Bacchante'; 'Nymph Going into the Bath'; 'Reclining Juno'; 'Hygieia'; 'Dancing Girl'; a polychrome marble statue of 'Victory' in the palace at Charlottenburg; a statue of Linneus and colossal statues of Charles X, XI, XII, XIII, XIV, and Gustavus Adolphus.

BYWATER, Ingram, English scholar: b. London, 27 June 1840; d. 17 Oct. 1914. He was educated at University College and King's College, London, and Queen's College, Oxford. He was Regius professor of Greek at Oxford University 1893-1908. Among his works are 'Fragments of Heraclitus' (1877); 'Works of Friscianus Lysius' (1886); 'Textual Criticism of the Nicomachean Ethics' (1892); 'An Outline of the Art of Poetry, with Translation and Commentary.'

BYZANTINE ARCHITECTURE designates the style and type of architecture which were developed in the Byzantine empire after
BYZANTINE ARCHITECTURE

the fall of Rome, and which spread thence westward into Italy and northward into what is now Russia, where it still persists in attenuated form. The historical and decorative art associated with this architecture was widely diffused through Europe (see Painting), and materially affected Western art. With the final division of the Roman empire between Honorius and Arcadius (395 A.D.), Constantinople became the capital of the Eastern or Greek empire, but the most important city of Christendom; the chief centre for centuries of Christian art and learning, especially of Greek culture as distinguished from the Latin, and of the Eastern Church as distinguished from that of Rome. Under the great Emperor Justinian (527-65 A.D.) there ensued an extraordinary activity in the building of churches, not only in the capital but in Syria, Dalmatia and Macedonia and in Ravenna, the seat of the Byzantine emperors. This architecture was chiefly the work of Asiatic Greeks, who introduced into the construction of churches certain traditional Asiatic forms and methods, especially in types of vaulting in brick or stone, and the arrangement of such a type of church—the basilica, with its three aisles and wooden roof—and substituted for it new types both of plan and construction, of which the dominant feature was invariably a central dome, raised above the surrounding structure and pierced by a ring of windows at its base. They revived certain features of Roman secular vaulted buildings and blended with these an Oriental taste for applied decoration in color, creating out of this combination a wholly new style and new effects. The style thus evolved matured with extraordinary rapidity and then began a long and gradual decline.

If we take the baptistery of the Orthodox and the tomb of Galla Placidia, both at Ravenna, and dating from about 450 A.D., as the earliest examples of the style, less than a century elapsed between its birth and its culmination in the unsurpassed church of Hagia Sophia at Constantinople (532-38 A.D.). This masterpiece was never equaled in scale or magnificence, and indeed was never equalled, in the church of Saint Mark at Venice (1047-71; the façade later) the style flowered in a new masterpiece of great beauty, at the hands of Greek and Italian artists. No other extant example approaches these two in magnificence and artistic merit. During the reign of Justinian several other splendid churches were built at Constantinople and Jerusalem, but even these were far inferior to Hagia Sophia. Except in the one instance of Saint Mark's, all the others that the Byzantines were relatively small in dimension and timid in construction.

Characteristics.—The dominant feature of the style is the central dome on pendentives. The pendentive is a device by which a circular dome can be erected upon four or more isolated supports, instead of upon a continuous circular wall. It consists of a triangular portion of a sphere comprised between two adjacent arches and a horizontal circle touching their summits. Four such surfaces carried by four arches bounding a square meet at the top in a circle to form the base of the dome, or of a circular drum upon which the dome is to rest. By means of eight piers, with their arches and pendentives, the dome may be built over an octagonal space. In either case the openings between the piers allow the floor-plan to be extended in any direction, so that the dome may be used in connection with almost any type of ground-plan; whereas in previous styles it had been almost wholly confined to circular structures, as in the Pantheon at Rome. The Byzantine plans were therefore very varied, and were vaulted throughout in brick. The construction of these domed and vaulted buildings by which were nearly all ecclesiastical, was based generally on the Roman principle of massive internal piers and intermediate columnar supports; but the Byzantine columns carried arches instead of entablatures like the Roman. External buttressing above the roofs of side-aisles or other low portions was another Roman feature derived from bath-halls and the Basilica of Maxentius. Roman also were the system of wall decoration by incrustation with slabs of richly veined marble, the use of marble decorative patterns for floor-pavements, and the employment of monolithic column-shafts of polished granite, porphyry and marble, at once structural and decorative. On the other hand, the Byzantine conceived Latin cross churches as a covering of all surfaces, both of walls and vaults, with a veneer of perfectly flat decoration in color, broken up into minute units, was distinctly Oriental. All carving in high relief was replaced by delicate all-over patterning in very flat low relief, and above the marble wainscoting the walls and vaults were covered with mosaic of minute glass tesserae (see Mosaic) in brilliant colors usually on a gold ground. These mosaics were partly pictorial, representing Christ, saints, apostles and other religious or Biblical subjects, and partly conventional patterns. The Roman types of capital were replaced generally by new types of simpler mass covered with flat-relief carving of foliate and basketwork, and impost-blocks were often introduced between the caps and the heavy arches which they carried.

History and Monuments.—The germ of the style are seen in certain early Christian buildings in Syria and in Dioscletian's palace at Spalato, which was, however, a work of Syrian or Byzantine workmen; more clearly in two 5th century buildings at Ravenna—the baptistery of the Orthodox, having a dome over an octagonal substructure and the tomb of Galla Placidia, a cruciform edifice with a square *lantern* rising above the arms at their intersection, crowned by a dome on rudimentary pendentives. Doubtless, however, the original prototype of one class of Byzantine churches having a central square or octagon surmounted by a lantern, to be found in two Roman buildings erected by Constantine—the baptistery of the Lateran and the tomb of Constantia (Santa Costanza). The roof of the high central part of the former was of wood; of the latter, a masonry dome. The evolution of the central space with a dome on eight supports may be traced through early examples in Syria to Saint Sergius at Constantinople (520 A.D.) where alternate sides of the octagon were occupied by open columnar niches or apsidioles projecting into the surrounding aisle, thence to San Vitale at Ravenna (525 or 527), where there are six such apsidioles; the easternmost bay being in both these churches extended to form a chancel and apse;
and finally to its culmination in the new type of plan seen in Hagia Sophia (The Divine Wisdom, often called "Saint Sophia"); now a museum of art. This church was the work of two architects from Asia Minor, Anthemius and Isodorus, was built under the orders of Justinian in six years (532–38) to replace an earlier church destroyed by fire during a racecourse riot. It occupies a broad rectangle, measuring nearly 330 by 320 feet, and consists of a central nave 243 by 115 feet covered by a dome 107 feet in diameter and 180 feet high, and two half-domes of 100 feet span opening into the two transverse arches of the four that carry the dome. This half is flanked by vast aisles, 60 feet wide, each divided into three parts by two massive buttresses which rise above the roofs of the two-storied aisles. This triple division of the aisles by transverse buttress masses which rise above the aisle roofs is peculiarly derived from the traditional form and construction of the Roman thermes, probably through the intermediary Basilica of Maxentius of the early 4th century. A narthex across the west front preceded by an atrium or fore-court, and the decision of the apse at the east end, make up the total length of 300 feet. Tall columnar apsidioles expand the semi-circular ends of the nave, and recall the six similar apsidioles between the piers of San Vitale at Ravenna. The interior is resplendent with polished columns of costly marble, verd-antique and porphyry, with marble wainscot and superb mosaics, though all human figures have been concealed by gilding and paint on account of Moslem prejudices. The furniture of the church, which was of unrivaled cost and splendor, disappeared centuries ago. In this stupendous work we seem to see the plan of Saint Sergius cut in two and between the two halves an immense square interposed, covered by a gigantic dome on pendentives rising far above the rest of the building. On the other hand, the cruciform type first shown in the tomb of Gall Placidia culminated, also in Justinian's time, in the church of the Apostles at Constantinople. This had five domes, one on each arm of the cross and a central dome dominating the whole. This splendid church was demolished in 1463 by the conquering Sultan Mehemet II, but it had already served as the model for the builders of Saint Mark's at Venice. With the exception of this last named church, none of the other Byzantine churches of Constantinople was of large size. The only other church of Justinian's time that has survived to our day is that of the Holy Peace, Hagia Eirene (miscalled "Saint Irene"), now used as a museum of art. It is, however, a poor example of all embellishments, and is really a late (8th century?) and hasty reconstruction of the original edifice. With its two domes it may have served as the model for the Cathedral of Cahors, France. The later examples of the style in Constantinople were relatively small in scale, sometimes complex in plan, with small domes on high drums (Saint Theodore, Pantokrator, Moné tes Choras, etc.). About 40 of these small churches are extant, mostly transformed into mosques; and only one of them retains any part of its original decorations. This one is the Moné tes Choras, now known as Karihi Jami, dating probably from the 11th or 12th century, with a narthex adorned with mosaics and frescoes which, uncovered about 1880, the Turks have allowed to remain exposed. There are a number of later churches, the work of singularly small size — and at Salonica several of various dates (Saint George, Saint Elias, Saint Bardias, Saint Sophia); besides interesting monastic groups in Macedonia, at Meteora and on Mount Athos. In Russian Armenia (Ani, Etchmiadzin, etc.), the style took on a distinct provincial character, with stone pyramids instead of domes as the outer form of the cupola on a high drum, and often with highly interesting carved interface ornament. The singular and barbarously fantastic forms of churches at Moscow, Kiev and other Russian cities (e.g., the Saint Basil in the Kremlin in Moscow) are remotely derived from the tall-drum domed "lanterns" of the late Byzantine type. Near the middle of the 11th century the desire for the desirous form and construction of the Roman thermes was revived from its low estate, and the native artists and the native art appeared inadequate for the task in hand, except as they were guided and assisted by Byzantine architects. The new church, measuring about 220 by 180 feet, was erected on the cruciform plan of the Holy Apostles' Church at Constantinople, with five domes, of which the central was slightly larger than those on the four arms. The very active Venetian commerce with the East brought in an extraordinary wealth of artistic material — antique columns, veined marbles, carvings from ruined or dismantled churches — and with these and the embellishments of mosaic by Greek artists and their Italian pupils, as well as by later additions of sculpture and furnishings, the interior was made resplendent beyond any other church in Italy or western Europe. Lacking the overwhelming majesty and unity of Hagia Sophia, it has nevertheless an extraordinary beauty of its own. The main construction was begun in 1070; the dome was first put up in 1072; but the building dates from the 12th century, with the extraordinary and marvelously picturesque façade; the wooden exterior domes and Gothic pinnacles were added in the 15th century: some of the mosaics are modern. Unlike the Byzantine churches of the East, which almost wholly lack external embellishment, Saint Mark's is revetted externally with paneling of fine marble. Strange to say, it was never copied or imitated, except in the Romanesque of the Eastern Front at Périgueux (France), which however is totally lacking in the embellishments of marble and mosaic that make up so much of the splendor of the Venetian model. Quite as surprising is the fact that Hagia Sophia, the noblest of all Byzantine monuments, remained absolutely unique and uninspired until the Turkish conquest. It was the Turkish mosque-builders who seized upon its superb possibilities and developed from them a new and splendid type of architecture for their own requirements (see MOHAMMEDAN ARCHITECTURE). An interesting lateral branch of Byzantine architecture is seen in the monasteries erected by Coptic Christians in Egypt, in the 6th-9th
Cathedral of the Resurrection of Christ, Petrograd
centuries, recently explored by the Metropolitan Museum of Art of New York. The domes and surface-carvings of these buildings strongly influenced the development of the Arabic art of Cairo. The great mosque at Jerusalem, known as that of Omar (more properly the Dome of the Rock, Kubbet-es-Sakrah) is probably a reconstruction of the church built on Mount Moriah by Justinian. The decline in the size and splendor of the Byzantine churches built after the 6th century was due to the slow decay of the empire itself in both political and military prestige and power. Those erected in Greece and the Danubian provinces were often of almost microscopic size. The "Old Cathedral" at Athens measures 37 by 32 feet; the dome of another church in the same city is but seven feet in diameter. Many of the later churches have three apses, one at the end of each aisle; and in all the examples after the 7th century the dome is carried on a high drum pierced with windows, forming a "lantern," whereas in the earlier churches the windows penetrated the base of the dome itself. Another innovation was the introduction, into the wall of the main structure, of arched windows coupled in pairs under a discharging arch, often with a marble or stone wall shaft between the two. This feature, together with the central lantern or high cupola over the crossing, was adopted by the Romanesque church-builders of Italy and France in the 11th and 12th centuries, and both became important features in the Western Romanesque style. The partial copying in France of Saint Mark's, and perhaps of Hagia Eirené, at Périgueux and Cahors has been referred to. Besides these there are in Aquitania and in the valleys of the Loire and Charente a large number of domed churches of the 12th century due to Byzantine influence, partly by way of Venetian commerce, partly (according to Enlart) by way of Cyprus where the Crusaders established important Latin Christian communities.

Of the Byzantine secular architecture there are hardly any remains. Doubtless the palaces of the emperors were of great splendor, but the only extant ruin of any importance is that of the palace of the Porphyrogenitus near the Bachierna at Constantinople, of which the walls of the great hall are still standing, but with no vestige of its interior decoration. The vaulted cisterns of the city are still intact, and at Ravenna the front wall of the so-called palace of Theodoric. There are a number of Byzantine fortifications in ruins in various cities of the empire, and Byzantine military architecture was of great importance; but these examples are so ruinous or have been so often and so completely rebuilt in later ages that further notice in this article is unnecessary.

The best general handbook of Byzantine architecture in English is by Sir T. G. Jackson, 'Byzantine and Romanesque Architecture' (Cambridge 1913). There are excellent accounts of the style in F. M. Simpson's 'History of Architectural Development' (Vol. I, London 1910), W. R. Scruggs, 'Dictionary of Architecture' (New York 1901), and in Vol. II of his 'History of Architecture' (ib. 1905). Lethaby and Swainson's 'Sancta Sophia' (London 1894) is an authoritative work. Texier and Pullan's 'Byzantine Architecture' is chiefly concerned with the churches of Salonica. The majority of the most important works on the subject are in French, among which may be mentioned: Bayet, 'L'Art byzantin' (Paris 1897); Ruby, 'Bâtir chez les byzantins' (Paris 1883); Diehli, Ch., 'Manuel d'art byzantin' (Paris 1910); Hubsch,aw,*Monuments de l'architecture chrétienne* (Paris 1886); Puigheri, 'Les églises byzantines de Constantinople' (Vienna 1878), and de Verneuil, 'L'Architecture byzantine en France' (Paris). In German: Essenwein, 'Auszüge der klassischen Baukunst' (in the Handbuch der Architektur, Darmstadt 1886), and the monumental work of Salzenberg, 'Die altchristlichen Baudenkmale von Konstantinopel' (Berlin 1854). In Italian the great work of Ongania, 'La basilica di San Marco' is authoritative.

ALFRED DWIGHT FOSTER HAMLIN,
Professor of the History of Architecture, Columb ia University.
crafstmen also, prohibited from following their callings, turned from religious to Hellenistic motives, and devoted themselves to ivory and goldsmiths' work, miniature painting, and conventional decorative design, Eastern in inspiration. By about the middle of the 9th century, mosaic and painted figures began to be used once more in decoration, and a general activity was resumed in the growing prosperity of the empire under the Macedonian dynasty. (3) The third period dates from the beginning of the Macedonian Dynasty (867 A.D.) to the sack of Constantinople (1204 A.D.). This was the second great stage of Byzantine art. It was two-fold in character, being imperial and secular, and inspired by classic tradition, while at the same time the monastic art of the times continued and preserved its strict and severe traditions. Masterpieces of each type were frequent, both historic and ecclesiastical. The greatest extant monument of this style and period was San Marco, Venice (11th century. (4) The fourth period is that from the Restoration until the Turkish Conquest (1453 A.D.). Although many of the great works of art were produced during this period, it was, on the whole, an age of artistic decline and slow decadence. As the empire was impoverished fewer works were executed in precious metal and ivory. Byzantine art had no period of struggle and slow development, and passed through no archaic stage. It represented the union of the mature styles of the Near East and West, and showed small desire to draw fresh truth from nature, being content instead to fold the stored fruits of its knowledge for the production of its masterpieces. Its chief element was not so much the art of Rome, but of Sassanid Persia and the Hellenized East. It was the East that it acquired its dislike of realistic representation, its love of domed and vaulted buildings and its delight in Oriental decorative pattern and sumptuous richness of color. It was above all a great decorative art — formal, splendid, ceremonial and reflecting the spirit of the court and the Church. We find the key to it, not in nature and the spontaneous joy and beauty of life, but in some such scene as Gibbon has described, when telling of the visit of Luitprand, bishop of Cremona, to the Emperor Constantine VII in the year 948 A.D.: "When he (Luitprand) approached the throne the birds of the golden tree began to warble their notes, which were accompanied by the roaring of two lions of gold. With his companions, Luitprand was compelled to bow and to fall prostrate, and thence to touch the ground with his forehead. He arose, but in the short time the throne had been hoisted from the floor to the ceiling, the imperial figure appeared in new and more gorgeous apparel, and the interview was concluded in haughty and majestic silence." Here we have all the set pageantry and conventionality of Byzantine decoration, which was magnificent for its purpose, but which, in the end, was destined to lose its power, as already the demand for the stimulus and inspiration, and its divorce from life.

Byzantine art was sternly controlled by the Eastern Church which turned in perhaps not unnatural reaction from the pagan love of form, as shown in the sculptures of Greece and Rome, and employed art instead in a decorative manner only, as an expounder of dogma, and an expression of East Christian ideas. In this way it is true painting and conventional decorative design, Eastern in inspiration. By about the middle of the 9th century, mosaic and painted figures began to be used once more in decoration, and a general activity was resumed in the growing prosperity of the empire under the Macedonian dynasty. (3) The third period dates from the beginning of the Macedonian Dynasty (867 A.D.) to the sack of Constantinople (1204 A.D.). This was the second great stage of Byzantine art. It was two-fold in character, being imperial and secular, and inspired by classic tradition, while at the same time the monastic art of the times continued and preserved its strict and severe traditions. Masterpieces of each type were frequent, both historic and ecclesiastical. The greatest extant monument of this style and period was San Marco, Venice (11th century. (4) The fourth period is that from the Restoration until the Turkish Conquest (1453 A.D.). Although many of the great works of art were produced during this period, it was, on the whole, an age of artistic decline and slow decadence. As the empire was impoverished fewer works were executed in precious metal and ivory. Byzantine art had no period of struggle and slow development, and passed through no archaic stage. It represented the union of the mature styles of the Near East and West, and showed small desire to draw fresh truth from nature, being content instead to fold the stored fruits of its knowledge for the production of its masterpieces. Its chief element was not so much the art of Rome, but of Sassanid Persia and the Hellenized East. It was the East that it acquired its dislike of realistic representation, its love of domed and vaulted buildings and its delight in Oriental decorative pattern and sumptuous richness of color. It was above all a great decorative art — formal, splendid, ceremonial and reflecting the spirit of the court and the Church. We find the key to it, not in nature and the spontaneous joy and beauty of life, but in some such scene as Gibbon has described, when telling of the visit of Luitprand, bishop of Cremona, to the Emperor Constantine VII in the year 948 A.D.: "When he (Luitprand) approached the throne the birds of the golden tree began to warble their notes, which were accompanied by the roaring of two lions of gold. With his companions, Luitprand was compelled to bow and to fall prostrate, and thence to touch the ground with his forehead. He arose, but in the short time the throne had been hoisted from the floor to the ceiling, the imperial figure appeared in new and more gorgeous apparel, and the interview was concluded in haughty and majestic silence." Here we have all the set pageantry and conventionality of Byzantine decoration, which was magnificent for its purpose, but which, in the end, was destined to lose its power, as already the demand for the stimulus and inspiration, and its divorce from life.

Mosaics and Painting.—In the second Council of Nicea (787 A.D.) the following statement, from its Acts, shows the attitude of the Church at the time toward painting: "It is not the invention of the painter which creates pictures but an inviolable law, a tradition of the Church. It is not the painters but the Holy Fathers who have to invent and dictate. To them manifestly belongs the composition, to the painter only the execution. This paragraph in the year 948 as, with both Byzantine mosaics and painting. It shows us once more how tradition took the place of nature, and led to both the greatness and the weakness of Byzantine art.

The weakness of Byzantine drawing and painting became apparent after the Restoration. Byzantine art had never been dramatic, and had never been filled with the warmth of human joys and sorrows, an, when the artistic creeds became arid and lifeless, the painter who lost their imaginative power, and were content to copy drawings which were often in themselves copies, and to accept such guidance as has been preserved to us in the 'Guide to Painting,' a collection of artistic precepts collected by its lack of fresh early 13th century, from the works of an earlier and famous Byzantine painter, Manuel Pantelinos of Thessalonica, who may have lived as early as the 13th century. In this guide, exact directions are laid down for the execution of all well-known scenes from Bible history.
Byzantine painting was generally executed in tempera upon plaster or a wooden panel, the outlines of the design being often drawn in with gold. Some of the subjects are still to be seen in the churches, and the painting, which were exported by the merchants, have been spread far and wide. Numberless miniatures were also produced in the monasteries, and these and the panel pictures exerted an immense influence on the art of other countries, particularly in Italy, to which art which was brought into such close touch with that of Byzantium. Even at the present day the Byzantine tradition is the chief force in the painting of many parts of Greece, Russia, and Asia Minor.

Mosaics were the most splendid expression of Byzantine decorative art. The art, which was an ancient one, had probably been derived from the East, and was raised to a position of importance in Egypt in Ptolemaic times. From there it spread out to the rest of the West, where in Rome it grew to be very popular. The Byzantines preferred, however, glass tesserae of various colors to the small cubes of colored marbles commonly employed by the Romans.

Gold and silver tesserae were made by laying gold and silver leaf upon the back of the glass and then covering the leaf by a second thin film of glass to protect it. The mosaics were placed in position by means of cement, and the glowing richness of the solemn figures against their golden backgrounds formed a sumptuous and splendid decoration to dome or wall.

In the 5th and 6th centuries Ravenna, then the artistic centre of Italy, was the most famous centre of the mosaic industry, and was renowned for the magnificent mosaic decorations of its churches. In the early days Venice was under artistic allegiance to Constantinople, and among later mosaics those in the churches of San Marco and the cathedral of Torcello, dating from the 11th century, may be mentioned. Fine mosaics were also produced in the Sicilian churches in the 12th century, although in Sicily the Byzantine craftsmen were probably helped by their western pupils.

Sculpture.—One of the immediate effects of Christianity was a distaste on the part of Christians for monumental figure sculpture, which to their minds was associated with the rites of pagan worship. This dislike was also shared by the all-conquering Arabs, who read in the preachings of Mohammed a prohibition of anything appertaining to idol-worship, a fact which no doubt had its influence on the Byzantines who were in constant touch with the Mohammedans. At this time, also, the general trend of opinion as to artistic decoration in the Near East was in favor of elaborate pattern as opposed to a naturalistic treatment of forms, and Byzantine art, being partly Eastern in spirit, shared to a certain extent the common preference. As the nude was not studied in classic times such few figures as were carved soon lost their close relation to life. Figure sculpture became a dependent of architecture and was often used in connections with the depicting of members of the Imperial family, high officials or famous characters from sacred story. Delicate gradations of relief were avoided, and carvings were largely confined to two planes so that a strong effect of light and shade, without halftones, should be obtained, and the effect of strong pattern produced. Some of the most beautiful Byzantine sculptures are on the capitals, partiuloai and the pulpits, or amboles, in the churches. Here we find the most delicate patterns of natural forms, plants, birds and animals, and also entwined scroll-work and geometrical designs. Among the most famous of the carvings are those in ivory, the diptyches, ikons, caskets, icons on the covers and tablets, many of which were originally colored and gilded. The goldsmith's work, tapestry, weaving and the art of enameling also attained great beauty, and served to keep the Eastern tradition alive in Europe.


John B. McDonnell, Editorial Staff of The Americana.

BYZANTINE EMPIRE. The. Old Byzantium, founded about 688 B.C., lay in ruins after its destruction in 196 A.D. until Emperor Constantine the Great rebuilt the city and made it the capital of the Roman empire instead of Rome (hence called also Roma Nova). Byzantium was chosen on account of the excellence of the site. On 26 Nov. 328 the cornerstone was laid for the extension of the city walls, and on 11 May 330 the solemn dedication of the new city was made. Two large tracts in the centre were adorned with colonnades and statues, while in the hippodrome was placed the famous serpent-column from Delphi. The whole empire was robbed of its finest treasures of art to embellish the new residence. The Emperor's palace was a magnificent congeries of buildings. The colonization of inhabitants was promoted by granting the privileges of Old Rome to the citizens of New Rome: the councilors were called senators, and the same advantages in the way of bounties and amusements were afforded the people of Byzantium as had been enjoyed by the Romans. The city soon grew in territory to 14 districts. But the people lacked unity, for the population consisted of colonists from many different races. Nevertheless, Byzantium was designed to become a seat and centre of learning. The schools of law were soon in a flourishing state. The bishop of Byzantium acquired the rank of a patriarch and laid claims to supremacy over the Oriental churches. Many councils, or conventions, were held in the city, the most renowned of which are the following: in 381 against the Macedonians, in 553 for the settlement of the controversy over the three capitals, in 680 against the Monotholites, 692 for the ratifica-
tion of the older ecclesiastical observances, 754 against the adoration of images, 869 against the patriarch Photius, and in 879 in his favor. Acting for nothing except to gratify their passion for the hippodrome, the people split into two factions, who named themselves, after the color of the charioteers, the "Blues" and the "Greens," and utterly devoid of higher aims fought each other with passionate hate. Under Justinian I this fictional strife increased until finally what is known as the Nika insurrection broke out. This sedition raged from 13 Jan. to 20 Jan. 532, and ended with the massacre of at least 30,000 human beings in the hippodrome by Bulgar and Latin enmity also took part with great magnificence after its semi-destructive fire and embalmed it with numerous richly adorned churches, the finest of which was the cathedral, Saint Sophia. The strong force defending the city against the violence of enemies. The Avars, strengthened by Bulgarians and Slavs in 626, penetrated several times into the suburbs. In 616 and 620 the Persians under Chosroes appeared before the city walls. The two sieges of the Arabs are particularly celebrated: from April to September 673, when the city was saved by the Greek fire of the Syrian Kallinikos, and 717-18, when Leo the Isaurian defended it. In 1203 the solders of the 4th Crusade marched before the walls of the city to restore to the throne Isaac Angelus, who had been deposed by Alexius. For a long time the inhabitants defended themselves under the leadership of Theodorus Lascaris; but when Alexius on 18 July cowardly took to flight, Isaac was released from prison and restored to the throne, whereupon the leaders of the Crusade marched into and occupied Galata. Meanwhile the bitterness of the Byzantines against the Franks led to an insurrection (February 1204), in which Isaac and his enemies were killed. Alexius V. Ducis Murzuphlos, was immediately defeated by the Crusaders, who took Constantinople by storm on 12 April after a stubborn fight. In the sacking of the city, which followed the battle, the most magnificent treasures of art were destroyed, while most of the rest were carried off to adorn Venice and the cathedral of Saint Mark; and an enormous booty was taken. On 9 May the Crusaders elected Count Baldwin of Flanders emperor, but the new emperor, nearly 200,000 soldiers and the fleet 250 ships. To oppose these the defender, Constantine XI Dragates, had only 11,000 Greeks and 3,000 Italian reinforcements. The Italian soldiers were led by Giustiniani, commanded. In addition to this great disparity in numbers was a further disproportion consisting in the unity of the assailants and the division among the defenders. In Constantinople embittered religious strife raged between the Orthodox and the Unionists (Henotikoi). But in spite of the inequality in strength the besieged, supported by the natural strength of the position and fortifications of the city, repelled the most violent attacks for 40 days. When the emperor, Constantine, refused a voluntary surrender, even with the permission of a free withdrawal of his forces, the city was stormed on all sides, 29 May, and captured. Giustiniani fell, and Constantine met a hero's death in the midst of the battle. In the heat of the conflict the conquerors destroyed everybody that fell in their path. Those that survived were sold into slavery. The city was completely sacked and numerous treasures of art destroyed. At mid-day Mohammed II, the new emperor, invested the beleaguered city and offered up prayers of thanksgiving in Saint Sophia, which became now the principal mosque. Then he ordered all the dignitaries of the empire to be driven into one place and cut down. The city was rebuilt, the fortifications restored, and Constantinople became the capital of the Ottoman empire.

Given in more chronological detail: after the death of Theodosos in 395 the Roman empire was divided between his two sons. Arcadius, whose realm included the western half of the empire, was established in 408-450. The government was ably carried on by his sister Pulcheria during his whole reign, notwithstanding the fact that the Huns under Attila exacted a tribute of 10,000 horses and gold. Pulcheria married Marcianus, who ruled from 450 to 457. This strong emperor refused to comply with Attila's demands. Leo the Thracian became the next emperor (457-74), and
was succeeded by Zeno (474-91), after whose death Anastasius I (491-518), who married Zeno's widow, and proved that the ruler emperors of the empire further than one. The next emperor, Justin, was an Illyrian peasant, who had become an experienced soldier. He reigned from 518 to 527. By the conquests and able administration of the next emperor, Justinian the Great, the empire reached the acme of its prosperity and power. The weak ruler was devoured to bring all under one state, one church and one law. He had the Roman law compiled and published under the form of a monumental code. After his death the empire began to decline. His successor, Justin II (565-78), desired to emulate the great Justinian and win even greater glory. But the Persian War exhausted his resources, while the Avars and Slavs made incursions on the northern borders and the Lombards overran Italy. Inefficient rulers succeeded: Tiberius Constantinus (578-82), Maurice (582-602) and Phocas (602-10). Heraclius ascended the throne in 610 and ruled till 641. By 628 he had restored the empire to its old supremacy. But the provinces had been so long lost that it was almost to ruin. And when the Arabs began their conquests the emperors were too weak to oppose them successfully. Constans II (641-68) was an able ruler, as was his son Constantine (668-685), who fought bravely against the Muslims. But the reign of Justin II (685-95 and 705-11) was disastrous. Leo the Isaurian (717-41) preserved the state. He defended Constantinople against the Saracens and reorganized the empire. Constantine Copronymus (741-75) was a great ruler and succeeded in enlarging the borders of the empire. He planted colonies along the frontiers and encouraged commerce. The next ruler was Leo IV (775-80), who was succeeded by his son, Constantine (780-97), a boy of nine. His mother, Irene, was his guardian until he became of age, after which they ruled conjointly; but in 797 Irene had her son's eyes put out and deposed him, so that she ruled in his stead till 802. The next emperor,Nicephorus I (802-11), paid tribute to the Caliph Harun-al- Rashid, and later was killed by the Bulgarians. Leo the Armenian (813-20) defeated the latter and began a prosperous reign, but was murdered by conspirators. Under Michael (820-29) the Saracens conquered Crete. His son, John, was constantly fighting against the Caliph. He was celebrated for his justice, and he won great renown for the magnificent edifices he erected. Constantinople was now the centre of European trade. Theophilius' son, Michael, was only four years of age when he ascended the throne. He later became a drunkard and was put to death at the instigation of Basil, who succeeded him (867-86). Basil was the first of the Macedonian line of emperors. From this time on the government was good, and the empire continued to be prosperous for three centuries. Basil himself was a man of great ability. His son, Leo the Wise (886-912) and his grandson, Constantine Porphyrogenitus (912-59), were authors of considerable ability. Romanus II (925-33) was a weak ruler, but under the able generalship of Nicephorus Phocas, who married the sister of Romanus, and became emperor in 963, ruling in the name of his two stepsons until 969. The first of these was Basil II (963-1025) and the second Con-
stantine VIII (963-1028). Basil defeated the Bulgarians and extended the boundaries of the empire further than those of Justinian. On the death of Constantine VIII the husbands and creatures of his daughter Zoe ruled for 26 years. The next two years (1054-56) her sister, Theodora, who was virtuous and able, held the reins of government. Important rulers were appointed on the throne for the next 24 years. The Seljuk Turks had been rapidly conquering all the Asiatic possessions of the empire; and the next emperor, Alexius Comnenus (1081-1183) had to face also new dangers from the attacks of the Normans and the Crusaders. But the finances of the empire had been weakened by the growth of the Italian cities and the foundation of the kingdom of Jerusalem. Alexius was succeeded by John the Good (1163-45), who fought courageously against the Turks, Hungarians, Serbians and Armenians. Manuel Comnenus (1143-80) undertook many wars, but exhausted the resources of the empire; and the weak rulers, of the next 24 years brought it almost to ruin. Crete, Corfu, and Bulgaria became independent and the Seljuk Turks menaced Constantinople. The Venetians were hostile and allied themselves with the Crusaders, who coveted the riches of the city. In 1204 Constantinople was captured, and the Latin empire established; but it lasted only until 1261, when Michael Paleologus of Nicaea drove out the Latins and re-established a Byzantine empire, though smaller than it was in 1204. The Paleologi were unable to strengthen the empire or increase its bounds. Michael VIII (1261-82) endeavored to win allies by offering to bring the Greek Church under the authority of the Pope. His son, Andronicus II (1282-1328), was a weak ruler, and civil war was rife at the close of his reign. Disaster followed disaster. The finances were in a hopeless condition, and from now on the emperors were incompetent. The command of the sea was lost, and the Ottoman Turks had already gained a foothold on the ruins of the Seljukian realm in Asia Minor. They conquered the provinces of the Byzantine empire one by one. Under John V (1314-91) the Turks gained their first foothold in Europe. They took Gallipoli in 1354. Manuel II (1391-1425) and John VIII (1425-28) were weak rulers, practically vassals of the Sultan. Constantine XI (1448-53) contended bravely against the Turks, but was unable to check the invaders and retain his capital—the only part of the empire left—and, finally, in 1453 Constantinople was captured by the Turks. This event marked the end of the Byzantine empire. Of the 107 rulers from 395 to 1453, 20 were assassinated, 18 had their eyes put out, or were otherwise mutilated, 12 died in a monastery or prison, 12 died of starvation, 8 in battle, or as a result of accident. Vice and corruption reigned supreme in some periods; the people were servile and superstitious, the government despotic; yet the traditions and civilization of Old Rome were maintained. Frederic Harrison says: 'First the Byzantine Empire preserved more of the tradition, civil and military organization, wealth, art and literature of the older Rome than existed elsewhere; and, secondly, in many essentials of civilization it was more modern than the nascent nations of
the West. The Corpus of Justinian continued to be the law of the Byzantine empire until the 9th century, when a new code was drawn up. Examples of Byzantine architecture can be found in every Mohammedan and Christian land. In the manufacture of mosaics, silks and embroidered satins, the Byzantine empire surpassed all others.

Bibliography.—Bury, ‘The Later Roman Empire’ (London and New York 1912); Diehl, ‘Études byzantines’ (1905); id., ‘Justinien et la civilisation byzantine’ (Paris 1901); Dieterich, ‘Das byzantinische Institut’ (Mainz 1921); Friedl, ‘History of Greece from B.C. 146 to A.D. 1864’ (7 vols., Oxford 1877); Gay, J., ‘L’Italie méridionale et l’empire byzantine’ (Paris 1904); Gibbon, ‘Decline and Fall of the Roman Empire’; Harrison, ‘Byzantine History in the Early Middle Age’ (London 1900); Heyd, ‘Histoire du commerce du Levant au Moyen Age’ (Dessau 1885); Holmes, W. G., ‘Age of Justinian and Theodora’ (New York 1905); Oman, ‘Byzantine Empire’ (London 1892); Pol, ‘Père de l’histoire grecque’ (London 1900); Rambaud, ‘L’Empire grec au Xᵉ siècle’ (Paris 1870); id., ‘Études sur l’histoire byzantine’ (Paris 1912); ‘Corpus Scriptorum Historiae Byzantinae’ (Bonn edition).

JOSEPH E. HARRY.

Author of ‘The Greek Tragic Poets,’ etc.

BYZANTINE LITERATURE. Byzantine literature comprises the writings of the Greeks from Constantine the Great (324 A.D.) to the fall of the Byzantine empire (1453). The period, however, down to the time of Justinian (527) is generally regarded as belonging to the ancient Greek literature. The Byzantine literature does not so completely lack individuality as is commonly assumed, although it continues substantially the ancient Greek tradition and borrows antique forms. Being a learned nation, it dealt in large measure with the science of antiquity. Through excerpts, compilations, textbooks, scholia and lexica, the Byzantines preserved the knowledge of the ancient world. Even down to the 10th century many were keenly interested in antiquity, as, for example, Arethas and Photius in the 9th century and Emperor Constantinus VII Porphyrogenitus (945–959), who was himself a political and historical writer, and established commissions of scholars, who had compiled encyclopedias for the various sciences. To the same century belongs the great encyclopedic lexicon of Suidas. In the following centuries there came about a revival of classical studies, which were zealously prosecuted, thanks to the enthusiasm and activity of such men as Psellus (11th century), Tzetzes, Eustathius, Gregory of Corinth (12th century) and Planudes (14th century). With these scholars many Greeks associated themselves in uninterrupted succession: Theodorus of Gaza, Lascaris, Musurus, who introduced the epoch of “humanism” in the West. Christianity presented entirely new problems to Byzantine scholarship. Hence theological literature occupies by no means a smaller space in Byzantine literature than in the main a continuation of the tradition of the Church Fathers, but it also unites with ancient philosophy, and reaches its summit in the Aristotelian and theologian, John of Damascus (8th century), and in Psellus. After the 11th century theological literature was revised by the controversy with the “Latinists.” Fully developed also was the science of writing history, which dealt with universal history either in imitation of the manner of presentation or of the language of the ancient models. Special attention too was given to Church and to contemporaneous history, the former is represented by the “Chronicles,” that is, the composers of world-chronicles, such as John Malalas (6th century), George Sincellos, Theophanes Nicephorus and George Monachus (8th century), John Skylitzes (11th century), John Zonaras (12th century), and Glycas (12th century). In the foreground, however, stand the historians, who treat contemporaneous history, or merely a section of the history of the world. If we count, also, the historians of the 5th century (Eunapius, Zosimus, Priscus), who lived in a period really prior to the beginning of Byzantine literature, then we should reckon as the first of the early Byzantine time (to the death of Heraclius, 640), Procopius, Agathias, Petrus Patricius, Menander Prenotos, and Theophanes (about 685–720). After the two following centuries, which mark a period of literary barrenness, we find in the 9th century a revival of literature, which manifests itself particularly in the manifold and varied historical activity of the patriarch Photius, and was further promoted by Constantine VII of the Macedonian house, and continued by historians such as Joseph Genesius and Leo Diaconus. With the many-sided Michael Psellios — statesman, philosopher, philologist and historian — begins in the 11th century another rise of Byzantine literature (Michael Attalates among others), which reaches the summit in the 12th century in the historical works of Nicephorus Bryennius, of Anna Comnena, John Cinnamus and Nicetas Acominatus. This period is also separated from the old development by the form of the language, for, while down to the 10th century concessions were made more and more to the spoken language, with the revival of classical studies in Byzantium the authors endeavored also to approach the antique form in the written speech; and so the gulf widened more and more between the language employed in books and that spoken by the people. Consequently, in the 12th century a reaction set in also against the so-called “vulgar Greek” literature, which selected the popular language as its vehicle of expression (see GREEK LITERATURE). This branch of Byzantine literature confined itself, to be sure, to didactic and devotional, epic and romantic verse and popular books. In the official literature also later, the archaising form of speech held undisputed sway, for example, in the historians, especially in the polyhistors, George Acropolites and Facihermes (13th century), Nicephorus Gregoras and Emperor John VI Cantacuzenus (14th century), Laonicus Chaldonides and George Phranzes (15th century), who portray the downfall of the Byzantine and the establishment of the Turkish empire in Europe. The Greek authors of the following centuries (down to the Greek revolution) must be looked upon as a branch of Byzantine literature, so far as it does not deal with the products of the popular language.

The poetry of the Byzantines has nothing of real importance to show except in the ecclesiastical field. Its chief representative is the
composer of hymns, Romanus, who is supposed to have lived in the 6th century. After John of Damascus, a master of the 9th century, and Cosmas of Jerusalem (7th century) nothing important and individual was produced. In secular poetry the didactic and eulogistic play an important part, as, for example, in George Pindas (7th century). The sententious and epigrammatic poetry is represented by the poetess Casia (9th century), by John Geometres (10th century), Christopher of Mitylene and John Mauropus (11th century). The single drama of the whole period, *Christos Patmos* (11th or 12th century) scarcely deserves this designation, for it is merely a multitude of reminiscences from ancient Greek tragedy. Theodorus Prodromus (also called Ptochoprodromus, *Beggar Prodromus*) showed a most remarkable activity and productivity, if the works that have come down to us under his name are the productions of one individual instead of several bearing the same name. He is the author of a long romance in verse, as well as satirical poems, eulogies and epigrams. In some of his works he makes use of the Bulgarian language and belongs consequently also to the earliest period of Bulgarian literature. The first collection of Byzantine historians, *Historiae Byzantiniae scriptores*, appeared in Paris (1648-1711, 39 vols., reprinted in Venice 1722f., in 28 vols.). A new *Corpus scriptorum historiae Byzantinae,* was published in Bonn (1828-97, 5 vols.) under the auspices of the Berlin Academy of Sciences, but is very unscholarly.

On the whole Byzantine literature is almost without originality, but is valuable for the historical material which it contains. Besides the authors already named we might mention Theodorus Prodromus, who wrote a long romance, in which the heroine is Rhodanthe and the hero Dosikles, Nicephorus Callistus of the 14th century, a writer on ecclesiastical history, John Doxopater of the 11th century, who wrote on rhetoric, and Michael Bellus, the younger, of the same century, who wrote historical and other works. See GREEK LITERATURE, and consult works there referred to.

JOSPEH F. HARRY,
*Author of 'The Greek Tragic Poets,' etc.*

BYZANTIUM, bli-zan’shit-üm, the name of the city of Constantineople before its name was changed by Constantine the Great. It was founded by a colony of Greeks from Megara, who, under a leader named Byzas, settled on what seemed a favorable spot at the entrance to the Thracean Bosporus, in 658 B.C. The city, which was built by the first colonists, was named after their leader. Other colonists followed from different quarters, especially from Miletus, and Byzantium was already a flourishing town when it was taken and sacked by the Persians, in the reign of Darius, the son of Hystaspes. After the retreat of the Persians (479 B.C.) Byzantium soon recovered itself. During the Peloponnesian War it acknowledged for some time the supremacy of the Medes, but afterward fell away. Alciabides recovered it for Athens (409), but it was taken by Lysander in 405. At a later period the Byzantines received support from Athens in their resistance against Philip of Macedon. The barbarian Thracians, who occupied the neighboring territory, and the Celts (Galatians), in their migrations to the East, often appeared to threaten the safety of the town; but in spite of this, chiefly owing to its favorable position for commerce, and even under the Romans it was left free to manage its own affairs, and was allowed to demand dues from all ships passing through the Bosporus, only part of these being claimed by the Romans. At the end of the 2d century of the Christian era Byzantium, unfortunately for itself, sided with Pescennius Niger against Septimius Severus. By the latter it was besieged for three years, and when at last it was forced to surrender Severus ordered its walls to be razed to the ground, deprived the city of its privileges and placed it under the jurisdiction of the Perinthians. For a time the prosperity of the city was annihilated, until a new and more brilliant era began for it under Constantine the Great, after the defeat of Licinius in 330 A.D. Constantine made it the capital of the Roman empire, and changed its name to Constantinople (see Constantinople). Its early form of government was that of an aristocracy, which passed into an oligarchy. In the year 390 B.C. it received from Thrasybulus a democratic constitution, closely resembling that of the Athenians. Byzantium was the great entrepot for the grain trade between the countries bordering on the Black Sea and those bordering on the Ægean.

BYZANTIUM, Bank of. In the remotest historical times Byzantium was not only a city of commercial importance, it was the feeder to Ilium, Tyre and Carthage, and the port through which flowed not merely the envied products of the Orient, but also its science, its art and its delusions. It was the galleys of Byzantium that first bore the spices of India to the Ægean, its rich carpets and metallic wares to Tyre, its Hyperborean missionaries (peripheres) to Delos, its sacred hymn (the maneros) to Egypt, and its fame to Venice and Carthage. (Herodotus, Mel., 32, 36.) The Byzantines engaged the entire trade and prolific fisheries (palamenes) of the Pontic sea; levied tolls upon all vessels passing the Bosporus, and with proud superiority, jeered at the Chalcedonians, who, after following them from Phrygia and arriving at the Bosporus too late to seize upon its commanding shore, had camped upon the arid point now known as Scutari. It is true that the Greeks claimed to have founded Byzantium; they also swore to their lineal descent from the "Eternal Gods"; but Grote has long since pricked these bubbles. Byzantium was in the possession of Cyrus, who died 520 B.C.; and the Ionian Greeks only captured it from the Persians in 478.

Byzantium was probably the most ancient city of the Levant, older than Colchis or Troy, and richer than Tyre or Sidon. To the former she afforded safe passage to adventurous Jason and veneful Menelaus; to others, the commerce of the Mediterranean, the richer her name—Byzantium, Nova Roma, Constanti-nople, Stamboul—she remained for 25 centuries the mistress of two seas; the arbiter and interpreter of two continents; the most inviting and most necessary location for the establishment and maintenance of an international bank.
whose installation took place about 390 B.C., when she became an independent state and shook off the restraints imposed upon her industries and growth by the successive tyrannies of Babylon, Assyria, Persia and Greece.

At this period, shortly after the disastrous Peloponnesian War, Greece was much exhausted; its industries were prostrated, supplies annihilated, and the mines of Laurium, Thasus, Scapte-Hyle, Siphnos, Pangeus, etc., all shut down. Both gold and silver coins were hoarded. In 407 B.C. the Athenians were obliged to melt down the statue of Minerva Victoria and convert it into those base gold coins which Aristotle satirizes in "The Frogs." In time, even the base mine were hoarded and gave way to the iron coins and parchment notes alluded to by Aristotle; the "shinplasters" and "wild cats" of a disturbed and suffering state. Prohibitions against exporting the precious metals had been followed by the usual evasions and these by the inevitable issuance of a fiduciary currency; something by which to trade, something by which to count.

When this makeshift currency was established in Athens the hoarded coins (chiefly silver drachmas) were furtively purchased by brokers, technically at risk of their lives, and sold to merchant with Oriental connections, who even in normal times profited so largely by this trade that now the shipment of silver to the Orient is said to have yielded, clear of all expenses, profits nearly cent per cent: a circumstance due to the superior value of silver as compared with gold, over and against the same relation in the Occident.

According to Boeckh, 772: "The money-changing business, which, if the iron coins were at that time in existence, must have been of special importance, was farmed in Byzantium to a single bank; and all persons were prohibited from buying or selling money elsewhere, under penalty of forfeiting the sums thus bought or sold." As the Hellespont at that period (5th and 4th centuries B.C.) was the principal, although the only channel through which flowed the trade to the Orient; the Bank of Byzantium must have reaped very considerable advantages from this monopoly, even when, before the independence of the state, such monopoly may have been required through Athens: advantages that were doubtless enhanced when Byzantium recovered its entire liberty. But the "money-changing business" was not its only source of profit. The bank collected the Straits duties and farmed the customs; it financed the fisheries, by discounting the obligations of merchant adventurers who were obliged to provide ships, tackle and nets and yet run the risk of storms or a bad catch. The bank also accommodated the foreign merchants who came to buy or sell commodities in the adjacent fairs; of which a great number were held within a short distance of Byzantium, both in Greece, the Isles and "Syria," a name, that according to Herodotus, went at that period for nearly all of Asia Minor west of the Halys. Under its banking laws enacted while Byzantium was under the control of Athens were the following:

1. No banker shall demand (or receive) more interest money than that agreed upon at the time the lender "enters into the market" and is "in good credit." For a similar proviso in ancient India.

2. Nobody who had put in surety for anything may sue for it, he or his heirs ("Put in" is here probably meant for "pledged").

3. Pledges and securities shall not stand but for one year.

4. Counterfeiters and dealers and diminishers of the current coin shall forfeit their lives.

5. No Athenian or sojourner shall lend money to be exported, unless for corn or some such commodity allowable by law. He who sends away money (out of the country), for other uses, shall be brought before the master of the custom house and prosecuted criminally, after the manner of those transporting corn unlawfully. He shall have no writ or warrant against his correspondent, nor shall the archons permit him to have a civil trial.

6. Corporations may make their own by-laws, provided that they are not inconsistent with the public laws (Potter, 'Antiq. Graeca,' II, 198-200).

The numismatic collections of Europe are so full of Byzantine coins of almost every period that they have given rise to numerous works and still more numerous correspondents. Briefly, it may be stated that before the plunder of Persia and India by Alexander the Great, gold was valued in the coinages of the Greek states at 10 times that of the same weight of silver. After his soldiers were so laden with gold spoil that they rejected silver vessels and all other plunder less valuable than gold, and demanded to be led back to Greece because they could carry no more, their leader, in his capacity of King and Basileus, raised by decree the value of gold in his coinages to 12 times that of silver; and so it remained until Byzantium fell to the arms of Rome, and practically throughout the entire Roman domination down to the capture of Constantinople by the Latin forces in 1204, when the various kingdoms and principalities which arose upon the ruin of the empire struck their own coins and fixed their own valuation upon them.

The so-called "leather moneys" of Byzantium and of the various nations which throughout the Dark and Middle Ages issued fiduciary coinages had obligations written on parchment and attested by the proper authorities; of which moneys but a single specimen is known to exist at the present time, preserved in one of the great national cabinets of Europe. For the history of other ancient banks see BARCELONA, BANK OF; FUGGERS, BANK OF THE; GENOA, BANK OF; MEDICI, BANKS OF THE; TYRE, BANK OF; VENICE, BANK OF.

BZOVIUS, Abraham (Pol. Bzowski), Polish scholar and divine: b. Prosowicz, near Mięchow, 1567; d. Rome, 31 Jan. 1637. At the request of Pope Paul V, he spent several years of the latter part of his life in the Vatican, as librarian of the Virgini de Ursinis, and actively engaged in literary pursuits. He was a member of the order of the Dominicans, one of the most voluminous writers of his age, gained for himself a high reputation as professor of philosophy and theology at Milan and Bologna, and crowned the labors of his life by continuing the celebrated ecclesiastical annals of Caesar Baroni, who had left them off at the year 1198, and completed only 12 volumes. Bzovius carried them to the year 1532, in nine volumes.
C

the third character of the English alphabet and of all the alphabets derived from the Latin. In its present form it is a modification of the primitive Greek gamma. That primitive form was \( < \), an angle with vertex pointing to the left; it is the reverse of the ancient Phoenician \( > \), which points to the right, and of the Old Hebrew gimpel, \( > \). The Latin C (used also by the Greeks to some extent) is the ancient Greek gamma retained by the Greeks of Italy and rounded, just as the later Greek gamma symbol, \( \Gamma \), is the angular symbol erected by the Eastern Greeks. The Russian alphabet retains the Greek symbol \( \Gamma \), but its place is fourth, because in that alphabet the sign for the dentilabial \( V \) holds the third place. The Greek gamma (\( <, \Gamma \)) seems to have always represented the same sonant guttural as the English \( g \) in "go." In the Latin alphabet of the Romans, as represented in their earliest inscriptions, the C stood for the same sonant guttural as in the Greek, \( g \) hard; for example, leciq, later written legio, macistatus, later magistraitus; yet at the same time the C represented also the surd guttural \( K \), as it still does in English except before the vowels \( e \) and \( i \) and the diphthongs \( ae \) and \( o\) in words from the Latin. Thus the early Latin alphabet was without the symbol \( K \). There is in this use of the character \( C \) in ancient Roman epigraphy ground for the inference that the early Romans confounded the two gutturals \( k \) and \( g \) hard, as in some localities or in some classes of people the termination \( ing \) becomes \( ink \), and "something" becomes "something." But at a later period the distinction between \( g \) hard and \( k \) was recognized, and then for the designation of the mute guttural the \( kappa \) (\( K \)) of the Greek alphabet came into use in Latin writing. But the \( k \) was afterward rejected, and its only use in Latin was in writing the word Kalenda (abbreviated to kal. or \( k \)) and as an abbreviation of Carthago (Carthage) and of the personal name Caso. No doubt the persistence of \( k \) in kalenda was due to the adherence of the Pontifices to the antique forms of the official calendars; and the \( K \) standing for the forename Casar was retained as a means of abbreviating that name and distinguishing it from the abbreviation of the name Gaius: C. Julius Caesar is Gaius, but C. Fabius Ambustus is Caso. But the \( k \) having been discarded from the Latin alphabet, its function was assigned to the symbol \( \kappa \). Thus \( \kappa \) and \( g \) served as modified forms of \( \kappa \) was adopted, namely, the \( G \) with the value of \( g \) in "go." The soft \( g \), equal to \( j \), was probably unknown to the Romans before the general debasement of the Latin language. After the symbol \( k \) had been discarded and been superseded by \( C \), the symbol \( C \) with the power of gamma, was retained as an initial abbreviation of Gaius, name for a man, and of Gaia (with \( C \) reversed \( C \)), the name of a woman. \( C \) was also retained in the formula \( Cn. \) as an abbreviation of Gaius. This use of the initial \( C \) as representing \( g \) hard (sonant guttural) recalls the primitive equivalence for the Romans of the two gutturals \( k \) and \( g \) hard; but the modern Latinists, unacquainted with such use of \( C \), have usually pronounced Gaius "Kaius" and Cnæus "Knæus," instead of "Gæus" and "Gæus." In the Anglo-Saxon, its alphabet having been derived from the Latin, the \( C \) had everywhere the value of \( K \), and the same is to be said of the Gael; that fact gives presumptive proof that at the first contact of the Gaelic and Germanic races with men of Latin speech the \( C \) in all situations was equivalent to \( k \) in Latin; and the German word Kaiser is proof that when the Germans first heard of Julius and the Caesars who succeeded him the head of the Roman state was "Kaisar," not "Cæsar." The change in the pronunciation of \( C \) from \( k \) to \( s \), as in French and English, to \( ch \) as in Italian, to \( ts \) as in German, appears to have come about after the fall of the Roman empire. In Anglo-Saxon the original Germanic \( K \) sound of \( C \) undergoes palatalization, ending in the English \( ch \); cf. Germanic kerl, A. S. ceorl, English churl. In some cases a word is transferred into English from Scandinavian or a non-palatalizing dialect, giving us a k-sound and a ch-sound side by side; cf. churl and carle, cheap and cope, church and Kirk. In words of true Indo-European descent, English \( C \) corresponds to original \( g \), as Eng. tug, Lat. duco. To a primitive \( C \), \( h \) corresponds in English, as Gr. kínon, Lat. canis, Eng. hound. There is no q in Anglo-Saxon and Old English, so \( cwo \) is written for the modern "quoth." Similarly, cyning is written for king.

As an abbreviation, \( C \) stands for a musical note, for Centigrade, for 100, for the name Gaius. c. stands for cent, for centime, for circa (about). Cn. stands for the name Gnaeus. B. C. stands for before Christ.

C. G. S., or CENTIMETER-GRAM-SECOND. See Metric System, The.

ÇA IRA, sâ är, a popular song of the great French Revolution. The origin and date of this song are both uncertain, and there are various versions of the words claiming to be original. The words are generally supposed to have been written by Ladre, a street singer, and the melody was originally a popular carillon by Bécourt, and a favorite air of Marie Antoinette. In all probability it dates from May or June.
1790. French writers say that Benjamin Franklin, in speaking of the American Revolution, frequently used the expression "Ça ira" ("it will succeed"). The French republicans caught up the phrase, and "consecrated" it to their own revolution in a popular hymn. The refrain of one version runs thus:—

"Ça ira, ça ira, ça ira, ça ira, en dépit d' l'aristocrate et d' la pluie, Ah l' ça ira, etc.
Nous nous mouillerons, mais ça finira,"

referring to the rain which fell during the taking of the Bastile. In 1797 the song was banned by the Directory.

CAABA. See KAAABA.

CAAIING-WHALE. one of several species of porpoise-like cetaceans of the Killer family (Orcidae), characterized by its globose head; properly Globicephalus melas, of the north Atlantic Ocean. It is from 16 to 24 feet long, 10 feet in diameter at its thickest part and weighs between 5,000 and 6,000 pounds. Its pectoral fins are about 5 feet long and 18 inches broad, and its dorsal fin is very low. With the exception of a white streak, which begins in the form of a heart under the throat and gradually narrows to the vent, the whole of the body is of a glossy black color, and hence the fish is frequently known as the blackfish (q.v.) or black dolphin. The teeth are arranged at considerable distances in the upper and under jaw in such a manner that those of the upper jaw fit into the spaces left in the lower jaw, and conversely. Their number is very variable. They are conical in shape, strong, rather long, and end in a point which is a little curved backward and inward. The caaining-whale is very abundant and very widely distributed. It is found in the whole of the Arctic Ocean, and also in the German, Atlantic and Pacific oceans, and even in the Mediterranean Sea. It is remarkable for its gregarious habits, being often found in schools numbering several hundreds, which are led by an old and experienced male whom, it is said, they never abandon. On this account its pursuers always endeavor to force the leader on shore, and when this is accomplished all follow him and are likewise stranded—hence the Scotch name "caasing," equivalent to "driving." In the stomachs of these animals are usually found the remains of cod-fish and various species of cuttle-fish, as well as of herrings, ling and other fishes. The caaining-whale is pursued chiefly on account of its oil. See WHALE.

CAAMA, kâ'ma. See HARTREEST.

CAB, a carriage with two or four wheels, usually drawn by one horse, and plying for hire; a hackney-carriage. One well-known two-wheeled variety is the hansom named after the inventor. Public cabriolets—hooded caiyes carrying one person besides the driver—were introduced in London in 1823, and the name was soon after shortened to cab. See COACH; HACKNEY-CARRIAGE.

CABAL, an English ministry under Charles II (1667-73), composed of Clifford, Ashley, Buckingham, Arlington and Lauderdale, the initials of whose names form this word, which has been perniciously used as a designating term. But the use of this word to signify a body of intriguers was not originally derived from this circumstance, as sometimes supposed, for the word cabala, derived from cabala (q.v.), was used in that sense in French before this time.

CABALA, or CABBALA. See JEWs AND JUDAISM—The Cabala.

CABALLERO, Fernán, férr-nán' kâ-bâ-lyór'ô, pseudonym of Cecilia Böhl von Faber, Spanish novelist, daughter of a German who settled in Spain and married a Spanish lady; b. Morges, near Lausanne, Switzerland, 25 Dec. 1796; d. Seville, 7 April 1877. Brought up in Germany, she went to Cadiz with her father in 1813. She was a polyglot writer, publishing works in Spanish, German and French. Her first novel, 'La Gaviota,' appeared in 1849, and was followed by 'Elia,' 'Clemencia,' 'La Familia de Alvareda,' etc., as well as by many shorter stories. In 1859 she published a collection of folk-tales under the title, 'Cuentas y poesias populares andalucias.' Some of her works have appeared in English translations, including 'La Gaviota' (translated as 'The Sea-Gull,' 1867); 'Elia: or Spain Fifty Years Ago' (1868); 'Air-Built Castles'; and 'The Bird of Truth' (1881). The chief charm of her writings lies in her descriptions of life and nature in Andalusia. She was three times left a widow; her last husband was a lawyer named Antonio Arron de Ayala. Of late it has been discovered that she was a very excellent letter writer, and critics who have examined her correspondence with other authors, the most notable of whom was the Madame de Sévigné of Spanish literature. She forms the subject of one of the 'Six Life Studies' (1880) of M. B. Edwards. Her 'Obras Completas' were published in 18 volumes (Madrid 1855-67), and have since been reprinted in the 'Coleccion de escritores castellanos.' Consult de Latour, A., 'Etudes litteraires sur l'Espagne contemporaine' (Paris 1864); and 'Espagne, traditions, mœurs et littérature' (Paris 1869); De Gabriel y Ruiz de Apodaca, F., 'Últimas producciones de Fernán Caballero,' with a biography (Seville 1878); José María Ausénio, 'Fernán Caballero y la novela contemporánea' (Madrid 1893); Morel-Patio, A., 'Fernán Caballero d'après sa correspondance avec Antoon-Desnos (in 'Bulletin His- panique, Vol. III, Bordeaux 1901), reprinted in his 'Etudes sur L'Espagne, 3° série' (Paris 1904); Pitot, 'Les premiers essais de Fernán Caballero' (Paris 1908); Coloma, 'Recuerdos de Fernán Caballero' (Bilbao 1910). See LA FAMILIA DE ALVAREDA.

CABANEL, kâ-ba-nêl, Alexandre, French artist; b. Montpellier, 26 Sept. 1823; d. Paris, 23 Jan. 1889. He studied with Picot, and after 1860 gave himself mainly to portrait painting. He was for many years a professor of the Académie des Beaux Arts and was especially popular with American patrons. Among his many portraits of Americans is that of Miss Catherine Wolfe, now in the Metropolitan Museum, New York, which contains also his 'Queen Vashti and King Ahasuerus,' and 'Birth of Venus,' See Strahan, 'A History of French Painting' (1899).

CABANIS, kâ-ba-nês, Jean Louis, German ornithologist; b. Berlin 1816; d. 1906. He made an ornithological tour of the North, South, and West, 1839-41, and in 1849 became custodian of the ornithological depart-
CABANIS, Pierre Jean George, French physician and philosopher: b. Cosnac, department of Charente-Inférieure, 5 June 1757; d. Rueil, near Paris, 5 May 1808. In his 16th year he went to Warsaw as secretary of a Polish lord, where the proceedings of the stormy Diet of 1773 filled him with melancholy and contempt of mankind. He began at Paris a complete translation of the 'Vie du Christ' of the reformed Lutheran, and through her with Holbach, Franklin and Jefferson, and became the friend of Condillac, Turgot and Thomas. In his 'Serment d'un Médecin' he formally took leave of the belles-lettres movement. He became Dean of the mediocrity and reorganization of French medical schools and taught in several. He was a leader in the reformation and development of French medical schools and teachers. He published himself in 1791, after the death of Mirabeau. He lived in still closer intimacy with Condorcet. At the time of his death he was a member of the Senate. His 'Rapports du physique et du moral de l'homme,' edited by Peisse (Paris 1844), is his most important work. It displays considerable power of analysis, and advocates the most extreme materialistic doctrines. Consult Dubois, 'Examen des doctrines de Cabanis' (2 vols., Paris 1842); Labrousse, F. 'Quelques notes sur Cabanis' (Paris 1903).

CABARET, ká-bár'-a', derived from the French, signifying inn or restaurant, a term generally applied in the United States since 1910 to the dinners, suppers or meals, the dansants or parties served in hotels and popular restaurants to the accompaniment of singing, instrumental music and dancing. It is an elaboration of the imported café chantant of Paris which provided vaudeville entertainment during meals.

CABAT, ká-bá, Nicolas Louis, French artist: b. Paris, 1812; d. 1893. He studied with Fleres and became prominent among painters of the landscape realistic school. Among his works are 'Fond at Ville d'Avray' (1834); 'A Spring in the Wood' (1864), and 'A Morning in the Park of Magnétot' (1859). The cabbage is a biennial plant, too well known to need description, and constituting one of the most valuable classes of vegetables. The Brassica oleracea, the original species from which the numerous varieties of cultivated cabbages are derived, although in a wild state very rare indeed, since 1834, the celery, the species with which our plants present, is scarcely more than the kale, cauliflower, broccoli, etc., all of which belong to the same family. There are two general classes of cabbage, smooth-leaved and wrinkled-leaved. The smooth-leaved are either red or green and the head conical, oblong, round or flat. The principal varieties are known to have existed at least as far back as the 16th century, but minor varieties are constantly produced by selection and intercrossing. The parent stock is of highly vegetable character, as its habitat and habitat like show; and placed in more favorable conditions, its growth becomes luxuriant. More normally it is carried back into the stem, and this may accordingly become swollen and turnip-like, in which case we have the kohlrabi, of which an extreme subterranean and almost turnip-like variety has also arisen; or it may be, as in the Jersey cabbage, largely applied to the purpose of the growth of the stem, which may reach a height of 8 to 10 feet, and furnish not only walking-sticks, but even spars for small, thatched roofs, etc. The vegetative surplus may, however, also be applied to the formation of buds, which accordingly develop with peculiar exuberance, giving us Brussels sprouts. The most evolved and final variety is the cauliflower, in which the vegetative surplus becomes poured into the flowering head, of more or less checked; the inflorescence becoming a dense corybiform instead of an open panicle, and the majority of the flowers aborting, so as to become incapable of producing seed. Let a specially vegetative cabbage repeat the excessive development of its leaf parenchyma, as we have the wrinkled and blistered savoy. Again a specially vegetative cauliflower gives us an easily grown and hardy winter variety, broccoli, from which, and not from the ordinary cauliflower, a sprouting variety arises in turn. The common cabbage is by far the most valuable to both man and beast. It is also the most productive; for it is believed that an acre of ground will yield a greater weight of green vegetable matter (and thus be more profitable to the farmer) in the shape of cabbage than in that of any other vegetable whatever. It is very abundantly produced by clay soils which are unfit for turnips, and the farmers who cultivate such soils will find it a vegetable worthy of much attention. The cabbage furnishes green fodder for cows and sheep, which is at least as good as turnips or carrots, fattening the animals equally fast, and rendering their milk, butter, etc., to the full as sweet, and is far preferable as it keeps longer in cold, and in spring, and thus supplies green food when no other can be procured. It is eaten by men in three forms, all of which have their admirers, but which vary much in respect to their wholesomeness and digestibility. These forms are sliced raw, plain-boiled and sautéed cabbage or sauerkraut (q.v.), the favorite dish of the German nation. Raw cabbage, sliced fine and eaten with vinegar, either cold, or hot enough merely to wilt the vegetable, is one of the lightest and most wholesome articles of vegetable food, and in this shape will supply a green summer vegetable through the whole of the winter. Its use cannot be too highly recommended. Boiled cabbage takes longer to digest and is more trying to a weak stomach. Cultivation.—The cabbage being biennial, the main crop must be sown the autumn previous to that in which it is to be reaped. Field cabbages and the drum-head varieties that are used in gardens, being late in character, may be sown in July, or from the third week of that
of winter the adult insects crawl under rubbish
to hibernate. The earliest specimens in the
spring crowd under most rubbish,
flies later to cabbages. The very young,
as well as the old, combine to destroy the plant,
which wilts as if poisoned. The insect is very
difficult to kill, so that destruction of the over-
wintering individual is the important point to be
striven for. Diluted kerosene emulsion must
be applied, not too strong to ruin cabbages.
The caterpillar of the cabbage-moth (Pieris
rapo) and its congeners prey on cabbage and
turnip leaves. Cabbages are more or less in-
jured by the web-moth (Plutella xylostella),
the zebra caterpillar (Mamestra picata), the cabb-
bage root fly (Phorbia brassicae), the cabb-
bage weevil (Ostiorhynchus picipes), the cabbage
aphis (Aphis brassicae), etc. All these can best
be destroyed by the use of pyrethrum, or dilute
kerosene emulsion or salt. The larvae or eggs
or infected leaves should be destroyed.

CABBAGE-MOTH. See CABBAGE-
INSECTS.

CABBAGE-PALM, a name given to va-
rious species of the palm-tree, from the
circumstance that the terminal bud, which is of great
size, is edible and resembles cabbage, as in
Oreodoxa olaracea, a native of the West Indies,
the simple unbranched stem of which grows to
a height of 150 or even 200 feet. It is crowned
by a head of large pinnate leaves. The flowers
are placed on a branching spadix and protected
by a double spathe. The unopened bud of
young leaves is much prized as a vegetable, and
the removal of it completely destroys the tree,
as it is unable to produce lateral buds. Ptycho-
 sperma elegans is the cabbage-palm of New
South Wales. The name is also given to species of
Euterpe, and to Sabal palmetto, a Florida
palm.

CABBAGE-ROSE, a species of rose
(Rosa centifolia) of many varieties, supposed
to have been cultivated from ancient times, and
eminently fitted, from its fragrance, for the
manufacture of rose-water and attar. It has
a large, rounded and compact flower. It is called
also Provence (or more correctly Provençale) rose,
from a town in the French department of
Seine-et-Marne, where it is much cultivated.

CABBAGE-TREE, a name given to the
cabbage-palm, and also to a tree of the genus
Andira (q.v.).

CABEIRI, ká-bi'ri, or CABIRI, heroes
or divinities, venerated by the ancients in Samo-
 thrace, Lemnos, and in different parts of the
coasts of Greece, Phenicia and Asia Minor, as
the authors of religion and the founders of the
human race. The multiplicity of names ap-
plied to the same character, the interchange
of the names of the divinities themselves with
those of their priests, the oracular law which
enjoined the preservation of ancient barbaric
names, and thus led to a double nomenclature,
sacred and profane, together with the profound
secrecy of the rites, have involved the subject
in great obscurity. Some have thought that
the Eastern myth of Isis and the Druidism
of western Europe contain traces of the Cabeiri.
Some say there were six, three male and three
female, children of Vulcan and Cabira, daugh-
ter of Proteus. Others make two sons of Jupi-
ter or Bacchus. In Samothrace four were vene-
rated. Recent excavations near Thebes have brought to light much information on the cult of the Cabeiri, one of whom has been identified with Demeter. Two of their ancient temples, in the obscurity of night, were the most famous. Consult Lobef. 'Aglaophamus' (Königsberg 1829); Schömmer. 'Griechische Altertümcr' (Vol. II, Berlin 1894); Pfeiler, 'Griechische Geschichte' (3 vol.; Berlin 1879); Welecker, 'Griechische Götterlehre' (Vols. I and III, Göttingen 1857–62); Lenormant, in Darmberg and Saglio, 'Dictionnaire des antiquités' (Vol. I, Paris 1882); Rubensohn, 'Die Mysterienheiligtümcr in Eleusis und Samothrake' (1892); Robinson. 'Greek Inscriptions from Sardis' (in American Journal of Archaeology, 2d series, 17, 1913; 365, for etymology).

CABELL, William, American statesman: b. Licking Hole, Va., 13 March 1730; d. Union Hill, Va., 23 March 1798. He was a member of the House of Burgesses of Virginia upon the outbreak of the Revolution; took an active part in the affairs of the new nation, and before the adoption of the Federal constitution was presiding magistrate for the United States in Virginia.

CABELLO. See Porto Cabello.

CABER, the undressed stem of a tree, 20 or more feet long, used for trial of strength in Scottish athletic games. It is held upright against the chest, by the smaller end, and tossed so as to strike the ground with the heavier end and turn over. The contestent making the farthest toss with the straightest fall is winner.

CABES, kâbês, or GABES, Africa, a town and port of the French protectorate of Tunis. It stands at the foot of the Jebel Hammarra, on the right bank of the Wad-er-rif, near the head of the Gulf of Caves, and may be said to consist of several villages. It contains an Arabic school, a French garrison and is the seat of the governor of the province. It has some export trade in dates, henna, etc. The Gulf of Caves (Syrris Minor) has at its entrance the islands of Kerkena and Jerba. Its chief seaport is Sfax. Pop. of Caves, 20,000.

CABESTAING, kâbêtàn', Guillaume de, Provencal poet and knight: d. about 1213. According to Boccaccio in the ninth tale of the fourth day of 'Decameron,' Cabestain was the victim in the legend of the 'eaten heart' which originated in Oriental literature, and is also told of Châteland de Coucy, a French troubadour, and of Reinmann von Brembenga, a German minnesinger. In 1212 Cabestain fought in the famous Christian victory over the Moors at Las Navas. He loved and was beloved of Marguerite, wife of Raymond of Château-Roussillon. In jealousy the husband murdered the poet-knight, tore out his heart, had it cooked and served in a meal to his wife. When he told her, she replied 'Since I have eaten such noble food, I shall never eat any other,' and leaping from a balcony, killed herself. A selection of Cabestain's verse is found in Raynard's collection.

CABET, kâ-hâ', Étienne, French communist: b. Dijon, 2 Jan. 1788; d. Saint Louis Mo., 9 Nov. 1856. He was brought up for the bar, and was appointed attorney-general of Corse, from which office, however, he was soon dismissed. He was sent to the Chamber of Deputies in July 1831, and there made himself so obnoxious to the government by his violent speeches, and at the same time by his inflammatory pamphlets and articles, that he was indicted for treason, and rather than subject himself to the imprisonment to which he was sentenced, withdrew for five years to England. While there he published the 'Voyages et aventures de lord Cabot, seigneur de l'Icarie,' in which he elaborated his scheme of communism, which from 1842 to 1848 passed through five editions. He began again to publish La Populaire in 1841, and circulated it widely among the working classes. He also issued an Icarian almanac, several pamphlets and a work on Christianity, which would restore social equality as taught by the early Christians and opposes modern ecclesiasticism. He also wrote a history of the French Revolution from 1789 to 1830 which appeared in a journal entitled La Populaire. On 2 Feb., 1848, a band of Icarians left France for the Red River in Texas, where Cabet had secured a tract of 400,000 acres of land, the free use of which was open to the settlers, under condition that before their departure they should deposit all their funds in the hands of Cabet, who assumed the financial and general control of the expedition. But the expedition turned out badly, and lawsuits were instituted against Cabet; and on 30 Sept. 1849, after he had left France for Texas, he was found guilty by default of swindling his disciples, and sentenced to two years' imprisonment. Meanwhile, with his colony of Icarians much reduced in number, he took up his abode at Nauvoo, on the Mississippi, in May 1850, and soon after returned to Paris. There, after a protracted trial, his innocence was fully established, 26 July 1851, by the Court of Appeal, and the judgment against him was canceled. He returned to Nauvoo, where he continued to preside over his colony but many disappointments and cares embittered his life and accelerated his death. In justice to Cabet it should be said that the highest moral tone prevailed in Nauvoo, and whatever may be the politically-economical objections to his system, the colony presented, as far as the conduct of the settlers was concerned, a model to other work and industry. Consult Shaw, 'Icaria: A Study in Communist History' (New York 1884); Lux, 'Étienne Cabet et und der ikarische Communismus' (Stuttgart 1897); Prudhommeaux, 'Icarie et son fondateur, E. Cabet' (Paris 1907).

CABEZA DE VACA, kâ-bê-thâ de vâ'ka, Alvar Nuñez, Spanish explorer: b. Jerez de la Frontera 1490; d. about 1564. He was second in command in the ill-fated expedition of Pánfilo de Narvaez to Florida in 1528. After the loss of their commander, Cabeza de Vaca, with a few survivors, landed west of the mouth of the Mississippi, and after eight years of wandering and captivity among the Indians reached a Spanish colony on the Pacific. He returned to Spain, and in 1540 was appointed governor of La Plata. He explored Paraguay, but became unpopular with the colonists, and after a defeat by the Indians was arrested on the charge of one of his subordinates, returned to Spain (1543), found guilty and banished to Africa. Eight years later he was pardoned and made judge of the Supreme Court at Seville. He has left an account of his travels and explorations in 'Relacion de los naufragios y
CABEZON—CABINET AND CABINET GOVERNMENT


CABEZON (Sp. 'big head'), a name applied to three or four distinct fishes. 1. Lari-
mus breviceps, occurring in seas from the West Indies to Brazil, and belonging to the family of the croakers or Sciaenidae. It reaches a length of 10 inches. 2. Scorpaenichthys marmo-
ratus, a member of the Cottidae, or sculpins. It is found from Puget Sound to San Diego, reaches a length of 30 inches, and is a common food-fish, but its flesh is coarse and tough. 3. The smooth cabezon (Leptocottus armatus), also a sculpin of the Pacific coast. 4. Porich-thys notatus, a member of the Batschichthidae, found from Puget Sound to Lower California, which reaches a length of 15 inches and is sometimes called 'singing-fish.'

CABILLONUM. See CHALON-SUR-SAONE.

CABINDA, ka-ben'da, or KABINDA, Portuguese West Africa (also called Angola), a seaport town north of the Kongo River in lat. 5° 30' S. It is the most important place in that portion of Angola separated from French Kongo by the boundaries assigned by treaty of 12 May 1886, and from the Belgian Kongo by those prescribed 25 May 1891. Its trade is chiefly in the products of the region as sugar, coffee, coconuts and vegetable oils. Number of inhabitants about 10,000.

CABINET AND CABINET GOVERN-
MENT. The word cabinet was originally applied to the small chambers, closets or private apartments in which sovereigns, ministers and other high officials consulted their trusted ad-
visers. In modern times, where used in connec-
tion with governmental affairs, the word is a collective name applied to the leading officers of state in a number of constitutional govern-
ments who act as a body of advisers to the head of the state and in some countries as the chief executive council and controller of legis-
lation as well. While usually confined to the ministers or department heads of a constitu-
tional government, there is no reason why the term should not be applied also to the chosen advisers of an absolute monarch.

Status and Functions of Foreign Cab-
inets. — Cabinets are widely divergent in their powers and functions. That of England, which is the earliest cabinet, is the direct antithesis of the cabinet of the United States, which is the next oldest, though the two cabinets are similar in this respect, that they are composed entirely (save on rare occasions) of members of the dominant political party, se-
lected by the actual head of the state. The constitutional governments of Europe, the self-
governing British colonies and Japan have completely or imperfectly accepted and ap-
piled the British type, while Sweden and some of the Latin-American republics have patterned theirs after that of the United States. France, which has completely accepted the theory of Cabinet government, is the most important re-
public which has an actual Cabinet government in its modern highly developed form. Cabinets based on the British type may be loosely de-
scribed as executive committees of the legisla-
tive bodies, in which their members have seats, before which they expound and defend the legis-
lative measures they prepare, and to which they are directly responsible—in fact, they are the government. The Cabinet must not be confused with the ministry. All members of the Cabinet are of the ministry—of the mem-
ers of the Commons and Lords who hold office under the government and who retire from office when the government goes out of power, but all members of the ministry are not of the Cabinet. Members of the ministry must sup-
port the policies adopted by the Cabinet—vote with the government as required by their minis-
ters—but they have no voice in determin-
ing these policies. See GREAT BRITAIN—
CROWN AND CABINET; ITALY—POLITICAL AD-
MINISTRATION and CROWN AND PARLIAMENT.

The British Cabinet, a shortened name for "cabinet council"—that is, a council held in the King's cabinet, or private room—gained its name under Charles I, between 1630-40, when it was ostensibly a committee of the privy council to expedite business, but in reality a few of the King's favorites. The sovereign presided at its deliberations, and it was not until George I ascended the throne (1714)—this King being unable to speak the English language—that it became the practice for the mon-
arch no longer to preside over its meetings. But the kings did not give up their control over the power of appointing the great officers of state without a long and bitter struggle; and it was not till George III's insanity loosened his hand that effective control be-
comcd and was said to have won the final victory. Even then, and during the early 19th century, its unity had by no means become so rigid as now; during the latter period many instances occurred of Cabinet members opposing the measures of the majority, and even of the Premier and still retaining their portfolios. But by the 'thirties it had pretty much settled into its pres-
ent constitution and rules. An important change was made in 1782, just after the Amer-
ican Revolution, when its hronics as members were dropped, and the membership confined to "efficient" members—officers of state so im-
portant that they cannot be excluded from it, or personalities so powerful that moribund of-
ices are kept constructively alive to make place for them. There is no absolute limit to the number of members, but custom dictates not less than 11, and the necessity of coming to some agreement and transacting business pro-
hibits its being much in excess of 15. The As-
quilt as the U. S. Cabinet, which has 32 members. As the Premier's duties are of a general character, it is unusual under modern
conditions that he assume control over a department, and he generally takes the office of First Lord of the Treasury, which is practically a new ministry. Of these, following the British tradition, in which from necessity foreign affairs had held the highest place, the secretariat of state—for war, for home affairs, for the colonies and for India; the Chancellor of the Exchequer, the First Lord of the Admiralty, the Lord Privy Seal, the Lord President of the Privy Council, the Lord Chancellor, and the Chief Secretary for Ireland. The last-named may or may not be included, and the heads of other departments may find places if desired. The Prime Minister is the head of the Cabinet; he selects his ministers, enforces harmony and concert of action among them, and by retiring, whether voluntarily or not, renders imperative their resignation. He presides at all Cabinet meetings (the deliberations of which are secret) but has no legal control over that body or its individual members. Besides being Premier, he may hold one or more governmental offices. The ministers are usually men of affairs, successful politicians and able debaters. If they cannot defend the government's policy, or if the floor of the legislative chamber may be turned out, and practical incapacity may render all defense of no avail. The defection of a Cabinet minister not only involves his retirement from the Cabinet but also from the office held by him. All ministers have the right to appear in the legislative chamber and to discuss measures under consideration; they introduce most of the important legislative proposals and also quite effectually control the proposals of private members by making them questions of confidence. The Ministry or ministry. While ministers are present on the floors of the legislative chambers the entire policy and administration of the Cabinet may be subjected to the most searching review by means of parliamentary questions and interpellations put to the ministers in open session. (See GREAT BRITAIN—PARLIAMENT; FRANCE—GOVERNMENT). In some of the countries which have followed the United States form of government the Cabinet members are granted a seat in the legislature for purposes of government, if not of voting. In the Cabinet system the head of the state in whose name all acts of government are performed is legally irresponsible, the responsibility for such acts being assumed by the ministers who countersign or otherwise attest their approval of such acts. The Cabinet's responsibility for all governmental acts is enforced by the legislative body by means of votes of censure or of lack of confidence or by defeating the legislative measures or programs advocated by the ministry. In the event of an adverse vote on their proposals the Cabinet must either resign or dissolve the existing legislature and appeal to the electorate at a new election. The responsibility is collective and the ministry stands or falls as a body or unit. But in England the fate of the Cabinet can only be affected by the censure of the House of Commons; the censure of the Lords can have no adverse effect.

Hence in governments patterned after the British system there is the dominant power in the state and renders wholly impossible the separation of powers, which forms the basic principle of constitutional government. The American Cabinet, or "President's Cabinet," has, of course, grown with the growth of the departments. There were but four Cabinet officers at the outset, the Secretaries of State, of War and of the Treasury, with the Attorney-General. Of these, followed the British tradition, in which from necessity foreign affairs had held the highest place, the secretariat of state was regarded as the most important and honorable, and its incumbent was considered to be in the line of succession for the Presidency, as for several administrations proved to be the case. John Quincy Adams was the last of these, and he appointed his chief rival, Henry Clay, Secretary of State with the presidential succession in view. The same notion has lingered to our own day and caused the Secretary of State to be termed the "Premier" of an administration; in itself an absurd and meaningless term, but with color given it by the preference for this post among some of the ablest party leaders ambitious of the Presidency. The next officer added was the Secretary of the Navy, whose office was created in 1798. In 1829 the Postmaster-General was raised to the Cabinet, though the office had existed 33 years. In 1821 the Secretarieship of the Interior was created and made of Cabinet rank; in 1889 was added the Secretary of Agriculture, in 1903 the Secretary of Commerce and Labor. The last-named office was divided in 1913 into the Department of Commerce and the Department of Labor, and the executive heads of each accorded Cabinet rank. In accordance with Congressional action in 1886 the Cabinet officers rank in order of succession to the Presidency as follows: Secretary of State, Secretary of War, Secretary of the Treasury, Attorney-General, Postmaster-General, Secretary of the Navy, Secretary of the Interior, Secretary of Agriculture, Secretary of Commerce and Secretary of Labor. It will be noted that after the original four the others are named in the order of the creation of their departments, not of their elevation to Cabinet rank. The President's Cabinet cannot, properly speaking, be called a cabinet, in the sense of a unified body, and only once has it been recognized by statute—in the General Appropriation Act of 26 Feb. 1907, where it is called by name in the clause fixing the salaries of its members. It does not act as a unit and has no responsibility as a unit. The word is merely a popular name for the group of officers in charge of the great branches of administration, whom the President consults individually or collectively at will or not at all. A more appropriate term for the President and his advisers would be "administration," since this of itself indicates that the group is restricted to the field of law operating and not concerned with law making, thus distinguishing the group from the British Cabinet which combines both functions and thus may properly be called the "government." The President is the head and centre of the administration, possessing all power of direction, short of suspending the laws, and usually co-operates with the department heads to enforce the principles of the party in power. There are a number of constitutional limitations of authority, the departments being equal in their subordination, and no means of inter-connection, save as they grow out of the Cabinet council. The department heads have nothing to do with legislation, and by law are prohibited from
being members of the legislative body (Art. I, Sec. VI, § 2 of the Constitution). Hence the privilege of debate and even of personal communion with Congress at any time, whereas the President is responsible to the country by popular election. The President very seldom endeavors to direct ordinary department operations, but practical necessity has clothed the secretaries with a measure of authority and discretion. Hence, as department heads, the Cabinet officers are morally responsible to Congress and indirectly to the country for the conduct of the affairs of their separate departments. They are liable to censure and impeachment, and conviction on impeachment means removal from office, which also results actually though not technically from a vote of censure. Appointments of Cabinet officers are subject to the approval of the Senate, which is rarely withheld, and the only limitation on the power of removal is contained in the Tenure-of-Office Act of 1867 (q.v.) was an exception but this act was repealed. In forming his Cabinet, the President usually endeavors to strengthen his administration politically by observing a code of geographical and other rules, distributing his appointments to cultivate doubtful sections or to reward party strongholds. In early times the Cabinet changed with the party, but with the development of the powers of appointment and removal the Cabinet comes into office with the President and retires with him. While in foreign countries ability to debate, personal prestige and political sagacity are usually essential to cabinet appointments, the reverse is true of the President's Cabinet. The President may fill the various portfolios with totally unknown men, in reliance on their unproved abilities, without serious risk, and some of these appointments have been eminently successful. The Secretary of State is usually selected with the greatest care, since he is regarded as the head of the Cabinet in influence and follows the Vice-President in the presidential succession, but he has neither the powers nor the influence of the European Premier, these residing in the President and the Speaker of the House of Representatives.

Cabinet meetings are frequent, occurring twice a week (Tuesday and Friday) when the President is at the seat of government. The procedure resembles a conference of a board of directors, the nature of the discussions depending upon the President. Sometimes they degenerate into mere discussions of routine affairs connected with the various departments. There is no question as to what officers shall sit in the Cabinet nor can outsiders mix in its councils; at times, however, outside persons with information to impart have met with it, but this is regarded more as a special consultation than as a Cabinet meeting. The President consults frequently with cabinet advisers outside his official household, and oftentimes he has certain intimates not connected with the government on whom he depends for impartial and unbiased opinions on matters of special importance to the country. Since Jackson's time these advisers have not attained such influence as to receive the title "Kitchen Cabinet." Cabinet opinions carry weight according to the personality of the President and secretaries and surrounding conditions. As previously stated the President is not obliged to consult the Cabinet but is expected to do so. As a rule, however, he consults regarding matters of grave public importance and very seldom takes action regarding departmental affairs without first consulting the several department heads.

The term Cabinet is sometimes applied in the United States to the heads of State departments advisory to the governor, but this is even less justifiable than its application to the President's advisers, since the State officers are elected by the people on the same ticket with the governor and the latter has no power of appointment removal in connection with the municipal officers accessory to a mayor has some justification, as many of these officers are appointed by him. The history of the national executive departments and of the President's Cabinet will be found under the title United States Be beginning of Executive Departments of the and The Cabinet of the; also the departments by name. In this connection see also CONGRESS; CONGRESSIONAL GOVERNMENT; EXECUTIVE AND CONGRESS; THE UNITED STATES—THE PRESIDENT'S OFFICE; THE VICE-PRES IDENCY, and THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.


IRVING E. RINES.
boards enclosed within doors; and these usually range from those of plain and chaste style to those of a highly ornamented character, decorated with carving, inlaying, marquetry, lacquer, painting, porcelain insets and medallions, enamel or metal appliqués. Cabinetmaking also comprises fine and ornamental joinery, interior wood finish, paneling and lattice work, etc., with their adjuncts of varnishing and polishing. The art of cabinetmaking is said to have originated in the 15th and 16th centuries in Italy and soon spread to France, Germany, the Netherlands and Spain, the cabinetmakers of these nationalities in the 16th and 17th centuries, and English cabinetmakers in the 18th century, rivals each other in the design and production of sumptuous, monumental and costly articles of furniture. Antwerp notably from the 16th century became famous for its output. Historic names among cabinetmakers are those of Boullé, Pierre and André Charles, and Jean Mace, Frenchmen, and Chippendale, English. See Buhlwork; Joinery; Wood-carving.

CABIRI. See Cabiiri.

CABLE, George Washington, American novelist and miscellaneous writer: b. New Orleans, La., 12 Oct. 1844. His father died when he was 14 years of age, and he had to leave school and seek employment as a clerk in order to assist in the support of his mother and sisters. In 1863 he joined the Confederate army as soldier in a cavalry regiment, and served till the conclusion of the Civil War, when he returned to New Orleans and again took to commercial life. But in 1879, being by this time a practised writer, and having had considerable success with his literary ventures, he decided to devote himself entirely to authorship. In 1884 he took up his residence in Massachusetts, where he has originated a system of home culture clubs, since developed into the People's Institute. Mr. Cable is a member of the National Institute of Arts and Letters and the American Academy of Arts and Sciences. His first important book, Old Creole Days (1879), appeared originally in Scribner's Magazine; and since its publication he has written The Grandissimes (1880); Madame Delphine (1881); The Creoles of Louisiana (1884), a history; Dr. Sevier (1884); The Silent South (1885), a plea for the negro; Bonaventure (1888); The Negro Question (1888); Strange True Stories of Louisiana (1889); John March (1894); Strong Hearts (1894); The Cavalier (1904); Bylow Hill (1904); Kincaid's Battery (1906); Posson Jone and Père Raphael (1909); Gideon's Band (1914); The Amateur Garden (1914). The chief interest of Mr. Cable's novels lies in their excellent descriptions of Creole life, a subject which he may be said to have introduced into literature. His pictures of negro life are equally effective, and he handles dialect in a masterly manner. See Grandissimes, THE; Old CREOLE DAYS.

CABLE, a large, strong rope or iron chain used as a mooring tie. The term is most frequently used in its nautical sense to designate the means by which a ship is connected with her anchor. The large ropes used for towing, or for making a vessel fast to a buoy or pier, are commonly known as hawsers. In more recent times the term cable has been expanded to include also the large suspensory ropes (usually of twisted or parallel wires) from which suspension bridges are supported. The endless ropes used to operate the kind of street cars commonly called cable cars or grip cars; the suspended wire ropes known as cableways, for the transport of goods, building materials, etc.; the groups of telephone wires placed in underground conduits or strung overhead in leaden casings; the wires for high voltage electric transmission; the undersea telegraph conductors, and, in fact, any very strong flexible tension connection. Rope cables are made of hemp, manila or other fibre, or of wire, twisted into a line of great compactness and strength. The circumference of hemp rope varies from 3 to 26 inches. A certain number of yarns are laid up left-handed to form a strand; three strands laid up right-handed make a hawser; and three hawser laid up left-handed make a cable. The strength of a hemp cable of 18 inches circumference is about 60 tons, and for other dimensions the strength is taken to vary according to the cube of the diameter. Wire rope has within recent years largely taken the place of hemp for towlines and hawser on board ship. These usually consist of six strands, laid or spun around a hempen core, each strand consisting of six wires laid in the contrary way around a smaller hempen core. The wires are galvanized or coated with a preservative composition. Wire ropes are usually handled on board ship by winding them round a special reel or drum. Hemp cables, moreover, have for long been almost wholly superseded by chain cables; the introduction of steam on board ship having brought in its train the powerful steam windlass wherewith to manipulate the heaviest chains and anchors required.

Chain cables are made in links, the length of each being generally about six diameters of the iron of which it is made, and the breadth about three and one-half diameters. They are generally of eight lengths of 15 fathoms each connected by swivels to prevent twisting. There are two distinct kinds of chain cables — the stud-like chain, which has a tie or stud welded from side to side of the long link, and the short-link or unstudded chain. The cables for use in the mercantile service are made in 15-fathom lengths, but in government contracts chain cables are required to be made in 1 1/4-fathom lengths, with one swivel in the middle of every alternate length, and one joining-shackle in each length. Besides the ordinary links and joining-shackles, there are end-links, splicing-tails, mooring-swivels and bending-swivels. The sizes of chain cables are denoted by the thickness of rod iron employed in forging the links. The following table gives certain ascertained data concerning the cables in ordinary use:

<table>
<thead>
<tr>
<th>Diameter of iron</th>
<th>Weight of stay-pin</th>
<th>Weight per fathom</th>
<th>Breaking strain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 in.</td>
<td>3 lb.</td>
<td>12 1/2 lbs.</td>
<td>6 tons</td>
</tr>
<tr>
<td>1 1/4 in.</td>
<td>12 lbs</td>
<td>121 lbs</td>
<td>60 lbs</td>
</tr>
<tr>
<td>2 in.</td>
<td>28 lbs</td>
<td>212 lbs</td>
<td>99 lbs</td>
</tr>
<tr>
<td>2 1/4 in.</td>
<td>40 lbs</td>
<td>272 lbs</td>
<td>152 lbs</td>
</tr>
</tbody>
</table>

CABIRI — CABLE
CABLE

Compared with the strength of hempen cable, a chain cable of one inch diameter of rod is equivalent to a hemp cable 10½ inches in circumference; 1½ inches, to 13½ inches; ½ inches, to 16 inches; ⅓ inches, to 18 inches; and 2 inches, to 24 inches. In navigation a cable's length is a useful measure of distance, equaling 120 fathoms, or 720 feet, by which the distances of ships in a fleet are frequently estimated. This term is often misunderstood. In all marine charts a cable is deemed 607.56 feet, or one-twelfth of a sea mile. In rope-making the cable varies from 101 to 115 fathoms; cable, 120 fathoms; hawser-laid, 130 fathoms, as determined by the British Admiralty. According to Ure a cable's length is 100 to 140 fathoms in the merchant service. The wire rope used for submarine telegraphy is also called a cable. See CABLES, SUBMARINE.

CABLE, Submarine specially constructed ropes of wire, hemp and gutta-percha, or other waterproofing and protecting materials, laid on ocean or river beds for the purpose of providing means of electrical communication across the bodies of water. Until the discovery of gutta-percha such communication was impossible, as water is so good a conductor of electricity that the submersion of current-carrying wires was dependent upon complete insulation. In this gum, however, such a perfect insulator was found that submarine communication all over the world became merely a question of time, experience and necessity. In 1843 Prof. S. F. B. Morse suggested electrical communication between the United States and Great Britain, but it was not until more than 20 years had passed that practical telegraphy across the Atlantic Ocean was established.

Early Cables.—The first under-water cables were short ones laid across rivers; later the English Channel was electrically "bridged" in this manner. In 1852 Dover and Ostend were connected by a cable 75 miles long and containing six wires. In 1854 Sweden and Denmark, Italy and Corsica, and Corsica and Sardinia were linked. In the same year the New York, Newfoundland & London Telegraph Company was incorporated, mainly through the efforts of Cyrus W. Field and Peter Cooper, of New York, for the purpose of laying a cable between Newfoundland and Ireland, a distance of about 2,000 miles. It received a charter from the Newfoundland legislature, with an exclusive right for 50 years to establish a telegraph between the American continent and Europe via Newfoundland. In 1856 Cape Rey and Cape Breton were united, as well as Prince Edward's Island and New Brunswick. The same year Mr. Field organized the Atlantic Telegraph Company. It was supported by both the United States and British governments, but the results of its efforts were discouraging for several years. In August 1857 an attempt was made to lay a cable by the American frigate Niagara and the British ship-of-war Agamemnon, but about 300 miles from the Irish coast the cable parted, owing to a strain caused by a sudden dip of the sea-bottom. In 1858 the second Newfoundland cable was laid on board, steamed to a point in the Atlantic midway between Valentia, Ireland, and Heart's Content, Trinity Bay, Newfoundland, spliced the cable, and, steering in opposite directions, safely landed the ends at their destinations on 5 August. The cable was 2,500 miles in length, weighed about one ton per mile and cost $1,256,- 250. It was composed of seven copper wires encased in gutta-percha, which in turn was surrounded by a covering of hemp saturated with oil, pitch and beeswax, the whole being protected by an outer sheath composed of 18 strands of seven iron wires each. Despite the success in laying, however, the cable was practically useless. The current was so weak that a message of 90 words from Queen Victoria to President Buchanan took 67 minutes to transmit, and after a few more messages the cable ceased to transmit signals. Two more cables were laid in this year to connect Great Britain with the Continent,—one to Holland and the other to Hanover; and in 1859 saw, among other cable connections, the joining of England with Denmark and France, and of Malta with Sicily.

In 1860 a cable was laid between France and Algiers, and in 1861 Malta was connected with Alexandria and Batavia with Singapore. Failures were met with in attempts to pass through the Red Sea and from Falmouth to Gibraltar, and these, with the ill-success of the Atlantic cable, caused great disappointment to the promoters of the latter enterprise. Capital seemed to have made up its mind that a successful cable across the Atlantic was impossible. In 1865, however, another cable of 2,300 miles and weighing 4,000 tons, was shipped on the Great Eastern, and was successfully paid out for 1,055 miles from Valentia, when it broke, and was abandoned after vain attempts to grapple the lost end. The following year the Great Eastern sailed with a lighter but stronger cable of 2,370 miles and laid it successfully. She then grappled the lost cable of the year before, recovering it from a depth of two miles, spliced it and completed the task by landing the end at Heart's Content.

Advance in Cable-Laying.—With two cables now linking America and Great Britain, confidence was restored, and the manufacture and successful laying of submarine cables went on at a rapid rate. In 1864 a cable was laid from Brest, France, to Saint Pierre, Newfoundland (a distance of 3,100 miles), by a French company. In 1873 a cable joined the cities of Lisbon and Funchal, and in 1874 and 1875 two more cables were laid between Valenica and Heart's Content. The latter weighed less than 900 pounds per mile. Another line from Penzance, Cornwall, to Saint Pierre, 2,920 miles, was laid in 1879, and one from England to Panama in 1882.

Meanwhile an incident had occurred which greatly influenced the expansion of submarine cable systems. In 1870 the British government purchased the entire land telegraph system of the British Isles, and the capital thus liberated, about $50,000,000, was largely reinvested in submarine cable ventures. In 1872 a number of small competing companies with lines through the Mediterranean were consolidated into the Eastern Telegraph Company, and in the following year the Eastern Extension, Australasian & China Telegraph Company was formed, the amalgamation of companies owning cables farther east. Since then the Eastern, Eastern Extension and Associated Cable companies
have become practically one immense organization.

In 1884 John W. Mackay and James Gor-
don Bennett organized a cable system across the Atlantic from Valentia to Torbay, N. S., in the interests of the Commercial Cable Company and the New York Herald. Consolidation of competing companies followed as a matter of course, and now there are practically, besides the French lines, but two competing cable companies in the north Atlantic field — the Anglo- American and the Commercial Cable companies. There are now 15 cables between North America and Europe, some of which run into New York harbor. The cables of 1858, 1865 and 1866 are "dead," and three others have but a brief tenure of life. Nine are "alive" and active.

About 1902 France undertook to lay cables to connect her colonies, and now has over 12,000 miles in operation. A little later the Commercial Cable Company laid its fourth line to connect New York and London, by way of Roscoff, Ireland, Cananéa, M., and Waterford, Ireland. The European Wire put a check on cable-laying for several years.

Pacific Cables.—In the Pacific Ocean the Commercial Company has constructed a cable 6,912 miles long and costing $12,000,000, laid from San Francisco, via Honolulu, the Mid- way Islands and Guam to Manila, in the Philip- pines, with an ultimate extension to Shanghai or Hong Kong. The first section, from San Francisco to Honolulu, 2,413 miles, was opened 1 Jan. 1903. This section is the most hazardous on the route, depressions of 5,160 and 5,269 fathoms having been encountered, and the profile displaying mountains of immense elevation and valleys of corresponding depth. A level plain, with an average depth of 2,700 fathoms, extends throughout the second section, from Honolulu to the Midway Islands, the bottom being of soft mud and extremely favorable for cable-laying. Thence toward Guam an average of 3,200 fathoms is found, and favorable conditions are maintained throughout. The last section is similar in its profile to the first, though the depth averages less, being from 1,400 to 2,700 fathoms. The sea-bed is extremely irregular in outline, with many reefs and shallow spots.

The cable is built around a core formed of copper wire insulated by gutta-percha, around which layers of jute yarn are wound. This, in turn, is sheathed in small cables, each formed of several strands of steel wire. An outer covering of jute yarn, the whole saturated with a bituminous compound, binds together the conduct- ing and protecting wires in one solid mass. The landing of the shore end of the cable at San Francisco was effected thus: A section of six and one-half miles was cut from the main cable on board the cable-steamer Silvertown and loaded on a tender, which steamed toward the shore. On approaching the line of breakers, which were heavy, the shore end was floated on balloon buoys placed every 10 fathoms, and a section of 12 fathoms in length was spliced to the permanent shore connection, and the tender returned to the Silvertown, on board which the shore section was spliced to the main cable. The cable-ship then started for Honolulu in the evening of 14 Dec. 1902.

The Silvertown was specially built for cable-laying purposes. On this trip she carried 2,413 nautical miles of cable, weighing 4,857 tons. She arrived off Honolulu on 9 Dec., 1902, and landed the shore end by buoying the cable; but she employed no tender or horses. Two spider-sheaves were sent ashore and fixed by sand anchors about 60 yards apart. A hauling- line was paid out from the ship, reeled through the sheaves and brought on board again at the end of this line being attached to the cable and the other to the picking-up gear, the engines were started and the cable was dragged toward the shore.

Another Pacific cable has been constructed jointly by the governments of Great Britain, Canada and Australia across the Pacific from Vancouver to Fanning Island, Fiji Islands, Norfolk Island, and thence to New Zealand and Australia. It is practically 8,000 miles long, and the 3,600-mile stretch from Vancouver to Fanning Island makes the longest single section in the world. This cable brought the Australian colonies 10,000 miles nearer to Canada than they were before, and there is now completed a British telegraph gridiron of the world which touches foreign territory only at Madeira and Saint Vincent, in the Cape Verde Islands, both belonging to Britain's old ally, Portugal.

Mention has already been made of the con- solidation of competing lines in the Medi- terranean and the East into the Eastern Telegraph Company. To this huge organization belongs a marvelous network of submarine cables — practically all the cables from Land's End, in England, through the Mediterranean to Suez, on through the Red Sea to Aden, across the In- dian Ocean to Bombay, thence linking into the system Madras, Singapore, Hong Kong, Ma- nila, Australia and New Zealand. In addition, practically all the cables which now surround Africa, and many of those which cross the ocean and follow the coast-line of South Amer- ica, are in its control. To such an organization the laying of 15,000 miles of cable from Eng- land to Australia, via the Cape of Good Hope, at a cost of over $13,000,000, was comparatively easy. Yet this great line may be traced from Land's End in England to Adelaide in South Australia, a distance which a modern Atlantic liner would take six weeks to steam over. The length of cable is more than half way round the globe, and about eight times longer than the first Atlantic cable.

The life of a deep-sea cable, aside from in- juries by ship's anchors, rocks, sharks, sawfish, and swordfish, has been variously estimated at from 30 to 40 years. Sharks occasionally bite cables and leave some of their teeth embedded, and sawfish and swordfish attack them, espe- cially in tropical waters, but on the level plains of ooze two miles or more below the surface cables seem to be almost imperishable. In shal- low water they are most exposed to damage. Deep-sea cables generally weigh from one to one and a half tons per mile, but the portions lying in shallow water are so heavily armored as to weigh from 10 to 30 tons per mile. The breaking strain is about seven tons. Yet in one year the ocean cables of the Commercial Company were severed by ships' anchors five times. In the Firth of Forth in Scotland no less than 13 ship's anchors were once found entangled in a length of four miles of cable. The deep-sea cable costs about $400 per mile,
is made in lengths of 15 to 25 miles and stored in a cable-laying steamship. The cost of coast cables may run up to $5,000 a mile, as they have usually paper insulation, covered with a lead sheath, and heavily armed with wire. Coast cables are made in mile lengths and stored on large reels.

Cable Tariffs and Codes.—In the early days the Atlantic Telegraph Company started with a minimum tariff of $100 for 20 words, and $5 for each additional word. Later this was reduced to $25 for 10 words. It was not until 1872 that a rate of $1 a word was introduced. This word rate system proved so popular that it was soon adopted universally, and since 1888 the cable rate across the Atlantic has been down to 12½ cents a word. Rates now range from the 12½-cent tariff across the Atlantic to $1.33 per word from New York to Japan. The average for the whole world is roughly 50 cents a word. The cost of cabling, however, is greatly influenced by "coding," a system by which business men use secret words for commercial messages, and which has developed to an extraordinary degree of perfection. One code word will frequently stand for 10 or 15 words, and there are instances where one word has been used to represent over 100 words. Practically all commercial telegraph cables are coded, and nearly all departments of commercial and industrial life nowadays have their special codes.

Speed of Transmission.—The cost of deep-sea cables makes it vitally important to get as much work out of them as possible. In the first place the transmission time of messages has been greatly reduced. Formerly from many parts of the world it took 5 or 10 hours to deliver a cablegram where it now takes from 30 to 60 minutes, and across the Atlantic the companies, for stock-exchange purposes at any rate, send a cablegram and get a reply in two or three minutes. In the second place, where traffic is heavy, speed of transmission of the signals has been greatly increased. Across the Atlantic and on three or four of the busy lines of the Eastern Company the art of cable telegraphy has been highly developed.

On the first Atlantic cable the speed was about seven words a minute in one direction only. The speed of recent Atlantic cables is as high as 75 words. In the mean time on land, telegraphy by means of a mirror galvonometer supplied the instrument needed. Lord Kelvin's mirror galvonometer supplied the instrument needed. By this means the speed of the early Atlantic cables was raised to seven or eight words a minute. Subsequently, when heavier cables were laid, the speed was increased to as much as 20 words a minute.

The Siphon Recorder.—In 1870 Lord Kelvin perfected his siphon recorder for working long cables, and it at once supplantèd the mirror instrument, as it worked just as well with feeble currents as gave a written record of signals received and enabled men to do the work of two. An exceedingly light coating of silk (in shape and size like the long, narrow O which would be obtained by winding several hundred turns of fine silk thread around the palm of the open hand) is delicately suspended between the two poles of a powerful magnet. As the electric signals from the cable flow through the coil of wire, it swings round under the influence of the magnet, back or forward according as the current is positive or negative. The motions of the coil are transmitted by silken fibres to a little glass siphon about as thick as a needle and three or four inches long, suspended so as to swing with perfect freedom. One end of the siphon dips into a pot of ink, and the other end hangs close above a moving strip of paper. The signals are so feeble that if the end of the glass siphon rested on the paper it would not move at all, but by causing the siphon to vibrate continuously against the paper the free motion of the siphon is not interfered with and the ink is splattered upon the paper so that the appearance is that of very fine dots and thus records the signals transmitted through the cable. This instrument, though crude at first, has gradually been perfected. It is now the most important part of modern cable equipment and is manufactured in all departments of commercial and industrial life nowadays.
human operator can send so fast. The key used for signaling through the cables by hand is practically the same as the ordinary Morse key, except that two keys are used side by side, one to send positive signals and the other negative signals, the letters of the alphabet being indicated by various arrangements of the two kinds of signals. First-class cable operators can send as many as 30 words a minute for a few minutes, but a sustained speed of 20 words a minute, when working by the hour, is regarded as very good. To take full advantage of the speed of a modern Atlantic cable, therefore, it is necessary to have some automatic method of transmitting. The advantages of automatic transmission are higher speed, greater uniformity of signals, more legibility and fewer mistakes.

The method adopted is simple and beautiful, — a modification of the Wheatstone system. The message is first punched as a series of holes in a paper tape. This perforated tape is then run through an automatic transmitter, and by means of a system of small levers the required key makes a space. In this way the cablegram before him is transmitted at the rate of about 20 words a minute into a perforated tape. From the perforator the tape runs into an automatic transmitter, or "auto." There is a row of small central holes in the tape, and on one side is a row of larger holes. The latter represent the message. A small star wheel in the "auto" engages with the central line of holes and feeds the tape along at a uniform rate. A couple of small steel rods about the size of a knitting-needle, one for each of the two rows of message holes, continually vibrate against the paper. When either of them enters a perforation in the paper, a lever connected with it moves and makes an electric contact, sending a short, sharp signal into the cable.

Cable Relays.—Recently several still more wonderful inventions have been perfected. On land relays are used. For instance, messages from New York to Chicago are automatically repeated at Buffalo or Cleveland, and by automatic repeating every 600 or 800 miles it is an every-day occurrence to telegraph direct between New York and San Francisco. A relay capable of performing similar work for cables has been a dream of cable engineers and inventors for years, and the success of an instrument "human relays" have been employed; that is, at the end of one section of a cable an operator takes the paper record of a cablegram as it comes from the siphon recorder and retransmits it.

But the cable relay is now an accomplished fact. The only hope of constructing such an instrument was to utilize the siphon recorder. One difficulty has been that the movements of the siphon, as shown by the paper records, have till now been most irregular. It has been what photographers would describe as "lack of definition" about the signals, rendering it hopeless to attempt to relay them automatically by machinery. The first thing to do was, therefore, to straighten and sharpen up the signals a bit, and a very able group of cable engineers, including H. A. C. Saunders, electrician-in-chief of the Eastern Telegraph Company, his assistant, Walter Judd, with Dr. Muirhead, inventor of the cable duplex, and Messrs. Brown and Dearlove, succeeded in sharpening them. They secured very regular signals, usually described as "square signals." This result was obtained by means too technical to be described here, but the chief device used is known as an "inductive shunt." Having squared the signals, it was now possible, though by no means easy, to construct a cable relay. Two have been perfected. One is known as the Brown & Dearlove relay, the principal inventor of it being S. G. Brown. The other has been invented by Dr. Muirhead. In both a fine wire terminating in a platinum contact-point takes the place of the ink in the siphon of a recorder. The contact-point instead of resting on the paper tape rests on a rapidly moving metallic surface divided into two parts. In the Brown & Dearlove relay this contact-surface consists of a constantly revolving metallic drum or wheel. The siphon skates, as the inventor describes it, with the utmost freedom on the periphery of this wheel. The drum looks like a phonograph cylinder. As the siphon skates upon the right or left half of this drum it makes a positive or a negative electric contact and automatically transmits a corresponding signal with renewed energy into the next section of cable. In the Muirhead relay the moving metallic surface consists of a small plate vibrating rapidly. The result is the same. Able in this way to make definite electrical contacts through a long ocean cable, an operator can easily work, by means of these contacts, local apparatus moved by more powerful currents. In this way both Mr. Brown and Dr. Muirhead have devised perforators which reproduce at the receiving station perforated tape identical with that used for transmitting the message at the sending station. This tape is available for transmission through an "auto," this plan having the advantage that the signals are retransmitted in as perfect form as the original signals; and, theoretically at any rate, the process may be repeated indefinitely, so that it would be possible to send a cable message automatically through a dozen stations from England to Australia. This will no doubt be done in time, but it is a very slow process getting such complicated and delicate inventions into commercial use. It is a question of time and growth. The Brown & Dearlove relay has been adopted by the Eastern Company, and has been in commercial use. Dr. Muirhead's relay has also proved very successful in several long-distance tests.

Cable Statistics.—In all there are now about 291,000 nautical miles of submarine cables, enough to go about 13 times around the globe. They have cost about $250,000,000, but their market value is considerably higher, as deep-sea cables are solid and profitable investments. All told there are about 50 cable steamers in the world, including those owned by the cable-construction companies and by governments, with gross tonnage of perhaps 85,000 tons.

The Eastern Telegraph Company owns 107 ocean cables of a total length of 46,790 nautical miles. Its cables extend from England to Spain, all through the Mediterranean and Black
seas, to most important points in Africa and on to Australia, the East Coast Extension, Australia China Telegraph Company owns 37 cables of 26,421 miles. The next largest is the Western Telegraph Company, with 30 cables of a total length of 23,836 miles, extending from Portugal across the Atlantic to the principal ports on the east coast of South America. The Western Union Telegraph Company's system is almost as extensive, comprising 27 cables of 23,508 miles. It controls three transatlantic cables and the Gulf of Mexico system. The Commercial Cable Company's system from Ireland via Nova Scotia to New York employs 15 ocean cables with a mileage of 16,595. The Central & South African Telegraph Company has 25 cables of 11,896 miles. La Compagnie Française des Cables Télégraphiques has 24 cables of 11,057 miles, connecting Brest, France, with Cape Cod, Mass., and also Saint Pierre and San Domingo. The Eastern & South African Telegraph Company has 17 cables of 10,490 miles. The Commercial Pacific Company has 8 cables of 10,010 miles, connecting San Francisco, Guam, Manila and Shanghai. La Compagnie Allemande des Cables Transatlantiques has 5 cables of 9,556 miles, connecting Coney Island, N. Y., with Borkum Island, the Azores and Spain. La Grande Compagnie des Telegraphes du Nord has 29 cables of 9,331 miles, connecting northern Europe and Asiatic ports. Die Deutsch-Sudamerikanische Telegraphen-Gesellschaft has 5 cables of 7,354 miles. The West Indian & Panama Telegraph Company has 22 lines of 4,355 miles. Die Deutsch-Niederlandische Telegraphen-Gesellschaft has 3 cables of 3,415 miles. There are 17 other private companies operating 66 submarine cables of a total length of a little over 20,000 miles; the total of privately-owned lines being 418, of 235,680 nautical miles.

The nations of the world own and operate over 2,000 short submarine cable lines, of a total nautical mileage of 55,207 miles. The longest of these is the line from British America through the Pacific to Australia. The greatest number is in Norway, 770, but they average less than two miles in length. The United States owns 15 and about Alaska, and 26 in the Philippines; it has 181 of 5,000 miles; Spain has 25, of 3,158 miles; France 79, of 12,348 miles; there are 224, of 2,909 miles, in the British Isles; Germany controls 98, of 2,956 miles, and the Netherlands 27, of 5,130 miles. Many of the terminals in the countries engaged in the European War have been cut and are out of service until peace is restored and they can be patched up.

Charles H. Cochrane, Author of 'Modern Industrial Progress.'

CABOOL. See KABUL.

CABOOSE, ca-boos', the cook-room or kitchen of a ship. In smaller vessels, the name is a room, but in an enclosed fire-place, hearth or stove, for cooking on the main deck. The cook-room is also known as the "galley." The name caboose also gives a railroad car on freight or construction trains used for carrying brakemen or workmen, tools, etc.

CABOT, George. American statesman: b. Salem, Mass., 3 Dec. 1751; d. Boston, 18 April 1823. He was educated at Harvard College, spending two years there, and afterwards going to sea. He reached the rank of captain while still under 21 years of age. In 1776 he was elected member of the provincial congress of Massachusetts and also of the State Constitutional Convention, and in 1791 he became United States senator from Massachusetts, and proved a steadfast friend of the Washington administration. He yielded essential aid to Hamilton in perfecting his financial system. President Adams appointed him first Secretary of the Navy, after the creation of that office in 1798, but Cabot served only one month. In 1814 he was chosen a delegate to the memorable Hartford Convention, and was elected president of that assembly. In 1793 he introduced the Fugitive Slave Act in the Senate. Consult Lodge, H. C., 'Life and Letters of George Cabot' (Boston 1877).

CABOT, James Elliott, American biographer: b. Boston, Mass., 18 June 1821; d. 16 Jan. 1903. He was the friend and literary executor of Emerson and in 1887 published 'A Memoir of Ralph Waldo Emerson,' a work undertaken at the request of the Emerson family.

CABOT, John, or GIOVANNI CABOTO (in the Venetian dialect, ZUAN CABOTO), an Italian navigator in English employ; the discoverer of the continent of North America. On 5 March 1496 he was given by Henry VII of England letters patent authorizing him to take possession of any countries he might discover. Under this charter, in May 1497, he embarked in a single vessel, the Matthew of Bristol, accompanied by his son Sebastian, and sailed west, as he said, 700 leagues, when, on 24 June 1497, he came upon land which he reported to have been a part of a continent, and which he assumed to be in the dominions of the Grand Cham. A letter of that year represents him as having sailed along the coast for 300 leagues; he landed, but saw no person, though he believed the country was not uninhabited. He planted on the soil the banners of England and of Venice. The exact spot of his landing is not known, but from the La Cosa map and the map of Sebastian Cabot it appears to have been near the mouth of the Grand River, perhaps near Breton, more than a year after Columbus discovered the main land of the continent at Venezuela. On his return voyage he discerned two islands to the starboard, but for want of provisions did not stop to examine them. He reached Bristol in August. His discovery attracted the favor of the English King, who on 3 Feb. 1498 granted him letters patent to impress six English ships at no higher charges than were paid for ships taken for the King's service, to enlist companies of volunteers, "and them convey and lede to the londe and isles of late founde by the seid John." He sailed early in May with two ships, and after a stormy voyage sighted early in June the east coast of Greenland, which he named 'Ladbrador's Land.' He then turned south, skirting the coast of Labrador, Nova Scotia, and New England, and is believed to have reached the parallel of 38° near Chesapeake Bay, after which the return voyage was made. He then passes out of history. Neither the time nor the place of his death, nor his age, is known. Neither is it known what country

**CABOT, Sebastian,** English navigator: b. Bristol, about 1474; other authorities say 1477; d. London 1557. He was the son of John Cabot (q.v.). Sebastian was early instructed in the mathematical knowledge required by a seaman, and at the age of 17 had made several voyages. In 1496 John Cabot obtained from Henry VII letters patent empowering him and his three sons, Lewis, Sebastian and Sanctius, to discover unknown lands, and conquer and settle them. In consequence of this permission John and Sebastian sailed to the northwest on 2 May with the *Matthew* of Bristol, manned by a crew of 18 men. In June 1497 the coast of Cape Breton, or, as some think, of Labrador, was reached. The accounts of this voyage are attended with much obscurity; but a second patent was granted to John Cabot in 1498, and it seems that in a subsequent voyage, the father and son sailed as far south as Chesapeake Bay and were actually the first who saw the mainland of America. Little, however, is known of the proceedings of Sebastian Cabot for the ensuing 20 years; but it seems that, in the reign of Henry VIII, by the patronage of Sir Thomas Peart, vice-admiral of England, he procured another ship to make discoveries, and attempted a southern passage to the East Indies, in which he failed. This disappointment is supposed to have induced him to quit England in 1513 and visit Spain, on the invitation of Ferdinand. The death of the King lost him his patron, and in a few years he returned to England and was employed by Henry VIII to find out the northwest passage. After this expedition he again entered the Spanish service, and in 1526 began a voyage which resulted in his reaching the river La Plata, where he discovered San Salvador, and erected a fort there. He returned to England after the death of Henry VIII and settled in Bristol. He was introduced by the protector Somerset to Edward VI, who settled a pension on him. From this time he was consulted on all questions relating to trade and navigation; and in 1552, being governor of the company of merchant adventurers, he drew up instructions and procured a license for an expedition to discover a passage to the east Indies by the north. He was also governor of the Russian Company, and was very active in its affairs. He was the first who noticed the variations of the compass; and he published a large map of the world, as also a work under the title of *Navigazione nelle parti Septentrionali,* per Sebastiano Cabota.' (1583). See Nicholls, 'Remarkable Life of Sebastian Cabot' (London 1869); Winship, 'Cabot Bibliography' (1900), and Henry Harrisse's unflattering portrayal of 'John Cabot and His Son Sebastian' (London 1895).

**CABRA,** ká'brá, Spain, town in the province and autonomous community of Andalusia, on the east coast of the south-east coast of Córdoba, in a valley almost environed by mountains. It has wide streets; a large, irregular, but imposing looking square; two large and handsome parish churches; a richly endowed college, etc. Captured from the Moors by Ferdinand II in 1240, and recaptured in 1331, in the succeeding century it passed finally into the possession of Spain. It has manufactures of coarse cloth and bricks. Pop. 12,181.

**CABRAL, or CABRERA, Pedro Álvarez, pâ'dro ál've-rêth ka-brâl,* Portuguese navigator: b. about 1460; d. about 1526. In 1500 he received command of a fleet bound for the East Indies, and sailed from Lisbon, but having taken a course too far to the west he was carried by the South American current to the coast of Brazil, of which he possessed knowledge about 24 April 1500, in the name of Portugal. Continuing his voyage he lost several ships and men in a storm, but with the remainder he visited Mozambique, and at last reached India, where he made important commercial treaties with native princes, founded a trading-post at Calicut and then returned to Europe. Despite his discoveries he was for some reason not retained in the service and sank into obscurity. Consult Fiske, 'Discovery of America,' Vol. II (Boston 1892); Capistrano de Abreu, 'Descobrimento do Brasil' (Rio de Janiero (1883)); Varnhagen, 'Historia general do Brasil' (2d ed., 2 vols.).

**CABRERA, Ramon,** Carlist general: b. Tortosa, Catalonia, 31 Aug. 1806; d. Wentworth, England, 24 May 1877. He was brought up for the clerical profession, for which, however, he was unfit by his love of pleasure and dissipation. When civil war broke out between the partisans of Don Carlos and those of the Queen Isabel II, the priests became the most zealous champions of Don Carlos. Their enthusiasm acted so powerfully upon the impetuous spirit of young Cabrera, that he joined in 1833 a small band of guerrillas. He fought with singular ferocity, which rose to fury, when, 16 Feb. 1835, upon the order of the Queen and of Mina, General Noguera, was to death Cabrera's aged mother and his three helpless sisters. Cabrera took vengeance upon all the Christians who fell into his hands. His enemies treated him like a wild animal, and hunted him, after he had eluded the garrisons of Valencia and Andalusia, from one place to another. After a temporary defeat at Torre Blanca he eventually took Morella. Hence in 1838 Don Carlos created him Count de Morella, and at the same time lieutenant-general, and in this capacity Cabrera continued to fight for the cause of the Pretender, and for what he considered the cause of the priesthood and the Church, until 1840, when he was compelled to flee to Paris. By order of Louis Philippe he was arrested and consigned to the fortress of Ham, but was soon set free. In 1848 the French revolution filled Cabrera with the most sanguine expectations; which, however, were doomed to disappointment, as on his arrival in Catalonia he was but indifferently received, and on 27 Jan. 1849, he was severely wounded at Pastoral, although he succeeded in making good his escape to France. In August of the same year he took up his abode in London, where he married a rich English woman. When Alphonso XII was proclaimed King of Spain in 1875 Cabrera advised the Carlists to submit to him. Consult Valras, 'Don Carlos VII et
Ramon Cabrera, translated from the Spanish (Paris 1875); Diaz and Cardenas, 'Galería de Españoles célebres contemporáneos,' Vol. I (Madrid 1841); Valle Inclán, 'La guerra carlista' (Madrid 1908).

CABRERA, a small Spanish island, one of the Balearic Isles, about 10 miles from Majorca. It is about three miles in length and breadth and the coast is irregular. The chief industry of the island is fishing and the permanent population is very small. During the war in the Peninsula Spain used it as a place for receiving convicts.

CABRERA BOBADILLA CERDA Y MENDOZA, kə-brəˈðəl-yə mɛnˈdɔbəlˈθa, Luis Gerónimo Fernandez de, Spanish colonial governor: b. Madrid, about 1590; d. near there 1647. He was viceroy of Peru 1629–39, during which period the useful properties of cinchona bark were discovered and the third ascent of the Amazon made. The chief of the Spaniards caused a revolt among the Urn Indians near Lake Titicaca, which Cabrera had great difficulty in suppressing.

CABRILLA, or HIND, one of the sea-basses (Epinephelus maculatus) found in the Atlantic from Charleston to Brazil. It attains a length of 18 inches and is highly esteemed as food. Another sea-bass (Paralabrax maculatus fasciatus) living along the coast of lower California and highly regarded as a food-fish is called the spotted Cabrilla. See Sea-bass.

CABRILLO NATIONAL MOVEMENT, created 14 Oct. 1913, at Point Loma, Cal., of a small tract of land containing 21,910 square feet which lies within the military reservation at Fort Rosecrans. It is of historic interest because of the discovery of the territory now partly embraced in the State of California, by Juan Rodriguez Cabrillo, who at this point first sighted land on 28 Sept. 1542.

CABUL, CABOOL or KABUL. See KABUL.

CACAHUATE, CACAHUETE, kə-kəˈwətə (nahuatl, “Cacahuatl”), the indigenous peanut of Mexico and Central America. It is practically the same as the mani (q.v.) of Cuba and parts of South America, and it is very much used to take the same member of the family grown in the United States. The cacahuates have been a common food of the indigenous races of the torrid zone of America since prehistoric days. At the time of the conquest of Mexico (1521) the Spaniards found it among the many kinds of fruit and vegetables displayed on the great market of Tenochtitlan (Mexico City). The cacahuates were one of the offerings made to the goddess of growth, fertility and birth, and on certain festive occasions it was the only offering made. A festival in honor of this very ancient religious custom is still heard in Mexico during the novenas or nine days of semi-religious celebration which precede Christmas day, when it is used to stuff earthen jars which are placed on the inside of cages and paper towns in paper houses for decorations. These latter are suspended from the ceiling of the house or in a yard to be knocked down by blindfolded children or young people in a game very much like blindman's buff. For hundreds of years the Mexicans have extracted from the cacahuates a light oil which, when burnt, gives a beautiful, strong, white light. Cacahuates nuts are sold every where in Mexico and Central America, in little stores, on the markets and on the street corners of the towns and villages, and every one buys them as candles are bought in other countries.

CACAO. See Cocoa.

CACCIANIGA, kə-chəˈneɡə, Antonio, Italian writer: b. Treviso 1823; d. 1903. He founded a critical magazine, Lo Spion Folletto at Milan in 1848; being exiled after the revolution of 1848 was for six years a journalist in Paris. He was subsequently mayor of his native town and a parliamentary deputy. He is the author of some notable works of fiction, including 'Il proscritto' (1853); 'Bossetti morali ed economici' (1869); 'La Vita Campesste'; 'Villa Ortensia' (1876).

CACCINI, kə-chəˈne, Giulio, Italian composer: b. Rome about 1546; d. Florence 1618. He was styled the father of a new music, having been the first to write an opera to whom performance in a public theatre. His works include 'Daphne,' and 'Apollo's Battle with the Serpent.'

CÁCERES, kə-kəˈrəs, Andrés Avelino, Peruvian military officer and statesman: b. Ayacucho, in southern Peru, 10 Nov. 1836; d. 20 Nov. 1911. While still young he became military attaché to the legation of the Peruvian government at Paris, and was stationed at that post until 1860. In the Chilean War (1879–83) he served in nearly all of the battles, being rapidly promoted from colonel to the rank of general, and, after the taking of Lima, was made 2d Vice-President in the provisional government of Calderon (June 1883). The imprisonment of Calderon the President, and the absence of the 1st Vice-President made him acting President of Peru. In his refusal to acknowledge the results of the elections the Chileans had placed at the head of the government at Lima, as President, Cáceres was supported by the interior provinces, and he at once planned to depose him. In his first attempt to do so he was repulsed in a bloody street fight, but after raising a larger force he appeared before the city, 1 Dec. 1885, and peaceably persuaded Iglesias to submit the office of President to a general election. This resulted in the election of Cáceres, and on 3 June 1886 he was inaugurated President of Peru. The country prospered greatly under his administration, gradually recovering from the ill effects of the war; a private company absorbed the state railroads and guano beds, and distant vessels loaded with the national debt. In 1890 he was defeated for the Presidency by Bermudez, but was soon afterward, in 1891, appointed by him Peruvian Minister to France and Spain. In 1894, upon the death of President Bermudez, the party of Cáceres seized the reins of government, Cáceres was proclaimed dictator and the Congress forced to elect him President. The ex-dictator, Piérola, however, disputed his right to the office and besieged the city, on 18 March 1895, after a bloody conflict taking place. The treaty of peace was signed between the two parties, in which
Cáceres was obliged to resign the Presidency. He soon afterward fled and Piérola was elected President 10 July 1895. Upon the retirement of Romaña from the Presidency, Cáceres returned to his native land and again entered the political arena. He was sent as Envoy Extraordinary to Italy in 1905, and was assassinated 20 Nov. 1911.

Cáceres, Spain, a town in Extremadura, capital of the province of the same name, 24 miles west by north of Truchillo. It consists of an old and a new town, the former owning the top of a hill, and surrounded by a strong wall flanked with towers, and the latter built round it on the lower slopes. The houses are tolerably well built, but the streets are mostly narrow and steep. Among the objects worthy of notice are four churches, several old feudal mansions and the bull-ring. It is famous for its bacon, has manufactures of linen, woollens, hats, leather, soap, etc., and controls a large trade in the produce of the district. Pop. about 16,000. The province of Cáceres is the second largest of Spain, in the north of Extremadura, owned chiefly by large proprietors, and mostly devoted to cattle-raising; the north half is a good wine country. The area is over 8,000 square miles, and the population about 415,000.

Cáceres Nueva. See Nueva Cáceres.

Cachar, ká-cháh', a district of Assam, India, bounded east by Manipur and the Naga Hills, south by the Lushai Hills, west by Sylhet and the Jaintia Hills, and north by Nowgong district. It comprises a series of fertile valleys diversified by low hills and almost surrounded by mountains. The Barak River flows through the district, its course here being about 130 miles. Lignite and petroleum have been found. Salt is manufactured in small quantities. The forests are of great extent, and constitute the chief natural wealth of the district. Rice and tea are extensively cultivated. Area, 2,472 square miles; pop. 467,300. The chief town is Silchar.

Cachexy, ká-kék'si, or Cachexia, ka-kék'-si-a (Gr., "evil habit of body"), a morbid state of the bodily system, in which there is great weakness, with or without the local manifestation of some constitutional disease. It is not a disease of itself, but the result of diseases such as gout, cancer, lead-poisoning, tuberculosis, syphilis, intermittent fever, excessive use of alcohol, etc., each disease producing its particular modification of cachexia. Thus scrofulous cachexia means the condition of body due to scrofula, shown by slender form, narrow or deformed chest, pallor, diseased glands, large prominent joints, etc.

Cachoeira, ká-shwá'-ť-ra, Brazil, town in the state and 62 miles northwest of Bahia. It stands on the Paraguassu, which divides it into two unequal parts and has often injured it by inundations, and is the entrepôt for the traffic of a large extent of surrounding country. Tobacco and cigars are manufactured, the best brand in Brazil being named from the suburb of Saint Felix. The chief exports are coffee, sugar, fruit, cotton and tobacco. Pop. 15,000.

Cacholong, kásh'-o-long, a mineral of the opal division of the quartz family. It is often called pearl-opal. It is usually milk-white, sometimes bluish or yellowish white, or reddish, opaque or slightly translucent at the edges. Its composition is of silica, like quartz, and its symbol is SiO₂. Some authorities add to the symbol nH₂O, to express a varying amount of water usually found in its composition. Other authorities regard the water content as not characteristic. It often envelops common chalcedony, the two minerals being united by insensible shades. It also associates with flint and semi-opal.

Cachou, ká-shoo', an aromatic sweet-meat in the form of a silvered pill, used for giving an agreeable odor to the breath.

Cachucha, ká-choo'-chá, an Andalusian dance, resembling the bolero, performed to a graceful air in 3-4 time, and with both sexes, but with a strongly marked accent. It is usually danced with castanets, and was introduced on the stage by Fanny Elssler in the ballet of 'Le diable boiteux.'

Cacique, ká-sékh', or Caçique, a title borne by, or a designation given to, the chiefs
of Indian tribes in Central and South America, Cuba, Haiti, etc. The term was formed by the Spaniards from a native Haitian word. Among the Pueblo Indians of New Mexico, there are two tribal divisions—summer and winter. Different caciques preside over each. Their office has religious powers, chiefly; on them also devolves the appointment of the annual government officials. The caciques are appointed for life.

CACIQUE, one of several South American icterine birds, forming the genus Cassicus, and closely related to the Baltimore oriole. They are sometimes uniform black, sometimes black relieved by chestnut, yellow, green or scarlet; the bill is frequently white instead of the usual black or brown. The caciques are noted for their intricately woven, pouch-like nests, composed of thin bark and grasses, several of which, sometimes a yard in length, hang from the outer twigs of a single branch of some large tree, usually overhanging the water, as an extra precaution of safety against monkeys and snakes.

CACODYLE, or CACODYL, kák’-ó-dil,-dil (Gr., "having a bad smell"), in chemistry, a monad radical having the formula As(CH₄), and known as dimethyl arsine oxide. It is of special interest to the chemist because it was the first radical known in which a metal or a metalloid (in this case, arsenic) is combined with an organic base. The compound As₂(CH₄), which was discovered by Bunsen in 1837, and which can exist in the free state, is often called cacodyle, but it is more correctly known as dicacodyl since its molecule consists of two cacodyle radicals. Dicacodyl is obtained in the pure state by heating cacodyle chloride with zinc in an atmosphere of carbon dioxide, but a mixture of cacodyle oxide and dicacodyl (known formerly as Cadet's fuming liquid) may be obtained by distilling potassium acetate with an equal weight of arsenic trioxide. As this is liable to spontaneous combustion, mercuric oxide (HgO) converts both of the constituents of Cadet's liquid into cacodylic acid, (CH₄)₂AsO(OH); and this, in turn, is converted into cacodyle chloride, As(CH₄)Cl, by the action of corrosive sublimate and fuming hydrochloric acid. Cacodyle oxide (known also as alkarsin) may be obtained in the pure state by distilling the chloride with an aqueous solution of caustic potash in an atmosphere of carbon dioxide. Dicacodyl is a colorless oily liquid, heavier than water, boiling at 338° F., very poisonous, and characterized by an intensely disagreeable smell suggestive of garlic. Dicacodyl is known to the chemist as tetra-methyl di-arsenide.

CACOMISTLE, kák’-ó-mis-él, a small Mexican animal (Bassariscus astutus), closely related to the raccoon found in Mexico and neighboring parts of the United States. It is slender, about 16 inches long, with a sharp, fox-like face, large bright eyes surrounded with light patches, and erect ears. The long, soft fur is light brown, above, darker along the back; the under parts are white, and the bushy tail has six broad white rings running around it. In habits it resembles the raccoon. It feeds on smaller mammals, birds and insects. It is frequently tamed by miners and is known to them as the American civet cat.

CACOMITE, kák-o-mé-tā, a plant in Mexico and Central America from which an edible flour is made. It is called in the Nahua tongue ococoxochitl (tiger flower) on account of the appearance of its very handsome and showy blossoms.

CACONGO, kák-kóng’gō, or KAKONGO, a former district of Guinea, Africa, extending along the south Atlantic Ocean, in lat. 5° S., just north of the mouth of the Congo. The Cacongo River enters the sea in lat. 5° 12’ S. This territory was claimed by the Portuguese, and Cabinda, the northern part of it, they still retain; the south and east of the Congo have been absorbed in the Congo Free State.

CACTACEAE. See CACTUS.

CACTUS, the common name for all members of the family Cactaceae, a group of dicotyledons, found in luxuriance in the arid sections of North and South America. Like the watermelon, they have the faculty of absorbing a vast bulk of water, making the stems most succulent.

Giant Cactus or Shauano Cactus near Phoenix, Arizona.

The economic uses of the cacti are many, especially among primitive peoples. One or two species of the genus Anhialonium yield alkaloids which are used in medicine and which were known and used to produce intoxication by the Indians before the advent of the whites, and are still so used to a limited extent. The peculiar reticulations of the vascular or wood systems of many species render them very useful in the manufacture of art goods, otherwise known as curios in magazine sections. The various species are of most importance as articles of food for man and beast. In the semi-tropical and tropical regions of America a large group of the plants belonging to the genus Carnegiea and its allies furnish edible fruits known to the Spanish-American as pitahayas. These
1. Leaf-cactus (Phyllocactus anguiger).
2. Stapelia (simulating a cactus).
3. A Cereus (Cereus dasycaanthus).
5. Wart-cactus (Mammilaria pectinata).
6. Hairy Opuntia (Opuntia filipendula)—a, the blossom, enlarged.
7. Melon-cactus (Melocactus communis).
8. Giant Cactus (Cereus giganteus)—a, blossom, enlarged; b fruit, enlarged.
9. Mexican Opuntia (Opuntia coccinellifera)—a, the fruit (“prickly pear”), enlarged.
CACTUS

Flower of the Hedgehog Cactus
grow for the most part on tall, branching and columnar plants, similar to the familiar giant cactus (Cereus giganteus) of the Arizona desert. These fruits vary in size from three-forth to a foot or larger, depending upon the species. Along the Texas frontier forms grow which are known as Mexican strawberry to the English-speaking people.

Slightly farther the greater part of the fruit produced by this family of plants comes in the flat-jointed prickly pears belonging to the genus Opuntia, the fruit of which are known in Spanish America as tunas. Some of these are extensively cultivated throughout the highland region of Mexico as well as in the Mediterranean region of Europe, Asia and Africa. Prickly pears, although natives of the American continent and its continental islands, are now cultivated or have become naturalized throughout sub tropical regions of the world. The fruits are eaten raw, dried, and in the form of preserves. Their juice are also expressed and fermented into a drink called colonche. It is less common now than formerly to find a distilled drink made from the tuna because of the deleterious effects of tuna alcohol.

On account of their ability to absorb and retain large quantities of water, the cacti, especially the prickly pears, often become important to the stockmen in portions of our southwestern States. They remain green and succulent after other forage has dried up or become exhausted. The rancher then resorts to this rough feed to save his stock. He may singe the thorns off with a brush or, if his herds are large, he may singe them with a modified plunger's torch, or he may even chop the plants into small pieces and feed them in this way.

It is a common practice in southwestern Texas to feed prickly pear and cottonseed meal to stock during the winter. In the vicinity of San Antonio dairymen for a number of years have fed prickly pear to their dairy cows along with a liberal supply of grain and hay. Prickly pears furnish the succulence so essential in milk production and so difficult to obtain in a semi-arid region.

When driven to extremity travelers in the desert have been known to resort to these plants for water supply. The pulpy tissues, preferably of such forms as the barrel cactus (Echinocactus), are macerated to set the juices free. A rather unpalatable and somewhat purgative drink is thus obtained which relieves thirst in a measure. The candied flesh of the barrel cactus forms a palatable sweetmeat.

The flowers and stems of the blooming cactus (Cereus grandiflorus) have been used in medicine, in the form of a fluid extract, as a cardiac stimulant. Its action resembles that of digitalis, but is less uniform.

**CACTUS WREN**, a small wren (Campylorhynchus brunneicapillus) inhabiting the arid and desolate regions of the Mexican border. It is grayish brown above, darker on the head, nearly pure white beneath, with a spotted breast, and a white line over the eye. It makes a large flask-shaped nest of grasses and twigs, lined with feathers, and laid in the crotch of a cactus. This nest is entered by a covered way or neck several inches in length. It is a very slyly bird with a clear, ringing song.

**Cacus**, in Roman legend, a huge giant, in some accounts a son of Vulcan, who lived in a cave on Mount Aventine. Having stolen and dragged into his cave some of the cattle of Hercules, he was caught by the latter when he was caught by the latter when he was passing the entrance of the cave. The Ara Maxima was built by Evander to commemorate this victory. Consult Livy (Bk. 1, 7) and Virgin, *Æneid* (VIII, 184–279.)

**CADA MOSTO, ká'da mo'stô, or CA DA MOSTO, Luigi da, Italian navigator: b. Venice, about 1432; d. about 1480. In 1455 he departed from Lagos, sailed into the river Sene- gal, which had been discovered five years before, and after trading in slaves and gold he steered for Cape Verde, where he joined two other discovery ships, and visited, in company with them, the mouths of the Gambia, the rivers of which had been greatly extolled. In 1456 Cada Mosto, in company with two other ships, made a second voyage to the Gambia. On the way thither they discovered the Cape Verde Islands. The description of his first voyage, "Il Libro de la prima navigazione per l'oceano alle terre de' Negri della Bassa Etiope, di Luigi Cada Mosto" (Vicenza 1507, and Milan 1519), the oldest of the voyages of the moderns, is a masterpiece. The arrangement is admirable, the narrative interesting, the descriptions clear and accurate.

**CADAMBA, ká-dam'bà, or KUDUMBA, the wood of several species of Nauclea, an Indian genus of Cinchonaceae. It is a wood of deep yellow hue, used locally in the manufacture of furniture. N. (Uncaria) gambir is the source of the dyestuff known commercially as gambir or gambier.

**CADASTRAL SURVEY** (F. cadastre, from It. catastro, from Lat. captastrum, "a register for a poll-tax"); Lat. caput, "the head"), a territorial survey in which objects are represented in their true relative positions and magnitudes. A cadastral survey differs from a topographical one, in not magnifying the principal objects. It requires consequently to be made on a larger scale than the topographical survey, so as to admit of a proportionally accurate representation of towns, houses, roads, rivers, etc. The scale on which the cadastral map of the United Kingdom is prepared, 1/20 of the linear measure of the surface surveyed, is an example of the scale of a cadastral survey. This scale corresponds with 25.34 inches to the mile. See Surveying.

**CADDIS-FLY**, the common name of any of the order Trichoptera, a group of aquatic insects, related to and by many supposed to be the ancestors of the moths and butterflies (Lepidoptera). They resemble the lower moths, but the wings are not scaled, except in a very rudimentary way. They differ from moths in having no true "tongue" or well-developed maxilla adapted for sucking the nectar of flowers, but as in moths the mandibles are either absent or obsolete. About 150 species are thus known. All are aquatic, some of which are called "caddis-worms," "case-worms," or "cad-bait." They are more or less cylindrical, with well-developed thoracic feet, and a pair of
feet on the end of the abdomen, varying in length. The head is small, and like that of a tortricid larva, which the caddis-worm greatly resembles, not only in form, but in its habit of rolling up submerged leaves. They construct cases of bits of sticks, sawdust or grains of sand, which they drag over the bottom of quiet pools, retreating within when disturbed. They live on vegetable matter and on water-fleas (Entomophaum), and small aquatic larvae. When about to pupate they close-up the mouth of the case with a grating, or, as in the case of Helicoptus, which is coiled like a snail-shell, by a dense silken lid with a single slit, and in some instances spin a slight, thin, silken cocoon, within which the pupa state is passed. The pupa is much like that of the smaller moths, except that the mandibles are present, and wings and limbs are free from the body. After leaving its case it makes its way over the surface of the water to the shore, sometimes going a long distance. The female deposits her eggs in a double gelatinous, greenish moss, which is attached to the surface of some aquatic plant. Consult McChlairs, 'Monograph of the Trichoptera of the European Fresh-Water Basins; A List Synopsis, Catalogue, and Bibliography of the Neuropteroidea Insects of Temperate North America'; 'Transactions of the American Entomological Society,' Vol. XIX; also a paper by Newham and Betten in 'Bulletin of the New York State Museum,' 47.

CADDIOAN (kâ’dô-an), INDIANS, a fanciful name of North American Indians, comprising the Arikare tribe in North Dakota; the four Pawnee villages, Grand, Tapage, Republican and Skidi, in the Indian Territory; and the Caddo, Kichai, Wichita and other tribes, formerly in Louisiana, Texas and Arkansas. The present number of these Indians is about 2,130, of which 416 are in North Dakota, the rest in the Indian Territory.

CADE, John (the Jack Cade of Shakespear), Irish rebel; d. 11 July 1450. Early obliged to flee from Ireland, he took refuge in France. In 1448 he passed over to England at the moment of great popular dissatisfaction with the ministers of Henry VI. He at once pretended to be a relative of the Duke of York, assumed the name of Mortimer, raised the standard of rebellion in Kent, 8 May, and very soon found himself at the head of 20,000 men. He advanced to Blackheath, and interchanged notes with King Henry, to whom he made known the griefs of his companions. He defeated the royal troops which were sent against him, and entering London, 1 July, immediately caused the arrest and imprisonment of the ministers. At first he kept his army under rigorous discipline, but after a few days' residence in the capital their propensity to plunder could no longer he restrained, and they pillaged some of the finest houses. This aroused the citizens against them, and on the night of 3 July Cade met with his first defeat. A promise of pardon now dispersed most of his followers, and finding his force no longer sufficient for resistance he took to flight, was overtaken, offered resistance and, mortally wounded, was taken prisoner and there slain by Sir John Fastolf and by Sir William de Dreyskirk, with whom he was imprisoned. He was afterwards tried by a court martial and executed. In his day Cade was considered to be the hero of the common people, and his name is associated with the popular rising of 1381. He is known in England as the Jack Cade of Shakespeare, and his memory is kept alive by hisද Caddo tribesmen in the United States.

CADELL, Francis, Scottish explorer in Australia: b. Cockenzie, Scotland, 1822; d. 1879. At the age of 14 he entered the service of the East India Company as midshipman and in 1844 was a sailor. They were sent to explore the Murray River and were engaged in scouting for the navigability of the Murray River in Australia. He then made an extended exploration of that stream in 1860. Subsequently forming a navigation company he reached by steamboat a point on the river's mouth, and in 1878 and 1879 he explored the Murray Bridge River, and in 1878 the Darling River as far as Mount Murchison. While in command of a vessel sailing from Ambonya he was murdered by his crew.

CADENCE, the concluding notes of a musical composition or of any well-defined section of it. See Harmony.

CADENCY, in heraldry, a system of marks intended to show the descent of a younger branch of a family from the main stock. Modern heraldry recognizes nine marks of cadency; the first son bears the label; the second, the crescent; next in order come the mulet, the martlet, the annulet, the fleur-de-lis, the rose, the cross-moline and the orle.

CADINGNA, in music, a flourish of indefinite form introduced on a bass note immediately preceding a close. Formerly the performer improvised his own cadenzas but after Schumann's tune all composers write out the cadenzas and do not trust to the improvisations of every performer.

CADER IDRIS, a mountain in Merionethshire, Wales, the beginning of a chain running northeast. The ridge is nearly 10 miles long, and with its breadth of from one to three miles makes an elevation of great massiveness. Its greatest height is 2,925 feet. It is about five miles southwest of Dolgelly, and there is a fine view of the Irish Sea from the summit.

CADET, ka’dêt, a word having several significations. It is of French origin, and was written capet in the 15th century, from capiteto, little chief, inferior head of a family. Fr. premier, premier.

1. A younger son of a family; that is, one junior to the eldest or heir by primogeniture; the youngest son; a younger branch—or member of a younger branch—of a family. Thus the brothers Coquelin, the famous French actors, were described as Coquelin aîné and Coquelin cadet. The feminine forms are aînée and cadette.

2. In the former French military service—before the Revolution—a gentleman who entered the army without a commission and without pay, two of the offensive professions, as was regularly done by the younger sons of the nobility to find a career for themselves. This last was all the more necessary as the droit d'ânesses, which had prevailed in France since the 12th century, gave the whole inheritable estate to the eldest son, to the detriment of the younger ones. Since the decree of 15 March 1790, hereditary possessions are equally divided among all the children or their descendants, irrespective of sex and primogeniture.

3. A junior clerk in the old East India Company's way to London. The body of students in the United States Military Academy at West Point is known as cadets.
Point, N. Y., is known as the United States Corps of Cadets. They constitute part of the army, but are not officers. Graduates are commissioned as 2d lieutenants. The students in the United States Naval Academy at Annapolis; those of the Royal Military Academy at Woolwich, or the Royal Military College at Sandhurst, are termed cadets, or, in the French military sense, a young man designed to become an officer not by rising from the ranks, but by a course of special instruction to qualify him for the position. A midshipman is a naval cadet afloat. In Germany the cadet system is highly developed. The training ships are called Kadettenschiffe. Cadet schools and corps exist in all the other European armies and navies. The Japanese Cadet School in Tokio has a teaching staff of 239 and over 1,500 students. In China each provincial capital contains a primary military school, where pupils from 15 to 18 years of age undergo a three years' course, proceed to one of the Four Middle Schools for two years, followed by six months' practical training. From there to the Military High School at Paotingfu.

CADETS DE LA CROIX, crwã, the early name by which the Camisards (q.v.) styled themselves, from a white cross they wore under their hats.

CADET'S FUMING LIQUID. See Caodyle.

CADILLAC, kã-dê-yãk, Antoine de la Mothe, French military commander: b. Gascony, France, about 1660; d. France 1720. He came of good family, and having entered the army was for some time captain in Acadia. In 1694 Frontenac placed him in command of Michilimackinac, where he remained until 1697. Cadillac then brought to the attention of Louis XIV a well-considered scheme for a permanent settlement and trading post in the Northwest. On receiving the monarch's approval he founded Detroit in 1701, establishing 50 soldiers and 50 settlers at that point. From 1712 to 1717 he was governor of Louisiana, returning to France in the year last named. The town of Detroit was named in his honor. Consult Burton, 'Cadillac's Village, a History of the Settlement, 1701-10' (1896); Parkman, 'A Half Century of Conflict' (Boston 1892).

CADILLAC, Mich., city and county-seat of Wexford County, on Little Clam Lake, and on the Grand Rapids and Indiana and the Ann Arbor railroads, 98 miles N. of Grand Rapids. It was founded in 1871, incorporated in 1874, and since 1914 has been under the commission manager plan of government. The principal buildings comprise city hall, county courthouse, public library and hospital. Besides the lumber interests of a valuable hardwood timber region, it has a veneer, table, chair and shoe and others factories, chemical works and machine shops. Pop. 8,375.

CADIZ, Ohio, village and county-seat of Harrison County, about 25 miles northwest of Wheeling, W. Va., and 120 miles east-northeast of Columbus, on the Pittsburgh, Cincinnati and Saint Louis Railroad. Cadiz is important as a banking centre and has a large trade in coal, gas, poultry, oil and wool. It was the home of Edwin M. Stanton (q.v.). Pop. 1,971.

CADIZ, kã-diz or kã-dis (anciently Gadara), a seaport and one of the handsomest cities in Spain, 95 miles south-southwest of Seville by rail, is situated at the extremity of a long tongue of land projecting from the Isla de Leon, off the southwestern coast of Andalusia. The narrowness of the land communication prevents its capture by a military force unless the garrison is master of the sea. It is walled, with trenches and bastions on the land side; the houses are high, and the streets narrow. The chief buildings are the great hospital, the custom-house, the old and new cathedrals (with pictures by Murillo), two theatres, the bullring, capable of accommodating 12,000 spectators, and the lighthouse of Saint Sebastian. From the harbor the town presents a magnificent appearance. The Bay of Cadiz is a very fine one. It is a large basin enclosed by the mainland on one side, and the projecting tongue of land on the other. It is from 10 to 12 leagues in circumference, with good anchorage and protected by the neighboring hills. It has four forts, two of which are in cold storage, the grand arsenal, La Caracci, in which are 3 basins and 12 docks. The city touched its greatest prosperity after the discovery of America, when it became the European emporium for the New World. The loss of the Spanish colonies in America dealt it a heavy blow; but within recent years it has made rapid strides despite the imperfect drainage and a bad water supply which are responsible for the high death rate of 44 per 1,000. Cadiz has long been the principal Spanish naval station. It was the centre of the Spanish-American trade, and the commerce of the port was very extensive before the separation of the colonies. The preparation of salt from pits belonging to the government was formerly an important branch of industry, but is now of comparatively little consequence. The manufactures of Cadiz are of comparatively little importance, but in regard to the extent and value of its commerce it ranks as one of the first ports in Spain. Its imports consist of all kinds of foreign colonial produce, coal, cotton and woolen manufactures etc.; its exports of wines, fruits, oils and other products of Spain. The town of Santa Maria, opposite Cadiz, is the principal depot of the wines. It was founded by the Phoenicians about 1100 B.C., and subsequently belonged in succession to the Carthaginians and the Romans. Long in possession of the Moors, it was captured from them in 1202 by Alfonso X. of Castile. In 1587 Sir Francis Drake destroyed the Spanish fleet in the bay; and it was taken by the Earl of Essex in 1596, and from its bay Villeneuve sailed previous to the battle of Trafalgar in 1805. In 1809 it became the seat of the central junta, and afterward of the Cortes. It sustained a long blockade from the French (1810-12), which was not raised till after the battle of Salamanca. In 1823 the French entered it after a short siege. The Spanish revolution of 1808 originated in Cadiz. Pop. 67,174.

CADMAN, Samuel Parks, American Congregational clergyman and author: b. Wellington, Shropshire, England; d. Richmond College, at the age of 50, 1844. A graduate of London University (Richmond College), after he came to the United States, he received the degree of D.D. from Wesleyan
and Syracuse universities, 1898; S.T.D., Columbia University, 1913; D.H.L., University of Vermont, 1913. He was pastor of the Metropolitan Temple, New York, from 1895 to 1900, when he accepted a call to the Central Congregational Church, Brooklyn. Previously he had been a student at Adelphi College in 1913-14. Well known as a public speaker and lecturer, he is author of ‘Charles Darwin and Other English Thinkers’ (1911) and ‘Three Great Oxford Movements’ (1915).

CADMEA, the name given to the acropolis of Thebes, Boeotia, because it was said to have been founded by Cadmus. Only fragments of its walls remain.

CADMIA, a name used by early writers (1) for the mineral calamine (q.v.); and (2) for the sublimate of zinc oxide that often collects on the walls of furnaces used in the reduction of metallic ores, when those ores happen to contain zinc.

CADMIUM, a metallic element resembling zinc in its chemical properties, and discovered by Stromeyer in 1817, in a specimen of zinc carbonate. Cadmium often occurs in ores of zinc to a small extent, blende sometimes containing as much as 3 per cent of cadmium sulphide. The commercial supply of the element is obtained as a by-product in the smelting of zinc, chiefly in Belgium and Silesia. Cadmium sulphide also occurs native as the mineral greenockite (q.v.), otherwise known as “cadmium blende.” In the distillation of zinc ores the cadmium, being more volatile, passes over first; and advantage is taken of this fact for the isolation of the metal in the arts. In Silesia, where the zinc ores often contain considerable quantities of cadmium, the first portion of the distillate is likely to contain as much as from 3 to 10 per cent of cadmium. This is mixed with coal or charcoal and redistilled at a low red heat. Cadmium, mixed with a little zinc, passes over; and by one more distillation the metal is obtained in a fairly pure form. To eliminate the last traces of zinc, the crude metal is dissolved in hydrochloric acid, then diluted and precipitated as a sulphide by a current of sulphurised hydrogen. The sulphide is then dissolved in concentrated hydrochloric acid, and the subsequent addition of carbonate of soda precipitates the carbonate of cadmium, which is reduced to the oxide upon ignition. The pure oxide thus obtained may then be reduced to the metallic form by distillation with charcoal.

Metallic cadmium is lustrous and resembles tin in appearance, though it has a bluish tinge. It is stronger than tin, but, like that metal, it emits a peculiar cracking sound, or “cry,” when bent. At ordinary temperatures it is quite ductile and malleable, and may be drawn into thin wire, rolled into thin sheets, or hammered into foil. At about 175°F. it becomes brittle, however, so that it can be pulverized in a mortar. Cadmium has the chemical symbol Cd. Its specific gravity is about 8.65. It melts at 600°F., and boils at about 1,500°F., yielding a yellow vapour. Its atomic weight is 112.4 if O = 16, or 111.6 if H = 1. Its specific heat is about 0.055, and its linear coefficient of expansion is about 0.0000185 per Fahrenheit degree. Metallic cadmium is used to a limited extent in the preparation of alloys, its general effect being to reduce the melting-point of the alloy to which it is added. The total production of the metal per annum is probably about two tons.

In its chemical relations, cadmium, like zinc, is a dyad. Metallic cadmium undergoes a slow, superficial oxidation upon exposure to the air; and when sufficiently heated in the presence of air it oxidizes rapidly and may even take fire. The resulting oxide, CdO, is brown in color and readily dissolves in acids, giving solution of the corresponding cadmium salts. One of the best known of these salts is the iodide, CdI2, which is used in photography and in medicine, and may be obtained by the action of hydrochloric acid, HCl, upon cadmium carbonate, or metallic cadmium. The bright yellow sulphide, CdS, is formed when the stream of sulphurised hydrogen gas is passed through a slightly acid solution of a cadmium salt; and this fact is used in the detection and isolation of cadmium in qualitative analysis. Cadmium sulphide is used as a pigment, under the name of “cadmium yellow”; it is brilliant in color, and does not change upon exposure to air or light.

CADMUS, in Greek mythology the son of Agenor and grandson of Poseidon. With his brothers he was sent by his father to seek for his sister, Europa, who had been carried away by Zeus, and he was not to return without her. After several adventures, the oracle at Delphi commanded him to desist from further search, to entrust himself to the guidance of a heifer, and where she should stop to build a city. He accordingly went to Boeotia, where he wished to sacrifice the cow to Athena. But his companions, attempting to bring water from the fountain of Ares for the purpose of the sacrifice, were slain by the dragon that guarded it. Cadmus killed the dragon, and, at the command of Athena, sowed its teeth in the earth; armed men immediately sprang up, whom he called Sparti (the sowed), but who perished in a contest with each other, excepting five. With the remainder he built his city, which he named after his father, or Thebes (see THEBES). He became by his marriage with Harmonia the father of Antinoé, Ino, Semele, Agave and Polydorus. After ruling for a time the city which he had built, and the state which he had founded, he proceeded, at the command of Bacchus, with Harmonia to the Enchelae, conquered their enemies, the Illyrians, became their King, and begat another son, Illyrius. Tradition states that Cadmus came to Boeotia from Phoenicia, 1550 B.C., conquered the inhabitants who opposed him, and, in conjunction with them, founded the above-mentioned city. To promote the improvement of his subjects he taught them the Phoenician alphabet, the employment of music at the festivals of the gods, besides the use of copper, etc. Another Cadmus, of Miletus, a son of Pandion, was regarded among the Greeks as the first who wrote in prose. He lived about 600 B.C.

CADOL, Victor Edouard, věk-tȯr ěd-ō-àrd ka-dōl, French dramatist and novelist: b. Paris, 11 Feb. 1831; d. 1898. He was long a prominent writer, and was one of the founders of Le Temps, and was one of the founders of L' Esprit Français. Among his very numerous works, many of which were written in collaboration, are 'La Germaine,' a three act
COUNT GENERAL LUIGI CADORNA
Commander-in-Chief of the Italian armies (1915-17)
comedy (1864); 'Les ambitions de M. Fauvelle' (1867), which ran for over 200 consecutive nights; 'Les Inutiles' (1868); 'La Belle Aventure' (1869); 'La fausse monnaie' (1869); 'Paris pendant le siège' (1871); 'Le spectre de Patrick' (1872); 'Mariage de princesse' (1888); 'Thérèse de Paris' (1893); 'L'archiduchesse' (1897). A corrected edition of his dramas appeared in 1897 entitled 'Théâtre inédit.' Among Cadol's romances are 'Contes gais' (1867); 'Le Monde galant' (1873); 'Madame Elise' (1874); 'Rose' (1875); 'La Grande Violette' (1879); 'Son Excellence Satinette' (1882); 'La Belle Virginie' (1883); 'Tout Seul' (1884); 'Lucette' (1886).

**CADORE, kā-dōrā, or PIAVE DI CADORE, a town of Italy, in the province and 22 miles north-northeast of the town of Belluno, on the Piave, derives its chief interest from being the birthplace of Titian.**

**CADORNA, kā-dōr-nā, Luigi, Count, Italian general, son of General Count Raffaele Cadorna. Born 1850. After receiving his early education at a cadet school he passed the Staff College and was attached to his father's staff in 1870 when the latter—a brilliant soldier—led the Italian army into Papal territory in 1870 and blew in the Porta Pia. He attained the rank of captain in 1875, and was ultimately appointed chief of staff of the Verona Army Corps. After commanding the 10th Bersaglieri he was promoted major-general in 1898 and lieutenant-general in 1905. For a time he commanded the division at Ancona and was subsequently appointed corps commander at Genoa, with the rank of commander-designate of an army in the field. In 1914 he succeeded General Polllo as chief of the general staff. His reputation as a professional soldier had long been established throughout Europe, for he had written works on military science and possessed a unique knowledge of that difficult terrain in which, if ever, Italy would be called upon to fight her old enemy and quondam ally Austria. When Italy entered the war in May 1915 Count Cadorna was given the supreme command in the field. His battle front of about 480 miles was the most difficult one in Europe, presenting enormous geographical obstacles, the angle of the Trentino, the great wall of the Dolomites and the Carnic and Julian Alps. The Italian successes of 1916, including the capture of Gorizia, were neutralized by the great Austro-German drive against Italy that began on 23 Oct. 1917. By the evening of the 29th the whole Italian line was in retreat and General Cadorna fell back upon the Tagliamento. Gorizia fell to the enemy and Udine was lost. The mountain defenses in the Carnic Alps began to crumble and the disaster soon extended to Cadore. Abandoning the Tagliamento line on 5 November Cadorna fell back to the Porta Pia. After a futile attempt to hold the Livenza. The Italian losses were estimated by the enemy at 250,000 men and 2,300 guns, and the Allies suffered a defeat in the field unparalleled in the war. French and American troops were rushed to the scene, but the Italians recovered themselves by their own efforts and made a firm stand on the Piave. On 9 Nov. 1917, a Supreme Political Council of the Allies for the whole of the western front was created, and General Cadorna was appointed a member of the permanent central military committee. On 10 Feb. 1918 Cadorna was succeeded as a member of the Supreme War Council by Gen. Gaetano Giardino. He was succeeded in his command by General Dandolo. See War, European—Austro-Italian Campaign.

**CADORNA, Raffaele, Italian general: b. Milan 1815; d. Turin, 6 Feb. 1897. He served in the Crimean War, and in 1860 was made war minister in Tuscany's provisional government, and military commander of Sicily in 1866. He suppressed the Bourbon insurrection in Palermo in the latter year, and in 1870 captured Rome and was its military governor for a time. In 1871 he entered the Italian Senate. He was the author of 'Osservazioni sull'amministrazione centrale della guerra' (1854); 'Bibliografia delle campagne per l'indipendenza italiana' (1882), and 'La liberazione di Roma nel 1870' (1889).

**CAUDIDAL, Georges, kā-doo'-dahl', French Chouan chief: b. Brittany, 1 Jan. 1769; d. Paris, 25 June 1804. In the protracted and sanguinary contests between the Royalists and Republicans during the French Revolution, the Chouans and Vendéens were the most resolute supporters of the Royal cause; and the energy and ability of Cadoudal soon raised him to an influential place among the adherents of the house of Bourbon. At this time attempts were made by Napoleon to gain over Cadoudal to the cause of the republic, and a lieutenant-generalship in the army was offered as the price of his submission; but he firmly declined all these overtures. He afterward engaged, in concert with General Pichegru and others, in a conspiracy having for its object the overthrow of the consular government and the restoration of the monarchy; which being discovered, Cadoudal was arrested and executed. Consult Georges de Cadoudal, 'Georges Cadoudal et la Chouannerie' (Paris 1889).

**CADUCEUS, kā-dū'-se-ūs, the staff considered as a symbol and attribute of the Greek god Hermes and the Roman god Mercury. It is generally represented as having two serpents twined around it in opposite directions, their heads confronting one another. It is probable that the staves carried by heralds and public criers gave rise to this fable, the fluttering ribbons or fillets tied to the end of the staff, or the green wreaths or bouquets which were tied around it, giving the suggestion of the presence of living serpents. Several different fables were invented by late Greek writers to account for the serpents in a miraculous way. The fable tells that Apollo gave his staff to Mercury in consideration of his resigning to him the honor of inventing the lyre. As Mercury enteredArcadia with this wand in his hand he saw two serpents fighting together; he threw the staff between them, and they immediately wound themselves around it in friendly union. The caduceus is Mercury's peculiar mark of distinction. With this he conducted the shades to the lower world, and from it, in the time of the Roman empire, he received the name of Caducer; yet we find it on ancient coins in the hands of Bacchus, Hercules, Ceres, Venus and Anubis. Among the moderns it serves princi-
pally as an emblem of commerce over which Mercury was the presiding divinity.

CADWALADER, kād-wālā'dér, George, American lawyer and soldier: b. Philadelphia 1804; d. there, 3 Feb. 1879. He practised law till 1846; was made brigadier-general of volunteers; and was brevetted major-general after Chapultepec. He resumed his law practice till 1861; became major-general of State volunteers; was placed in command at Baltimore; accompanied Patterson's expedition to Winchester (1861); and, as one of a military board, directed the United States army operations. He was author of 'Services in the Mexican Campaign of 1847' (1848).


CADY, J. Cleveland, American architect: b. Providence, R. I. He entered the profession of architect in 1870 and among his noteworthy buildings are the American Museum of Natural History, the Metropolitan Opera House, the Brooklyn Art Association, various collegiate structures at Yale, Williams, Trinity and Wesleyan, and numerous churches, hospitals, mansions, commercial buildings, etc., throughout the country. Trinity College conferred on him the degree of M.A. in 1880 and LL.D. in 1905.

CÆCILIAN, sē-sēl-ē-ăn, a member of a family of batrachians, the Cæcilidae, regarded as forming an order, called Apoda, or Gymno- phiona. They are long, worm-like animals, lacking all traces of limbs, and having only a rudiment of a tail. They may be as many as 250 vertebrae. The hinder end is blunt and hardly to be distinguished from the head. The body is covered with a soft, moist skin, and the jaws are armed with rather feeble teeth. These animals are found in the tropical parts of America, Africa and Asia, where they burrow like earth-worms, which they resemble. They are often found in the nests of ants, which they devour. They also feed on worms. The breeding habits of these creatures are not well understood. The eggs are laid either in the water or near it. One species found in Ceylon lays a mass of eggs which are connected by a cord, thus resembling a string of beads. They are deposited in a burrow near the water, and are incubated by the mother until the escape of the young. About 30 species of these animals are known.

CÆCILIUS, sē-sēl-ē-us, Status, Roman comic poet and dramatist. He was born in Gaul of the race of the Iserbians; d. 166 B.C. His contemporaries ranked him with Plautus and Terence and included him in the number 40 comedies of which fragments remain. He was brought to Rome as a prisoner of war, but was freed. He was a friend of Ennius. Volcacius Sedigetus ranks him first among the comic poets of Rome. A few fragments have been preserved, mainly by Cicero and Aulus Gellius. Consult Ribbeck, 'Comiconum Romanorum Fragmenta' (Leipzig 1898).

CÆCULUS, sē-kū-lūs, in mythology, a son of Vulcan, and a great robber, who lived in Italy, and built Premneste; he was unable to find inhabitants he employed the aid of Vulcan, his father, who populated the city for him.

CÆCUM, sē-kūm (Lat. cæcus, blind), or caput coli (head of the colon), a blind pouch into which the small intestine empties. In the human body it is so small as to be practically useless. It is the therefore inclined to be larger in herbivorous animals; but it is lacking in some animals, like the bear, which would seem to require it; and omnivorous or granivorous birds have two cæcæ generally large, while fishes have no true cæcum and in reptiles the cæcum is small. The cæcum aids the digestion in the mammalia by the secretion of a fluid resembling gastric juice.

CÆCUM, Diseases of. Acute disease of the cæcum is usually present in the form of appendicitis (q.v.). Tuberculosis of the cæcum and cancer of the cæcum are described under the terms cancer and intestinal tuberculosis. The chronic diseases of the cæcum may be arranged under the headings, chronic catarrhal inflammation, atony of the cæcum with dilatation, spasm of the cæcum, displacements, and the neuroses of the cæcum. In some instances the cæcum may be thought of as a secondary stomach. Like the stomach, it is a dilated organ at the end of a portion of the intestinal canal, hence its disorders run in a sense parallel to those of the stomach. It is a food pouch which contains a quantity of food ready to be absorbed.

Atony of the cæcum is not an infrequent cause of serious disturbance and is due either to a general body loss of tone, as from wasting disease, from neurotic disturbances, from displacements or from mechanical obstructions. Certain clinicians regard the neurotic disposition or constitution as the most frequent, others regard the mechanical factors to be the most important. Atony may be present alone or be associated with dilatation, which latter is the more frequent.

The symptoms are complex and at times obscure. They are frequent in young adults, usually between 25 and 45. Obstinate constipation is a prevailing state. This is interspersed or broken into, as it were, by paroxysmal attacks of griping pain. These may last a few hours. At times there are simply periods of severe discomfort, with feeling of fullness in the right iliac fossa. Loss of appetite with times nausea and vomiting are present. Examination of the abdomen reveals a fullness and resistance; there is frequent ileo-cæcal gurgling of gases and percussion of the area reveals a greater or less area of tympanites. Diarrhoea is not infrequent during the attacks. X-ray pictures are important in the diagnosis as it is frequently misinterpreted as a chronic ap-
CÆDMON — CAEN

PENDICTIS — which latter condition often accompanies the chronic caecal atony and dilatation. The treatment is by rest, the knees drawn up, hot applications and belladonna. If the pain is severe, high soapsuds enemata are of value. Operation is rarely called for; the chief general treatment should consist in raising the general muscular tone of the individual. Setting up exercises with special attention devoted to the morale of the abdominal muscles is the best treatment. A vigorous attitude will give rise to a strong-minded intestine and do much to relieve the flabbiness and loss of muscular tone of these individuals. They are for the most part people who are chronically sorry for themselves and are usually internally indolent although at times externally fairly active.

Typhlospasm is the name given to an opposing type in which increased tone of the caecum gives rise to a chronic spastic state of the organ. This is found in young adults usually of the more forceful and busy type. Here pain and discomfort are felt and there is a tendency toward increased frequency of bowel movement, two to three small dryish movements a day. The movement usually does not seem to relieve the patient. There is a sense of something "left behind" and mucus and blood are sometimes passed, and the entire colon seems in a tense, full, uneasy state. This type of individual is usually forceful, overaggressive, choleric and impatient. They are frequently haters and often not well socially adjusted, often intensely aware of their environment. The treatment is largely, psychical. Belladonna, chloral and bromides are of value in tiding over the acute periods of distress. A prevailing trend in neurological medicine is to regard these conditions as largely of mental origin in which the mechanical factors, Lane's kinks, etc., are contributing causes.

CÆDMON, kâd'môn, the first Anglo-Saxon poet; d. 680. According to Bede's 'Ecclesiastical History,' Cædmon was a swineherd to the monks of Whitby, and never gave evidence of any poetical talent until one night a vision appeared to him, and commanded him to sing. When he awoke, he found the words of a poem in praise of the Creator of the world impressed upon his memory. This manifestation of talent obtained for him admission into the monastery at Whitby, where he continued to compose devotional poems. An edition of his paraphrase of parts of the Scriptures was printed at Amsterdam in 1655, edited by Junius. Thorpe published an edition of it (London 1832) for the Society of Antiquaries. It has been assumed by some that Milton took some ideas of 'Paradise Lost' from the poems of Cædmon. It is certain that they were very popular among the English and the Saxon part of the Scottish nation, and furnish plentiful materials to the makers of mysteries and miracle plays. In the Bodleian Library at Oxford is a manuscript the contents of which are ascribed to Cædmon, but the best authorities do not consider it to be his. Consult Ten Brink, 'Early English Literature'; Morley, 'English Writers'; Vol. II (1888); and the bibliography in the 'Cambridge History of English Literature.'

CÆLIUS, sè'lûs, Aurelianus, Latin physician, generally supposed to have been a native of Numidia, and to have flourished in the 4th or 5th century of the Christian era. He was a member of the sect of the Methodici, and the author of 'Medicinae Responsiones,' a compendium of the whole science of medicine in the form of a catechism 'Libri Quinque Tar- darum Chronicarum Passionum' and 'Libri Tres Celerum sive Antiquorum Passionum.'

CÆLIUS MONS, one of the seven hills on which Rome was built. It is said to have received its name from Celius Vibenna, an Etruscan, to whom it was assigned. The palace of Tullius Hostilius was on this mount. It is at present covered with ruins.

CAEN, kã, France, town in the department of Calvados, and the ancient capital of Normandy, 125 miles northwest of Paris, and about nine miles from the mouth of the Orne, which is here navigable and crossed by several bridges. There is a dock connected with the sea by both river and canal. Caen is the centre of an important domestic trade, in the market of a rich agricultural district, and carries on extensive manufactures. The streets are broad, regular and clean, the houses well built of white freestone and it possesses various ancient and remarkable edifices. The public parks and recreation grounds are beautiful, and there are various extensive squares and places. The church of La Trinité, a fine edifice in the Norman-Romanesque style, restored in modern times, was formerly the church of the Abbaye-aux-dames, founded in 1066 by Matilda, wife of William the Conqueror. The church of Saint Stephen was founded at the same time by William the Conqueror as the church of the Abbaye-aux-hommes, and though considerably modified since is a noble and impressive edifice. It has two fine western towers 295 feet high. The Abbaye-aux-hommes, built by the Conqueror, who was buried in it, is now used as a college, having been rebuilt in the 18th century. One of the finest churches in Caen is that of Saint Pierre, whose tower (255 feet), terminated by a spire, is exceedingly elegant. Among other public buildings are the Hôtel de Ville, the prefecture and the palace of justice. Caen possesses a university faculty or college, a public library with some 100,000 volumes, and numerous paintings with valuable works of old masters, a natural history museum, an antiquarian museum, etc. The hospital of the Abbaye-aux-dames is one of the best regulated in France. The hospital of the Bon-Sauveur is another admirable institution. The city was formerly fortified, and there are remains of a castle begun by William the Conqueror and finished by Henry I, but since much altered and now used as barracks. Caen first rose into importance in the time of William the Conqueror. In 1346 it was taken by Edward III, at which time it was said to be larger than any city in England except London. Henry VI of England founded a university here in 1431, Caen having been in the possession of the English from 1417 to 1430. It suffered much in the religious wars between the Protestants and the Roman Catholics of France. Admiral de Coligny captured it for the Protestants in 1562. Caen carries on shipbuilding, and its manufactures embrace linen, woolen and cotton goods, lace, ropes, metals, goods, leather, cutlery and various other articles and has foundries, breweries, dyeworks and sawmills. It is also famed for gloves made.
from the skins of the Angora rabbits. It carries on a considerable trade in timber, iron ore, coal, grain and other articles, including agricultural produce exported to England, to which also is still exported the Caen building stone famous for many centuries. A canal connects the port with the sea. Mahére, Laplace, Eée de Beaumont and Auber were born in this city or in its vicinity, and are commemorated by statues. Pop. 46,934.

CAEN-STONE, a cream-colored oolitic limestone from Caen in Normandy, identical with the Bath oolite of England. It is easily carved and has long been highly esteemed as a building stone. Westminster Abbey, Canterbury Cathedral and other English churches are built of it. It is quarried underground in blocks nine feet long, two feet thick. Its amorphous nature prevents its use on external structures in severe climates. Its principal use is for interior work.

CÆNOTHERUM. See RUMINANTS.

Cænozoic. See Cenozoic.

CAERNARVON, kâr-nâr’vôn. See Carnarvon.

CÆRULARIUS, Michael, Greek ecclesiastic, the Patriarch of Constantinople, 1043-49. By dispensing with the Latin ritual in many churches of Bulgaria and protesting against the use of unleavened bread by the Latins in the Eucharist, he completed the division between the Latin and the Greek communions. He was formally excommunicated by Pope Leo IX. Some epistolary and letters issued by him are still preserved. Consult Pichler, 'Geschichte der kirchlichen Trennung zwischen dem Orient und Occident' (Munich 1864).

CÆSALPINIÆ, sēs-āl-pi-nē-tā’sē-ē, a family of plants containing numerous genera. The botanical characteristics of the family are: Calyx of five divisions, joined together at different points, or often distinct to the base, with prefloreal imbricate or valvular; petals equal or fewer in number; stamens often not symmetrical to the other parts of the flower, or very irregular, sometimes very numerous, sometimes partly abortive, rarely regular, very often free, or lightly joined together at the base only; ovary raised on a free support, or joined in part to the calyx and becoming legumes, which sometimes contain only one or two ovules, and of which the pericarp may have a fleshy consistence; seeds without perispem; embryo often straight; stems often arborecent or fruticos, sometimes creeping; leaves simple, or more frequently compound, in the latter case frequently bipinnate. The typical genus is Cæsalpinia. The family contains many plants of great economic importance.

CÆSALPINUS, Andreas, or ANDREA CÆSALPINO, Italian physiologist: b. Arezzo, Italy, 1519; d. 23 Feb. 1563. He is first mentioned in public life as a professor of botany in the University of Pisa. He was subsequently made chief physician to Clement VII, and lived during the greater part of his life in Rome. He published works on botany, mineralogy, medicine and the highest questions of philosophy. In his first publication, entitled 'Speculum Artis Medice Hippocraticum,' his knowledge of the system of the circulation of the blood is stated in the clearest manner. The following passage is taken from the second chapter of its first book: *For in animals we see that the nutrient blood is carried through the veins to the heart as to a laboratory, and its last perfection being there attained, it is driven by the spirit which is begotten in the heart through the arteries and distributed to the whole body.* The system accepted since the time of Harvey could hardly be more definitely or accurately stated. His philosophical speculations are contained mainly in his 'Questiones Peripateticæ.' The philosophy of Cæsalpinus was scholastic Aristotelianism, with a leaning toward some of the methods and doctrines of the later transcendental or absolute systems. He reduces the world to the simplicity of two only substances, God and matter, and he makes all finite intelligences, all human, angelic and demoniac souls, to belong to the latter element. Two things are remarkable about his system: (1) The boldness of speculation, unparalleled in his age, with which he seeks a purely scientific view of the universe; and (2) its entirely materialistic character. But more important than either his anticipation of Harvey's discovery or his speculative opinions, were his botanical labors. He was styled by Linnaeus the first orthodox or systematic botanist, and his work 'De Plantis,' was a handbook to Linnaeus in all his classifications. Botany in the time of Cæsalpinus was the popular witchcraft: as a science, it consisted in a mass of erudition about the imaginary but marvelous virtues of plants. Cæsalpinus sought successfully to transfer it from the realm of magic to that of science. He proposed the basis of classification upon which the whole system of Linnaeus rests, namely, the distinction of plants in their parts of fructification. He lived quietly to an old age at Rome, submitting all his speculations to the supremacy of the Church, and presenting in his life an example of every virtue.

CÆSAR, the name of a patrician family of the Julian gens, tracing its origin to Julius, the son of Æneas. The first member of the family who occurs in history with the surname of Cæsar was Sextus Julius Cæsar, praeator, 208 B.C. Cæsar was the family name of the first five Roman emperors. With Nero the imperial family became extinct (68 A.D.), and Cæsar became merely a title of dignity. The Emperor, who bore the title of Augustus, appointed his successor, with the title of Cæsar. On medals and monuments we find the title Cæsar preceding the name of the emperor, as *Img. Cæsar Nerva Trajanus Augustus,* and following that of the designated successor, as *Marc. Aurel. Antonin. Cæsar.* In the lower Greek empire, a new dignity of Sebastocrator was conferred, and that of Cæsar became the third rank in the state. From Cæsar are derived the German *kaiser* and the Russian *tsar.*

CÆSAR, Gaius Julius, the greatest representative of the genius of Rome, a man of consummate ability alike as a general, a constructive statesman and a writer. He was born, according to all accounts, in the 13th or 14th year of the Roman era, c. 100 B.C., but Mommsen, in his 'History of Rome,' considers that the year should be given as 102. Of purest patrician ancestry, and with a family tradition intimately associated with the
rule of the senatorial oligarchy, he was yet, from early youth, a champion of the popular party. His aunt Julia had married Marius, and when, upon the latter's death in 89, Cinna became the leader of the Populares, Caesar entered into intimate relations with him through his daughter Cornelia. But the following year Sulla returned from the East and overwhelmed the foes of the Senate. A reign of terror for the Marian party followed. With characteristic boldness, Caesar refused to divorce his wife in the hope of becoming her father's successor to the dictatorship. In consequence, his property, his position as priest of Jupiter and almost his life. The famous story that Sulla pardoned him with the remark that "he would one day be the ruin of the aristocracy, for in him there was many a Marius," though vouched for by both Suetonius and Plutarch, seems strikingly inconsistent with Sulla's usual remorseless logic. Partly to avoid further trouble, and partly to gain that military experience which was at Rome deemed a prerequisite for a political career, he now went to Asia, and, as a staff officer, served with distinguished bravery at the siege of Mytilene, and afterward against the pirates in Cilicia, but returned home upon receiving news of Sulla's defeat in the "Alliance of the Thracians" (74). In the courts was the natural avenue to popular favor; we presently find him acting as prosecutor in two cases involving extortion in provincial administration. But the culprits, Dolabella and Antonius, belonged to the senatorial order, and his eloquence, though it won applause, failed to move the juries composed of senators. He determined to perfect himself in oratory by studying under the most famous teacher of the age, Apollonius Molo of Rhodes. On the way thither he fell into the hands of pirates near Miletus, and was held for a ransom of 50 talents (over $55,000). During a stay of almost 40 days he won the admiration of his captors by his coolness and wit, and laughingly promised to crucify them all as soon as he should obtain his freedom, a threat which he promptly carried out to the letter. He studied under Molo only a short time, however, for the renewal of hostilities by Mithridates against the Roman province of Asia brought him into the field with some hastiness, and after a brief but effective service, he returned to Rome in the winter of 74-73. He had been elected pontifex in his absence, and now took part, with the utmost energy, in the attempts that were being made to overthrow the Marian constitution. This was accomplished in the year 70, though in a totally unexpected manner, by the legislation of Pompey and Crassus, both of whom had, previous to that time, been supporters of senatorial pre-rogative. Meanwhile Caesar, by his unfailing courtesy and good will, and a lavish generosity that soon plunged him deep into debt, had been winning all hearts. In 69 he was elected questor, and was assigned to the province of Further Spain. But before his departure he lost his aunt Julia and his wife, Cornelia. At the former's funeral he caused busts of Marius to be carried in the procession, to the great delight of the populace, and in the two memorial addresses which he delivered in the forum he eulogized the aims and leaders of the people's party. In Spain he must have noted with appreciation the work of the great Marian generals, Sertorius, the first man who tried to romanize the provincials. Upon his return, in 67, he entered into friendly relations with Pompey, and supported the Gabinian and Manilian laws, by which the latter was to receive the supreme command against the pirates in the west, and Mithridates, in the east. He had now become a recognized figure in the history of the republic. In 65 he was adile, and met the demands of his office with unheard of magnificence in buildings and games. In particular, he stirred the people to frantic enthusiasm by secretly erecting in the Capitol the trophies of Marius and lost; but in consequence, his property, his position as priest of Jupiter and almost his life. The famous story that Sulla pardoned him with the remark that "he would one day be the ruin of the aristocracy, for in him there was many a Marius," though vouched for by both Suetonius and Plutarch, seems strikingly inconsistent with Sulla's usual remorseless logic. Partly to avoid further trouble, and partly to gain that military experience which was at Rome deemed a prerequisite for a political career, he now went to Asia, and, as a staff officer, served with distinguished bravery at the siege of Mytilene, and afterward against the pirates in Cilicia, but returned home upon receiving news of Sulla's defeat in the "Alliance of the Thracians" (74). In the courts was the natural avenue to popular favor; we presently find him acting as prosecutor in two cases involving extortion in provincial administration. But the culprits, Dolabella and Antonius, belonged to the senatorial order, and his eloquence, though it won applause, failed to move the juries composed of senators. He determined to perfect himself in oratory by studying under the most famous teacher of the age, Apollonius Molo of Rhodes. On the way thither he fell into the hands of pirates near Miletus, and was held for a ransom of 50 talents (over $55,000). During a stay of almost 40 days he won the admiration of his captors by his coolness and wit, and laughingly promised to crucify them all as soon as he should obtain his freedom, a threat which he promptly carried out to the letter. He studied under Molo only a short time, however, for the renewal of hostilities by Mithridates against the Roman province of Asia brought him into the field with some hastiness, and after a brief but effective service, he returned to Rome in the winter of 74-73. He had been elected pontifex in his absence, and now took part, with the utmost energy, in the attempts that were being made to overthrow the Marian constitution. This was accomplished in the year 70, though in a totally unexpected manner, by the legislation of Pompey and Crassus, both of whom had, previous to that time, been supporters of senatorial prerogative. Meanwhile Caesar, by his unfailing courtesy and good will, and a lavish generosity that soon plunged him deep into debt, had been winning all hearts. In 69 he was elected questor, and was assigned to the province of Further Spain. But before his departure he lost his aunt Julia and his wife, Cornelia. At the former's funeral he caused busts of Marius to be carried in the procession, to the great delight of the populace, and in the two memorial addresses which he delivered in the forum he eulogized the aims and leaders of the people's party. In Spain he must have noted with appreciation the work of the great Marian generals, Sertorius, the first man who tried to
the following year Caesar was at last able to address himself to the peaceful organization of the new territory.

At Rome, however, a crisis was imminent. The ties between Caesar and Pompey were being rapidly and inevitably slackened. Pompey's wife and Caesar's daughter, was followed in 53 by the defeat and death of Crassus in the Parthian War. Pompey became more and more jealous of his rival's military glory, and the Senate, resolved to crush Caesar at any cost, and itself unable and too slow to stem the streets of Rome, made friendly overtures to Pompey, and in 52 made him sole consul, with practically the powers of a dictator. Caesar's term of office would expire on 1 March 49. It was essential to his safety that he should retain his provinces and his army until after he should be elected consul for 48. But the aristocracy was plainly determined that there should be an interval during which he would be a mere private citizen, defenseless against the attacks of his enemies. It is certain that Caesar acted with great moderation, even sending to Italy two of his legions which the Senate declared were needed for the war in the East, but which, as he had foreseen, were instead placed in camp at Capua; and it is evident that the decisive step was taken. The Senate ordered Caesar to lay down his command on pain of being proclaimed a public enemy. The tribunes of the people, Antony and Quintus Cassius, who had in vain interposed their veto, fled to him for protection in their inviolable office; Caesar with a single legion crossed the Rubicon, the frontier stream of Italy, and war was begun.

In the ensuing five years, all that remained for him of life, the amazing energy and resourcefulness of this extraordinary man are most impressively displayed. In three months, without striking a blow, he was master of Italy, and Pompey, with a small force, barely escaped from Brindisiom across the Adriatic. Caesar had no ships on which to follow him, and besides, the veteran Pompeian forces in Spain must be crushed before they could join their commander. Accordingly after first securing Sicily and Sardinia, through his lieutenants, he crossed the Pyrennes into Spain, and, in a brief campaign of 40 days, perhaps the most brilliant in all his career, extricated himself from apparently certain destruction, and forced the surrender of the entire opposing army. All Spain now declared for him. On his way back he received the submission of Massilia (Marseilles), which had been besieged by Decimus Brutus and Trobius. Eleven days were spent in Rome in administrative work; and early in January 48 he crossed the Adriatic and proceeded to surround Pompey, near Dyrrachium, now Durazzo. But his force was quite insufficient, and, to deprive his foe of the advantage of the sea, he retreated into Thessaly, whither Pompey followed him, and the decisive battle was fought on the plain of Pharsalus, 9 Aug. 48. Pompey had 47,000 infantry and 7,000 cavalry; Caesar only 22,000 infantry and 1,000 cavalry. But the latter's army was composed of veterans, and numbers did not avail. Pompey fled to Egypt where he was brutally murdered. Caesar, who had followed him with all the troops with which he was provided by the forces of the young King Pontus, at last, ultimately, upon the arrival of reinforcements, defeated them, and set Cleopatra upon the throne. He then passed through Syria and Asia Minor, putting affairs on a permanent basis, and incidentally defeating Pharmaces, a son of the great Mithridates. The victory was announced to the Senate by the words "victrix et victor! ("I came, I saw, I conquered!"). Upon his return he announced his intention of pardoning all who had fought against him. In December he left Rome for Africa, where the campaign against the Pompeians, commanded by Scipio, was successfully carried out. He met him at Thapsus, 6 April 46. Cato, unable to defend Utica, committed suicide. Caesar returned to Rome in June, and, after celebrating his victories over the Gauls, Egyptians, Pharmaces and Juba, King of Numidia, who had fought against him at Thapsus, by four magnificent triumphs, flung himself into the work of legislation. Among his reforms was the placing of the calendar, for the first time, upon a scientific basis. But some of his reforms were interrupted by a dangerous revolt in Spain, headed by Pompey's sons, and the campaign against them, ending in the hard-fought battle of Munda, 17 March, and the final settlement of affairs in Spain, necessitated his absence from Rome from the end of April to September 46. The Senate welcomed him upon his return with the most servile flattery. He was already tribune for life; he was now made, for life, dictator and prefector morum, a new term for the censorship; his head was stamped on the coinage, the month of Quintilis was renamed Julius and he was given divine honors. With absolute power thus lodged in his hands, he set about the permanent reconstruction of the government and the social fabric. He made the Senate a much larger and more representative body, increased the number of magistrates, reduced by one-half the recipients of the donation of grain, passed several laws in the interest of the debtor class and of Italian agriculture, prohibited farming by slave labor exclusively, inaugurated a far-reaching plan to colonize in the provinces the unemployed population of Rome and Italy, and laid a legal foundation for the principle of limited local self-government of all Roman communities, wherever they might be. He had in mind, but was not able to carry out, the reform of the laws, the building of public libraries, the draining of the Pontine marshes, the making of a canal through the Isthmus of Corinth, and the taking of a general census which should form a just basis for the imposition of taxes throughout the empire.

But he had risen too high to escape hatred. The plot to assassinate him probably originated in the personal spite of Gaius Cassius, but many of the conspirators, in particular Marcus Brutus, were foolish enough to believe that by the death of the dictator the republic could be restored. On 15 March 44 a., at a meeting of the Senate held in the hall attached to Pompey's theatre, he fell at the feet of his great rival's statue, pierced by 23 wounds.

In studying Caesar's life, one is especially struck by three points: his sane perception of the concrete fact, his indomitable energy and his many-sidedness. More clearly than any other man of that time, he realized that the senatorial oligarchy had been proved wholly incorporeal to govern a great empire, and that the problem could be solved only by the concor-
tion of all power in the hands of a single man. Augustus cautiously veiled the change to monarchy; Julius blantly called things by their real names and paid the penalty with his life. He was a Cassar or Caesar, but of his speeches, warm praised by Cicero and Quintilian, none has come down to us. A treatise on grammar and one on astronomy have also perished. But his enduring fame as a writer rests upon the seven books of 400,000 B.C. (the eighth book is by Aulus Hirtius) and the three books of 'Commentaries on the Civil War.' The former, essentially a political document, published in 51 B.C., is unsurpassed in its succinct simplicity and strength. See Commentaries on the Gallic War.

Bibliography.—The principal ancient authorities are the biographies of Plutarch and Suetonius, Cicero's 'Letters,' Sallust's 'Catiline,' Lucretius' 'Pharsalia,' Caesar's own Commentaries; and the Roman histories of Velleius Paterculus, Appian and Dion Cassius. Mommsen's account in his 'History of Rome' is brilliant but over-enthusiastic. The following books may be recommended: Fowler, 'The Cæsar and the Foundation of the Roman Imperial System' (New York 1899); Dodge, 'Cæsar' (Boston 1892); Drumm, 'Geschichte Roms' (Vol. III, ed. by Gröbe 1906); Froude, 'Cæsar' (New York 1884); Napoleon III, 'Histoire de Jules Cæsar' (Eng. trans., New York 1865); continued by Stoffel, 'Histoire de Jules Cæsar; la guerre civile' (Paris 1887); Holmes, 'Cæsar's Conquest of Gaul' (London 1899); Holmes, 'Ancient Britain and the Invasions of Julius Cæsar' (Oxford 1907); Ferrero, 'Greatness and Decline of Rome' (Vol. II, Eng. trans., New York 1907); Tyrell's edition of the 'Correspondence of Cicero' (Introduction to Vol. V); Scott, 'Portraits of Julius Cæsar' (London 1903); Roper, 'The Likenesses of Julius Cæsar' (in Scribner's Magazine, 1887); Veith, 'Geschichte der Feldzüge C. Julius Caesars' (1906); Holmes-Schott-Rosenberg, 'Cæsars Feldzüge in Gallien und Britannien,' a condensation of the two works by Holmes, mentioned above; Nelson G. McCrea, Professor of Latin Literature, Columbia University.

CÆSAREA, sès-a-rès, the ancient name of many cities: (1) Cæsarea Philippi, or Paneas (deriving its second name from the local deity, Pan, to whom the neighboring groto, the source of the river Jordan, was dedicated), named after Philip, tetrarch of Galilee, son of Herod the Great, who founded it in 3-2 B.C., near the source of the Jordan on the southern slope of Mount Hermon. It is mentioned twice in the Gospels. On its site is the small modern village of Banias. It fell into the hands of the Crusaders in 1130 but was recaptured by the Moslems (1165). (2) Cæsarea Palestina or Stratonis, on the shores of the Mediterranean, about 55 miles northwest from Jerusalem. It was built with great magnificence by Herod the Great, named in honor of Augustus Caesar, and became the metropolis of Palestine, and the seat of the Roman proconsul, as well as a busy seaport owing to the fact that Herod, who encouraged commerce, built there one of the finest ports on the coast, and protected it by a breakwater, the ruins of which still exist there. It was the place where Herod Agrippa was smitten by the angel (Acts xii, 20-23), when Cornelius the centurion resided (x), and Saint Paul was imprisoned two years (xxiii-xxv). It was a place of some importance during the Crusades, but is now a scene of ruin and of utter desolation. Eusebius was bishop of Cæsarea. (3) The ancient capital of Cappadocia in Asia Minor, originally called Mazaca, and now Kaisariah. It is situated in the southeast of the vilayet of Angora, at the foot of the Erjish Dahg, about 160 miles to the southeast of the town of Angora. It was once supposed to contain 400,000 inhabitants. It has now about 70,000 inhabitants, and its position makes it a place of considerable trade. The manufacture of carpets, though of quite recent introduction, is of some importance. Foreign goods are received by way of the railway from Angora to Constantinople. The name Cæsarea dates from the time a palace of some importance Valerian the city was captured by Sapor, when a large number of its inhabitants were slain.

CÆSARIAN SECTION, a surgical operation in obstetrics which consists in delivering a child by means of an incision through the abdominal walls and the uterus. The operation has been recorded since ancient times but was performed at first upon a dead or dying woman and was required by Roman and later by Venetian law. The first recorded instance of operation upon a living woman was in 1500 when a butcher of Switzerland operated upon his wife. After this it was frequently resorted to but with a very high mortality. The mother until the latter half of the 19th century brought the knowledge of antiseptic and aseptic surgery and suturing for control of hemorrhage. The mortality has now decreased from almost 100 per cent to about 5 per cent, and its employment increases in favor. It is indicated when the child is alive and the mother dead, either in labor or in the latter months of pregnancy, in extreme degrees of pelvic contraction, if the existence of malformation or tumor of the uterus, cervix or vagina render normal birth impossible, and in case of material complications such as eclampsia and concealed accidental hemorrhage. The etymology of the name is probably from the Latin verb cedere, to cut, though it has been attributed to Julius Cæsar who is reported to have been born in this manner.

CÆSARIUS, the son of Julius Cæsar and Cleopatra, put to death by order of Augustus.


CÆSARIUS OF NAZIANZUS, Christian scholar of the 4th century. From Alexandria, where his education was received, he went to Constantinople and rose to distinction as a mathematician and physicist. In the Latin editions of Saint Gregory are four dialogues ascribed to him, as also in the 'Bibliotheca
Patrum,) and he is also credited with a work styled 'Contra Gentes.'

CÆSARS, The Era of, also known as the Spanish Era, a period of time reckoned from 1 Jan. 38 a.C., being the year following the conquest of Spain by Augustus. It was much used in Africa, Spain and the south of France; but by a synod held in 1180 its use was abolished in all the churches dependent on Barcelona. Peter the Great of Aragon abolished the use of it in his dominions in 1350. John of Castile did the same in 1383. It was used in Portugal till 1415, if not till 1422. The months and days of this era are identical with the Julian calendar, and to turn the time into that of our era, subtract 38 from the year; but if before the Christian era, subtract 39.

CÆSAR'S COMMENTARIES. This great work contains the narrative of Cæsar's military operations in Gaul, Germany and Britain. It was given to the world in the year 51 a.C. Every victory won by Cæsar had only served to increase the alarm and consternation of his enemies at Rome, and doubt and suspicion were beginning to spread among the plebeians, on whom he chiefly relied for help in carrying out his designs. When public opinion was evidently taking the side of the Gauls and Germans the time had come for Cæsar to act on public opinion. Hence the 'Commentaries,' a hasty compilation made from notes jotted down in his tent or during a journey. As to its truthfulness we do not, decide absolutely, the Gauls not having written their commentaries. But if Cæsar sinned in this respect, it was probably by omission, not by commission. Things the Romans might not like he does not mention: the sole aim of the book is to gain their suffrages. There is no allusion to the enormous fortune Cæsar acquired by plunder. On the other hand, he speaks of his cruelties—for instance, the killing in cold blood of 20,000 or 100,000 prisoners—with a calmness that to us is horrible, but which the Romans would deem natural and proper. The 'editio princeps' or first edition was printed at Rome (1449).

CÆSIUM, sē'zi-äm, a metallic element discovered in 1800 by Bunsen and Kirchhoff, in the form of the chloride, in a mineral spring at Diez, in the state of Hesse-Cassel. It has the historic distinction of being the first element discovered by the agency of the spectroscopist. The metal is widely disseminated, but is seldom found in any considerable quantity. It never occurs in the metallic state, but usually as the chloride or oxide, and commonly associated with the rare element rubidium. Cesium is found in the ashes of many seaweeds, in tea and tobacco and in several mineral springs. It is also a common constituent of the drainage water of mire. Its most important source is the mineral pollucite (q.v.), or pollux, which is found on the island of Elba and in the vicinity of Hebron, Me., and which contains as much as 36 per cent of cesium oxide, with no rubidium. Cesium forms stable salts, and strongly resembles potassium in its chemical properties. It may be separated from this metal by taking advantage of the fact that cesium platinocloride is much less soluble in water than the corresponding potassium compound. Metallic cesium cannot be obtained by reducing the oxide with carbon, but is best prepared by the electrolysis of a fused mixture of four parts of the cyanide of cesium and one part of the cyanide of barium, using aluminum electrodes. It may also be obtained by heating cesium chloride with metallic calcium. It is a silvery white metal, quite soft and ductile, and oxidizing rapidly upon exposure to the air. It also decomposes water with the production of sufficient heat to ignite the liberated hydrogen. Cesium has a specific gravity of 1.88, and melts at about 80° F. Its chemical symbol is Cs, and its atomic weight is 133 (O = 16). Its oxalate and nitrate are used to a limited extent in medicine. The spectrum of cesium is characterized by two blue lines, from which circumstance the element takes its name (cesium, bluish-gray). Cesium stands first in rank among the electro-positive elements.

CÆSTUS. See Cæstus.

CÆSURA, sē'zū-ra, in verse, the resting of the voice on a syllable; in Latin verse, the caesura divides the line into two parts and renders the syllable on which it falls long.

CAF, kä́f, or KAF, a fabled mountain of the Mohammedans which encircles the whole earth. It is the home of giants and fairies, and rests upon the sacred stone Sakhral, one grain of which gives miraculous powers to its possessor. This stone is of an emerald color, and its reflected light is the cause of the tints of the sky. The name "Kaf" is sometimes applied to the Caucasus range.

CAFÉ, kä́f, a coffee-house, enlarged by American usage to include restaurants of all descriptions.

CAFARIELLI, kä́f-a-re-él'ë, François Marie Auguste, French general, brother of the famous bishop of the same name: b. Falga, Haute-Garonne, 7 Oct. 1766; d. 23 Jan. 1849. At the beginning of the Revolution he was employed in the Sardinian army, but joined the army of the republic as a simple dragoon. He was in command of the French army that opposed the Spanish invasion of the Pyrenees in 1793. For his good work in this campaign he was made adjutant-general and later on chief of the consular guard. In 1804 he was charged with the mission to Rome to invite Napoleon to come to Paris to perform the ceremony of Napoleon’s coronation, and on his return was made governor of the Tuileries. He was wounded at Austerlitz, where he distinguished himself for his bravery and ability as a leader; accompanied Prince Eugene in Italy, where he became Minister of War and Marine; took part in the war in Spain, and defended Metz against the Russians. In 1814 he was chosen by Napoleon to conduct the Empress and son from Paris to Vienna. He retired from public life after the battle of Waterloo.

CAFFEINE, kä́f’fé-in, an alkaloid occurring in the coffee bean, and having the formula C₈H₉N₄O₂. It is considered identical with the alkaloid theine, which occurs in tea, and also with guaraine (the alkaloid of guarana); it is present in small amounts in cocoa. It is found also in maté or Paraguay tea, and also in Kola nuts. Coffee contains by weight about 1.5 per cent of caffeine; and tea, from 3 to 4 per cent. It may be prepared by adding basic acetate of lead to a strong decoction of coffee or tea until the tannin that is
present has all been precipitated, removing excess of lead by a stream of sulphurised hydrogen, and then evaporating the filtrate until the caffeine crystallizes out. For commercial purposes it is commonly prepared from tea dust. This is heated for an hour with four times its weight of boiling water, and then mixed with its weight in lime, and dried. The caffeine is dissolved out with boiling chloroform. When prepared from a water solution caffeine consists of a mass of silky needles which contain more or less water; when by a chloroform solution it is anhydrous. It is but slightly soluble in water, alcohol or ether. It has a bitter taste, and although it acts as a weak base, its salts are decomposed by water. See also COFFEE.

CAFFI, kā'fē, Ippolito, Italian artist: b. Bulluno 1814; d. near Lissa, 20 July 1866. He studied in Venice and excelled in matters in perspective and effects of light. He also lived in Rome and traveled extensively in Africa and the East. Among his chief works are 'Isthmus of Suez'; and 'Carnival Scene on the Piazza, Venice' (1855). He was killed on the Italian battleship Re d'Italia in a naval battle of 1866, while present on that occasion with the design of painting a picture of the engagement. He also painted the 'Panorama of Rome.' Many of his works are in the Museo Civico, Venice. Consult his biography by Codognata Bertolani (Venice 1868).

CAFFIN, Charles Henry, American art critic: b. Sittingbourne, Kent, England, 4 June 1854. He was educated at Oxford and, after engaging in school and theatrical work, came to the United States in 1892 and worked in the decoration department of the Chicago Exposition. He went to New York in 1897 and became art critic for Harper's Weekly, New York Evening Post and New York Sun (1901–04). His published works which are popular in style include 'Photography as a Fine Art' (1901); 'American Masters of Painting' (1902); 'American Masters of Sculpture' (1903); 'How to Study Pictures' (1905); 'Story of American Painting' (1907); 'Story of Spanish Painting' (1910); 'Story of French Painting' (1911); 'Art For Life's Sake' (1913); 'History of Study Architecture' (1915).

CAGAYAN, kā-ga'yān', an island of the Philippine group; the largest of six small islets, known as the Cagayan-Sulu group. It is five miles wide and eight miles long. Pop. about 3,500. There are mountains attaining a height of 1,100 feet. The chief products are tobacco and sugar. There are pearl and shell fisheries. Cagayan was sold by Spain to the United States, with Cebito, in 1900, upon payment of $100,000, having been inadvertently excluded from the terms of the treaty of peace.

CAGE-BIRDS, birds kept in cages for the benefit or enjoyment afforded by their powers of song, beauty of plumage, ability to talk or companionship. They have been so kept by human beings ever since prehistoric times. The first essential for the maintenance of birds in captivity is a cage as large as possible, and adjusted to suit them as circumstances permit. Cleanliness is a prime necessity, and the bird should be given a constant fresh supply of water for bathing and drinking purposes, and as much fresh air and light as possible, always, however, avoiding draughts and the sun's direct rays. The food and necessary attention bestowed on the bird vary according to the species.

Birds are captured by means of birdlime or a falling net, but many are taken from their nests when young, and so tamed, or are bred solely for market purposes. An important trade throughout Europe is the rearing of cage-birds, especially German canaries. The best-known songster, and probably the most popular cage-bird, is the common canary (q.q.v.), originally a native of the Canary Islands. It is typical of captive birds generally, in the marked change produced by captivity and selective breeding, in coloring and size, from its original wild state. Other widely known and popular cage-birds are the nightingale, goldfinch, cardinal, mocking-bird, bullfinch, the Indian bulbul, several European thrushes, and others, all of which are fine singers. Among the birds kept because of their beauty are the parrakeets, lovebirds, cockatoos, macaws, the whydah-bird, the painted finches and others. Those imitating human speech are not so plentiful, consisting chiefly of the parrot, of which there are several species, and the starlings, especially the English species, and the Indian mina-bird (q.q.v.). Owning to the change of climate, and especially the cold, nine-tenths of the African parrots transported to Europe or North America die before learning to speak. It is advisable, therefore, to purchase such birds in the spring, thus giving them a chance to become gradually acclimated.

In the case of all cage-birds most particular attention should be paid to their food, and overfeeding must be especially guarded against. Frequently ailments can be greatly benefited by a fresh supply of food given in smaller quantities. Insectivorous birds are most troublesome to care for in regard to food, as their diet is less easily obtained. In case of inability to procure the accustomed food, finely chopped meat should be substituted, and a reasonable quantity of spiders is always beneficial. The universal and most acceptable food to nearly all birds, however, is canary seed, with a little hemp, rape or oats may frequently be mixed to advantage. Seed-eating birds should be given such fresh vegetable matter as soft green leaves, chickweed or lettuce, at regular intervals. Sugar in small quantities is also beneficial, but acid fruits of all kinds should be avoided. A prime necessity in the rearing of cage-birds is something on which the bird may sharpen its bill. This is most easily supplied in the form of sandpaper, or, better, cuttle-fish bone, which is essential to the health of breeding birds. A bird's nails are apt to grow too long as to become troublesome to it, but in clipping them care should be taken to use a sharp pair of scissors, avoiding a possible injury to the foot by twisting. In case of illness due to overfeeding, a drop of castor oil may prove beneficial, especially if it is accompanied by a change of surroundings, quiet and a simpler diet for a time.

Bibliography.—Bechstein, 'Cage and Chamber Birds,' (London 1864), a complete work; and Greig, 'Notes on Cage Birds' (London 1899); Dixon, 'Dovecot and Aviary' (London 1851); Holden, 'Book on Birds' (Boston 1875); Greene, 'Diseases of Cage Birds' (London 1897); Blackester, Swainsland
and Wiener, 'Book of Canaries and Cage Birds' (London); Greene, 'Parrots in Captivity' (London 1845); Hahn, 'Foreign Pincet' (London 1849); and 'How to Sex Cage Birds' (London 1907); Olden, 'Cage-bird Traffic of the United States' (Washington 1907); Norman, 'Aviaries, Birdrooms and Cages' (London 1908); Birchley, 'Birds for Cages, Aviaries, and Exhibitions' (London 1909); Telling, 'Practical Guide to Successful Cage-bird Culture' (London 1909). The Agricultural Magazine and Bird Notes are two monthly magazines published in London and devoted to the interest of cage and aviary birds.

CAGLI, kā'lyē, Italy, city and bishop's see of the province of Pesaro e Urbino at the confluence of the Cantiano and Busso, 18 miles by rail south of Urbino. It has a fine cathedral; the church of San Domenico is noted for its frescoes by Giovanni Sanzio, father of Raphael; and there are interesting archaeological remains dating from early Roman days. Pop. 13,000.

CAGLIARI, kā'l-yārē, Paolo. See VONNESE, PAOLO.

CAGLIARI, Sardinia, the capital of the island, situated on a hill slope near the south coast. It consists of four parts: (1) the Castle or old town; (2) the Marina; (3) Estampache; (4) the Villa Nuova or new town. It is fortified, and is the residence of the viceroy and of an archbishop, and the seat of a university founded in 1596, and revived and remodelled in 1765. Cagliari has some manufactories, and is chief emporium of the Sardinian trade. There are dockyards and a spacious and safe harbor. The 'Castle' contains some important buildings, including palaces of the nobility. The cathedral, partly faced with marble, was completed in 1312, but afterward modernized. The city was founded by the Phoenicians, and there are some interesting remains of Roman times, including an amphitheatre and ancient dwelling-houses. Cagliari was the residence of the kings of Sardinia from 1798 to 1814. It is connected by rail with the most important Sardinian towns. Pop. of commune 59,600.

CAGLIOSTRO, kāl-yos'tra, Alessandro (Cagliostro; real name Giuseppe Balsamo), Italian charlatan: b. Palermo, 8 June 1743; d. Saint Leon, Italy, 26 Aug. 1795. He entered the order of the Brothers of Mercy, where he found an opportunity to cultivate his talents for medical science, by which he afterward distinguished himself. But as he showed at the same time a great love of dissipation, he was compelled to separate from the order. He returned to Palermo, where, among other tricks, he deceived some credulous persons by his pretended skill in the finding of hidden treasures. He also showed himself adroit in counterfeiting handwriting, and attempted to get possession of a contested estate by means of a forged document, but was discovered and was obliged to flee. He now determined to go to Rome, and in his flight from Calabria became acquainted with Lorenzo Felici, daughter of a belt-maker, who appeared to him intended by fortune to assist his designs. He formed an intimacy with her, and they began their travels, in which he assumed the character of a man of rank, first appearing under the name of the Marquis Fellerini, and finally under that of the Marquis di Canossa. He traveled through many countries of Europe, stopped in the capital cities, and by his chemical mixtures, his tricks, and by the amours of his companion, gained considerable sums. He knew how to cheat with great ingenuity, and was always fortunate, and his projects were always in early flight, if men's eyes began to be opened, or waking justice threatened him with imprisonment. The discovery of the philosopher's stone, the preparation of a precious elixir vitae, etc., were the pretenses by means of which he extracted considerable sums from credulous people. Many had recourse to his assistance, not indeed to be initiated into the mysteries of magic, but to purchase at a high rate different kinds of medicine, one of which was the water of beauty. This profitable business permitted him many years; but his trade in medicine began to grow less lucrative, and he determined to seek his fortune as the founder of a new and secret sect. In pursuance of this plan he passed himself off during his second residence in London for a Free Mason, and played the part of a magician and worker of miracles, in which character he drew upon himself the eyes of all the enthusiasts in Europe. The Countess Cagliostro, as her part, did not remain idle. She was the first and most perfect scholar of her husband, and ably played the part of a priestess to this new order. His plan for reviving an old Egyptian order, the founders of which he declared to be Enoch and Elias, contained a mass of absurdities, but his pretensions to supernatural power, the mystery with which his doctrines were enveloped, his pretended ability to work miracles, his healing the sick without pay, with the greatest appearance of generosity, and the belief that, as the Great Kophta (this name he had taken as the restorer of Egyptian monsry), he could reveal the secrets of futurity, gained him many friends and supporters. Cagliostro again traveled through Europe, and attracted great attention in Miltia, Strassburg, Lyons and Paris. While in this last city (1785) he had the misfortune to be implicated in the scandalous affair of the Diamond Necklace, and was banished the country as a confidant of Cardinal Rohan. He now returned to London, and sent many epistles to the leaders, wherein he bitterly complained of the injury he had received in France, and painted the French court in the blackest colors. From London, where he could not long remain, he went to Basel and other cities in that quarter. But at length, listening to the treaties of his wife and other friends, he returned (1789) to Rome. Here he busied himself about Freemasonry; but being discovered and committed to the Castle of Saint Angelo, he was condemned by a decree of the Roman Inquisition to imprisonment for life as a Freemason, an arch heretic and a very dangerous foe to religion. He died after five years' imprisonment. His wife retired to a convent. Consult the Cagliostro bibliography by W. E. Axon in 'Notes and Queries' (4th series, Vol. X, London 1872); Carlyle, Thomas, 'The Life of Count Cagliostro' (London 1878); 'The Life of Joseph Balsamo, Commonly Called Count Cagliostro' (London 1791); Trowbridge, 'Cagliostro; the Splendor and Misery
of a Master of Magic (New York 1910). There is much spurious material in existence concerning Cagliostro, such as the so-called "Mémoires authentiques" (Paris 1786).

CAGNACCI, kán-yă-chî. See Camlassi.

CAGNOLA, kán-vô'łâ, Luigi, Marchese, an Italian architect: b. Milan, 9 June 1762; d. Invorio, 14 Aug. 1833. He was a member of the State Council, and was much engaged in political affairs. His most celebrated works are the Arco della Pace, "Arch of Peace," commenced in 1807 and finished in 1837; the Porta di Marengo, subsequently called Porta di Ticino (both built by order of Napoleon), at Milan; the Campanile, at Urgnano, completed in 1829, and the mausoleum for the Metternich family.

CAGNOLI, kán-yô'li, Antonio, Italian astronomer: b. Zante, Ionian Islands, 1743; d. Verona, Italy, 1816. He was attached in his youth to the Venetian embassy at Paris, where, after the year 1776, he showed more love for astronomy than for diplomacy. Having settled in Verona in 1786 he constructed an observatory in his own house, by his observations in which he enriched the Piazza, and discovered. After the destruction of his observatory by the French (1796), who, however, compensated him for his loss, his instruments were transferred to the observatory of Brera in Milan, and he was appointed professor of astronomy in the military school at Modena. His best works are "Notizie Astronomiche adatt. all’ uso comune" (1802); "Trigonometria Piana e Sferica" (2d ed., Bologna 1804).

CAGOTS, kâ-gôt, a race or caste of men, living in the south of France in the region of the Pyrenees, regarded as pariahs or social outcasts. In former ages they were shut out from society as lepers, cursed as heretics and abhorred as cannibals; their feet were bored with an iron, and they were forced to wear a piece of red cloth in the shape of a duck’s foot on their garments by way of distinction. The only trade they were allowed to follow was that of sawyers or carpenters. They had to enter the church by a special door, and had a special corner set apart for them with a holy water vessel for themselves. Opinions are divided with regard to the origin of the Cagots, of whom there are now comparatively few. They have been considered by some to be remains of the Saracens conquered by Charles Martel. The most plausible conjecture is that which derives them from the Visigoths who established themselves in the south of France and in Spain in the 5th century. The origin of the name has been the subject of equal controversy. Among numerous derivations, is that from cants and gotths, "dogs of Goths." Others derive the name from a word simply meaning leper, and believe that the Cagots were originally lepers, who as such were expelled from the society of and intercourse with their fellowmen. Several similar races, as the Czarts due to inbreeding, are common among them, such as cretinism (q.v.), goitre, etc. Until the French Revolution the Cagots were not considered citizens. Some remains of them, or of corresponding outcasts, are to be found under various names in different parts of France. Their language is a jargon of neighborhood dialects with some original forms. Similar remains are also found among the mountains of North Spain, consult Michel, "Histoire des races maudites de la France et de l’Espagne."

CAGSAUA, kâ-sâ-wâ', or DARAGA, Philippines, town of Luzon, Albay province, two miles north of Albay, an important hemp growing and trading centre. Pop. 18,700.

CAGUAS, kâ-gwâs, Porto Rico, municipality and commune; on the military road, 22 miles southeast of San Juan. It is a thriving tobacco growing and cigar manufacturing centre, and also has marble and limestone quarrying industries. Pop. 10,500.

CAHAN, kâ-han, Abraham, Russo-American journalist and novelist: b. Vilna, Russia, 7 July 1860. He came to the United States in 1882 and has edited several Yiddish periodicals in New York. He was prominent as a labor leader and in time drifted to the Socialists. He became editor of the Jewish daily Vornuvits in 1901. After 1894 he was a constant contributor to American journals, his articles generally dealing with phases of Ghetto life. He has written "Yekl, a Tale of the New York Ghetto"; "Raphael Nariizokh," in Yiddish; "The Chasm"; "The Imported Bridegroom and Other Stories"; "The White Plague, or the Red" (1904); "Ein Historie von die Vereinigte Staaten" (1912); "Yiddish Folk Songs" (1912).

CAHENSLSYIM, a popular name given to a movement in the United States in 1891, among Roman Catholics speaking other languages than English, to have bishops or priests of their respective nationalities appointed over them. It took its name from Herr Cahensley, a layman, secretary of Saint Raphael’s Society for the protection of German Catholic immigrants to this country, on the supposition that he was the chief inspirer of the movement. On a visit to the United States in 1893 Herr Cahensley denied his connection with the scheme. It was vigorously opposed by most of the English-speaking prelates of the Roman Catholic Church in this country. It received no official sanction by the Vatican, and, after considerable agitation in the Catholic and secular press, died out. As a matter of fact, owing to the large immigration of Roman Catholics speaking foreign tongues, priests of their respective nationalities are often appointed to administer to their spiritual needs. This is especially notable in the instance of the Italians. To meet this necessity in the archdiocese of New York, the study of Italian is now made compulsory in its diocesan seminary for all candidates for the priesthood.

CAHILL, Thaddeus, American inventor: b. Iowa 1867. After studies at Oberlin College 1884-85, and a law course at George Washington (then Columbian) University, he was admitted to the bar in 1894, but never practised, devoting himself to mechanical invention. His most notable achievements are the electric typewriter and the telharmonium, the latter a device to produce music electrically by means of dynamos transmitting vibrations from a central station to receiving
telephones. George Washington University conferred on him the degree of D.C.L. in 1900.

CAHORS, ka-ór'. France (ancient Cadurcu-
cum), capital of the department of Lot, and
on the river of that name, 60 miles north of
Toulouse. It is nearly surrounded by the
river, and communicates with the opposite
shore by three bridges, one of which, dating
from the 14th century, is the finest fortified
bridge of mediæval times existing in the
country. Before the conquest of Gaul by
Cæsar it was the capital of the Cadurci, and
under the Romans, who gave it the name of
Divona, it was adorned with a temple, theatre,
baths, an immense aqueduct and forum. Sev-
eral Roman roads can still be traced in its
vicinity. Among the principal edifices are the
cathedral, an irregular structure, supposed to
date from the 12th century; an episcopal
palace, now converted into the prefecture;
three old churches; barracks; a theatre;
and a lyceum or college. In the Middle Ages
it was a great centre of finance operated by
Lombard bankers. Cahors had formerly a
university, which was united with that of
Toulouse in 1371. It was founded in 1322 by
Pope John XXII, a native of the town. The
celebrated jurist Cujsas was a professor, and
Pénélon a student, in it. The manufactures
are rich in wool, and a considerable trade is
carried on in the red wine of the district, in
brandy and nut oil. Coal is worked in the
vicinity. Clément Marot, the poet, and Léon
Gambetta, the statesman, were born here.

CAIAPHAS, ka-ya-fas, the high-priest of
the Jews at the time when the crucifixion
took place. Previously, when the resurrection
of Lazarus had spread dismay among the Jewish
functionaries, it was Caiaphas who suggested
the expediency of putting the Saviour to death,
and when Jesus was arrested in Gethsemane he
was carried first to Annas and then to Caia-
phas, from whom he was transferred to the
high-priesthood of the Sanhedrim. Caiaphas was
deposed, 35 A.D., and Jonathan, son of Annas,
appointed in his stead. Consult Schürer, "Ges-
chichte des jüdischen Volkes" (Vol. II, 4th ed.,
1907); Schmidt, "The Prophet of Naz-
areth" (pp. 285f., 2d ed., 1907).

CAIBARIEN, ki-ba-ré-on', Cuba, a town
of the province of Santa Clara, situated on
the northern seacoast; it has sponge fisheries
and some trade. Pop. about 10,000.

CAICOS, k'i-kös, CAYOS or THE KEYS
(from the Spanish cayo, a rock, shoal or islet),
one of the island groups comprehended under
the general name of the Bahamas, belonging
to Great Britain, consisting of six islands be-
sides some uninhabited rocks; between lat. 21°
and 22° N. and long. 71° and 73° W. The
largest, called the Great Key, is about 30 miles
long. They are wooded and tolerably fertile,
as are the other islands; but an absence of
present the inhabitants are few in number and
mostly engaged in fishing and the preparation
of salt. In 1873 the Turks Islands and the
Caicos were united into a commissionership
under the governor of Jamaica. Pop. (1911)
5,615.

CAILLAUX, ká-yō', Joseph, French
statesman; b. Mâens 1863. After the study
of law he entered politics and became in 1888
inspector of finances. Elected deputy for
Sarthe in 1898, 1902 and 1906, his rise was
rapid. He was thrice Minister of Finance
between 1899 and 1911, when he became Pre-
mier and remainder of which, dating
from the 14th century, is the finest fortified
bridge of mediæval times existing in the
country. Before the conquest of Gaul by
Cæsar it was the capital of the Cadurci, and
under the Romans, who gave it the name of
Divona, it was adorned with a temple, theatre,
baths, an immense aqueduct and forum. Sev-
eral Roman roads can still be traced in its
vicinity. Among the principal edifices are the
cathedral, an irregular structure, supposed to
date from the 12th century; an episcopal
palace, now converted into the prefecture;
three old churches; barracks; a theatre;
and a lyceum or college. In the Middle Ages
it was a great centre of finance operated by
Lombard bankers. Cahors had formerly a
university, which was united with that of
Toulouse in 1371. It was founded in 1322 by
Pope John XXII, a native of the town. The
celebrated jurist Cujsas was a professor, and
Pénélon a student, in it. The manufactures
are rich in wool, and a considerable trade is
carried on in the red wine of the district, in
brandy and nut oil. Coal is worked in the
vicinity. Clément Marot, the poet, and Léon
Gambetta, the statesman, were born here.
Cahors was given up to the English by the
Treaty of Bretigny in 1360. It revolted, and
returned to French allegiance in 1428. Pop.
(1911) 13,650.

CAIAPHAS, ka-ya-fas, the high-priest of
the Jews at the time when the crucifixion
took place. Previously, when the resurrection
of Lazarus had spread dismay among the Jewish
functionaries, it was Caiaphas who suggested
the expediency of putting the Saviour to death,
and when Jesus was arrested in Gethsemane he
was carried first to Annas and then to Caia-
phas, from whom he was transferred to the
high-priesthood of the Sanhedrim. Caiaphas was
deposed, 35 A.D., and Jonathan, son of Annas,
appointed in his stead. Consult Schürer, "Ges-
chichte des jüdischen Volkes" (Vol. II, 4th ed.,
1907); Schmidt, "The Prophet of Naz-
areth" (pp. 285f., 2d ed., 1907).

CAIBARIEN, ki-ba-ré-on', Cuba, a town
of the province of Santa Clara, situated on
the northern seacoast; it has sponge fisheries
and some trade. Pop. about 10,000.

CAICOS, k'i-kös, CAYOS or THE KEYS
(from the Spanish cayo, a rock, shoal or islet),
one of the island groups comprehended under
the general name of the Bahamas, belonging
to Great Britain, consisting of six islands be-
sides some uninhabited rocks; between lat. 21°
and 22° N. and long. 71° and 73° W. The
largest, called the Great Key, is about 30 miles
long. They are wooded and tolerably fertile,
as are the other islands; but an absence of
present the inhabitants are few in number and
mostly engaged in fishing and the preparation
of salt. In 1873 the Turks Islands and the
Caicos were united into a commissionership
under the governor of Jamaica. Pop. (1911)
5,615.

CAILLETET, ka-yé-tä', Louis Paul,
French chemist; b. Châtillon-sur-Seine 1832;
d. 1913. He studied at the School of Mines in
Châtillon and subsequently gave special at-
tention to original researches on the manu-
lizing and liquefying oxygen and nitrogen in 1877, for-
selling by a few days a similar discovery by a
Swiss chemist, and was at once elected corre-
sponding secretary of the Académie des Sciences,
becoming a full member in 1884. He was made
an officer of the Legion of Honor in 1889.

CAILLAUD, ká-yō', Frédéric, French
taveler; b. Nantes, France, 9 June 1787;
d. there, 1 May 1869. In examining the mineral
resources of Egypt he rediscovered the ancient
emerald mines of Jebel Zobara, near the Red
Sea; and his report of a silver mine in 1821 in-
22° N. and long. 71° and 73° W. The
largest, called the Great Key, is about 30 miles
long. They are wooded and tolerably fertile,
as are the other islands; but an absence of
present the inhabitants are few in number and
mostly engaged in fishing and the preparation
of salt. In 1873 the Turks Islands and the
Caicos were united into a commissionership
under the governor of Jamaica. Pop. (1911)
5,615.
CAIMAN—CAIQUE

graphical Society of Paris had offered a premium of 10,000 francs to the first traveler who should reach Timbuctoo. On 13 June 1827 he reached for the first time to geographers of the Niger which he crossed. He then traveled about 200 miles eastwardly over territories never visited before, arriving at Timé 3 August. Here he was detained by illness until 9 Jan. 1828, when he struck on a new road previously unknown to geographers and reached Jenne on 11 March. Here he embarked for Timbuctoo, where he arrived about 11 April, after one month's sail on the Niger. After a short stay of a fortnight, and after a tedious and painful return passage through the desert, he reached Faz, 12 August, and from there returned to France. On his arrival at Toulon he was received with the utmost enthusiasm. He was the first European who ever returned from Timbuctoo, and who had achieved success, while expeditions supported by government had resulted in failure. A special prize of 10,000 francs was awarded to him by the Geographical Society, with the annual prize of 1,000 francs for the most important discovery of the Legion of Honor was conferred upon him by the King, and he became, at the same time, the recipient of a salary in connection with an office, to which he was appointed in the Senate. Furthermore, a pension from the fund set apart for eminent literary and scientific men was decreed to him by the Minister of the Interior, and his 'Journal d'un voyage à Timbuctou et à Jenne, dans l'Afrique centrale,' with geographical data added by Jomard, was published at the expense of government, and appeared at the beginning of 1830 in three volumes.

CAIMAN. See CAIMAN.

CAIN, the eldest son of Adam and Eve; the first murderer, who slew his brother Abel. God drove him from His presence, but relieved his fears by appointing for him a sign, lest anyone finding him should smite him. For the biblical account of Cain and his descendants see Gen. iv-vii. Modern biblical scholars assume that Genesis iv is a composite of stories relating to several Cains. The posterity of Cain is traced from the Flood. Cain founded the first city, which he named after his son Enoch, and his descendants were the first inventors and promoters of the useful and agreeable arts. Josephus relates that he became the leader of a band of robbers, committed all sorts of licentiousness, corrupted the simpicity of primitive manners by his luxury, established the right of property by setting up landmarks and was the inventor of weights and measures. A Gnostic sect of the 2d century were called 'Cainites.' See RELIGIOUS Sects. Consult Stade, 'Das Kainzeichen' (in Zeitschrift für alttestamentliche Wissenschaft, Vol. XIV, pp. 250ff, 1884); Driver, 'Book of Genesis' (1904); Gordon, 'Early Traditions of Genesis' (1907); Church, 'Cain' (in 'Encyclopædia Biblica'); Schmidt, 'Messages of the Poets' (pp. 290ff, 1911); Gunkel, 'Genesis' (3d ed., 1913).

CAIN, ka-ān, Auguste Nicolas, French sculptor: b. Paris, 4 Nov. 1822; d. there, 7 Aug. 1894. He was in early life a carpenter, but subsequently studied under Guionnet and Rude, and devoted his attention chiefly to groups of animals. He received the bronze medal in the great exhibition of 1851, another medal in 1864 and a third at the Universal Exposition in 1867. His largest work was the monument of Duke Charles of Brunswick for Geneva—an equestrian statue representing two lions and a griffin in red marble. Among noted works by him are 'Eagle Defending its Quarry' (1852); 'Combat Between Tigers' (1878); 'Rhinoceros Attacked by Tigers.'

CAIN, Richard Harvey, American clergyman: b. Greenbrier County, Va., 12 April 1825; d. Washington, D. C., 18 Jan. 1887. He entered the ministry at an early age; was elected to the South Carolina Constitutional Convention in 1867, and to the State senate in 1868; and was a member of Congress 1870-80. He was made bishop in the African Methodist Episcopal Church and placed in charge of the churches in Louisiana and Texas, and later was transferred to the first Episcopal district of that church. While in Texas he organized Paul Quinn College in Waco.

CAIN, William, American civil engineer: b. Hillsboro, N. C., 14 May 1847. He was graduated from the North Carolina Military Institute and has been professor of mathematics and civil engineering in the University of North Carolina since 1889. He has published 'Theory of Voussoir, Solid and Braced Arches' (1874); 'Maximum Stresses in Framed Bridges' (1878); 'Solid and Braced Elastic Arches' (1879); 'Symbolic Algebra' (1884); 'Practical Designing of Retaining Walls' (1888); 'A Brief Course in the Calculus' (1905); and contributions to scientific journals.

CAINE, (Thomas Henry), Hall, English novelist and dramatist: b. Runcorn, Cheshire, 14 May 1853. He received his education in the Isle of Man and at Liverpool, and qualified as an architect, but abandoned architecture in order to become a journalist. He lived in London with Dante Gabriel Rossetti from 1881 till the latter's death in 1882, and in that year appeared his 'Recollections of Rossetti.' He had previously published 'Richard III and Macbeth' (1877), a critical work, and 'Sonnets of Three Centuries' (1882). In 1883 he appeared his 'Colwebs of Criticism'; and in 1887 he contributed to the Great Writers series a 'Life of Coleridge.' His first novel was 'The Shadow of a Crime' (1885), followed by 'A Son of Hagar'; but 'The Deemster' (1887) first brought him fame. His subsequent novels include 'The Bondman' (1890); 'The Scapegoat' (1891); 'The Prophet' (1892); 'The Manxman' (1894); 'The Christian' (1897); 'The Eternal City' (1901); 'The Prodigal Son' (1904); 'The White Prophet' (1905); 'The Woman Thou Gavest Me' (1913). His most successful novels deal with Manx life, in the description of which he reveals intimate knowledge of his subject and considerable literary power. His principal novels have been successfully dramatized. In 'My Story' (1908) he records the earliest years of his literary life.

CAINOZOIC. See CENOZOIC.

CAIQUE, kā-ék', a light boat or skiff much used in the Levant, and particularly in the Bosporus.
CAIRD, kārd, Edward, Scottish philosopher: b. Greencock, 22 March 1835; d. Oxford, 1 Nov. 1906. He was educated at the universities of Glasgow and Oxford; was a fellow and tutor of Merton College, and was professor of moral philosophy at Glasgow from 1866 till 1893; and in 1893 succeeded Benjamin Jowett as master of Balliol College, Oxford, a position he held with much distinction until his retirement in 1906. He is author of 'Account of the Philosophy of Kant' (1878); 'Social Philosophy and Religion of Comte' (1885); 'Hegel' (in Blackwood's Series of Philosophical Classics, 1883); 'Critical Philosophy of Kant' (1889); 'Essays on Literature and Philosophy' (1892); and 'The Evolution of Religion' (1893); 'Evolution of Theology in the Greek Philosophers' (1904); 'Lay Sermons and Addresses' (1907); 'Essays on Literature' (1909). He is a brother of John Caird (q.v.).

CAIRD, John, Scottish theologian: b. Greencock, 15 Dec. 1820; d. London, 30 July 1898. He was educated at the Grammar School of Greencock, and at Glasgow University, where he took a high place both in arts and divinity. Having entered the ministry of the Church of Scotland, in 1845 he became minister of Newton- upon-Ayr, and two years later was transferred to Lady Yester's parish, Edinburgh. Between that date and 1862, when he became professor of divinity in Glasgow University, he was minister of Errol, Perthshire (1849-57) and of Park Church, Glasgow (1857-62). In 1873 he was elected principal of his university, a position which he held till his resignation in 1898. He died before his resignation had taken effect. He was generally recognized in Scotland as the most powerful preacher of his time. He published sermons (his sermon 'Religion in Common Life,' preached before the Queen, had an immense circulation, and was described by Dean Stanley as the greatest single sermon of the century); 'Introduction to the Philosophy of Religion' (1880); and 'Spinoza' (1888) in 'Blackwood's Philosophical Classics.' In 1899 appeared 'The Fundamental Ideas of Christianity,' under the editorship of his brother, Edward Caird (q.v.), accompanied by memoir of the author.

CAIRN, kārn (Gaelic curn), a name given to heaps of stones, common in Great Britain, particularly in Scotland and Wales, generally of a conical form. Some are evidently sepulchral, containing urns, stone chests, bones, etc. Others were erected to commemorate some remarkable event, and others appear to have been intended for religious rites.

CAIRNES, kārnz, John Elliot, British political economist: b. Castle Risingham, County Louth, 26 Dec. 1823; d. London, 8 July 1875. After an education at Kingstown and Chester he was for a time employed in his father's brewery at Drogheda, but ultimately went to Trinity College, Dublin. He was graduated in 1854, and two years afterward was appointed Whately professor of political economy at Dublin. His first series of lectures was published in 1857, under the title 'The Character and Logical Method of Political Economy.' In 1859 he was appointed professor of political economy and jurisprudence in Queen's College, Galway, and seven years later was appointed to the corresponding chair in University College, London; but in 1872 the state of his health compelled him to give up active teaching. He had been called to the Irish bar in 1857, but he hardly ever practised. During the later years of his life he suffered much from the effects of an accident to his knee, which befell him while hunting in 1867. Some time left in his death was completely crippled. In 1862 he issued a work in defense of the Northern States of America, entitled 'The Slave Power,' which created a profound impression. The most important of his other works are 'Essays on Political Economy, Theoretical and Applied' (1873); and 'Some Leading Principles of Political Economy Newly Expounded' (1874). He takes rank as one of the leading economists of the 19th century.

CAIRNGORM, kärn-gōrm' (that is, 'blue cairn'), a mountain of Scotland belonging to the Grampian Hills, on the border of Banffshire and Inverness-shire, three miles north of Ben Macdhui in Aberdeenshire. Its summit is 4,084 feet above the level of the sea, and its sides are clothed with pine forests. The group of mountains to which it belongs is known as Cairngorm Mountains. It is particularly celebrated for the regular, brownish yellow crystals of quartz found on it and known as cairngorms. These are also found in many other places, and are much used for seals, brooches, etc. Specimens weighing a good many pounds are sometimes found.

CAIRNS, kärnz, Hugh McCallmont Cairns (1st Earl), Irish lawyer and parliamentary debater: b. County Down, Ireland, 1819; d. Bournemouth, England, 2 April 1885. He was called to the bar at the Middle Temple in 1844, was returned to Parliament for Belfast in 1852 and quickly made his mark in the House by his fluency and readiness in debate. He became Queen's counsel in 1856, in 1858 solicitor-general, and in 1866 attorney-general under Lord Derby. Later in the same year he was a judge of appeal, and in 1867 was created Baron Cairns. Under Disraeli's premiership he became Lord Chancellor in 1868, and again in 1874, and was created Earl Cairns in 1878. For some years he led the Conservatives in the House of Lords with dexterity and vigor, and is ranked among the finest parliamentary orators of his time.

CAIRNS, John, Scottish theologian: b. Berwickshire, 23 Aug. 1818; d. Edinburgh, 14 March 1892. He was ordained at Berwick in 1845, where he remained till 1876, becoming also in 1867 professor of theology in the United Presbyterian Church, and principal in 1879. He was an eminent preacher of a healthy evangelical type, and among his works were 'Life of John Brown, D.D.' (1860); 'False Christs and the True' (1864); and 'The Church in the 18th Century' (1881). Consult Cairns, 'Principal Cairns' (1903); A. MacEwen, 'Life and Letters of John Cairns' (London 1895), and his brother's memoir in the 'Famous Scots' series (1903).

CAIRO, kārō (Arabic El Kāhira, 'The Victorious,' or Misr el Kāhira), Egypt, capital of the country, and largest town in the world situated on the right bank of the Nile, about nine miles above the point where it divides to form
TOMBS OF THE MAMELUKES, CAIRO
the two main branches of its delta. The town is built between the river-bank and the northwestern end of the hills known as Jebel Mokattam, on whose most advanced spur the citadel stands in the centre of the city. Within the last 50 years the town has lost much of its Oriental character, but the Arab quarters still present a maze of narrow streets lined by curious buildings in an endive variety of style. The houses are mostly built of yellow limestone, with flat roofs; and many of them have small gardens behind. In the more modern parts of the city the streets are broader, and many of them are lined by trees and well lighted. The European quarter, known as Ismailiyeh, forms the western part of modern Cairo, and its centre is the octagonal Ezbekiyyeh Garden (20½ acres), with plants from many regions and with an artificial pond.

Here, too, are many cafés, concert-halls and other similar 60,000 visitors. Among the most notable buildings of the European quarter are the consulates, the opera-house, open in winter, the Italian summer theatre, English and German churches, the ministerial offices and the barracks. The chief business street of Cairo, known as Muski, runs east-southeastward from the neighborhood of the Ezbekiyyeh, and the Boulevard Mehemet Ali extends from about the same place southeastward to the citadel. Cairo has more than 500 mosques, but many of them are wholly or partly in ruins. The finest of all is the Sultan Hasan Mosque, a truly noble building with a lofty minaret. Others worthy of mention are: that built in the 9th century by Ahmed ibn Tulun in imitation of the one at Mecca; the Hakim Mosque, dating from the beginning of the 11th century; the Hosen Mosque of the Son of Ali, Mohammed's son-in-law; the Sitti-Zeynab Mosque, named after a grandchild of the Prophet, and the Alabaster Mosque of the citadel, with the tomb of Mehemet Ali, the finest of the modern mosques.

Cairo is one of the great educational centres of the Mohammedan world. The chief of the schools that are associated with the mosque of El Azhar, attended by 6,000 students, and has a history of nearly a thousand years. The tombs in the burying-ground outside the city, many of them in the form of mosques, are remarkably interesting, especially those known as the tombs of the caliphs. The most important gate of the city is the Bab el-Nasr, through which large numbers of pilgrims pass every year on their way to Mecca. The mosques contain valuable libraries, but the chief library of the city is the vice-regal one, founded in 1870, and now containing 17,000 volumes, largely in manuscript.

The trade of Cairo is large and the bazaars and markets are numerous, there being special bazaars for gold- and silver-smiths, tapestry merchants, saddlers, armorers, shoemakers, etc. It has also a large cotton industry. Beside the numerous Mohammedan places of worship Cairo contains English, French, German, Coptic and other churches and Jewish synagogues, and there are European schools and hospitals. The Egyptian Institute, founded at Alexandria in 1859, is now located in Cairo.

The suburb of Nilometer, 1.5 miles northeast of the town, opposite the island of Bulak, forms the port of Cairo, and its narrow streets present a busy scene of Oriental life. The island of Bulak and the left bank of the Nile are reached by a great iron bridge, and there is also a railway and general traffic bridge below the island. To the southwest of the modern town and also on the Nile bank stands the village of Masr el-Atika. On the left bank of the river, almost directly opposite Old Cairo, is the suburb of Gizeh. It has government buildings, a zoological garden, etc., but its chief attraction is the great Egyptological Museum formerly in Bulak, but removed here in 1857. Gizeh has a road and a tramway lead southwestward to the famous group of pyramids called the pyramids of Gizeh. On the island of Roda, between Gizeh and Old Cairo, the celebrated Nilometer was built in 1798, and passed into the hands of the Turks in 1801. The city was occupied by the British in 1882, after the battle of Tel-el-Kebir and has since remained in their hands. Pop. (1911) 654,476, including Pellaehin, Copts, Turks, Arabs and Moslems, besides about 53,000 foreigners from the chief European countries, especially Italy, Greece, France, Austria, England and Germany. Nowhere in the world do the contrasting civilizations of East and West blend more picturesquely than in Cairo.

CAIRO, III., city, port of entry and county-seat of Alexander County, situated at the junction of the Mississippi and Ohio rivers, in the southermost part of the State, with Kentucky on the east and Missouri on the west, 150 miles southeast of Saint Louis, on the Illinois Central, Cleveland, Cincinnati, Chicago and Saint Louis and other railroads. The city was first settled in 1838 by William Bird and was incorporated as a city in 1857. It was expected to become a great commercial centre. Cairo has a commission government, administered by a mayor and four commissioners. It has a large transit trade in agriculture and lumber, and affords a good market for the produce and trade of the Mississippi Valley. The industries include sewing-machine factory, box factories, handle factory, flour mills, wagon works, foundries, etc. The United States census of manufactures for 1880 reported 61 industrial establishments of factory grade, employing 1,769 persons, of whom 1,522 were wage earners, receiving annually $853,-
CAISSON—CAITHNESS

000 in wages. The capital invested aggregated $3,474,000, and the year’s production was valued at $6,500. Of this, $1,500 was the value added by manufacture. The city has four banks with a combined capital of $4,806,690.

A United States custom house is located in Cairo and it has a free public library, courtrooms, United States Marine Hospital, Saint Mary’s Infirmary and Burndurant Hospital. The Federal government during the Civil War used the town as a depot for military supplies. For many years, until levees were built, the city suffered from frequent floods which greatly impeded its progress, the most disastrous of which occurred in 1858. In 1913 $250,000 was appropriated by the State for the repair of levees within the city limits; it is the "Eden" of Dickens’ "Martin Chuzzlewit." The city is growing in wealth and population, has many fine churches and an excellent system of education with six white schools, five colored schools and two parochial schools. The value of its taxable property is $11,000,000. Pop. (1910) 14,540; (1916) 17,000.

CAISSON, a water-tight chest or casing, used in the construction of bridges, quays, etc., large enough to contain an entire pier, which is built in it, the caisson being sunk to the bed of the river. (See FOUNDATION). The pneumatic caisson has an air-chamber in which men may work at the bottom of the water, air pressure being maintained within the caisson sufficient to keep the water out, and the air-space being entered by what is called an air-lock. This form of caisson is used where the water is too deep or the bottom too rocky to permit of the construction of a coffer-dam. The name is also applied to an air-tight structure which is sunk below a vessel by the admission of water, and raises the vessel when the water is pumped out, although the commoner name for this form is "pontoon." It is also used to designate the hollow boat-shaped gate used to close the entrance to a dry dock. (See HARBOURS). In military language, the term is applied to the ammunition carriage attached to a battery of artillery. In architecture caisson signifies a panel left in a vaulted ceiling or more rarely in a wall ceiling or wall. There is no standard size, but the most common arrangement is a pattern of sunken octagons with much smaller sunken squares set diagonally between. The caisson may be decorated with mouldings and ornaments of stucco painted and gilded.

CAISSON DISEASE, or COMPRESSED AIR DISEASE, a disorder occurring among workers in compressed air, who are submitted to a pressure of two or three atmospheres, as in bridge-caissons. The symptoms of the disease do not appear while the workman is under compression but come on after decompression when some minutes or even hours have elapsed. The symptoms were at first thought to be due to mechanical pressure which by producing changes in the distribution of the blood caused congestion or blood stases when pressure was removed. This, however, is contrary to the admission of medical science, as the blood is both pressed outward and bent under pressure and does not agree with experimental evidence. The gas emboli theory is now generally accepted. According to this theory blood in compressed air absorbs an increased amount of oxygen and nitrogen which under compression is distributed to the fluids of the various parts of the body. If now rapid decompression takes place bubblesthe gas will be forced out of solution more rapidly than the gas can be cast off by the lungs and numerous capillary emboli result. These then cause pain in local regions, either by direct or mechanical force, or by cutting off the local blood supply. There may be more or less general pain involving two or three or even all of the extremities and sometimes severe abdominal pain with prostration, which in some cases result in unconsciousness, collapse and death. These symptoms are due to the presence of cord or brain lesions, the result of the gas emboli in the blood supply to the central nervous system. Vertigo with deafness and occasional labyrinthine hemorrhage are sometimes present and probably point to embolism in the labyrinth. Dyspnea and sense of constriction in the chest are also sometimes present but are not fatal. The most successful treatment is that of recompression with gradual decompression carried on in a medical air-lock. This is now required by law in some countries. Prophylactic measures are carried out by careful examination of the workman and elimination of those unfitted for work in compressed air. Predisposing factors are youth or too advanced age, alcoholism, organic disease and fatness. New men should be given a short shift and workmen should be carefully supervised. Fatigue is also a factor. Certain countries and states already have laws regulating shifts and providing for gradual decompression, gauged according to the pressure undergone, which are the chief preventive measures. SMITH ELY JEFFERIES.

CAITÉS, or CAERTÉS, kət-əs, an extinct tribe of Brazilian Indians which, up to the close of the 16th century, inhabited a large portion of the eastern coast region north of the Sao Francisco. Of the Tupi race, they were more warlike than other branches of that family, and, while they exhibited traits that indicated at least a crude sort of civilization, such as life in fixed villages and the practice of agriculture, they were the most cannibalistic of all the Brazilian tribes. In 1554 they murdered the biscutari Indians. The Cariris, or Barbudos, who were shipwrecked on that coast, and their ravages upon the settlements of the colonists aroused an enmity that finally resulted in their complete extinction.

CAITHNESS, kath’nes, a maritime county in the extreme northeast of the mainland of Scotland; area, 686 square miles. The surface is generally level or undulating, and there are few hills of any height, except on the Sutherland border. Much of the surface is deep moss or peaty moor, but there is a fair proportion of fertile land in the eastern part. About one-quarter of the whole surface is under crops and rotation grasses, or in permanent pasture. Of corn crops oats is by far the most important. Sheep farming is largely engaged in, and a considerable area is under deer forest. Only a very small portion of the country is wooded. The coast, precipitous and bold and rocky; in the southeast low and sandy. The chief headlands are Dunnet Head on the north coast, Duncansby Head at the northeast corner, Noss Head and the Orm on the east coast. The largest bays are
Dunnet Bay on the north and Sinclair’s Bay on the east, but Thurso Bay and Wick Bay are also noteworthy. There are many lakes, some of which are one for the largest is Loch Watten, near the centre of the county. There are no navigable rivers. Caithness is poor in metallic minerals, but excellent flagstones have been quarried for many years and form one of the chief exports of the county. Many of the inhabitants are engaged in fishing, and Wick is one of the chief centres of the Scottish herring-fishery. The manufactures are subsidiary to its other industries. Wick, the county town, is a royal burgh, and Thurso is the only other town. The antiquities of Caithness are numerous, and include old castles, so-called Pic’s houses, monoliths, etc. The county returns one member to Parliament. Pop. (1911) 32,010.

CAIUS, kā′yūs. See GAIUS.

CAIUS, kā′s, John, English physician, the founder of Caius College, Cambridge University: b. Norwich, 6 Oct. 1510; d. Cambridge, 29 July 1574. His name was Kaye or Key, which he Latinized into Caius. He took his degrees at Gonville Hall, Cambridge, and was chosen fellow of his college. While at Cambridge he distinguished himself by various translations from the classical. He spent some time in travel in the Continent, studied medicine at Padua, under Montanus and Vesalius, and took his doctor's degree at Bologna (1541). In 1542 he lectured at Padua on the Greek text of Aristotle, and in the following year made a tour through Italy, visiting the principal libraries, in order to compare the manuscripts of Galen and Celsius. He returned to his native country in 1544, and practised, first at Cambridge, then at Shrewsbury, and afterward at Norwich. He was appointed by Henry VIII lecturer on anatomy to the Company of Surgeons, London. In 1547 he became fellow of the College of Physicians, and was appointed court physician to the young King Edward VI, which appointment he retained under the young Queen Mary and Elizabeth. In the reign of the latter, an exciting controversy arose between the surgeons and physicians of London, as to the right of the former to administer internal remedies for sciatica. Caius argued the negative on behalf of the physicians, and the decision was against the right of the surgeons to continue the practice of administering medicines. He was elected president of the College of Physicians for seven years in succession. There is extant a book of the college annals from 1555 to 1572 written by him in Latin, the earliest account we have of the transactions of that college. He was dismissed from the royal service in 1568 on suspicion of favoring the Catholic party. He obtained permission to reside and raise Gonville Hall into a college, which still bears his name (Gonville and Caius College), and accepted the mastership thereof. His last days were passed in the seclusion of his college. His works are numerous, on various subjects; many of them have been reprinted in modern times. See his ‘Works,’ edited by J. S. Roberts, with memoir by J. Venn (New York 1912).

CAIUS CESTIUS, kā′yūs ses′ti-us, Pyramid of, a sepulchral monument, a pyramid of the time of Augustus, standing at Rome. Built of brick and stone and encrusted with white marble, it is more than 114 feet in height, while each side of the base measures 90 feet. This contains a small burial chamber, which is painted with arabesque.

CAIUS COLLEGE. See GONVILLE AND CAIUS COLLEGE.

CAIVANO, kī′va-no, Italy, a city lying north of Naples, at a distance of about five miles, and connected with the latter by tramway. It was a fortified town in the Middle Ages, and at present is interesting as the centre of a fertile agricultural district that produces fruits, wine, olives, grain, hemp, etc. There are also a few manufactories. Pop. about 13,000.

CAIX, kā′-ēks, Napoleone, Italian philologist: b. Bozolo, near Mantua, 1845; d. 1882. His education was obtained at Cremona and Pisa, and in 1869 he was called to the chair of ancient languages in the Lyceum of Parma, becoming professor of Romance languages and comparative philology in the Institute of Higher Studies in Florence in 1873. He was a prolific writer, and among his many works are ‘Saggio sulla storia della lingua latina di’Italia’ (1872); ‘Sulla lingua del Contrast’ (1876); ‘Le origini della lingua Poetica Italiana’ (1880).

CAJAMARCA, kā′-ha-mar′-ca’, or CAXA-MARCA, Peru, the name of a department and city in the valley of the upper Marañón, or Amazon. The department lies in a very mountainous region. Pop. 213,391. The city stands on the eastern declivity of the Andes in a rich silver mining district, 75 miles from Trujillo. It lies about 350 miles to the northwest of Lima, has broad and well-paved streets and several plazas or squares. The climate is equable, the temperature being very moderate because of the elevation. It contains several handsome churches and flourishing manufactories of steel articles, straw hats, cotton goods, woolens and cutlery. The inhabitants are considered the best workmen in silver and iron in Peru. An extensive trade between the inland provinces and Lambayeque and Trujillo is carried on through this town. Woolen fabrics form the chief exports, and European sugar, brandy, wine, iron, steel and other articles are imported in return. In the vicinity are the baths of the Incas, and a volcanic lake, into which, according to tradition, were cast the throne and regalia of the Peruvian monarchs, the last of whom, Atahualpa, perished here in 1533 by the hands of Pizarro. Pop. about 9,000.

CAJEPUT, kā′jē-pūt, or CAJUPUT OIL, the volatile oil obtained by distillation from the leaves of the cajuput-tree (Melaleuca cauput or minor), belonging to the order Myrtaceae. This tree has lanceolate, aromatic leaves and spikes of odorless flowers, and is common in many islands of the Malay Archipelago, India and the hot sections of Australia. Booro, one of the Moluccas, yields the bulk of the oil exported, although much comes from other islands. It is mostly sent to Singapore, when it is re-exported to other countries. The oil is of a pale-green color, very limpid, lighter than water, of a strong smell, resembling both turpentine and camphor, and of a strong pungent taste. It is often adulterated with other essen-
tial oils. The color of the oil depends on the presence of a little copper, which must be re-
moved by redistillation before the oil is fit for use in perfumery, and with it has many applica-
tions, being used as a carminative, an antispas-
modic, a rubefacient and a sudorific. The active principle of cajeput oil is the camphor
`cinene` (\(\text{Ca}_2\text{H}_4\text{O}\)). \text{Kuyuput}, the native name of the tree, means "white wood," and refers to the color of the bark.

**CAJETAN, kā`jē-tan, or CAJETANUS, Tommaso de Vio, Italian cardinal:** b. Gaeta, 25 July 1470; d. Rome, 9 Aug. 1534. He entered the order of Dominican friars, graduated as a doctor and was elected general of his order in 1508. When Pope Julius II was sum-
mmoned to appear before the council of cardinals assembled at Pisa and afterward at Milan, in the interest of King Louis XII of France, Ca-
jetan undertook his defense, asserting that to the Pope alone belonged the power of con-
voking a council. He was appointed cardinal in 1517 by Leo X, and sent as a legate in Ger-
many to bring the Emperor Maximilian and the King of Denmark into the league formed against the Turks. His efforts to make Luther-
ian recant his doctrines proved in vain. In 1519 he was present, as Roman legate, at the assembly of the electors of the empire, and sided with the partisans of Don Carlos of Spain, who was elected emperor under the name of Charles V. He then returned to Rome, but was soon or-
dered by Adrian VI to Hungary, which was invaded by the Turks. In 1524 he was recalled to Rome by Clement VII. On the capture of Rome in 1527, being taken prisoner by the im-
perial troops, under the command of the Con-
stable of Bourbon, he had to pay 5,000 crowns as a ransom for his liberty. He made a transla-
tion of the Old Testament, with a commenta-
tary, and wrote a treatise on the authority of the Pope, which was answered by the faculty of the University of Paris. He also wrote com-
mentaries on parts of Aristotle's writings and on the `Sumara` of Aquinas. The latter is reprinted in the definitive edition of the great
Aquinas issued under the patronage of Leo X; a collection of his works, to which his life is prefixed appeared at Lyons in 1639 (5 vols.). Consult Schulbach, `De Vita ac Scriptis de Vio Cajetani` (1881).

**CAJIGAL, kā-hē-gāl, DE LA VEGA, Francisco Antonio, Spanish colonial governor:** b. Santander, 5 Feb. 1695; d. there, 30 April 1777. He held the post of governor of Santiago, Cuba, 1738-47, and in 1742, during the course of the war between Spain and England, repelled an attack by Admiral Vernon. He was governor-
general of Cuba 1747-60, and while in office established an arsenal and navy yard at Ha-
vana. During a part of 1760 and the year fol-
lowing he was viceroy of Mexico. Withdraw-
ing to Spain after this, he became councillor of the War Department (1761), and on the outbreak of hostilities with England in 1762 went to the front and fought in Portugal under the orders of the Count of Aranda. After the war, he returned to the Council of War, whose dean he became in 1768.

**CAJORI, că-jōr`é, Florian, Swiss-American mathematician:** b. Saint Aignan, Switzer-
land, 28 Feb. 1859. He came to the United States in 1873 and studied at the University of
Wisconsin and at Johns Hopkins and Tulane universities. In 1885-88 he was professor of mathematics at Tulane and removed to Colo-
rado College in the latter year, where he be-
came professor of physics and mathematics and later dean of the School of Engineering. He has published `The Teaching and History of Mathematics in the United States` (1890); `A History of Mathematics` (1909); `A History of the Calculus and Its Applications` (1914); `A History of Mathematics` (1898); `A His-
tory of Physics` (1899); `Introduction to the Modern Theory of Equations` (1904; 1912); `A History of the Logarithmic Slide Rule` (1909).

**CAKCHIQUEL, kāk-chē-kēl,** a tribe of Mayan stock occupying northern and central Guatemala. They are probably an off-shoot of the Quiché, as they resemble that tribe closely in customs and language. They were conquered by Alvarado in 1524, and at that time had a well-developed civilization, as is shown by their architectural ruins and their system of hieroglyphic writings. They had an intense religious veneration for maize, and it is even probable that they were the first to cultivate it. Consult Brinton, `Annals of the Cakchiquels` (Philadelphia 1885); Stoll, `Manual de la geografia y de la republika Guatemala` (Zürich 1844); Thomas and Swanton, `Indian Languages of Mexico and Central America` (Washington 1911).

**CAKE-URCHIN, SAND-CAKE or SAND-DOLLAR,** a flat, round sea-urchin two or three inches in diameter (Echinarchus para) which lives buried in the sand in the shallow portions of the north Atlantic, from low-water mark to 40 fathoms. It is occasionally thrown ashore on beaches. The body is protected by limestone plates, and the ambulacra, or delicate suckers, are arranged in a rosette on the upper side of the animal, the mouth being on the under side. See also SEA-URCHIN.

**CALABA OIL,** an excellent illuminating oil obtained from calaba-nuts, the seeds of Calo-
phyllum calaba, a tree of the order of Guttifera that flourishes in Brazil and the West Indies, and yields useful timber. The yield of oil is from 50 to 55 per cent of the weight of the nuts after they are divested of their shells — equiva-
 lent to about 30 per cent of their gross weight. The oil consists of the glycerides of palmitic, stearic and oleic acids and contains about 15 per cent of a greenish resin which is poison-
ous, and renders the oil inedible. It is, how-
ever, used medicinally. Calaba oil solidifies at 38° F., and melts again at 46°. Its saponi-

**CALABAR, kā-lā-bār, or kēl-a-bār,** Africa, the former name of a district on the west coast, extending eastward from the Niger delta, and now included in the Niger Territories. The name is now applied to two towns and two rivers in that region. Old Calabar is a port in southern Nigeria, situated on the east bank of the estuary of the Cross River at the point where it receives the waters of the Old Calabar River. It contains, among other buildings, a Presbyteran Mission Institute for natives, a large prison, good hospitals and marine work-
shops. Its climate, like that of all the coastal settle-
ments in this part of the continent, is very
unhealthy. The rainfall is very great, tornadoes are frequent and the temperature is very high. The value of its exports, consisting chiefly of palm oil, palm kernels, and rubber, exceeds $1,000,000, and its imports are valued at rather more. New Calabar is situated farther east on one of the mouths of the Niger known by the same name. Its trade is less than that of Old Calabar, but is nevertheless of considerable value. Since 1904 the official style of Old Calabar has been Calabar.

**CALABAR BEAN**, or **ORDEAL BEAN**, the brown or reddish-brown kidney-shaped seed of *Physostigma venenomum*, a climbing, woody, West African vine of the pea family (*Leguminosae*), reaching a height of 50 feet. The flowers are purple, resembling the sweet pea, and each pod contains two or three seeds, which are about one inch long with a blackish groove along the convex edge; and in the interior an air-cavity which enables the heavy seeds to float on water. This bean is very poisonous, and has been much used in paste or in infusion in the trial by ordeal conducted by the native medicine men of West Africa. If the person accused of witchcraft or crime vomited the mixture, he was declared innocent; if he did not vomit, death ensued. At one time 70 children in Liverpool ate some of the beans; one who ate four seeds did not vomit and died; all the rest vomited and recovered. In poisoning with this bean vomiting should be encouraged; the stomach washed out and atropine administered if the dose has been small; if the dose was large atropine hastens death. Two alkaloids are prepared from the Calabar bean, calabarine and physostigmine. The latter has the strongest known power of contraction upon the pupil of the eye, and is used in subcutaneous injection by oculists for this purpose. It is also used in the treatment of photophobia and glaucoma. In medicine, physostigmine is used in connection with tetanus antitoxin in the treatment of lock-jaw, and also in chronic constipation and certain diseases of the bladder.

**CALABASH GOURD**, **BOTTLE GOURD**, **WHITE PUMPKIN**, *Lagenaria vulgaris*, the only cultivated or common wild species of its genus, which belongs to the family *Cucurbitaceae*, distinguished from the species of the closely related genus *Cucurbita* by having white instead of yellow flowers, distinct instead of united anthers, and seeds with distended edges. It is a climbing annual vine, 30 to 40 feet long, with a musky odor and sticky texture. It is a native of tropical Asia and Africa, and is grown in warm countries for its very variable smooth, hard-shelled fruit, which, while young and soft, is used by some races as food; but much more generally the ripe fruits are used for making utensils such as dippers, cups and pitchers. Some of the largest fruits are used in India and other Eastern countries in raft-construction and for buoys. These fruits range in size from a few inches to five feet or even more, and from their resemblance to various objects are called Hercules' club, dipper, bottle, snake, sugar trough, etc. The plant is often cultivated in the United States, but is less frequently seen in the North, where the season is usually too short for the fruits to fully mature. A sunny exposure in warm, quick soil, and cultivation similar to that given squashes and melons, will suit the plan well.

**CALABASH NUTMEG**, a tree (*Monodora myristica*) of the family *Myristicaceae*, introduced into Jamaica probably from West Africa. The fruit resembles small calabashes, hence the name. It is called also American nutmeg or Jamaica nutmeg.

**CALABASH TREE**, a tree (*Crescentia cujete*) of the West Indies and tropical North America, of the family *Bignoniaceae*, about the height and dimensions of an apple-tree, with crooked, horizontal branches, wedge-shaped leaves, pale-white flowers on the trunk and branches, and a roundish fruit, from two inches to a foot in diameter. The greenish-yellow skin of the fruit encloses a thin, hard and almost woody shell, which is used for the same purposes as water-cans, goblets, cups, etc. So hard and close-grained are these shells that when they contain fluid they may even be put several times on the fire as keetles. Any in use. When intended for ornamental vessels, they are sometimes highly polished, and have figures engraved upon them, which are variously tinged with indigo and other colors. The calabash contains a pale-yellow, juicy liquid with an unpleasant taste, which is esteemed a valuable remedy in several disorders, both external and internal.

**CALABAZAR**, kā-la-ba-thār', Cuba, city of the province of Santa Clara, situated 20 miles north of the city of Santa Clara. It has a fine municipal building. The Calabazar River is crossed at this point by a fine railroad bridge, the best of its kind in the country. Pop. 1,496; municipal district, 16,979.

**CALABOZO**, kā-la-bō-thō', Venezuela, town in the state of Miranda (Guzman Blanco), 120 miles south-southwest of Caracas, on the left bank of the river Guaro, in the midst of the llanos. It was founded in 1730, is tolerably well built and has rather a pleasing appearance. Its church, though not very handsome, is commodious. The principal wealth of the inhabitants consists of cattle. There is a considerable trade in live stock, hides, cheese, timber, etc. The neighboring ponds abound in electrical eels. Pop. 6,000.

**CALABRIA**, Italy, division of the kingdom, comprising the southwest peninsula or toe of Italy, from about 40° N. lat. to the Strait of Messina; area estimated at 5,819 square miles. It was formerly divided into three provinces— Calabria Citeriore, the most northerly; Calabria Ulteriore I, the most southerly; and Calabria Ulteriore II, between the two former; but these have been renamed respectively Cosenza, Reggio di Calabria and Catanzaro. The central region is occupied by the great Apennine ridge, wild and bleak, to which, however, whole colonies with their cattle migrate in the summer. The flats near the coast are marshy and unhealthy, and inhabited by herds of buffaloes; but the valleys at the foot of the ridge are well watered and produce most luxuriant vegetation. The vine, the orange and lemon trees, the fig, the olive and all the fruits of southern climates, grow there to perfection. The climate was reckoned salubrious in ancient times; but in some places the accumulated malaria produces disease in the hot season. Corn, rice, saffron, anise, licorice, madder, flax, hemp,
this town, then called Calagurris, siding with Sertorius, was besieged by Afranius, one of Pompey's adherents, and the insurrection reached to such extremity that they fed on their wives and children; whence the Romans were wont to call any grievous famine James Calagurritana. Quintilian was born here about 35 A.D. Pop. 9,897.

CALAIS, ka-lā', France, a seaport town and fortified place of the first class, in the department of Pas-de-Calais, 20 miles northeast from Boulogne on the Strait of Dover, and about 21 miles east-southeast of the port of Dover. It is situated at the junction of several canals, and by railway is directly connected with Paris, from which it is distant 185 miles. The town consists of two portions, almost entirely separated by basins or water areas connected with the harbor accommodation. These are Calais proper or the old town farther to the north, and Saint Pierre or the new town, now a great manufacturing centre, and incorporated with the other portion only in 1885. The whole is enclosed by a new line of circumvallation, and is also defended by a citadel and seven detached forts and batteries. On the land side the country is flat and marshy, and can be laid under water to strengthen the defenses. The streets are broad and well paved, the houses substantially built of brick, and the hotels in general excellent. The chief square is the Place d'Armes, where the old Hôtel de Ville, built in 1740 (restored in 1867), is located. The new town hall is on Place Centrale. The principal church, Notre Dame, contains a fine altar-piece in Genoa marble. Other noteworthy objects are the Hôtel de Guise, originally founded by Edward III of England; the column erected to commemorate the landing of Louis XVIII in 1814; barracks; and the Hôtel Dessin. Calais is the seat of a commercial court and chamber of commerce and has a college, a commercial school, school of design, school of hydrography, etc.

The harbor is accessible at all states of the tide, and is entered between two long piers. The works include extensive graving dock and wet dock accommodation. Calais is one of the principal ports for the debarkation of travelers from England, there being day and night communication with Dover by steamboat. There is a submarine cable to England from this port. The manufactures of the town are important. The silk and cotton trade and hosiery trade employ thousands of hands. Various other industries are also carried on, such as flax-spinning, lace-making, hosiery, engineering, net-making, brewing, etc. Vessels are built here, and fitted out for the cod fishery and fisheries. It is the entrepôt for an important district, and a considerable trade is carried on in grain, wool, wine, sugar, timber, coal, etc., and not less than 55,000,000 of eggs are annually exported to England. Calais is a town of considerable antiquity. In 1347 it was taken by Edward III of England, after a siege of 11 months. The famous incident of the six burgesses having their lives saved at the intercession of Queen Philippa belongs to this siege.

CALAHORRA, kā-la-ør'ra, Spain, a town of Old Castile, near the south side of the Ebro, in the province of Logroño, and 32 miles south-east of the city of Logroño by rail. It is a bishop's see, and contains a cathedral, three parish churches and three convents. In 78 B.C.,
CALAIS, kā'ls, Me., city, port of entry, and county-seat of Washington County, situated on Saint Croix River, opposite Saint Stephen, N. B., and on the Saint Croix & P. and Canadian P. railroads, 120 miles east of Bangor. It is the extreme northeast seaport of the United States and is connected by steamship lines with Boston, Portland and Saint John, N. B. It has a large lumber trade and numerous foundries, machine shops, shipyards, granite quarries and other extensive mechanical industries, including shoe factories, plaster works, etc.; a national bank, several newspapers, high and grammar schools, electric lights, a public library and an assessed property valuation of $2,500,000. The government is vested in a mayor and council elected annually. Pop. 6,116.

CALAMAMCO, a woolen stuff made in the Netherlands, the warp of which is sometimes mixed with silk or goats' hair. It has a fine gloss, and is checkered in the warp so that the checks are seen on one side only. It was fashionable in Addison's time.

CALAMANDER WOOD, a hard wood of Ceylon, obtained from a species of ebony-trees.

CALAMARY, The old European name of the 10-armed cuttle-fish. See Squid.

CALAMATTA, Luigi, Italian engraver: b. Civitā Vecchia, Italy, 12 July 1802; d. Milan, 8 March 1869. He was educated in Rome under Marchetti and Riccianesi, but was much in Paris, where he was a follower of Ingres. In 1837 he became professor of the École des Beaux-Arts in Brussels and among his pupils were Gustave Biot, Leopold Flameng and Charles Blanc. He founded a school of engravers in Brussels under government direction, and in his latest years was professor of drawing in the Academy of Milan. He is well known by his engraving of the head of Napoleon, from the death mask, and portraits of Ingres, Paganini, Guizot, George Sand, *Francesca da Rimini*; *La Gioconda* da Vinci, and the *Madonna di Foligno* after Raphael. Consult Alvin, *Notice sur Luigi Calamatta* (Brussels 1882).

CALAMBA, kā-lăm'bā, Philippines, a town of the province of Laguna, situated in the southern part of the island of Luzon, about 30 miles southeast of Manila. It is connected with several important towns by highways, and has a telegraph station. Pop. about 13,000.

CALAMBAC, aloes-wood, the product of a tree, *Agularia agallocha*, growing in China and some of the Indian islands. It is of a very light, spongy texture, and contains a soft, fragrant resin, which is changed by the natives into a pungent perfume.

CALAMB, ka-lăm, Alexandre, Swiss landscape artist: b. Vevey, Switzerland, 28 May 1810; d. Mentone, France, 17 March 1864. His life was passed mainly in Geneva, where a monument was erected to him in 1880. He was ranked among the best landscape painters of his day. He devoted the most, if not all, of his contemporaries in portraying Alpine scenery. Among works by him are *Bernese Oberland* (Leipzig Gallery); *Wetterhorn* (Basel Museum); *Lake of Lucerne* (Berlin Museum); *Shreckhorn*; *Lake of the Four Cantons.*

CALAMIANES, kā-lā'-mē-ā'ñēs, a cluster of islands in the Philippine Archipelago, of which Busuanga, Calamian and Linacapan are the most important; Busuanga is 36 miles long and 17 miles broad. There are about 98 islands in the group, with a total land area of 675 square miles. Pop. 17,000.

CALAMINE, a native basic metasilicate of zinc, having the formula (ZnOH)_2SiO_3. In England the name is applied to the carbonate ore and the name given to the silicate is smithsonite. The mineral, now known as smithsonite, was formerly included here, but James Smithson, in 1803, showed that the two species are distinct. The two are usually found together. Calamine occurs in hemimorphic, rhombohedral crystals, usually with a hardness of from 4.5 to 5 and a specific gravity of between 3.4 and 3.5. It also occurs in massive forms, sometimes mammillary in shape, and often cellular. In the United States calamine is found in fine crystalline form in New Jersey, Pennsylvania and Virginia; and both crystalline and mammillary in Missouri, Utah and Montana. In localities where it occurs in quantity it constitutes a valuable ore of zinc.

CALAMINT, any plant of the genus *Calamintha*, belonging to the family *Menthaceae*. The plants are herbs or shrubs with usually entire leaves, and dense whorls of purple-white or yellow flowers, with a two-lipped corolla and didynamous stamens not projecting from the corolla. Five species are British. They all contain a volatile oil, and a pectoral medicine is obtained from them. In the United States several species are also found.

CALAMIS, Greek sculptor, satyruary and embosser of Athens, a contemporary of Phidias, who flourished between 467 and 429 B.C. Pliny bestows the highest praises upon his horses. Among his most celebrated works were a statue in metal of Apollo Alexieus in Athens, in 429 B.C., and which has erroneously been supposed to be the Apollo Belvedere; a colossal statue of Apollo in bronze, 30 cubits in height, which was taken to Rome by Lucullus; and a Jupiter Ammon consecrated by Pindar at Thebes. Consult Gardner, E. A., *A Handbook of Greek Sculpture* (pp. 232-36, London 1911).

CALAMITE, a genus of fossil plants very characteristic of the coal measures. They occur in the Devonian rocks, and in other formations up to the Jurassic, in which one species is found. Their classification is not finally determined, but they are generally regarded as closely related to the *Aquifolium* or horsetails. The stalks are striated longitudinally, and interrupted with rings marking a regular articulation.

CALAMITY JANE. See Burke, Jane.

CALAMUS, a remarkable genus of palms, the species of which are mostly Indian, and are very different from most other palms, having slender, many-jointed, reed-like stems, often stretching to a length of several hundred feet. Some have the stems erect, others climb and trail among trees on which they support themselves, hanging on by the hooked prickles that terminate their leaves. Some have leaves at
intervals along the stem, others only at the extremity. The stems are hard, smooth and sili- ceous on the surface, and from their toughness and pliancy they are much used in the regions where they grow for matting, strong ropes, plaited work, etc. Bridges over streams are frequently made of ropes formed by twisting up their stems, and in the West Indies and the Eastern seas often carry cables of the same kind.

CALAMUS, a popular name for the sweet flag (*Acorus calamus*), of the family Araceae. This plant is found in wet land from Nova Scotia to Florida, and westward to Kansas and Minnesota. The pungent, bitterish, acrid root stocks have been used in medicine, especially among the colored people of the southern United States. It is sometimes cultivated as an ornamental plant in wet places, and is attractive for its erect, sword-shaped leaves, which in one variety are striped with yellow.

CALAMY, Edmund, Puritan clergyman: b. London, England, February 1600; d. there, 29 Oct. 1666. He studied at Pembroke Hall, Cambridge (1616-19), where he attached himself to the presbyterian party, and in 1639 was chosen minister of Saint Mary's, Aldermanbury, Lon- don. He entered warmly into the controversies of the time, and became noted as a leading man on the side of the Presbyterians. He had a principal share in the composition of *Smectym- num*, a work intended as a reply to Bishop Hall's *Divine Right of Episcopalcy* (London 1640), and one of the most able and popular polemics of the day. Like the mass of the Presbyterian clergy, he was monarchical and not a radical in his political opinions. He did not approve, therefore, of the execution of Charles, and of Cromwell's protectorate, and did not hesitate to avow his attachment to the Royalist cause. He was one of the deputies appointed to meet Charles II in Holland and confer on the subject of his restoration. He took part in the Savoy Conference (1661) but was ejected from his living by the Uniformity Act (1662); for venturing to preach in his church (December 1662) he was cast into prison, but released by Charles II.

CALAMY, Edmund, English clergyman, grandson of the preceding: b. London, 5 April 1671; d. there, 3 June 1732. He was educated among the Dissenters and in Holland, and later became pastor of a congregation in Westminster and published an abridgment of Baxter's *History of His Life and Times*, with a continuation; *Influence of the Scriptures*; *Life of Increase Mather*; *Historical Account of My Own Life* (London 1830); and also carried on through the press controversies with Bishop Hoadly and others. He is well known for his *Nonconformists' Memorial* (1778) which is the best historical source concerning the 2,000 ministers ejected from the Church of England by the Act of Conformity. Consult Palmer, *Abridgment of the Nonconformists' Memorial* (London 1802-03).

CALANCHIA, ka-lân'cha, Antonio de la, Peruvian chronicler: b. Chiquisca 1584; d. Lima, 1 March 1654. He belonged to the Augustinian order, and was rector of the Col- legio de San Ildefonso in Lima. Afterward he traveled extensively through Peru. He wrote *Crónica moralizada del Orden de S. Agustin en Peru,* first printed at Barcelona in 1638 in folio, which is an important source for early Peruvian history. It was continued in a second volume, never completed, however, by Fray Diego de Cordova (Lima 1653). The first volume was translated into French as *Histoire de l'église du Peru aux antipodes* (Toul- ouse 1653), and into Latin (Antwerp 1651) is called a translation. The original work appeared at Barcelona 1639, under the title *Crónica moralizada del orden de Sán-Augustin en el Perú.* The Spanish bibliographer Antonio creditis Calanchia with another work, *Crónica de los santuarios de Nuestra Señora de Copacabana y del Prado* (Lima 1653).

CALANUS, Indian philosopher, much es- teemed by Alexander the Great. At the age of 73, 323 a.c., being seized with illness at Per- sepolis, he caused a funeral pile to be erected, which he ascended with a composed contem- nence, and expired in the flames, saying, that having lost his health and seen Alexander, life had no more charms for him.

CALAS, kà-làs, or kà-làs, Jean, French judicial martyr: b. Languedoc 1698; d. Toul- ouse, 9 March 1762. Brought up in the Catho- lic religion, he had established himself as a merchant in Toulouse. He had four sons and two daughters whom he educated himself, and was held in general esteem, when he was sud- denly accused of the crime of murdering one of his sons. In 1761 his eldest son, Marc Antone- nie, a young man of irregular habits and a gloomy disposition, was found strangled in his father's house. It was reported that the unfortunate youth had been put to death by his father because he wished to become a Catholic. Jean Calas and his whole family were arrested, and a prosecution instituted against him, in support of which numerous witnesses came forward. The Parliament of Toulouse con- demned him by eight voices against five, to be tortured and then broken on the wheel; and on 9 March 1762, the sentence was executed. He suffered the torture with firmness, and pro- tested his innocence to the last. The youngest son was banished forever, but the mother and servants were acquitted. The eldest son, an unhappy man retired to Geneva. Voltairre, then at Ferney, became acquainted with them, and for three years exerted himself to defend the memory of Calas, and to direct attention to the defects of the criminal law which affected profoundly the legal attitude toward the French Protestants. The widow and children of Calas also solicited a revision of the trial. Fifty judges once more examined the circumstances, and declared Calas altogether innocent, 9 March 1765. The King, not being his own son, sought to recompense the family for their un- deserved losses, and people of the first rank emulated each other in endeavoring to relieve them. Consult Coqueler, *Jean Calas et sa Famille* (Paris 1858); *Causes Célebres* (Vol. IV, 1875); Allier, Raoul, *Voltaire et Calas* (Paris 1898); Masmonteil, *La législation crimi- nelle dans l'œuvre de Voltaire* (Paris 1901); Fällenlty, *Life of Voltaire* (2 vols., London 1903; New York 1905).

CALASIO, ka-làs-i-làs, Philippines, a town of the province of Pangasinan, situated in the western part of the island of Luzon, a
CALATAFIMI — CALBAYOG

few miles from the coast of the Gulf of Lingayen, on the main highway to Manila. Pop. (1903) 16,539.

CALATAFIMI, kā-la-tā'-ē-mē, Sicily, town in the western part of the island, in the district of Trapani, 57 miles southwest of Palermo. It is situated in a mountainous district, near the coast. It is badly built, and has a ruinous castle on the summit of a neighboring hill, now used as a prison. The environs are well cultivated and extremely fertile. A ruined Saracen castle stands above the town. In 1560 a battle took place here between Garibaldi's forces and Landi's Neapolitan troops, in which the latter were defeated. Pop. of commune (1910) 10,486.

CALATAGIRONE, kā-lā-tā'-je-ro-nā, or CALTAGIRONE (ancient CALATA HIERONTIS), Sicily, town in the province of, and 36 miles southwest of, Catania direct. It stands on two hills, 2,000 feet above sea-level, and consists generally of spacious, clean and well-built streets. There is a fine promenade and marketplace, beside which stands the old castle. It is the birthplace of the town of the three churches and a college. Its inhabitants are highly skilled in the arts. It has a considerable commerce, and is celebrated for the manufacture of terracotta ware. It was fortified by the Saracens, and wrested from them by the Genoese. Roger Guiscard gave it important privileges. There are interesting Greek, Roman and Moorish remains. Pop. (1910) 43,169.

CALATAYUD, kā-la-tā'-yood', Spain, the second city of Aragon, 48 miles southwest of Saragossa. It stands on the Jalón, near its confluence with the Jiloca, at the foot of two rocky heights crowned with the ruins of Moorish forts. The upper or Moorish town is a very wretched place, but the modern town below is well built and contains many remarkable edifices, among which the most conspicuous are the church of Santa María, once a mosque, and surmounted by an octagonal tower; and that of San Sepúlcre, a Doric structure containing many curious relics. Red wines are produced in the neighborhood, and above 10 miles from the town there are sulphur baths. The poet Martiál was born at Bilbilis, a former town on the site of the present Bambolla, two miles east of Calatayud. Pop. (1911) 11,594.

CALATRAVA, kā-la-trā'vā, Order of, a Spanish order of chivalry, originated during the Moorish wars. Calatralva la Vieja, taken from the Moors in the 12th century by the king of Castile, was committed to the Templars, who guarded it till 1158. At this time, a powerful army advancing to besiege it, despaired of being able to defend it, restored it to the king, who offered it in absolute property to whosoever would defend it. Two monks of the abbey of Citeaux (Cistercians), in France, presented themselves and were accepted. They proved a curse, and offered a pardon of sins, and being supplied with money and arms, were able to repel the invaders. Thereupon, having received the investiture of the town and other donations, they instituted the same year (1158) an order into which all the nobility of Castile and Navarre were emulous to enter. In 1164 the chevaliers of this order, by sanction of Pope Alexander III, separated them- selves from the monks, and the order became purely military. They still followed the rule of the Cistercians, until Paul III dispersed them from the vow of chastity. The almost uniform success of the Knights of Calatrava against the Moors gave rise to the orders of the Hospital and of St. John, the latter, however, more exterminated, the survivors transferring the seat to the castle of Salvatierra. In 1523 the grand mastership was transferred to the Crown by a papal bull, the knights being permitted to marry once by way of compensation for their loss of independence. Since 1806 the body has been continued as an order of merit.

CALATRAVA LA VIEJA, ve-a-hā, a ruined city of Spain, situated on the Guadalquivir, about 12 miles northeast of Ciudad Real. It was captured by Alfonso VIII of Castile, who gave it to the Templars. They in turn, restored it to Sancho III (1157). Its defense against the Moors, undertaken by Raymond, abbot of Fitero, and Diego Velasquez in 1158, after it had been abandoned by the Templars, is famous on account of its having originated the Order of Calatrava and has so often been cited in literature. Pop. (1910) 12,350.

CALAVERAS GROVE, the most northern of the California groves of big trees, containing about 100 of these trees. The tallest one is known as the "Keystone State," and is 235 feet in height and 45 feet in girth. The "Mother of the Forest" is another tree of notable size, being 315 feet high and 61 feet in circumference. The grove is a State reservation.

CALAVERAS SKULL, a widely disputed fossil skull, now preserved in the Peabody Museum, Cambridge, Mass., reported by Prof. J. D. Whitney to have been found in 1866 in the undisturbed auriferous gravels of Calaveras County, Cal. Whitney assigned the skull to late Tertiary (Pliocene) times. The skull corresponds in type with those of modern Indian inhabitants of the district. Consult Hrdlicka, "Bureau of American Ethnology, Bulletin 33" (Washington, D. C., 1907).

CALAVERITE, a native gold telluride, AuTe₂, with the average composition: tellurium, 57.4 per cent; gold, 42.5 per cent; silver, 3.1 per cent. It was originally described by Genthi as a very rare massive gold (and silver) telluride from Boulder County, Colo. It is the commonest of the gold ores of Cripple Creek and occurs there in beautiful triclinic crystals. It is found also in great abundance at Kalgoorlie, West Australia. Calaverite occurs with petzite at the Stanislaus mine, in Calaveras County, Cal., and with sylvanite at the Red Cloud mine in Boulder County, Colo. It is often confused with "sylvanite" by the miners, but while it is practically of the same qualitative composition as sylvanite, carries a proportion of gold 25 to 40 per cent greater, and only about one-third as much silver. It has a brilliant metallic lustre, pale bronze-yellow color, a hardness of 2.5 and a specific gravity of about 9.

CALBAYOG, kāl-bā'-yōg, Philippines, town of Samar province at the mouth of the Calbayog River on the eastern coast of Samar, north-west of Cathalan. Hemp, the chief product, copra and fine timber are shipped to Manila. Pop. 16,000.
CALC-TUFA, a variety of calcite essentially travertine. It is formed in streams or springs by deposits of calcium carbonate in a cellular form. It often contains fossil twigs, moss leaves, seeds, etc.

CALCAIRE GROSSIER, käl-sär grō-sē-ār, a coarse limestone of the Middle Eocene Tertiary series of the Paris and London basins. Its limestone strata furnish building material for the city of Paris. The fossils of the Calcaire Grossier are remarkable for number and for the variety of forms, some 500 species in all being represented, including water shells as well as marine shells and rising up to the remains of the mammals.

CALCAR, or KALKAR, Jan Stephanus van, yan stē-fān'-ōs van käl-kär', Dutch painter: b. Calcar in Westphalia 1510; d. Naples, 1546. He studied so thoroughly the style of Titian, that their pictures cannot always be distinguished. Later he imitated the style of Raphael with equal success. The 'Mater Dolorosa,' in the Boisserée collection in Stuttgart, a perfect work of art, is by him. Another small portrait of his, the 'Infant Christ with the Shepherds,' was a favorite with Rubens. In this piece the light is represented as proceeding from the child. He designed almost all the portraits in Vasari's Lives, and the figures for the anatomical work of Vesalius.

CALCAREOUS, a term applied to substances partaking of the nature of lime or containing quantities of lime. Thus, we speak of calcareous waters, calcareous rocks, calcareous soils. Calcereous spar is calcite (q.v.).

CALCAREOUS TUFFA. See CALC-TUFA.

CALCASIEU, käl-kä-shō, a river of Louisiana, rising in the western part of the State. It flows through the parish of the same name, and after a southerly course of about 200 miles enters the Gulf of Mexico through Lake Calcasieu. It drains a large area in southwest Louisiana, and is navigable by small boats for about 130 miles.

CALCEOLARIA (Latin, calceolus, a little shoe, alluding to the form of the corolla), a genus of plants of the family Scrophulariaceae, mostly natives of South America, especially of Chile and Peru. They are characterized by having the corolla with a very short tube, with two lips, concave or shaped like a hood, the upper one very small, under the one greatly inflated. They are common as greenhouse or outdoor plants. There are about 200 species, of which about 20 are in cultivation, and their varieties are very numerous. The flowers of the indigenous species are white, yellow and purple. They are greatly excelled in beauty by the cultivated varieties, which acquire numerous tints in these colors, and have besides on the lower part of the corolla, the part which bears the strictest resemblance to a shoe, large spots, or innumerable small points of a different color, which have a very graceful effect. They grow best in a rich, open, sandy garden mold, and are propagated by seeds or cuttings, the herbaceous part by the former method.

CALCHAQUI, kal-chä-kē, a South American tribe formerly living in the northwestern part of Argentina. They were conquered by the Incas of the 15th century, and the ruins of their buildings and tombs indicate quite an advanced stage of civilization. They extended over considerable area of territory now belonging to Argentina. They lived in villages, as the surviving stone inclosures, mounds, cemeteries and art products show. They were visited by the Jesuit missionaries, but were destroyed by the inroads of the Spaniards. The tribe is now extinct and all record of their language is lost. Consult Chamberlain, A. F., in the American Anthropologist (N. S. Vol. XIV, pp. 503-07, 1912).

CALCHAS, kal-häs, a legendary priest and prophet of the Greeks at the time of the Trojan War, who foretold that Troy would not be subdued by them till the 10th year of the siege. At his advice, Iphigenia was sacrificed at Aulis to appease Artemis. He himself accompanied the Greek army to Troy. During the siege, the Greeks were attacked by a plague, and Calchas declared that it was the effect of Apollo's anger, because they had deprived his priest of his daughter Clytie, whom Agamemnon had selected as his mistress. He counseled the Greeks to appease Apollo by storing the damsel; and it was by his advice that they afterward built the wooden horse. There are various legends relating to his death. The most common is that he died of grief caused by his failure in a cure attempted with Mopus at Colophon. At Apulia, where he had a temple and an oracle, his grave is shown.

CALCIFEROUS, a geologic term applied to the sandy limestones found in Pennsylvania, extending across New Jersey and New York to Canada, and known as the Beckmantown beds. The formation is probably the equivalent of the magnesite limestones of Iowa and Missouri and belongs to the Canadian epoch of the Lower Ordovician. See ORDOVICIAN.

CALCIMINE, a mixture of zinc-white, glue, water and pigments, used to finish the plaster walls of buildings. In cheaper forms, lithopone or Paris white is substituted for zinc-white. A superior dampproof form uses casein instead of glue. See WHITEWASH.

CALCINATION, a term now used as practically equivalent to roasting. It is derived from the Latin word calc, meaning quicklime, and received its present signification by extension from its original meaning of obtaining lime from limestone by the application of great heat. The process contemplates a very high degree of heat, but lower than the fusing point of the substance treated. By calcination many substances may be reduced to a friable condition, and freed from constituents capable of passing off in the form of gas or vapor. Thus various salts may be deprived of water of crystallization, and rendered amorphous in this way; the hydrated carbonate of magnesium is reduced to the pure oxide, known as calcined magnesia; limestone is converted into quicklime, etc. Calcination is usually the first process in the extraction of metals from their ores. The oxides of metals produced by this process were formerly known as calxes, but this term is now disused. It depends on circumstances which oxide is obtained, if the metal, like lead, can form more than one. The weight of the total calx is equal of course to that of the metal and the oxygen with which
CALCEOLARIA (FISHERMAN’S BASKET)
CALCITE

1 Calcite Crystals, Bigrigg Mine, England

2 Calcite "Bird's Nest," Reichenbach, Hesse, Germany
it has combined, but the calc itself is specifically lighter than the metal. Platinum, gold, silver and some other metals are not affected in this way, and on this account they are called the noble metals. See Combustion.

CALCITE, -sit, also known as calc-spar, a native carbonate of calcium, crystallizing in the rhombohedral system, and exhibiting over 300 distinct crystals of general forms or "habit." The mineral also occurs massive, fibrous, granular, lamellar, compact, earthy, stalactitic, nodular. In other forms it exhibits minute percentages of magnesium, iron, manganese, zinc and lead, replacing equivalents of calcium. Its typical crystals exhibit a very perfect cleavage, commonly splitting up, from a blow, into many small rhombohedrons. Pure crystals have the composition carbon dioxide 44 per cent, lime 56 per cent. They show a vitreous or earthy lustre and have a specific gravity of about 2.72, and a hardness of about 3, though the latter varies somewhat with the face of the crystal. Calcite may be transparent, translucent or opaque, and in color may vary from white, or colorless, to black, also brown, violet, blue, green, yellow and red. It exhibits the phenomenon of double refraction powerfully, and transparent crystals of it (called *Iceland spar* because first obtained from Iceland) are used in the manufacture of polarizing prisms. (See Light.) Limestone, marble and chalk are commonly classed as massive or cryptocrystalline varieties of calcite. Oolite (q.v.) is a granular limestone composed of innumerable minute rounded concretions. Pisolite is a similar variety in which the spheres are as large as peas. The stalactites and stalagmites of many caves (q.v.) are calcite. Mexican onyx, travertine and calc-tufa (q.v.) are a few of the many other varieties of calcite. Varieties containing other metallic carbonates are known as baricate, strontianocalcite, ferrocalcite, etc. Calcite effervesces briskly even in cold acid. It occurs abundantly all over the world; especially choice specimens of crystals come from Germany, England, Guanajuato, Mexico; Rossie, N. Y.; Joplin, Mo., and Lake Superior. Examples of the stalactite forms are found in caves of Schoharie, N. Y., and at Wier's Cave in Virginia. The various rock forms of calcite are burned to make lime, and also in mixture with silica and alumina in the manufacture of Portland cement. See GLASS; CEMENT.

CALCITE GROUP, in mineralogy, an important series of rhombohedral carbonates of the bivalent metals—calcium, magnesium, iron, manganese, zinc and cobalt. The series includes calcite, CaCO₃; dolomite, (Ca, Mg) CO₃; ankerite, CaCO₃(Mg, Fe, Mn) CO₃; magnesite, MgCO₃; mesite, 2MgCO₃ FeCO₃; siderite, FeCO₃; rhodochrosite, MnCO₃; smithsonite, ZnCO₃; and spheroocalcite, CoCO₃.

CALCUIUM, a metallic element first obtained in the free state by Sir Humphry Davy in 1808. Its compounds are exceedingly abundant and are widely distributed. Calcium carbonate, CaCO₃, is familiar in its various forms of marble, chalk, limestone and calcite. The sulphates, CaSO₄, is also very common, and is perhaps best known in the form of gypsum, which contains two molecules of water, and therefore has the formula CaSO₄ + 2H₂O. Calcium phosphate also occurs in nature in considerable quantities, both in the form of fossilized bones and as a constituent of apatite (q.v.) and its various modifications.

Metallic calcium may be obtained by the electrolysis of the fused chloride (which melts at a red heat), or by decomposing the iodide with metallic sodium. It is a white metal with a light yellow hue, has a hardness about equal to that of gold and is very malleable and ductile. Its density is 1.546 and its melting point about 1465° F. Its chemical symbol is Ca. Its specific gravity is about 1.58 and its atomic weight is 40.0 (O = 16). Perfectly dry air does not affect it at ordinary temperatures, but in moist air it becomes rapidly coated with the hydrate Ca(OH)₂. When strongly heated in air it burns with a yellow flame, taking up oxygen to form the oxide CaO. It decomposes water rapidly, passing into the form of the hydrate, with evolution of hydrogen. It melts at a red heat, has a specific heat of about 0.169 and has an electrical resistance only about one-twelfth of that of mercury.

In its chemical relations calcium is a dyad. It combines with almost every known acid, and yields a vast number of compounds, many of which are of great industrial value. Of these the best known are the carbonate, oxide, hydrate, chloride, sulphate, phosphate, fluoride, carbide and bisulphide, and the indefinite mixture of the chloride and hypochlorite known as bleaching-powder (q.v.).

The carbonate occurs native in large quantities, as already noted. It is also commonly present in ground water as obtained from wells and springs. It is almost insoluble in pure water, but dissolves to a considerable extent when the water contains free carbon dioxide in solution. It is this compound that gives to water what is known as "temporary hardness." Upon boiling, the free carbon dioxide held in solution is expelled, and the lime carbonate is therefore precipitated also, so that the water loses that part of its hardness which is due to the presence of the carbonate. This effect is well illustrated, in regions where the soil is rich in limestone, by the crust of lime carbonate that is deposited upon the interior of household kettles that are used for heating. Calcium carbonate also gives rise, in steam boilers, to troublesome deposits that keep the water out of contact with the metal plates, which, in such cases, become overheated and seriously impaired in consequence. To prevent this action, chemists often recommend the addition to the water in the boiler of a certain amount of ammonium chloride (sal ammoniac). This compound combines with the lime carbonate to form calcium chloride, which is exceedingly soluble, and ammonium carbonate, which is volatile, and therefore passes away with the steam. Beautiful as this process is in theory, it cannot be recommended for adoption in practice, because if the sal ammoniac is present in any excess it induces rapid corrosion of the boiler plates.

When calcium carbonate (more familiarly known as carbonate of lime) is strongly heated in a current of air, it loses its carbon dioxide and becomes converted into a substance known to the chemist as calcium oxide CaO, and in the arts as quicklime, burnt lime or simply lime. Pure calcium oxide (or lime) is a white, mor-
phous substance, infusible, glowing with a dazzling white light when strongly heated, possessing caustic properties and acting as a powerful chemical base. When treated with about one-third of its own weight of water, lime passes into the form of the hydrate or hydroxide, Ca(OH)_2, with the evolution of much heat. The process of converting it into the hydrate by the addition of water is called slaking, and the resulting hydrate is known in the arts as slaked lime. Mortar is composed of a mixture of slaked lime and sand, the silica (or sand) slowly combining with the lime to form a silicate after the mortar has been applied. Slaked lime, or calcium hydrate, is somewhat soluble in water, its solution being known as lime water.

Calcium chloride is formed when calcium carbonate is dissolved in hydrochloric acid. It is exceedingly soluble, but upon evaporation of its solution it separates in white, needle-like crystals having the formula CaCl_2 + 6H_2O. When these are heated to about 400° F. they lose five-thirds of their weight of water and become converted into CaCl_2 + 2H_2O, in which form the chloride is commonly used. Thus prepared, calcium chloride is a white, porous solid, which absorbs moisture with great avidity, and hence is exceedingly valuable to the farmer in allowing plants and other gaseous bodies. It forms crystalline compounds with ethyl and methyl alcohols, which are again resolved, by the addition of water, into calcium chloride and the free alcohol. On account of this property it has been used for the preparation of these alcohols in the pure state. See also CALCIUM CHLORIDE.

Calcium hyperchlorite is a bleaching agent which is more stable than ordinary bleaching powder (chloride of lime), yielding a clear solution in water and containing from 80 to 90 per cent of available chlorine. (See BLEACHING.) It is made by passing chlorine gas into milk of lime at a temperature not exceeding 90° F., and then concentrating the solution to crystallization. Besides its bleaching properties it is used in very large quantities for the purification of water in reservoirs for drinking purposes.

Calcium sulphate occurs native in the anhydrous form, as the Shaherud salt, and, combined with two molecules of water, it also occurs abundantly as gypsum. It is soluble in 400 parts of water, and, like the carbonate, it occurs quite generally in the waters of wells and springs. Like the carbonate, too, it makes the water in which it occurs hard; but the hardness due to the presence of the sulphate cannot be removed by boiling, and it is therefore said to be "permanent." Calcium sulphate produces deposits in steam boilers that are far more troublesome and injurious than those due to the carbonate, since the sulphate is deposited in a hard, compact, stony form, and can be removed only with difficulty.

When gypsum is moderately heated it loses its water of crystallization and becomes converted into a substance that is commercially known as plaster of Paris, from the fact that the gypsum from which it is prepared (and which is also called plaster of Paris, though rarely) occurs abundantly in the Tertiary formations of the Puy-de-Dôme. When moistened by the addition of the proper quantity of water, takes up two molecules of water again, and rapidly sets into a hard, solid mass which expands somewhat at the instant of solidification. It is much used in making casts and molds. These are harder and better when the plaster is wetted with a solution of alum than they are when pure water is used for this purpose. If equal weights of the hydrous sulphates of calcium and of potassium are wetted with about four parts of water, the mixture sets like plaster of Paris, with the formation of a double sulphate of calcium and potassium, having the formula CaSO_4·KSO_4·H_2O. The casts so obtained exhibit polished surfaces, superior to those obtained with pure plaster.

Calcium fluoride, CaF_2, occurs native as fluor spar, or fluorite, and is used to some extent as a flux in metallurgical operations, to which circumstance it owes its name (Latin fluor, a flux). It is also used in the manufacture of vases and other ornamental articles and as a source of hydrofluoric acid, which is set free when the fluoride is treated with warm sulphuric acid.

Calcium carbide, CaC_2, has long been known, and was prepared by Wöhler in 1852 by melting an alloy of zinc and calcium in the presence of carbon. Its commercial importance, however, dates from the discovery by Professor Willson in 1892, that it can be formed by the direct combination of lime and carbon at the temperature of the electric furnace. Large quantities of it are now made by this process at Niagara Falls, at Spray, N. C., and elsewhere. Calcium carbide in its commercial form is a dark-gray substance, often almost black. It is hard, infusible and incombusible, with a specific gravity of about 2.24. Its value in the arts depends upon the fact that when it is thrown into water a double decomposition occurs, by which acetylene gas is formed, in accordance with the equation CaC_2 + 2H_2O = Ca(OH)_2 + CH_2. See ACETYLENE; CARBIDE.

Calcium phosphide, CaP_3, has the property of decomposing insensibly when thrown into water with the evolution of phosphuret hydrogen which takes fire spontaneously. It is used in several forms of marine signal lights and also in naval target practice at night.

Calcium sulphide, CaS, and, combined with two molecules of water, also occurs as a white powder when a solution of a calcium salt is added to a solution of an alkaline sulphide. The sulphide so formed requires 800 parts of pure water to effect its solution. It is far more soluble in sulphuric acid, however, and it is believed that the sulphuric acid acts upon it to produce a new but comparatively unstable compound, CaSO_4·SO_3, to which hypothetical substance the name calcium bisulphate, or bisulphide of lime, has been given. Upon exposure to air the bisulphate solution gradually deposits crystals of the monosulphide, having the composition CaSO_4·2H_2O. On the commercial scale the bisulphite solution is prepared by passing sulphur dioxide gas (SO_2) through "milk of lime" (that is, water containing slaked lime in suspension). The monosulphide of lime is first formed, and by the continued action of the sulphur dioxide this passes into solution in the form of the bisulphite. The usefulness of bisulphite of lime in the arts depends upon the power of CaSO_4·2H_2O, by which the fibres of wood are cemented together. Thus, in the sulphite process of manufacturing...
CALCULATING MACHINES

wood pulp, chips of wood are submerged in a solution of the bisulphite and heated for some hours in closed digesters, by the action of steam. By this means the chips are disintegrated, the gummy connector materials being entirely dissolved away, and the wood being thereby reduced to a mass of separate fibres, which after simple washing and bleaching are ready for use in the manufacture of paper. See Electrochemical Industries.

CALCULIUM CARBIDE. A compound crystalline substance composed of calcium and carbon. Its symbol is CaC₂. When pure it is colorless and transparent, but as found in commerce it is of a lustrous reddish-brown or blackish color, being discolored by iron. It is a substance of great economic importance, owing to the fact that it decomposes with water at ordinary temperatures, with the formation of acetylene gas. See Calcium; Carbide; Electrochemical Industries.

CALCULUIIUM CHLORIDE. The commercial supply of this important chemical salt is obtained from natural brines found in several localities in Ohio and West Virginia. The output in 1916 was 26,062 tons (20,535 tons in 1915), valued at $216,729. In addition to this direct and recorded production there were thousands of tons produced as a by-product in the manufacture of soda. The uses of calcium chloride are constantly increasing in number. One of the most important is the addition of 3 per cent to Portland cement permits cement work to be carried on during freezing weather. In the water-jackets of water-cooled automobile engines a 20 per cent solution of calcium chloride will remain liquid down to a temperature of 9 degrees below zero. In refrigerating apparatus it is much superior to common salt (sodium chloride), remaining liquid at a much lower temperature. Because of its affinity for moisture it is used to sprinkle roads, tennis courts and playgrounds, to prevent dust. It is used also to preserve railroad ties and fence posts, and other timber used under similar conditions, and also in the manufacture of important dyestuffs. See also Calcium.

CALCULUIIUM LIGHT. A brilliant light produced by directing the flame of an oxy-hydrogen blowpipe against a block of compressed quicklime. It had long been known that lime emits a light of extraordinary brilliance and whiteness when strongly heated in this manner, but the first practical application of the principle was made by Capt. Thomas Drummond in 1825, in connection with the trigonometrical survey of Ireland. The calcium light is constantly employed in the production of theatrical effects and for the projection with a stereopticon of photographic pictures upon a screen. It is also called Drummond light, lime-light and oxy-hydrogen light.

CALCULATING MACHINES. These machines are classified according to their use, as arithmetical or geometrical; the former dealing with combinations of numbers, the latter with calculations of length, area, and contents. In the first class the operations performed by the machine may be simply addition, in which case it is called an adding machine. Some of these simple machines also perform subtraction. The multiplying machines are far more complicated and perform also division, and they can be manipulated so as to work problems in the rule of three, and extract square roots.

In the simple adding machine the number is always progressively added, a unit at a time. Several different devices have been employed by inventors to accomplish this result. The simplest is a train of wheels bearing the nine digits and zero on the face of the wheel near its outer edge. On the first wheel (at the left) units are counted up to 10. At the tenth count the next wheel to the left is moved one cog by a stud which operates each time the "units" wheel makes a complete revolution. The "hundreds" wheel, next again to the left, is in like manner turned one cog when the "tens" wheel completes one revolution; and so on. The result is read through a "window" showing the uppermost figure on each wheel. On this principle the automobile speedometer and the trolley-car fare indicator are operated. Other devices include a rocking sector of a circle, operated by a key. On the curve of the sector are nine teeth, with a wheel with nine teeth. When the key marked 9 is depressed, the entire sector moves in gear with the counting wheel giving it a complete turn. When the key marked 4 is depressed only four of the teeth engage the wheel which is thus turned only four-ninths of a complete revolution. A second sector placed to the left of the first and operated in the same way would count tens, and a third sector still farther to the left would count hundreds; and so on up to as many places as desired. Several variations of this system have been utilized. The key may not move the sector when it is pressed, it may simply set a stop or check, and the movement may be produced by a lever, or by electric mechanism. This is the device used in the cash register, and in the Burroughs Adding Machine.

Another application of the same fundamental idea is the stepped cylinder, in which ridges running lengthwise of the cylinder take the place of cogs on a wheel, each pair of ridges are of different lengths, appearing as steps, each succeeding ridge being longer by one unit than the ridge preceding. By sliding a toothed counting-wheel across the cylinder, a distance regulated by the position of the desired number on a scale, and turning the cylinder by a crank, the respective number of ridges at that plane will operate the counting-wheel. This device is utilized in the Arithmometer and other machines of the Thomas type. A variation of this idea consists of a series of rails in place of the ridges on the cylinder—as in the Mercedes machine.

Another basic device is a cylinder having cogs which may be withdrawn into the body of the cylinder by adjusting a cam-shaped ring. The teeth or cogs which remain projecting beyond the surface of the cylinder are those which operate the counting wheel. The action may be similar to that of the sector, the teeth operating in one plane, or it may follow the plan of the stepped cylinder, by means of the "stepped" and operate on a sliding carriage. This device is used on the Brunsviga machine, and the many modifications of it. Adding machine attachments have been devised for type-
writers, whereby figures set in a column by the typewriter are added by the attachment and the total may be printed in at the foot of the column.

The Abacus, described elsewhere in this encyclopedia, in one of its varied forms is widely employed in India, China and Japan for making a variety of mathematical calculations, generally for commercial accounting. The geometrical class of calculating machines the simplest type is a measuring wheel which is graduated on its circumference, and is run over the lines to be measured, a recording mechanism at the axis showing the total distance traversed. The slide rule is a device of some little antiquity, having been invented in the logarithmic type in 1620 by Gunter. Many other mathematicians followed with variations and adaptations. The slide rules are classified as (1) those working with movable indexes, and (2) those with adjacent sliding scales. To the first class belong the circular scales of Oughtred, Scott, Nicholson and Weiss; and the spiral scales of Milburne, Adams, Nicholson and Lilly. To the second class belong the straight rules of Partridge, Everard, Roget and Mannheim; the circular rules of Biler, Sonne and Charpentier; and the cylindrical rule of Thacher. The standard British slide rule is of the Mannheim type, and carries four scales, two on the stock and two on the slide. The slide is set for the problem in hand, and the result is read by a "runner," or the rule may be turned over and read from scales on the back. The Integrator is a mechanical apparatus for solving graphically differential equations. Planimeters are machines which measure lines and the areas of plane surfaces. There are several types, but only one, the polar planimeter, is in use at the present day. There are two separate fixed points on this machine, one of which is the pole. From these points reach out arms to a carriage on which is a tracing wheel and calculating mechanism mounted on a sleeve, which slides along graduations on one of the arms. A modification of this machine has a long straight rail against which a guide is held while the machine is being operated. The Integrator is another form of planimeter by which many intricate problems may be solved mechanically. The name "Harmonic Analysers" is given to another machine of similar construction. The "Tide Predictors" of Roberts and Lord Kelvin are among the remarkable mechanisms devised to solve mathematical problems. With these machines set with a duplication of the component forces operating upon the tide at any port, the mechanism delivers in about two hours a tracing showing graphically the movements of the tide at that port for a year in advance.

The Hollerith electric tabulating mechanism used by the United States Census Bureau is prominent among the remarkable calculating machines that have been developed in America. Three separate machines constitute the outfit. The first one punches holes in cards, in any one or more of 240 places; the second tabulates the cards, while the third sorts them. Machine No. 1 has a keyboard of 240 keys, this being the number of answers called for in the census blanks of the bureau. The operator takes a return blank, representing the report of some individual, and, as he reads it, strikes the appropriate keys, which results in the punching of a card, that becomes a mechanical counterpart of the original return. As the average number of questions answered on each return is but 15, the work is not so tedious as might be inferred from the statement as to 240 questions.

When the cards of a State have been punched, they are brought to the tabulating machine, which is the real calculating machine. This machine reads the holes of the cards that are fed into it, and makes an electrical record of each hole, according to its position, adding up the totals for each hole, and showing them on dials. When the cards are all fed through, the total of each of the 240 replies is enumerated. The third machine is a sorting box, which serves to secure answers to cross-questions. For instance, if it is desired to know how many white persons are among the total number convicted of crime, the sorting box will locate all cards having the holes corresponding to these two statements, and give the total. In this way a great variety of statistics are made available which it would be too expensive to gather or compute in any other way. For other information on this subject, see Cash Register; Computing Scale. Consult Cajorl, F., 'A History of the Logarithmic Slide Rule' (London 1909); Horsburgh, E. M., 'Modern Instruments and Methods of Calculation' (London 1914); Pickworth, C. N., 'The Slide Rule: A Practical Manual' (London 1910).

CALCULUS. As used in medicine the term calculus (Lat. calculus, a pebble or small stone) is applied to certain concretions occurring in the cavities or tissues of the body, usually as the result of the deposition of solids from some natural secretion. Calculi may be of many different sorts, and vary greatly in consistency, some being merely crumbling masses that can be crushed between the fingers, while others are extremely hard. Calculi occurring in the lacrimal or tear passages are called dacryoliths, while salivary calculi are found in the salivary glands or their ducts, and amygdololiths in the tonsils. So-called rhinoliths are concretions which sometimes develop in the nasal cavities, usually as the result of the presence of some foreign body. The term tooth calculus is sometimes spoken of as dental calculus. Pneumololiths occur in the lung and broncholiths in the bronchi; pancreatic calculi are found in the pancreas. The breast and prostate gland also occasionally harbor calcareous concretions, which in the former case are called lacteal calculi. The deposits of chalk about the joints in gouty persons are sometimes referred to as arthritic calculi. Intestinal calculi or enteroliths may give rise to serious disturbances, and if they happen to occur in the appendix often simulate date or other fruit stones in appearance. Before appendicitis was well understood their true nature often passed unrecognized and when they were discovered in cases of the disease the malady was mistakenly attributed to the swallowing of such foreign bodies. The two most important types of calculi, however, are the biliary calculi or gallstones, and urinary calculi.

Gall-stones are very common and fortunately usually do not give rise to symptoms. It is estimated that in Europe 10 per cent of the
entire population have gall-stones, while in this country their frequency is held to be about 7 per cent. As their formation is probably encouraged by sedentary life and conditions favoring stagnation of the bile, such as tight lacing, lack of exercise and constipation, they are three times commoner in women than in men. They rarely give symptoms in younger persons, and about half of the patients are over 40 years of age. Pregnancy is said to be of importance in favoring their formation. Biliary calculi may be extremely small or may attain considerable size, stones as large as an English walnut not being at all uncommon. They also vary greatly in number and the smaller ones may be present in hundreds. They are composed principally of cholesterol (q.v.), with varying but much smaller amounts of bile pigment, lime and magnesium salts, fatty acids and bile acids. It is now generally assumed that an inflammatory or catarrhal condition of the mucous membrane of the gall-bladder (q.v.) and the calculi associated, furnishes the starting point of gall-stone formation. As already stated gall-stones may remain in the gall-bladder for years without causing symptoms, or their presence may be accompanied by inflammatory changes in the organ, or it may lead to disturbances of various sorts, of which pain, local tenderness, persistent or remittent jaundice, clay-colored stools and chills and fever are conspicuous features. While a rational and hygienic mode of life will do much to prevent the formation of gall-stones, if they are present and give rise to symptoms that are at all severe surgical intervention is usually necessary to effect a cure.

Urineal calculi may be found either in the kidney, ureter or bladder, and are accordingly called renal, ureteral or vesical calculi. Kidney stones of small size often pass into the ureter and during their journey downward to the bladder give rise to severities of renal colic which in the agony and general prostration they cause are very similar to those of biliary colic. The pain is felt lower down in the abdomen and also in the back; frequently also radiating along the inner surface of the thigh. Aside from the attacks of colic renal stones may cause pain in the back, chills, fever and bloody or turbid urine containing pus. Coral calculi are large stones which gradually fill the pelvis of the kidney, and in the conformation reproduce with great fidelity the irregularities and recession of this cavity. Very small concretions pass into the bladder without difficulty and are evacuated in the urine as gravel. Stone in the bladder is rare in women and in the male sex is seen most frequently in infancy and after the fifth year. The symptoms include pain increased by jolting or bodily motion, frequent urination, pain at the end of urination — and sometimes sudden stoppage of the stream owing to the fact that the stone rolls into the neck of the bladder shutting off the flow — and usually bloody and turbid urine. Stone is especially common in old persons on account of the cystitis (q.v.) often present. Urinary calculi may be composed of various materials, of which uric acid and urates, calcium oxalate (calcium carbonate), ammonium phosphate and ammonio-magnesium phosphate are the commonest, singly or in combination. Rarer forms are made up of calcium carbonate, cystin or xanthin. The cut section usually shows a laminated structure and a nucleus or starting point, which may be a blood clot, a shred of tissue, a bit of mucus, a small renal calculus, a mass of urates or a foreign body. Any conditions encouraging excessive deposition of the urinary constituents predispose to urinary calculi. Among such causes are lack of exercise, digestive disorders, defective oxidation, excesses in eating or drinking, catarrhal conditions of the urinary tract, etc. The tendency to stone formation is particularly pronounced in those having what is called the gouty or lithicemic diathesis. The diagnosis of renal calculi is facilitated by the use of the X-ray, while for the detection of bladder stones a special form of steel sound termed a stone seeker is introduced into the bladder. The cystoscope is also of great service in this field. Individuals predisposed to stone should keep the urine abundant by the free use of water — preferably distilled — and moderate exercise. They should avoid disturbances of various sorts, of which pain, local tenderness, persistent or remittent jaundice, clay-colored stools and chills and fever are conspicuous features. While a rational and hygienic mode of life will do much to prevent the formation of gall-stones, if they are present and give rise to symptoms that are at all severe surgical intervention is usually necessary to effect a cure.

CALCULUS, The Infinitesimal. The Infinitesimal, or Differential and Integral, Calculus is not so much a branch of mathematics as a method or instrument of mathematical investigation, of indefinite applicability. The masters now seldom try to treat it in less than a thousand large pages; here we may hope no more than to expose its basic principles, to illustrate its characteristic processes and to exhibit some of its more immediate applications, with their results. Even so little will require the utmost condensation and self-explaining abbreviations.

We might define the Calculus as the Theory and Application of Limits, so central and dominant is this latter concept. We must then, clear the ground for its full presentation.

Successive addition of the unit 1, continued without end, gives rise to the assemblage of positive integers, in which all additions, multiplications and involutions are possible. This assemblage is ordered: i.e., of two different elements, a and b, either a < b or a > b; and if a < b and b < c, then a < c. To make all subtractions (inverses of addition) possible, we annex the symmetric assemblage of negative integers, any negative integer as a (or -a), being defined by the equation a + a = 0, this 0 itself being defined by a - a = 0. To make all divisions (inverses of multiplication) possible, we annex the assemblage of fractions, quotients of integers by integers. This total assemblage of integers and their quotients, both + and —, we may call the domain or assemblage of rational real numbers, wherein all direct operations (of addition and multiplication) and also the inverses (subtraction and division) are possible. For a precise definition of the processes of
annexation here involved, see Algebra, Definitions and Fundamental Concepts.

The operation of involution is direct, a special case of multiplication, but is not commutative like addition and multiplication: thus \( a + b = b + a, \ ab = ba, \) but in general \( ab \neq ba \) unless \( a = b \) or one of them is zero. Thus the operation of involution is not commutative. The inverse of \( a \) is \( \frac{1}{a} \) if \( a \neq 0 \). It has two inverses: Given \( b \) and \( c \), to find \( a \) and given \( a \) and \( c \), to find \( b \). The former gives rise to roots or surds, the latter to logarithms. But neither of these can in general be found in the universe of rationals; to make such inversions always possible, we must still further enlarge the domain of number by annexing Irrationals. These demand exact definition.

Divide the assemblage of rationals into two classes, \( A \) and \( B \), any member \( a \) of the first being \( a < b \) to any member \( b \) of the second. Three possibilities present themselves:

1. \( A \) may contain and be closed by a number \( a > a \) to any other \( a \) but not \( < a \).

2. \( B \) may contain and be closed by a number \( b < a \) to any other \( b \) but not \( > a \).

3. Neither \( A \) may contain a largest \( a \), nor \( B \) a smallest \( b \). Then we may form (1) \( A \) of 2 and all rationals \( < 2 \); or (2) \( B \) of 2 and all rationals \( > 2 \); in either case 2 is a border (frontière) number; or (3) \( A \) of all negatives and all positive rationals whose squares are \( < 2 \) and \( B \) of all positive rationals whose squares are \( > 2 \). Here there is no border number among rationals. But a border does exist, defined as \( > a \) to any \( a \) but \( < a \). We name it second root of 2 and denote it by \( \sqrt{2} \) or \( 2^{\frac{1}{2}} \).

All such common borders are called Irrationals. The assemblage of Irrationals is determined by all such possible partitions of rationals \( (A, B) \). The assemblage of all rationals and all such Irrationals is the assemblage of Reals. It remains and is possible to extend the operations of arithmetic to all Reals. In particular, the assemblage of rationals is dense; i.e., between any two there is an infinity of others; in the same sense the assemblage of Reals also has density. Again, always on dividing all Reals into \( A \) and \( B \), in such a manner that each member of \( A \) is each member of \( B \), there will be a border in one set at \( A \) or the least in \( B \), all less numbers being in \( A \), all greater in \( B \). Hence, and in this sense, the assemblage of Reals is named continuous.

In this continuum, admitting no further introductions, suppose a magnitude to assume successively an infinity of values: \( v_0, v_1, \ldots v_n \ldots \) \( v_n^+ \ldots \); it is then called a variable, \( V \) and its values in order form a sequence, \( S \). It often happens that \( V \) will approach some constant \( L \), so that by enlarging \( n \) we may make and keep the modulus or absolute worth (i.e., radius of sign) of the difference \( V - L \) any preassigned positive magnitude, \( c \), for all following values of \( v \); in symbols, \( |V - L| < c \) for every positive \( k \). Then \( L \) is called the Limit of \( V \): \( L = \text{Lim} \ v \). Plainly, \( V \) cannot have two limits as thus defined. It is evident that \( V \) has a limit when and only when \( |V - L| < c \). If \( V \) changes always in the same sense, by increase or decrease, it has a limit when and only when \( |V - L| < c \). When \( V \) increases (positively or negatively) beyond any assignable \( L \), it is often said to have \( \infty \) as limit.

A perfect geometric illustration is found in the sequences \( I \) and \( C \) of inscribed and circumscribed regular polygons of the circle. Here every \( C \) is \( > I \); also \( C_n - I_n < r \); also \( C_n - I_n + I_n < r, C_n - A_n < r \); \( A_n - I_n < r \) (\( A \) being the circle-area); hence \( A \) is the common limit both of \( C_n \) and of \( I_n \) for \( n \) increasing without \( \infty \).

Algebraically, if \( C_n, C_{n+1}, \ldots \) be the sequence (\( O \)) of odd convergents and \( C_n, C_{n+1}, \ldots \) \( C_n \) the sequence (\( E \)) of even convergents in an infinitesimal continued fraction

\[
\frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \cdots}}} = \text{as \ convergent, then every } C_n^{+} > C_n^{o}, \text{also } C_n^{o+} - C_n^{o+} + C_n^{o}< C_n^{o}, C_n^{o+} < C_n^{o+}; \text{and } C_n^{o+} - (\sqrt{13} - 3) < r, (\sqrt{13} - 3) - C_n^{o}< r.
\]

The odd convergents from above and the even convergents from below close down endlessly upon their common limit, \( \sqrt{13} - 3 \); as quadrants of a hyperbola and its conjugate close down upon their common asymptote.

The difference \( |V - L| \) is a variable small at \( \infty \) and is called \( \infty \) infinitesimal (\( o \)); its limit is 0. The quotient of two \( o \)'s will generally be a variable; if it has a finite limit \( L \), the \( o \)'s are named of the same order; if the limit of the quotient is 0 (or \( \infty \)), the numerator (or denominator) is of higher order. If any \( o \) be chosen as standard, it is called principal infinitesimal; any other whose \( p \)th root is of the same order as the principal \( p \) is itself said to be of \( p \)th order.

Easy theorems are now proved as to the limits of the sum, difference, product, quotient or variables. In general: If \( R(w, u, v, \ldots) \) be a rational function of simultaneous variables, \( u, v, w, \ldots \); and if \( w, v, w, \ldots \) have limits, \( l, m, m, \ldots \); then \( R(w, v, w, \ldots) \) has a limit \( R(l, m, m, \ldots) \); always provided that this latter does not involve a division by 0, which has no sense.

If two \( V \) differ at most by a \( \sigma \) and one has a limit, the other has the same limit. Hereby there becomes possible a Calculus of the Limits of Variables instead of the Variables themselves. These limits are often far more the important, as we shall soon see.

A variable \( V \) (or sequence \( v_0, v_1, \ldots \) ) is bounded above when we may assign a value \( M \) that it cannot exceed; then there is a certain smallest number its upper limit, which it cannot exceed. Similarly, it is bounded below when we may assign an \( m \) below which it cannot sink; then there is a certain greatest number, its lower limit, under which it cannot descend. If \( V \) may assume either of these limits as one of its values, then that limit is attainable and is a Maximum or a Minimum; otherwise it is unattainable. If \( V \) be a proper fraction, its limits, 0 and 1, are not attainable. When \( V \) may assume every value between its attainable limits, \( a, b \), it is said to vary continuously in the interval \([a, b]\). But if \( a, \) or \( b, \) both are unattainable, we shall say that it is continuous in \([a+\alpha, b]\) or \([a, b-\alpha] \), or \([a+\alpha, b-\alpha] \).

When to values of one magnitude correspond values of another, the magnitudes are called Functions of each other (Limitants). The one to which arbitrary values may be supposed given is called the argument or independent variable; the other, whose corresponding values
CALCULUS, THE INFINITESIMAL

may be reckoned or observed (or which at least exist), is called the function. Such are a number and its logarithm or sine; the radius of a sphere and its surface or volume; the elasticity of a medium and the velocity of an undulation through it; etc. The general functional connection of and is expressed by.

If, in , then is a function of .

If , then is a rational function of ; otherwise, an irrational function.

If to any one value of there corresponds one unique value of , then is a one-valued or unique function of ; if be a unique function of , then there exists between and a one-to-one correspondence.

If and 

then and denote inverse functions. A function may reduce to a constant; as , for every finite when .

As ranges in , function will also range. Similarly, may have an upper limit and a lower limit; then is bounded in , and is its oscillation. If either or be absent (or ), this oscillation is . If we put , we get sub-intervals such that for at least one , and in none; the oscillation will not be in any .

If approaches , no matter how, approaches as its limit, then is continuous at (i.e. for ). Or, if is bounded in and if the limit of its oscillation be for vanishing, then is continuous at . That is, we must be able to and keep the oscillation of small at will by making and keeping the fluctuation in small at will.

It may be that limit of is only for , then is named continuous right of ; or that is continuous only for , then is named continuous left of . Only when the is left of, and or (i.e. of being the same), is continuous at .

If is continuous at all points (values of ) right of and left of, it is named continuous in .

The infinitesimal is called the (immediate) vicinility (or neighborhood) of .

A change in the value of is conveniently denoted by , read difference- or Delta-; hence and will denote corresponding (simultaneous) differences or changes in and .

If is continuous in , we may cut this latter up into finite sub-intervals, each so small that the oscillation of in each shall be . Hence Heine calls uniformly (equally, gleichmässig) continuous in . This corresponds to uniform convergence, as of a power-series,

opposed to non-uniform or infinitely slow convergence (Seidel, 1850). Finer discriminations must here be omitted.

Continuity in the same functional property with which the Calculus is concerned. Since

and cosine are everywhere continuous, but tan is discontinuous for ,

where and cosine are everywhere continuous, but tan is discontinuous for ,

Similarly, is discontinuous at , at an extremely important discontinuity.

So is discontinuous at , leaping from to ; the discontinuity is 2. It is generally assumed that Continuity holds throughout the Processes of Nature.

Again, is not defined for , but whatever value be assigned it there, it remains discontinuous, since sin 1/ vibrates infinitely fast between +1 and −1 for . Again, may approach a limit for vanishing, yet not approach . Thus, let .

A decreasing geometrical series, ratio , hence . Then as , . But for , . There are many immediate consequences of continuity, which we have no space to discuss here, such as: A function continuous in is continuous in its upper and lower limits (its maximum and minimum); it also assumes at least once every value between and , a property, however, not peculiar to continuous functions (Darboux).

The notion of function is at once extended to several variables, , . One- or many-valued, algebraic or transcendental, etc., as before. Each variable, as , has its range or interval ; so its , etc. All possible sets of values , ... form an assemblage or the Domain (D) of variation. Any set (or point) for which any variable has an extreme or border value, as or , or , or , is a border point; the assemblage of all such is the border or contour of . A simple geometric description of in rectangular co-ordinates for only two variables, and , are the limits of or sides ; beside , , , and ; of three variables, , , it would be a cuboid bounded by the planes . The point (x, y) or (x, y, z) is anywhere in or on the rectangular or cuboid. Such a may be thought cut up into elements, infinitesimal rectangles or cuboids. Suppose any point , within an element. If now approaches , ... approaches point , ... , no matter how, then approaches a point, ... (point, ...).

This amounts to saying that the oscillation of shrinks toward zero as the element contracts, no matter how, about the point; that is, infinitesimal function-changes correspond to any and all infinitesimal argument-changes in the immediate vicinity of the point.

Any is called continuous within when continuous at every point in . But on this border, as , , etc. approach , ... the point must not get without D. An f is continuous in the (immediate) vicinility of a point, when continuous within an infinitesimal D including that point.
In general, theorems holding for functions of one variable may be extended, with proper modifications, to functions of several variables.

**Derivatives.** In the study of functional dependence, the main subject of scientific inquiry, it is of first importance to know how corresponding changes in the magnitudes are related. To discover this, we form the quotient of corresponding differences, \( \frac{\Delta y}{\Delta x} \) called Difference-Quotient (DQ). In general, it is very complex, but breaks up into two parts, one independent of \( \Delta x \), the other vanishing with \( \Delta x \). The first is the important part and is named Derivative (D) or Differential Coefficient (DC). More formally, if \( y = f(x) \) be a unique continuous function of \( x \) in \([a, b]\), and \( x \) be any point therein, and if

\[
\frac{dy}{dx} = \lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}
\]

approaches a limit as \( \Delta x \) approaches 0, no matter how, then that limit is called Derivative (D) of \( f(x) \) as to \( x \), at the point \( x \). If \( f(x) \) has a D at every point of \([a, b]\), the assemblage of them forms a new function, the Derivative of \( f(x) \) for \([a, b]\), which we may write \( f'(x) \) with Lagrange, or \( \frac{df(x)}{dx} \) with Cauchy. Hence

\[
\frac{df(x)}{dx} = f'(x) + \sigma.
\]

**Geometric Interpretation.** The Differential Calculus originated in the Problem of Tangents. Let \( P \) be any point of a curve referred to rectangular axes \( X, Y \), and let \( P \) be between \( Q \) and \( Q' \). Draw secants \( PQ, PQ' \), sloped \( \theta \) and \( \theta' \) to \( X \), and \( \phi \) to \( \theta \) and \( \theta' \) to each other; draw ordinates through \( P, Q, Q' \); through \( P \) and \( Q' \) draw parallels to \( X \), meeting ordinates through \( Q \) and \( P \) at \( D \) and \( D' \). Then

\[
PQ = \Delta x, \quad PQ' = \Delta x', \quad DQ = \Delta y, \quad PD' = \Delta y'.
\]

Also

\[
\frac{\Delta y}{\Delta x} = \tan \phi, \quad \frac{\Delta y}{\Delta x} = \tan \phi', \quad \tan (\phi' - \phi) = \frac{\Delta y}{\Delta x} = \tan \phi.
\]

If now by approaching \( Q \) and \( Q' \) to \( P \) we can make and keep \( \phi \), and therefore \( \tan \phi \), small at will, then the secants settle down into a common position called tangent to the curve at \( P \) (sloped \( r \) to \( X \) and the common limit of \( \frac{\Delta y}{\Delta x} \) and \( \frac{\Delta y}{\Delta x} \) is tan \( r \); or \( f'(x) = \tan r \). But if \( P \) were an angular point, then \( PQ \) and \( PQ' \) would not tend together, \( \frac{dy}{dx} \) would tend to one limit, the progressive differential coefficient, and \( \frac{dy}{dx} \) to another limit, the regressive differential coefficient; only when these two coalesce there is a Derivative proper. Thus in \( y = x (\frac{1}{e^x} - 1) / (\frac{1}{e^x} + 1) \), at the Origin, Lim. \( \frac{dy}{dx} = (\frac{1}{e^x} - 1) / (\frac{1}{e^x} + 1) \), the progressive \( DC = 1 \), the regressive \( DC = -1 \), the two limiting positions of the secants are perpendicular.

How thickly may such salients be strewn along a curve? To have a D, i.e., to be differentiable, plainly the function must be continuous; it was long thought that this necessary condition was sufficient, that the continuous function possessed in general a D, save at certain special points. It was Riemann who first suggested (at least as early as 1861) the astonishing possibility that such an \( f(x) \) as

\[
\frac{\Delta y}{\Delta x} = \sum_{n=1}^{\infty} \frac{\sin(n\pi x)}{n!},
\]

though everywhere continuous, was nowhere differentiable; but as he left no proof, it was generally thought he meant strictly that the D did not exist for any value of \( x \). In any case Weierstrass himself produced (18 July 1872) an example of such a function, \( y = \sum_{n=0}^{\infty} \frac{\sin(n\pi x)}{n!} \), where \( a \) is an odd integer, \( b, c, d \) be a positive number \( < 1 \), and \( ab > 1 + \frac{\pi}{n} \), which, though everywhere continuous, has nowhere a D, since the progressive and regressive Difference-Quotients are everywhere opposite in sign and increase oppositely toward \( \infty \) as they pass over into Differential Coefficients (Math. Werke von K. Weierstrass, II, p. 71–74). Geometrically, in the graph of the differentiable function, the polygon formed by \( n \) consecutive chords tends toward the curve for \( n \to \infty \). For \( PQ \) to \( PQ' \) tend to coalesce as \( Q \) and \( Q' \) both approach \( P \), the triangle \( PQ'' \) becomes flatter and flatter (we may suppose the arc \( PQ'' \) steadily enlarged under a microscope to its original length as \( Q \) and \( Q' \) close down on \( P \)), the curve we may say is elementally straight at \( P \). But with Weierstrass’s function the polygon remains always re-entrant, a zigzag, and as consecutive chords, \( PQ \) and \( PQ' \), tend to separate at a straight angle. Such discontinuities may yet present themselves to the future student of nature.

If \( y = x^a \), \( \frac{dy}{dx} = 2x \Delta x + \Delta x^2 \), \( \frac{dy}{dx} = 2x \Delta x \), whence \( \Delta x = \frac{\Delta y}{2x} = \frac{\Delta y}{\Delta x} \). Here \( y \) is the area of a square of whose side is \( x \), and \( 2x \) is the border of the square perpendicular to which the square expands, the \( D \) is the front of variation. Similarly, if \( y = x^2 \), \( D_y = 2x \), the circumference, the front of variation perpendicular to which \( x \) varies. If \( y = x^3 \), \( D_y = 3x^2 \), the front of variation perpendicular to which \( x \) varies. If \( y = 4x^3 \), \( D_y = 4x^2 \), the sphere surface, the front of variation perpendicular to \( x \). For \( y = x^4 \), \( D_y = 4x^3 \), again the whole front of variation, though here our powers of envisagement fail us. Thus we are conducted to the Derivation of Assemblages, for which the reader must be referred to this latter subject.

**Kinematic Illustration.** Let \( s \) = length of path of a moving point \( P \), described in time \( t \); \( \Delta s \) and \( \Delta t \) = corresponding changes in \( s \) and \( t \); then

\[
\frac{\Delta s}{\Delta t} = \bar{v} = \text{average speed during } \Delta t;
\]

Lim. \( \frac{\Delta s}{\Delta t} = \text{instantaneous speed at } t = \text{speed at the instant } t \) (i.e., end of \( t \) and beginning of \( \Delta t \)). There is no motion at the instant of time, nor at the point of path, but only
CALCULUS, THE INFINITESIMAL

during the time and space immediately about the point and instant. Instantaneous speed is a technical term for limit of average speed in the instantaneous vicinity of the point and instant. This instantaneous speed generally varies with $t$, and its $D$ as to $t$ is named acceleration and is written $\frac{dv}{dt}$. The product of this acceleration by the mass of the moving $P$ yields the all-important motion of force. The $D$ of this acceleration might be called second acceleration, but the notion has not yet proved useful in Mechanics (q.v.).

The notion for $D$ may be this or that. Newton used the dot, thus $\dot{s}$, to denote derivative as to $t$, as still do the British; Lagrange, the accent, $\dot{F}(x)$, still common; Cauchy, the operator $D$, with or without subscribed argument $x$; others subscripts, as $y_k, y_n, \text{etc.}$: most common, most expressive, but possibly misleading is the Leibnitzian $\frac{dy}{dx}$, not a fraction (thus far at least), not the quotient of $dy$ divided by $dx$, but the limit of the fraction $dy/dx$ for $dx$ vanishing, no matter how.

Sometimes we write $\frac{d}{ds}$ for $D_s$, thus: $y_s \equiv D_s y \equiv \frac{dy}{ds}$, etc.

Lagrange (‘Théorie des Fonctions,’ 1) attains the notion of Derived Functions (or $D_s$) by substituting $x + \xi$ for $x$ in $F(x) = a_0 + a_1x + a_2x^2 + \cdots + a_nx^n$, whence $F(x + \xi) = F(x) + F'(x)\xi + \frac{1}{2} F''(x)\xi^2 + \cdots + \frac{1}{n} F^{(n)}(x)\xi^n$,

where each $F$ turns out to be formed from the preceding in the same way; they are the Derived Functions of $F$. A near-lying Generalization considers $f(x) = \sum a_n(x - a)^n$, $n = 0$ supposed absolutely convergent for all values of $|x - a| < R$, i.e., for $x$ within $[a - R, a + R]$.

Then in the same [ ] all the $\infty$ series

$$\sum_{n=m}^{\infty} a_n(x-a)^n$$

will also converge absolutely. Denote them in turn by $f'(x)$, $f''(x)$, $\ldots$. Choose $\xi$ so that $|x - a| + |\xi| < R$; then the series

$$\sum_{m=0}^{\infty} \frac{f^{(m)}(x)}{m!}$$

will also converge absolutely in the same [ ] and will equal $f(x + \xi)$. These Sums $f'(x)$, $f''(x)$, $\ldots$ are called 1st and 2d, etc. Derived Functions of $f(x)$, which may be called its own 0th Derived Function. If instead of the inconvenient Lagrangian accents we put Cauchy's $D_s$'s with proper exponents, we perceive that these latter, denoting order of differentiation, obey the same laws as ordinary exponents:

$$D^{m+n} = D^m \cdot D^n, \quad D^m \cdot D^n = D^m \cdot D^n, \quad D^m, \quad D^n, \quad D^{m+n}.$$

It is usual, though not quite satisfactory, to denote the value of any derived function at any point $(x - a)$ by writing $a$ for $x$, thus: $f(a)$. At this stage the $D$-notation is not so convenient. These special values are seen to be $f^{(n)}(a) = \frac{n!}{n} a$. On finding hence the $a$'s and substituting in the definition of $f(x)$ we get

$$f(x) = f(a) + \sum_{n=1}^{\infty} \frac{f^{(n)}(a)}{n!} (x - a)^n$$

Such is the ordinary Taylor's Series, or MacLauren's (more justly Stirling's) in case $a = 0$.

Lagrange supposed (amazingly, Picard) any arbitrary $f(x)$ expansible in positive integral powers of $(x - a)$, except for special values of $a$. However, presupposed only uniqueness and continuity in a definite interval, there may be no value of $a$ in the interval for which such expansion is possible. Thus, $f(x) = -(x)$ for $z < 0$ and $\rightarrow 0$ for $z \geq 0$ cannot be developed in positive integral powers of $x$ for $x$ positive and $\rho$ not integral. Hence this Lagrangian notion of derived function, while in general agreeing with the notion of $D$ as limit of difference-quotient, is not yet so universal.

The notion of Differential, though unnecessary at this stage, is commonly introduced thus: From $\frac{dy}{dx} \equiv f'(x) + a$, $dy \equiv df(x) = f'(x)dx + a$. This first part of $df(x)$, namely, $f'(x)dx$, proportional to $dx$ and of the same order of infinitesimality, may be defined as the Differential of $f(x)$ and may be denoted by $df(x)\; x$, which is thus a finite variable for $dx > 0$. For $f(x) = x$, we have $dx = dx$, which is therefore differential of $x$. Hence $dx = df(x)$, i.e., the $D$ of $f(x)$ as to $x$ is the quotient of the differentials of $f(x)$ and $x$ (Leibnitz). Here $\frac{dy}{dx}$ is strictly a fraction whose terms are no means "ghosts of departed quantities" (Berkeley). Geometrically, $dy$ is the $dy$ prolonged up to the tangent at $P$, change of the ordinate of the tangent when abscissa changes by $dx$; $\lim_{dy \rightarrow 0} \frac{df(x)}{dx}$. This notion of differential, though useful in geometry, mechanics and elsewhere, rather embarrasses the theoretical development of the subject. Hence the terms Derivation (\"Derivation\"), to differentiate, and hence the names Differential Calculus, Differential Coefficient.

On these bases the structure of the Differential Calculus may now be safely erected. Primary formulæ, easily established, are as follows (D meaning always Derivative as to $x$, $u$, $v$, etc., being simultaneous functions of $x$):

$$D(u + v - w) = Du + Dv - Dw$$

$$D(uv) = Du + u'Dv = uv\left(\frac{Du}{u} + \frac{Dv}{v}\right)$$

$$D\left(\frac{u}{v}\right) = \frac{u'v - uv'}{v^2}$$

$$(u + c)' = u'$$; $$(uv)' = c: u'$$.

Very important is Mediate Derivation, when $y$ is function of a function of $x$, as $y = f(\phi(u))$, $\phi(x)$, hence $y' = f'(x)\phi'(u)\phi'(x)$. If then $\phi$ and $f$ have definite $D_s$, $\phi'(u)$ and $f'(x)$, we have

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

hence $y' = y'u' = f'(u)\phi'(u)'$. $f'(x)$,
But $y z$ may exist even when the supposition fails, and this rule with it.

In particular, if $y = f(x)$ and inversely $z = f(y)$ and if either variable has a $D \neq 0$ so has the other. For if $f'(x) \equiv \lim \frac{dy}{dx} \neq 0$, then $\frac{dy}{dx} = f'(x)$ and hence $\lim \frac{dx}{dy} = \frac{1}{f'(x)}$ or $f'(y) = \frac{1}{f'(x)}$, i.e., in general, the $D$'s of $x$ as to $y$ and of $y$ as to $x$ are reciprocals of each other: $y z = \frac{1}{y z}$.

If $y = f'(x)$ is a function, then $x$ and $y$ increase (or decrease) together, $f(x)$ is called increasing at $x$. But if $y = f(x)$ be a function of $x$ and $y$ change oppositely, $f(x)$ is decreasing at $x$.

Hence if $f'(c) = 0$, $f(x)$ must be $f'(c)$ on one side of the point $c$, and $f'(c)$ on the other. Hence Rolle's Theorem: If $f(x)$ vanishes at $a$ and $b$ and has a $D$ at every point within $[a, b]$, then this $D$, $f'(x)$ vanishes at some point within $[a, b]$.

Now, $f(x) = (b-a) \phi(x) - (x-a) \phi(b) + \phi'(b) \phi(b)$ is such an $f(x)$, made to order, $\phi$ being differentiable within $[a, b]$. Hence $f'(x) = (b-a) \phi'(x) - \phi(x) + \phi'(b) \phi(b)$, and $\phi'(x) = 0$ for some $x$ in $[a, b]$. Hence $\phi'(x) = \phi'(b) \phi(b)$, and $\phi'(x) = \frac{1}{\phi'(b) \phi(b)}$.

Commonly we write $a \pm h$ for $a + h$ and $b \pm h$ for $b$; then $e^{x} = e^{x + \theta h}$, where $\theta$ is in $[0, 1]$, so that $\theta \phi' = e^{x + \theta h}$, the extremely important result for finite increments. Hence we see at once that if the $D$ is everywhere $0$ within an interval, the function is constant in that interval; and hence that two functions whose $D$'s are equal in an interval can themselves differ only by a constant in that interval — a Theorem at the base of the Integral Calculus.

Passing now to $D$'s, we first attempt $y = e^{x}$.

Hence

$$y + dx = e^{x} + dx = e^{x + dx} = e^{x} \left( 1 + dx + \frac{dx^{2}}{2} + \ldots \right).$$

Hence

$$\frac{dy}{dx} = e^{x} \left( 1 + \frac{dx}{2} + \frac{dx^{2}}{3} + \ldots \right).$$

This is term by term, except the first, less than $e^{x}$, whose limit is 1; hence $D \frac{dy}{dx} = e^{x}$ on $D e^{x}$, the exponential $e^{x}$ is unchanged by Differentiation as to its exponent. Hence $D e^{x} = e^{x}$. Hence, if $y = \log x$, $e^{x} = y$, $e^{x} y = 1$, $y = e^{-x} = 1$; or $D \log x = \frac{1}{x}$. Hence

$$D \log u = \frac{u}{u}.$$  Hence, if $y = x^{n}$, $\log y = \log x^{n} = n \log x$; $D y = D x^{n} = n x^{n-1}$.

For $y = \sin x$, $2 D y = \sin(x + 2dx) - \sin x = 2 \cos(x + dx) \sin dx$; $\frac{dy}{dx} = \cos(x + dx) \frac{dx}{dx}$; hence

$$\frac{dy}{dx} = \cos(x + dx) \frac{dx}{dx} = \sin(x + \frac{\pi}{2})$$; hence

$$D \sin u = \cos u \cdot u \frac{du}{dx}.$$  Hence $D \cos x = - \sin x$.

Cosine as to the angle merely adds $\frac{\pi}{2}$ to the angle. Also, $D \tan x = 1 + \tan^{2} x = \sec^{2} x$. If $y = \sin^{-1} x$, $\sin y = x$, $y \frac{dy}{dx} = 1$, $y = \frac{1}{\sqrt{1 - x^{2}}}$; hence

$$D \sin^{-1} x = \frac{x}{\sqrt{1 - x^{2}}}.$$  Similarly for $\cos^{-1}$. If $y = \tan^{-1} x$, similarly $D \tan^{-1} x = \frac{1}{1 + x^{2}}$.

Specially, if $D \sin^{-1} \frac{x}{a} = \frac{1}{\sqrt{a^{2} - x^{2}}}$, $D \tan^{-1} \frac{x}{a} = \frac{1}{a^{2} + x^{2}}$.

Similarly we treat the hyperbolic sine and cosine and tangent ($\sinh x$, $\cosh x$, $\tanh x$), and their inverses $\sinh^{-1} x$, $\cosh^{-1} x$, $\tanh^{-1} x$, with the important results:

$$D \sinh x = \cosh x, \quad D \cosh x = \sinh x, \quad D \tanh x = 1 - \tanh^{2} x,$$

with easy generalization for $u$ and $\frac{x}{a}$, — formulæ especially important in Integration. By Derivation the anti-transcendentals are thus reduced to algebraic forms, while the exponentials and goniometrics return into themselves; hence the inverse of Derivation, whatever it may be, is applied to algebraic forms, may give rise to transcendentals. So much for ordinary algebraic and simple periodic functions.

The Infinite Series cannot always be differentiated by differentiating term by term, but only under certain conditions of equable convergence. If each term $f_{n}(x)$ of $f(x) = \sum_{n=0}^{\infty} f_{n}(x)$ be unique and continuous and if $\Sigma f_{n}(x)$ converge, for every $x$ in $[a, + d]$, and if $L f_{n}(x) = f_{n+1}(x)$ — for such a series the Theorem holds: If each term has a finite progressive $D$, $f'_{n}(a)$, and if the series of $D$'s, $\Sigma f'_{n}(x)$, converges equably for every $dx > 0$ and $dx > 0$, then

$$f(x) = \sum_{n=0}^{\infty} \frac{f_{n}(x) + dx}{dx} - f_{n}(a)$$

for $dx > 0$.

In general, this narrower Theorem will answer: If, for every $x$ in $[a, + d]$, each $f_{n}(x)$ is unique, continuous, and has a $D$ (and for $x = a$ at least a progressive $D$), and if both $\sum_{n=0}^{\infty} f_{n}(x)$ and $\Sigma f_{n}(x)$ converge, the latter equably, then $L f(x) = f(x)$, and $f(x)$ has a progressive $D$ at $a$, which is $\Sigma f'_{n}(a)$: i.e., we form the $D$ of the infinite series by summing (to $\infty$) the $D$'s of the terms (for details see Real Variable, Theory of Functions of the).

For $D f(x)$ as to $x$, where $x = x + y$, see Complex Variable, Theory of Functions of.
A D of a first D is called a second D, written variously \( f'(y), Ds^2, \frac{d^2y}{dx^2}, \) and so on for the 3d, 4th, ... nth Ds. We see at once,

\[
Dn^m = \frac{m!}{(m-n)!} \frac{\sin \theta}{\cos \theta} (x + \pi n)^{2n-1}
\]

A rational fraction must first be decomposed into such fractions. The exponential \( e^x \) repeats itself steadily, \( D(e^x) = e^x \); hence \( \phi(D) = \phi(a)e^x \), \( \phi \) being algebraic and rational. The log \( x \) is at once reduced to a fraction by \( D \log x = \frac{1}{x} \). For a product \( uv \) we have Leibnitz's Theorem:

\[
D(uv) = u Dv + v Du + \frac{n(n-1)}{2!} u^2 v' + \ldots
\]

precisely as in the Bionomial Theorem, the subscripts denoting the Ds. For a quotient \( \frac{u}{v} \), we write \( \frac{D(u)}{D(v)} = \frac{vDu - uDv}{v^2} \). From these \( n+1 \) simultaneous equations we find the \( n \) unknowns, \( y, x, y_n, y_{n-1}, \ldots \); this elimination is linear in \( y_n \) and yields

\[
y_n = \frac{(-1)^n n!}{n^2!} \frac{\mu v 0 0 \ldots}{\mu v ^2 \mu v \ldots}
\]

Applications. 1. Let \( P \) be any ordinary point of a curve, \( S \) the foot of the ordinary \( y \), stretched evenly along \( Y \), the assemblage of \( y \)-values is not stretched evenly along \( Y \), but is stretched, compressed, folded, crumpled in countless ways. The study of \( Y \) becomes the study of the intimate texture of this \( Y \) axis bearing the assemblage of \( y \)-values.

If now \( y = x + cy \), \( w = u + iv \) are complex variables, and \( w = f(a) \), then \( a \) is indeed compounded of \( x \) and \( y \), not however in just any combination, as \( x+cy \), \( x-2iy \), but only in the one combination \( x+i(y+c) \). The domain of \( z \) is the \( X \) plane of \( w \), the \( Y \) plane of \( w \), as two we may take the floor and a wall or the ceiling. Not having a 4th dimension at command, we cannot envisage \( w = f(a) \) as a surface, as we did \( y = f(x) \) as a curve. We must again think of two points \( P \) and \( Q \), in \( X \) and \( Y \) connected by an elastic rod, \( PQ \); if \( P \) moves about in \( X \), \( Q \) moves about in \( Y \), obeying \( w = f(a) \). We may think of the texture of \( XY \) as uniform, then the texture of \( UV \) will not be uniform, but stretched, compressed, folded and crumpled in countless ways. The study of \( w \) now becomes the study of this intimate texture of \( UV \).

As in \( y = f(x) \) the derivative \( y_x \) is the part of the \( ds \) that is entirely independent of \( ds \) so \( w_x \) must be independent of \( ds \) as \( y_x \) is the same whether \( ds = \pm 1 \) or \( = -1 \), so in general \( w_x \) is the same no matter how \( ds \), along whatever path of value. Geometrically this signifies that if \( p, q \) be two intersecting paths of \( x \) and \( y \), the corresponding intersecting paths of \( w \), then \( p \) and \( p+q \) and \( q \), intersect under the same angle. Hence the angles of the curvilinear triangle \( (p, q, p') \) of the corresponding curvilinear triangle \( (p, q, p') \); hence the two corresponding infinitesimal curvilinear triangles of the chords (or tangents) will be similar, the ratio of similitude being \( w_x \) which of course varies from point to point: the one plane is a map of the other and the textures are similar in the smallest parts. Such is the geometric interpretation of the Derivative of Functions of a Complex Variable (q.v.). It would seem that such interpretations might be indefinitely extended.
a we find the 4-cusped Hypocycloid, \( r^4 + y^4 = c^4 \), as the envelope, or path of the instantaneous pivot.

Hence Plücker's double conception of a curve as path of a point gliding along a straight line that turns about the point, and envelope of a straight line that turns about a point that glides on the straight line. The relation connecting the corresponding magnitudes, arc-length \( s \) (of the path) and angle \( a \) (through which the straight line turns), is the intrinsic equation of the curve. The \( DQ \cdot \frac{da}{ds} \) is named average curvature of \( ds \); its limit \( \frac{d}{ds} \) is named instantaneous curvature (\( \kappa \)) at \( P \). Plainly \( da = a \cdot \tau \); hence

\[
\kappa = \frac{dy}{dx} \cdot \frac{d}{ds} = \frac{d}{dx} \tan \tau \cdot \frac{dx}{ds} = \frac{y'}{(1 + x^2)^{\frac{3}{2}}}
\]

(N.B. The Differential Triangle \( PDQ \) formed by \( dx, dy, ds \), yields at once

\[
s^2 = x^2 + y^2 \frac{dx}{ds} = \frac{1}{1 + y^2} \frac{dy}{dx} = \frac{y^2}{1 + y^2}
\]

In the circle \( \kappa \) is the constant \( \frac{1}{r} \), hence the curvature of the circle is the reciprocal of the radius. For any point of any curve the reciprocal of this curvature is called the radius of curvature \( \rho \); hence this \( \rho \) at any point is the radius of a circle of equal curvature, hence called circle of curvature.

To illustrate.—Draw \( PT \) and \( PN \), tangent and normal to the curve; about \( K \) and \( K' \) on \( PN \), with radii \( \rho' > \rho \) and \( \rho'' < \rho \), through \( P \) draw two circles, one less, the other greater than the circle of curvature. Let \( \rho' \) and \( \rho'' \) approach and coalesce in \( \rho \); then \( K \) and \( K' \) approach and coalesce in \( K \) the centre of curvature, and the \( \sigma \) about \( K \) is the osculatory circle.

Otherwise, through \( P \), and \( Q \) and \( Q' \) on opposite sides of \( P \), draw a circle. Let midnormals to \( PQ \), \( PQ' \) meet \( PN \) at \( S', S'' \), and each other at \( S \); as \( Q' \) and \( Q'' \) approach and coalesce in \( P \), \( S', S'', S \) all approach and coalesce in their common limit \( S \) (or \( K \)). Hence the osculatory circle = circle through three consecutive points of a curve, and centre of curvature = intersection of two consecutive normals.

The co-ordinates (\( u \) and \( v \)) of \( K \) are given by

\[
u = x - \frac{y^2}{2} (1 + y^2), \quad v = y + \frac{1}{2} (1 + y^2)
\]

Eliminating \( x \) and \( y \) between these equations and the equation of the curve, we get the equation connecting \( u \) and \( v \) for every \( K \), i.e., the equation of the Evolute, or locus of the centres of curvature of the original curve (the Involute).

Since \( u, v \), \( u^2 + v = 0 \), the tangents at corresponding \( P \) and \( K \) are perpendicular, the normal to the involute is tangent to the evolute. Also, it is easy to prove that the arc-length in Evolute can differ only by a constant from the radius of curvature (\( \rho \)) in Involute. Hence a point of a cord held taut while being unwound from the evolute must trace an involute; hence the former name. To any involute there is only one evolute, but to any evolute there are infinitely many (so-called parallel) involutes.—An excellent illustration of a one-valued determination with many-valued inverse, and also of the definiteness of differentiation as compared with the indefiniteness of its inverse, Integration (see below). Some curves reproduce themselves in their evolutes, notably Cycloid and Logarithmic Spiral, which latter inspired the engraving and epitaph on the tomb of Jacob Bernoulli (1654–1705): Eadem mutata resurgo. The general theory of the Contact of curves, Asymptotes etc. beautifully exemplifies this Calculus, but cannot be treated here (see Curves, Higher Plane).

Indeterminates.—If for \( x = a \) both terms of a fraction \( y = \frac{a}{\phi(x)} \) vanish, then \( y \) loses definiteness, taking the unmeaning form, \( y' = \frac{a}{\phi(a)} = \frac{\phi(a)}{\phi(a)} \) (Cf. Algebra).

The fundamental example is \( y = \frac{x^n - a^n}{x - a} \) for \( x = a \). However, we may still seek Lim. \( \frac{\phi(x)}{\phi(a)} \) for \( x = a \), though it would be arbitrary to assume this limit as the value of \( \frac{\phi(x)}{\phi(a)} \) (D'Abelaux). If \( x = a \) be removable from both terms, we may cancel it for \( x = a \), and then seek the limit for \( x = a \). Thus \( x = a \)

\[
ax + a^2 \quad \text{for} \quad x = a + 0, \quad \text{this last} = 3a^3 \quad \text{for} \quad x = a; \quad \text{hence} \quad \text{Lim.} \quad x = a \quad \text{or} \quad a = 3a^3, \quad \text{but not} \quad x = a = 3a^3
\]

for \( x = a \), unless arbitrarily. Now \( x = a \) = \( \phi(a) \) = \( \text{Lim.} \phi(x) \)

\[
\text{Lim.} \phi(a) = \text{Lim.} \phi(a) = 0 = \phi(a) \quad \text{(L'Hospital)}
\]

Hence the ordinary rule: Take the limit of the quotient of the \( D \)'s of the terms at the critical value. Or, expand the terms in the neighborhood of \( a \), simplify, cancel the vanishing common factor, and evaluate for \( x = a \). Similarly, with proper modification, we treat \( \infty \); and \( \infty = \infty \), reduced to 0. Indeterminate exponentials like \( 1^0, \infty^0 \) etc., are first reduced to 0 by passing to Logarithms.

Maxima and Minima are points where a curve ceases to ascend and begins to descend; accordingly at such points the \( D \) must change sign; hence must pass through 0, if continuous. This passage is from + to − for a maximum, from − to + for a minimum. Hence the ordinary rule: To maximize or minimize \( f(x) \), put \( f'(x) = 0 \); the \( x \)-roots will yield maximal or minimal values of \( f(x) \) according as they make \( f''(x) \) negative or positive. For \( f''(x) = 0 \), treat 3d and 4th D's precisely as the 1st and 2d D's. The same rules result from expanding \( f(x) \), as by Taylor's Theorem. Special cases (as of \( D \) discontinuous) call for special treatment, often preferably geometrical or mechanical.

The geometric depiction of a function of two independent variables, \( z = f(x, y) \) or \( F(x, y, z) = 0 \), is of course a surface (\( S \)): at any point \((x, y)\) in the plane erect the corresponding value.
of $z$; the ends of these $z$'s form $S$. We may pass on $S$ from $P$ to $P'$ in $\infty$ of ways; e.g., parallel to $ZX$; then $x$ and $z$ would change, but not $y$. Hence there would be simultaneous $dz$ and $ds$, but $dy=0$. Then \( \frac{ds}{dx} \) is written $\partial z/\partial x$ (Jacobi), and is read partial D of $z$ as to $x$. Similarly, for a path of $P$ parallel to $YZ$, there are simultaneous $dy$ and $ds$, but $dx=0$. \( \frac{ds}{dy} = \frac{dx}{dy} = \text{partial D of } z \text{ as to } y. \)

For $u=f(x, y, z)$ institution fails, but we think each $P$ in $[x, y, z]$ as weighted with the proper $w$ instead of erecting this $u$ perpendicular to $[x, y, z]$. As $P$ moves, the weight $u$ changes. For motion parallel to $X$ both $dy$ and $ds$ are $0$ and \( \frac{du}{dx} = \frac{du}{dx}, \) etc. Of course, the foregoing presumes that $x$ and $w$ actually admit of the derivations in question.

**Differentials, Partial and Total.**—By Definition, \( \frac{du}{dx} \) is partial D of $u$ as to $x$, etc. \( \frac{du}{dx} + \ldots = \text{total D of } u. \)

Geometrically, on $z=f(x, y)$, the path of $x$-change is parallel to $ZX$, hence $\frac{dx}{dz} = \tan \tau$, as before. Similarly $\frac{dy}{dz} = \tan u$. The plane through the tangents to these paths (at $P$) is in general the plane tangent to $P(x, y, z)$ to $S$.

Clearly its equation is $w-z=(u-x)^2 + (v-y)\frac{dz}{dx}(w, v, w)$ being the current co-ordinates for the plane. This equation assumes the symmetric form $w-x = F_z + (v-y) F_y + (w-z) F_w = 0$, since $\frac{\partial z}{\partial x} = -\frac{F_z}{F_x}$, etc. Hence the equations of the normal are $u-x = F_z F_x$, etc. As to existence, the tangent plane is conditioned like the tangent line. Through $P(x, y, z)$ and two neighbor points, $Q$ and $R$ (as $z+dz$, $y+dy$, and $x+dx$), and $x, y, dx, dy, dz$, pass a secant plane $II$. Let $K$ and $Q$ descend any wise upon $P$. If the tiltings of $II$ approach $0$, if $II$ settles down toward the same fixed position, no matter how $dx$ and $dy$ approach 0, i.e. independently of $dy$ and $dz$, then the limiting position of $II$ is the tangent plane at $P$. But at the vertex $P$ of a cone ($s^2 + a^2 = m^2$), $II$ rolls forever around the cone as $Q$ and $R$ circle around $P$.

Here, at $(0, 0, 0), \frac{\partial z}{\partial x} = x = m^2$, and \( \frac{\partial z}{\partial y} = -m^2 \) lose all meaning, as do tangent plane and normal; but if both be functions of an arbitrary $t$, we have the Total $D$ of $z$ as to this $t$: \( \frac{dz}{dt} = \frac{dy}{dt} = 0, \) + and $\frac{dy}{dt}$, or the Total Differential is the sum of the Partial Differentials. For $t=x, \frac{dz}{dx} = f_x + f_y \cdot y, or \( \frac{dz}{dy} = y, f_x + f_y \cdot dy $, a fundamental theorem holding when at $(x, y)$ the DQ $f(x + dx, y + dy) - f(x, y)$ is an equably continuous function of $y$ and $dz$.

Earlier $D$'s are pure when the same Independent Variable is retained, mixed when it is changed. So $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ are pure, but $\frac{\partial z}{\partial x} \frac{\partial z}{\partial y}$ is mixed. In mixed $D$'s the question arises: Is the order of Derivation indifferent? The answer is, Yes, $\frac{\partial z}{\partial x} \frac{\partial z}{\partial y} = \frac{\partial z}{\partial y} \frac{\partial z}{\partial x}$ but only under conditions. For a power-series the case is clear, but the general investigation is subtle, and the result is involved and tedious. The theorem holds: When, for $x$ in $[a-h, a+h]$, and $y$ in $[b-k, b+k]$, $f(x, y)$ is uniquely defined, and the $f(n-1)(n^2) DC$'s exist and are finite, and all the mixed ones are continuous as to both $x$ and $y$, then everywhere in the same rectangle $2h, 2k$ all the other mixed $DC$'s of the $n$th order exist, and the order of derivation is indifferent. Also, if, besides, everywhere in the rectangle the $(n-1)$-mixed $DC$'s of the $n$th order, $\frac{\partial^{n-1} f}{\partial x^{n-1} \partial y}$ exist finite, and at $[a, b]$ are continuous as to both $x$ and $y$, then all other mixed $DC$'s exist at $[a, b]$, the order of derivation being indifferent. Space is want- ing for the proofs.

The Taylorian Series or Law of the Mean may now be extended, under proper conditions, to develop $f(x, y)$ near $(x, y)$, thus:

$$f(x + h, y + k) = f(x, y) + \frac{k}{h} \frac{\partial f}{\partial x} + \frac{h}{k} \frac{\partial f}{\partial y}$$

$$+ \left( \frac{h}{2k} \frac{\partial^2 f}{\partial x^2} + \frac{k}{2h} \frac{\partial^2 f}{\partial y^2} + k \frac{\partial^2 f}{\partial x \partial y} \right)$$

$$+ \frac{1}{n} \frac{\partial^n f}{\partial x^n} \left( \frac{x}{n} + \frac{k}{n} \right)$$

Symbolically,

$$f(x + h, y + k) = f(x, y) + \frac{h}{x} \frac{\partial f}{\partial x} + k \frac{\partial f}{\partial y}$$

The last term is the remainder $R_n$, which must converge upon 0, for $n \to \infty$, to be neglected. A sufficient condition therefore is that the partial $D$'s of $f$ remain finite near $(x, y)$ for $n \to \infty$. This is not a necessary condition, however, to find which is not easy nor attempted here.

Geometrically, take the tangent plane at $P$ as $XY$, the normal as $Z$. Develop $z=f(x, y)$
CALCULUS, THE INFINITESIMAL

every normal section is principal, the point \( P \) is an umblic or cyclic point. If the indicatrix is a parabola, then \( S \) is edged or ridged (cylindrical) at \( P \).

The notion of surface-curvature is generated and defined quite like that of line-curvature.

Draw the normal \( N \) to \( S \) at every point of the border \( B \) of \( DS \), forming a ruled surface, \( R \). Draw parallel to each \( N \) a radius of a unit-sphere, forming a cone \( C \) cutting out \( DS \) on the sphere-surface, which subtends a (so-called) solid angle \( \delta \) at the centre. This we also define as the solid angle of the \( N \)'s, and further define the average curvature of \( DS \) as the ratio \( \frac{\delta}{\sqrt{S}} \).

(Take of a cord passed round the gorge of \( R \) and then tightened, compressing \( R \) into \( C \) without changing the solid angle).

If the unit solid angle or steradian (Halsted) be subtended by \( r \), the whole solid angle about centre \( = 4\pi \); then the metric numbers of \( \delta \) and \( \frac{\delta}{\sqrt{S}} \) are equal, hence the curvature of \( S = \frac{\delta}{\sqrt{S}} \), and \( \lim \frac{\delta}{\sqrt{S}} = S' = a \), instantaneous curvature at \( P \) in (\( DS \)) = \( K \).

If \( R \), \( R' \) be the principal radii of curvature at any \( P \) on \( S \), then \( K = \frac{1}{RR'} \); moreover, this \( RR' \) is not affected by bending \( S \) in any way without stretching or tearing—a beautiful Gaussian theorem of profound philosophic import. In this sense, an \( S \) that may be flattened out into a plane (a Developable) has 0-curvature; for such, \( RR' \) must become \( \aleph \); hence either \( R = \aleph \) or \( R' = \aleph \). But \( RR' = (1 + \rho^2 + q^2)/(\rho_1 - \rho) \), where \( \rho = \rho_1 - \rho_2 \), \( q = \rho_2 \), \( r = \rho_1 \), \( s = \rho \) (Euler). Hence \( r - s = 0 \) is the equation of Developables. For Applications and further illustrations, see SURFACES, THEORY OF.

The difficulty in dealing with Implicit Functions (obtained by unsolved equations in the Existence-theorems, which can only be stated. I. Let \( F(x, y) = 0 \) at \( (x_0, y_0) \), and have 1st partial \( D' \)s fine and continuous about \( (x_0, y_0) \), and \( F_{xx} = 0 \) at \( (x_0, y_0) \): then there is a \( y = y(x) \) that \( D' \) comes \( y_0 = y(x_0) \) and satisfies identically \( F(x, y) = 0 \) in the vicinity, and is unique, and has a \( D \), \( y_2 = \phi(x) = F_{xx}/F_{yy} \). II. Quite similarly for \( F(x, y, z) = 0 \), \( z = \phi(x, y) \), the last being statement: has two partial \( D' \)s.

Most generally (III) let \( F_1, \ldots, \) \( F_n \) be \( n \) functions of \( m \) variables \( x, y, \ldots \), and \( n \) variables \( u, v, \ldots \), all the \( F \)'s vanishing at \( (x_0, y_0, \ldots, u_0, v_0, \ldots) \), all admitting partial \( D' \)s in that vicinity, and \( J(F_1, \ldots, F_n, w, v) \) \( \neq 0 \) (p. 176), at \( (x_0, y_0, \ldots, u_0, v_0, \ldots) \): then there is a system of functions of \( m \) independents \( x, y, \ldots \), that become \( u_0, v_0, \ldots \) at \( (x_0, y_0, \ldots) \), that satisfy identically all the \( F \)'s in that vicinity, and pass in general \( D' \)s.

Hence we have as the ordinary rule for finding \( y \) from \( F(x, y) = 0 \) differentiae \( F_0 \) as to \( x \) regarding \( y \) as a function of \( x \), as in mediate derivation, and solve the result as to \( y \).

To find now maximum or minimum \( y \) in \( F(x, y) = 0 \), differentiate \( F \) as to \( x \) regarding \( y \) as a function of \( x \), as in mediate derivation, and solve the result as to \( y \).
CALCULUS, THE INFINITESIMAL 173

maximum for \( F_{xx} \) and \( F_y \) like-signed, minimum for \( F_{xx} \) and \( F_y \) unlike-signed, and no determination for \( F_{xx} = 0 \).

Often we seek (so-called) relative maximum and minimum of \( z = f(x, y) \) when \( F(x, y) = 0 \). The former equation is a surface \( S \), the latter an intersecting surface determining a path over \( S \).—we seek the peak and valley points in this path. Differentiating we find as the prime condition, \( F_x, F_y, -F_z = 0 \), \( J(f; F; x, y) \), from which and \( F = 0 \) we find the \( x \) and \( y \) that maximize or minimize \( f \).

More generally we seek maximum or minimum of a function of \((m + n)\) variables, \( f(x, y, u, v, \ldots) \), under \( n \) conditions \( F_1(x, y, \ldots, u, v, \ldots) = 0 \). Theoretically we might eliminate \( n \) variables \( u, v, \ldots \) leaving the other \( m \) independent; it is better to let them remain considered as functions of the \( m \) independents, \( x, y, \ldots \). Hence, on putting each partial \( \partial F = 0 \), we get \( m \) equations which, with the \( n \) \( F = 0 \), form \((m + n)\) equations for finding \((m + n)\) unknowns \( x, y, \ldots \). Discriminants between maximum and minimum by the sign of \( df \) will now be tedious, but often geometrically or mechanically unnecessary.

Simpler and swifter is Lagrange's Method of Multipliers. We form a new function, \( \phi(x, y, u, v, \ldots) = f(x, y, \ldots, u, v, \ldots) - \Sigma \xi_i F_1(x, y, \ldots, u, v, \ldots) \). Only so long as each \( F = 0 \) will \( \phi \) identify for all values (under consideration) of the variables. We now determine these \( \xi \)'s so as to make vanish simultaneously all the partial \( \partial \) of \( \phi \) as to \( x, y, \ldots \). The \( n \) conditions are rolled off from the \( m \) unknowns \( x, y, \ldots \). We may proceed similarly in dealing with Envelopes, where \((n + 1)\) parameters are connected by \( n \) conditions.

Transformation of Variables is often necessary, like transformation of Co-ordinates. The formulae, simple at first, soon become highly complicated and we are led into the Theory of Substitutions, Invariants, Reciprocal and the like, which cannot be treated here.

Integration.—As the Differential Calculus is the doctrine of Limits of Quotients of Simultaneous Infinitesimal Differences, so the Integral Calculus is the doctrine of Limits of the Sums of Infinitesimal Products that increase in number while decreasing in size, both indefinitely. The type is the quadrature of an area \((A)\) bounded by \( X, Y \), a curve \( y = f(x) \), and two end-ordinates, \( x = a \) and \( x = b \). Cut it into \( n \) strips, \( dA \), standing each on a \( dx; \) their sum is \( A \); plainly \( YdX > dA > YdX \) \( Y \) being the greatest, \( y \) the least, ordinate standing on its own particular base \( dx \). Since \( \Sigma x = b - a \), \( \Sigma y = f(x) \) is continuous, finite, one-valued throughout \([a, b]\), each \( Y - y \) is an \( t \); hence \( \Sigma (Y - y)dx < \Sigma dx \), \( Y - y < (b - a) \); hence \( \lim \Sigma (Y - y)dx = 0 \). Hence \( A \) is the common limit of every \( \Sigma dy \), written \( \int_a^b ydx \), named Definite Integral \((DI)\) of \( f(x) \) (the Integral) as \( x \), between the extremes (end-
put $x$ or any other symbol for $x$. The integral depends for its form solely on $f$; for its value, on $a$ and $b$ also.

Hence integration and derivation or differentiation are inverse operations and \( \int = D^{-1} \). The direct $D$ yields a definite result, the inverse \( \int \) yields a result definite only as to form, up to an additive constant, $C$. (Cf. Evolute and Involute, above). Derivation simplifies, reducing even transcendentals to algebraics; integration complicates, lifting algebraics and even rationals up into transcendentals (as $\sqrt{a^2-x}^2$ and $\frac{1}{x}$). Derivation is deductive and can create no new forms. Integration is inductive and creates an infinity of new forms, all defined as integrals.

Operating directly on $y=f(x)$ by a series of differentiations as to $x$, say $\phi(D)$, we get some function of $x$, as $X$, or $\phi(D)y=X$. If we know $X$ and $\phi$, we may seek that $y=f(x)$ that will yield $X$ on being subjected to the train of operations $\phi(D)$; i.e., we seek to invert at once the totality of operations $\phi(D)$, so that $y = \frac{X}{\phi(D)} = \phi^{-1}(D)X$. This inversion is solving the Differential Equation $\phi(D)y=X$, and is perhaps the most profound of mathematical operations, of immense and even unconquerable difficulty, overcome as yet only in special cases. Thus $x^2 \frac{dy}{dx} = 3x \frac{dy}{dx} + 4y = 2x^2$, where $\phi(D) \equiv D^2 - 3xD + 4$, yields, as result of the inverse $\phi^{-1}(D)$ or $\phi(D)$,

\[
y = x^2(4A+B \log x + \log x^2),
\]

where $A$ and $B$ are arbitrary constants. Other forms of $\phi(D)$, quite as simple, yield far higher transcendentals.

Inverting a table of elementary $D$'s we get a table of elementary Integrals. The art is to reduce other forms, if possible, to these elementary forms; when impossible, we must introduce transcendentals defined by integrals.

Change of Variable is the most fruitful method of Reduction. By direct differentiation, $D\phi(u) = \phi'(u) \cdot u_x$; also $D\phi(u) = \phi'(u) u_x$;

\[
\int \phi'(u) du = \phi(u) = \int \phi'(u) u_x \cdot dx.
\]

In this 2d \( \int \), all is supposed expressed through $x$.

Hence, to pass from an old to a new variable of integration, multiply by the $D$ of the old as to the new, or divide by the $D$ of the new as to the old; i.e., the $\int$ sign,

\[
du = u_x \cdot dx, \quad dx = \frac{du}{u_x}.
\]

Of course, the extremes must be properly adjusted.

Integration by parts is also a powerful reduction process. From $(uv)_x = u_xv + uv_x$ we have

\[
uv = \int u_xv \cdot dx + \int uv_x \cdot dx, \quad \text{or} \quad \int uv_x \cdot dx = \int u_xv \cdot dx.
\]

This latter \( \int \) may be simpler, or may return into the first, or other advantages may accrue.

Thus $\int \cos x \cdot \cos x \cdot dx = \int \sin x \cdot \cos x + \int \sin x \cdot \cos x \cdot dx$

$= \sin x \cdot \cos x + x - \int \cos x \cdot dx$; whence

\[
2 \int \cos x \cdot dx = x + \sin x \cdot \cos x.
\]

Similarly for any integral power of sine or cosine except $\sin^2 x$ and $\cos^2 x$, which are reduced by passing to the half-angle, $\frac{x}{2}$.

What is the range of such reductions? What functions can we thus integrate in terms of known functions? Few enough. Of Algebraics,

I. Rational functions, $\frac{a}{x^b}$, by decomposition into part-fractions.

II. Rational functions of $x$ and $\frac{ax+b}{cx+d}$, etc. Put $ax+b = m x + m$, $m$ being

L.M.C. of $b$, $b'$, etc. Here with, if \( \int \) becomes rational in $u$.

III. Rational functions of $x$ and $\sqrt{ax^2+2bx+c}$.

If we think of $y^2=ax^2+2bx+c$ as a conic, and $y-\beta = u(x-a)$ as a segment through a point $(a, \beta)$ of the conic, then we may express both $x$ and $y$ rationally through $u$, which reduces this case to I; $(a, \beta)$ may be taken variously. Generally we bring $y'$ to the form of sum or difference of two squares by putting $x = u + h$.

IV. Rational functions of $x$ and $y$, these being co-ordinates of a unicursal $F(x, y) = 0$. We shall then have $x = \phi(u)$, $y = \psi(u)$, where $\phi$ and $\psi$ are rational, whereby these Abelian Integrals reduce to I.

The binomial $x = (a+bx)^p$ can be reduced to II, and hence integrated, not generally, but in these important cases, by putting $w = x^p$.

1. $p$ integral; if $\frac{m+1}{n} = \frac{r}{s}$ ($r$ and $s$ integers),

\[
\text{put } w = x^{\frac{r}{s}}.
\]

2. $m+1$ integral; if $\frac{r}{s}$ ($r$ and $s$ integers),

\[
\text{put } w = a+bw^\frac{r}{s}.
\]

3. $\frac{m+1}{n} + p$ integral; if $\frac{r}{s}$ ($r$ and $s$ integers), put $a+bw = w^p$, which reduces it to 3.

Of Transcendentals.— 1. Rational functions of $\sin x$ and $\cos x$. Put $w = \tan \frac{x}{2}$, a very important substitution.
2. Rational functions of \(e^{x^2}\). Put \(w=e^{ax}\).

3. Rational Integral functions of \(x, e^{ax^2}, e^{ax^3}, \ldots \). \(\sin mx, \sin nx, \ldots, \cos mx, \cos nx, \ldots\)
Express the sines and cosines through imaginary exponentials. In the result express the imaginaries through sines and cosines. Here are included rational functions of the hyperbolic sine and cosine.

4. Rational Integral functions of \(x\) and \(\log x, x, x, \sin x, \sin x, \ldots\).

If \(f(x)=R(x, \sqrt{T}), T\) of 3d or 4th degree in \(x\), we cannot rationalize but must introduce Higher Transcendents. Let

\[
\Phi = \int_0^1 \frac{dx}{\sqrt{1-x^2}} = \int_0^1 \frac{\cos^{-1}(x)}{\sqrt{1-x^2}}.
\]

Here \(x\) and \(u\) are functions of each other and it seems natural to take \(u\) as function, \(x\) as argument; but in \(L=\int_0^1 \frac{dx}{\sqrt{1-x^2}} = \sin^{-1}(x), x=\Phi(u)\)

\(\sin l\) is a much simpler (periodic) function of \(I\) than \(f\) is of \(x\); hence we may suspect that \(x\) above is a simpler (periodic?) function of \(u\) that \(f\), namely \(\Phi\). Hence Abel thought the theory might be simplified by inverting the dependence before him assumed — one of the greatest divination in mathematical history. We write

\[
\Phi = \Phi(u) \text{ (Weierstrass), } u = \int_0^1 \frac{dx}{\sqrt{1-x^2}}.\]

Hence \(u = \frac{1}{\sqrt{1-\Phi^2}}\) and so on. Now just as sine and cosine have one period \(2\pi\), so \(\Phi\) has two periods, \(2\pi\) and \(2\pi\), it is an Elliptic or Doubly periodic function. The Theory of such Functions, one of the most august creations of the last century, is conspicuous in Analysis. Of Hyper-elliptic Integrals there is no space to speak.

The integral of an Infinite Series may be found by integrating term by term only when the series converges uniformly within an interval comprising the extremes of the integration. It is seen that the integrable forms are absolutely many, relatively few, the integration generally giving rise to a new function.

Thus far we have raised no question as to Integrability, the Integral being supposed unique, continuous, definite and therefore integrable, in \([a, b]\). But when, if ever, may we let one or more of these conditions fail? As to continuity, Riemann has discussed profoundly, In what cases is a function integrable, and in what not? and still further particular interest has been attained by Du Bois Reymond and Weierstrass. It is of particular interest to know whether \(\Sigma \delta e_\xi\) will vary finitely with varying modes of divisions of \([a, b]\). Riemann calls the subintervals \(\delta_1, \delta_2, \ldots\); the greatest fluctuation of function-value in each \(\delta_\xi\) he calls \(D\); then must \(D\delta e_\xi\) be infinitesimal. This it follows that when, as each \(\delta_\xi\) sinks indefinitely toward 0, the sum of subintervals, in which \(D\) is \(\sigma\) itself, is infinitesimal, then the sum \(\Sigma\) has a definite limit, the same however \([a, b]\) be subdivided. Hence the integral \(I = \int_a^b f(x) \, dx\) exists when \(f(x)\) is finite and unique in \([a, b]\), and when for every infinitesimal positive \(\varepsilon\) there is also a positive \(\delta\) such that \(|x-a| < \delta\) when each \(\delta < \varepsilon\).

Plainly such is the case (1) for \(f(x)\) continuous throughout \([a, b]\); but also (2) when \(f(x)\) is finitely discontinuous at a finite number of points in \([a, b]\), and when \(f(x)\) has an \(\infty\) of maxima and minima, or is quite undetermined (though finite), at a finite number of points in \([a, b]\), as \(\sin \frac{1}{1-x} \) at 1 and 2;

(3) even when \(f(x)\) is discontinuous or finitely indeterminate at an \(\infty\) of points and has an \(\infty\) of maxima and minima in the vicinity of an \(\infty\) of points, provided only all these points of finite function-fluctuation form not a linear but only a discrete mass of points (Punktmenge) — the function is then said to be only pointwise (punktirt) discontinuous (Hankel). A discrete or manifold of points is an \(\infty\) of points in a finite interval \([a-h, a+h]\), so distributed at subintervals that the sum of these subintervals may be made small at will by enlarging at will the number of subintervals. Otherwise, the mass is linear. Functions linearly discontinuous are not integrable. For Cantor’s more comprehensive theory of Derived Masses (‘Math. Ann.,’ XVII, 338f), see Assemblages.

Du Bois Reymond has shown (‘Journ. f. d. r. u. d. a. Math.,’ 79, 21f) that the product of two such integrable functions is itself integrable.

Thus far the integrand has been finite. But the \(\int_0^1 \frac{dx}{\sqrt{1-x^2}} = \pi/2\), although the integrand \(= \infty\) at \(1\). In general, if \(f(x)\) be \(\infty\) or discontinuous, or oscillatory at \(x=0\) in \([a, b]\), then

\[
\int_a^b f(x) \, dx\]

loses meaning; but if the sum

\[
\int_a^e f(x) \, dx + \int_e^{e+\beta} f(x) \, dx
\]

nears a definite limit no matter how \(a\) and \(\beta\) approach 0 indefinitely, then this limit is named value of \(\int_a^b f(x) \, dx\).

Such is the case only when \(\int_a^e f(x) \, dx\) and \(\int_e^{e+\beta} f(x) \, dx\) converge each toward 0, as \(a, a', \beta, \beta'\), all close down on 0, \(a' < a, b' < \beta\); i.e., the immediate neighborhood of \(a\) must contribute infinitesimally to the integral. Similarly for any number of points not forming a linear mass.

So, too, we may let either extreme, as \(b\), increase toward \(\infty\) if only the total contribution of the infinitely remote region be infinitesimal, i.e., if \(\int_{a'}^{b'} f(x) \, dx < \eta\) for \(b\) however large, \(b'\) being first taken sufficiently large.

Double Integrals \(\int_a^b \int_a^b f(x, y) \, dy \, dx\). Think of a definite region \(R\) in \(XY\), at each point of which is erected a perpendicular \(z\), all forming a cylindric volume (\(V\)) bounded by \(XY\), the surface
The formula for the cylindrical surface standing on the border \( B \) of \( R \). To find \( V \) we may cut up \( R \) into elements \( (dR) \), as by parallels to \( X \) and \( Y \), and \( V \) into elementary cylinders \((dV)\) on these elementary bases. Thus:

\[
V = E f(x, y) dR = \int f(x, y) dR.
\]

Here we assign no extremes to \( R \); the integration stretches over all of \( R \), so that \( B \) corresponds to the extremes of simple integration. It is and must be indifferent in what order the elements \( dR \) are taken; hence we may sum up first along a strip parallel to \( X \), and then sum all such strips along \( Y \). This double summing is expressed by a **Double Integral** \((II)\) thus:

\[
\int \int \int f(x, y) dx dy = \int_a^b \int_a^b f(x, y) dx dy.
\]

Here for any value of \( x \) the values of \( y \) are determined by the equation of \( B \). Hence \( b \) and \( y \) are functions of \( x \); but \( a \) and \( y \) depend on the extreme parallels to \( Y \) tangent to \( B \), hence are absolute constants.

It is geometrically clear that \( II \) is perfectly **definite**, but we must ask in default of Geometry, when does \( \Sigma \) approach the same **limit** independently of the function-value chosen for each \( dR \) and the way in which each \( dR = 0 \), as their number \( \rightarrow \infty \)? \( \omega \) Answer: When \( \Sigma D_k dR_k = 0 \) as each \( dR_k \rightarrow 0 \), \( D_k \) being the greatest fluctuation in function-value in \( dR_k \). When is this the case? \( \omega \) Answer: (1) When \( f(x, y) \) is **continuous** throughout \( R \); (2) when \( f \) at single points or on single lines \((\omega = 0)\) becomes **discontinuous** or indeterminate or oscillatory; (3) when \( f \) becomes thus **finite** but becomes **finite** or indeterminate or oscillatory along an \( \omega \) of lines \((\omega = 0)\), if only the sum of the elements \((dR_k)\) where \( D \rightarrow \sigma \), is itself \( < \varepsilon \) (infinitesimal); i.e., when the linear masses do not form an area (or planar) mass, i.e., when their initial elements form not a linear but only a discrete mass.

May \( f(x, y) \) attain \( \approx \) and \( II \) retain sense? \( \omega \) Answer: If \( f \) attains a definite \( \approx \) but only at definite points, or along a curve and of order \( < \varepsilon \), then the \( II \) remains definite and finite; also the order of integration remains indifferent. Here the contribution, to the \( II \), \( \approx 0 \) as the element of area \((XY)\) shrinks toward 0 along the curve; i.e., the volume \( \varepsilon \) shoots up to \( \approx \) only along an infinitely sharp edge.

So, too, the **region** \( R \) may stretch out any way toward \( \approx \) if \( f \) shrinks faster than \( R \) spreads; e.g., \( R \) may spread over all the plane, if in all regions \( f \) becomes 0 of higher than \( 2 \)d order. 

Minuter discussion must be foregone.

Extremely important is the change of variables in \( II \). In simple integration \( dV = du dv \) under the \( \int \), whereby we pass from \( x \) to \( u \) as variable of integration. In passing from \( x, y \) to \( x, v \), under the \( \int, du dv = M dx dy \), but what is \( M \)? It is \( \frac{\partial}{\partial y} \frac{\partial}{\partial x} = \frac{\partial u}{\partial v} \frac{\partial v}{\partial y} \).

The remarkable expression, introduced by Jacobi and named by him the **Functional Determinant**, is called the **Jacobian** (Salmon). As already exemplified, it plays the role of derivative of the system

\[
\frac{\partial(u, v)}{\partial(x, y)} = \frac{\partial(u, v)}{\partial(x, y)} - \frac{\partial(u, v)}{\partial(x, y)} = 1.
\]

just as \( \frac{\partial(u, v)}{\partial(x, y)} = 1 \). Also \( \frac{\partial(u, v)}{\partial(x, y)} = \frac{\partial(u, v)}{\partial(x, y)} \). Thus \( \frac{\partial(u, v)}{\partial(x, y)} = 1 \). Again, if \( \frac{\partial(u, v)}{\partial(x, y)} = 0 \), then \( F(u, v) = 1 \), and so on.

From \( II \) we readily pass to the triple \( I \),

\[
\int_a^b \int_c^d f(x, y, z) dx dy dz,
\]

and hence to multiple \( I \)'s in general. The higher Jacobian maintains its role: \( \frac{\partial(u, v, w)}{\partial(x, y, z)} = \frac{\partial u}{\partial x} \frac{\partial v}{\partial y} \frac{\partial w}{\partial z} \), and so on in general.

Thus, to pass from rectangular to polar co-ordinates, \( x = r \cos \theta, y = r \sin \theta \), \( J(x, y; \rho, \theta) = r^2 \cos \theta \sin \theta \), \( \rho = r \cos \theta \), \( \phi = \theta \sin \theta \), \( \phi = r \cos \theta \), \( \theta = \phi \), \( \phi = \theta \), \( \phi = \theta \), \( \phi = \theta \), \( \phi = \theta \).

Analogy readily extends these forms to \( n \)-fold spaces. Thus the Jacobian appears geometrically as a real **derivative**, the limit of the ratio of two simultaneous changes.

The single \( \int_a^b f(x) dx = F(b) - F(a) \), where \( f = F' \) expresses the sum-value of \( f \), integrated along the length \( b-a \), through the *end-values* of some \( F \) at \( b \) and \( a \); can the double \( \int_0^\pi f(x, y) dx dy \) integrated over the region \( R \) also be expressed through the *end-values* of some \( F(x, y) \) along the contour of \( R \)? This query is much harder to answer, but is answered similarly: If \( f(x, y) \) is integrable in \( R \), then in general \( \int_0^\pi f(x, y) dx dy \) is for every included value of \( y \) a continuous function of \( x, F(x, y) \), and for every included value of \( x \) an integrable function of \( y \).

Then the \( D I \int_0^\pi f(x, y) dx dy = \int F(x, y) s dx dy \), where \( s \) is the contour of \( R \) and \( u = \) slope of the normal (drawn inwards at any point of \( s \)) to the \( +Y \)-axis. This latter is a curvilinear \( \int \), geometrically depicted as a wall built up (resp. down) along the contour \( s \) of \( R \).
Similarly a \( \int \int \int \) of \( f \) extended throughout a volume (or three-wayed spread) may be expressed through the end-values of a certain \( F \) integrated over the entire surface \( (S) \) of the volume, whereby a space-integral is turned into a surface-integral and conversely:

\[
\int \int \int \left( \frac{\partial f}{\partial x} + \frac{\partial f}{\partial y} + \frac{\partial f}{\partial z} \right) dx \, dy \, dz = \int \int \left( \frac{\partial m}{\partial x} + \frac{\partial m}{\partial y} + x \frac{\partial m}{\partial x} \right) ds,
\]

where \( ds \) along the normal to \( S \) corresponds to \( dx \) on \( X \), etc. These conversions (of Green and Riemann) are equally important to pure and to applied mathematics.

The most immediate geometric problem of integration is **Quadrature**, or in any straight-length—an arc-length. This latter must be defined as the **common limit** of the length of inscribed and circumscribed polygons of which each side=0.

Since \( x = \sqrt{(x - y^2)} \), \( S = \int \sqrt{(x^2 + y^2 + dz)} \),

If now \( w = \phi(t) \), \( y = \psi(t) \), be continuous functions of \( t \), with finite limits of value, then this integration is possible, and the curve is **rectifiable**. Such is not the case in Weierstrass's curve; there the oscillations (maxima and minima) are infinitely many in every neighborhood however small, nor is the variation finite in any such neighborhood—the arc is infinite between any two points.

**Volume** is given by triple integration,

\[
\int \int \int dx \, dy \, dz,
\]

extremes defined by the bounding surface. Often the area of a section perpendicular (or possibly oblique) to an axis, as \( x \), is a function of \( x \), \( z = f(x) \); then \( V = \int_{x} Sds \).

In the important case of **Revolute** (of an area bounded by \( x \)), the curve, and two \( y \)-ordinates,

\[
s = \pi y^n, \quad V = \pi \int y^m dx.
\]

Quadrature of a curved surface is sometimes called **Conformation**.

Here again the area must be defined as the common limit of the surface area of polyhedra inscribed and circumscribed, no matter how. The surface element \( ds \) or \( (4s) \) about \( P \) may be viewed as projected into the element \( dx \, dy \) in \( XY \) and having a limiting ratio \( 1 \) with the corresponding element \( d\II \) in the plane tangent at \( P \). The slope of this plane to \( XY = \gamma = \text{slope of normal to } Z \);

Hence Lim. \( dS = d\II \), \( dx \, dy = dx \, dy \), hence \( \gamma = \frac{|F_x + F_y + P_z|}{P_y} \); hence \( S = \int \int \frac{1}{|F_y|} dx \, dy \), the region of integration

in \( XY \) being the projection thereon of \( S \), under obvious conditions. Often the surface is given **parametrically**, i.e., \( x, y \) and \( z \) as functions of the independents, \( u \) and \( v \). Then we write off the rectangular array

\[
\left| \begin{array}{ccc}
\frac{\partial x}{\partial u} & \frac{\partial x}{\partial v} & \frac{\partial x}{\partial w} \\
\frac{\partial y}{\partial u} & \frac{\partial y}{\partial v} & \frac{\partial y}{\partial w} \\
\frac{\partial z}{\partial u} & \frac{\partial z}{\partial v} & \frac{\partial z}{\partial w}
\end{array} \right|
\]

and form therefrom the three Jacobians, by deleting the columns in order, commonly written \( A, B, C \). Hence, by easy substitution for \( \int \int \int \sqrt{A^2 + B^2 + C^2} \, du \, dv \).

At every point \((x, y, z)\) of \( S \) there is co-ordinated a point \((u, v)\) of a plane.

For Revolutes, \( S = 2\pi \int yds \).

Differentiation de Curva in Curvam.—We have found the \( D \) of an \( f \) as to either extreme, but the integral may contain a parameter, thus \( f(x, p) \, dx \). The \( f \), being then a function of \( f \), is also a function of \( p \) and may be differentiated as to \( p \), giving rise to **Parametric Derivation**. Thus, \( I = \int a^b f(x, p) \, dx \), hence \( I_p = \int a^b \frac{dx}{dp} f(x, p) \, dx \).

If now we differentiate the integral first, and then integrate, we obtain the same result. Hence the order \( \int_a^b f(x, p) \, dx \) is equivalent to \( \int_a^b f(x, p) \, dp \).

This holds generally, if for a definite interval \( [a, b] \), and for \( [a, b] \), \( \frac{\partial f(x, p)}{\partial p} \) is in general (with possible exception of only discrete masses of points) a continuous function of both \( x \) and \( p \); then \( \int_a^b \frac{\partial f(x, p)}{\partial p} \, dp = \int_a^b \frac{\partial f(x, p)}{\partial x} \, dp \).

If \( f \) appears in either \( a \) or \( b \) or both, then \( \int_a^b \frac{\partial f(x, p)}{\partial p} \, dp = \int_a^b \frac{\partial f(x, p)}{\partial x} \, dp \).

If the \( \int \) be an integrable function of \( p \), \( F(p) \), in \( [a, b] \), integrating as to \( p \) we get

\[
\int_a^b \{ \int_a^b f(x, p) \, dx \} \, dp = \int_a^b F(p) \, dp,
\]

and the order of integration is indifferent while \( f \) is a continuous function of both \( x \) and \( p \).

Thus the \( \int \) may be treated as function of any parameter in \( f \), when the extremes are constant, as \( 0, 1, \pm \infty \), and this gives rise to an important set of concepts and to the **Theory of Definite Integrals**. Thus, for \( 0 < a < 1 \), \( \int_0^\infty x^{-1} \, dx = \frac{\pi}{\sin \alpha} \), and is a function of \( \alpha \). Among such the **Eulerian**s are conspicuous, especially that of \( 2 \) species (Legendre),

\[
\int_0^\infty x^{a-1} \, dx = \Gamma(a), \text{ or better by the Gaussian } II(a-1), \text{ through which counts—}
\]

\[\text{Also } S = \int \sqrt{1 + F^2} \, \rho \, d\rho, \quad F = x + y + z, \quad \rho = x^2 + y^2 + z^2. \]
less others are expressible. This \( I \)-or \( II \)-
function has remarkable properties:

1. \( I(x+1)=xI(x) \), or \( \frac{I(a)}{a!}=\Gamma(a) \),
   the factorial property, \( \Gamma(n+1)=n! \).
   But the factorial loses its meaning if \( n \) is not a positive
   integer, while \( I \) and \( II \) retain theirs: thus,
   \( \Gamma(1)=\Gamma(1)-\sqrt{\pi} \).

2. \( \Gamma(a) \Gamma(1-a)=\pi \frac{\sin \alpha}{\cos \alpha} \),
   Euler's beautiful discovery.
   Hereby arguments complementary to 1 are set in mutual relation,
   as \( \sin(\pi - a) = \sin a \), \( \tan a \tan(\pi - a) = 1 \),
   so that from \( \Gamma(1) \)
   we may reckon \( \Gamma(1) \). Hence we need reckon
   \( \Gamma(a) \) only for \( a \) in \([0, \frac{1}{2}]\), as \( \sin a \) only for \( a \)
   in \([0, \frac{\pi}{2}]\).

\( \Gamma(a) \) and particularly \( \log \Gamma(a) \) may now be
differentiated with highly interesting results,
\[
\frac{d}{da} \log \Gamma(a) = \sum_{n=1}^{\infty} \frac{1}{(a+n)^{m}}.
\]
This \( \Sigma \) is uniformly convergent for \( a > 0 \); however, we may
integrate term-wise from 1 to \( a \) and get
\[
\int_{0}^{a} \log \Gamma(a) \, da = \sum_{n=1}^{\infty} \frac{1}{(n+1)^{m}} (a+n) + C,
\]
where \( C \) is the Eulerian or Mascheronian Constant.

\[
\Gamma(1) = \Gamma(1) = 0.5772156649 \ldots \text{calculated by}
\text{Euler to 15 and by Legendre to 19 decimals.}
\]

Hence, by a 2d Integration,
\[
\log \Gamma(a) = \sum_{m=1}^{\infty} \frac{1}{m(1+\frac{a}{m})^{m}} - 1
\]
\[
\Gamma(a) = \Pi_{m=1}^{\infty} \frac{1}{m(1+\frac{a}{m})^{m}} - 1
\]
\[
\Gamma(a) = \prod_{m=1}^{\infty} \frac{1}{m(1+\frac{a}{m})^{m}} - 1
\]
\[
\Gamma(a) = \Pi_{m=1}^{\infty} \frac{1}{m(1+\frac{a}{m})^{m}} - 1
\]
\[
\Gamma(a) = \Pi_{m=1}^{\infty} \frac{1}{m(1+\frac{a}{m})^{m}} - 1
\]
\[
\Gamma(a) = \Pi_{m=1}^{\infty} \frac{1}{m(1+\frac{a}{m})^{m}} - 1
\]

Such is Gauss's Definition of \( \Gamma(a) \) for every
finite \( a \) for which no factor in the denominator
vanishes. Herewith we are brought to the expression
of functions not through infinite
\[
\frac{a(1+a)}{(a+1)(a+2) 
\]
\[
\frac{a(1+a)}{(a+1)(a+2) 
\]
\[
\frac{a(1+a)}{(a+1)(a+2) 
\]
\[
\frac{a(1+a)}{(a+1)(a+2) 
\]

This subject, of infinite range, cannot be
pursued here—hills peep o'er hills, and Alps
on Alps arise. The fundamental theorems
were rigorously proved first by Weierstrass
(Jour. f. d. r. u. d. a. Math., L). It may be
added that the 1st Eulerian,
\[
\int_{0}^{x} \frac{1}{x^{(1+a)x^{a}}} \, dx
\]
is denoted by \( B(a,b) \) (Binet) and is connected
with the 2d by \( \text{B}(a,b)\Gamma(a+b)=\Gamma(a)\Gamma(b) \),
and being expressible thus simply through \( \Gamma \) has
not so much independent significance.

The central notion of the \Integral Calculus, the
\textit{Limit of a Sum}, is more obvious than that
of the \Differential Calculus, the \textit{Limit of a Quotient}.

The foundations of the one are also seen to be much broader than those of the
other, so that the former is not merely the
inverse of the latter. The twin seizing upon the
two great aspects of History, the Dynamical and the
Statical, Process and Result. While the
Integral Calculus borrows its speed and directness
from the Differential Calculus, its own
reaction upon this latter is instant and powerful.
Thus, from integration by parts we have
\[
\int f(x) \, dx = \int a \, dy - \int a' \, dy - \int f(x) \\
\int a' \, dy = \int a \, dy + \frac{1}{2} \int a'' \, dy
\]

Evaluating between the extremes 0 and \( h \) we get
Bernoulli's Series (with Remainder):
\[
\phi(h) = \phi(0) + h \phi'(h) - \frac{h^2}{2} \phi''(h) + \frac{h^3}{3} \phi'''(h) - \ldots
\]

\[
\pm \frac{1}{n^2} \int_{0}^{h} \frac{h^m}{n^{m+1}} \, dy.
\]

To avoid the alternation in sign we take
\[
\int \phi(x) \, dx + \frac{1}{n} \sum_{n=1}^{\infty} \frac{h^m}{n^{m+1}} \, dy
\]

Such is the swiftest, directest, nearest-lying
foundation of the fundamental \textit{Taylor's Series},
by which the value of \( \phi \) at \( x \) is built up
out of the value of \( \phi \) and its \( D's \) at \( x_0 \).
The \( K \) is here yielded as a definite integral, from
which form the other forms, as Lagrange's,
Cauchy's, Schömilch's, come at once on applying
the Maximum-Minimum Theorem. This
development holds under the two necessary and
sufficient conditions (Pringsheim):

1. That \( \phi(x) \) possess everywhere in \([x_0, x+R] \)
definite finite differential coefficients of every

2. That Lim. \( \frac{1}{n} \phi(x) \), \( k \) converge uniformly on \( 0 \) (for \( n \to \infty \) for all pairs \( h, k \)
for which \( 0 < h < k < R \).

The Infinitesimal Analysis or Method of
Limits is very highly developed and is applicable
to almost every subject of exact thought,
often asserting itself in the most surprising
adorn and in the \textit{Theories of Numbers} and of
\textit{Knots}, to which it might seem wholly alien,
suddenly unlocking and laying wide open secret
passages utterly unsuspected. In particular
the Integral Calculus shows itself amazingly
and unendingly fertile in the generation of
new notions. As other and still other fields are
exposed to investigative thought, the Calculus
will receive more and more applications and
there seems to be no limit to the subtlety and
refinement of its processes, to the keenness and
penetration that may be given to this two-
edged sword of the spirit, the strongest,
sharppest and most flexible ever fashioned or
wielded by the mind of man.

\textbf{Historical Sketch.}—Passing by anticipations,
especially of Integration, that reach back
at least to Archimedes (267-212 B.C.), we come
to Barrow's \textit{Lectiores Opticae et Geometricae}.
CALCULUS OF VARIATIONS

(1669–70), on which Newton collaborated, how much no one knows. Barrow used the Differential Triangle even in 1664 (indefinite parvum, . . . ob in deinde curvam parvitudinum), calling in the name of the term (d' Alembert, A and E, 1638). Newton was busied with Series at Cambridge, 1665–66 (eo tempore pestis ingruens coeq mel hinc fugere) in his famous letter, filling 30 pages in the Opuscula, to Oldenberg, Secretary of the Royal Society, 24 Oct. 1670. His MS. 'De analysi per aequationes numero terminorum infinitas' (partially published first in Wallis's Works, Vol. II, 1693) was shown to Barrow, Collins, Lord Brouncker in 1669, wherein he used o for a magnitude ultimately vanishing, as had James Gregory already in his 'Geometria pars universalis' (1667, Venice). He treated Rectification, Cubature and Mass-Centre determinations as reducible to Quadrature and to be solved by introducing the notion of 'Momentum'—instantaneous change, thus going beyond Barrow. Newton's 'Methodus Fluxionum et Serierum infinitarum' was ready for the press before 1672, but not printed till 1736. In it he proposes, (1) to find the value y at any instant from the velocity—one (from the range) of the two several Derivations and Integration conceived kinematically. The equi-crescent magnitude x, as a space, is called fluens (Cavalieri fluens, 1639, Napier fluxus, 1614, Clavius fluere, 1574); the velocity he writes x and calls fluxio—our Derivative (as to the time t). 'Momentum' varies as fluxion, is written xo, and corresponds to our Differential x (incrementa indefinite parva). This treatise seems to have been revised after 1673, hence does not clearly attest Newton's knowledge in 1671. Leibnitz wrote, 26 Oct. 1675 (following Cavalieri), Omnia ut, etc.; but 29 Oct. 1675, 

\[ \int f(x) \, dx \]

\[ \sum \text{pro omn. ut f pro omn.} \]

id est summa ipsum 1; again, the same day, nompe ut \[ \oint \text{angetit, ita d minute dimensiones.} \]

\[ \int f(y) \, dy = x^2 \]  \[ \text{but the 3 was originally 5.} \]

His 'Characteristic Triangle' equivalent to the Differential \[ \text{and Integral 'Calculus.' Under date of 11 Nov. 1673, Leibnitz wrote} \]

\[ \int f(y) \, dy = x^2 \]

\[ \text{but the 3 was originally 5.} \]

"Characteristic Triangle," equivalent to Differential Triangle, he took not from Barrow but from Pascal. All attempts to show any real dependence of Leibnitz on Newton have failed. These terms of the new Method were abroad in the air.

**Bibliography.**—Leibnitz and his school, especially the Bernoullis, poured forth memoirs abundantly. Leibnitz first, 'Nova Methodus pro maximis et minimis, itemque tangentibus, etc. I apud Acta Eruditorum, 1684. Newton gave his method of prime and ultimate ratios in geometric form in his 'Philosophiae Naturalis Principia Mathematica,' 1687. Johann Bernoulli's 'Lectiones Mathematicae' was the first textbook of the Integral Calculus, composed at Paris 1691–92, published 1742; Taylor, 'Methodus incrementorum directa et inversa' (1715); D'Alembert, 'Mémoire sur le calcul intégral' (1739); Maclaurin, 'A Treatise on Fluxions' (1742); Euler, 'Introd. à l'Analyse des Lignes Courbes Algébriques' (1750); Lacroix, 'Traité du calcul diff. et du cal. int.' (1779); Lagrange, 'Théorie des fonctions analytiques' (1797); Cauchy, 'Cours d'analyse' (1821); 'Lesons sur le calcul différentiel' (1829); Duhamel, 'Cours d'analyse' (1840), third edition, by Bertrand (1874–75); De Morgan, 'Diff. and Int. Calculus' (1842); Todhunter, 'Diff. and Int. Calculus' (1852); Price, 'Infinitiesmal Calculus' (1854); Gerhardt, 'Die Entdeckung der höheren Analysis' (1855); Bertrand, 'Traité du Cal. Diff. et du Cal. Int.' (1864–70); Hermite, 'Cours d'Analyse' (1873); Williamson, 'Diff. and Int. Calculus' (1872–74); Meyer, 'Theorie der bestimmten Integrale'—nach Lejeune-Dirichlet (1853); Lipschitz, 'Lehrbuch der Analysis' (1877–80); Honel, 'Cours de Calcul Infinitésimal' (1878–79); Dini, 'Analisi Infinitesimale' (1877–78); 'Fondamenti per la teoria delle funzioni di variabili reali' (1878); Harnack, 'Die Elemente der Diff.-und Int. Rechning' (1881); Stolz, 'Allgemeine Arithmetik' (1885–86); 'Grundzüge der Differential- und Integralrechnung' (1893–96–99); Tannery, 'Introduction à la théorie des fonctions d'une variable' (1886); Laurent, 'Traité d'Analyse' (1885–92); Picard, 'Traité d'Analyse' (1891–1903); Genocchi-Prano, 'Calcolo differenziale e principii di calcolo integrale' (1884, German translation 1898–99); Cantor, 'Geschichte der Mathematik' (1880–90–01); Jordan, 'Cours d'Analyse' (1893–94–96); Serret, 'Cours de Calcul diff. et int.' (1869, Harnack's German translation, 2d ed., by Bohmian and Zerme, 1899–1904–05); de la Vallée-Poussin, 'Cours d'Analyse infinitésimale' (1903); Goursat, 'Cours d'Analyse mathématique' (1902–04); Humbert, 'Cours d'Analyse' (1905–07); 'Lesons sur les fonctions de variables réelles' (1905); Kiepert-Stegemann, 'Grundriss der Differential- u. Integral-rechnung' (1905).

Elementary textbooks on the calculus are legion, and of very various merits, though those in favor at American universities do not vary much from type. Those of Byerly and of Os-good are perhaps as good as any. Among the older books, those of Williamson, though in many respects obsolete, give a training in the purely formal treatment of the subject that is not to be surpassed. The more advanced books generally go by the name of 'Cours d'Analyse' or 'Introductions to Analysis'; they partake equally of the nature of textbooks and of independent investigations. They are only accessible to those who already have a thorough grounding in the elements of the Calculus.

**William Benjamin Smith,**
Professor of Mathematics, The Tulane University of Louisiana.

**CALCULUS OF VARIATIONS.** The. The Calculus of Variations is a natural outgrowth of the Infinitesimal Calculus (q.v.)—in particular of the Integral Calculus (q.v.) and of
Differential Equations (q.v.). In the Integral Calculus, properly speaking, only integrals of the type \( \int f(x, a_1, a_2, \ldots) \, dx \) are considered, where 
\[ f(x, a_1, a_2, \ldots) \] 
is a function of the variable of integration \( x \) and of several parameters \( a_1, a_2, \ldots \) which are independent of \( x \). In solving differential equations of the type \( dy/dx = f(x, y) \)
we are in one sense dealing with a new type of integral, \( \int f(x, y) \, dy \). Such integrals, in which \( y \) is to be replaced by a certain function of \( x \), are called line integrals.

The integrals considered in the Calculus of Variations are essentially of this kind, but we shall see that the more interesting problems are those in which still another element is introduced. The integral

\[ I = \int_{x_1}^{x_2} f(x, y, y') \, dx, \tag{1} \]

where \( y' = dy/dx \), can be evaluated whenever \( y \) is known as a function of \( x \). For if \( y = \Phi(x) \)
be the known value of \( y \) in terms of \( x \), and if \( \phi(x) \) and \( \phi'(x) = d\phi(x)/dx \) be substituted for \( y \) and \( y' \) respectively under the integral sign, the integrand becomes a function of \( x \) alone, and the integral itself has a definite numerical value, at least under certain very general restrictions which need not be stated here. Thus to every function of \( x \) which can be substituted for \( y \) there corresponds a definite number — the value of \( I \) and \( y \). We shall denote the value of \( I \) relating \( y = \Phi(x) \) defines a curve \( C \) in the plane of \( x \) and \( y \). We shall denote the value of \( I \) which corresponds to the function \( \Phi(x) \) by the symbol \( I_\Phi \).

The central problem of the Calculus of Variations is the determination of a curve \( K[y = \Phi(x)] \), for which the value of \( I, I_\Phi \), is less than [greater than] the value of \( I \) for any other curve \( C \) \( y = \psi(x) \), which satisfies the conditions of the particular example.

In most of the simpler examples it is specified or implied by the conditions of the problem that the curves \( C \) considered shall all pass through each of two given fixed points \( P_0(x_0, y_0) \) and \( P_1(x_1, y_1) \), whose abscissae are respectively \( x_0 \) and \( x_1 \), the limits of integration of the integral \( I \). Hence only those functions of \( x \) \( \psi(x) \) are to be considered for which \( \psi(x_0) = y_0 \) and \( \psi(x_1) = y_1 \).

In order to clarify the general problem, let us consider the example

\[ L = \int_{x_1}^{x_2} \sqrt{1 + y'^2} \, dx. \]

This is a familiar integral; it is the formula for the length of any curve \( y = \Phi(x) \) between any two of its points. With respect to this integral the statement of the simplest problem of the Calculus of Variations is as follows: Given two fixed points \( P_0(x_0, y_0) \) and \( P_1(x_1, y_1) \) in the \( xy \) plane to determine that curve \( y = \Phi(x) \) joining \( P_0 \) and \( P_1 \) for which the value of the integral \( L \), i.e., the length of the arc \( P_0P_1 \), is at a minimum. Accepting the Euclidean postulate that the shortest distance between two points is measured along the straight line joining them, it is evident a priori that the solution of this example is the straight line \( P_0P_1 \), or

\[ y = y_0 + (x - x_0)(y_1 - y_0)/(x_1 - x_0). \]

It is at least plausible that any conditions which we may discover must, in this particular example, be satisfied by this function.

It is easy to see how this simple problem may be generalized. For we might inquire what is the shortest path between a fixed point and a fixed curve, or between two fixed curves. Again, obstacles may be placed in the plane, and the shortest path then sought. This latter idea leads to an important application of the general theory: the determination of the shortest path between any two fixed points of a given surface, the surface being thought of as an obstacle placed in the plane. The most general problem of the kind mentioned above may be thought of as the determination of a certain shortest path.

An entirely distinct generalization of the preceding problem is that in which the integral involves derivatives of higher order than the first, i.e., of the type:

\[ \int f(x, y, y', y'', \ldots, y^{(n)}) \, dx. \]

Another is that in which the integral involves several dependent variables:

\[ \int f(x, y, z, \ldots, y', z', \ldots) \, dx. \]

Finally, the integral considered may involve two (or more) independent variables and require two integrations:

\[ \int \int f(x, y, z, p, q) \, dx \, dy, \]

where \( p \) and \( q \) denote \( dx/dy \) and \( dy/dx \), respectively, and where the function to be determined is a function of \( x \) and \( y \), which is 

Further generalizations are evident and would tend only to confuse it stated here. We shall return briefly to these generalized problems, but we shall state theorems principally for the simple integral \( I \) in one dependent and one independent variable. Many of these theorems can be generalized without essential difficulty to the other cases which have been mentioned.

Returning to the integral \( (1) \), let us consider the history of the problem very briefly. Although a previous problem had been considered by Newton in 1687 ('Phil. nat. prin. Mathem.' II, Sec. 7, Prop. 34), the first problem which came rise to any general theory and encouraged investigation was the so-called problem of the brachistochrone — or curve of quickest descent — which we shall discuss as a particular example.

This problem was stated by Johann Bernoulli in 1696, solved by him in the following year, by his brother Jacob in 1701 in an important memoir dealing with more general problems, and by Euler in 1744 in an important treatise 'Methodus inveniendi linearis curvas'... It has remained of interest down to the present day, probably the last paper concerning it being that by Bolza, 'Bull. Amer. Math. Soc., 1904, No. 1,' in which a final solution is given.

In the paper mentioned Euler first gave the first necessary condition (known as Euler's condition) or less properly as Lagrange's condition in its general form, and developed the theory in several directions, solving incidentally many problems from the formal standpoint. Following Euler, Lagrange introduced
many simplifications and generalizations in a
series of important papers (cf. his ‘Works,’
and his books ‘Théorie des fonctions’ and ‘Cal-
cul des fonctions’). In particular the Method
of Multipliers for the treatment of problems of
relative extrema, which we shall discuss briefly,
is due to Lagrange. The other prominent
names in the early history are Legendre, for
whom the second condition is named; Gauss,
who first studied double integrals with variable
limits; Jacobi, who discovered the condition
which bears his name; and Du Bois-Reymond,
who initiated the very modern critical develop-
ment of the theory. We shall restrict ourselves
to a reference to Todhunter, ‘A History of,...
The Calculus of Variations,...’ (Cambridge
1861); and Pascal, ‘Calcolo delle variazioni’
(Milan 1897; German trans. by Scheppr.
1899); and Kneesser, ‘Variationsrechnung’ and
‘Ency. der Math. Wiss., II A 8, 1900’; and
Bozla, ‘Lectures on the Calculus of Variations’
(Chicago 1905). In these books exact and
complete references to the literature of the sub-
ject and notes concerning its history up to the
dates of publication may be found. It should
be noted that only the latter of these books con-
tains references to the important developments
published since 1900.

Precise Statement of the Problem.—It is evident upon examination that the naive con-
ception of the problem does not permit of exact
mathematical treatment. For definiteness, let us
suppose that the function \( f(x,y) \) in (1) is
an analytical function of its three arguments
inside of a certain three-dimensional region \( K \),
which may be finite or infinite, but which ex-
pressly does not include any points at infinity.
Let us also restrict ourselves to curves of the
form \( y = \psi(x) \), together with its first der-
ivative \( \psi'(x) \), is a continuous, single-
valued function of \( x \) in the interval \( a < x < b \),
and that \( \psi(x) \) and \( \psi'(x) \) are equal, re-
spectively, to the ordinates \( y_a \) and \( y_b \) of the fixed
points \( P_a \) and \( P_b \). We shall call these ‘curves
of the class \( B \).’ If there is a single one of these
curves \( y = \psi(x) \), or \( K \), for which \( I \) is less than
[greatest value of \( I \)] for any other curve \( C \)
[except \( \psi(x) \)] of the class \( B \), that curve \( K \) is said
to render the given integral \( I \) an absolute mini-
mum [maximum]. It is evident that this will
rarely occur, as is also the case in extrema of
functions of a single variable. If we now set
(2) \( \phi(x) = \psi(x) + \eta(x) \), i.e., \( \eta(x) = \psi(x) - \phi(x) \),
and if there exists a positive number \( \delta \) such
that \( I_e \) is less than [greater than] \( I \) whenever
the condition

\[
|\eta(x)| < \delta, \quad x_1 < x < x_2,
\]

then \( K \) is said to render the integral \( I \) a weak
minimum [maximum] among the curves of the class
\( B \). If instead of (3) we merely require the
condition

\[
|\eta(x)| < \delta, \quad x_1 < x < x_2,
\]

the curve \( K \) is said to render a strong minimum
[maximum]. If in addition to (3) [or (4)] we
also require that \( \eta(x) = 0 \),

\[
x_1 + (b-2) \cdot d \leq x_1 \leq x_2 + (b-1) \cdot d < x_2,
\]

then \( n \cdot d = x_2 - x_1 \), the curve \( K \) is said to
render \( I \) a limited weak [strong] minimum
[maximum].

Geometrically these conditions mean that the
curves compared to \( K \) must lie, in the case of a
strong extremum (i.e., maximum or minimum),
close to the curve \( K \); in the case of the weak
extremum, they must lie close to \( K \) and vary
only a little from \( K \) in direction; in the case of
a limited extremum, they must cut \( K \) at
least once in every vertical strip of width \( \delta \).

It is easy to show that if \( K \) is to render \( I \) an
extremum (of any sort), \( \psi(x) \) must in general
satisfy the equation

\[
\frac{d}{dx} \left( \frac{df}{dy} \right) - \frac{df}{dy} = 0,
\]
or

\[
\frac{d^2f}{dy^2} y'' + \frac{df}{dy} y' + \frac{df}{dy} \frac{df}{dy} \frac{df}{dy} = 0,
\]

which is known as Euler’s (or less properly as
Lagrange’s) equation. For we have

\[
I_e = \int_{x_1}^{x_2} f(x, \psi(x) + \eta(x), \psi'(x) + \eta'(x)) \, dx,
\]

which must be a minimum [maximum] for
\( \eta(x) = 0 \). Replacing \( \eta(x) \) by \( \varepsilon \lambda(x) \), where \( \lambda(x) \) is
an arbitrary function and \( \varepsilon \) is a variable pa-
rameter, \( I_e \) will evidently be a function of
the parameter \( \varepsilon \) alone:

\[
I_e = F(\varepsilon) = \int_{x_1}^{x_2} f(x, \psi + \varepsilon \lambda, \psi' + \varepsilon \lambda') \, dx,
\]

it is readily demonstrated that the ordinary
rule applies and that we can have an extremum
only if

\[
dI_e/d\varepsilon = F'(\varepsilon) = \int_{x_1}^{x_2} \left\{ f_x(x, \psi + \varepsilon \lambda, \psi' + \varepsilon \lambda') \lambda + f_y(x, \psi + \varepsilon \lambda, \psi' + \varepsilon \lambda') \lambda' \right\} \, dx = 0,
\]

when \( \varepsilon = 0 \), or \( F'(0) = \int_{x_1}^{x_2} \left( f_x \cdot \lambda + f_y \cdot \lambda' \right) \, dx = 0 \),

where \( f_x = df/dy \), etc. Integrating the second
term by parts, we get

\[
F(0) = \int_{x_1}^{x_2} \left\{ f_x(x, \psi, \psi') - d \frac{df}{dy} f_y(x, \psi, \psi') \right\} \, dx = 0,
\]

or since \( \lambda(x) \) evidently vanishes for \( x = x_1 \)
and for \( x = x_2 \),

\[
\int_{x_1}^{x_2} \left\{ f_x(x, \psi, \psi') - d \frac{df}{dy} f_y(x, \psi, \psi') \right\} \, dx = 0.
\]

But \( \lambda(x) \) was itself any permissible function of
\( x \), and it is not hard to prove that the integral of
such a product, of which one factor is arbitrary,
can vanish only if the other factor vanishes.
This gives precisely the equation (6). Certain
further considerations are necessary to show
that this proof, which implicitly assumes the
existence of the second derivative of \( \psi(x) \),
does not involve any restrictions. (Cf. Bolza, ‘Lec-
tures,’ Chap. 1).

Assuming the further details without proof,
it becomes evident that any curve \( K, \psi = \psi(x) \),
which is to render \( I \) a minimum (of any sort)
must satisfy the differential equation (6).
Since \( f \) and its derivatives are known functions,
(6) is an ordinary differential equation of the
second order, linear in \( d^2f/dx^2(f''y'y') \). The
coefficient of \( y'' \) is \( d^2f/dx^2(f''y'y') \). If this
coefficient \( f_{yy} \) does not vanish, one and only
one solution of (6) passes through a given
point in a given direction. The general solution of (6) contains two arbitrary constants:

(12) \( y = f(x, a, \beta) \).

Any one of these solutions, i.e., any solution whatever of (6) is called an extremal. Hence the required curve \( K \), if it exists, must be an extremal, and it is necessary to search for it only among the extremals. But \( K \) was to connect \( P_1 \) and \( P_2 \). Usually, however, there is only one of the extremals (12) which passes through two given points, for the equations,

(13) \( \gamma_1 = f(x_0, a, \beta), \gamma_2 = f(x_0, a, \beta), \)

usually determine \( a \) and \( \beta \), and hence also determine a single extremal joining \( P_1 \) and \( P_2 \). If this is actually the case, either that extremal is the required solution \( K \), or else there is no solution of the problem.

A large number of special cases lead to differential equations which can be solved directly.

For example, if \( I = \int f(x, y, y') \sqrt{1 + y'^2} \, dx \), we shall have

\( f(x, y, y') = \sqrt{1 + y'^2} \), whence \( f_2 = f_2 = f_2 = f_2 = f_2 \),

\( f_{2y'} = 0, f_{2y'} = (1 + y'^2) \), and the equation (6) takes the form \( y'' = 0 \). The only solutions of this differential equation are the straight lines \( y = ax + b \). It follows that if there is any curve of the class in the plane along which the distance between two given fixed points is at a minimum, that curve is the straight line joining the two points. This result is independent of the Euclidean postulate, and depends only upon the definition of length by means of the preceding integral.

The problem of the brachistochrone, mentioned above, is to find the curve along which a particle, with initial velocity \( v_0 \), will descend most quickly from a given initial point \( P_1 \) to another given point \( P_2 \). It is easy to show that the time of descent is given by the formula

\( I = \int \gamma_1 \sqrt{1 + y'^2} \, dx \),

hence Euler’s equation (6) is

\( \frac{d}{dx} \left( \frac{y''}{\sqrt{1 + y'^2}} \right) = 0 \),

which gives at once \( y'' = c^2 (1 + y'^2) (v_0 + 2g (x_0 - x)) \). This equation may be readily solved in parametric form, and we find:

\( x - A = \frac{-2g}{c} + x_0 \),

\( y - C = \frac{-2g}{c} + x_0 \),

where

\( A = \frac{-2g}{c} + x_0 \),

\( B = \frac{-2g}{c} + x_0 \).

These extremals are cycloids on horizontal base, the radius of the generating circle being \( (A + B)/2 \), and one cusp being at the point \( (A, C) \). Further investigation is necessary to decide just when a given pair of points can be connected by such a cycloid (cf. Bolza, ‘Lectures,’ p. 236). If such a cycloid can be drawn, we can infer that it is the solution if there is any solution. If no such cycloid can be drawn, we can infer that there is no solution in the region \( R \).

The problem of finding the geodesic lines on a given surface is that of minimizing the integral,

\( I = \int \gamma \left( E + 2Fy' + G y'^2 \right) \, dx \),

where \( \gamma = \phi(x, y) \) is the surface and where \( E = 1 + x'^2, F = x y', G = 1 + x'^2 \). Euler’s equation therefore coincides with the usual equation for the geodesic lines:

\( \frac{d}{dx} \left( \frac{G y' + F}{\sqrt{E + 2F y' + G y'^2}} \right) = 0 \),

and the geodesic lines are the extremals of this problem, i.e., no line not a geodesic can be a shortest line on a surface.

Though the proof of the necessity of Euler’s condition was satisfactory, even in a cruder form, to the originators of the subject, a desire to formulate sufficient conditions arose. Thus Legendre showed that a second necessary condition for a minimum [maximum] is that the condition

\( f y''(x, \psi(x), \psi'(x)) > 0 \quad \text{if} \quad x_0 < x < x_1 \)

be satisfied along the supposed solution \( y = \psi(x) \) between the end points. We shall prove this, and we shall see that the same condition is actually a sufficient condition for a weak limited minimum if the sign in be removed.

Jacobi then showed, by means of the second variation of the given integral, that a third necessary condition for a minimum [maximum] is that the integral

\( d(x, x_0) = \int_0^x (x) \, dx \)

should not vanish for any value of \( x \) in the interval \( x_0 < x < x_0 \) where \( d(x, x_0) \) is a solution of the equation

\( f y''(x, \psi(x), \psi'(x)) + \frac{df}{dx} \psi' \frac{d\psi'}{dx} = 0 \),

which vanishes for \( x = x_0 \). The proof, which is omitted, can be found in Bolza, ‘Lectures,’ Chap. 2. A beautiful geometrical interpretation of this condition exists: if we consider the one parameter family of extremals through \( (x, x_0) \), and call their envelope \( E \), the extremal which joins \( x_0 \) to any point beyond its point of tangency with \( E \) cannot possibly render the integral a minimum [maximum] between those two points, i.e., the envelope of the extremals through \( (x, x_0) \) bounds all the points which can possibly be reached by a minimizing extremal from \( x \).

It was long believed that Jacobi’s condition, together with the previous two, was a sufficient condition. That such is not the case, was first pointed out by Weierstrass, who also showed that Jacobi’s condition, while not sufficient for a minimum in general, is sufficient for a weak minimum (if the point \( (x, y_0) \) lies inside the envelope of the extremals through \( (x, y_0) \) bounds all the points which can possibly be reached by a minimizing extremal from \( x \).

Cf. Bolza, ‘Lectures,’ Chap. 3.

That the preceding conditions are not sufficient is most readily seen by giving an actual example in which the extremals, though all the above conditions are satisfied, do not minimize the integral. Such is the example (see Bolza, ‘Lectures,’ p. 73),

\( f(x, y, y') = y'^3 (y'^2 - 1) \)

Here the extremals are straight lines, but it is easy to join two points for which all the preceding conditions are satisfied by a simple broken line for which the value of the integral
is less than that along the straight line extremal. Of course, the comparison line used varies considerably from the straight line extremal in direction, though not in position.

Weierstrass, in 1879, gave a fourth necessary condition. He defines a new function,

\[ E(x, y, y', p) = f(x, y, y') - f(x, y, p) \]

Then Weierstrass’s (fourth) necessary condition for a minimum [maximum] is

\[ E(x, y, y', p) \geq 0 \quad [\leq 0] \quad x_{0} \leq x \leq x_{0}, \]

where \( x, y, p \) are the values of \( x, y, dy/dx \) along the extremal between the end points, and where \( y' \) is any finite number whatever. (Cf. Bolza, ‘Lectures,’ Chap. 3). Since we have

\[ \text{Limit} \quad \frac{E(x, y, y', p)}{(y' - p)^{2}} = \frac{1}{2} f' y' \]

it follows that it is also necessary that \( f' y' \geq 0 \), which is precisely the second (Legendre’s) necessary condition mentioned above. It is easy to show that if (a) the end points can be joined by an extremal \( K \), (b) a one parameter family of extremals \( \{y = \varphi(x, \alpha)\} \) can be found, one of which is \( K \) itself, and one and only one of which passes through each point of the plane near \( K \), so that \( y = \varphi(x, y) \) can be found, i.e., a function which gives the slope of the extremal of the family at any point \( (x, y) \) near \( K \), then the integral

\[ J = \int_{x}^{x_{0}} [f(x, y, p) + (y' - p) f_{p}(x, y, p)] \, dx \]

is independent of the path of integration inside the field just constructed near \( K \), and we have

\[ I_{K} = \int_{x}^{x_{0}} E(x, y, y', p) \, dx \]

along \( \gamma \).

where \( C \) is any curve of the class \( B \) in the field about \( K \), since \( I_{K} = I_{\gamma} \). It follows that the condition

\[ E(x, y, y', p) \geq 0, \quad x_{0} \leq x \leq x_{0}, \]

for all \( x \) and \( y \) near \( K \) and for the function \( p(x, y) \) just mentioned and for any finite value of \( y' \) whatever, is a sufficient condition for a strong minimum, if the sign of equality holds only for one. Cf. Osgood, ‘Annals of Mathematics,’ II, 3. Bolza, ‘Lectures,’ Chap. 3. Actually it is possible to show (cf. Hedrick, ‘Bull. A. M. S.,’ IX, 1) that for a limited minimum the conditions remain the same except that Jacobi’s condition may be omitted. The conditions in the various cases may be summarized in the following scheme:

<table>
<thead>
<tr>
<th>Limited variations</th>
<th>Unlimited variations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak</td>
<td>Strong</td>
</tr>
<tr>
<td>Euler’s necessary.</td>
<td>Euler’s necessary, Legendre’s necessary, Weierstrass’s necessary.</td>
</tr>
<tr>
<td>Euler’s sufficient.</td>
<td>Euler’s sufficient, Legendre’s sufficient, Weierstrass’s sufficient.</td>
</tr>
</tbody>
</table>

It is seen on glancing at the table that from the simple conditions (Euler’s and Legendre’s) for limited weak variation we proceed to any other case by adding Weierstrass’s conditions in the case of a strong minimum, and Jacobi’s in case of an unlimited minimum, only. A fifth necessary condition for a strong extremum, independent of all the others, has been discovered by Bolza.

In special problems the irksomeness of these conditions can sometimes be circumvented. For instance, given a problem in which \( \frac{df}{dy} > 0 \) for all values of \( x, y, y' \), then the necessary and sufficient condition for a limited strong minimum is the possibility of finding a solution of Euler’s equation joining the two given end points. Such is the case in the geodetic problem and also in the integral which leads to Hamilton’s principle; and in each of these cases, fortunately, a limited strong minimum is all that is desired. Similar simplification occurs in every case when \( \frac{df}{dy} > 0 \) for all values of \( x, y, y' \). For then Legendre’s and Weierstrass’s conditions are always satisfied, and may be abstracted from the above table. For this reason Hilbert has called a problem in which \( \frac{df}{dy} > 0 \) for all \( x, y, y' \) contained in a singly connected region \( R \), in which the given end points lie, a ‘regular’ problem of the Calculus of Variations.

Considering the example \( \int_{x}^{x_{0}} \sqrt{1 + y'^{2}} \, dx \), we see that \( f y' > 0 \) for all finite values of \( x, y, \) and \( y' \) whatever. Since

\[ E(x, y, y', p) = \frac{(y' - p)^{2}}{2} - f y' (x, y, p) \]

it follows that such an example surely satisfies Weierstrass’s sufficient condition, provided that a field exist in the manner specified above. But in this case, since the extremals are all straight lines in the plane, it is obvious that all other conditions are satisfied. Hence the straight line joining any two points actually minimizes the given integral, i.e., the straight line is the ‘shortest’ line between any two of its points if the preceding integral be the definition of length.

In the problem of the brachistochrone, mentioned above, it is shown that the extremals found (cycloids) actually render the integral of the problem a minimum provided no cusp lies between the end points. (Cf. Bolza, ‘Lectures,’ Chap. 4, pp. 126, 136, 146).

Returning to the integral which defines length, it is evident that some other integral might as well have been selected as the definition of length, if we are not to assume an intuitive knowledge of it. The variety of choice is limited only by the selection of those properties which we desire to have hold. This leads very naturally to The Inverse Problem of the Calculus of Variations: Given a set of curves which form a two-parameter family. What is the condition that they be the extremals of a problem of the Calculus of Variations? What are the conditions that they actually render the integral thus discovered a minimum? Let
CALCUTTA

$y = F(x, a, b)$ be the given family. Then (cf. Bolza, 'Lectures,' p. 31) the integrand of any interval for which these are extremals must satisfy the equation

$$\frac{\partial f}{\partial y} - \frac{\partial f}{\partial y'} = \frac{\partial f}{\partial y} \cdot \frac{\partial y}{\partial y'} - \frac{\partial f}{\partial y'} \cdot \frac{\partial y}{\partial y'},$$

where $y' = G(x, y, y')$ is the differential equation of the given family. This equation for $f(x, y, y')$ always has an infinite number of solutions, of which only those are actually solutions of the given inverse problem which satisfy the relation $f y'' > 0$, and these are solutions in any region free from envelopes of one-parameter families of the given extremals. Some interesting conclusions for particular forms are to be found in a paper by Stromquist, 'Transactions of American Mathematical Society' (1905).

Another interesting class of problems are the so-called isoperimetric problems. These are problems in which a further restriction is placed upon the solution by requiring that it shall give a second (given) integral a given value. Such is, for example, the problem of finding the curve of maximum area with a given perimeter. The solution is obtained by means of the so-called method of multipliers, which is too long for presentation here. Consult Bolza, 'Lectures,' Chap. 6.

This article is too short to give any account of the details of the work for double integrals. Suffice it to say that the known methods fall closely those given above for simple integrals. In the other possible problems mentioned above the same holds true. An interesting application of these other problems occurs in the well-known Problem of Dirichlet, which is fundamental in mathematical work. Another is the important problem of Minimum Surfaces. Another is the well-known theory of mechanics based upon Hamilton's Principle or one of the analogous mechanical principles. The modern methods have made these theories more rigorous.

Bibliography.—The following is a list of the more important works and articles published in America concerning the Calculus of Variations, the one by Chicago (1900); and various papers, 'Annals of Mathematics'; and 'Transactions of the American Mathematical Society'; Bolza, various papers, 'Bulletin American Mathematical Society'; 'Transactions American Mathematical Society', etc. (1901-06); brochures published in the Chicago Decennial publications, including the Lectures on the Calculus of Variations mentioned above (Chicago 1904): Carll, 'Calculus of Variations' (New York 1885); Hancock, various papers in 'Annals of Mathematics'; and 'Calculus of Variations' (Cincinnati 1894); Hedrick, articles in ' Bulletin American Mathematical Society' (1901-05); Osgood, 'Annals of Mathematics' (II, 3) and 'Transactions American Mathematical Society' (II); Whittemore, 'Annals of Mathematics' (II, 3).

The foreign literature is well collected for reference in the footnotes to Bolza's lectures and in the following books and articles: Kneser, 'Variationsrechnung' (Braunschweig 1917); 'Ency. of Math. Wiss.' (II, A 8) (Leipzig 1904); Migno-Lindeloff, 'Calcul des Variations' (Paris 1861); Pascal, 'Calcolo delle Variazioni' (Milano 1897), German trans, Leipzig 1899); Todhunter, 'History of the Calculus of Variations' (Cambridge 1861); Zermelo u. Hahn, 'Ency. d. Math. Wiss.,' (II A 8a) (Leipzig 1904).

The literature is altogether extremely extensive, covering, as it does, a period of over 200 years. It is evident that the more important papers for present use are those of recent date.

An important phase of the subject which has necessarily been overlooked is the general proof by Hilbert (1900) that at least an improper minimum always exists. Consult Bolza, 'Lectures,' (chap. 7).

EARLE RAYMOND HEDRICK,
Professor of Mathematics, University of Missouri.

CALCUTTA (the ghaut or landing-place of Kali from a famous shrine of this goddess), India, the capital of the presidency and province of Bengal, and which a further restriction is placed upon the solution by requiring that it shall give a second (given) integral a given value. Such is, for example, the problem of finding the curve of maximum area with a given perimeter. The solution is obtained by means of the so-called method of multipliers, which is too long for presentation here. Consult Bolza, 'Lectures,' Chap. 6.

This article is too short to give any account of the details of the work for double integrals. Suffice it to say that the known methods fall closely those given above for simple integrals. In the other possible problems mentioned above the same holds true. An interesting application of these other problems occurs in the well-known Problem of Dirichlet, which is fundamental in mathematical work. Another is the important problem of Minimum Surfaces. Another is the well-known theory of mechanics based upon Hamilton's Principle or one of the analogous mechanical principles. The modern methods have made these theories more rigorous.

Bibliography.—The following is a list of the more important works and articles published in America concerning the Calculus of Variations, the one by Chicago (1900); and various papers, 'Annals of Mathematics'; and 'Transactions of the American Mathematical Society'; Bolza, various papers, 'Bulletin American Mathematical Society'; 'Transactions American Mathematical Society', etc. (1901-06); brochures published in the Chicago Decennial publications, including the Lectures on the Calculus of Variations mentioned above (Chicago 1904); Carll, 'Calculus of Variations' (New York 1885); Hancock, various papers in 'Annals of Mathematics'; and 'Calculus of Variations' (Cincinnati 1894); Hedrick, articles in ' Bulletin American Mathematical Society' (1901-05); Osgood, 'Annals of Mathematics' (II, 3) and 'Transactions American Mathematical Society' (II); Whittemore, 'Annals of Mathematics' (II, 3).

The foreign literature is well collected for reference in the footnotes to Bolza's lectures and in the following books and articles: Kneser, 'Variationsrechnung' (Braunschweig 1917); 'Ency. of Math. Wiss.' (II, A 8) (Leipzig 1904); Migno-Lindeloff, 'Calcul des Variations' (Paris 1861); Pascal, 'Calcolo delle Variazioni' (Milano 1897), German trans, Leipzig 1899); Todhunter, 'History of the Calculus of Variations' (Cambridge 1861); Zermelo u. Hahn, 'Ency. d. Math. Wiss.,' (II A 8a) (Leipzig 1904).

The literature is altogether extremely extensive, covering, as it does, a period of over 200 years. It is evident that the more important papers for present use are those of recent date.

An important phase of the subject which has necessarily been overlooked is the general proof by Hilbert (1900) that at least an improper minimum always exists. Consult Bolza, 'Lectures,' (chap. 7).

EARLE RAYMOND HEDRICK,
Professor of Mathematics, University of Missouri.

CALCUTTA (the ghaut or landing-place of Kali from a famous shrine of this goddess), India, the capital of the presidency and province of Bengal, and which a further restriction is placed upon the solution by requiring that it shall give a second (given) integral a given value. Such is, for example, the problem of finding the curve of maximum area with a given perimeter. The solution is obtained by means of the so-called method of multipliers, which is too long for presentation here. Consult Bolza, 'Lectures,' Chap. 6.

This article is too short to give any account of the details of the work for double integrals. Suffice it to say that the known methods fall closely those given above for simple integrals. In the other possible problems mentioned above the same holds true. An interesting application of these other problems occurs in the well-known Problem of Dirichlet, which is fundamental in mathematical work. Another is the important problem of Minimum Surfaces. Another is the well-known theory of mechanics based upon Hamilton's Principle or one of the analogous mechanical principles. The modern methods have made these theories more rigorous.

Bibliography.—The following is a list of the more important works and articles published in America concerning the Calculus of Variations, the one by Chicago (1900); and various papers, 'Annals of Mathematics'; and 'Transactions of the American Mathematical Society'; Bolza, various papers, 'Bulletin American Mathematical Society'; 'Transactions American Mathematical Society', etc. (1901-06); brochures published in the Chicago Decennial publications, including the Lectures on the Calculus of Variations mentioned above (Chicago 1904); Carll, 'Calculus of Variations' (New York 1885); Hancock, various papers in 'Annals of Mathematics'; and 'Calculus of Variations' (Cincinnati 1894); Hedrick, articles in 'Bulletin American Mathematical Society' (1901-05); Osgood, 'Annals of Mathematics' (II, 3) and 'Transactions American Mathematical Society' (II); Whittemore, 'Annals of Mathematics' (II, 3).

The foreign literature is well collected for reference in the footnotes to Bolza's lectures and in the following books and articles: Kneser, 'Variationsrechnung' (Braunschweig 1917); 'Ency. of Math. Wiss.' (II, A 8) (Leipzig 1904); Migno-Lindeloff, 'Calcul des Variations' (Paris 1861); Pascal, 'Calcolo delle Variazioni' (Milano 1897), German trans, Leipzig 1899); Todhunter, 'History of the Calculus of Variations' (Cambridge 1861); Zermelo u. Hahn, 'Ency. d. Math. Wiss.,' (II A 8a) (Leipzig 1904).

The literature is altogether extremely extensive, covering, as it does, a period of over 200 years. It is evident that the more important papers for present use are those of recent date.

An important phase of the subject which has necessarily been overlooked is the general proof by Hilbert (1900) that at least an improper minimum always exists. Consult Bolza, 'Lectures,' (chap. 7).

EARLE RAYMOND HEDRICK,
Professor of Mathematics, University of Missouri.
CALCUTTA, INDIA

THE JAIN TEMPLE, CALCUTTA
CALCUTTA 185

office, custom house, Bengal secretariat, etc. The European retail trading quarter occupies a small area to the east of the above area. Everywhere outside of the European quarters Calcutta is interspersed with bâtiks, or native hamlets, and the notion of the cemeteries and the town is largely built over with small bâtki villages. The most interesting of the European suburbs is the French quarter, in which a city of palaces in front, is one of pigs-sties in the rear. First among the public buildings is old Government House, the vice-regal residence, situated, as already mentioned, on the Esplanade. It was built in 1799-1804, and with its grounds occupies six acres. Four wings extend toward the four points of the compass from a central mass which is crowned with a dome and approach from the north by a portico. The High Court, the town-hall, the Bank of Bengal, the government office, post-office, etc., are among the other public buildings in this locality, while further to the north stands the mint, near the banks of the Hooghly. The chief of the Anglican churches in Calcutta is the cathedral of Saint Paul's, at the southeastern corner of the Maidan, a building in the Indo-Gothic style, with a tower and spire 201 feet high, consecrated in 1847. Saint John's Church, or the old cathedral, is another important church, in the graveyard surrounding which is the tomb of Job Charnock, founder of Calcutta. The chief Presbyterian church is Saint Andrew's, or the Scotch Kirk, a handsome Grecian building with a spire. The Roman Catholics have a cathedral and several other churches; and there are also places of worship for Greeks, Parsees and Hebrews. Hindu temples are numerous but uninteresting; among the Mohammedan mosques the only one of note is that which was built and endowed by Prince Ghulam Mohammed, son of Tippoo Sultan. The religious, educational and benevolent institutions are numerous. Various missionary and other religious bodies, British, European and American, are well represented. There are four government colleges, the Presidency College, the Mohammedan College and the Bethune Girls' School. There are five colleges mainly supported by missionary efforts; besides several others, some of them under native management. Other educational institutions include Calcutta Medical College, a government school of art, Campbell Vernacular Medical School and a school of engineering at Howrah, on the western side of the river. Besides these there is the University, an examining and degree-conferring institution. Among the hospitals are the Medical College Hospital, the General Hospital, the Mayo Hospital (for natives), and the Eden Hospital for women and children. The Martinère (so named from its founder, General Martin, a Frenchman in the East India Company's service) is an important institution for the board and education of indigent Christian children. Elementary and other schools are increasing in numbers. The Asiatic Society was founded by Sir W. Jones in 1784. The study of languages, literature and antiquities of Asia. The Botanic Garden occupies a large area on the right bank of the river. Calcutta possesses a number of public monuments, most of them in or about the Maidan. Several governors-general are thus commemorated, as also Sir David Ochterlony and Sir James Outram, "the Bayard of the East," of whom there is a monument. Also a statue by Foley. The city is lighted partly by gas, partly by electricity. There is an extensive system of tramways. The sanitation of Calcutta, though vastly improved in recent years, is still defective, more especially in the suburban districts, whereas the ditches or the swamps are so numerous. The Calcutta Improvement Commission was formed in 1912 to aid in town planning and in the improvement of public health. One difficulty in the way is the site of the city itself, which is practically a dead level. An act which came into force in 1889 brought a large additional area under the municipal authorities, and since then much has been done in the way of drainage, opening up of arterial streets, alignment of roads, etc. The water supply has also been improved, and a treated water from the Hooghly (there is a pumping station at Patla, 16 miles above Calcutta) is now available at the daily rate of 36 gallons per head in the city, and over 15 in the suburbs, besides a supply of unfiltered water from the river and other purposes. The mortality throughout the entire municipality in 1912 was 28.1 per 1,000, a great improvement on former times, and the birth-rate 21.06 per 1,000. The death-rate is far higher among the natives than among the Europeans, and in the native quarters cholera is said to be seldom absent. The healthiest months are July and August, which form part of the season of rains; the unhealthiest are November, December and January. The mean temperature is about 79°, the average rainfall a little over 66 inches. The port of Calcutta extends for about 10 miles along the river, and is under the management of a body of commissioners. Opposite the city it is crossed by a great pontoon bridge, which gives communication with Howrah for vehicles and foot passengers, and can be opened at one point to let vessels pass up or down. It cost $1,100,000. Besides the accommodation for shipping furnished by the river, there are several docks. The trade of Calcutta being the commercial centre of India. There is a very extensive inland trade by the Ganges and its connections, as also by railways (the chief of which start from Howrah), while almost the whole foreign trade of this part of India is monopolized by Calcutta. In 1913-14 the gross tonnage of the shipping inward and outward was over 6,926,817 tons; the total of exports and imports at the wet docks was about 4,800,000 tons. The total over-seas trade in merchandise during the fiscal year ended 31 March 1916, amounted to $452,785,005. The year's imports were valued at $167,666,650 and the exports at $285,119,855. The chief exports are opium, jute and jute goods, tea, grain and pulse, oilseeds, raw cotton, indigo, hides and skins, silk and silk goods, seeds, coal and coke, raw hemp, mica, etc. The most important imports are cotton goods, sugar, metals, machinery, oils, railway plant and rolling stock, cutlery, salt and spices. The jute manufacture is extensively carried on, also that of cottons. The first factory in Bengal of the East India
CALDARA—CALDERON

Company, which was incorporated by royal charter in the year 1600, was established at Hooghly, 28 miles farther up the river, in 1644. Job Charnock, the company's agent, was driven out of this settlement in 1686, and the English then occupied part of the present site of Calcutta, which in 1699-1700 became the head-quarters of the commercial establishments of the company in Bengal. In 1700 the company acquired from Prince Azim, son of the Emperor Aurungzebe, the three villages of Suitam, Halisahar, and Calcutta, and Govindpore, for an annual rent of 1,195 rupees, and these formed the nucleus of the present city. The original Fort William, named after William III, was built in 1696, on a site considerably to the north of the present fort. Calcutta was taken and plundered by Suraj-ud-Dowlah in 1756, and retaken by Lord Clive in 1757. To the capture by Suraj-ud-Dowlah belongs the episode of the "Black Hole" (q.v.) of Calcutta. When the British recovered possession, much of the town was in ruins and had to be rebuilt, so that it may be said to date only from 1757. Clive built the new Fort William on the site of Govindpore, between 1757 and 1773. In 1773 Calcutta became the seat of British government for the whole of India, and so continued until 1911, when announcement was made, for political and climatic reasons, of a change of capital to the city of Delhi, the ancient seat of the Mogul empire. Pop. (1911) 896,067.

CALDARA, Polidoro. See CARAVAGGIO.

CALDER, Alexander Stirling, American sculptor: b. Philadelphia, 11 Jan. 1870. The son of Alexander Milne Calder, himself a sculptor, whose work is represented by the General Meade statue in Fairmount Park, and by the sculptural decorations in the city hall, Philadelphia, after early instruction at the Pennsylvania Academy, went to Paris and studied under Chapu and Falguière. On his return he was appointed instructor in the School of Industrial Art, Philadelphia. Among his notable productions are 'The Dozing Hercules,' 'Primeval Disconsolate,' 'The Man Cub,' 'The Miner,' 'Narcissus' and the six heroic figures of leading Presbyterian theologians above the entrance to the Witherspoon Building, Philadelphia.

CALDER, James Alexander, Canadian statesman: b. Ingersoll, Ontario, 17 Sept. 1868. He was educated at Ingersoll Public School, High School, Winnipeg, and was graduated from the University of Manitoba in 1888. He entered the teaching profession, was principal of Moose Jaw High School 1891-94, inspector of schools for the Northwest territories 1894-1900 and deputy commissioner of education for the territories 1901-05. He was called to the bar of the territories in 1906. He was elected to the local legislature of Saskatchewan for South Regina in 1905, but was defeated in 1908, and afterward reelected and served as the first Provicial Treasurer and Minister of Education in the Scott ministry he showed a thorough mastery of the details of legislation and was aided by his singularly lucid expository style. In 1910 he became Minister of Railways. During the ill-health of Premier Scott he was acting head of the government, and on his retirement he declined the succession in favor of William Mar-

tin. In October 1917 he joined as one of the Western Liberal representatives the Dominion Union ministry formed by Sir Robert Borden, in which he assumed the new portfolio of Immigration and Colonization.

CALDERA, Chile, a seaport in the province of Atacama, 25 miles by rail from the city of Copiapó, and connected also with the points of the central valley and west coast. Among Chilean ports, Caldera ranks as 15th in the value of imports and as 19th in the value of exports. For the mineral productions of this region, the climate and agricultural products (with the aid of irrigation) see Chile. Pop. about 3,000.

CALDERON, Francisco García, Peruvian statesman: b. Arequipa 1834; d. Lima, Peru, 21 Sept. 1905. At the age of 21 he was a professor of jurisprudence, a member of the Peruvian Congress 1867 and Minister of the Treasury 1868. After the occupation of Lima by the Chilean army, during the war between Chile, Peru and Bolivia, 1879-81, he was made president of a provisional government formed under the protection of the Chilean authorities, Feb. 1881. His government was recognized by the United States, the Central American republics and Switzerland. He pledged himself to conduct his government upon principles not opposed to the fundamental conditions demanded by Chile for the final arrangement of peace, but failing to do this, he was arrested, 6 Nov. 1881, by order of Gen. Patrick Lynch, rear-admiral and general-in-chief of the Chilenos, and sent as a prisoner to Valparaiso. Upon his return to Lima in 1886 he was elected president of the Senate and was made rector of the University of San Marcos. He worked earnestly for its rehabilitation after the war and by 1886 its restoration was in great part effected, new buildings constructed and normal university life resumed. He aided in securing the Grace contract through which Peruvian finances were placed on a sound basis and the commercial stability of the country assured a great degree of permanency. His principal works are 'The Dozing Hercules,' 'The Man Cub,' 'Narcissus'; a work, 'Consult Markham, C. R., 'History of Peru' (Chicago 1892); García's 'Le Perdú contemporain' (Paris 1907); Martin, M., 'Peru of the Twentieth Century' (London 1911).

CALDERON, Philip Hermogenes, English painter, of Spanish parentage: b. Poitiers, 3 May 1833; d. London, 30 April 1898. He was the son of Juan Calderon, at one time professor of Spanish literature in King's College, London. Coming to England about 1845, he became shortly afterward the pupil of a well-known engineer; but his artistic ability was so pronounced that his father allowed him to devote himself to the study of art at the British Museum and the National Gallery. In 1853 he went to study under Picot at the Ecole des Beaux Arts in Paris. In 1856 the French Academy in 1853, his picture being named 'By the Waters of Babylon.' Among the many pictures he subsequently produced are 'Broken Vows' (1857); 'Far Away' (1858); 'The Gasker's Daughter' (1859); 'Liberating Prisoners on the Young Heir's Birthday' (1861); 'After the Battle' (1862), one of his most successful works; 'The English
Embassy in Paris on the day of the Massacre of Saint Bartholomew (1563); 'Her Most High, Noble and Puissant Grace' (1565), the last two being among his finest works; 'Whither?' (1587 — his diploma picture); 'Sighing His Soul Out in His Lady’s Face' (1866); 'Spring Driving Away Winter' (1870); 'On Her Way to the Throne' (1871), a sequel to his masterpiece of 1865; 'Victory' (1873); 'Half-hours with the Best Authors'; 'La Gloire de Dijon' (1878); 'Renunciation of Saint Elizabeth of Hungary' (1919, National Gallery, London), probably his greatest work; 'Home They Brought Her Warrior Dead'; 'Aphrodite'; 'The Answer' (1897) and 'Ruth' (1897). Elected A.R.A. in 1864, he became, three years later, a full academician. He gained in 1867 the first French gold medal awarded to an English artist, and in the same year was made keeper of the Royal Academy, in which position he remained until his death. In 'Broken Vows' he betrayed a tendency to the pre-Raphaelite style, but he did not retain this influence long, and his next work betrays his French technical training, while his subjects reflect English popular sentiment.

CALDERÓN, Serafín Estebanés, Spanish writer: b. Malaga, Spain, 1799; d. Madrid, 7 Feb. 1867. He was professor of poetry and rhetoric at Granada, 1822–30, and resigned and went to Madrid. There he collected a library of old Spanish literature, especially of ballads, whether manuscript or in print; the collection is in the National Library at Madrid. He wrote a volume of poems, 'Poesías del Solitario' (1830); a novel, 'Christians and Moriscos' (1838), and a very valuable study of 'The Literature of the Moriscos.' He also wrote 'The Conquest and Loss of Portugal' and a charming volume of 'Andalusian Scenes' (1847).

CALDERÓN DE LA BARCA, Pedro, Spanish poet and playwright: b. Madrid, 17 Jan. 1600; d. there, 25 May 1681. He was the last of his line, which embraced the reigns of three kings, one of whom, Philip IV, was a generous patron, and exerted a profound influence upon the dramatist's art by demanding of him spectacular plays for his own court theatre in the royal palace, coinciding with the golden age of the Spanish drama, and his death marked its close.

Of Calderón's life little is known except that it was uneventful and blameless, in which respect he contrasts favorably with his famous contemporaries and rival, Lope de Vega. His father, who was of noble origin, served as secretary to the Treasury Board under Philip II and Philip III. When nine years of age, Calderón was sent to the Jesuit College at Madrid, from which at the age of 14, he entered the University of Salamanca, not without first giving evidence of precocity and an interest in the drama by writing a play, known now only by title, 'The Chariot of Heaven' (i.e., Elijati's). The influence of Jesuit teaching is seen in his plays, where the dramatist reveals an unusual fondness for dialectics. Some of his most successful dramas defend the attitude of Jesuits toward the doctrine of freewill. These influences were continued at the University of Salamanca, where professors stoutly championed the Jesuit cause against the professors of the University of Coimbra. At Salamanca Calderón studied mathematics, philosophy, geography, history, civil and canon law, and graduated in 1619. While at the university he continued to write plays, and, according to his panegyrist and earliest biographer, Vera Tassis, with such marked success that his name became known throughout Spain. Nevertheless, he planned to enter the legal profession in his native city, but, as he himself records, the desire to win a prize in a poetical tournament organized in 1620 to honor the patron saint of Madrid, Saint Isidor, made the poet of him. He failed, however, to win a prize, but in a second contest two years later he was awarded a third prize for a euphuistic poem of little promise. More significant, as indicating the esteem in which he was already held by contemporary writers, is the fact that he contributed one of three commendatory poems to the official account of the second contest prepared by Lope de Vega. In 1625 Calderón entered the army for service in Lombardy and Flanders. Upon his return to Spain he began to occupy the court of Philip IV as a kind of official playwright and master of the revels. For these services he was honored with knighthood in 1630, and later was granted a pension. In order to qualify for a chaplaincy endowed by his maternal grandmother in his parish church of San Salvador, he became a priest in 1651. It is usually stated in biographies of Calderón that he now ceased to write for the secular stage and produced only "autos sacramentales" for the feast of Corpus Christi. Documents published by Pérez Pastor (1905) show, however, that he wrote plays at rare intervals for the royal theatre in the palace of the Buen Retiro. Calderón was by nature a serious and pious man, and his literary production from 1651 on consists almost entirely of "autos sacramentales," most of which were adaptations of his earlier secular plays. In 1653 Philip IV appointed Calderón to a chaplaincy in Los Reyes Nuevos at Toledo, but the absence of the poet from the court proved unsatisfactory to the King, and so in 1663 he made him one of his honorary chaplains at Madrid. On his death, in 1681, all Spain mourned for him. Foreign scholars vied with Spaniards in paying tribute to his memory. During his long life he had been honored by royalty, and the principal cities of Spain commissioned him annually to write their "autos sacramentales." Many of his plays had been translated into French and Italian. In Spain his dramatic works remained popular until about the middle of the 18th century, when pseudo-classical critics singled him out as the special butt of their attacks on the national drama. In 1763 the performance of "autos sacramentales" was forbidden by law. Calderón's plays were censured for the importance given in them to intrigue, with the consequent neglect of character study. His brilliant, but at times pompous and euphuistic style — especially in plays composed for the royal theatre — also met with disapproval. About the year 1800, the romantic critics of Germany, Friedrich Schlegel, started a furore for Calderón which made him during two decades the most popular dramatist of modern times. This extravagant enthusiasm for the Spaniard is well exemplified in Shelley, who recommended his plays "with inexpressible wonder and delight," and
CALDERÓN Y BELTRAN — CALDWELL.

was inspired to throw over their perfect and glowing forms the grey veil of my own words, with what success is seen in his famous, although often inaccurate, rendering of parts of "The Wonder-Working Magician." At present, partakers of a natural reaction, and partly because critics like Grillparzer and Menéndez y Pelayo have set up the counterclaim of his more spontaneous and less conventional contemporary, Lope de Vega, Calderón is held in less esteem than formerly.

Calderón's plays can be grouped under five headings, as follows: (1) Religious or sacred plays, to which class belong three of his most successful works, "The Wonder-Working Magician" (q.v.), "The Devotion to the Cross" and "The Firm Prince." These plays have as their themes conversion from paganism, the repentance of a sinner, who thereby receives pardon, and the fortitude of a Christian hero. (2) Philosophical plays, the best-known being "Life is a Dream" (q.v.). (3) Tragedies, or so-called honor plays, a representative work of this peculiarly Spanish type of play being "The Mayor of Zalamea" (q.v.). (4) "Cloak and sword" comedies, plays of intrigue which reflect the customs of the dramatist's age. It was part of these plays that Goethe was thinking when he remarked that Calderón's characters are as alike as bullets or leaden soldiers cast in the same mould. In this type of play Calderón was surpassed by Lope de Vega, Tirso de Molina, and Alarcón. (5) "Autos sacramentales," in which Calderón was acknowledged a master without a peer. The modern reader is interested only in the few lyrical passages which occur at rare intervals in arid wastes of philosophical or theological discussions and abstractions.

Bibliography.—"Biblioteca de Autores Españoles" (Vols. VII, IX, XII, XIV, LVIII); "Select Plays" (ed. N. MacColl, London 1888); "Six Dramas of Calderón" (freely trans. by E. Fitzgerald, London 1903) by Schmidt, F. M.; "Die Schauspieler Calderón's" (Elberfeld 1857); M. Menéndez y Pelayo, "Calderón y su Teatro" (Madrid 1881); Breymann, H., "Calderón-Studien" (a pretentious but incomplete and inaccurate bibliography, Munich 1905).

Milton A. Buchanan,
Professor of Italian and Spanish, University of Toronto.

CALDERÓN Y BELTRAN, Fernando, Mexican dramatist and poet: b. Guadalajara, 20 July 1809; d. Ojocaliente, 18 Jan. 1845. Throughout Spanish America his plays, such as "The Journey," "Anne Boelyn" and "The Return of the Crusader," have been extremely popular. As a lyrical poet his work is characterized by dramatic fire, and he is popular, not only in Mexico, but throughout the whole of Spanish America.

CALDERWOOD, David, Scottish clergyman and ecclesiastical historian: b. Dalkeith 1575; d. Jedburgh, 29 Oct. 1650. In 1604 he was sent as an usher to Crailing, in Roxburghshire, where he distinguished himself by his opposition to episcopal authority. In 1617 he was banished from the realm for his contumacy and went to Holland, where, in 1623, he published his work entitled "Altare Dramasenum." He returned to Scotland, and became minister of the church of Pencaitland, near Edinburgh, and in 1643 was appointed one of the committee which compiled the directory for public worship in Scotland. He then engaged in writing the history of the Church of Scotland, in continuation of that of Knox, a work which was published as the Woodrow Society, with a life by the Rev. Thomas Thomson, from his manuscript in 1842-49, in eight volumes.

CALDERWOOD, Henry, Scottish philosopher: b. Peebles, 10 May 1830; d. Edinburgh, 19 Nov. 1897. He received his early education at the Edinburgh Institution and High School. He afterward attended the university of that city, and while a student published his "Philosophy of the Infinite" (1854), an attempt to controvert the views of Sir William Hamilton. He became minister of Greyfriars United Presbyterian Church, Glasgow, in 1856, and in 1868 was elected professor of moral philosophy in Edinburgh University, a chair which he occupied for the rest of his life. His chief works are his "Handbook of Moral Philosophy" (1872); "Relations of Mind and Matter" (1873); "Evolution and Man's Place in Nature" (1873); "The Relations of Science and Religion" (1881); and a "Life of David Hume" (1896). He devoted much of his time to work for educational and temperance reform. Consult the biography (London 1900) by his son, W. C. Calderwood, and D. Woodside, which contains a chapter on Calderwood's philosophy by A. S. Pringle-Pattison.

CALDICOTT, Alfred James, English musician and composer: b. Worcester, England, 1842; d. 24 Oct. 1897. After studying at Leipzig under Richter and Moscheles he was organist of Saint Stephen's Church in his native town for a time, becoming professor in the Royal College of Music in 1882. Among his works, besides many songs, glee, etc., are the cantatas 'The Widow of Nain' (1881) and 'A Moss Rose Tent' (1883) and the operas 'Old Knocksle' (1884).

CALDWELL, Alexander, American banker: b. Drake's Ferry, Huntington County, Pa., 1 March 1830. He attended public and private schools until 16 years of age. In 1847 he enlisted as a soldier in the Mexican War, entering the company of his father, who was killed at one of the gates of the city of Mexico. In 1848 he returned to Columbus, Pa., where he entered a bank, and later took up business. In 1861 he removed to Kansas, where he engaged in the transportation of military supplies at the various posts on the plains, and became largely interested in railroad and bridge building. He was elected to the United States Senate as a Republican, took his seat 4 March 1871 and served until 24 March 1873, when he resigned. He is president of the Kansas Manufacturing Company and president of the First National Bank of Lebanonworth since 1897.

CALDWELL, Charles Henry Bromedge, American naval officer: b. Hingham, Mass., 11 June 1828; d. Boston, 30 Nov. 1877. He did a notable service in an expedition against a tribe of cannibals inhabiting one of the Fiji Islands, defeating them in a pitched battle and destroying their town. In the Civil War he commanded the "Husca," taking part in the bom-
bardment of forts Jackson and Saint Philip and the Chalmette batteries, and in the capture of New Orleans. He was promoted commodore in 1874.

Caldwell, Howard Walter, American historian: b. Bryan, Ohio, 26 Aug. 1858. He was graduated from the University of Nebraska in 1880 and is professor of American history and jurisprudence there. He has written 'History of the United States, 1815–1861' (1896); 'Studies in History' (1898); 'A Survey of American History' (1898); 'Some Great American Legislators' (1898); 'Life of Henry Clay' (1899); 'Expansion of the United States' (1900); 'Education in Nebraska' (1902); 'Civil Government of Nebraska' (1902); 'Source History of the United States' (1909); 'Outlines with References for American History 1783–1877' (1910).

Caldwell, James, American clergyman: b. Charlotte County, Va., April 1734; d. 24 Nov. 1781. After graduating at the College of New Jersey, now Princeton University, he became a Presbyterian pastor at Elizabethtown. During the growing antagonism between the colonies and Great Britain, he warmly took the side of the former, and when hostilities began, became chaplain to the New Jersey brigade, and took an active share in its campaigns, fighting "with the sword in one hand and the Bible in the other." Irritated at the unexpected and obstinate resistance made by the Jersey troops and yeomanry, the English began to burn the houses, and the property of the villagers at Connecticut Farms. In one of the houses was the family of Mr. Caldwell, whose wife had retired to a back room with her two youngest children — one an infant in her arms — where she was engaged in prayer, when a musket was discharged through the window. Two balls struck her in the breast, and she fell dead upon the floor. On 23 June General Knyphausen made a second incursion with about 5,000 troops. On this occasion he passed over the same route to Springfield, where a battle was fought. Among the most active in the fight was the chaplain Caldwell. The British were compelled to retrace their steps, which they did with all possible rapidity. He was shot and killed by an American sentinel in the course of a dispute over a package the latter desired to examine. The soldier was tried and executed for murder later. In 1846 a monument was raised to Caldwell's memory in Elizabeth.

Caldwell, Joseph, American educator: b. Lamington, N. J., 21 April 1773; d. Chapel Hill, N. C., 20 Jan. 1835. He was graduated at Princeton in 1791, delivering the Latin salutatory, and then taught school in Lamington and Elizabethtown, where he began the study of divinity. He became tutor at Princeton in April 1793, and in 1796 was appointed professor of mathematics in the University of North Carolina. He founded the institution, then only five years old, in a feeble state, nearly destitute of buildings, library and apparatus, and to him is ascribed the merit of having saved it from the verge of bankruptcy. He was made its president in 1804 and held the office till his death, with the exception of the years from 1812 to 1817. Princeton gave him the degree of D.D. in 1816. In 1824 he visited Europe to purchase apparatus and select books for the library of the university. A monument to his memory has been erected in the grove surrounding the university buildings. He published 'A Compendious System of Elementary Geometry,' with a subjoined treatise on plane trigonometry (1822), and 'Letters of Carleton' (1825).

Caldwell, William, Scottish-American educator: b. Edinburgh, Scotland, 10 Nov. 1863. He was graduated from the university of his native city and was assistant professor of logic and metaphysics in that institution 1887–88. In 1891 he was called to the same School of Philosophy, Cornell University, New York; in 1892 to the University of Chicago, and from 1894 to 1903 he was professor of moral and social philosophy in the Northwestern University at Evanston, Ill. In the latter year he was appointed Macdonald professor of moral philosophy in McGill University, Montreal. He has published 'Schopenhauer's System in Its Philosophical Significance' (1896); 'Pragmatism and Idealism' (1913); and contributions to the leading psychological and philosophical reviews.

Caldwell, Idaho, city, county-seat of Canyon County on the Oregon Short Line Railroad, 26 miles direct west of Boise. It is in the Payet-Boise Reclamation project, a rich farming region, yielding wheat, flour, cereals, fruits, potatoes and live stock. It has municipally owned waterworks, a Carnegie library, courthouse, city hall, and the College of Idaho is situated here. Here 30 Dec. 1906, ex-Governor Steunenberg was assassinated by Harry Orchard. Pop. 3,543.

Caldwell, Kan., city in Sumner County, on the Chicago, Rock Island and Pacific, the Atchison, Topeka and Santa Fe and Kansas and Southwestern railroads. The principal industries are the manufacture of ice and flour. There are two banks whose combined resources amount to $1,750,000. The public buildings include two primary and one grade and high schools, a city hall, Carnegie library, opera house. The government is by a commission, and the municipality owns the gasworks and water plants, which have been brought up to date recently at a cost of $95,000. Pop. 2,500.

Caldwell, N. J., city in Sussex County, on the second ridge of the Orange Mountains, 10 miles west of Newark, the county-seat, and on the Erie Railroad. It is mainly a residential city, has two banks with combined resources of $2,000,000, and taxable property of an aggregate value of $3,500,000. There are three public schools and a Carnegie library and town hall. Pop. 3,500.

Caldwell, Ohio, village, county-seat of Noble County, on the Ohio, Vevay and Western and the Cleveland and Marietta railroads, 35 miles north of Marietta. Coal mines and oil wells are worked and the village owns waterworks and electric-lighting plant. Pop. 1,430.

Caldwell, Tex., town and county-seat of Burleson County, on the Gulf, Colorado and Santa Fe Railroad, 87 miles southwest of Austin. It is the trading centre of a stock raising and cotton growing region and has cotton-gin, oil and grist mills, ice-factory and brick yards. Pop. 1,476.

Caleb, son of Jephunneh, a descendant of the tribe of Judah, or according to some au-
thorities a foreigner of Kenite origin incorporated with that tribe, according to Ussher born 1530 a.c., was sent with Joshua and 10 others to conquer the land of Canaan. When Joshua had conquered the country, Caleb reminded the Jews of the promise which had been made by God, that they should enjoy this country. He obtained the city of Hebron for his share of the spoil, besieged and captured it, and drove out three couples, or Anakim. He then marched against Kirjath-sepher, and offered his daughter Achsah to the first who should enter it. Othniel, his nephew, was the successful aspirant for the fair Jewess. Consul More, 'Judges' (1805); Myer, ed., 'Die Entstehung des Judentums' (1896); id., 'Die Israeliten und ihre Nachbarstämme' (1906).

CALEB WILLIAMS. Caleb Williams, the best-known novel and most widely read book of William Godwin, published in 1794, embodies many of the ideas of the author celebrated as 'Inquiry Concerning Political Justice.' The hero, from whom the book takes its name, a lad of humble origin but uncommon intelligence, becomes involved in the after effects of a feud between two wealthy and influential country gentlemen, Tyrrel, a sensual, boorish square, and the more courteous and refined Falkland. Becoming possessed, through an inordinate curiosity, of the secret that his master, Falkland, had murdered Tyrrel and allowed the blame to lie on innocent men, Williams is unremittingly persecuted by his master. Lodged in jail at Falkland's instigation on charge of felony, the hero, after one unsuccessful attempt, finally escapes, and in the course of his adventures meets with many class of society — highwaymen, artisans, blood-hunters and magistrates — but never escapes the consequences of Falkland's malevolence. The thesis of the book is the inequality of man before the law. Having innocently incurred the enmity of the influential, Williams cannot henceforth obtain either legal or social redress. The results of injustice are also illustrated among other members of the humbler classes, and a secondary thesis of the book is that many thieves and highwaymen are driven to their mode of life simply through injustice of laws and customs. Falkland's desire to preserve his reputation at all hazards and Tyrrel's exclamation that the lives of 20 such as his ward are not worth one hour of his convenience, are typical of the anti-social feeling that Godwin attacks.

Throughout, the book is written in a vigorous and vivid style, which, in spite of its conscious stateliness, retains vitality and has made it one of the minor classics of English literature. The solution of the relation of 'Caleb Williams' to the theories of the time is to be found in H. N. Brailsford's 'Shelley, Godwin and Their Circle.'

WILLIAM T. BREWSTER.

CALEDONIA, the name by which the portion of Scotland north of the rivers Forth and Clyde is better known to the Romans. The year 80 of the Christian era is the period when Scotland first becomes known to history. The invasion of Caesar did not immediately lead to the permanent occupation of southern Britain. It was only in the year 43 that the annexation of this portion of the island to the Roman empire began. It was completed superficially about 78, and two years were occupied in reconciling the natives to the Roman yoke. Agricola then moved northerly along the eastern route, and occupying the country up to the line of the Friths of Clyde and Forth. Agricola ran defensive works across this line, and hearing, in the third year of his occupation, rumors of an organized invasion in preparation by the Caledonians, a name applied to the dwellers north of the boundary, he resolved to anticipate them, and again advanced northward. The Roman army marched in three divisions. The weakest, consisting of the ninth legion, was attacked by the barbarians, who fought their way to the Roman camp. Agricola came to the rescue, and the Romans were victorious. The Roman army now advanced to Mons Grampius, where they found the enemy, 30,000 strong, under a chief named Galgacus. Agricola had stretched his line as far as he deemed prudent to prevent being outflanked. The auxiliaries and Romanized Britons were in the centre and front, the legions in the rear. The Caledonians are described as riding furiously about in chariots between two wealthy and influential country gentlemen, Tyrrel, a sensual, boorish square, and the more courteous and refined Falkland. Becoming possessed, through an inordinate curiosity, of the secret that his master, Falkland, had murdered Tyrrel and allowed the blame to lie on innocent men, Williams is unremittingly persecuted by his master. Lodged in jail at Falkland's instigation on charge of felony, the hero, after one unsuccessful attempt, finally escapes, and in the course of his adventures meets with many class of society — highwaymen, artisans, blood-hunters and magistrates — but never escapes the consequences of Falkland's malevolence. The thesis of the book is the inequality of man before the law. Having innocently incurred the enmity of the influential, Williams cannot henceforth obtain either legal or social redress. The results of injustice are also illustrated among other members of the humbler classes, and a secondary thesis of the book is that many thieves and highwaymen are driven to their mode of life simply through injustice of laws and customs. Falkland's desire to preserve his reputation at all hazards and Tyrrel's exclamation that the lives of 20 such as his ward are not worth one hour of his convenience, are typical of the anti-social feeling that Godwin attacks.

Throughout, the book is written in a vigorous and vivid style, which, in spite of its conscious stateliness, retains vitality and has made it one of the minor classics of English literature. The solution of the relation of 'Caleb Williams' to the theories of the time is to be found in H. N. Brailsford's 'Shelley, Godwin and Their Circle.'

WILLIAM T. BREWSTER.

CALEDONIA SPRINGS, Canada, town of Prescott County, Ontario, on the Canadian Pacific Railroad, 65 miles west of Montreal, a health resort frequented for its alkaline springs.

CALEDONIAN CANAL, in Scotland, counties of Inverness and Argyile, connects the North with the Irish Sea, extending from Murray Firth through Lochs Ness, Oich and Lochy, in the great glen of Caledonia, to Loch Elie. The total length is 60½ miles, of which the lochs compose 37½. It was built to shorten the distance between Kinmaird's Head and the Sound of Mull, which had offered a very difficult passage. By the canal route, the distance was reduced from 500 to 250 miles. It allows passage of ships of 500 to 600 tons. The canal was begun in 1803, and opened for navigation about the close of 1823.

CALEF, Robert, American merchant of Boston: b. about 1648; d. Roxbury, Mass., 13 April 1719. His fourth son, also named Robert, died in 1722 or 1723, aged about 41. One or the
other of these men was the author of a remarkable book on the witchcraft delusion in New England. The best authorities, notably James Savage and Wm. P. Poole, ascribe it to the younger, who was about 23 when it appeared. The book was entitled ‘More Wonders of the Invisible World’ (London 1700), the title being suggested by Cotton Mather’s ‘Wonders of the Invisible World.’ The substance of it had been circulated in manuscript several years previous to its publication and its malicious attacks on Cotton and Increase Mather caused a bitter and life-long quarrel between the former and the author. The book abounds records of cases. His book has not become very rare and copies bring high prices in the book auctions. It was reprinted at Salem in 1796, 1823 and 1861, and at Boston in 1828 and 1865.

CALENDAR, a system of dividing time into years, months, weeks and days for use in civil life, or a register of these or similar divisions. Among the old Romans, for want of such a register, it was the custom of the pontifex maximus, on the first day of the month, which began with the new moon, to proclaim (calare) the month, with the festivals occurring in it. Hence, calendar (the first of the month) and calendar. The periodical occurrence of certain natural phenomena gave rise to the first division of time. The apparent daily revolution of the sun about the earth occasioned the division into days. The time at which a day begins and ends has been differently fixed, the reckoning being from sunrise to sunrise, from sunset to sunset, from noon to noon, or from midnight to midnight. The changes of the moon, which were observed to recur every 29 or 30 days, suggested the division into months, but the month now used, though nearly equal to a lunation, is really an arbitrary unit; and, as a still longer measure of time was found necessary for many purposes, it was supplied by the apparent yearly revolution of the sun round the earth, producing the changing seasons. The time of this revolution is now known to be 365 days, 5 hours, 48 minutes, and 46 seconds, but as it has at various times been reckoned differently, this has given rise to corresponding changes in the calendar. This unit of time is called a solar year. The division into weeks, which has been almost universally adopted, is not founded on any natural phenomenon, and, as it originated in the East, has been ascribed to the Jews, till the time of Moses in regard to the observation of the seventh day as a day of rest. By other authorities it has been ascribed to the number of the principal planets, a theory supported by the names given to the days. It was not used by the Greeks, nor by the Romans, till the time of Theodosius. The great influence of the sun’s course upon the seasons naturally attracted the attention of men at all periods to this phenomenon; accordingly all nations in any degree civilized have adopted the year as the longest unit of time. The year of the ancient Egyptians was based on the changes of the seasons alone, without reference to the lunar month, and contained 365 days, which were divided into 12 months of 30 days each, with five supplementary days at the end of each year. The Jewish year consisted of lunar months, of which they reckoned 12 in the year, intercalating a 13th when necessary to maintain the correspondence of the particular months with the regular recurrence of the seasons. The Greeks in the earliest period also reckoned by lunar and intercalary months. They divided the month into three decades, a system also adopted long afterward at the time of the French Revolution. It possesses the advantage of making the smaller division an exact measure of the larger, and under it the number of a day in the 10-day period readily suggests its number in the month. The Greeks in the time of Solon had a year of 12 months alternately of 29 and 30 days, the total number of days being 354, and the year being very nearly equal to a lunar one. Soon afterward a month of 30 days began to be intercalated every other year in order to reconcile their year with that founded on the sun’s movement, but as the error was still very large the intercalary month was afterward omitted once in four times. The Hebrew and also the Greek year thus both varied in duration according to the number of the very month was introduced or omitted. This, with the uncertainty as to the exact duration of the year, was a constant source of confusion. Various plans for the reformation of the calendar were proposed from time to time; but all proved insufficient till Meton and Euctemon finally succeeded in bringing it to a much greater degree of accuracy by fixing on the period of 19 years, in which time the new moons return upon the same days of the year as before (as 19 solar years are very nearly equal to 235 luniations). (See Cycle). This mode of computation, first adopted by the Greeks about 432 B.C., was so much approved of that it was engraved with golden letters on a tablet at Athens. Hence the number showing what year of the metonic cycle it is is called the golden number. This period of 19 years was found, however, to be about six hours too long. This defect Calippus, about 102 years later, endeavored to remedy, but still failed to make the beginning of the seasons return on the same fixed day and time. The Romans first divided the year into 10 months, but they early adopted the Greek method of lunar and intercalary months, making the lunar year consist of 354, and after-
ward of 355 days, leaving 10 or 11 days and a
fraction to be supplied by the intercalary di-
visions of the arrangement of which was placed
under the charge of the pontiffs, continued until
the time of Caesar. The first day of the month
was called the calends. In March, May, July
and October, the 15th, in other months the 13th,
was called the ides. The ninth day before the
ides (receding intervals) was called the nones.

The other days of the months they reckoned
forward to the next calends, nonees, or ides,
whether in the same or the succeeding month,
always including both days in the reckoning.
Thus the 3d of March, according to the Roman
reckoning, would be the fifth day before the
nones, which in that month fell on the 7th.
The 8th of January, in which month the nones
happen on the 5th, and the ides on the 13th
was called the 6th before the ides of January.
Finally to express any of the days after the
ides, they reckoned in a similar manner from
the calends of the following month. From the
inaccuracy of the Roman method of reckoning
it appears that in Cicero's time the calendar
began the vernal equinox almost two months
later than it ought to be. To check this irregular-
ity Julius Caesar invited the Greek astrono-
mer Sosigenes to Rome, who, with the assist-
ance of Marcus Fabius, invented that mode of
reckoning which, after him who introduced it
into use, has been called the Julian calendar.
The chief improvement consisted in restoring
the equinox to its proper place in March. For
this purpose two months were inserted between
November and December, so that the year 707
(a.c.), called from this circumstance the year
of confusion, contained 14 months.

In the number of days the Greek computation
was adopted, which made it 365 1/4. The number
and names of the months were kept unaltered
with the exception of Quintils, which was
henceforth called, in honor of the author of the
improvement, Julius. To dispose of the quarter
of a day it was determined to intercalate a day
every fourth year between the 23d and 24th
of February. This was called an intercalary
day, and the year in which it took place was
called an intercalary year, or, as we term it, a
leap year.

This calendar continued in use among the
Romans until the fall of the empire, and
throughout Christendom till 1582. The festivals
of the Christian Church were determined by it.
With regard to Easter, however, it was neces-
sary to have reference to the course of the
moon. The Jews celebrated Easter (that is, the
Passover) on the 14th of the month Nisan
(or March); the Christians in the same month,
but always on a Sunday. Now, as the Easter
of the Christians sometimes coincided with the
Passover of the Jews, and it was thought un-
Christian to celebrate so important a festival
at the same time as the Jews did, it was re-
solved at the Council of Nice, 325 A.D., that
from that time Easter should be solemnized on
the Sunday following the first full moon after
the vernal equinox, which was then supposed
to take place on 21 March. As the course of the
year was longer and the determining the time of Easter, the lunar Cycle
of Meton was taken for this purpose; accord-
ing to which the year contains 365 1/4 days, and
the new moons, after a period of 19 years,
return on the same day as before. The inac-
curacy of this combination of the Julian year
and the lunar cycle must have soon discovered
itself on account of which was placed
under the charge of the pontiffs, continued until
the time of Caesar. The first day of the month
was called the calends. In March, May, July
and October, the 15th, in other months the 13th,
was called the ides. The ninth day before the
ides (receding intervals) was called the nones.

The other days of the months they reckoned
forward to the next calends, nonees, or ides,
whether in the same or the succeeding month,
always including both days in the reckoning.
Thus the 3d of March, according to the Roman
reckoning, would be the fifth day before the
nones, which in that month fell on the 7th.
The 8th of January, in which month the nones
happen on the 5th, and the ides on the 13th
was called the 6th before the ides of January.
Finally to express any of the days after the
ides, they reckoned in a similar manner from
the calends of the following month. From the
inaccuracy of the Roman method of reckoning
it appears that in Cicero's time the calendar
began the vernal equinox almost two months
later than it ought to be. To check this irregular-
ity Julius Caesar invited the Greek astrono-
mer Sosigenes to Rome, who, with the assist-
ance of Marcus Fabius, invented that mode of
reckoning which, after him who introduced it
into use, has been called the Julian calendar.
The chief improvement consisted in restoring
the equinox to its proper place in March. For
this purpose two months were inserted between
November and December, so that the year 707
(a.c.), called from this circumstance the year
of confusion, contained 14 months.

In the number of days the Greek computation
was adopted, which made it 365 1/4. The number
and names of the months were kept unaltered
with the exception of Quintils, which was
henceforth called, in honor of the author of the
improvement, Julius. To dispose of the quarter
of a day it was determined to intercalate a day
every fourth year between the 23d and 24th
of February. This was called an intercalary
day, and the year in which it took place was
called an intercalary year, or, as we term it, a
leap year.

This calendar continued in use among the
Romans until the fall of the empire, and
throughout Christendom till 1582. The festivals
of the Christian Church were determined by it.
With regard to Easter, however, it was neces-
sary to have reference to the course of the
moon. The Jews celebrated Easter (that is, the
Passover) on the 14th of the month Nisan
(or March); the Christians in the same month,
but always on a Sunday. Now, as the Easter
of the Christians sometimes coincided with the
Passover of the Jews, and it was thought un-
Christian to celebrate so important a festival
at the same time as the Jews did, it was re-
solved at the Council of Nice, 325 A.D., that
from that time Easter should be solemnized on
the Sunday following the first full moon after
the vernal equinox, which was then supposed
to take place on 21 March. As the course of the
year was longer and the determining the time of Easter, the lunar Cycle
of Meton was taken for this purpose; accord-
ing to which the year contains 365 1/4 days, and
the new moons, after a period of 19 years,
return on the same day as before. The inac-
}
that of the old and that of the new year, as January 1752–53.

In France, during the Revolutionary epoch, a new calendar was introduced by a decree of the National Convention, 24 Nov. 1793. The new reckoning was to begin with 22 Sept. 1792, the day on which the first decree of the new republic had been promulgated. The year was made to consist of 12 months of 30 days each, and, to complete the full number, five féte days (in leap year six) were added at the end of the year. Instead of weeks, each month was divided into 10, 20, 30, or 38 days, consisting of 10 days each; the other divisions being also accommodated to the decimal system. This calendar was abolished at the command of Napoleon, by a decree of the Senate, 9 Sept. 1805, and the common or Gregorian calendar was re-established on 1 January of the following year. The Mohammedans employ a lunar year of 354 days and 12 lunar months, which have alternately 29 and 30 days. Thirty years (or 360 years) in every cycle an extra day is added at the end of the year. The months and the seasons do not correspond and the first of the year may fall at any time during the solar year. The months are named Muharram, Safar, Rabia I, Rabia II, Jomadi I, Jomadi II, Shaaban, Ramadan, Shawwal, Dulaakada and Dulkegga. The Mohammedan era is computed from the first day of the year of the Hejira, or flight of Mohammed to Medina. It corresponds with 15 July 622 of the Christian era. The Mohammedan year, which began on 28 Oct. 1916 was the 15th year of the 45th cycle, or the year 1335 of the Mohammedan era. See also CHRONOLOGY; CYCLE; EPOCH; HEJIRA.

Bibliography.—Boll, ‘Griechisches Kalender’ (Heidelberg 1910); Bowditch, ‘Numeration, Calendar Systems and Astronomical Knowledge of the Mayas’ (Cambridge, Mass., 1910); Burnaby, ‘Elements of the Jewish and Mohammedan Calendar’ (London 1901); Langdon, ‘Tables from the Archives of Drehem, with a Complete Account of the Origin of the Sumerian Calendar’ (Paris 1911); Mahler, ‘Etudes sur le calendrier égyptien’ (ib. 1907); Plunket, ‘Ancient Calendars and their Relations’ (London 1903); Schram, ‘Kalendarigraphische und chronologische Tafeln’ (Leipzig 1908).

CALGARY, Canada. The city of Calgary is situated in the province of Alberta, at the junction of the Bow and Elbow rivers, 840 miles west of Winnipeg, and 2,626 miles west of Montreal. The site is picturesquely, as the city lies in a species of natural bowl. From Calgary, the Rocky Mountains 80 miles away are clearly visible. Before the advent of the Canadian Pacific Railway 30 years ago, Calgary was an important trading post and headquarters for the ranching country of southern Alberta. With the establishment of transcontinental communication, Calgary assumed a place on the map and rapidly began to develop commercially.

Calgary is the entrance of two great passes through the mountains and surrounded by both a fine agricultural and ranching country, Calgary has naturally become an important railway centre. Lines belonging to the Canadian Pacific Railway, Canadian Northern Railway, and Canadian National Railway run south via Lethbridge through the Crow’s Nest Pass. The city is also served by the lines of the Grand Trunk Pacific and the Canadian Northern.

The city has an altitude of 3,410 feet above sea-level, and enjoys a bracing and healthful climate. The average temperature is 35.2 and the rainfall 19 inches. While low temperatures are of regular occurrence in the winter, the climate is agreeably modified by the warm Chinook winds which frequently bring a cold spell to a sudden and welcome close.

Buildings.—Calgary is a very substantially built city, and its combine in its having nearly extensive quarries of excellent sandstone. Calgary stone, as it is called, has been used with excellent effect in the Provincial Parliament Buildings at Edmonton. Handsome public and office buildings and business blocks line the downtown streets. Knox Presbyterian Church, built of Calgary stone, is one of the finest specimens of ecclesiastical architecture in western Canada.

Government.—Calgary was founded in 1883 and incorporated in 1894. Its municipal government consists of an elective mayor and council and an elective board of commissioners. Calgary employs a slightly modified form of the single tax. The city owns its own electric street railway, with 60 miles of tracklage in operation. It operates its own gravity water system and sewerage system, and owns its own asphalt paving plant. Natural gas sells for 35 cents per 1,000 cubic feet, and at 15 cents for power. Water power has also been brought in and of this 31,100 horse power is already available.

Religion and Education.—Calgary is the seat of Anglican and Roman Catholic bishoprics, and all the leading religious denominations are well established. Educational facilities are amply and generously provided. There are 32 public and high schools, four Roman Catholic separate schools and a Normal School. The provincial government opened in 1916 an Institute of Technology and Manual Arts.

Industrial Progress.—Western Canada is substantially an agricultural country, but Calgary has had a considerable industrial development, and is the chief distributing centre between Winnipeg and the Pacific. Though coal is not mined in the immediate vicinity, coal is being worked on an extensive scale at Lethbridge and Bankhead, both of them points within 100 miles. Natural gas has been piped into the city from Bow Island, 100 miles distant. Oil was discovered in 1914 a short distance south of Calgary, and the indications are promising. The foothills of the Rockies to the west form an admirable grazing country and large herds of stock are raised. These contribute the raw material for the successful stockyards and extensive packing plants which are amongst Calgary’s most important industries. Excellent clays for brickmaking exist. Calgary is the site of one of the Dominion government’s great interior storage elevators and has become an important centre in the grain trade. Large milling establishments flourish. Manufacturers include biscuits, boxes and breakfast foods. A large business is carried on in building materials, harness and leather goods, iron and metals, aerated waters, beer, etc. The Canadian Pacific has erected at Calgary car shops costing over $3,500,000, with an annual wage bill of
$3,400,000. Pop. (1911) 43,704; special
Dominion census of 1916, 55,000.

WILLIAM A. R. KERR,
Dean of the University of Alberta.

CALHOUN, käl-hoon', John Caldwell,
American statesman: b. Abbeville District, S.
C, 18 March 1782; d. Washington, D. C, 31
March 1850. He was graduated with distinc-
tion at Yale College in 1804, and was admitted
to the South Carolina bar in 1807. After serv-
ing for two sessions in the legislature of the
native State, he was elected to Congress in
1811. From that time until his death, a period
of nearly 40 years, he was seldom absent from
Washington, being nearly the whole time in the
public service, either in Congress or in the
Cabinet. When he first entered Congress the
disputes with England were fast approaching
actual hostilities, and he immediately took part
with that portion of the dominant party whose
object was to drive the still reluctant admin-
istrations into a declaration of war. They suc-
cceeded, and, as a member of the Committee on
Foreign Relations, he reported a bill for de-
claring war, which was passed in June 1812.
When Monroe formed his administration in 1817,
Calhoun became Secretary of War, a post
which he filled with great ability for seven
years, reducing the affairs of the department
from a state of great confusion to simplicity
and order. In 1824 he was chosen Vice- Presi-
dent of the United States under John Q.
Adams, and again in 1828 under General Jack-
son. In 1828, a protective tariff was enacted
which bore very heavily on the agriculturists of
the South and hence was known throughout
that section as "The Tariff of Abominations."8
Mr. Calhoun prepared a paper declaring that the
"United States is not a union of the people,
but a league- or compact between sovereign
states, any of which has the right to judge when
the compact is broken and to pronounce any
law to be null and void which violates its con-
ditions." This paper was issued by the legis-
lature of South Carolina and was known as "The South Carolina Exposition." This
view of the United States constitution as a
compact between the States had been many
years before strongly expressed in the Virginia
and Kentucky Resolutions.9 Mr. Calhoun's
stance was drawn up by James Madison, often styled the "Father of the Constitution," and the latter by
Thomas Jefferson. The Kentucky resolutions
had suggested nullification as a remedy. Alex-
ander Hamilton in The Federalist frequently
spoke of the United States as a "Confederate Republic" and a "Confederacy" and called the
constitution a "compact." Washington fre-
cently referred to the constitution as a "compact," and spoke of the Union as a "Con-
federacy" at the time of the Louisiana
Purchase. Hon. Timothy Pickering of
Massachusetts advocated the right and advisa-
bility of secession and Hon. Josiah Quincy of
the same State in 1811 expressed similar views.
Hence John C. Calhoun propounded no new
or strange doctrine, but one which had found
advocates before, and in the North as well as
in the South.

In 1828, the friendly relations between Mr.
Calhoun and President Jackson were broken off, when the latter ascertained that Calhoun
had sought to have him called to account for
his acts in the Seminole War. This breach
was still further enlarged when Calhoun re-
fused to co-operate with President Jackson in
the effort to reinstate Mrs. Eaton in Washing-
ton society.

When Mr. Calhoun found that the repeal
of the tariff of 1828 could not be secured through
President Jackson, he resigned the Vice-Presi-
dency and entered the Senate from South Caro-
olina. On 26 July 1831 he published, a paper
favoring free trade and declaring that the
"great conservative principle of Union is nullification." The tariff question was settled
by a compromise in 1832.

Mr. Calhoun feared that the slavery quarrel
would some day disrupt the Union and there-
fore endeavored to check all discussion of this
issue. He opposed Jackson's removal of the
funds from the National Bank and also assailed
the "spoils system." He supported Van Buren's
"sub-treasury system" favored his re-election
and secured for him the electoral vote of South
Carolina. He defended Tyler for vetoing the
recharter of the United States Bank, and as
Secretary of State under that President was
largely instrumental in bringing about the
annexation of Texas. He regretted the division
of the Union into sections, but, recognizing a
fact which already existed, he advocated a dual
executive, one from the North, the other from
the South, each having the power to veto an
act approved by the other; thus preventing the
passage of any law offensive to either section.
His motive in this was the preservation of the
Union, which he dearly loved.

He died 31 March 1850, having spent the
last few months of his life in writing his "Dis-
quision on Government" and his "Discussion
on the Constitution and Government of the
United States" which has been pronounced the
most remarkable discussion of the rights of
minorities ever written. Mr. Calhoun was of
attractive personality and of irreproachable
character, to which Daniel Webster testified in
his grand eulogy on the great South Carolinian.

His "Collected Works" appeared 1853-54, and
his correspondence, edited by Jameson, in
1900. Consult Lives by Jenkins (1851); Von
Holst (1882); Benton, "Thirty Years' View" (1854); Dodd, "Statesmen of the Old South" (New
York, 1911); Hunt, "J. C. Calhoun" (Philadel-
phia 1908); Peck, H. C., "The Jack-
sonian Epoch" (1906); Peck, H. T., "American
Party Leaders" (New York 1914); and
Calhoun's correspondence, edited by J. F. Jameson
(1900).

J. T. DERRY,
Author, History of Georgia.

CALHOUN, Simon Howard, American
Congregational missionary, linguist and trans-
lator: b. Boston 1804; d. 1876. A graduate of
Williams College in 1829, from 1836 to 1874
he labored as a missionary in the Levant and
Syria. An expert in Turkish and Arabic, he collabo-
rated with William Goodell on the first Turkish
translation of the Bible.

CALHOUN, William James, American
He practiced as a lawyer at Danville, Ill., from 1875
to 1898, when he removed to Chicago to become
senior member of the law firm of Calhoun, Ly-
ford & Stidham. In 1867 President McKinley
had appointed him special commissioner to
CALI—CALICO-PRINTING

Cuba and in 1898, member of the Interstate Commerce Commission. President Roosevelt
weighed the voices from him in a moment in Vienna
in 1905 and he served as Minister to
China from 1909 to 1913. The subsequent
Chinese policy of President Wilson was
severely criticised by him.

CALI, ka-lé, Colombia, South America, a
city near the confluence of the Cali and Cauca
c in the department of Cauca, and north of
Popayan, the capital of that department. It is
one of the ancient cities of the republic
(founded in 1536) and to-day is important on
account of its location in an agricultural district
and on the Pacific Railway, from Buenaventura
to Cali and thence through the Cauca Valley, a
distance of 108.1 miles. Cali is also con-
nected by a short steam tramway with the
Cauca River. Pop. 27,747.

CALICE, Count Heinrich, Diplomatist, an
ambassador and linguist of international fame:
18 August 1831; d. Goerz, 28 Aug. 1912. His first
activities began in the year 1857 when he was
appointed consul for the Dual Monarchy at
Constantinople. Later he served in Liverpool,
China and Japan. In 1876, while the Serbian
War was in progress, he was sent with full
powers, by Count Andrassy, as the Austro-Hungar-
ian representative, to the eventual conference
that ended in imitation of the Congresses
between Russia and Turkey. At the Conference
Ignotieff, the Russian Plenipotentiary, strongly
urged armed entry into Serbia, but was resisted
by Lord Salisbury, supported by Count Calice.
In 1880 Baron Calice was appointed Austrian
Ambassador to the Porte,—which position he
held for 26 years. Notwithstanding the fact
that he presented four ultimatums to Turkey,
he was at all times a trusted friend of the ex-
Sultan. Baron Calice was the oldest active
diplomatist in Europe, and became the dean of
the diplomatic corps in Constantinople.

CALICO-PRINTING, the art of produc-
ing on calico or cotton cloth variegated patterns
by the process of printing; the object, as a rule,
being to have the colors composing the designs
as fast as possible to washing and other influ-
ences. It is similar to the art of dyeing, but
different in so far that the coloring mat-
ters are fixed on certain parts of the fabric
only, to form a pattern. Linen, wool and silk
fabrics are printed in a similar manner, but less
extensively. The origin of the art of printing
is probably coeval with that of dyeing (q.v.).
India is generally regarded as the birthplace of
calico-printing, and the word calico is derived
from the name of the Indian town Calicut,
where it was at one time extensively manufac-
tured and printed. Calico-printing, as an
Egyptian art, was first described by Pliny in the
1st century. Indian printed chintz calicoes were
introduced into Europe by the Dutch East India
Company, and the first attempts at imitating
them in Europe are said to have been made in
Holland, but at what exact date is uncertain.
The art, however, spread to Germany and England, where it is said to have been intro-
duced about 1676, two of the earliest works be-
ing situated at Richmond on the Thames, and
at Bromley Hall, Essex. In 1738 calico print-
works were established in Scotland in the
neighborhood of Glasgow, and in 1764 at Bam-
ber Bridge, near Preston, in Lancashire. At
the present time the chief seats of the calico-
printing trade in Great Britain are in the
neighborhood of Glasgow and Manchester.
The chief European seat of calico-printing is
Mulhausen, in Germany, and it is practised in
various towns in France, Austria, Russia, Swit-
zerland, Holland and the United States.

Calico-printing is of a highly composite
character, and enlists not only the co-operation
of the arts of designing, engraving, bleaching and
dyeing, but also an important element of suc-
cess, the science of chemistry.

The first operation to which the gray calico
is submitted, as it comes from the loom, is that
of singeing. This consists in burning off the
loose downy fibres from the surface by passing
the pieces rapidly, in an open and stretched con-
dition, over red-hot plates or a row of smoke-
less Bunsen gas flames. The object of singe-
ing is to obtain a smooth printing surface on
the calico, thus ensuring the production of clear,
sharp impressions during the printing process.
The next operation is that of bleaching, which
consists in boiling the fabric, which has been
singed, in solutions, followed by a treatment with cold
dilute solutions of bleaching-powder and acid,
interspersed with frequent washings with water.
By these means the natural impurities of the
cotton are removed, and the calico ultimately
presents a snow-white appearance. A number
of pieces are now stitched together, wrapped
on a wooden roller, and passed through a so-
called shearing machine, in which, by means of
a spiral cutter similar to that in a lawn-mower,
any projecting knots, loose fibres or down are
finally removed. In this condition the calico is
ready for the printer.

The printing of the patterns upon the cloth
may be carried out in various ways, the earliest
method being by means of wooden blocks, on
which the figures of the patterns stood out in
relief. Where several colors were employed
in one pattern, a block for each color was neces-
sary. In a set of blocks for one pattern, each
block, although at first having the same design
drawn upon it, was cut in such a manner that
it ultimately transferred only a single color,
which appeared in different parts of the pat-
tern. When all the blocks had been applied,
the various colors printed completed the origi-
mal design. To ensure the correct juxtaposition
of the colors, each block was furnished with
brass points at the corners, in order to guide the
workman. The printer first furnished the
front of the block with the requisite color by
pressing it several times on a piece of woolen
cloth suitably stretched and supported on a so-
called color-sieve, and which had been previ-
ously brushed over with color by a boy attend-
ant. The printer then applied the block to the
surface of the calico, which was stretched on a
long table covered with felt, striking the back
of the block with his hand or with a small mal-
et. The operation of block printing was slow
and tedious and though many improvements
have been introduced, and it can even be
affected by mechanical power, as in the so-
called Perrotine machine, it is now only em-
ployed to a very limited extent for certain
special kinds of work. Another mode of print-
ing, introduced about 1700, is by means of en-
graved copper-plates, but its employment is
also similarly restricted.
The modern method of printing, which dates from 1785, is effected by means of engraved copper cylinders, and this method has now practically superseded all others.

The method of engraving employed varies according to the kind of pattern to be put on the roller. In the case of very large patterns the figures are engraved by hand on the cylinder, with the use of the ordinary tools of the copper-plate engraver. For smaller designs, however, which are often repeated, it is usual in the first instance to engrave the pattern by hand on a very small cylinder of soft steel in intaglio, just as it will ultimately appear on the copper. This steel cylinder, which is called a die, is then tempered to a high degree of hardness, and by means of machinery is pressed against another cylinder of soft steel, on which the pattern is thus made to appear in relief. This last cylinder, called the mill, is then hardened, and, being pressed against the copper cylinder, the figures are indented and the roller is ready for use. In the first instance the original pattern of the designer has always to be engraved or repeated an exact number of times over the roller to be engraved. In order to reduce the amount of skilled labor one repeat only of the pattern is engraved on the die; the mill, which is of larger diameter, has two, three or four repeats; while the number of repeats on the circumference of the copper cylinder is still greater. A third method of engraving, which has now largely superseded the foregoing, is that of etching, in conjunction with the pantograph system of transferring the design to the copper roller. The roller, being coated uniformly with a bituminous varnish, has the pattern traced on the varnish in the pentagraph machine by a set of diamond points, and it is then submitted for a very brief period to the action of nitric acid. In the parts where the pattern has been traced the varnish is removed, there the copper is speedily attacked by the acid, and the pattern is thus etched upon it. After removing the varnish the roller is ready for printing.

The cylinder printing machine consists of a large central iron drum, around which are arranged one or more engraved copper rollers, according to the number of colors to be printed simultaneously. Each roller is provided with the means of making general adjustments, in order to determine the exact position of the color which it prints. The central drum is wrapped with cloth, and it is further provided with an endless blanket and back-cloth, so as to present a yielding surface to the printing rollers. The cloth to be printed passes from a roll behind the machine, round the central drum in a tightly stretched condition, while the several printing rollers press forcibly against it. Each roller, as it revolves, is fed with color from a small trough below, the superficial color being scraped off the plain surface of the roller by means of a sharp-edged steel blade, or "doctor," thus leaving the color only in the engraved portions. As the rollers thus charged with color press against the cloth, the latter absorbs the color from the engraved pattern, and the pattern is thus transferred to the calico. By this machine as much work can be performed in three minutes as could be done by block-printing in six hours. After the cloth has received the impression from the rollers it passes over a series of steam-heated flat irons, chests or cylinders, and is thus dried.

In close connection with this printing-machine is the so-called color-house or color-shop, where the solutions of coloring matters are suitably thickened and made ready for the printer. The color-house is provided with numerous steam-heated copper pans, and the use of the ordinary tools of the calico-printer. The color-mixtures are stirred with wooden blades by hand, or by mechanical agitators, and carefully strained through cloth before use. The thickening of the color-solutions is managed with starch, flour, gum, dextrine, albumen, etc., is necessary to prevent the spreading of the color by capillary attraction beyond the printed parts, and thus ensure sharp and neat impressions. Near the color-house is a chemical laboratory, and a drum room containing the store of coloring matters, dyewood, extracts, thickenings, chemicals, etc.

The various classes or styles of calico-prints are usually arranged either according to the chief dyestuff employed alone, by the calico-printer and only furnish useful colors if applied in conjunction with certain metallic salts or mordants, of which the chief ones here employed are the acetates of aluminum and iron. At first the pattern is printed on the white calico with these or similar mordants alone, and only after they have been suitably fixed is the madder or other similar coloring matter applied in the dye-bath, where for the first time the desired colored pattern appears. The aluminum mordant yields reds and purple, iron yields purple or black, a mixture of iron and aluminum yields chocolate, etc. The fixing of the mordant after printing and drying is effected by passing the printed calico through the so-called anhydride machine, which is suitably heated and charged with moisture, where the acetic acid of the printed mordants is driven off, leaving the aluminum salt in an insoluble form on the calico. A more complete fixing of the mordant is subsequently effected by passing the fabric through solutions containing silicate or arseniate of soda, and a final washing completes its preparation for dyeing. The dyeing operation consists in boiling the fabric in a solution or decoction of the requisite dyestuff. After dyeing, the stained unprinted portions are cleaned and purified, while the printed colors are rendered more brilliant by washing, soaping, coloring, etc. Variety of effect is produced by printing the same fabric two or three times (print, cover, pad) with various designs before proceeding to the ageing, etc. If in the first instance a portion of the pattern is printed with lime-juice (citric acid), it resists or prevents the fixing of the mordants applied over it in the second and third printings, and the part remains undyed and ap-
pears as a so-called resist white. In a similar manner, stannous chloride, mixed with aluminum acetate before printing, resists the fixing of iron mordants printed over the aluminous mordant, and a resist red pattern under a purple cover is obtained, presuming madder to be the dyestuff employed. Alizarin now replaces the madder, and similar variegated effects are obtained if other mordant dyestuffs are employed, for example, cochineal, quercitron bark, etc. Formerly a preparation of madder, termed garancine, was largely employed, and gave rise to the garancine style, in which the colors were fuller and darker, the prevailing hues being browns, chocolates, drabs, etc. Since the range of colors yielded in the madder style is limited, additional colors, as green, blue or yellow, may be printed in by block after dyeing, etc., and are fixed by steaming. If the whole fabric is evenly impregnated with mordant by means of a "paddling-machine" and dried, and then a pattern is printed over the mordant with lime-juice, the mordant is removed from the printed parts, and remains white in the subsequent dyeing. Such a print would be termed a padded style with discharge white.

Steam Style.—Many coloring matters, differing from each other widely in character, are fixed by the operation of steaming instead of by dyeing, so that this style is somewhat varied in character. Ordinary steam-colors consist of a thickened mixture of dyeweed extract and mordant, with the addition of assistant metallic salts and acids. The mixture is printed upon the white calico, which, after drying, is exposed from a half to one hour in closed chambers to the action of steam. This steaming operation effects the combination of the coloring matter and mordant, and the color is thus developed and at the same time fixed upon the calico. Black is produced with logwood extract and chromium acetate, scarlet produced with cochineal extract and stannous chloride. The prints are washed and dried after steaming, the colors being usually bright, but not very fast. Steam colors, fast to light and soap, are obtained in a similar manner by printing mixtures of alizarin and allied coloring matters with mordants, and then steaming. These are used in the so-called mordant style. Black is fixed the calico, which is fast red, pink, purple, etc., appear. In the pigment style use is made of pigments, or insoluble colored mineral powders as ultramarine-blue, chrome yellow, Guignet's green, etc. These are mixed with a solution of egg or blood albumen, printed and steamed. The albumen coagulates on steaming, and thus adheres firmly to the cloth, at the same time enclosing the pigments within the coagulum. Such colors are fast to light and soap, and may therefore be printed simultaneously with the steam alizarin colors for the production of variegated fast prints. Another class of colors are the so-called basic colors, as magenta, aniline blue, etc. Their solutions may also be thickened with albumen, printed and steamed, to give fast steam-colors. It is more usual, however, to print a mixture of the thickened color solution and tannic acid, and to pass the steamed print through a boiling solution of tartar emetic. By this means an insoluble color-lake (tannate of amyntomy and color) is fixed to the calico, which is fast to soaping but not to light. Basic colors applied in this manner are now usually printed along with the steam alizarin colors, instead of pigments, thickened with albumen, and variegated fast prints are thus obtained. Loose pigment colors are basic colors thickened with starch or gum tragacanth only, and then steamed. Such prints do not even stand washing with cold water.

Turkey-red Style.—In this style use is made of the fact that turkey red is at once bleached by the action of chlorine. Plain dyed turkey-red calico is printed with tartaric acid, dried and passed through a mixture of potash or bleach-powder. In the printed parts chlorine gas is evolved, the red is destroyed and a white discharge pattern is produced. A blue pattern results if Prussian blue is added to the printing mixture; yellow is obtained if a lead salt is added, and the fabric is afterward passed through bichromate of potash solution, whereby yellow chromate of lead is produced; green results from a mixture of the blue and yellow; black is printed direct. These and other discharge colors may also be obtained by other methods.

Indigo Style.—Of the numerous indigo styles in use it is only possible to refer to one or two of the most important. Indigo blue patterns on a white ground are obtained by printing a thickened mixture of finely-ground indigo and caustic soda on white calico, previously impregnated with glucose. A subsequent steaming reduces the indigo to indigo white, and causes it to penetrate the fibre, while a final washing oxidizes, regenerates and fixes the color. Resist white pattern on a blue ground is obtained by first printing upon white calico a resist paste composed of gum or flour, China clay, sulphate of copper, etc. When the printed calico is dyed in the indigo vat the paste resists the entrance of the color, partly in a mechanical and partly in a chemical manner, hence the blue is only fixed in those parts which are unprotected by the paste, after the removal of which by washing, the white pattern appears. Various resist colors, as yellow, green, etc., are obtained by the addition of different chemicals to the paste and altering the after-processes. A discharge white pattern on a blue ground is obtained by printing on plain indigo-blue dyed calico a solution of bichromate of potassium mixed with gum, and then passing the fabric through a solution containing sulphuric and oxalic acids. During this passage there is liberated, in the printed parts only, chromic acid, which at once oxidizes and destroys the blue, producing the desired white pattern. Colored discharge patterns are produced similarly by employing albumen thickening instead of gum thickening, and adding to the printing mixture such pigments as are not affected by acids, for example, vermilion, chrome yellow, Guignet's green, etc.

This method is now being superseded by the Freiberger process, a simpler and more productive way of discharging, the reagents used being either chromic acid, sodium chlorate or in some cases, bromate and, still more recently, nitrates. This latter method passes the cotton fabric imprinted with nitrate discharging color through hot and concentrated sulphuric acid and, by accurate control of the strength, temperature and time exposure, not only preserves the fabric in undiminished strength but obtains
the most accurate and permanent discharge effects.

Bronze Style.—Manganese brown or bronze is decolorized by reducing agents; hence white discharge patterns on a bronze ground are obtained. Manganese or manganese-brown dyed calico with a mixture of stannous chloride and oxalic acid, and then steaming. Colored discharge patterns are obtained if coloring matters are added to the printing mixture which are not affected by reducing-agents, or which even require stannous chloride as a mordant to develop the color as Prussian blue, chrome yellow, Persian-berry yellow, Brazil-wood pink, safranine, acridine orange, etc.

Aniline Black Style.—Aniline black being a product of the oxidation of aniline, patterns in this color on a white ground are obtained by printing a thickened solution of aniline hydrochloride containing the oxidizing agent, sodium chlorate, and a salt of copper or vanadium. When the printed fabric is slightly steamed or exposed to the air, which happens previously, the impression, which is at first devoid of color, gradually becomes dark green, and this by a final treatment with an alkaline solution, soap, etc., changes at once to a rich black. The color is extremely fast to light, although previously bleached with lithographic, or oil, colors and dispensing with the practice of fixing the colors after printing, which is essential when aniline or allied colors are used. The actual process is continuous, as in ordinary copper rollers being used for impressing the pattern the effects are obtained by the use of continuous metal plates, or tubes, upon which the designs are transferred directly in the manner employed in ordinary lithographic printing on paper. It is said to cheaper production greatly, for as soon as an order is completed of one design, the rollers may be cleaned and fresh patterns immediately transferred.

Bibliography.—Blackwood, William, ‘Calico Engraving’ (London 1913); Stütz, Ernest, in the ‘Journal of the Franklin Institute’ (January 1914).

CALIFORNIA, principal Pacific Coast State of United States (No. 31 in order of admission), bounded north by Oregon, south by Mexico (Lower California), east by Nevada and Arizona, west by Pacific Ocean. Extreme length about 800 miles, coast line 1,076 miles, greatest width about 270 miles. Area (No. 2 in United States), 158,360 square miles (2,380 water). Pop. (1910) (No. 21 in United States) 2,377,549, an increase of 892,496 (60.1 per cent) since the census of 1900. Pop. (1916) 2,938,654, an increase of 561,105 (23.8 per cent) in six years.

Topography and Climate.—Its peculiar shape, determined less by political than by natural delimitations, gives California a character unique among the States, climatically and economically. It has a range of climate all its own, and its boundaries include all the climates in North America. It is longest of the States; and, in proportion to its length, narrowest. It corresponds with an area which upon the Atlantic seaboard should run as far inland as does South Carolina, and as long coastwise as from Charleston to Boston. This in itself gives large range of climate by latitudes; but its topography and its climatizations greatly increase this range. Its peculiar projection or leaning out upon the Pacific; its enormous coastline (somewhat less than one-fifth total coastline of the United States); and particularly its exposure to the west and south upon this great

equalizer; its contact on the east with the "Great American Desert"; its huge mountain systems; and its orographic protection against the north, are all vital factors in determining its atmospheric temperament. While the Atlantic seaboard is made humid by the warm Gulf Stream, and is open to the north (its mountains being scattered far out), California is screened from the Arctic air-currents by a vast Alpine range, almost unbroken in its whole length and with its lowest passes 50 per cent higher than the highest peak east of Colorado. The wettest pass in California is 8,000 feet; 41 exceeding 10,000 feet and 11 exceeding 13,000 feet. From its northern boundary down to Point Conception, California is washed by the cold Kuro Siwo, or Japan current, swinging back from the Arctic; and the exposure is largely westerly. From this point southward the exposure is more southerly, the Japan current is deflected far off-shore, and the coast is sheltered by a long line of islands. Tempered on one side by an equable ocean, on the other by great land masses, California is still further differentiated by its mountain systems. Roughly speaking, it is all "under wall." Two huge cordilleras, insculpting at the north and south, form an almost complete circumsallation of the great agricultural region; while to the south, though the ranges are much broken down, there is something like a repetition of this pattern, on a much smaller scale; the whole forming something like an inverted figure 8. In their major loop, these ranges enclose one great central valley, practically level, of 18,000 square miles,—or about the aggregate area of Massachusetts, New Jersey and Delaware,—screening it from the Arctic, and filtering the winds from sea and desert. This great remnant is broken down only at the Golden Gate, through which, in a mile-wide passage, the drainage of this enormous watershed reaches the sea. In their imperfect minor loop, there is a broken congeries of valleys aggregating an almost equal area, sheltered from the desert, but as a rule open southerly toward the here warmer sea. To the east of the main wall lies a large but almost uninhabited area, strictly desert, and part of the great interior wastes. The inclination of the State to the west, and its concave dip in this respect, is the fact that despite its narrowness the extremes are three-fourths as far apart in longitude as in latitude. The southeast corner or San Bernardino County is nearly 500 miles more easterly than False Cape; while from Oregon to the Mexican line the north and south distance is about 655 miles.

The Coast Range, altitude 2,000 to 8,000 feet, rather closely follows the coast line from Oregon to Point Conception; south of which topographic hinge it breaks down as to be relatively unimportant. The Sierra Nevada proximately following the east line of the State, at an average distance of 50 to 100 miles therefrom, is "the largest and most interesting chain of mountains in the United States" (J. D. Whitney). The Range, which extends from Lower California to Alaska, this range in California is 600 miles long and 75 to 100 miles wide,—its base covering four times the area of Massachusetts. The snow-line averages about 2 miles wide. Its surpassing peak (Mount Whitney, highest in the United States) is 14,522 feet (Langley). Its passes average 11,000 feet, the lowest being 9,000 feet, and the most used (Kearsarge) 12,000 feet. The western slope is gradual, averaging about 100 feet to the mile; its eastern slope 10 times as rapid, being by far the steepest general gradient in North America. At many points the fall is 10,000 feet in a mile; and from the highest peak in the United States one looks down nearly 15,000 feet into Death Valley, some 200 feet below sea-level. This vast granitic range is the most remarkable register of glacial action on the earth's surface. Derivations *perhaps a vertical mile* (Muir) it is still the most Alpine cordilleran in North America. It holds 1,500 glacial lakes,—the lake line being at about 8,000 feet. Of small residual glaciers, Muir has counted 65 between 36° 30' and 39°. Its Yosemite (including the famous one so-called, the Hetch-Hetchy, and minor ones) are noted among geologists as well as travelers—well-like valleys gouged deep in the granite by glaciers, and of scenery nowhere surpassed. The highest water-fall in the United States (Hetch-Hetchy 3,727 feet) is in this region. Upon the huge moraines left by that continental incubus of ice grow the noblest coniferous forests in the world,—greatest in variety of species, in density of merchantable lumber and in size, age and beauty of trees. These forests cover 44,700 square miles (a larger area than the entire States of New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, Delaware and Maryland together). California is fifth in area of forests and second in stand of lumber (200,000,000,000 feet, exceeded only by Oregon with 225,000,000,000 feet). Eighteen national forests reserves in the State cover 19,508,000 acres. The cut of 1916 was nearly three times that of 1890. It comprised: redwood, 490,828,000 feet; Western (white) pine, 494,973,000 feet; Douglas fir, 141,200,000 feet; sugar pine, 165,-461,000 feet; white fir, 85,918,000 feet; spruce, 10,000,000 feet; cedar, 16,587,000 feet; hemlock, 500,000; other trees, 25,000,000 (1,430,467,000); shingles, ties, etc., 1,000,000 feet; a total, 1,560,467,000 feet. To this should be added 30,000 cords of tan-oak bark, valued at $600,000. Total value of product, 1916 (exclusive of fuel) $47,000,000. Fuel wood amounts to about $9,000,000. The Big Tree is the largest and oldest of growing things on earth; averaging 275 feet high and 20 feet diameter. The largest reach over 325 feet high and 36 feet diameter, with an age of 5,000 years. Muir "never saw a Big Tree that had died a natural death." The other Sequoia (Sempervirens), or California redwood, covers an area of about 2,000 square miles. It is second only to the Big Tree in size, reaching 18 feet diameter; and like it is found nowhere else. It belongs to the Coast Range, as the Big Tree to the Sierra. It is almost exclusively used in California for sheathing. The immunity of a city like San Francisco from great fires, though windy, hill-built, and of "frame," is largely due to the low inflammability of this redwood lumber. The sugar pine, the yellow pine, covered, reaches 245 feet high and 18 feet diameter; the yellow pine 220 feet high and 18 feet diameter; the Douglas spruce, king of spruces, 200 feet high, 8 feet diameter; the Libocedrus, or incense cedar, 150 feet high and 7 feet diameter; the white silver fir 200
feet high, 6 feet diameter; the magnificent silver fir 250 feet high and 5 feet diameter. The oak is a familiar sight at most of our shabby tree, but of great economic importance in feeding the Indians and horses; in a good year its crop of excellent nuts is enormous — estimated (Muir) equivalent to 50,000 acres of wheat in food value. These are often fed to horses instead of barley. The shagbark hickory (which reach great size); also maples, yews, birches, alders, sycamores, cottonwoods, aspens, madronos, etc. A California palm (Washingtonia) is native in mountain canyons along the southerly desert, and is now largely used for street ornamentation. Specimens planted by the Franciscans have reached a height of 80 feet. The flora of the State includes about 2,500 species, and is of great interest. In the great central valley in February or March one can travel 400 miles, treading flowers at every step; and as much is true in other parts of the State.

No other State contains a moiety of the vast number of exotic trees now in California. Fruit, ornamental and shade trees from every country in the world are represented here. Nearly 11,000,000 tropical fruit trees are bearing in 1918. Millions of pepper-trees (Molle) from Peru are used on streets, etc.; and of Australian eucalyptus (intro. 1858), there are now over 15,000,000, including about 100 varieties, for fuel and ornament. Setting 3,000,000 acres to orchard and other trees within a generation has partially balanced the deforestation, though not where needed to offset the denudation of the watershed by lumbering and forest fires.

The most striking meteorological feature of California is perhaps the ordering of its seasons, of which it has practically but two, the wet and dry. The winter, or rainy season, is approximatively from late October to late April, with 15 to 25 rainy days, an annual precipitation ranging from 23.53 inches for San Francisco (far greater than the extreme northern 14.56 inches for Los Angeles, and 10 for San Diego. For six months after 1 May, rain is practically unknown, except showers in the high mountain regions, etc. In 1917-18 there were 361 days with precipitation in rain in Los Angeles, the largest city west of Saint Louis. In the high Sierra the winter precipitation takes the form of snow, with an annual fall of 30 to 50 feet, thus supplying the natural reservoirs which feed the streams, upon irrigation from which agriculture largely depends. But in Oregon, which bounds California on the north, we have the familiar eastern seasons; and again in Arizona and Nevada, abutting upon the east, winter snow and summer rains characterize the meteorology. This California differs altogether from all its neighbors and has well been called an "Island on Land." Within its own limits, also, it has extraordinary range of climates, as it were in strata, following the topographic contours. Thus in the vicinity of Los Angeles it is possible at times to take a sleigh-ride within 12 miles of the city on one side (and looking down upon blossoming orange groves not five miles distant), and by an hour's ride to bathe in the Pacific, which has here a winter temperature of 60°. Within a short journey from almost any given point one may find almost any variety of climate, from below sea-level to nearly 15,000 feet above it; from the extreme but arid and non-grazing desert to the mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of the State — many varieties of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of mountain to eternal snow; from palms and perennial roses to the primeval coniferous forests, or to the desolation of alkaline Saharas. Although all California shares the seasonal peculiarity of California climate, the northern and southern parts of the State — many varieties of
"Ten Miles" Range including Mount San Bernardino, altitude 11,800 feet; full-bearing orange groves to the left; 100-foot Australian Eucalyptus to the right.
extirpated. At the American occupation, elk were seen in droves of thousands. Great numbers were killed from the deck of steamers plying to Sacramento. Occupation of the State by Indians immemorially, and by Spaniards for nearly a century, had not appreciably diminished the wild animals; but the same wanton sport which exterminated the bears and wolves exterminated tens of millions of the American bison on the great plains has in California made the great mammals nearly extinct. The grizzly bear (the State emblem) once in great abundance in all parts of the State is now scarce; the black, cinnamon and brown bear are more common, though rare. Sea lions of a ton weight are still found along the coast, and their populous rookeries a few hundred feet from the 4Cliff House4 in San Francisco are an object of interest to travelers. The California lion, mountain lion or puma, is still not infrequent, and wildcats abound in the mountains. The coyote is common and of utility in decimating the hordes of rabbits, though an ill-judged bounty on coyote scalps has of late years much reduced the animal. This small wolf. The beaver, once in vast numbers here, is now confined to the remotest streams; and the valuable sea otter is almost extinct. Black-tailed and mule deer are still reasonably frequent; but the antelopes, which once roamed the northern and southern valleys in great bands, have hardly a representative left. The same is true of the mountain sheep (Ovis Ammon), once common in all the higher ranges. Spermophiles, or ground squirrels, and five species of gopher, are innumerable; and a great pest to the farmer as well as carriers of bubonic and other diseases. The Federal and State governments are making scientific campaigns to exterminate them. Millions have been poisoned. The true gray squirrel is common in the north. Jack rabbits and pocket gophers are abundant in all parts of the State, despite community "drivers" in which sometimes tens of thousands are killed in a day. The birds of California number above 350 species. The largest winged creature in North America is the California condor. Quail of two species are in vast abundance throughout the State.

Earthquakes.—While the Pacific Coast of North, Central and South America in general is peculiarly liable in recent geological times to seismic disturbances, California has never experienced an earthquake of the second magnitude, nor probably even of the fourth. The only first-degree earthquake in the United States was that of New Madrid, Mo., in 1811. The largest city in the world, if built upon its epicentre would have been immediately wrenched off the map. California has never had an earthquake approaching in severity that of Charles-ton, S. C., in 1886. The most serious "trem- bles" of California were in 1812 when the fall of the Mission tower of San Juan Capistrano killed 30 persons in the church. It did not special damage elsewhere in the village; and 1872 when some old adobe houses in Owens Valley collapsed and killed 19 Mexicans. The "Earthquake" of San Francisco, April 1906, was a very minor shock (geologically) — not above the 6 or 7th magnitude. It broke rusty water mains in the 30 feet of sand with which lower San Francisco is "filled." It threw down a few decrepit frame buildings, on the same sand "fill," but not a single respectable structure in the city. Fire caught in one of the wrecked tenements; and half San Francisco was consumed because there was no water to check the fire. In Charleston, practically every building was wrecked by the earthquake.

The unremitting tension upon the crust of the entire earth has found its "safety-valves" in California. The earthquake "faults" are not only known and visible, but mapped. There is no excuse for building towns or reservoirs across one of these "faults." For this reason, the foremost geologists agree (vid. Branner) that California is safer from earthquakes than are many States where these safety-valves have not yet been developed, and earthquakes are as yet strangers.

River Systems.—As in most arid States, the drainage of California is simple. For some 300 miles on its southeastern edge the State is bounded by the Colorado River, which rises in the Rocky Mountains in Colorado and flows 1,360 miles to the Gulf of California. No tributaries whatever from California, all east-bound streams from the Sierra Nevada being lost in the desert. On the western coast, though a few rivers reach the sea (like the Klamath, Mad, Eel and Salinias) they are relatively unimportant and incidental. The real drainage system of the State has outlet through San Francisco Bay and the Golden Gate, by two chief inland rivers which join about 60 miles northeast of San Francisco. Both rise in the Sierra Nevada, the Sacramento (370 miles long) to the north, the San Joaquin (350 miles long) to the south. Their main course averages along nearly the median line, north and south, through nearly two-thirds the length of the State. They have no tributaries worthy of the name from the great westerly mountain wall, the Coast Range; their waters being fed almost exclusively from the vast Alpine chain which is in effect, though not politically, the eastern boundary of California down to latitude 33° 30′. Their important feeders from the Sierra are the Feather, Yuba, Cosumnes, American, Mokelumne, Kern, Kings, etc. All these are fine mountain torrents, beloved of sportsmen, and flowing through magnificent scenery, but not of navigable ways. The most important is the Feather, which has a large drainage area. Several streams in southern California, like the Los Angeles, San Gabriel and Santa Ana, reach the sea, but all are practically exhausted by irrigation uses, except during winter flood-water. The many streams from the abrupt eastern slopes of the Sierra Nevada all disappear in alkaline "sinks,"—like Pyramid Lake, the Mojave River, Mono Lake and Death Valley,—and never even in flood reach the ocean by their great natural conduit, the Colorado River.

The total mean annual run-off (in acre-feet) of 32 chief California rivers is 59,078,200. The Colorado River is enormously largest, with 16,900,600 acre-feet; the Sacramento next with 9,770,000; the Feather 5,880,000; American 3,820,000; Yuba 3,050,000. The San Joaquin, Kings, McCloud, Merced, Stanislaus and Kings rivers all exceed 1,000,000 acre-feet; and the Tuolumne 2,000,000. Seven others exceed 500,000.

The Sacramento and Colorado are navigable to light-draft steamers to the State capital and
to Needles, respectively. The lakes of California are not important as to navigation. Tulare Lake, receiving the drainage of the Kern, Kaweah and Kings rivers, is 700 square miles in area, but only 40 feet deep. In very high water, it will overflow into the San Joaquin; but ordinarily its income of water is secured for by evaporation. Lake Tahoe in the extreme north, at an elevation of 6,200 feet, is 20 miles long and 1,500 feet deep, and famous for the purity of its waters, the beauty of its scenery and its trout. This lake is the headwaters of the Truckee River, of which there are a great number in the Sierra, mostly at altitudes exceeding the highest mountain summits east of Colorado. The lower-lying lakes of the State are mostly without outlet, and of various degrees of brackishness, culminating in the "sink" of the Amargosa River nearly 200 feet below sea-level on the eastern side of the range, where evaporation has left vast alkaline deposits, now of great commercial value.

Geology.—The main axis of the Sierra Nevada is of granite throughout. To the north there are some metamorphic peaks, and many summits are capped with volcanic materials. Mount Shasta in the far north is an extinct volcano. In the far south is Lassen's Peak, (10,577 feet), of late years sometimes emitting smoke. This granite core is flanked by a very heavy mass of slaty, metamorphic rocks,—mostly argillaceous, chloritic and talcose slates,—constituting the great auriferous belt of the Sierra. The Coast Range is made up almost entirely of cretaceous and tertiary marines, chiefly sandstones and bituminous shales. It is in this belt that the recent vast development of petroleum has been made.

Besides the vast reaches of alluvial soils in the lower valleys, which were first selected for agriculture, an enormous area of disintegrated granite gravels along the foothills and first activities has been found the most productive soil in the State, particularly with reference to valuable crops. These great granite beds, which seem to the farmer from the black "bottoms" of Ohio the most unpromising of soils, are in reality rich in all the elements of plant food. The vast majority of the valuable orchards of southern California, are planted upon this granitic detritus; and without exception the finest oranges and other citrus fruits come from this soil. The relative aridity of California, long supposed to be a curse, is now known to be a two-fold blessing. Exhaustive analyses, comparative with every portion of the Union, show these gravels to average much richer in chemical constituents than soils leached out by excessive rainfall. Furthermore, the fact that precipitation is not invariably sufficient to ensure crops has compelled irrigation, which does ensure them; so that farmers in the arid lands have much greater crop-certainty than those of regions with most abundant rainfall.

Agriculture.—In no item of its history has California been more unlike other States than in development and sequences of agriculture. The first (and for 60 years commercially chief) industry was cattle — derived from herds introduced from Mexico by Mariano Galvez, 1769, and chief wealth of the Mission establishment and Spanish colonists. It was a generation after the American occupation before agricultural ture was seriously undertaken; and for another term of years it was chiefly a gigantic seasonal "gamble with the weather" in dry-farming of cereals. The characteristic features of agriculture up to about 1870 were enormous holdings,—reckoned by at least tens of thousands of acres,—with the single crop (almost exclusively wheat and barley) and purchase of every other article of necessity or luxury. On areas of hundreds of square miles there were an individual or corporate owner, a single crop, and a few hundred raisings at the height of the season and their temporary quarters. A few of these enormous ranchos still survive; and Miller and Lux still farm about 1,000,000 acres, with 20,000 acres in a single field. But within a generation the typical character of agriculture in California has radically changed. The greatest record drought (1864) which not only destroyed grain but hundreds of thousands of cattle (60,000 head being sold that year in Santa Barbara at 37½c. per head), exclusion of the Chinese, who supplied the chief reliance for labor on the great ranchos, the fall in wheat, and other factors, led to the breaking up of these gigantic domains. A slight idea of the change may be had from the census that in 1850 the average size of all California farms was 4,456 acres; and in 1910, 318 acres. Along with this great dry-farm gambling — for such it was — sheep became a leading industry in the State, particularly in southern California. But the enormous increase in value of land has reduced sheep to a valuation of $17,000,000. The city of Pasadena (Pop. 40,000) was a sheep pasture in 1870.

Within about 30 years — that is, since 1885, — the general character of California farming has changed to small holdings, occupied not by tenants but by American owners, with families, with diversified crops, and obliged to purchase only the luxuries of life; with intensive methods and certainty (by irrigation) of crops. California has now one-fourth of all the irrigators in the United States. The average size of irrigated farms is in southern California 214 acres; in rest of State about 82 acres. The typical California farm under the present system is a quarter or half of an acre, irrigated either by its own pumping plant or from a community ditch, and yielding an annual income of not less than $200 per acre and sometimes $900.

Perhaps the greatest single factor in bringing about this structural change was the orange. In 1862 there were 25,000 orange trees in the State, all seedlings, and deriving from Mexico, where the fruit was introduced by the Spaniards nearly three and a half centuries earlier. In 1873 two seedless orange trees from Brazil were sent from the Department of Agriculture in Washington to Riverside, Cal. From these two parent trees has sprung the modern orange industry of California — and practically of the United States; as Florida, the only other orange State in the Union, yields only one box of oranges to California's two. Millions of trees grafted from their "buds" are now bearing in this State, and the hereditary fruit, seedless and delicious, leads the American market. This has its highest consumption practicably continuous (shipments being made every month in the year) has been for these
1 Mt. Shasta, from Sisson's

2 Mt. Tamalpais, near San Francisco
reasons, and aesthetic ones, a large attraction to high-class immigration, and an important factor in shaping agricultural methods. For development of the industry, see statistics below.

In deciduous fruits, total production, shipments fresh, canned and dried, California has within a generation come to lead the Union; as it leads in all tropical fruits.

**Beet Sugar.**—California was the first successful grower of sugar beets, and has by far the largest factories. In 1909 it was second to Colorado in the value of its beet-sugar output ($11,981,000), or 25 per cent of the total. The beet sugar industry of the United States originated at Alvarado, Alvarado County, Cal. In 1916 the output of its 11 beet-sugar factories was 472,770,100 pounds of sugar; value, $30,800,000. In 1917 the number of beet-sugar factories and acreage planted to beets had increased in one year over 26 per cent. California beets averaged 7 per cent higher in sugar than those of other States. The effect of the great war and government control on agriculture in California (as elsewhere) is not yet to be prophesied, particularly as to beet sugar, wheat, beans and live-stock. In 1917 the production of sugar beets was 2,636,800,000 pounds. Within a decade California has become the greatest producer of beans (navy and frijol, but principally lima). In 1916 the yield of beans was 5,047,082 bushels, valued at $19,144,000. In 1917 there were 8,035,000 bushels at double the value per bushel. This industry is practically confined to Ventura, Los Angeles, Orange and San Diego counties. Within less than a decade, also, cotton has come to count in the agricultural resources of California. Imperial County, organized 1907 (a recently re-described desert, often compared with the valley of the Nile), now produces annually 65,000 bales of cotton (40 per cent Durango or long-staple) worth $9,380,000, besides a great variety of other vegetable products. It lies along the Colorado River, just north of the Mexican line. Ten years ago a desert, it has now a population of 50,000, with several small cities and tens of thousands of acres under cultivation by a huge irrigating system from the river.

With modern refrigerator freight cars, a vast quantity not only of citrus and deciduous fruits, but of fresh vegetables, is now shipped from California, 2,000 to 3,000 miles to the Eastern States, including some 800 carloads of celery annually from one small town. Strawberries are in the Los Angeles market every month of the year, but are shipped (as are blackberries, raspberries, loganberries, etc.) to Arizona and New Mexico only in summer; as are also the famous cantaloupes and watermelons. California is foremost producer of the most extraordinary of forage plants, the Arabian-Spanish-Mexican alfalfa. This produces, under irrigation, about one ton per acre for each of four to eight cuttings per annum. In 1917 it sold at $26 per ton. In 1910 there were 487,134 acres planted to alfalfa; in 1916, 862,534 acres.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Acres</th>
<th>Yield, bushels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>75,000</td>
<td>240,000</td>
</tr>
<tr>
<td>Wheat</td>
<td>375,000</td>
<td>7,425,000</td>
</tr>
<tr>
<td>Barley</td>
<td>1,350,000</td>
<td>39,150,000</td>
</tr>
<tr>
<td>Oats</td>
<td>196,000</td>
<td>6,860,000</td>
</tr>
<tr>
<td>Rye</td>
<td>8,000</td>
<td>104,000</td>
</tr>
<tr>
<td>Rice</td>
<td>80,000</td>
<td>5,600,000</td>
</tr>
</tbody>
</table>

Up to 1908 the hop industry of the United States was all in Maine, Vermont and Massachusetts. Soon New York, with better soil, had a monopoly; then Wisconsin and Michigan became important hop-growers. In 1916 five counties of California produced more hops than all the rest of the United States. In 1916 the live-stock in the State, valued at $14,380,000, included 95,000 horses, valued at $45,396,000; 70,000 mules, valued at $8,120,000; 591,000 milch cows, valued at $39,597,000; 1,636,000 other cattle, valued at $62,332,000; 2,524,000 sheep, valued at $16,911,000; 994,000 hogs, valued at $10,059,000; and poultry valued at $19,000,000, making a total value of $201,395,000.

In the same year the total value of the State’s dairy products amounted to $40,310,105, consisting of 70,030,174 pounds of butter, worth $19,181,204; 7,745,124 pounds of cheese, worth $1,203,592; and other produce valued at $19,925,249.

The sensational achievements of Luther Burbank in hybridizing fruits—for instance, the creation of a large plum without any pit whatever—are already world-famous. Almost as remarkable results have been reached in floriculture. Seeds and bulbs are raised on a great scale; carnations, calla lilies and other flowers being grown outdoors by the 10-acre field. A large proportion of the flower seed of the United States is grown in California, and it supplies most of the mustard of the nation. The total area of California farms is now over 46,000 square miles, considerably exceeding the entire area of States of New Hampshire, Vermont, Connecticut, Rhode Island and Maryland. The State was seventh in the Union in per capita value of farm products ($68) and fifth in value of products of farm ($1,816) as compared with Ohio, $929 in 1900. California had in 1910, 87,670 farms; total value of farm property, $1,448,560,000; total value of farm products 1899, $131,690,606. Total acreage in farms, 27,883,000 acres, of which 11,380,000 acres are improved. The area farmed decreased 3 per cent, 1910 to 400,000. In 1850 there were 872 farms; in 1890, 18,716; in 1870, 23,724. The development of farming is briefly indicated as follows to 1910—the latest Federal figures available. The great increase since 1910 cannot be officially stated.

<table>
<thead>
<tr>
<th>Year</th>
<th>Farms</th>
<th>Acres</th>
<th>Value of farm property</th>
<th>Value of products</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910</td>
<td>87,670</td>
<td>27,883,000</td>
<td>$1,448,560,000</td>
<td>$131,690,606</td>
</tr>
<tr>
<td>1900</td>
<td>90,318</td>
<td>31,639,000</td>
<td>$1,759,711,000</td>
<td>$135,450,000</td>
</tr>
<tr>
<td>1890</td>
<td>18,716</td>
<td>40,000,000</td>
<td>$123,500,000</td>
<td>$10,000,000</td>
</tr>
<tr>
<td>1880</td>
<td>23,724</td>
<td>40,000,000</td>
<td>$108,300,000</td>
<td>$12,450,000</td>
</tr>
</tbody>
</table>

The largest number of farms was in Los Angeles County (6,577); three other counties
had over 3,000 farms each; Santa Clara, 3,995; Sonoma, 3,676; and Fresno, 3,290. Of all farms, 84,692 were farmed by whites; the rest by Indians, Chinese, negroes, Japanese.

Dairy cows had increased nearly one hundred-fold since 1850, in 1910 being 464,000. Horses (1910), 462,000; mules, 68,000; sheep, 2,325,000; swine, 749,000; of other cattle there were 1,155,000. Total value of domestic animals 1910, $119,487,452—including poultry and bees, $4,500,000; animals sold and slaughtered, $15,754,965; poultry and eggs, $6,356,780; wool, $1,707,088. Sheep and wool decreased steadily, from 1879, with the great increase in value of lands for farming.

From 1850 to 1900 the population increased sixteen-fold; number of farms over eighty-fold. California was one of the few States in 1900 that in 30 years added more to its agricultural than to its other population.

Irrigation and Horticulture.—Development of the new and characteristic agricultural era in California is outlined by these statistics from the last available census (1910).

<table>
<thead>
<tr>
<th>No. irrigators</th>
<th>Acres irrigated</th>
<th>Value irrigated crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>102,819</td>
<td>7,263,273</td>
</tr>
<tr>
<td>California</td>
<td>25,611</td>
<td>1,445,872</td>
</tr>
</tbody>
</table>

Of the 72,542 farms in the State, 25,675 or 35.4 per cent were irrigated, an increase of 44 per cent in 10 years; the number of irrigators increased in the same term 87 per cent, showing the great subdivision of the lands—nearly twice as many people living on the same area. Total cost of construction of all irrigating systems, $19,181,610; so the irrigated crop of 1899 alone paid nearly $14,000,000 in excess of total cost of works. Los Angeles County led by far in number of irrigators (4,005); only Fresno (2,459) having one-half as many. In number of acres Fresno County was far in the lead, with 283,737 acres; Kern next with 112,533 and Merced, 111,330. Of the total 1,445,872 acres irrigated in 1910 (last available figures), 1,293,608 were irrigated from streams. There were 2,361 artesian wells and 10,924 pumped. By 1914, the pumping-plants for irrigation had increased to 24,589. More than half the flowing artesian wells in the United States were in California; and a large number of farms were served by electric power pumped from underground wells.

Of deciduous orchard trees there were in the State, in 1916: Apples, 61,752 acres; apricots, 96,716 acres; cherries, 13,484 acres; figs, 10,872 acres; peaches, 107,971 acres; pears, 40,324 acres; plums, 22,805 acres; others, 19,000 acres; a total of 372,924 acres planted to deciduous orchard trees. In 1916 the shipment of fresh deciduous fruit from 50 counties of northern California were 17,890 carloads; from the seven counties of southern California 450 carloads, having a total value of $29,500,000. In 1916 the citrus fruits (orange, lemon and grape-fruit, nearly all from southern California), were 92,607 acres; shipments reached a total of 45,083 carloads, valued at $41,348,000.

Dates were recently introduced from the government experimental stations in Arizona. In 1916 the Coachella Valley produced $65,000 of dates. The acreage has vastly increased since. There are over 7,000 bee-keepers in the State, owning more than 600,000 colonies. The production of honey in 1916 was 11,100,000 pounds, valued at $642,000.

California was first (1769), and is still practically the only State to produce the olive and its oil. Thirty-eight counties now grow the olive, though only in a half a dozen is it important. The olive is a million bearing trees in the State, and half as many not yet bearing. The California "ripe" olive has become of great commercial importance; while the "dehydrated" seems destined to become even more popular.

The annual production of oil (1916) is 1,000,000 gallons; packed olives, 18,000,000 gallons.

Of dried fruits the output is larger than in any other State.

<table>
<thead>
<tr>
<th>DRIED FRUIT</th>
<th>1913</th>
<th>1916</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>1,900</td>
<td>4,500</td>
</tr>
<tr>
<td>Apricots</td>
<td>10,500</td>
<td>10,900</td>
</tr>
<tr>
<td>Figs</td>
<td>5,000</td>
<td>6,700</td>
</tr>
<tr>
<td>Peaches</td>
<td>23,000</td>
<td>28,000</td>
</tr>
<tr>
<td>Prunes</td>
<td>48,000</td>
<td>68,500</td>
</tr>
<tr>
<td>Raisins</td>
<td>65,000</td>
<td>115,800</td>
</tr>
<tr>
<td>Sundry</td>
<td>2,000</td>
<td>3,000</td>
</tr>
<tr>
<td>Total</td>
<td>155,400</td>
<td>237,100</td>
</tr>
</tbody>
</table>

Almonds and walnuts are not "commercially" produced elsewhere in the United States. Both crops have more than quadrupled in a decade. In 1916 the yield was, for California, 3,400 tons of almonds and 12,800 tons of walnuts.

California produces 95 per cent of the United States almond crop; and over four times the nation's importation of this nut. The aguacate, avocado or alligator pear (from Guatemala) is of recent introduction, but there are already over 35,000 trees in southern California; and the ordinary income is $200 per tree—the fruits selling as rarities at 50 cents to $1.25 each. In the last census year the number of plum and prune trees was greater than the total number of all deciduous trees 10 years before. The number of apricot trees had more than doubled in the decade.

Total number of semi-tropical fruit trees had increased from 1,809,161 to 8,996,459 in the decade. Of the latter number 62.8 per cent were orange trees; 17 per cent olives; 16.6 per cent lemons; 21 per cent figs. Other trees included were guavas, kaki, limes, pineapples, pomelos, etc. The counties of San Bernardino, Los Angeles, Riverside and Orange contained more than four-fifths of the orange trees. The number for the State increased nearly five times in 10 years. Orange and lemon shipments increased about eight-fold in the decade. San Diego and Los Angeles counties contained more than half the lemon trees of the State, the number being more than 14 times as great as 10 years before. There were 5,648,714 orange; 1,493,113 lemon; 1,530,164 olive trees in the State.

Strawberries, blackberries, raspberries, loganberries and other small fruits are valued at about $2,000,000. Fifty-seven million pounds of raisins were produced in the State.
Viticulture.—California has over 90,000,000 grape-vines (more than all the rest of the Union), occupying 355,000 acres; representing an investment of $150,000,000. The State shipped in 1916 10,741 carloads, valued at $13,000,000. It is the only raisin State. In 1916 it shipped (from 22 counties, though Fresno is centre) 128,500 tons of raisins. The seedless-raisin industry began in Fresno County, and has grown from 3,500 tons in 1897 to 45,000 tons in 1916.

Grape Products, 1916

<table>
<thead>
<tr>
<th>Product</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry wines</td>
<td>23,000,000</td>
<td>$14,500,000</td>
</tr>
<tr>
<td>Sweet wines</td>
<td>11,741</td>
<td>5,000,000</td>
</tr>
<tr>
<td>Brandy</td>
<td>3,027</td>
<td>892</td>
</tr>
<tr>
<td>Grape juice</td>
<td>50,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Champaigne</td>
<td>1,000,000</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Table grapes</td>
<td>11,741</td>
<td>11,000,000</td>
</tr>
<tr>
<td>Raisins</td>
<td>128,500</td>
<td>16,000,000</td>
</tr>
</tbody>
</table>

The best dry wines are grown almost exclusively in the northern half of the State; the best sweet wines exclusively in the southern. The recent (1917) vote in Los Angeles prohibits the use of beverages above 14 per cent alcohol in the State; the trade in the largest city in the West thus to restrict. It permits the 14 per cent claret of the North, but inhibits the 21 per cent ports, sherrys and other fortified sweet wines of the South. California is committed to a policy of "local option," as regards the liquor problem, but the great majority of the smaller cities are (nominally) "bone dry." On 1 April, 1918, the 200 saloons in Los Angeles (600,000 population), closed their doors, being "voted out" by a large city majority. It was then the largest city in the Union without liquor license. The effect of the prohibited movement on the whole grape industry and the 100,000 persons directly dependent upon it can be inferred. The ordinance was voted in November, and became effective only four months later. This was virtual confiscation of several million dollars in stock, leases, licenses, fixtures, etc. At the same time there were still 1,750 places in San Francisco where "hard drinks" could be secured.

Mining.—As early as 1690, Loyola Casallo mentioned placer gold in the San Joaquin Valley. Some nuggets were described by Antonio Alcedo, (1785) in the 18th century. Not later than 1841, gold was found on San Francisco Creek, Ventura County, about 45 miles from Los Angeles, and was "washed" there by Mexicans on a modest scale. On 19 Jan., 1848, James W. Marshall, an American from New Jersey, employed by the Swiss pioneer, John Sutter, in building a saw-mill near Coloma, on the north fork of the American, picked up yellow metallic flakes in the mill-race; the news spread in spite of efforts to suppress it, and in a few months the gold rush was on. Up to 1848 the whole United States had produced less than $12,000,000 in gold since the discovery of America; in five years following, California alone yielded over $250,000,000 in gold. In 1851, the total gold output from 1848 to 1 Jan., 1851, was $1,653,594,500. It now averages 2½ million per year. This first bonanza in United States history had a profound economic, sociological and political effect. "Sound money" was as yet unknown in this country; silver and gold together in the Union up to 1849 had not reached $25,000,000 in total output; and the instability of the currency prior to the California gold discovery is familiar to students. The California gold-fund not only precipitated such a shifting of population as had not before been dreamed of on this continent; it brought about the admission of the Union of a State distant 2,000 miles from any other State. —California was the first State in the geographic western half of the United States, and sixth west of the Mississippi River,—it furnished the finances for the great civil achievement nominally most concerned with slavery, and gave the free States a majority in the United States Senate. It is probably not fanciful to hold that this "irrepressible conflict" could not so soon have opened had the nation been so short of bullion and of credit as it was prior to the gold discovery of 1848. Furthermore, in 1859, almost exclusively with California capital, labor, enterprise and machinery, the great silver bonanzas of Nevada (just across the Sierra) began the remarkable record of 21 years, in which they produced over $300,000,000 in bullion.

The first mining in California by Americans was crude, as it had been in Mexican days—"washing out" the auriferous gravels in the "gold pan." The first step in advance was the "rocker," employing two men, and foreshadowing a certain associative effort. Next came the "Long Tom," which made also for stability, since it could not be carried. Then came the sluice-box, a small wooden flume with wooden riffles on the bottom, behind which the gold sank and was saved, while the lighter sand and gravel were swept on by the swift current. In 1852, E. E. Matteson, a Connecticut Yankee, invented hydraulic mining, the greatest advance ever made in the placers. Water under high pressure, served through a nozzle called the "monitor," thrown 200 or 300 feet with such nozzle force that a crowbar could not be thrust into the jet, ate away whole hillsides almost as hot water disintegrates sugar, the detritus passing through long riffles; the sluice-boxes. Hydraulics was the most essential yet made in mining, it was long disastrous to ultimate development of the State, agriculturally. In 1880 it was proved by engineers' measurements that on the Yuba River alone more than 100,000,000 cubic yards of gravel had been washed by hydraulics into the bed of the stream, raising it 70 feet, and burying 15,000 acres of farm lands under the debris. After a long and bitter fight, the "anti-Stickens" campaign ended in 1884 in favor of the agricultural interests, and hydraulic mining in California has never since been on a large scale.

Quartz mining—that is, deep mining on the original veins from whose waste the placers derive—began in 1851, but did not take chief rank for many years. The first large scale "lead" from the discovery to 1859 inclusive, was in million dollars, 5, 10, 45, 75, 85, 65, 65½, 65, 57, 50 and 50. The total gold output from 1848 to 1 Jan., 1848, was $1,653,594,500. It now averages 2½ million per year. This first bonanza in United States history had a profound economic, sociological and political effect. "Sound money" was as yet unknown in this country; silver and gold together in the whole Union up to 1849 had not reached $25,000,000 in total output; and the instability of the currency prior to the California gold discovery is familiar to students. The California gold-fund not only precipitated such a shifting of population as had not before been dreamed of on this continent; it brought about the admission of the Union of a State distant 2,000 miles from any other State. —California was the first State in the geographic western half of the United States, and sixth west of the Mississippi River,—it furnished the finances for the great civil achievement nominally most concerned with slavery, and gave the free States a majority in the United States Senate. It is probably not fanciful to hold that this "irrepressible conflict" could not so soon have opened had the nation been so short of bullion and of credit as it was prior to the gold discovery of 1848. Furthermore, in 1859, almost exclusively with California capital, labor, enterprise and machinery, the great silver bonanzas of Nevada (just across the Sierra) began the remarkable record of 21 years, in which they produced over $300,000,000 in bullion.

The first mining in California by Americans was crude, as it had been in Mexican days—"washing out" the auriferous gravels in the "gold pan." The first step in advance was the "rocker," employing two men, and foreshadowing a certain associative effort. Next came the "Long Tom," which made also for stability, since it could not be carried. Then came the sluice-box, a small wooden flume with wooden riffles on the bottom, behind which the gold sank and was saved, while the lighter sand and gravel were swept on by the swift current. In 1852, E. E. Matteson, a Connecticut Yankee, invented hydraulic mining, the greatest advance ever made in the placers. Water under high pressure, served through a nozzle called the "monitor," thrown 200 or 300 feet with such nozzle force that a crowbar could not be thrust into the jet, ate away whole hillsides almost as hot water disintegrates sugar, the detritus passing through long riffles; the sluice-boxes. Hydraulics was the most essential yet made in mining, it was long disastrous to ultimate development of the State, agriculturally. In 1880 it was proved by engineers' measurements that on the Yuba River alone more than 100,000,000 cubic yards of gravel had been washed by hydraulics into the bed of the stream, raising it 70 feet, and burying 15,000 acres of farm lands under the debris. After a long and bitter fight, the "anti-Stickens" campaign ended in 1884 in favor of the agricultural interests, and hydraulic mining in California has never since been on a large scale.
CALIFORNIA

"soft money" or a depreciation of currency. The largest mint in the world is located in San Francisco.

In the sixties, extensive experiments were made by Thomas Scott of the Pennsylvania Railroad to develop petroleum in California, even shipping around the Horn barrels for the experiment. For reasons, chiefly administrative, the experiment failed.

Petroleum.—In 1875, J. D. Whitney (of Yale), perhaps the greatest geologist of the United States, and for years State geologist of California, stated that while there were surface indications of petroleum, it was geologically impossible that California should become a great producing petroleum State, and there could not be flowing oil wells like those of Pennsylvania. The enormous surface indications in many parts of the Coast Range tempted further exploration; and within a year after Professor Whitney's prophecy, oil was struck in Los Angeles County at Puente; and soon thereafter in Los Angeles City and also in Ventura County. By 1883, there were about 100 wells in California producing in a year 400,000 barrels. By 1900, the annual product had increased to 4,324,484 barrels, with 1,590 producing wells, and 470 drilling. In February 1918, the total number of producing wells was 8,158. A majority of the California oil wells are flowing when first tapped. The famous "Lake View" spouted about 90,000 barrels a day for a long time, and continued to flow for more than a year. Other wells have spouted from 30,000 down to 10,000 barrels a day. The life of a flowing well varies from six months to three years. For these great gushers, whole valleys are dammed up as reservoirs are dammed for water; and the petroleum product makes lakes of large size. The oil fields touch 17 counties in a line over 600 miles long. The vast majority of the product is in eight counties in the south in the following order (1916):

<table>
<thead>
<tr>
<th>COUNTY</th>
<th>Barrels</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kern</td>
<td>54,120,509</td>
<td>$34,691,246</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>13,198,591</td>
<td>8,750,666</td>
</tr>
<tr>
<td>Orange</td>
<td>13,102,206</td>
<td>8,750,666</td>
</tr>
<tr>
<td>Santa Barbara</td>
<td>7,875,468</td>
<td>1,502,109</td>
</tr>
<tr>
<td>Other counties</td>
<td>971,537</td>
<td>1,002,109</td>
</tr>
<tr>
<td>Total</td>
<td>90,262,557</td>
<td>$57,421,334</td>
</tr>
</tbody>
</table>

Oil wells are from 700 to 4,000 feet deep. In the Summerland district, in Ventura County, most of the production is from wells put down in the bed of the ocean from piers. Thousands of miles of pipe-lines deliver at tide-water the product from Kern River and other districts. In 1916 (except for Oklahoma which has recently outstripped it) California produced nearly 50 per cent of the total petroleum of the United States and over 10 times as much as Pennsylvania.

California locomotives nearly all burn crude petroleum, as do the steamers. Steam and electric roadbeds are "oiled" for thousands of miles. An overwhelming majority of the manufacturers of the State use it for fuel. It is equivalent to coal at about $3 per ton. There can be no fuel famines in California. The mud road has disappeared from the progressive streets. Farmers drive (mostly by auto and truck) to market over unpaved roads made by mixing the universal disintegrated granites with crude oil and steam-rolling the surface. The production of natural gas increased from $34,578 in 1900 to $28,717,537 in 1916—a gain of 82 times in 16 years. Twelve counties produce this commodity but the output is overwhelming from Kern (over 60 per cent of total), Santa Barbara, Orange, Fresno, Los Angeles and, Yavapai counties in that order. One pipe line (the "Midway") transmits 23,000,000 cubic feet per 24 hours, and is 107 miles long. In 1916 there were 31 plants in the State making gasoline, having an aggregate capacity of 61,400 gallons per day. The petroleum of California, in its varying forms has not only been one of the greatest industrial and economic factors of the State, but has contributed to Paleozoology the most extraordinary find in history—not even surpassed by the remarkable deposits of actual fossils at Agate Springs, Neb.—the "La Brea Rancho," partly within the city limits of Los Angeles, discovered in 1906, a unique preservative of Pleistocene remains. In a space of about 1,400 feet long, northwest by southeast, and 150 feet wide, 53 skeletons have been discovered, of which many were before unknown to science. In the same area, crude oil is still bubbling up; and jackrabbits, owls and smaller animals are caught in it at night, taking it for water, and being "hogged down. In the Pleistocene period, southern California was a tropical jungle roamed by the largest land mammals. The drying up of the region, the extinction of tropical forests and of lakes and water-courses, brought about the rapid extinction of these ancient species. On the "La Brea" is a little pond of about an acre of asphaltum springs, still bubbling. In Pleistocene days, the Imperial elephant came down here to water, and was caught in this oozing quicksand. Sabre-tooth tigers sprang upon their backs and devoured them alive—and other tigers disputed the prey; and all slowly sank down to be preserved hundreds of thousands of years for science, to-day. The skeletons of 50 species of mammals and 50 of birds have been exhumed here, and new material is constantly coming up. The great bird of 14 feet wing spread—the teratornis—is the largest of the winged creation found here. The sabre-tooth tiger was known to science before, but with forelimbs reaching below the lower lip. In this incommensurable cemetery have been taken out, already, 630 sabre-tooth tigers with an average length of 10 inches for those great canine teeth, seven inches below the gums. The first complete skeleton of the Imperial elephant was taken out here; and 16 other specimens have been found. Over 200 of the "big wolves"—very much larger than the modern timber wolf; 7 mastodons; 39 giant ground sloths; 39 bisons; 59 horses and 39 camels, and new varieties of the little sloth, the antelope and a cat as large as the jaguar (whereas the puma was before the largest, except the lions and tigers). Other museums have fragments of the giant ground sloth; but the only complete specimen is from here. Of the little sloth, here are the only 11 skulls known. This is the only place known in the world where bones have been preserved in asphalt. They are not fossils, and their durability is a matter of surprise, though they are in perfect consistence. The "valleys" made by the dead animal tracks as they had been buried in soil. The Museum of
History, Science and Art, in Los Angeles, has a vast quantity of material unmounted, and 15 examples mounted of the most important of these unique prehistoric creatures. The owner of "La Brea" has donated 32 acres of this waste land, and Los Angeles County will build a park and subsidiary museum on the spot around this death valley which attracted these forgotten animals of the Pleistocene period. The petroleum trap will be maintained as it has been for so long; except that it will show the modern excavations and some bones in situ.

Mining Output in 1910 and 1917—California, while first in present annual output of gold, is overwhelmingly first in total production; having produced more than all the rest of the United States put together. It is second in output of copper, eighth in silver, first in borax and soda, second in petroleum, fifth in salt, first in asphaltum, tungsten, quicksilver (with two-fifths of the total production of the world); and with a range of mineral productions entirely without parallel in North America.

The principal products with their respective values were (1917):

<table>
<thead>
<tr>
<th>Product</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>$22,500,000</td>
</tr>
<tr>
<td>Copper</td>
<td>17,000,000</td>
</tr>
<tr>
<td>Potash</td>
<td>7,431,116</td>
</tr>
<tr>
<td>Potash (by kiln)</td>
<td>2,500,000</td>
</tr>
<tr>
<td>Potash, mineral</td>
<td>2,700,000</td>
</tr>
<tr>
<td>Silver</td>
<td>1,400,000</td>
</tr>
<tr>
<td>Other</td>
<td>39,478,713</td>
</tr>
</tbody>
</table>

In 1917, total value of mineral products for California was $142,100,107, excluding kelp and many other products amounting to about $6,000,000.

Interesting other items in mineral production (1917) were:

<table>
<thead>
<tr>
<th>Product</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borax and soda</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>Cement</td>
<td>6,100,000</td>
</tr>
<tr>
<td>Brick</td>
<td>5,000,000</td>
</tr>
<tr>
<td>Lead</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Natural gas</td>
<td>2,877,751</td>
</tr>
<tr>
<td>Tungsten concentrates</td>
<td>4,000,000</td>
</tr>
<tr>
<td>Zinc</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Building stone</td>
<td>5,100,000</td>
</tr>
<tr>
<td>Chromite</td>
<td>200,000</td>
</tr>
<tr>
<td>Mineral water</td>
<td>470,000</td>
</tr>
<tr>
<td>Potash clay</td>
<td>350,000</td>
</tr>
<tr>
<td>Pottery clay</td>
<td>115,000</td>
</tr>
<tr>
<td>Lime</td>
<td>285,000</td>
</tr>
<tr>
<td>Manganese ore</td>
<td>800,000</td>
</tr>
<tr>
<td>Manganese ore</td>
<td>200,000</td>
</tr>
</tbody>
</table>

The total metal output of the 589 active mines of California for 1916 amounted to a value of $38,749,263, a figure $7,484,419 greater than for 1915, and a new record in the mining history of the State. But this increase is to be attributed to the greatly enlarged output of copper, zinc and lead; for the gold output showed a fall, of $1,031,555. In detail, the year's record shows: gold, 1,035,744.6 ounces, valued at $21,410,741; silver, 2,564,354 fine ounces, valued at $1,687,835; copper, 55,897,118 pounds, valued at $13,750,691; zinc, 15,256,485 pounds, valued at $2,044,369; lead, 12,407,493 pounds, valued at $651,117.

The reduction in the gold output was nearly all in the deep-mine production, and is laid partly to the two months' strike of miners in the Mother Lode district, and partly to the higher wages paid at the copper mines, which drew away a considerable body of miners. The placers are credited with 40 per cent of the total yield, as compared with 38 per cent for 1915. More than seven-eighths of the placer total was recovered by the 53 dredges throughout the State. The largest dredging operations were carried on in Yuba County, where 13 dredges, some of them the largest ever built, were at work during the year. Some platinum also was obtained by the dredges. The largest output of copper was in Shasta County, which produced 50 per cent more than in 1915. The lead output was nearly three-fold that of 1915, and nearly all came from Inyo County. Shasta and Inyo counties produced nine-tenths of the zinc output, and San Bernardino County the remaining tenth. The total tonnage of ore mined and treated in California in 1916 was 3,187,642 short tons. From this was recovered an average value of $9.77 per ton—a figure surpassing the former record ton-value of $7.87, made in 1915, by 24 per cent.

Minor mineral products (1917) by thousand dollars: Antimony 5, asbestos 5, barytes 10, bituminous rock 60, coal 25, dolomite 15, feldspar 7, fuller's earth 4, graphite 45, iron 10, lead 60, iron 3, limestone 155, marble 40, platinum 25, potash 25, silica 35, soapstone 15, soda 85.

Manufactures—For its first 80 years entirely pastoral, for its next 20 years chiefly mining, for the next 60 years overwhelmingly devoted to agriculture, horticulture and viticulture, California has in the last decade (to 1917) become the ninth manufacturing State in the Union. This is due not alone to the vast range of productivity but still more to the unprecedented development of petroleum-fuel and hydro-electric power. Between a population of 92,597 in 1850 and 2,938,659 in 1916, California's population increased 31-fold. Its economic progress has been perhaps as surprising. The United States census of 1914 shows nearly 5,000 manufacturing industries, of which 71 produce more than $500,000 a year each (including four that exceed $50,000,000 and 11 between $10,000,000 and $50,000,000). Value increased, in five years, more than value increase of United States as a whole.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of establishments</th>
<th>Persons engaged</th>
<th>Capital</th>
<th>Salaries and wages</th>
<th>Value of products</th>
</tr>
</thead>
<tbody>
<tr>
<td>1899</td>
<td>4,997</td>
<td>10,057</td>
<td>$175,467,806</td>
<td>$736,105,455</td>
<td>$257,385,354</td>
</tr>
<tr>
<td>1914</td>
<td>11,057</td>
<td>25,473</td>
<td>$359,129,006</td>
<td>$140,842,691</td>
<td>$712,800,704</td>
</tr>
</tbody>
</table>

*Figures not available.

Percentage of increase 1899-1914, establishments 101.3; average number of wage-earners, 80.6; value of products, 176.9; value added by manufacture, 186.1.

Aside from manufacturing products covered in other tables for petroleum, fisheries, fruit and vegetable canning, lumber, etc., some important manufactured products may be assembled as follows:

<table>
<thead>
<tr>
<th>Industry</th>
<th>Establishments</th>
<th>Value of output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slaughter-house and meat packing</td>
<td>108</td>
<td>$90,011,830</td>
</tr>
<tr>
<td>Printing and publishing</td>
<td>1,543</td>
<td>34,744,879</td>
</tr>
<tr>
<td>Foundry and machine-shop products</td>
<td>1,057</td>
<td>31,732,384</td>
</tr>
<tr>
<td>Flour and mill products</td>
<td>132</td>
<td>24,078,735</td>
</tr>
<tr>
<td>Brick, tile, and glass products</td>
<td>117</td>
<td>21,853,040</td>
</tr>
<tr>
<td>Butter, cheese and condensed milk</td>
<td>201</td>
<td>20,466,428</td>
</tr>
</tbody>
</table>

See also, elsewhere, statistics of oil refining, packing fish, fruit and vegetables, etc., under their headings.
Detailed statistics of minor manufactures may be found in the census of manufactures of the Department of Commerce, United States of America.

Even in the four years since the issue of the last (1914) bulletin, enormous changes have taken place in nearly every item of the total United States trade upon the Pacific Ocean, and nearly one-fifth of the total coastline of the United States. All this, added to its relation as outlet for an enormous inland territory, including not only California but New Mexico and Arizona, gives great importance to its commerce. San Francisco (1905) though the 11th city of the Union in population was third in commerce. Its exports for 1916 were $127,598,531 and imports $117,128,253 (including exports to China $4,857,956 and to Japan $24,818,324). Operations in the Philippines and development of the Oriental trade are bringing about for California the realization of Seward's prophecy (about 1865) that the Pacific is to be the chief theatre of the world's new, but highly important industrial advance, is the long-distance transmission of electric power from mountain streams. In this California has for years led the world. When a 33,000-volt, 82-mile line from San Bernardino to Los Angeles was installed (1900), it far exceeded any other line in the world in length and voltage. Then 40,000 volts were brought 140 miles from Yuba River to Oakland—with cable crossing Carquinez Straits by suspension span of 4,400 feet, 300 feet in air. The longest power transmission in the world was that from Colgate to San Francisco, 211½ miles. Plants have been built to transmit 28,000 horse power from Kern River, 116 miles, to Los Angeles; and 120,000 horse power from San Joaquin River, 180 miles, to San Francisco; and 218 miles to Los Angeles. One electric company expended $250,000 per month for a year, in electric development in and around Los Angeles. Two companies in the northern part of the State are developing 169,000 horse power for long-distance transmission. Not only are nearly all streets and houses lighted, and street-cars propelled by this new, far-fetched fuel, but thousands of the smaller manufacturing establishments are run by hydro-electric motors, with Philactis parva and bulkena), which skirt the littoral from about Point Conception to San Diego. These kelp beds cover 50,000 acres. Kelp pirates had for several years ravished the beds to a small degree by a crude method, and extracted the potash still more crudely; destroying the plants which they tore out by the roots, and causing great havoc among the young fish, of which the most important have their spawning-beds and nurseries in this same kelp field. State legislation has now been secured to regulate the harvesting of the crop by scientific methods, so that it will be enduring. Kelp is the algal sea. The more it is cut (scientifically) the better it thrives. There are (1918) eight corporations with plants, with an investment of $6,000,000, kelp with a fleet of special boats of 12 to 600 tons capacity, and with reciprocating knives which cut the kelp not over five feet below the surface, without any injury whatever to this curious marine plant, or the myriad fish-spawn sheltered thereby; and carry the harvest to be treated in great modern plants.
The product of potash (selling in 1918, at $450 a ton, multiplied about 700-fold), amounts to $2,700,000. The wet-tons harvested in 1917 were 400,000; yielding 6,000 tons of potash at 1¼ per cent of potash to the wet-ton. The large content of ammonia and iodine by-products is very important, and it is ready being saved — though too recently for accurate statistics. The harvest, under this scientific treatment, lasts all the year, three crops annually; the average, per acre, being 7½ wet-tons. No method is known to increase the acreage of the kelp beds; but under the present system the crop will be perennial. About 75 per cent of the possible gathering is now harvested. On account of its vital relation to the important fisheries of California, the administration of this industry has wisely been placed under the control of the State game and fish commission. Whether to be rated among the agricultural, manufacturing or marine products, this Sea Alkaline, in view of the constant value of the production and its exhaustible field, and its proximity to factories by rail makes this extraordinary industry of southern California worthy the attention of economists.

The first commercial production of potash in California was in 1915 increasing the acreage of kelp. The first potash derived from mineral sources was produced as a by-product from cement treater dust, at Riverside, in 1915. The yield of potash from purely mineral sources for 1920 was approximately 120,000 tons, valued at $2,200,000. This is principally from the cement treater dust in Riverside County and the evaporation of the natural brines in Searles Lake, San Bernardino County. Eight corporations are now engaged in the manufacture of mineral potash; and in spite of the youth of this industry, it is already important. The development of the mineral industry is barely begun, and its potentialities can hardly be estimated. The kelp potash can be practically measured as above. But the mineral potash cannot be. It is the consensus of producers that there is an enormous possibility for the mineral potash industry in the great deposits now being developed in California.

Fisheries.—In 1865 there were 650 vessels, mainly herring vessels and whale fisheries in the Pacific. The centre of the industry was San Francisco. Half a century later, San Francisco was still the foremost whaling port of the New World, but the industry had shrunk to $132,000. Long Beach, southern California, is important in this fishery, and the market has become a valued market food. The State is the richest in marine and fresh-water fish; and ranks second or third, at present, in the canned pack. This was until recently almost altogether salmon. But within a few years the so-called “Tuna” (really the albacore), and the sardine have become rivals of the salmon pack. The centre of this industry is in southern California, at Los Angeles Harbor (formerly San Pedro). Another important fishing and cannery port is San Diego. The total pack for southern California, 1916, was:

<table>
<thead>
<tr>
<th>Fish</th>
<th>Cases</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuna</td>
<td>560,000</td>
<td>$3,360,000</td>
</tr>
<tr>
<td>Sardine</td>
<td>546,000</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>100,000</td>
<td>300,000</td>
</tr>
<tr>
<td>Total</td>
<td>1,166,000</td>
<td>$5,660,000</td>
</tr>
</tbody>
</table>

The value of the salmon pack (entirely confined to northern California) was, for 1916, approximately $8,375,000. The sardine pack, for northern California, for 1916, had increased from 30,000 cases to 250,000 cases. Japanese and Chinese and other alien fishermen dry large quantities of fish which are not recorded in State or Federal statistics. Throughout, the fishermen are about 90 per cent aliens. Statistics are not readily available, under a loose system of State supervision. Probably now that the government has taken control of the food supply it will soon be easy to get some accurate idea of this product, which is enormously larger than the recorded statistics. Among the most important marine fishes are the chicken-haibug, sole, tom cod, rock cod, rock bass, mackerel, Spanish mackerel, barracuda, pompano, sand-dab, red snapper, hound and other valued varieties, besides many fish of lesser estimation. These marine fish are in the market the entire year, at reasonable prices. The San Francisco market lists 133 varieties on sale by seasons. Of the fresh water fish, the striped bass of the Sacramento River is an esteemed delicacy. Salmon, sturgeon, steel-head trout, rockfish and smelt, running from sea to stream, are abundant here. Within the last 30 years all varieties of trout (besides the native) have been successfully colonized in California, which now exceeds any other State in the variety, size and abundance of trout. Black bass, shad, codfish, crab, etc., have also made handsome growths here. For game fish and sport, California is admitted to lead the world not only in trout and black bass, but in the marine fish, like the leaping tuna of Catalina Island, which has built up itself an international reputation. For cups and medals and strict laws. The record tuna of 251 pounds and the black sea bass of 380 pounds were taken with light rod and reel and 21-strand line. The coast is very rich in shell fish. It is against the law to have in one's possession a crab less than six inches in diameter. But though large, they are delicious. Shrimps are abundant. Crawfish, like the eastern lobster in flavor but without mandibles, are abundant. The native oyster is small but flavorful; and eastern oysters which are here and are excellent in flavor. Mussels, clams, razor-shells, cockles and other edible mollusks are in great abundance. The mollusk most prized by the epicure, though still little known, is the abalone. Its beautiful shell is familiar to collectors all over the world, when polished—a beautiful nacre univalve, measuring from six inches longer diameter, upward (six inches being the minimum allowed by law). It requires much labor to pry it from the rocks, and still more to beat it into edibility; but when properly macerated it is much sought after delicacy in the market. All game fish, as well as all game quadrupeds and birds, are protected by strict State laws, rigidly enforced. The State has 12 fish hatcheries, turning out annually, of fry: trout, 17,000,000; quinnet salmon, 20,000,000; shad, 1,000,000.

The Mount Shasta hatchery produces more salmon and trout fry than any other in the world. Besides these State hatcheries, there are four hatcheries and egg-collection stations under Federal control.
The value of marine fish, fresh, in 1917 was $11,795,000; packed, $15,235,000; a total value of $27,030,000.

Railroads and Street Railways.—In 1870 the State had 525 miles of railroads, 7,529 in 1895, and 12,145 in 1916. This mileage permitted by the Los Angeles Standard-Union.
museums of scientific importance in the State — in Berkeley, San Francisco and Stanford, with the Southwest Museum in Los Angeles and the County Museum, with its wonderful array of Pleistocene semi-fossils.

Churches.—Though founded and civilized by the Catholic Franciscan Friars in 1769 (the first Protestant sermon being preached here 80 years later), California is richer per population in Protestant churches than most of the Puritan States; having (1916) 2,370 Protestant churches, valued at $21,400,565; membership 328,631 (an increase of 60 per cent in 10 years) and under 25 denominations. These churches contributed to missionary purposes in 1916 $1,650,926. Los Angeles city had 281 Protestant churches with 58,685 members or 10 per cent of the population. San Francisco had 100 such churches with 15,713 members, or 3¾ per cent of the population. Los Angeles County leads the State with 104,418 members or 31 per cent of total Protestant membership of the 58 counties. Alameda comes next with 21,750 members. Twelve denominations maintain 17 Protestant religious schools and colleges, of which more than half are in southern California. It is widely recognized that lack of co-ordination causes great wastefulness in this church work.

The Christian Science churches are multiplied in number and membership very greatly in the last decade; but no statistics are available. They are not included in the list of Protestant or other churches.

The Catholics have 539 churches, of which 298 have resident priests, 155 mission stations, 15 orphan asylums and 8 homes for the aged.

Church membership is as follows:

<table>
<thead>
<tr>
<th>CHURCHES</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methodist</td>
<td>92,065</td>
</tr>
<tr>
<td>Presbyterian</td>
<td>50,704</td>
</tr>
<tr>
<td>Baptist</td>
<td>41,503</td>
</tr>
<tr>
<td>Congregational</td>
<td>32,640</td>
</tr>
<tr>
<td>Christian</td>
<td>32,522</td>
</tr>
<tr>
<td>Episcopal</td>
<td>28,584</td>
</tr>
<tr>
<td>All other 19 Protestant denominations</td>
<td>56,913</td>
</tr>
</tbody>
</table>

Total Protestant | 355,631
Catholic | 520,233

Charities and Penal Institutions.—California has two State prisons, three industrial reform schools, five asylums for the feeble-minded, for deaf, dumb and blind, and a great number of public and private hospitals, asylums, orphanages, etc. There are 64 orphan homes, of which 36 receive State aid. There is also a Federal prison on Alcatraz Island in San Francisco Bay.

Military and Naval Establishments.—There are garrisons and fortifications at the harbors of San Francisco, Los Angeles and San Diego — respectively The Presidio, Fort MacArthur and Fort Rosecrans. There is also a navy yard at Mare Island, and an arsenal at Benicia. The largest training camp in California in the Great European War was Fort Kearsney, located near San Diego. Under contract with the government there is being built in 1918 a large number of wooden and steel and concrete ships, of 3,000 tons and upward, for commerce during and after the war. This ship-building is almost exclusively in Los Angeles Harbor, Long Beach and San Francisco.

State Government.—State control has been extended for four years, except assemblymen for two; no bar to re-election; governor’s salary, $6,000;
two-thirds vote in each house passes bill over governor's veto. If he does not act on any bill within 10 days, it becomes law, unless adjournment of legislature prevents return of bill, in which case it becomes operative if within 10 days after such adjournment the governor approves it. Legislature limited to 40 members in session 80 in house; meets biennially, in January of odd-numbered years. Sessions not limited, but pay allowed members for only 60 days — $8 per day, with traveling expenses and mileage 10 cents per mile. No bill can be introduced after 50th day of session. State constitution is notable for numerous restrictions on legislative action; provision for three-fourths majority verdict of juries in civil cases; and prohibition of Chinese suffrage and of employment of Chinese on State works, or by corporations. The initiative, referendum and recall are also in full use. California was sixth State to adopt "Woman's Suffrage." There are 40 State commissions, expending annually nearly $5,000,000. California is represented in the U.S. Congress by 3 senators, nine congressmen (prior to apportionment of 1901, seven congressmen). Electoral vote, nine.

Population.—The settlement of California, steadily progressive for 65 years, has been marked by two of the most remarkable shifts of population anywhere recorded. Everything considered, the "Gold Rush" of 1848-49 has no parallel. In first 12 months after the discovery of a small flake of gold at Sutter's Mill, 42,000 Americans from the far Eastern States made their way across the unbroken plains with wagons. This great migration continued uninterrupted for years. Its demands brought about the first large development of steam navigation; and the finest clipper ships that had ever been built were constructed for the California trade. In 1845 the white population of California was about 5,000; 4,000 of whom were Spanish Californians, 300 "Americans," 300 English, Scotch and Irish, and the remainder "scattered." By 1850 this number had increased to 19,597; by 1855 to 107,000. That is, in 12 years over 370,000 persons reached California by an overland journey of 2,000 miles; or by a voyage of 19,000 miles around the Horn in sailing ships; or by the 5,000 mile voyage of Pacific steamers. For all these and other reasons, it is the isthmus. For the first decade this precipitate migration was overwhelmingly of men; and this preponderance of males, with dearth of families and of women, colored in almost every social, political and economic aspect the early fortunes of the State. The scarcity of home life, and profligacy abundance of money, brought about an era of luxury in private and public expenditures on such a scale as was then hardly dreamed of in the Eastern States. San Francisco had less than 150,000 people when it began to build the largest hotel in the world — covering two and a half acres and costing $7,000,000. Everything was in this proportion. Enormous subscriptions were sent to relieve great catastrophes of fire, pestilence which at one time touched the world. Its were made to education and other public utilities, on a scale never yet surpassed and at that time elsewhere unheard of. For a generation San Francisco was a proverb the world over of princely living and good living. This large population was largely of young men, vigorous, adventurous, mostly unattached, far from home and the conventions, and under excitation of sudden wealth, shaped and established such an epoch, social and financial, as no other American State has ever comparably known.

It was only after the first decline in the "diggings" — after the pursuit of gold became less a fortunate scramble for surface nuggets, and mining had come to demand skill, patience, and business methods — that attention began to be paid to the soil. Though for 80 years the Franciscan missionaries had already proved, in little oases about their missions, the wonderful fertility of California, the aridity of climate and the "look" of the land, so unlike in color and texture to soils recognized as fertile at home, led the adventurers to believe for years that California was worthless except for mining and stock-raising. It was only when the real fecundity of the soil began to be understood that character of population underwent essential change. Immigration in the first decade was almost purely of male fortune-hunters and adventurers, none of business character. They came to get rich and go home. But when the slow comprehension dawned that in agricultural possibilities the State was inconceivably richer than in mineral resources, and that here was not only the most hospitable of climates, but the most generous land for homebuilding, an entirely different type of migration began — the migration of families. This stream, small at first, has continued steadily since about 1870. In 1886 the completion of a competing railroad into southern California — to which its first transcontinental line had brought but slow increase of population or development — precipitated another migration numerically greater than the gold rush, almost as rapid, far longer continued and of entirely different category. It was characterized by well-to-do and educated families, without the heroic qualities of the pioneers, but of much higher average in the civic and financial scale. They came not to tame a wilderness, but to enjoy such a land as travelers seek along the Mediterranean. They came to build homes and create a new and cultured class of men who had probably never been found among an equal population. It is only by reference to the peculiar character of this migration that the development and progress of California in all social, educational and material lines during the last 25 years seems at all credible.

In 1880 the population was 864,694; in 1890, 1,208,130; in 1900, 1,485,053; in 1910, 2,377,549, an increase of 60.1 per cent since the census of 1900; in 1910 it was 2,938,654. The recent great increase in population, however, has been disproportionately in the seven southern counties of the State. Much more than half of the State gain for 20 years has been in eight counties, including in the northern half of the State only the city and county of San Francisco. Since 1880, Los Angeles had by 1910 outstripped in population 99 other American cities then numerically larger. In 1910 it was the 36th city in the Union in population, and only 13 cities in the Union had gained as many people in the decade. There were 117 incorporated cities and towns; 50 places exceeding 5,000 popu-
CALIFORNIA

1. The Arroyo Seco ("Dry Wash"), a typical ravine between Los Angeles and Pasadena and its concrete bridge 1,460 feet long, 160 feet high.

2. Oil wells in the Pacific Ocean at Summerland.
1 The Bay of Avalon, Santa Catalina Island
2 The Junipero Serra Cross on Mount Rubidoux; Riverside "the city of orange groves" 500 feet below; Snow-capped Mount San Bernardino (11,800 feet) in the distance
The first large aviation field-meet in the United States was held in Los Angeles County about 1911. Until recently surpassed by a field in Texas, the North Island Field, San Diego was the largest in the country. Up to date, 1918, it has had the fewest fatalities, the climate and conditions making this location particularly adaptable for the training of beginners in aviation. Los Angeles is the world's chief center of the moving-picture industry; the expenditure within the city by the film industry, amounting to about $20,000,000 a year, and the actors including nearly all the famous stage favorites. The fact that weather conditions are favorable nearly all the year is no more important than the fact that almost every landscape from that of Palestine or the Sahara to that of the Alps, from perpetual summer and roses to snowbanks and glaciers and deserts and almost every other geographic range can be duplicated within easy reach of the various studios, of which there are several in Egypt and Babylon and Switzerland, France, England and New England, South America—the pictures of these are almost entirely located in southern California. As with Florida, Switzerland and parts of New England, the tourist must be reckoned by the economist among the assets of the State. This is overwhelmingly the case in the southern counties, where the tourist influx amounts in value to from $75,000,000 to $100,000,000 per year. In 1915, over 250,000 tourists visited southern California. Unlike the case of other summer or winter resorts the number of tourists who remain permanently or return soon to become residents causes the increase in population which has, no parallel in United States history. The climate, the scenery, the romance of the missions and other history, the educational and other advantages, the class of population already here, the growth of automobilizing and the unrivalled facilities for this in southern California have conspired with other causes to make it the most visited State in the Union. Its permanent immigration is small from foreign countries except by individuals. Its great growth comes from the better classes of the Eastern States. From Point Conception (nearly half the total coast-line of the State) the littoral is dotted with dozens of cities, towns and resorts largely depending upon their interests of bathing, boating, fishing, yachting, etc. The most important of these, from north to south, are Santa Monica, Venice, Ocean Park, Redondo, Long Beach, La Jolla and Coronado at San Diego. The important seaside towns have their enclosed swimming tanks; but many people take surf baths every month in the year. For climatic reasons above stated, the seaside above Point Conception is not as popular nor as populous for marine diversions, the water and the weather being alike too cool. Perhaps the most famous of these seaside resorts is the Island of Catalina, about 20 miles off coast from the harbor of Los Angeles, with its placid bay and its remarkable "Marine Gardens" which are viewed through glass-bottom boats; and its fishing which is internationally famous. California is the paradise of the automobilist, as it has more autos per capita than any other part of the world. Within 10 years (ending with 1917) over $40,000,000 have been spent
CALIFORNIA

by State and counties on *good roads*—of native asphalt and gravel, largely founded on concrete, and generally smooth as a table. One can ride almost from end to end of the State on these luxurious roads—and over 1,000 miles in Los Angeles County alone. There are many extraordinary scenic drives—some over a mile above the sea. This has naturally led to the decimation of deer, duck, rabbits, quail and trout; as well as the multiplication of cattle. There were in 1917 over 400,000 auto-vehicles in the State—about two-thirds in the southern half. Southern California has also the largest per capita number of telephones in the world. The automatic telephone was perfected here. The number of telephones in California, 1 Jan. 1918, was 699,470, being one telephone to every 4.38 persons; for San Francisco, 130,175, being one to every 3.56 persons; for Los Angeles, 132,662, being one telephone to every 3.79 persons. Comparison is often more graphic and more instructive than mere figures. California has a total area practically equal to that of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York and Pennsylvania combined; or England, Ireland, Scotland, Wales, Barbados, Mauritius, Straits Settlements, Java, and the Northern provinces of India; or the Hawaiian, Samoan, and Tonga Islands; or the Philippines, Hawaii, Porto Rico, Samoa and Guam, with Massachusetts and Connecticut thrown in. California has in its 18 *National Forests* more acres of great trees than the total area of the States of New Hampshire, Vermont, Massachusetts, Maine, New York, and Pennsylvania combined; and California’s acreage to vegetables another Rhode Island and Delaware—and nearly another Delaware thrown in; and the national reserves are less than half the forestation of the State. California has enough primal desert to blanket most of New England. But in that same desert is more mineral production per annum (except coal and oil) than is recorded for all States east of the Alleghanies in all their history.

California’s hay, grain and alfalfa fields are nearly as large in area as the States of Connecticut and Delaware. California’s fruit farms cover an area twice as large as Rhode Island; and California’s acreage to vegetables another Rhode Island. Nor do these figures for vegetables include half another Rhode Island cultivated home-lots. California’s acreage in beans, sugar, beets and potatoes is 15 per cent larger than Rhode Island.

History—The name California, for which so many preposterous derivations have been urged, is taken from a Spanish romance, called ‘*Serras de Esplandian*’ (‘*Exploits of Esplandian*’), by Ordoñez de Montalvo (translator of ‘*Amadis de Gaul*’), printed about 1510, and often mentioned in old sources. *California* was a mythical island on the right hand of the Indies, very near the Terrestrial Paradise, peopled with Amazons and Griffins. The name was afterwards applied to the peninsula (extensively by Jimenez 1533) and is first recorded thus in Fregiado’s diary of Ulloa’s coastwise voyage in 1539. In time it came to be used indefinitely for the whole Pacific Coast from the peninsula practically to Nootka; and later the *California* (Lower or Lower California and Alta (Upper) California, the former including about what is now the Mexican Peninsular Territory. The first European to touch the present State was Alarcon, who went up the Colorado River some hundreds of miles in 1540. The first seaboard exploration was by Cabrillo 1542; and the next important coast explorations were by Sir Francis Drake in 1579, and described the coast of Upper California was in 1579 by the Franciscan missionaries under Junipero Serra, with a small escort of Spanish troops. These pioneer missionaries had by 1800 founded 18 missions, whose total population, mostly Indian neophytes, was 13,000. Three other missions were established by 1823. The mission period lasted about 65 years; converted over 80,000 Indians; erected in the wilderness at least $1,000,000 worth of buildings, and had developed stock-raising and wheat on a scale which astonished Humboldt. In 1834 the Mexican government *disestablished* the missions and confiscated their property. The Indians were scattered, and perished in great numbers. The buildings were plundered and left to decay. At present the Landmarks Club (incorporated) is preserving the mission edifices. The State passed from Spanish rule to that of the Mexican republic, 1821; was seized, practically without resistance, by the United States in 1845, and ceded by Mexico at close of Mexican war; admitted to the Union 9 Sept. 1850. The discovery of gold caused an unprecedented transcontinental migration (see *Population*). Aside from the great impetus given steam and clipper ships, the migration had other unique features,—like the Merchants’ Express, which employed 5,000 men, 2,000 wagons, and 25,000 head of oxen in freighting across the continent; and the Pony Express, which carried mail (letters only) at $5 per half ounce, 1,950 miles horseback from Independence, Mo., to San Francisco, in 10 days; and the Butterfield stages, 8 times a month between Saint Louis and San Francisco, via Texas and New Mexico; quickest time, 21 days from New York to San Francisco. Extraordinary records were made in this overland traffic. Robert H. Haslam (‘*Pony Bob*) made one continuous ride of first miles in 1861. William F. Cody (‘*Buffalo Bill*) over 384, without stopping except for meals and to change horses,—both as riders of the Pony Express. The quickest time made by this route (1,950 miles), was 7 days, 17 hours. The growth of this overland traffic led California capitalists, heavily subsidized by government, to build a transcontinental railroad. Ground was broken at Sacramento for the Central Pacific Railroad 8 Jan. 1863. The road was completed by driving of a spike of pure California gold by Governor Stanford in the presence of distinguished company at Promontory, Utah, 10 May 1869. In 1877 the Southern Pacific Railroad from Texas tidewater to San Francisco was completed. In 1885 the Atchison, Topeka and Santa Fe Railroad reached Los Angeles from Saint Louis; and in about 1910 was extended to San Diego. The latter and the Southern Pacific Railroad are among the longest railroad systems in the world, the former with a mileage of 8,648 and the latter with a mileage of 7,065. The modern development of California dates from competition of two lines during the decade beginning 1886.

The swift creation of an American commonwealth by the sudden horde of adventurous pioneers upon whom that duty at once devolved
State Capitol at Sacramento, Cal.
is perhaps the most remarkable monument to the genius of the American people for self-government. Ninety thousand wanderers, homeless, jobless, wifeless, broke, hastened to their deaths, or lost so anxiously and suddenly, without any help of the outside world, within a year had been silenced and firmly established on the western side of the United States. The desperadoes who flocked in from all parts of the world including a large contingent of Australian convicts were firmly suppressed, though not at once. Between 1849 and 1856 there were in San Francisco alone 1,000 homicides and seven executions. In 1856 the second vigilance committee, composed of the best citizens, after full and formal trial, publicly hanged half a dozen of the worst desperadoes, and banished scores of others on pain of death. Since that time law and property have been quite as safe in California as in the Eastern States. Chinese exclusion, though finally a national measure, was brought about by California, which then contained a majority of all Chinese in the country. In 1879 California voted exclusion by 154,638 to 883. The number of Chinese in the State has decreased from 75,132 in 1880 and 72,472 in 1890 to 45,753 in 1900. The bitterness aroused by the exclusion struggle has passed, and Chinese are well treated.

California entered the Union as a free State, thus giving balance of power to the North. In State elections since the war it has been peculiarly independent, having gone Democratic in 1867, 1875, 1882, 1886 (Democratic governor and Republican lieutenant-governor, who became governor by his superior's death) and 1894; Republican in 1871, 1879, 1890, 1898 and 1902.

In politics, California is counted "Safe Republican." For its first half century it came near alternating between the two great parties; but from 1902 to 1918 it has elected only Republican governors (including a "Progressive"). In national politics it has given its electoral vote in the same 16 years for only one Democratic President—Wilson, second term. This was largely by the women's vote and on the slogan "He kept us out of war." The presidential vote of California was decisive. California was the sixth State to adopt (1911) equal suffrage, and the first State of considerable size—being more than double the total population of the five earlier equal suffrage States. In 1916, out of a population of 3,000,000, the total registration was 1,314,446; the total vote nearly 80 per cent of this, ranging from 39 per cent to 46 per cent women. No woman has been elected to a Federal or State office; about 30 have been appointed. In counties and cities, over 50 women have been elected to office from 18 superintendents of schools, to one county clerk and the only councilwoman in the county (Los Angeles). There are several policewomen, probation officers, etc.; and many serving on civic commissions. The question of their eligibility on juries is not yet (1918) determined, and depends on the ruling of the judge. Women have procured the introduction and enactment of laws in varying importance and value, chiefly concerned with women and children, prohibition and the social evil.

Next to the gold excitement (see Mining and Population) the most sensational era in California history was the great bonanza silver period from 1859 to 1880. The mines were in Nevada, but were owned in San Francisco, and an era of stock-gambling therefore unbroken in history, and probably not yet surpassed, sprang from their sensational yield. Stocks on the San Francisco board rose $1,000,000 a day for many months, and sales in one year were $120,000,000. Everybody gambled in stock from bankers to scrubwomen. In 1875, with less than 200,000 population, San Francisco had 100 millionaires. The "Consolidated Virginia" mines paid $1,000,000 per month dividends for nearly two years. One lode was valued at nearly $400,000,000; $250,000,000 was spent in "developing" a small group of hills. The decadence of these great bonanzas, following the subsidence of gold mining to sober methods, at last turned more general attention to agriculture, the real wealth of the State. (See Agriculture.) In 1880 California was first in the Union only in gold, sheep and quicksilver; all other industries being far down the list. It is now first in gold; ninth in sheep; first in diversity of crops; first in milk for making butter, canned fruits, dried fruits, barley; first in number of irrigated farms; first in average wages in manufacturing establishments; first in borax, asphalt, quicksilver, platinum; second in copper; third in wheat; first in beef sugar; first in hops; first in oranges, lemons, olives and all semi-tropical fruits, honey, prunes, walnuts, almonds, beans, grapes, pears, peaches, cherries, apricots, etc.; first in electric power transmission; third in ship-building; second in petroleum; fifth in total value of farms (excluding farms, $2,000,000,000); twelfth in total value of manufactured products.

The highest California gold product in any one year was $55,000,000. The total agricultural products for 1916 were $194,556,000; and total value of manufactured products (1916) $712,800,764.

A South Sea bubble as wild as the Comstock silver stock-craze was the great "Land Boom" of southern California, 1886-87, a period of land-gambling never quite equaled in any other part of America. An area as large as New England was involved, with varying intensity; but the chief focus of excitement was in Los Angeles, San Bernardino and San Diego counties. Scores of thousands of city lots were staked out far from towns; hundreds of miles of cement sidewalks and curbs were laid; scores of big hotels and other buildings erected as baits, and great quantities of lands (purchased at from $10 to $30 per acre) were sold in town lots at $1,000 to $10,000 per acre. In Los Angeles County alone, with a population then not over 50,000, real estate transfers recorded in 1887 were over $100,000,000. Excursion auction sales of new "towns" sometimes realized $250,000 in a day; and $100 was often paid for a place in the line waiting for a sale to open. The collapse of this gigantic bubble, early in 1888, was as extraordinary in its freedom from disaster as it had been in its inflation. Not a bank failed, nor a business house of respectable standing; and while desert town lots reverted to acres of value, all really desirable real estate, rural and urban, has constantly advanced in value every year—thanks to the uninterrupted continuance of large and wealthy immigration. Building of
homes and setting out of orchards continue on an extraordinary scale. "Local option" is in force; and nearly all towns of southern California are "prohibition."
CALIFORNIA, Pa., a borough in Washington County, on the Monongahela River, three miles south of Pittsburgh, on the P. V. and C. Railroad. The largest coal mine in the world is located here (Vesta No. 4). There are also manufactures of glass bottles and foundry and machine shops. The resources of the two banks amount to $1,735,045. The Southwestern State Normal Schools and the borough public and high school are situated here. The latter and the borough building are fine structures. The government is in the hands of a council of seven members. Pop. about 2,300.

CALIFORNIA, University of, a university of the state system in California, but supported as well by the income from endowments and by national aid.

In 1869 the College of California, which had been incorporated in 1855 and which had carried on collegiate instruction since 1869, closed its work of instruction and transferred its property, on terms which were mutually agreed upon, to the University of California.

The university was incorporated by a law which received the approval of the governor, 23 March 1868. Instruction was begun in Oakland in the autumn of 1869. The commencement exercises of 1873 were held at Berkeley, 16 July, when the university was formally transferred to its permanent home. Instruction began at Berkeley in the autumn of 1873. The new constitution of 1879 made the existing organization of the university perpetual.

The professional schools were contemplated in the original plan, but not organized till later. The executive board consists of the governor and lieutenant-governor of the State, the speaker of the assembly, the State superintendent of public instruction, the president of the State Agricultural Society and the Mechanics' Institute of San Francisco, and the president of the university (all regents ex officio), and 16 others appointed by the governor for a 16-year term with the advice and consent of the senate. The university comprises the following colleges and departments: (1) In Berkeley: the colleges of letters and science of commerce, agriculture (courses at Berkeley; farms and laboratories, etc., at Davis, Riverside, Whittier, Chico, Santa Monica, Tulare County, Mелиoland and Kearney Park, Fresno County), mechanics, mining, civil engineering, chemistry; the schools of education, jurispudence, medicine (first year and part of second year), the university extension division, the California Museum of Vertebrate Zoology; (2) at Mount Hamilton: the Lick Astronomical Department (Lick Observatory); (3) at Santiago, Chile: the D. O. Mills Observatory; (4) in San Francisco: the California School of Fine Arts, the Hastings College of Law, the medical school (part of second year, and the third, fourth and fifth years, including the University Hospital, the George Williams Hooper Foundation for Medical Research, the college of pharmacy, the California College of Dentistry, the California College of pharmacy, the institute of ophthalmology, archaeology and art; (5) in Los Angeles: Los Angeles Medical Department (graduate instruction only); (6) the Scripps Institution for Biological Research at La Jolla; (7) the Herriot Research Laboratory of Biology at Pacific Grove, and (8) the Summer School of Surveying at Swanton.

In 1898 Mrs. Phoebe Apperson Hearst informed the regents that she proposed to erect a building, but wished first a worthy general plan for the Berkeley campus, and that she would bear the expense of an international competition to obtain such a plan. In 1898 an international jury assembled at Antwerp and voted upon more than 100 plans submitted, awarding prizes to 11 composers invited to the visit the university and to prepare revised plans for a second competition. In September 1899, the jury met again in San Francisco and gave the first prize ($10,000) to M. Emil Benaud of Reims. Among the 11 composers invited to Berkeley in many conferences with the university authorities, M. Benaud undertook a revision of his drawings to fit the plans to the actual necessities of the site and the prospective needs of the university. In December 1905, he submitted a design which the regents adopted as the permanent plan. To Mr. John Galen Howard was entrusted the development of the plan, as supervising architect. In realization of the Hearst plan, several buildings have been completed including the Hearst Memorial Mining Building, given by Mrs. Hearst for the college of mining of the university and as a memorial to the late Senator George Hearst; California Hall, for which an appropriation of $250,000 was made by the California legislature, and the president's house. Another notable building is the beautiful Greek theatre, an open-air auditorium, seating 8,000, patterned after the classic theatres of Greece and the Greek colonies, and given to the university by Mr. William H. Ralston. Other new buildings is the library, for which generous provision was made by Mr. Charles F. Doe of San Francisco, who bequeathed $700,000 for this purpose.

Since this time gifts and appropriations have made possible the erection of a series of new buildings. As a memorial to her husband, the late Judge John H. Boalt, Mrs. Elizabeth J. Boalt in 1898 made a gift of about $100,000 to the university for the erection of a Hall of Law. Members of the bench and bar of California subscribed an additional $50,000 and on the 28th of April, 1911, the Boalt Hall of Law, constructed of white granite and completely equipped with library, offices and class rooms, was formally dedicated. Upon the death of Mrs. Jane K. Sather on 12 Dec. 1911, President Wheeler, as her trustee, sold to the regents of the university property valued at $400,000 which Mrs. Sather had left as a gift to the university. Of this sum $200,000 was devoted to the erection of the Sather Tower, a white granite 302 feet in height, designed after several similar towers in Italy, but not a direct replica of any one. In 1917 the Sather Bells, made in Europe.
CALIGULA

at a cost of $10,000, were hung in the Sather Tower and the Sather Esplanade was con-
struction at a cost of $40,000. Benjamin
ide Wheeler Hall, one of the new classroom
building, was made ready for occupancy in
January 1917. It was built at a cost of $720,000,
of white granite, and represents the Georgian
tradition in architecture. It contains an audi-
torium seating 1,020 people, 62 classrooms, 48
studies for members of the faculty (each study
accommodating two), a large and comfortable
faculty room, and accommodations for 4,889
students at one time. Hilgard Hall, the new
agriculture building, was dedicated in the sum-
er of 1917. It was built of reinforced con-
crete at a cost of $362,000, to house instruction
in agronomy, citriculture, forestry, genetics,
pomology, soil technology and viticulture. The
exterior of this building is notable for the
highly original treatment of decoration in
sgraffito—the use of colored cements for adorn-
ment of concrete surfaces. Work was started
in 1917 on Gilman Hall, which is being built at
a cost of $220,000, to house the research labora-
tories in chemistry. It will be used by the fac-
culty and by graduate and undergraduate students. Reinforced
concrete is the building material used. These
three buildings were designed by John Galen
Howard, professor of architecture and super-
vising architect in the university. Under his
direction also has been completed the university
library, at a cost of about half a million dol-
ars, making the total cost of the building $1,400,000. Special features of the new portion
are a second reading room seating 240 readers
and added facilities for periodicals (of which the university receives 8,000 titles), 20 seminar
rooms, 22 faculty studies and space for book-
stacks to hold 1,250,000 volumes, although at
present this space is only utilized for some
600,000 volumes. In San Francisco the univer-
sity has built the university hospital at a cost
of $700,000, with accommodations for 225
patients. It is mainly intended as a laboratory
for the university's medical school and the
Hooper Foundation for Medical Research.

The university has 542 officers of instruc-
tion, a library of 360,000 volumes, an art gallery, museums and laboratories, also
the agricultural experiment grounds and sta-
tions, which are invaluable adjuncts of the
farming, orchard and vineyard interests of the
State. In San Francisco there are 150 officers of
instruction, besides demonstrators and other
assistants, and 775 students. Tuition in the col-
leges at Berkeley, during regular sessions, is
free to residents of California; non-residents
pay a fee of $10 each half year. In the pro-
"fessional colleges, in San Francisco, except that of
law, tuition fees are charged. The instruc-
tion in all the colleges is open to all qualified
persons, without distinction of sex. The
constitution of the State provides for the perpetua-
tion of the university with all its departments.

In 1917 there were 3,850 students in all the
departments, a gain of about 60 per cent, due to
the entrance of the United States into the war,
were women; it is also to be noted that a com-
paratively large proportion of students is in the
general or academic courses, as distinguished
from the technical and professional courses.

CALIGULA, Gaius Cæsar Augustus Germanicus, Roman Emperor, a son of Germanicus
and Agrippina: b. 31 Aug. 12 A.D., in the camp at Antium, and brought up among the legions;
d. 24 Jan. 41 A.D. He received from soldiers the surname of Caligula because he usually wore the calige, the boots commonly used
by the soldiers. He understood so well how to insinuate himself into the good graces of Tibe-
rius that he not only escaped the cruel fate of his parents, and brothers, and sisters, but was
ever loaded with honors. Whether, as some writers inform us, he removed Tiberius out of
the way by slow poison is uncertain. When
the latter was about to die he appointed, ac-
根据 to Suetonius, Caligula and the son of
Drusus, Tiberius Nero, heirs of the empire.
But Caligula, universally beloved for the sake
of his father, Germanicus, was able without
difficulty to obtain sole possession of the
throne. Rome received him joyfully, and the
distant provinces echoed his welcome. His
first actions were just and noble. He interred, in
the most honorable manner, the remains of
his mother and of his brother Nero, set free
all state prisoners, recalled the banished and
forbade all prosecutions for offenses com-
mitted before the magistrates free and indepen-
dent power. Although the will of Tiberius had
been declared by the Senate to be null and void, he fulfilled every article of it, with the exception
only of that above mentioned. When he was
chosen consul he took his uncle, Claudius, as
his colleague. Thus he distinguished the first
eight months of his reign by many magnani-
mous actions, when he fell sick. After his
recovery, by a most unexpected alteration, which has given good grounds to suspect his
sanity, he suddenly showed himself the most
cruel and unnatural of tyrants. The most ex-
quise tortures served him for enjoyment.
During his meals he caused criminals, and even
innocent persons, to be stretched on the rack
and beheaded; the most respectable persons
were daily executed. In the madness of his
arrogance he even considered himself a god,
and caused the honors to be paid to him which
were paid to Apollo, to Mars, and even to
Jupiter. He also showed himself in public
with the attributes of Venus and of other
goddesses. He built a temple to his own divin-
ity. At one time he wished that the whole
Roman people had but one head, that he might
be able to cut it off at one blow. He fre-
frequently repeated the words of an Alexandrian poet, Oderint dum metuant—"let them hate so long
as they fear." He squandered the public money
with almost incredible prodigality. One of his
greatest follies was the building of a bridge
between Baiae and Puteoli (his "seventy-miler"), in order that he might be able to boast of marching
over the sea on dry land. He had it covered
with earth, and houses built on it, and then
rode over it in triumph. He gave a banquet
in the middle of the bridge, and to celebrate
this great achievement ordered numbers of the
spectators whom he had invited to be thrown
into the sea. On his return, he entered Rome
in triumph, because, as he said, he had con-
quered nature herself. After this, he made
preparations for an expedition against the Ger-
man, passed with more than 200,000 men over
the Rhine, but returned after he had traveled
a few miles, and that without having seen an
enemy. Such was his terror, that, when he
came to the river, and found the bridge ob-
structed by the crowd upon it, he caused himself to be passed over the heads of the soldiers. He then went to Gaul, which he plundered with unexampled rapacity. Not content with the considerable booty thus obtained, he sold all the property of both his sisters, Agrippina and Livilla, whom he banished. He also sold the furniture of the old court, the clothes of Marcus Antonius, of Augustus, Agrippina, etc. wherever he went he was welcomed with the intention of going to Britain. He collected his army on the coast, embarked in a magnificent galley, but returned when he had hardly left the land, drew up his forces, ordered the signal for battle to be sounded, and commanded the soldiers to fill their pockets and helmets with shells, while he cried out, "This booty, ravished from the sea, is fit for my palace and the capitol!" When he returned to Rome, he was desirous of a triumph on account of his achievements, but contented himself with an ovation. Discontented with the Senate, he resolved to destroy the greater part of the members, and the most distinguished men of Rome. This is proved by two books which were found after his death, wherein the names of the principal chieftains (636 A.D., Heg. 13) which one was entitled Gladius (Sword), and the other Pugillus (Dagger). He became reconciled to the Senate again when he found it worthy of him. Caligula's morals were, from his youth upward, corrupt. After he had married and repudiated several wives, Cesonia retained a permanent hold on his affections. A number of conspirators, at the head of whom were Cærea and Cornelius Sabinus, both tribunes of the praetorian cohorts, murdered him in the 29th year of his age, and the fourth of his tyrannical reign, which thus lasted from 37 to 41 A.D. Consult Baring-Gould, 'The Tragedy of the Caesars' (London 1892).

CALIPH (Fr. calife, Ar. khilif’a, calif, successor), is the name assumed by the successors of Mohammed in the government of the faithful and in the high-priesthood. Caliphate is therefore the name given by historians to the empire of those persons who are Arabs founded in Asia, and impelled by religious enthusiasm, enlarged, within a few centuries, to a dominion superior in extent to the Roman empire. The title is still borne by the Sultan of Turkey. Mohammed, in the character of the prophet of God, made himself the spiritual and temporal ruler of his people. In the following account the dates both of the Hegira and the Christian year are often given. The difference in the mode of computing the Mohammedan year has caused considerable divergencies among authorities in regard to the exact dates of the particular events of Mohammedan history.

After the death of the Prophet the election of a successor occasioned considerable excitement, Mohammed having left no son and nominated no successor. Abdullah Ibn Abu Kofas, called Abubekr, that is, father of the virgin (because his daughter Ayesha was the only one of the wives of Mohammed whom he had taken as a virgin), succeeded the Prophet over Ali, the cousin and son-in-law of Mohammed, and became the first caliph, 632 A.D. (year of the Hegira 11). Victorious over enemies at home, by the aid of his general, Khaled, "the Sword of God," he proceeded, as the Koran directs, to spread the doctrines of Mohammed by arms among the neighboring nations. With the watchword, conversion or death, a numerous army of volunteers inspired with zeal for the holy war, penetrated into Syria and Mesopotamia, but before much could be done, Abubekr died after he had filled the place of the Prophet two years and four months. The Prophet having once acquired a strong footing in Syria by the treacherous surrender of Bosra, they undertook, under Khaled, the siege of Damascus, and having repulsed two large armies, sent by the Emperor Heraclius to the relief of the city, they obtained possession of it by a capitulation (635 A.D.), the terms of which were perfidiously broken. Khaled pursued his victorious path in retreating Christians. By him and other generals, though not without a brave resistance on the part of the Greeks, the subjugation of Syria was completed (638 A.D., of the Hegira 17). Jerusalem having been compelled to surrender (638 A.D., Heg. 18), the Caliph placed the solitary rock over which the city was built, either in person to fix the terms of capitulation, which subsequently served as a model in settling the relations of the Moslems to the subject Christians. These terms were carefully observed by the conscientious caliph. The new Persian empire of the Sassanide was also overthrown, and Mesopotamia and other extensive regions overrun. Equally successful was the Mohammedan general, Amru, in Egypt, which was subjected to the caliphate in two years (641). Omar was the first who bore the appellation of Emir al Moumenen ("Prince of the Faithful")—a title inherited by all succeeding caliphs. Many of these conquests were over Christian populations who readily changed their creed and adapted themselves to the new rule.

After the murder of Omar by a revengeful slave (644 A.D., Heg. 23), a council, appointed by him on his death-bed, chose Osman, or Othman, son-in-law of the Prophet, parking over Ali. Under him the empire of the Arabs continued to expand. From Egypt the tide of conquest advanced westward along the northern coast of Africa, as far as Ceuta. Cyprus too (647 A.D.), and Rhodes (654 A.D.) were conquered; but the former was lost again, two years after. An agitation against Othman now arose, partly owing to the fact that he favored and aggrandized his own family connections in every way, and entrusted the provinces, not to the most capable, but to his favorites. To many also the claims of Ali to the caliphate were deemed superior to those of Othman. The dissatisfaction thus excited occasioned a general insurrection in the year 656 (Heg. 34), which terminated in Othman's death.

Ali, the son-in-law of the Prophet by Fatima, became the fourth caliph, by the choice of the people of Medina, and is regarded as the first legitimate possessor of the dignity by a numerous sect of Mohammedans, which gives him and his son, Hassan, almost equal honor with the Prophet. This belief prevails among the Persians, and others who belong to the Shiite sect as opposed to the Sunnites or Orthodox. Instead of being able to continue the conquests
of his predecessors, Ali always had to contend with domestic enemies. Among these was Ayesha, the widow of the Prophet, called the mother of the believers, and especially the powerful Moawiyah, governor of Syria, who all laid claim to the government. These were able to create suspicion, and spread the report that Ali had instigated the murder of Othman. In vain did he endeavor to repress the movement against his person; Amr, for the government of the provinces to his friends. Nowhere were the new governors received. The discontented collected an army and made themselves masters of Bassora. Ali defeated it, and Tellah and Zobeir fell; but he could not prevent Moawiyah and his friend Amru from extending their party and maintaining themselves in Syria, Egypt, and even in a part of Arabia. Three men of the sect of the Kharejites proposed to restore concord among the faithful, by having the heads of the parties, Ali, Moawiyah and Amru; but Ali only fell (661 A.D., Heg. 40). He was a man of a cultivated mind, and was the author of a collection of sentences or moral maxims, etc. on the death of the man, had the desire to defend the caliphate against the indefatigable Moawiyah; a treaty was concluded between the two, by which Hassan solemnly abdicated the government (661). Some years later he perished by poison, said to have been administered by one of his wives at the instigation of Moawiyah.

Moawiyah I transferred the seat of the caliphate from the city of the Prophet, Medina, where it had hitherto always been, to Damascus, in the province of which he had formerly been governor (673 A.D., Heg. 54). With him began the series of the caliphs called Ommiades (or Ommayads), which name this family bore from Moawiyah's progenitor, Ommiyah. Not long after his accession he was obliged to quell an insurrection of the Kharejites by a campaign, and a rebellion at Bassora by severe punishments. He then seriously meditated the entire subversion of the Byzantine empire (q.v.). Rhodes was attacked, and the famous colossus was brought into the city. The emperor in person marched through Asia Minor, meeting but little resistance; then crossed the Hellespont and laid siege to Constantinople, but was obliged to raise it (669 A.D., Heg. 49). Other generals were more successful against the Turks in Khorasan, and the regions extending to the borders of India.

The next caliph, Jezid (or Yazid), was not altogether a worthy successor of his father, the politic Moawiyah (660 A.D., Heg. 60). At first he was not able, even of the two holy cities, Mecca and Medina, which, as long as the caliphs had resided in the latter city, had enjoyed a principal voice in their election, but which had not been consulted when Moawiyah, according to the custom of the caliphs, appointed his successor in his lifetime. This discontented espoused the cause, either of Houssain, the famous son of Ali, or of Abdallah, Zobeir's son, both of whom had laid claim to the caliphate. A rebellion of the inhabitants of Iraq in favor of Houssain, led by Muslum. Houssain's cousin, was suppressed by the prudence and decision of Obeidallah, governor of Cufa; and Houssain, who had accepted the invitation of the conspirators, was killed (660 A.D., Heg. 61), to the great grief and rage of all those who took part with Ali's family—a feeling still cherished by the Shiites. Abdallah Ebn Zobeir was recognized as caliph in Medina, where Jezid was put to death for his insubordination and skepticism. On this account Medina was invested, stormed and sacked; and Mecca, in which Abdallah took shelter, was besieged, but during the siege Jezid died.

After Jezid's death (683 A.D., Heg. 64) his son, Moawiyah II, a weak but pious youth, became caliph, but after a reign of 40 days he died when he was meditating abdication. By this time Abdallah Ebn Zobeir had caused himself to be proclaimed as Prince of the True Believers, and he had a powerful following. For a period anarchy prevailed. Irak, Hejaz, Yemen and Egypt acknowledged Abdallah Ebn Zobeir as caliph. In Syria, Dehac, regent to Abdallah, was at first chosen caliph; but the people of Damascus against his interrogator, of the race of the Ommiades, caliph, who made himself master of all Syria and Egypt. Khorasan separated from the caliphate, and submitted to a prince of its own choosing—the noble Salem. Afterwards, by the will of Obeidallah (65) Solomon Ebn Sarad excited a great rebellion in the discontented in Syria and Arabia, and pronounced both caliphs deposed, but was defeated by the experienced soldier Obeidallah. Merwan (who died in 685) had been compelled to promise on oath to leave the caliphate to Khaled, the son of Jezid, yet he nominated his son Abdalmelek as his successor. Under him (685 A.D., Heg. 65) Mokthar, a new rebel against both caliphs, was subdued by one of them, Abdallah (686 A.D., Heg. 67); but this only made Abdallah more formidable to Abdalmelek, who, in order to be able to direct all his forces against him, concluded a peace with the Greek emperor, Justinian II, in which, reversing the order of the Koran, he conceded to the Christians a yearly tribute of 50,000 pieces of gold. He then marched against Abdallah, defeated him twice, and took Mecca by assault. In this last conflict Abdallah fell. Thus Abdalmelek united under his dominion all the Mussulmen, of whom he marched through Asia Minor, meeting but little resistance; then crossed the Hellespont and laid siege to Constantinople, but was obliged to raise it (669 A.D., Heg. 49). Other generals were more successful against the Turks in Khorasan, and the regions extending to the borders of India.

The next caliph, Jezid (or Yazid), was not altogether a worthy successor of his father, the politic Moawiyah (660 A.D., Heg. 60). At first he was not able, even of the two holy cities, Mecca and Medina, which, as long as the caliphs had resided in the latter city, had enjoyed a principal voice in their election, but which had not been consulted when Moawiyah, according to the custom of the caliphs, appointed his successor in his lifetime. This discontented espoused the cause, either of Houssain, the famous son of Ali, or of Abdallah, Zobeir's son, both of whom had laid claim to the caliphate. A rebellion of the inhabitants of Iraq in favor of Houssain, led by Muslum. Houssain's cousin, was suppressed by the prudence and decision of Obeidallah, governor of Cufa; and Houssain, who had accepted the invitation of the conspirators, was killed (660 A.D., Heg. 61), to the great grief and rage of all those who took part with Ali's family—a feeling still cherished by the Shiites. Abdallah Ebn Zobeir was recognized as caliph in Medina, where Jezid was put to death for his insubordination and skepticism. On this account Medina was invested, stormed and sacked; and Mecca, in which Abdallah took shelter, was besieged, but during the siege Jezid died.

After Jezid's death (683 A.D., Heg. 64) his son, Moawiyah II, a weak but pious youth, became caliph, but after a reign of 40 days he died when he was meditating abdication. By this time Abdallah Ebn Zobeir had caused himself to be proclaimed as Prince of the True Believers, and he had a powerful following. For a period anarchy prevailed. Irak, Hejaz, Yemen and Egypt acknowledged Abdallah Ebn Zobeir as caliph. In Syria, Dehac, regent to Abdallah, was at first chosen caliph; but the people of Damascus against his interrogator, of the race of the Ommiades, caliph, who made himself master of all Syria and Egypt. Khorasan separated from the caliphate, and submitted to a prince of its own choosing—the noble Salem. Afterwards, by the will of Obeidallah (65) Solomon Ebn Sarad excited a great rebellion in the discontented in Syria and Arabia, and pronounced both caliphs deposed, but was defeated by the experienced soldier Obeidallah. Merwan (who died in 685) had been compelled to promise on oath to leave the caliphate to Khaled, the son of Jezid, yet he nominated his son Abdalmelek as his successor. Under him (685 A.D., Heg. 65) Mokthar, a new rebel against both caliphs, was subdued by one of them, Abdallah (686 A.D., Heg. 67); but this only made Abdallah more formidable to Abdalmelek, who, in order to be able to direct all his forces against him, concluded a peace with the Greek emperor, Justinian II, in which, reversing the order of the Koran, he conceded to the Christians a yearly tribute of 50,000 pieces of gold. He then marched against Abdallah, defeated him twice, and took Mecca by assault. In this last conflict Abdallah fell. Thus Abdalmelek united under his dominion all the Mussulmen, of whom he marched through Asia Minor, meeting but little resistance; then crossed the Hellespont and laid siege to Constantinople, but was obliged to raise it (669 A.D., Heg. 49). Other generals were more successful against the Turks in Khorasan, and the regions extending to the borders of India.
taleb, uncle of the Prophet, began to be formidable. Under Hisham an end was put to the progress of the Saracens in the west by the energy of Charles Martel, who annihilated their armies at Tours in 732, and at Narbonne in 736. Walid II was murdered after a reign of one year (744 A.D., Heg. 124). Al Walid's sons and reigns of Jezid III and of his brother Ibrahim, Merwan II followed, with the surname (respectable among the Arabs) of the Ass (Al Hemar). Ibrahim, the Abasside leader, being imprisoned and put to death by his prince, his brother Al Affas took up the cause of the Abassides and assumed the title of caliph. In the resulting war Medwan was twice defeated, and fell (750 A.D., Heg. 133). With him terminates the series of caliphs of the race of Ommiyah. The furious Abdallah, uncle of Ibrahim and Abul Abbas, treacherously destroyed almost all the Ommiades by a horrible massacre at a meeting to which they had been inveigled. One of the family, Abderrahman, grandson of Hisham, having taken refuge in Spain, escaped the massacre and founded the independent caliphate of Cordova. See Spain.

Abul Abbas, first of the Abasside caliphs, died young in 754 A.D. (Heg. 136). His brother, Abul Giafane, died. Al Affas ("the Victor of the Victors"), was obliged to contend with a rival in his uncle, Abdallah, whom he, however, overcame. He acquired his surname by his victories in Armenia, Cilicia and Cappadocia. Spain was lost by him, however, as well as Africa. In the year 764 he founded the city of Bagdad on the Tigris, and transferred thither the seat of the caliphate (768 A.D., Heg. 149). He died on a pilgrimage to Mecca, leaving immense treasures (775 A.D., Heg. 158). Mohammed Mahdi, his son and successor, a man of a noble character, had to contend with the turbulent inhabitants of Khorasan under the pretended prophet, Hakeem, and died 785 A.D.; and Musa or Hadi, his grandson, met with the same opposition from the AlI party under Houssain. Hadi’s mother was a strong-minded and ambitious woman, who wished to rule her son, and with him the state, and this led him to try to poison her. She, however, caused him to be smothered before he could effect his purpose.

Abul Abbas had a son, but by his brother Harun (789 A.D.), who was, denominated Al Rashid ("The Upright"), on account of his justice, and is famous for promoting the arts and sciences. He concluded a truce (an actual peace could never be made with Christians) with the Greek empress Irene (789 A.D.), who consented to pay him tribute. Yahya, a member of the house of Ali, disputed with him the possession of the throne, but subsequently submitted. Harun, however, tarnished his reputation by the murder of Yahya, and still more by the murder of his sister, and her favorite, the Barmecide Giafar, and by the expulsion and persecution of the whole family of the Barmecides, whose services to the state and himself had been of very great value. Harun divided the African provinces among his sons, the elder, Hisham, to reign over Egypt, Libya, Syria, Egypt and the rest of Africa: under him Al Mamun was to govern Persia, Turkestan, Khorasan, and the whole East; and Motassem was to rule Asia Minor; Armenia and all the countries on the Black Sea. The younger brothers were to succeed Amin in the caliphate. Thus, in Khorasan, through which Harun was passing in order to quell a rebellion that had broken out in Samarcand, he was arrested by death, of which he had been forewarned by extraordinary dreams (809 A.D., Heg. 190).

Al Amin the Faithful (his proper name was Mohammed) was undeserving of this name. Untrue to his obligations as a ruler, and addicted to all kinds of sensuality, he left the discharge of his duties to his vizier, Fadhel. The vizier, from hatred of Mamun, persuaded the caliph to appoint his brother Thaher as his successor, and deprive Motassem of his portion of territory. A war arose between the brothers. Mamun’s general, Thaher, defeated the armies of the caliph, took Bagdad, and caused Amin to be put to death (813 A.D., Heg. 194).

Mamun was recognized as caliph. Nobler in his inclinations than Amin, he cherished the arts and sciences but, like his brother, he left the government and armies to his ministers. His measures to secure the caliphate to the Alides in order to please his favorite Riza, excited the powerful Abassides to an insurrection. They declared Mamun to have forfeited the throne, and proclaimed Ibrahim caliph, but submitted again, after the death of Riza, when the caliph had changed his sentiments. The vast empire of the Arabs, embracing numerous provinces in two quarters of the globe, could hardly be held under his sceptre. There is but one step, and that an easy one, under a weak sovereign, from a vice-royalty to a kingdom. The wisdom of the former Abassides could only retard this evil; the faults of the latter precipitated it. Even under Harun Al Rashid the Alides had founded an independent empire in Tunisia (800 A.D., Heg. 181), as had likewise the Edrises in Fes. Thaher, having been appointed governor of Khorasan, made himself independent. From him the Thaherides derived their origin. Mamun sent Thomas, a Greek exile, with an army against the Greek emperor, Michael II the Stammerer. Thomas depopulated Asia Minor, and laid siege to Constantinople; but a storm destroyed his fleet (823 A.D., Heg. 207). A second attack on the imperial city was repelled by the aid of the Bulgarians. Thomas was taken prisoner and executed by order of the emperor. A fleet into which the Mussulmans were then divided. Mamun acted with toleration. He died 833 A.D. (Heg. 218). During his government (about 830 a.D., Heg. 215), the African Arabs conquered Sicily and Sardina, where they maintained themselves about 200 years, till the latter island was torn from them by the Pisans in 1016-17, and the former island by the Normans between 1061 and 1090.

Motassem, at first named Billah (by the grace of God). Harun’s third son, built a new city, Samara, 56 miles from Bagdad, and transferred thither his residence. In his wars against the Greeks and rebellious Persians he first used Turkish soldiers. From grief at the death of his private physician, Motassem became insane, and died. In 842 A.D., Al Mamun died.

Vathek Billah, his son, member of the Moazazite sect, exerted himself to promote the advancement of science; but he was an enervated voluptuary, and died of nervous weakness (846 A.D., Heg. 232). A contest for the succession, between his brother Motawakkel and his
CALIPH

son Mothadi, was decided by the already powerful and arrogant Turkish bodyguard in favor of the former, the more unworthy competitor. Under Motawakkel it became more and more customary to carry on all wars by means of Turkish mercenaries. Thus the Arabs were rendered unwarlike and effeminate, as must necessarily be the case in a hot climate with those who do not live in constant activity. Motawakkel manifested a blind hatred of the Avides, not sparing even the memory of the deceased, who in revenge he embittered against the spirit, and a proneness to sensuality and cruelty. His own son, Montasser, trained to early indulgence in all vices, and often barbarously treated by him, conspired against him with the Turkish bodyguards and effected his murder (861 A.D., Heg. 247).

The Turks, who now arrogated the right of electing the caliphs, called the murderer to the throne of the faithful, and compelled his brothers, who were innocent of the atrocious act, and whose names were the caliphate on Mothadi Bilah. One of them, at Cufa, was defeated and put to death; but the other founded an independent empire in Tabristan, which subsisted half a century. The discord of the Turkish soldiers completed the dismemberment of the empire. One party raised to the throne Motaz, second son of Motawakkel, and compelled Mostain to abdicate. Motaz Bilah soon found means to get rid of him as well as of his own brother Muwiaid. He then meditated the removal of the Turkish soldiers; but before he found courage to execute his projects they rebelled on account of their pay being in arrear, and forced him to resign the government. He soon after died (869 A.D., Heg. 255). They called the caliphate on Mothadi Bilah, son of the Calip Vathek, but deposed this excellent prince 11 months after, because he attempted to improve their military discipline.

Under Motawakkel's third son, the sensual Mothadi Bilah, whom they next called to the caliphate, Muafeek his brother succeeded, by his prudence and courage, in overcoming the dangerous preponderance of these Turks. Motamed transferred the seat of the caliphate from Samara back to Bagdad in the year 873 (Heg. 257), where it afterward continued. In the same year, owing to a revolution in the independent government of Khorasan, the dynasty of the Thaherides gave place to that of the Soffarides, who eventually extended their dominion over Tabristan and Segistan. The governor of Egypt and Syria, Achmet Ben Tulun, also made himself independent (877 A.D., Heg. 263), from whom are descended the Tulunides. The brave Muafeek annihilated, indeed, the empire of the Zinghians, in Cufa and Bassora, 10 years after its formation (881 A.D., Heg. 264); but he was unable to save the caliphate from the ruin to which it was continually hastening.

Motamed died soon after him (892 A.D., Heg. 279), and was succeeded by Muafeek's son, Mothadad Bilah. He contended unsuccessfully with a new sect, that had arisen in Iraq, the Carmathians (899 A.D., Heg. 286)—against whom his son, Moktaphi Billah (902 A.D., Heg. 289), was more fortunate. He was still more successful in a war against the Tulunides, as he again reduced Egypt and Syria in 905 (Heg. 292). Under his brother, Moktadair Billah, who succeeded him at the age of 13 years (905 A.D., Heg. 299), rebellions and bloody quarrels between the sovereigns disturbed the government of the empire. He was several times deposed and reinstated, and finally murdered (931 A.D., Heg. 319). During his reign Abu Mohammed Obeidallah rose in Africa, who, pretending to be descended from Fatima, daughter of the Prophet (therefore from Ali), overthrew the dynasty of the Avides in Tunis, and founded that of the Fatimides (910 A.D., Heg. 298). Not satisfied with reigning independent of the caliph, this party, as descendants of the Prophet, asserted themselves to be the only lawful caliphs.

Shortly afterward the dynasty of the Boudies, in Persia, rose to authority and power (925 A.D., Heg. 322), and extended the power of the caliph. The only change was that the Samanides had taken the place of the Soffarides. In a part of Arabia the heretic Carmathians ruled; in Mesopotamia, the Hammadites. In Egypt, which had just been recovered, the Avides, or Abbasides, were called to be a sovereign. From him descended the Akschidites. Kaher Billah, Mothadad's third son, merited his fate, on account of his malice and cruelty. The Turkish soldiers having recovered their power drove him from the throne into exile (934 A.D., Heg. 322), in which he perished five years afterward. Rhadi Billah, his brother, bore the dignity of an emir al omra (*captain of the captain*), with which the exercise of absolute power, in the name of the caliph, was united; and thus the caliph was more and more thrown into the background. The first who was invested with this dignity was Raial; but it was soon torn from him by the Turk Jakan, by force of arms, in the year 939 (Heg. 327). Jakan extended the office to such a degree as to leave the caliph nothing, but the name of his temporal sway, and even assumed the right of determining the succession to the throne. Raial was indemnified by receiving Cufa, Bassora and Irak Arabi as an independent government.

The next caliph, Moktaki Billah, Moktader's son, made an effort to regain his independence by the murder of Jakan; but he was soon compelled by the Turkish soldiers to appoint Touas, another of their countrymen, emir, who made this office hereditary. He formally devised it to a certain Schirzad, but it soon came into the possession of the Persian royal house of the Boudies, whose aid the succeeding caliph, Moktaki Billah, solicited against the tyranny of Schirzad. The first Boudie emir, Mozeddulat, left it as an inheritance to his posterity. Not the caliph but the emir now reigned in Bagdad, though over only a small territory. In every remote province there were independent princes.

To continue the catalogue of the names of those who were henceforward caliphs would be superfluous, for these Mussulman popes had not by any means the power of the Christian. It would be too tedious to trace the branches into which the history of the caliphate is now divided; but we must briefly show the great
changes which the different states and their dynasties have undergone, and which gave rise to the domination of the Ottoman Porte.

During the minority of the Akschidite Ali, the Fatimite Morz Ledinillah, at that time caliph in Tunis, subjugated Egypt in 969 (Heg. 388), and founded Cairo, which he made the seat of his caliphate. There were, consequently, at this time three caliphs—at Bagdad, Cairo and Cordova,—each of which declared the others heretics. But the Fatimites as well as the Abbassides fell under the power of their vassals, and, like them, the Omейyades in Cordova were deprived of all power by the division of Spain into many small sovereignties, till they were entirely subverted by the Moresbesh.

Ilkan, King of Turkestan, having conquered Khorasan, and overthrown the Samanidades, was expelled again by Mahmud, Prince of Gizia, who founded there the dominion of the Gaznevides, in 998 (Heg. 388), who were soon, however, thrown out by the Seljuk Turks under Togrut Beg in 1030 (Heg. 421). Ilkan was an able and valorous leader, conqueror also Charasim, Georgia and the Persian Iran. Called to the assistance of the Caliph Kajem Bemellah, at Bagdad, against the tyranny of the Bouide emirs, he proceeded to Basra and seized the office in 1053 (Heg. 448), by which means the dominion of the Turks was firmly established over all the Musulmans. To his nephew, Alp Arslan (who defeated and took prisoner the Greek Emperor Romanus Diogenes), he left this dignity with so great power that these Turkish emirs al omra were frequently called the Sultans of Bagdad. Turkish princes, who aspired to be sovereigns in the other provinces, were at first satisfied with the title of atabaek (father, teacher), such as the atabeks of Irak and Syria, of Azerbaijan, Farsistan (Persia) and Farsistan. It was the atabeks of Syria and Irak with whom the Crusaders had principally to contend. The first was called Özamededdin Zenghi by the Franks, Zanghi by the Greeks, and the afterward termed sultans. The Caliph of Bagdad was recognized by all as the spiritual sovereign of all Musulmans: his temporal authority did not extend beyond the walls of Bagdad. Nomreddin Zenghi, so often being requested by the Fatimite caliph Aded to protect Bagdad against his vizier, sent to Cairo, in succession, Shirkahu and Salaheddin or Saladin; but the latter overthrew the Fatimites (as schismatic anti-popes), and usurped the authority of Sultan of Egypt in 1170 (Heg. 556) with which he united Syria, after Nomreddin’s death. This is the great Salaheddin, (Saladin), the formidable enemy of the Christians, the conqueror of Jerusalem. The dynasty which commenced with him was called, from his namesake, Ayyouh, the Ayyoubite. They reigned over Egypt till expelled by the Mamelukes in 1250. The Seljuk sultans of Irak were overthrown in 1194 (Heg. 590) by the Charasians; and as those of Khorasan were extinct, there remained of the Seljuk dominions nothing but the empire of Iconium or Roum, in Asia Minor, from which the present Turkish empire derives its origin. See OTTOMAN EMPIRE.

The Charasian Sultans extended their conquests far into Asia, until their territories were invaded by the Tartars under Genghis Khan, in 1220 (Heg. 617). They were finally totally destroyed by his son Octai. Bagdad, also, the remains of the possessions of the caliphs, became the easy prey of a Mongol horde under Holagu, in 1258 (Heg. 630), by the treachery of the vizier Al Kami, and a slave, Amram, under the 50th caliph Motazem. The nephew of the cruelly murdered Motazem fled to Egypt, where he continued to be called caliph under the protection of the Mamelukes, and bequeathed the Mohammedan popedom to his posterity. When the Turks conquered Egypt, in 1517, the last of these nominal caliphs was carried to Constantinople and died, after returning to Egypt in 1538. The Turkish Sultans subsequently assumed the title of caliph, and have retained it to the present day, with the claim of spiritual supremacy over all Mussulmans, though this claim is little regarded outside his own dominions, and strongly disputed by the Persians. Consult Muir, Sir William, ‘Annals of the Early Caliphate’ (London 1853); id., ‘The Caliphate: Its Rise, Decline and Fall’ (ib. 1891); Syed Ahmed Ali, ‘A Short History of the Saracens’ (New York 1889); Lane-Poole, S., ‘The Mohammedan Dynasties’ (London 1894); Weil, ‘Geschichte der Chalifen’ (5 vols., Mannheim and Stuttgart 1840-62).

CALIPUS, a Greek astronomer, who was the first to discover the inaccuracy of the golden number or period invented by Meton, and attempted to remedy it by the invention of a new cycle of 76 years, being only six hours less than the quadruplet of Meton’s period. It commenced 331 B.C., and being accepted particularly by astronomers in giving the date of their observations, is frequently mentioned by Ptolemy. Though more perfect than Meton’s period, it was shown to be inaccurate by Hippocrates, who substituted for it a cycle of 345 years.

CALISAYA BARK, the yellowish bark of Cinchona Calisaya (q.v.).

CALISTHENICS, or CALLISTHENICS, the art of promoting gracefulness, strength and health by means of the lighter forms of gymnastic exercise. See GYMNASTICS.

CALIVER, an early form of hand-gun, musket or arquebuse, lighter and shorter than the original musket, fired without a rest and much more rapidly. It seems to have gone out of fashion about 1630. Its name is derived from the fact that the bore was of uniform calibre, so that a common supply of bullets might be used by an entire company.

CALIXTINES, ka-likes’tins, or UTRAQUISTS, a sect of the Hussites in Bohemia (q.v.), who differed from the Roman Catholics principally in giving the cup in the Lord’s Supper to laymen, from which circumstance they got their name, derived from the Latin calix, “a cup.”

CALIXTUS, the name of several popes.

1. The first of this name, a Roman bishop, was the 7th pope (217 to 229, or from 218 to 223), when he suffered martyrdom according to some accounts.

2. Guino, son of Count William of Burgundy, archbishop of Vienne, and papal legate in France, was elected in 1119, in the monastery of Clugny, successor of the expelled Pope, Gelasius II, who had been driven from Italy by the Emperor Henry V, and had died
in this monastery. In the same year he held councils at Toulouse and at Rheims, the latter of which was intended to settle the protracted dispute respecting the right of investiture. As the Emperor Henry V would not confirm an agreement which had been made on the subject, Calixtus repeated anew the excommunion which he had already pronounced against him when legate in 1112. He excommunicated also the anti-pope, Gregory VIII, and renewed former decrees respecting simony, lay investiture, and the marriage of priests. Successful in his contest with the Emperor on the subject of investiture, by means of his alliance with the rebels in Germany, in particular with the Saxons, he made his entrance into Italy in 1120, and with great pomp into Rome itself; took Gregory VIII prisoner in 1121, and banished him to a monastery. He availed himself of the troubles of the Emperor to force him, in 1122, to agree to the Concordat of Worms. After an energetic pontificate he died at Rome in 1124. Calixtus III, chosen in 1168 in Rome as anti-pope to Paschal III, and confirmed by the Emperor Frederick I in 1178, was obliged to submit to Pope Alexander III. As he was not counted among the legal popes, a subsequent one was called Calixtus III. This was a Spanish nobleman, Alfonso Borgia, counsellor of Alfonso, King of Aragon and the Sicilies. He was made Pope in 1455. He was at this time far advanced in life, but equalled in policy and energy the most enterprising rulers of the Church. He appointed an ecclesiastical commission to reconsider the case against Jeanne d’Arc, and its decision was that she died a martyr to her faith, her king and her country. In order to appease the displeasure of the princes and nations occasioned by the proceedings of the councils of Constance and Basel, he instigated them to a crusade against the Turks. His intention was counteracted in Germany by the discontent of the states of the empire with the Concordat of Viretta, which he had already signed. By the appeals of the universities of Paris and Toulouse against the title for the Turkish war, King Alfonso, moreover, was indignant at the refusal of the Pope to acknowledge his natural son Ferdinand as king of Naples.

Calixtus (properly Callisen), Georg, gâr'îg, German clergyman, the most able and enlightened theologian of the Lutheran Church in the 17th century: b. Medelbye, Schleswig, 14 Dec. 1586; d. 19 March 1656. In 1609 he visited the universities of the south of Germany; in 1612 those of Holland, Britain and France, where his intercourse with the different religious parties which had already produced the Thirty Years War, had already developed the independence and liberality of opinion for which he was distinguished. In 1614 he was made professor of theology at Helmstedt, and he held this post till his death. He was the author of the Holy Scriptures, transubstantiation, celibacy, supremacy of the Pope, and the Lord’s Supper belong, even according to the judgment of learned Roman Catholics, to the most profound and acute writings against Roman Catholicism. But his erudition and historical knowledge exposed him to the persecutions of the zealots of his time. His assertion that the points of difference between Calvinists and Lutherans were of less importance than the doctrines in which they were agreed, and that the doctrine of the Trinity was less distinctly expressed in the Old Testament than in the New, and his recommendation of good works, so far as they were nearly, a the research of hereafter. He made Christian morality a distinct branch of science, and, by reviving the study of the Christian fathers and of the history of the Church, prepared the way for Spener, Thomasius and Semler. Commut Hunte, E. L., "Calixtus and the Thirty Years War" (Halle 1856–57); Dowding, W. C., ‘German Theology during the Thirty Years War’; ‘The Life and Correspondence of G. Calixtus’ (London 1863).

Calking, kök'îng, the process of driving tarred oakum into the seams between the planks of ships, in order to render the joints water-tight. A wisp of the oakum is drawn out and rolled together between the hands, and, being laid over the seam, is driven by a wedge-shaped instrument called a calking iron. The work is afterward gone over with a more powerful instrument of the same kind, which is held by one man and struck with a beetle held by another. When all the oakum is forced in that is practicable, the seams are payed over with melted pitch, and where they are to be covered with copper, a thread of spun yarn is laid in to make them flush with the planks.

Calking, Franklin Welles, American author: b. Iowa County, Wis., 5 June 1857. He was an early explorer of parts of Black Hills of South Dakota and made acquaintance with many Indian tribes. His studies of bird and animal life have given him rank as a naturalist. He was educated for the law and had practice in counsel; also had experience as ranchman and railway contractor. He began writing for The Youth’s Companion at 22 years of age and has been one of the chief contributors to that magazine for 35 years; is author of a number of syndicate serials which have been running in various magazine sections of newspapers for 30 years, and contributes to many periodicals: author of Tales of the Air, (1883); The Cougar-Tamer (1899); My Host the Enemy (1901); Two Wilderness Voyagers (1902); ‘The Wooing of Tokala’ (1907).

Calking, Gary Nathan, American scientist: b. Valparaiso, Ind., 18 Jan. 1869. He was graduated at the Massachusetts Institute of Technology in 1890. He received the degree of Ph.D. at Columbia in 1898. In 1900 he became instructor in zoology at Columbia University; adjunct professor of zoology 1902; professor of protozoology 1909. He was biologist of the New York State Cancer Laboratory 1904–08; president of the American Association for Cancer Research 1913–14; and is vice-president of the Society of Experimental Biology and Medicine. He has published ‘The Protozoa’ (1901); ‘Protozoology’ (1909); also numerous scientific papers.

Calking, Mary Whiton, American psychologist, educator and author: b. Hartford, Conn., 30 March 1863. She studied at Smith College and at Clark and Harvard universities and from 1905 was assistant professor of philosophy and psychology at Wellesley College. Her published works include ‘Introduction to Psychology’ (1910);
CALKINS—CALLAO

State. He projected and built the third railroad in the United States, from Tallahassee to Saint Marks, and also located the town of Port Leon, which was afterward destroyed by a cyclone. He always considered himself a Jackson democrat, as opposed to later democracy. Feeling that he had fought on Jackson's side for every inch of ground from Tennessee to the peninsula, he regarded himself as one of the builders of the nation, and during the Civil War was one of the few men in the South that looked on secession as treason. On 12 Feb. 1861, he wrote a long letter to John S. Littell of Pennsylvania, deploring secession, but defending slavery. See also CALL, WILKINSON, nephew of the preceding.

CALL, Wilkinson, American lawyer and politician: b. Russellville, Ky., 1834; d. 1910. Early in life he removed to Florida where he was admitted to the bar. He entered the Confederate army in the Civil War and attained the rank of adjutant-general. In 1865 he was elected to the United States Senate, but was not permitted to take his seat. He was again elected in 1879 and served thereafter for 18 years.

CALLA, a genus of plants of the Arum family, containing a single species, growing in bogs in Europe, Asia and eastern North America. The plant commonly cultivated under the name of calla is Zantedeschia aethiopica.

CALLAHAN, James Morton, American publicist: b. Bedford, Ind., 4 Nov. 1864. He was graduated at the University of Virginia in 1884 and completed the work for the doctorate at Johns Hopkins in 1897. He was engaged in historical research (at Washington, D. C.) and lecturer on American diplomatic history at Johns Hopkins University 1898-1902, and since 1902 professor of history and political science, West Virginia University. He has written 'Neutrality of the American Lakes' (1898); 'Cuba and International Relations' (1899); 'American Relations in the Pacific and the Far East' (1901); 'Diplomatic History of the Southern Confederacy' (1901); 'The American Expansion Policy' (1908); 'Seward's Mexican Policy' (1909); 'History of West Virginia' (1914); and various monographs and encyclopedia articles. Editor of 'West Virginia University Studies in American History'; Historian of Semi-Centennial Commission of West Virginia, 1913.

CALLAO, kāl-yā'o, Peru, seaport city, capital of Callao province, on Callao Bay, seven miles by rail, steam and electric, west of Lima. The spacious harbor affords safe anchorage, making Callao the principal port of the country; defended by three forts and sheltered southward by San Lorenzo Island, nine miles in circumference, and rising 600 feet above sea level. An earthquake and tidal wave destroyed the early city in 1746 and the modern city is three-quarters of a mile from the original site. The city itself is uninteresting, and the climate unhealthy. Business centres around the harbor, which is modern in every respect, with concrete piers, floating dock, gas and electric lighting, steam. In 1890, 1,100 vessels of 2,672,000 tonnage entered and cleared the port annually. Callao has lumber,
CALLAWAY — CALLENDER

iron and sugar manufacturing industries; exports sugar, minerals, cotton, hides, bone, cocoa, wool, etc., to the value of over $7,350,000 annually, and imports coal, beer and manufactured articles valued annually at about $13,434,250. Callao dates from early Spanish times; in 1624 it was besieged unsuccessfully by the British pirate, Clark, who died there. Incorporated as a town in 1671; it was submerged with all its inhabitants during the earthquake of 1746, and when the sea is calm, the ruins are still distinguishable under water. The harbor saw the naval victory of the independent Chileans in 1820 over the Spaniards who surrendered Callao, their last foothold in Peru, the following year. Callao suffered volcanic disasters in 1825 and in 1868. In 1866 it was bombarded by a Spanish fleet and in 1890 by the Chileans who took possession the following year. It was restored to Peru by the treaty of 1883. Pop. 32,000.

CALLAWAY, Morgan, American educator; b. Cuthbert, Ga., 3 Nov. 1862. He was educated at Emory College, Ga., and at Johns Hopkins University, and has been professor of English in the University of Texas from 1890. He has published 'The Absolute Participle in Anglo-Saxon' (1889); 'The Appositive Participle in Anglo-Saxon' (1901); 'The Infinitive in Anglo-Saxon' (1913); and contributions to reviews.

CALLAWAY, Samuel Rodger, American railroad president; b. Toronto, Canada, 24 Dec. 1850; d. New York, 1 June 1904. At the age of 14 he entered the employ of the Grand T. Railway and later was in the service of the Canadian Express Company, and Great W. Railway. His rapid progress thereafter may be summarized as follows: in 1875 he became superintendent of the Detroit and M. Railroad; in 1880, manager of the Chicago and G. T.; in 1884, vice-president of the Union P. and allied lines of nearly 6,000 miles; president of the Toledo, Saint L. and K. C. Railroad, 1887-95; president of the Lake Shore and M. S., 1897-98; president of the New York C. and H. R. Railroad, 1899-1901. He was regarded as one of the busiest railroad managers in the United States. From 1901 he was president of the American Locomotive Company.

CALLCOTT, kol'kot, Sir Augustus Wall, English painter; b. Kensington, 20 Feb. 1779; d. there, 25 Nov. 1844. He studied portrait-painting under Hoppner, but soon discovered that his genius lay in another department of art, and was so successful in his delineation of landscape, that in 1807 he was elected an associate of the Royal Academy. In 1837 he was knighted, and in 1843 was appointed keeper of the royal collections of pictures. He suffered much from ill health for many years before his death. Callcott excelled in the delineation of coast scenes, and, like Turner, has been called the "Modern Claude." Examples of his paintings are 'The Mouth of the Tyne' (1820); 'Entrance to the Pool of London' (1816); and 'Milton Dictating to his Daughters' (Leeds).

CALLCOTT, John Wall, English composer, brother of Augustus Wall (q.v.); b. Kensington, 20 Nov. 1766; d. near Bristol, 15 May 1821. He at first intended to become a surgeon, but abandoned the intention, and devoted himself to music. In 1785 he competed for the prizes of the Catch Club, and gained three out of four gold medals. In the following decade the same club awarded him 20 medals. In 1790, when Haydn arrived in England, he studied under him, and the same year obtained from Oxford the degree of musical doctor. In 1805 he published his 'Musical Gram- mar'; and in 1806 was preparing to deliver lectures on music at the Royal Institution when his mind gave way, and he never completely recovered, although his insanity left him on one occasion for three years. He ranks among the most eminent of English composers, and was especially celebrated for his glee compositions. His best works were published in two volumes by his son-in-law, Mr. Horsley, in 1824.

CALLEJA DEL REY, kal'-ya-ha del ra. Félix María, Spanish general; b. Medina del Campo 1750; d. Cadiz 1820. He distinguished himself in Mexico by quelling the insurrection instigated in 1810 by Hidalgo, who was on the point of seizing the city of Mexico, when Calleja was charged by the viceroy, Venegas, to oppose his progress. After the death of Hidalgo, in which both parties strove to surpass each other in a display of cruelty and brutality, Calleja succeeded in defeating Hidalgo's army, and on 2 Jan. 1812, he took possession of the principal fortress Zitaquaro, and massacred the inhabitants. Hidalgo, who fell near Guadalajara, was succeeded by the priest, Morelos, who defended Cuautla Amilpas against the attack of Calleja with great bravery until 2 May 1812, when famine forced him to surrender. Calleja again signalized his victory by acts of barbarism, and was rewarded for his zeal, 4 March 1813, by the appointment of viceroy, in which capacity he continued to alienate the feelings of the Mexicans by his relentless rigor. The priest, Morelos, fell into his hands and was shot, 22 Dec. 1815. Subsequently he promulgated an amnesty, but as he was unable to restore peace to the distracted country, he was recalled. On his return to Spain he was created Conde de Calde- ron, and in January 1820, while preparing to sail from Cádiz to Paraguay, his troops having mutinied, he was captured and remained prisoner in the fortress of the Isla de León until the insurrection was quelled by Ferdinand VII, when he died, soon after having recovered his liberty.

CALLENDER, Hugh Longbourne, English physician; b. Hatheron 1863. A student of Trinity College, Cambridge, since 1902 he is professor of physics at the Imperial College of Science, London, having previously held a similar position at McGill University, Montreal 1893-98, and at University College, London, 1898-1902. He is author of 'Law of Conden- sation of Steam' (1898); and 'The Imperial College of Science' (London 1904).

CALLENDER, James Thomas, American publicist; b. Scotland; d. 1813. He came to Philadelphia as a refugee from England in 1790 having been exiled for his pamphlet 'The Political Progress of Great Britain.' He published, in America, 'The American Register, and was editor of the Richmond Recorder. He wrote 'Sketches of the History of America'; 'The Prospect Before Us.'
CALLENDER, John, American historian and Baptist minister: b. Boston, Mass., 1706; d. Newport, R. I., 26 Jan. 1748. He collected many valuable papers relating to the Baptists in America; and published 'A Centennial Discourse on the Civil and Religious Affairs of the Colony of Rhode Island' (1739), which was the only history of that State for more than a century. The State Historical Society revived it, with notes by Rev. Romeo Elton (1838), and a memoir of the author.

CALLET, kā-lā, Antoine François, French historical painter: b. Paris 1741; d. Paris 1823. He obtained the grand prize in 1764 for a painting entitled 'Biton and Cléobis dragging the chariot of their mother to the temple of Herē.' This picture was purchased by the Academy. Among his noted paintings are 'Winter Saturnalia,' 'The Festival of Bacchus,' 'Summer,' 'Spring' (all four in the Louvre), 'Battle of Marengo,' 'The First Consul entering Lyons,' 'The XVIIIth Bruiney and Nepotism,' 'The Marriage of Napoleon and Marie-Louise,' 'Capitulation of Ulm,' 'Battle of Austerlitz.' Callet was one of the best decorative painters of his day, and became a member of the Academy in 1780. He painted three portraits of Louis XVI, one each of Louis XVIII and the Comte d'Artois and Comte de Vergennes, then Minister of Foreign Affairs, and several other portraits now in the Louvre.

CALLET, Jean François, French mathematician and educationalist: b. Versailles, 25 Oct. 1744; d. Paris, 14 Nov. 1798. He completed his studies at Paris in 1768, and in 1779 gained the prize which the Academy of Arts at Geneva had offered for escarmouche in watches. In 1788 he was appointed professor of hydrography at Vaneu and shortly after obtained the same appointment at Dunkirk. He was afterward professor in the school of geographical engineers, Paris. He is best known by his 'Tables of Logarithms.' He was also one of the first to propose a regular telegraphic code for commercial purposes, using the word 'telegraphic' in the French sense.

CALLERY, Walter, American Baptist clergyman: b. Dover, Del., 19 Aug. 1858. A graduate of Crozier Theological Seminary at Upland, Pa., he was ordained to the ministry in 1880 and after holding pastorates at Bethelhem, Pa., 1880-82; 18 high Avenue Church, Philadelphia, Pa., 1882-91; Emmanuel Church, Cambridge, Mass., 1891-93; Tabernacle Church, Boston, 1893-1902; Upland, 1903-09, in the latter year he became pastor of the First Church, Jamaica Plain, Boston. He specialized in sociology and pedagogy, was one of the founders of Prospect Union, an affiliation of Harvard Union for the education of workingmen, was general secretary of the Baptist Young People's Union of America, and managing editor of the official magazine Service 1902-05.

CALLICRATES, Greek architect of the 5th century B.C. He was a contemporary of Ictinus and with him erected the Parthenon at Athens.

CALLICRATIDAS, a Spartan, succeeded Lyonsard in the command of the Lacedaemonian fleet against the Athenians, in 406 B.C. He defeated Conon at Mitylene, captured the fleet of Diomedon, and was afterward himself defeated by the Athenians at Arginusae, where he was drowned.

CALLIÉRES, kā-b-yār', BONNEVUE, Louis Hector, Chevalier de, French colonial administrator: b. France 1639; d. Quebec, 26 May 1703. He was governor of Montreal in 1664, and impressed on the French government, during a special visit to France, the necessity of capturing New York so as to maintain French supremacy in Canada. He had previously led a division of the French and Indian forces which in 1697 unsuccessfully attacked the Five Nations in New York State. In 1699 he became governor-general of Canada, succeeding Frontenac, and was the founder of Detroit, Mich.

CALLIGONUM, a genus of shrubs belonging to the Polygonaceae. They are leafless plants, with small flowers, branches jointed, dichotomous, and the fruit a large, four-cornered nut. The root of C. Pallida, a leafless shrub found in the Mediterranean, furnishes from its roots, when pounded and boiled, a gummy, nutritious substance like tragacanth, on which the Calmucks feed in times of scarcity, at the same time chewing the acid branches and fruit to allay their thirst.

CALLIMACHUS, Greek architect and sculptor: d. Athens 366 B.C. He adorned the Corinthian capital and designed the mystic golden lamp which shed perpetual light on the Erechtheum. Consult Gardner, W., 'Handbook of Greek Sculpture' (London 1911).

CALLIMACHUS, Greek poet and grammarian: b. Cyrene, about 310 B.C.; d. about 240 B.C. He opened in Alexandria a school of grammar, that is, of the belles-lettres and liberal sciences, and could boast of several scholars of distinguished attainments, such as Eratosthenes, Apollonius Rhodius, Aristophanes of Byzantium and others. Ptolemy Philadelphus presented him with a place in the museum and gave him a salary, as he did other men of learning. After the death of Philadelphus, he stood in equal favor with Ptolemy Euergetes. Under these circumstances he wrote most of his works, the number of which was, according to him, over 800. With the exception of some fragments, we have of these only 64 epigrams and six hymns. His works in prose include the 'Tablets' in 120 books (a critical bibliography); 'Memorabilia'; 'Causae' (4 books); in poetry, the best known is his 'Hecale,' which Ovid used in his 'Philémon et Baccis.' In 1893, research in Egypt uncovered some 50 verses of this poem, which are published in Gomera, 'Neue Bruchstücke aus der Hekale des Callimachos' (Vienna 1893). His poem on the hair of Berenice has been preserved in the Latin adaptation of Catullus ('De coma Berenices'). 'Callimachus' poems bear the stamp of their age, which sought to supply the want of natural genius by a great ostentation of learning. Instead of noble simple grandeur, they exhibit an overcharged style, a false pathos and a straining after the singular, the antiquated, the learned. His elegies are mentioned by the ancients with great praise and served Propertius as models. The best editions of the hymns and epigrams are those of Meineke (Berlin 1861); Schneider 1870-73; Wilkomowitz (Berlin 1897). Consult also Kenyon, 'Recent Greek Literary
CALLINGER—CALMETTE


CALLINGER, an ancient hill fort and town in India. See KALINJAR.

CALLINUS OF EPHESUS, the earliest Greek elegiac poet, flourished probably about 700 b.c. Only one elegy and a few fragments are extant; these have been edited by several scholars, among them Bergk, in the ‘Poetic Lyric Greek’ (Leipzig 1878). Consult also Wright, ‘A Short History of Greek Literature’ (New York 1907).

CALLIOPE, käl-hô-pê. (1) In Greek mythology, one of the Muses (q.v.) She presided over eloquence and epic poetry. She is said to have been the mother of Orpheus by Apollo. She was represented with an epic poem in one hand and a trumpet in the other, and generally crowned with laurel. (2) An asteroid (No. 22). It was discovered by Hind on 16 Nov. 1852. (3) A musical instrument, consisting of a series of steam whistles, pitched to proportions of the scale, and grouped together and operated by a keyboard.

CALLIOPE HUMMING-BIRD. See HUMMING-BIRD.

CALLISTHENES, Greek historian: b. Olynthus, about 365 B.C.; d. 328. He was a nephew and pupil of Aristotle, and was appointed to attend Alexander the Great in his expedition against Persia. His republican sentiments roused him until for a courtier, but his unpardonable crime was his opposition to the assumption of divine honors by the conqueror. On a charge of treason he was put to death, by what method historians are not agreed. Of several historical works written by him only fragments remain. A work on Alexander was once thought to be his, but it has since been proved to be of later date. Consult Christ-Schmid, ‘Geschichte der griechischen Litteratur’ (Vol. II, Munich 1911).

CALLISTO, in Greek mythology, a nymph of Artemis, daughter of Lycaon, King of Arcadia. According to the modern prevalent story of this maiden, Zeus loved her, and her son Arcas was hid in the woods, and preserved, while she was changed by the jealousy of Hera into a bear. Zeus placed her, with her son, among the stars, as the constellation of the Great Bear. Arcas became the ancestor of the Arcadians.

CALLISTRATUS, Athenian orator: b. about 400 B.C.; d. 361. In 377 B.C. he played an active part in the movement for the formation of a new Athenian League. His eloquence is said to have fired the imagination of the youthful Demosthenes. For his Spartan sympathies he was condemned to death by the Athenians, and on his return from exile in Macedonia was actually executed.

CALLOT, Jacques, French etcher: b. Nancy 1592; d. there 1635. He overcame many obstacles to his study of art, twice running away from his parents. He went to Italy, learning from Rubens how to give himself up entirely to his love for engraving, and became famous for his etchings. He studied with Parisi at Florence and served at the court at Tuscany. In the space of 20 years he designed and executed about 1,600 pieces, most of them, except sacred subjects, representations of battles, sieges, dances, festive processions, etc. The ‘Misères et malheurs de la guerre,’ in 18 pieces, may be mentioned as a remarkable series. He executed works of this kind for Cosmo II of Florence, Louis XIII of France and the Duke of Lorraine. His ‘Pair’ and his ‘Beggars’ are called his best pieces. He was the first who used in his etchings a grey tone — the vernice grossa dei lignanuoli of the Italians; and was the first to make etching an independent art. He was distinguished for his piety, magnanimity and regularity of life. Consult Mâeume, ‘Recherches sur la vie et les ouvrages de J. Callot’ (Paris 1860), and Green, J. H., ‘A Catalogue and Description of the Works of the Celebrated J. Callot’ (London 1804).

CALLUNA. See Heather.

CALLUS, an abnormal hard growth, either carneous or osseous. The new growth of bony substance between the extremities of fractured bones, by which they are united, is an instance of the latter. External friction or pressure produces the former, as in the hands of laborers and the feet of persons who wear ill-fitting shoes. A temporary or provisional callus is a flange of callus formed on the ends of broken bones which move freely upon one another and separate widely; and acts as a splint would. When the amount of callus is excessive, permanent injury may result to neighboring structures since nerves and tendons may be included or a joint rendered useless. Surgical operation is sometimes necessary under these conditions. See Corn.

CALMET, kal-mâ’, Augustin, French exegetical and historical author: b. Mesnil-la-Horgne, near Toul, France, 26 Feb. 1672; d. Paris, 25 Oct. 1757. He entered the order of Saint Benedict in 1698, and became the head of several abbeys in succession. In 1698 he became teacher of philosophy and theology in the abbey of Moyen-Moutier; in 1704, subprior of a convent of learned monks at Münster in Alsace; and in 1706 he went to Paris to undertake the publication of his commentary on the Bible. He afterward became (1715), abbot of Saint Leopold in Nancy (1718), abbot of Senones in Lorraine (1728). He was an industrious compiler of voluminous works. Among them are ‘Commentary on the Old and New Testaments’ (23 vols., Paris 1707–16); ‘Historical and Critical Dictionary of the Bible’ (4 vols., Paris 1722–28); and ‘Ecclesiastical and Civil History of Lorraine’ (4 vols., Nancy 1728; 2d ed., 6 vols., 1745–47). For his life consult Fangé (Senones 1766); Didot, A., (Nancy 1861); for his correspondence, Guillaume, P. E. (Nancy 1875).

CALMETTE, Gaston, French journalist: b. Montpellier 1858; d. Paris, 16 March 1914. As editor of the Figaro from 1903, and noted for his fearlessness in attacking his political opponents, regardless of consequences, he was shot and killed by Mme. Caillaux, wife of Joseph Calmette, M. himself being former Premier, whose private correspondence, obtained surreptitiously, Calmette had threatened to publish. Calmette was a chevalier of the Legion of Honor, and had been decorated with the grand cross of the order of Charles III by the King of Spain.
CALMON, kil-mōn', Marc Antoine, French political economist: b. Tarnies, Dordogne, 3 March 1815; d. Paris, 13 Oct. 1890. In 1845 he became undersecretary of State in the Department of the Interior, and in December 1872 prefect of the Department of the Seine. He entered the National Assembly as life member in 1875, but will be longest remembered for his writings on political economy, which include "Les impôts avant 1790" (1863); "William Pitt, étude financière et parlementaire" (1865); "Histoire parlementaire des finances de la Restauration" (1868-70); "Études des finances de l'Anatolecque depuis la réforme de Robert Peel, jusque en 1869" (1870); "Histoire parlementaire des finances de la monarchie de Juillet" (4 vols., 1899). He edited Thiers' "Discours parlementaires" (15 vols., Paris 1879-83).

CALMON DU PIN E ALMEIDA, Miguel, Brazilian statesman: b. Santa Amara, Bahia, 22 Dec. 1796; d. Rio de Janeiro, 5 Oct. 1865. He entered the Constituent Assembly in 1822, was senator in 1840, Prime Minister in 1840 and again in 1843 and resided in Europe as special envoy 1844-47. He was created viscount in 1849 and Marquis of Abrantes in 1854.

CALMS, Region of; or, Zone of, tracts in the eastern Atlantic and eastern Pacific oceans on the courses of the tradewinds, where calms of long duration prevail. This region is not the same all the year through, but follows the course of the sun, and lies farther north or farther south according to the hemisphere in which the sun happens to be. About the winter solstice its average northern limit is in lat. 5° N., and in the months about the summer solstice its average northern limit is about 12° N. lat. The southern limit lies nearly always to the north of the equator, varying between lat. 1° and 3° N.; but it is sometimes, though rarely, so far south as lat. 1° or 2° S. During the months following the winter solstice its average breadth is four degrees, while in the months following the summer solstice it is about six degrees, and it is much more especially on the northern margin of this region, but even there, there is an occasional light breeze, but not sufficient to fill the sails. The climate of this region is extremely unpleasant, for the atmosphere is moist and foggy, and the sky generally overcast and gloomy, and the heat is intense and unvarying. Almost every day there occurs a violent storm of thunder and lightning, accompanied by sudden blasts of wind, and by rain which falls in regular streams for hours together. On this account the region is dangerous to navigators. To increase these dangers there is between lat. 4° and 10° N., and long. 18° and 23° W., a tract of considerable extent, which seamen call the "rainy sea," and which, with only rare intervals of calm, is visited by almost constant storms of thunder and lightning, and violent falls of rain, from which it is very difficult for a sailing vessel to make its escape.

CALMUCKS. See Kalmucks.

CALOCHORTUS, a genus of plants of the lily family, containing about 50 species, natives of western North America. They are known as Mariposa lilies, star tulips and globe tulips. The plants have narrow leaves and showy, tulip-like, white or pale or bright yellow flowers, often spotted with darker colors. Many of the species are frequent in cultivation.

CALOMARDE, kā-lo-mär'de, or CALOMARDA, Francisco Tadeo (COUNT OF ALMEIDA), Spanish statesman: b. Villal, Aрагón, 1775; d. Toulouse, France, 1842. He studied law, entered political life and sustained the national cause in resistance to Napoleon. In 1814 on the return of Ferdinand VII, Calomarde was made chief secretary of the Department of Indian Affairs. Here he was convicted of bribery and banished to Toledo and afterward to Pamplona. In 1815 he held a similar post in the Ministry of Justice, and was made chief secretary of the American Order of Isabella the Catholic. In 1823 he received the appointment of secretary to the regency, and subsequently an important office in the royal household, and he was appointed Minister of Justice. He organized the corps of royalist volunteers, recalled the Jesuits, reopened the convenuts and closed the universities. Ferdinand VII decorated him with the order of Charles II, and on the birth of Isabella he became Knight of the Golden Fleece and, by order of the King of Naples, Duke of Santa Isabel. He established the King's Order of Charles IV, admitting women to the succession. In 1832, when Ferdinand's death was supposed to have taken place, Calomarde was the first to bend his knee before Don Carlos. The King recovered physically, but lingered in a semi-idiotic condition; of this Calomarde took advantage, by extorting from his signature to the act of 31 Dec. 1832, reintroducing the Salic law, by which Ferdinand abdicated in favor of Don Carlos instead of the Infanta Isabel. When Ferdinand revealed this fraudulent proceeding Calomarde was banished to Aragon, and later avoided imprisonment by escaping to France in disguise. Here he passed the rest of his days in obscurity.

CALOMEL, the sub-chloride, or "mild" chloride of mercury, HgCl (or Hg₂Cl₂), known to chemists as "muriatic," known to physicians as "mercuric chloride," and distinguished from it by corrosive sublimate, HgCl₂, which is known as "mercuric chloride." It is prepared by adding an alkaline chloride to a solution of a mercuric salt, usually the nitrate. The precipitate is thoroughly washed to remove the last remaining trace of the unchanged alkaline chloride. In the use of calomel as a medicine particular attention should be given to its liability to generate corrosive sublimate by decomposition. This effect may be produced by bitter almonds or cherry-laurel water, or any other substance containing hydrocyanic acid, being administered simultaneously with it. Nitro-muriatic acid produces the same effects, as also, to some degree, the chlorides of potassium, sodium and ammonium. If there is any possible chance of its adulteration with corrosive sublimate, it may be tested by shaking a sample with a little alcohol and dipping a knife blade in the solution. The presence of even so minute a proportion of corrosive sublimate as 1/500 of 1 per cent will produce a blackening of the steel blade. It is rendered ineffectual by the alkalies and alkaline earths. Calomel is regarded as the most valuable of the mercurial preparations, though some medical innovators reject it. It is employed as a purga-
tive, operating chiefly upon the liver by stimu-

lating its secretory functions. Being slow in its
action, and liable to salivate if too long
retained, it is usually administered with some
saline cathartic. It is also given as a remedy
for worms and as an alternative in derangement
of the liver. Calomel occurs native in Spain,
Bohemia, Serbia, Mexico and elsewhere, in the
form of tetragonal crystals white in color (or
nearly so) with a hardness of from 1 to 2
and a specific gravity of 6.48. In this form it
is known to miners as horn-quicksilver.

CALONNE, kā-lōn, Charles Alexandre
de, French statesman: b. Douai, 20 Jan. 1734;
in 1783 as Comptroller-General of the Finances.
In this office he continued till 1787. During
this period he maintained the public credit by a
punctuality till then unknown in the payments
of the royal treasury, though he found it
drained to the lowest ebb. He labored with
unwearied assiduity to restore the equipoise
between the annual income and expenditure,
and to provide a supply for the emergencies of
the state, without increasing the burdens of the
people. For this purpose he advised the King
to re-establish the ancient usage of convening
national assemblies of the "notables," to whom
he proposed the bold project of suppressing
the pecuniary privileges and exemptions of the
nobility, clergy and magistracy. This measure
alarmed those powerful bodies, and Calonne
found it necessary to retire to England, where
he wrote two defenses of himself—his 'Petition
to the King' and 'Reply to Necker.' On
the breaking out of the Revolution he supported
the Royalist party with much zeal, both by his
pen and his journeys to various countries of
Europe on their account. Consult Susane, 'La
tactique financière de Calonne,' with bibliog-
raphy (Paris 1902).

CALOPHYLLUM, a genus of trees be-
longing to the family Gutiferaceae, and natives
of warm climates. They have large shining
leaves and showy transverse parallel veins.
Some of the species yield excellent timber.
C. inophyllum affords a medical resin, the taca-
mahac of the East Indies. The seeds yield
dombia oil, which is used for burning, for
making ointment, etc. C. calaba is a West Indian
species whose oil is used for illuminating
purposes.

CALORESCE, the phenomenon of the
transmutation of heat rays into light rays;
a peculiar transmutation of the invisible calorific
rays, observable beyond the red rays of the
spectrum of solar and electric light, into visible
luminous rays, by passing them through a solu-
tion of iodine in bisulphide of carbon, which
intercepts the luminous rays and transmits the
calorific. The latter, when brought to a focus,
produce a heat strong enough to ignite com-
bustible substances, and to heat up metals to
incandescence, the less refrangible calorific
rays being converted into rays of higher re-
frangibility, whereby they become luminous.
Tyndall first described it in the book men-
tioned below. See also FLUORESCENCE. Consult
Tyndall, T. "Heat a Mode of Motion" (New
York 1905).

CALORIC (Latin calor, "heat"), a name
formerly given to a hypothetical, impondera-
ble substance of gaseous form, whose existence
was postulated in order to explain the observed
phenomena of heat. It is not known whether this
substance exists, and the word is now practi-
cally obsolete, except as an adjective in such
expressions as "caloric effect," "caloric engine," etc.,
where it stands for the words "thermal" or
"heat," though sometimes in a special sense.
For a statement of the theory of caloric
and caloric theory, consult Metcalfe's 'Caloric'
(2 vols., Philadelphia 1859). See also HEAT;
THERMODYNAMICS.

CALORIE, or CALORY, the unit of
heat in the c. g. s. system; being the amount of
heat necessary to raise the temperature of a
kilogram of water one degree Centigrade, or
from 4° to 5° C. In ultra-scientific researches
the calorie is determined by taking 1/100 part
of all the heat required to raise 1 gram of
water from 1° to 100° C. It is used as a
standard of heat by physicists as the term
"foot-pound" is employed as the unit of energy.
It is also known as the "greater calorie," to
distinguish it from the "small calorie," in
which the unit of mass is the gram instead of
the kilogram. Its mechanical equivalent is
4.187 joules, that being the amount of energy
which disappears when one calorie of heat is
developed. See CALORIMETRY.

CALORIMETER, The Respiration. A
respiration calorimeter is an instrument of
precision by means of which gaseous exchange
and heat production can be measured. It com-
prises a chamber in which the interchange of
gases and the production of heat occurs, the
walls of which are air-tight and heat-proof,
with accessory devices by which any gases
added to or removed from the air of the cham-
ber are measured, while the heat imparted to
the air of the chamber is also removed and its
quantity determined. The apparatus was origi-
nally designed for use in the study of funda-
mental problems of physiology with the living
organism, particularly with respiration, but it has been found valuable for a great
variety of other uses.

Investigations of nutrition commonly com-
prise what are known as complete metabolism
experiments. The subject, for example a man,
is given a prescribed diet during an experi-
mental period which may continue several days.
All his food and drink and all solid and liquid
excreta are weighed and samples analyzed.
From a comparison of the quantities of ele-
ments and compounds in the materials taken
into and given off by the body it is possible
to tell whether the store of material has in-
creased or decreased under the experimental
conditions. In order that the balance may be
complete, however, it is necessary to include
with the data obtained by analysis of the solids
and liquids, the quantities of oxygen consumed,
and those of water vapor and carbon dioxide
given off by the lungs and skin. To this end
the subject remains during some part or all
of an experimental period in a device called
a respiration apparatus by means of which these
quantities may be measured. From all of the
data thus obtained it is possible to estimate with
considerable accuracy the actual transformation
of matter within the body.

The transformations of energy are likewise
learned from comparison of the intake and
the
output of energy by the body, the quantities of energy being measured as heat, because other kinds of energy can be converted into heat and whatever the nature of the energy utilized in the body it is ultimately converted into heat, and eliminated from the body as such. The actual income of energy to the body is the difference between the potential energy of the combustible material in the food and drink and that of the oxidized residues of food and body material in the solid and liquid excreta, which are determined by burning samples of each in oxygen in a bomb calorimeter. The actual output of energy by the body is the heat resulting from the expenditure of energy in the maintenance of bodily functions and the performance of muscular work. To measure the amount of energy given off from the body and after it leaves is determined, and from these data the quantities of gases imparted to the air by the subject are ascertained. By another method somewhat similar the air leaving the chamber is passed through purifying devices which remove all the carbon dioxide and water vapor from it, the amount of each being found from the gain in weight of its absorber. The quantities of gaseous exhalation can be determined with considerable accuracy in such manner, and with small animals as subjects the consumption of oxygen can also be ascertained; but with larger animals, such as man, the determination of the quantity of oxygen consumed is somewhat more difficult. This can be accomplished more readily by the closed circuit method in which air is withdrawn from the chamber, passed through the purify-

Respiration Calorimeter, in Laboratories of the United States Department of Agriculture, Washington, D. C.

as heat, the respiration apparatus in which the subject spends the experimental period is arranged also as a calorimeter. The term "respiration calorimeter" is intended to signify that the device measures simultaneously the respiratory exchange and the heat output of the body. In recent years a large amount of work has been done with the respiration calorimeter in experiments in which measurements of the gaseous exchange and energy production were the chief end, few or none of the other factors of income and outgo being considered.

Several methods of measuring the respiratory exchange are employed. One of the simplest is that in which a constant current of air is passed into and out of the respiration chamber by means of pipes through the walls, which are otherwise air-tight. The volume of air passed through the chamber is measured, and the composition of the air before it enters ing devices and returned again to the chamber, and oxygen is supplied to it to replace that used by the subject. The gain in weight of the air purifiers shows how much carbon dioxide and water vapor were brought out of the chamber, and the loss in weight of the oxygen container shows how much of this gas was admitted to it; from these data, with allowance for any change in the composition of the air of the chamber, the actual respiratory exchange by the subject is determined.

Various methods are also employed to determine the amount of heat produced by the subject in the respiration calorimeter. One method in common use at the present time is to take up the heat as fast as it escapes from the body by a current of cold water flowing through a coil of pipe in the chamber. From the weight of water flowing through the coil and the difference between the temperature of the water entering and that of the water leaving
the coil, the quantity of heat carried out is computed. This constitutes the major part of the heat given off from the body of the subject. A small part, however, leaves the chamber as latent heat. The temperature of the air in the chamber is controlled so that no heat will be transmitted through them from within or without. The illustration gives a general view of a respiration calorimeter of this type as employed in the laboratories of the United States Department of Agriculture in investigations with men and women. The respiration chamber of this apparatus is 6½ feet long, 4 feet wide and 6½ feet high. Though it is rather small, a person can remain in it very comfortably during a period of even several days' duration. The subject enters the chamber through the large opening in the side in which a pane of glass is sealed during an experiment, thus serving as a window, though there is a small electric light inside to provide further light if needed. There is also a small electric fan to keep the air stirred, and a telephone by which the subject may communicate with those on the outside. On the walls are hooks for clothing and shelves for books, food receptacles and the like. A tubular opening in one wall, called the "food aperture," has a tightly closing door on each end by means of which receptacles for food and excreta and other objects may be passed into or out of the chamber. The furniture, which varies with the character of the experiment, comprises a chair, a table and a cot, which may all be folded into small bulk, and devices with which definite amounts of muscular work may be performed. The present apparatus is sufficiently accurate for the purpose for which it is used is demonstrated by the fact that it measures at least 99 per cent of the quantities of oxygen used and of water vapor, carbon dioxide and heat produced when known amounts of alcohol are burned in test experiments within the chamber.

The first respiration calorimeter employed in America was devised and constructed in the laboratory of Wesleyan University by the late W. O. Atwater, then director of the Office of Experiment Stations of the Department of Agriculture, and professor of chemistry, and Dr. E. B. Rosa, of the United States Bureau of Standards, then professor of physics at Wesleyan University, who began work on it in 1892. The original device combined an open circuit respiration apparatus similar in principle to that of Pettenkofer of Munich, but was altered in detail in accordance with modifications in method of investigation; and a calorimeter that was quite original, the principal features of which were suggested by Professor Rosa. The completion of this apparatus and the continuing experiments with it were the outcome of the investigations on the nutrition of man which were begun by the United States Department of Agriculture in 1894, and were put in charge of Professor Atwater. During the 12 years in which it was in use at Wesleyan University the respiration calorimeter was considerably modified, particularly with respect to the exchange of oxygen and carbon dioxide, being changed from an open to a closed circuit type to afford better means of determining the consumption. In 1907 it was transferred to Washington and completely reconstructed in the laboratory of the Department of Agriculture, where it continues in use at the present time. The apparatus, larger and less cumbersome, is a smaller respiration calorimeter of similar nature but with modifications that make it to a considerable extent automatic in operation, has been constructed and employed for use in the study of metabolic activity of small magnitude, as, for example, the ripening of fruits, the wintering of bees and other problems.

Respiration calorimeters are important aids in research and are in use in many laboratories. They have been found of great value for clinical purposes and for the study of pathological and other medical problems as well as general problems of health and hygiene. Their application to botanical research opens up a large field which is very promising from a theoretical as well as from a practical standpoint.

CHARLES F. LANGWORTHY, United States Department of Agriculture.

CALORIMETRY ("heat measurement"), the art of measuring the quantity of heat that a body absorbs or emits when it passes from one temperature to another, or when it undergoes some definite change of state. In order to execute such measurements it is first necessary to adopt some convenient and accurate unit, in terms of which the quantities of heat that are to be measured can be expressed. Several such units have been proposed, but none has yet met with universal favor among physicists. One of the simplest that has been suggested (at least so far as the principles involved are concerned) is the quantity of heat that is required to melt 1 kilogram or a pound of ice. Evidently it will require precisely 10 times as much heat to melt 10 pounds of ice as to melt 1 pound, and hence, if the quantity of heat required to melt one pound of ice is taken as the unit of heat, the measurement of any given quantity of heat becomes reduced to the simple operation of observing how many pounds of ice the proposed quantity of heat can melt. The earliest form of heat-measuring device (or "calorimeter") based upon this idea is that invented by Dr. Joseph Black about the year 1760. It consists simply of a block of clear ice, in which a cavity is made, the cavity being closed by a slab of ice laid upon the main block. To make the use of this device plain, let us suppose that it is desired to determine the quantity of heat that is given out by a certain fragment of platinum in cooling from 100°F. to the freezing point. The chamber in the block of ice is first carefully wiped dry, and the platinum, heated accurately to 100°, is quickly introduced, and the covering lid of ice is laid in place. The platinum gives up its heat to the ice about it, with the result that a certain weight of the ice is melted, and a corresponding amount collects within the chamber. When it is certain that the platinum has attained the temperature of the ice, the slab covering the excavation in the main
block is lifted off, and the water that has collected about the platinum is removed and weighed. The quantity of heat given out by the platinum in one minute is the quantity required to melt one pound of ice. Lavoisier and Laplace improved Black's calorimeter in certain respects, while retaining its main features. Their instrument consists essentially of three distinct concentric chambers. The inner one is the only one in which the experiment is to be performed; it is placed in the middle chamber, the ice whose melting is to serve as a measure of the heat given out is placed, in the form of broken lumps, in the intermediate chamber, surrounding the object to be investigated. In the outer chamber, which encloses the two other as completely as possible, broken ice is also introduced, to prevent the conduction of heat into the apparatus from the outside. The quantity of ice melted is determined by observing the amount of water that is formed in the middle chamber, this being drawn off by a conveniently situated tube and tap. This apparatus has been described as an improvement upon that of Black; but the only way in which it is superior to that instrument is in the respect that it does not call for large blocks of pure clear ice. In other particulars it is somewhat inferior to the simpler apparatus of Black. The quantity of water that is produced, for example, cannot be determined with the same degree of accuracy as in Lavoisier and Laplace's instrument. The ice calorimeter of Bunsen was a far greater advance. This ingenious apparatus consists of an inner chamber, for the reception of the object to be studied, and an outer enveloping one, which is entirely filled with a mixture of ice and water, and from which a graduated capillary tube is led away. The whole instrument is surrounded by broken ice, as in Lavoisier and Laplace's form, in order to protect the interior parts from the effect of external thermal influences. When the apparatus is in perfect working order, the mixture of ice and water in the intermediate chamber should be neither melted nor freezing, but should be in exact equilibrium in this respect.

Upon the introduction of the object to be studied into the central chamber, the ice in the intermediate chamber begins to melt, just as in the types of calorimeter already considered; but the essential peculiarity of Bunsen's instrument consists in deducing the quantity of ice that is melted by observing the change of volume of the contents of the intermediate chamber, as shown by the motion of the water in the graduated capillary tube that leads away from that chamber; advantage being taken, for this purpose, of the known fact that ice diminishes in volume upon melting, so that when the exact diminution in the volume of the contents of the intermediate chamber is known, we can calculate with a considerable degree of precision the quantity of ice that has been melted. Bunsen's calorimeter is an admirable instrument, capable of giving results of great accuracy when intelligently handled.

Another unit of heat that suggests itself quickly upon the question is the quantity of heat given out by a pound of steam when it condenses into a pound of water at the same temperature. A calorimeter based upon this idea was also used by Bunsen, but the steam calorimeter was brought to its present excellent form largely through the labors of Dr. J. Joly. In his type of the instrument the object to be studied is suspended from one arm of a delicate balance. After being accurately weighed, the object is bathed in an atmosphere of steam, with the result that it absorbs a certain amount of heat as its temperature rises to that of the steam. But the heat thus absorbed by the body under examination can be obtained only from the steam itself; and since we never have the steam part with heat in this way without condensing, it follows that there is deposited upon the body a weight of condensed moisture that corresponds precisely to the quantity of heat that has been absorbed. The amount of this moisture is determined by careful weighing; and it is evident that the quantity of heat absorbed by the experimental body in passing from its original temperature to the temperature of the steam is then immediately known, if we take, as the unit of heat, the quantity of heat that is given out by a pound of steam in condensing into a pound of water at the same temperature. In practice, numerous corrections are of course necessary, as with all other instruments of precision. It may be imputed to the apparatus and the steam calorimeters are primarily intended to determine the heat emitted or absorbed by a body in passing from any given temperature to some one particular temperature that is always the same (that is, the freezing-point in the one case and the boiling-point in the other), yet it is always possible to determine the quantity of heat emitted or absorbed by the body between any two temperatures, by performing two experiments in succession, the body having these respective temperatures as its initial temperatures in the respective experiments. It is plain that the quantity of heat emitted or absorbed between the proposed initial and terminal temperatures can then be obtained by simply subtracting one of these results from the other.

Another and more familiar unit of heat is the quantity of heat required to warm a given weight of water one degree on a given thermometric scale. (See Calorific.) Thus in general engineering practice in the United States and in England, it is customary to define a heat unit as the quantity of heat that is required in order to raise the temperature of a pound of water one degree on the Fahrenheit scale. This definition is good enough for rough purposes, because it conveniently happens that there is no great difference between the quantity of heat required to warm a pound of water from 32° to 33° and the quantity required (for example) to warm it from 99° to 100°. This, however, we can only regard as a fortunate accident; and for accurate scientific purposes we must recognize that the equality is only approximate, and we must adopt some particular temperature range as a part of our definition. Thus it is common to define the British heat unit, when great accuracy is desired, as the quantity of heat required to raise the temperature of a pound of water from 59° to 60°; although some authorities, apparently without sufficient reason, make the temperature range from 32° to 33°, and others have chosen other positions on the temperature scale for the defining degree. It is unfortunate that no general agreement has yet been reached on this point. In accurate scientific work the unit of heat is usually taken as
the quantity of heat required to warm a kilogram of water from 15° C. to 16° C., or (which is practically the same thing) from 14.5° to 15.5° C. It would appear that several very good results may be added at 40° C. as the standard temperature to be used in defining the heat unit. For example, the specific heat of water has its minimum value not far from that point; or, in other words, any small uncertainty in the actual realization of the temperature contained in the definition would have little or no effect if that temperature were 40° C. Again 40° C. is the temperature at or near which the differences between the various thermometer scales that are in practical use reach their maximum; and this means that at or near this temperature a slight error in the standardization of the thermometer that is used would have the least effect upon the verification of the heat unit. Moreover, 40° C. (104° F.) is a touch warmer than the assumed 30° C.; the general temperature of the laboratory in which work is being carried out; and it is well known to be easier to realize a temperature that is lower than that of the surrounding air, than it is to realize one that is lower. From every point of view, therefore, 40° C. (or thereabouts) would appear to be the best temperature to assume in establishing the definition of the heat unit; a unit of heat being then defined as the quantity of heat required to raise the temperature of a kilogram of water from (say) 39° C. to 40° C. Yet, cogent as these reasons would appear, no authority has yet suggested this particular temperature as the standard.

In measuring the quantity of heat emitted by a body by observing the change of temperature produced in a given mass of water when the water absorbs the heat so emitted, a great variety of forms of apparatus may be used. In some cases the heated body may be plunged into the water directly, the water being kept well stirred, and its temperature taken at the beginning and end of the experiment. In other cases, and especially when the body under examination cannot be allowed to come in contact with the water, it is necessary to adopt some other method, such as enclosing the experimental body in a water-tight envelope of some kind, and afterward making due allowance for the heat capacity of the envelope. In cases, for example, in which the heat generated by the combustion of fuel is to be measured, the fuel must be enclosed in an air-tight crucible, to which oxygen is admitted by one tube, and from which the products of combustion are drawn off by another. The crucible is surrounded by a mass of water that is disposed in such a way that it is likely an average of the heat that is produced as possible. A direct observation of the temperature of the water in the calorimeter is made before and after the combustion, and the change of temperature so obtained gives a first approximation to the amount of heat that has been liberated.

This result has to be corrected, however, for the thermal capacity of each part of the calorimeter that has been warmed during the experiment, and for that of the gases admitted and drawn off, and also for any loss of heat that may have occurred through radiation. The precise details of the corrections will vary, however, with the design of the calorimeter, and with the mode of conducting the experiments.

For a discussion of the relations of the different units of heat that have been mentioned above, and for an account of the experiments that have been made for determining the differences in the heat capacity at different temperatures, see Heat (q.v.) constructed on a large scale are used to measure the amount of heat given off by an animal or human being, the amount of food and air supplied being recorded. Considerable success has been attained in ascertaining the fuel value of various foods by W. O. Atwater and by the Nutrition Laboratory of the Carnegie Institution of Washington. A very good account of the subject of calorimetry in general will be found in Preston's 'Theory of Heat' (London 1894), which also contains valuable references to original papers. The various forms of calorimeter that are used in practical engineering are explained and illustrated in Carpenter's 'Travels and Wonders of Engineering' and in almost all general textbooks on physics. Consult 'Philosophical Transactions of the Royal Society of London' (1894), and Wiedemann's 'Annalen der Physik und Chemie' (Vol. XXXVII, p. 494, 1889). See Fuel.

CALOTROPIS, a genus of asclepiads forming shrubs or small trees natives of the tropics of Asia and Africa. There are three species, and their flowers have a somewhat bell-shaped corolla, expanding into five divisions. C. gigantea, the largest of the genus, forms a branching shrub or small tree about 10 feet high, with a short trunk four or five inches in diameter. Its flowers are of a pretty rose-purple color. Cloth and paper have been made from the silky down of the seeds. The bark of the roots of some species furnishes the substance called mudder, which is used in India as a diaphoretic. The juice has been found very efficacious in the cure of elephantiasis, in syphilis and anasarca. From the bark of the plant is made a substance called mudderine. The bark of the young branches also yields a valuable fibre. The leaves warmed and moistened with oil are applied as a dry fomentation in pains of the stomach; they are a valuable rubefacient. The root, reduced to powder, is given in India to horses. An intoxicating liquor, called bar, is made from the mudder by the hillmen about Mahabaleshwar, in the western Ghauts.

CALOTTISTS (French Calottiste, kal'o-tistes'), or the Régiment de la Calotte, a society which sprung up at Paris in the last years of the reign of Louis XIV, and took its name from the word calotte, a flat cap formerly worn by the absbee and which was the symbol of the society. All were admitted whose odd behavior or character, foolish opinions, etc., had exposed them to public criticism. Every one who made himself particularly ridiculous received letters, patent authorizing him to wear the calotte. They had a singular coat of arms, on which was the sceptre of Momus, with bells, apes, rattles, etc. On their principal standard were the words, Favet Momus, luna infelix. On the death of Torsac, the colonel of the Calottists, the death of the Emperor (in allegorical style) which the Calottists pronounced on this occasion, was suppressed. Aimon, colonel of the guards, hastened to Marshal Villars with their complaints, and concluded with the
words, "My lord, since the death of Alexander and Caesar, the Calottists have not had any protector besides you, and the order was re- tracted. They became, however, too bold, attacked the ministers and even the King himself; and the regiment was in consequence dissolved. After the restoration the epiphlet, Régime de la Calotie, was applied to the clerical influence in politics. The "Mémoires pour servir à l'Histoire de la Calotie" (Basel 1725) is an amusing little book. Consult "Journal historique et anecdotique du règne de Louis XV de l'avocat Barbier" (ed. 1857).

CALOTYPE, a photographic process invented by Talbot, and patented in 1841. Paper saturated with nitrate of silver is dried and then immersed in a solution of potassium iodide for a few minutes, and again dried and kept in the dark. When wanted for use it is brushed over with a solution of gallo-nitrate of silver, and immediately exposed in the camera. The image thus formed may be left to develop itself, and then thoroughly washed and fixed with hyposulphite of soda; or a customary developer may be used. The process is no longer in use commercially, but is occasionally revived by amateurs.

CALOVIO (Latinized form of original German name, KALAU), Abraham, German Lutheran theologian; b. Mohrungen, Prussia, 16 April 1612; d. 25 Feb. 1666. He became rector of the gymnasium in Danzig (1643) and professor of theology in Wittenberg (1650). He was the chief representative of controversial Lutheran orthodoxy in the 17th century, and waged war incessantly on Arminian, Socinian, Reformed and Roman Catholic doctrines, and with the greatest bitterness against Calixtists. He was six times married, the last time in his 72d year. His chief writings are "Systema Locorum Theologicorum" (12 vols., 1655-77); "Biblia Illustriata" (4 vols.), defending the orthodox views of inspiration against Grotius.

CALOYRS (σαβύς, "beautiful", ροδός; and ἀνές "an old man"), Greek monks belonging with a few exceptions to the order of Saint Basil, who lead a very austere life, eating no meat and observing the fasts of the Greek Church rigidly. They do not even eat bread unless they have earned it. During their seven weeks of Lent they pass the greatest part of the nights in meditation and grief for their own sins and those of others. The caloyrs of the Greek Church occupy a position of much greater importance than the members of the religious fraternities of the Church of Rome, inasmuch as all the higher Church dignitaries—bishops, archbishops and patriarcs—are chosen from their number. They are, indeed, the only individuals in the Greek Church who are instructed in theology and even among them the amount of theological learning is very limited. They are commonly educated at the monasteries on Mount Athos, and on the isle of Patmos, but besides these there are many monasteries dispersed over the archipelago and the Morea, and a few elsewhere belonging to this class of monks. Their most celebrated monastery in Asia is at Mount Sinai. They do not all agree as to their mode of life. Some of them are cenobites; that is, they live in common. Others are anchorites, living alone, or with only one or two companions; and others again are recluse, who live in grottoes or caverns in the greatest retirement, and are supported by alms supplied to them by the monasteries of the hills. There are also convents of female caloyrs. The Turks sometimes call their dervishes by this name.

CALPE, kāl'pē, the ancient name of the rock of Gibraltar (q.v.), at the southern extremity of Spain, the northern of the two hills called by the ancients the "Pillars of Hercules" (q.v.). Across the straits of Gibraltar, on the African coast, was Abyla, the southern pillar.

CALPREE. See KALPI.

CALPRENÉDE, kāl'prēnē'd, Gautier de Costes de la, French romance writer: b. Tol- gou, Gascony, 1610; d. Paris 1663. He was an officer of the guards and royal chamberlain, and one of the authors who in the 17th century brought into fashion a new kind of voluminous and long-spun romances of chivalry. He wrote "Cassandra"; "Cleopatra"; and "Paramond," besides 10 tragedies, among which are "La mort de Méthridate" (1635); "Jeanne d'Angieterre" (1636); "Le Comte d'Essex" (1638). His romances were highly celebrated, and are the best of their kind. Consult Fourecaud-Lagraze, "Le Périgord littéraire; La Calprenédé" (Ribéac 1877); Morililot, "Le roman en France" (Paris).

CALPURNIA, the fourth wife of Julius Caesar, married to him 59 B.C. She was a daughter of L. Calpurnius Piso Cæsonius, who was consul 58 B.C. Shakespeare introduces her into his tragedy. "Julius Caesar." The name is also that of the daughter of L. Calpurnius Bestia, wife of P. Antistius, who took her own life when she learned that her husband was slain by order of the younger Marius, 82 B.C.

CALPURNIUS, Titus, surnamed SICULUS, Latin poet: b. about 30 A.D.; d. about 80. Seven eclogues composed by him are extant, but nothing whatever is known with certainty about his life, and even his name is doubtful. The poems attributed to him are evidently modeled on Virgil's more famous eclogues. They are exaggerated and artificial. They have been edited by Schenkl (Leipzig 1885); Keene (London 1887); and translated by Scott (London 1890). Consult Butler, "Port-Auguston Poetry" (pp. 150-59, Oxford 1909). See NEMESIUS.

CALTANISSETTA, kāl-tā-nē'sēt'a, Sicily, capital of the province of the same name, on the right bank of the Salso, 62 miles southeast of Palermo. It is fortified, and has a citadel and cathedral, with paintings of the later Sicilian school, public gardens, a seminary, a gymnasium, a school of technology, broad streets and well-built houses. In the vicinity, at Terra Pilata, are springs of petroleum and of hydrogen gas, a mud-volcano and important sulphur mines, producing annually about 5,500 tons. In the neighborhood there still stands a Norman monastery built by Roger II in 1153. Caltanisetta owes its origin to the Saracens, by whom it was called Kalat of Muro (the lady's castle). The province of the same name has an area of 1,445 square miles. Pop. 40,297.

CALTHA, the genus of ranunculaceous plants to which the marsh-marigold (C. palustris) belongs. See Cowslip.

CALTROP, a kind of thistle growing in southern Europe. It is armed with prickles,
which, if trodden on by men or animals, are capable of wounding. Hence in the military art the name of caltrop is given to an instrument with five or six projecting points, and when used in a triangular form, three of them being turned to the ground and the other pointing upward. They are used to impede the progress of cavalry.

**CALUMBA or COLOMBO**, the root of *Jateorrhiza columba*, an herbaceous plant, belonging to the family Asparagaceae, which grows in Ceylon in the neighborhood of Colombo, whence it is said to derive its name. It is imported in the form of round slices or cut pieces, the interior of which is of a greenish-yellow color, while its thick and furrowed skin is greyish-brown; its odor is slightly aromatic, but somewhat nauseous; its taste extremely bitter. Calumba is often administered as a tonic, and is considered an excellent stomachic. It is regarded as of great value in chronic diarrhea and dysentery; but it is necessary that all symptoms of inflammation should have disappeared before it can be used. It is usually given as a decoction, less commonly in the form of pills or powders. The root of an American gentian, *Fraseria cornute*, is substituted for the true calumba, and is hence frequently called the false calumba. It is not very bitter, and is almost without smell; it has no very marked effects.

**CALUMET**, Mich., township in Houghton County, at the terminus of the Mineral Range Railroad, 42 miles north of L'Anse and 68 miles northwest of Marquette. It is the seat of the famous Calumet and Hecla copper mine, the richest in the world, producing nearly 50,000 tons a year. It is the trade and supply centre of the Superior mining district, and has a national bank, several weekly newspapers, many manufactories and an assessed property valuation of over $26,000,000. A $10,000,000 water-power project on the Sturgeon River, 15 miles to the south now completed, affords cheap freight rates to a handsome number of industrial plants, elevators, and coal docks. Commerce in a recent year amounted to 6,549,576 short tons, consisting of coal, grain, iron ore and merchandise, valued approximately at $162,000,344. Pop. about 33,000.

**CALUMET**, the pipe of peace, a tobacco-pipe used by the North American Indians. On ceremonial occasions, as when Indian chiefs and warriors meet in peace, or at the close of a war with those of another nation, in their talks and treaties with the whites, or even when a single person of distinction comes among them, the calumet is handed round with ceremonies peculiar to each tribe, and each member of the company draws a few whiffs. To accept the calumet is to agree to the terms proposed; to refuse it is to reject them. Some symbols of amity are found among all nations; the white flag or flag of truce of the moderns and the olive branch of the ancients are similar in character to the Indian calumet. There is also, it appears, a calumet used in the ceremonial declaration of war and differently made from that of peace. Tobacco is smoked in the calumet and the leaves of the tobacco plant. The bowl of this pipe is made of different kinds of soft stone, especially of a kind of red soapstone, and the stem of a reed, or of some light kind of wood which is easily perforated. This stem is adorned in various ways, sometimes it is marked with the figures of animals and hieroglyphical delineations, and almost universally has beautiful feathers attached to it, disposed according to the taste of the individual or of the tribe to which he belongs.

**CALUMPIIT**, Philippines, a town of the province of Bulacan, situated in the southwestern part of the island of Luzon on the Pampanga River. It is about 27 miles north-west of Manila, with which it is connected by rail. Pop. about 15,000.

**CALVADOS**, kãlvá'dos', France, a northern maritime department, bounded on the north by the English Channel, and east and west and south by the departments of Eure, Manche and Orne. The soil is generally fertile, supplying wheat, barley, oats and rich pasturage for cattle, sheep and horses, which, with swine, constitute the principal wealth of Calvados. Fishing is also a thriving industry. Calvados is named for its cider. The climate is healthful, though changeable. Iron, marble, slate and coal are found. The area is 2,198 square miles. It is so called from Calvados, corruption of 'Salvador,' the name of a vessel of the Spanish Armada, which was wrecked on the coast here. Capital, Caen. Pop. 396,310.

**CALVAERT, kãlvâr', Dionys (called in Italy Dionisio Fiammingo), Flemish painter: b. Antwerp 1555; d. Bologna, Italy, 17 March 1619. He went very young to Italy as a landscape painter, where, in order to learn how to draw figures, he entered the school of Pontana and Sabbatini, in Bologna, with the latter of whom he visited Rome. After having passed some time in copying the paintings of Raphael, he opened a school at Bologna, from which proceeded 137 masters, and among these Albano, Guido and Domenichino. The Bolognese regarded him as one of the restorers of their school, particularly in respect to coloring. Calvaert understood perspective, anatomy and architecture; but the attitudes of his figures are sometimes mean and exaggerated. His best paintings are to be seen at Bologna and others are to be found in England, Dresden and Vienna.

**CALVARY**, the English name for the eminence, which was the scene of the crucifixion of Jesus Christ. It lay beyond but near Jerusalem, and by some it is identified with the old House of Stoning, or place of public execution, according to the law of Moses, on the top of the remarkable knoll outside the Damascus gate, on the north side of Jerusalem. It was from this cliff that the criminal used to be flung before being stoned (according to the Talmud), and on it his body was afterward crucified; for the spot commands a view all over the city, and from the slopes round it the whole population might easily see him. In the Catholic countries the name is applied to the representation of the passion and crucifixion, by three crosses, with life-size figures of Christ and the thieves and a number of surrounding figures, representing the most present at the crucifixion. The Calvary at Aix-la-Chapelle is represented by a church on a hill, around which are 12 stones, with sculpture marking the events which occurred on the journey of Jesus to Mount Calvary. The road leading to Calvary is called *Via Dolorosa*.9
CALVÉ—CALVIN

CALVÉ, kā'vō, Emma, French opera singer: b. Madrid, Spain, 1864. Her real name is Emma Rodriguez de Fermoselle, and she was a descendant of a Spanish mother and French father, and was educated in a convent school in the south of France. She studied under Rosine Laborde and made her début at Brussels in Gounod’s ‘Faust,’ 1882. She has made successful tours of the United States in leading rôles, her first appearance in New York being on 29 Nov. 1893; and has been popular in opera comique and grand opera in Europe. Some of her best rôles are ‘Chevalier Jean’ (1885); and Massenet’s ‘Navarrese’ (1895). After 1899 she devoted herself to concert tours.

CALVERLEY, Charles Stuart, English poet and humorist, son of the Rev. Henry Blayds: b. Martley, Worcestershire, 22 Dec. 1831; d. London, 17 Feb. 1884. In 1852 his father dropped the name of Blayds and resumed that of Calverley, formerly borne by his family. He was educated at Christ’s College, Cambridge, and during his college career showed great skill in Latin and Greek composition, in 1856 was second in the classical tripos and was appointed fellow in 1858. As a writer of English poetry he could not hope to become self famous. He afterward studied for the bar, and was called in 1865, but his promising legal career was cut short by a serious accident which befell him on the ice in the winter of 1865–67. The effects of this misfortune clouded the whole of the remainder of his life. As a parodist and writer of light verses Calverley is perhaps unequalled, but his published volumes are not numerous. The earliest of them appeared in 1862 under the title of ‘Verses and Translations’; and the others are ‘Translations into English and Latin’ (1866); ‘Theocritus Translated into English Verse’ (1869); ‘Fly Leaves’ (1872); and ‘The Idyls of Theocritus and the Eclogues of Virgil Translated into English Verse; with an Introduction by R. Y. Tyrell’ (London 1908). A ‘Memoir and Literary Remains’ were published by Sendall (London 1885).

CALVERT, George. See Baltimore Family.

CALVERT, George Henry, American writer: b. Baltimore, Md., 2 Jan. 1803; d. Newport, R. I., 24 May 1869. He was a grandson of Lord Baltimore. After graduating at Harvard in 1823 he studied in Göttingen; then returning to Baltimore, became editor of the American and a contributor to various periodicals. In 1843 he removed to Newport, R. I., of which city he was elected mayor in 1853. His published books include ‘Illustrations of Phrenology’ (1832); ‘Poems’ (1847); ‘Joan of Arc’ (1860); ‘Goethe, his Life and Works’ (1872); ‘Brief Essays and Brevities’ (1874), and ‘Wordsworth: a Biographical Study’ (1875); ‘Three Score and Other Poems’ (1883). He translated the correspondence of Schiller and Goethe (1845) and Schiller’s ‘Don Carlos’ (1836).

CALVERT, Leonard. See Baltimore Family.

CALVI, kä'vë, Lazzaro and Pantalone, Genoese painters, sons of Agostino Calvi: the former b. 1502; d. 1568; the latter d. 1595. They painted in concert many pictures in Genoa, Monaco and Naples. In particular, the façade of the Palazzo Doria (now Spinola), a spirited composition crowded with figures highly exalted. Lazzaro was the more inventive genius of the two, his brother generally working out the details of their joint productions.

CALVIN (modified from the French form Cauvin or Cauvlin), John, Swiss reformer of the 16th century: b. Noyon, Picardie, 10 Oct. 1509; d. Geneva, Switzerland, 27 May 1564. Though born in humble condition, his father, as procureur-fiscal of the district of Noyon and secretary of the diocese, was able by personal influence to further the interests of his family. Calvin’s mother, Jeanne Lefranc, was distinguished alike by personal beauty and piety. Even as a lad Calvin was deficient in physical vigor, but gave early tokens of more than ordinary intellectual powers, a circumstance that attracted to him the regards of a noble family at Noyon who received him under their care and gave to him the same opportunities of schooling as were enjoyed by their own children (1523). It was his father’s original intention to fit him for the priesthood and in pursuance of that end he entered the Collège de la Marche at Paris; then to the Collège Montaigu where he was trained in logic by a learned Spaniard who afterward directed the education of Ignatius Loyola while a student at the same university. He easily stood in the front rank of his fellow-students but was little disposed to affiliate with them, and from a certain unsocial severity of bearing acquired among them the nickname of the Accusative Case. At the age of 12 he received part of the chapel revenue of Noyon in return for some services there. In 1527 his father secured for him the curacy of Saint Martin de Martinville, from which he resigned in 1529, in favor of his younger brother, and in the same year exchanged the curacy for that of Pont l’Evêque, his father’s birthplace.

Then his father changed his plans with reference to John and determined to have him prepared for the profession of law, putting him for that purpose under instruction at Orleans (1528), where he studied first at St. Ouen, then at d’Etoile and Bourges (1530), where he applied himself to his studies with the same assiduity evinced at Paris, and attained immediate distinction, though at the expense of impaired health. Without confining himself strictly to the curriculum of the school he devoted himself at the same time to the study of Greek under the German professor, Melchior Wolmar, whose Protestant views strengthened the bias toward the new faith already existing in his pupil’s mind, for his attention had previously been drawn to the careful study of the Scriptures by his kinsman Olivetan, the first Protestant translator of the Bible into French. When Calvin was 22 his father died, whereupon the young man gave up his law studies and returned to Paris, where he met Le Fèvre and Farel, studied theology, issuing soon after his first publication, an annotated edition of Seneca’s ‘De Clementia.’ Up to this point it is safe to presume that his interests and ambitions were purely those of a humanist, and whatever thought he may have had in regard to the need of reform in the matters of Church doctrine
and discipline, he doubtless felt with Erasmus and Reuchlin that all the reforms that might be required would come about as the result of completer knowledge.

It was not long after this that he experienced what he calls his "sudden conversion." He writes: "After my heart had long been prepared by the most earnest self-examination, on a sudden the full knowledge of the truth, like a bright light, disclosed to me the abyss of errors in which I was wandering, the sin and shame of which I was left to feel. I saw the presence is near of kin to that of Luther, and we are set thinking also of the "great light" that shone upon Saul as he was nearing Damascus. Yet with all the profound disclosure thus made to him, he still felt no special call to the work of preaching the reformed doctrine and sought only for the undisturbed retirement that would permit him farther prosecution of his serious studies.

His friend Nicholas Cop had been elected to the chairmanship of the University of Paris and at his request Calvin prepared for him an inaugural address which was substantially a defense of the reformed doctrine (1533). To the Sorbonnists this was intolerable, and Calvin was forced to leave Paris. He spent some time at home, read the Bible, and then returned for a while to his native place, resigned the preference he held in the Roman Catholic Church and for nearly three years led a wandering life. We find him at Saintonge; at Nérac, the residence of the Queen of Navarre; at Angoulême, with his friend Louis Tillet; then in Paris again. To escape persecution in France, he fled to Basel, where in 1536, at the age of 26, he published his Institutes. This remarkable work was intended to be a vindication of the Protestant doctrine, and its dedication to the reigning king, Frances I, sought to create royal sympathy for the cause and for its persecuted adherents. It has been claimed that no other work, written at so early an age, has produced such a marked influence upon the opinions and practices both of contemporaries and posterity. Although the book as then composed was but the germ of what it was subsequently developed into, yet the line initially laid down by Calvin never swerved from. By his Catholic opponents his work was styled the "Koran of the heretics."

After completing this work he went for a short time to Italy to visit Renée, the Duchess of Ferrara. Finally he made a visit to his native town; and after selling the paternal estate, which had devolved on him at the death of his eldest brother, set out with his brother and sister for Strassburg. The direct road being dangerous, they went through Geneva. The situation, political and religious, which he there confronted, however, vetoed his plans and really determined his entire subsequent career. That situation briefly outlined is as follows: The Duke of Savoy, unable to secure the submission of Geneva, had by the aid of Pope Leo X forced upon the city the reluctant acceptance of John, the Bastard of Savoy, as bishop, it being stipulated that the civil administration of the city should be vested in the Duke. The Genevese revolted under the lead of John Bodmer, with whose daughter, Berthelier was executed and Bonivard became the "Prisoner of Chillon" (1530-36). Defeat did not, however, extinguish the spirit of revolt. Of the two parties into which the Genevese were divided, the Confederates ("Eidgenossen," a word from which perhaps comes the word Huguenot) looked for relief to the Swiss, and the Mamelukes favored supporting the Duke. The Confederates prevailed, the Duke was defeated and all power both military and civil passed into the hands of the people. This was in 1533.

To this civil overturning succeeded an ecclesiastical revolution. Protestant tendencies had established themselves in Bern, and from there had extended themselves to Geneva. The struggle in the latter place was a severe one, but Protestantism gained ground till under the leadership of Farel and with the assistance of Bern an ecclesiastical reconstruction was effected, the bishop driven out, Protestantism established and Geneva left independent. This meant not only a new form of doctrine and mode of worship, but a reformed system of morals, and thereby a strain put upon the large profligate element of the population which worked a reaction strenuously encouraged by the Savoyards and the Catholic priests. The entire city was in this way wrought into a condition of tumultuous faction, and it was just in the midst of this upheaval that Calvin arrived at Geneva as already stated, and took lodgings for the night with the distinct intention of going on to Basel the next day. Farel, who was in charge of the Protestant movement, learned of Calvin's presence in the city, through Louis du Tillet, got into communication with him, and in an interview graphically described by Calvin in the preface to his 'Commentary on the Psalms' (a work especially rich in autobiographical references), entreated him to remain and help work out the problem of Protestantism in Geneva, denouncing upon him the curse of God if he refused. Calvin was aye-stricken by what seemed to him the prophetic deliverance of Farel and yielded to his Elijah-like exultation, so that the dictum is well justified that "Farel gave Geneva to the Reformation and Calvin to Geneva."

He prefaced his work in Geneva by introducing and setting in operation a series of stringent regulations relative to doctrine, discipline and daily conduct. Amusements like dancing and card-playing were punishable offenses, not because in his judgment inherently wrong, but because so abused that the only safe course was to prohibit them altogether. The stringency of this policy excited a revolt led by the Libertins, so styled, and participated in even by many of the same "Eidgenossen" that had helped wrest Geneva from the grasp of the Duke. The opposition culminated in an act of Council expelling Calvin and Farel from the city (1538), the latter going to Neuchâtel, and Calvin to Strassburg, where, with a sense of relief, he thought to find himself free to gratify his tastes and resume his studies. Here again, however, as at Geneva, he was stirred by an intimidating call and applied himself to the work of ministering to the French refugees there gathered. It was during his stay in Strassburg that he married a lady of admirable character, Ida, but the Defeas of Strassburg with the hood of Liége, with whom he lived in relations of tender attachment till her death nine years later, their only child, a son, dying in early infancy.
In Geneva, in the meantime, matters had been going from bad to worse, till by the united voice of government and people Calvin was called. Crime and vice had become rampant. Catholics were planning for the restoration of the old faith. Cardinal Sordelet had addressed to the people a flattering and coaxing letter, calling them back to the Catholic Church. To that letter Calvin while still in Strassburg had published a reply both sagacious and masterly. Bern was suspected of having ambitious political designs on the city. The local government was too weak to maintain itself amid such a storm of conflicting elements and so after three years the people turned again helplessly to the man they had exiled. He fought against the overtures tendered him but was overborne by their earnestness and unanimity and came back to Geneva to make there his life-long home (1541).

Calvin entered at once upon his office of administrative head of the city, considered in both his ecclesiastical and civic character. Though confined to the two in his own capacity, he was no Erastian, and Church and State stood to him as theoretically distinct, and yet contributing, each, to the interests of the other, the Church infusing its spirit into the State and the State in turn furnishing authoritative support to the Church. Civil authority, previously widely distributed, he made more oligarchic and vested it primarily in what was known as the "Little Council of Twenty-five." The code devised for the city bears everywhere the marks of Calvin's authorship. For this his legal training especially qualified him. Larger and smaller matters alike came under his purview. Like the English Englishman the Genevese legislator traced his system of enactments by a liberal infusion of the Mosaic letter and spirit. Ecclesiastical discipline was delegated to the Consistory, composed at first of 18 members, 6 clerical and 12 lay, with Calvin as its president. The city was divided into districts or parishes and a system of vigilance so thoroughly organized that every family was at least once a year visited by responsible parties for purposes of censure, counsel or relief.

Although introducing his administration with a measure of moderation, its animus soon evinced itself in a way that made evident the lawless and vicious classes what it was they had to contend with, and a wide-reaching opposition began immediately to organize itself. This opposition included the Libertines and the "Patriots," which latter class bitterly opposed the close aristocratic lines with which the previous popular government had been replaced and regarded with jealousy the foreigners that in great numbers were coming to make their home at Geneva. The enmity toward him and his administration was still further fanned by the irrational and mercenary severity shown in the punishment of small offenses, such as the beheading of a child for striking its mother, the committal of heretics to the flames, the eliciting of testimony by torture. His rule was one of terror and he was hated and published. Mobs attempted to intimidate him. Dogs in the street were named after him. To antagonize Calvin was a crime, as Castello found to his cost, and to speak disrespectfully of predestination, as did Bolesec, a felony. But cases like these two are quite eclipsed by the instance of Servetus.

Servetus was a Spaniard, a scholar of independent thought, who convinced himself of the groundlessness of papal claims, but without cordially accepting the theology of Protestantism. In 1531 he published a book entitled 'The Errors of the Trinity.' Irritated by Calvin's treatment of him and his speculations he resorted upon him and the Reformed doctrine flatly and acrimoniously. Though out of sympathy with the Roman Catholic Church Servetus continued for 20 years in outward conformity with its doctrine and discipline and then wrote another volume under the title 'The Restoration of Christianity.' This was issued by him during his residence at Vienne and resulted in his arrest at the instance of the archbishop. A copy of the work came under Calvin's eye, who declared that if Servetus were to come to Geneva he should not get away alive if his authority was sufficient to prevent it. Having escaped from Vienne Servetus did come to Geneva, where his presence was known to the knowledge of Calvin, who ordered his arrest. Thirty-eight heretical propositions were alleged against him, among others the rejection of the Trinity and speculation leaning toward pantheism; and, although he conducted his defense with vigor and with a degree of acuteness, he was condemned and, to the disgrace of the Protestant cause, was burned a little way out from Geneva on 27 Oct. 1553. It is claimed in behalf of Calvin that he tried to mitigate the severity of the penalty. However that may be, he was set on pursuing Servetus to the death, and it is on record that he wrote as follows to Farel two months before the execution.—"I hope the sentence will be capital but desire the atrocity of the punishment to be mitigated." It has to be remembered however that all of this was in keeping with the barbarism of the age and that so gracious-spirited a man as Melancthon gave to it his assent. After the execution of Servetus and the expulsion of the Libertines two years later, Calvin's power in Geneva was firmly established. He used his influence vigorously for the defense of Protestantism throughout Europe. By the mediation of Theodore de Bèze he made his influence felt in France in the great struggle on there between the hierarchical party with the Guises at its head and the Protestants led by Condè and Coligny. In 1561, his energies began to fail, and after much bodily suffering, he died.

During the entire course of his conflict with heresy and the Libertines, Calvin was actively engaged in preaching and lecturing. He had crowds of hearers from all parts of Europe. Protestant refugees were invited upon his lectures and discourses and went back carrying with them the impression made upon them by his doctrines and personality. Thus was he able to stamp himself ineffacably upon the religious thought of his own and aftertimes, and to cause Geneva to sustain to the Latin nations in particular a relation similar to that subsisting between Wittenberg and the Germanic. The weight and permanence of the influence he exerted was due partly to his own idiosyncrasies. Both his mode of thinking and point of action were measurably determined by his natural temperament and his physical debility. He
CALVINISM—CALVINISTIC METHODISTS

was composed principally of will and brain, with too little of the tenderer sensibilities to sweeten the action of the one or to rectify the aberrations of the other. Naturally enough then he made the doctrine of God’s sovereignty the keystone of his system, and could conceive of heresy as being none other than the unpardonable sin. The same combination of volitional and intellectual genius made him also a born organizer, enabling him to compact and mature the reform tendencies of the times into a corporate whole where before everything had been incipient and sporadic.

Calvinism is Augustinianism in its developed and Protestant form, the two theologians coinciding in their views of predestination, sin and grace, though differing in the matter of justification and other less important matters. The keynote of Calvinism is not predestination, as is sometimes claimed, but divine sovereignty, out of which, understood as Augustine and Calvin understood it, predestination issues as a necessary corollary. Predestination so derived carries with it the notion that those who are elected to be saved are so elected by the arbitrary action of the divine will;—He hath mercy on whom he will have mercy, and whom he will he hardeneth. The motive, therefore, leading to God’s exercise of grace in specific cases has its inexplicable grounds in the mind of God, and is nowise referable to any condition existent in the sinner. "Infralapsarianism," "Permissive Decree," etc., are merely philosophical attempts to relieve divine arbitrariness from the charge of immorality.

Among Calvin’s most important works are "Christiane Religionis Instituio" (1536); "De Necessitate Reformandae Ecclesiae" (1544); "Commentaires sur la concordance ou harmonie des Evangelistes" (1561); "In Novum Testamentum Commentarii"; "In Libros Psalmorum Commentarii"; "In Librum Geneseeorum Commentarii." The first edition of Calvin’s whole works is that of Amsterdam (1671, 9 vols. fol.), but this has been superseded by the definitive and critical edition begun by J. W. Baum, E. Cunizit and E. Reuss, and finished by Lobstein and Erichson (59 vols., Brunswick and Berlin 1863–1900). By the Calvin Translation Society, his works have been collected, translated into English in 51 volumes (1843-55). Consult for biography Beza, T. de (Geneva 1564, new ed., 1869), the original life, written a few months after Calvin’s death; Bolsec, J. (Lyons 1577; new ed., 1875), written from the Roman Catholic standpoint; Henry, P. (3 vols., Hamburg 1835–44), English translation abridged and altered by Stebbing (London 1851); Dyer, T. H. (London 1850); Bungener, F. (Paris 1863, English trans., Edinburgh 1863); Staehelin, E. (Eibergen 1863); Pierson, A. (Amsterdam 1883–91); Walker, W. (New York 1906); all of which are written from a Protestant point of view. A very impartial and valuable book from a Roman Catholic is that by Kampschulte, F. W., Johann Calvin, seine Kirche und sein Staat in Genf (Leipzig 1889-99). An exhaustive work in the very same line is that by Durrermegue, E. (Lausanne 1899–1908), containing many original drawings, facsimiles, etc., and is the work of a lifetime. For detailed history of the life of Calvin, consult d’Aubigné, M., "History of the Reformation in Europe in the Time of Calvin;" Fisher, G. P., "The Reformation;" Schaff, Philip, in "History of the Christian Church" (Vol. VII, pp. 257-1844, New York 1892); article on "Calvin" in the "Schaaff-Herzog Encyclopedia of Religious Knowledge." A very complete bibliography is given in Schaff’s "Credos of Christendom." See INSTITUTION OF THE CHRISTIAN RELIGION.

CHARLES H. PARKHURST.

CALVINISM. The system of religious thought taught by John Calvin, which maintains that God is the sovereign ruler of the world and every good thought comes directly from him. The conception of the sovereignty of God did not originate with Calvin; it is as old as the Hebrew writings; but he emphasized it in such a way that it impressed itself upon the religious thought of his day and has continued to be the conception of God held by all Christian denominations and by many of whom it is made such a cardinal belief that the possibility of doubting it is not even brought into question. The dominant features of Calvinism impressed themselves upon his followers so thoroughly that they became a moving power in the lives of people. Calvin followed the belief in predestination to its logical conclusion and he proclaimed that some were born to life and some to damnation; he taught that regeneration could be obtained only through the spirit of God acting upon the human heart; that God will keep to the path of righteousness only those to whom he has given regenerating grace, and that he who is elected will continue in the way of righteousness. Calvinism emphasizes the unchangeable nature of God, his never-dying love and his justice; for the manifestation of these, his great and glorious attributes, he created the world and all that is therein. He foreordains everything that comes to pass; and the world moves forward according to his plans. Calvinism lays stress upon election, redemption, bondage of will, grace and the perseverance of the saints. According to Calvinism the fall of man was predestined, and all descendants of Adam have inherited his sin and the accompanying punishment.

All Calvin’s religious beliefs are logically stated and developed in his "Institutio Christianae Religionis;" but, with all his care, he left certain questions unanswered; and these have divided his followers into two camps or schools, the "Supralapsarian" and the "Infralapsarian," who differ principally on the order of the divine decrees. The former looks to the final result, as the first thing contemplated in these decrees; whilst the latter tries to soften the pronounced theory of predestination by having God permit man to fall. This softened form of predestination is the one generally accepted by Calvinists. (See CALVIN, JOHN.) Consult Bright, "Select Anti-Pelagian Treatises of St. Augustine" (London 1890); Calvin, "The Institutes of the Christian Religion;" (Philadelphia); Hodge, A. A., "Commentary on the Westminster Confession of Faith" (Philadelphia 1869); Kuypers, A., "Calvinism, The Stone Lectures" (New York 1898).

great evangelistic movement in the 18th century, differed with regard to the doctrines of grace, Wesley being Arminian, and Whitefield Calvinistic. Whitefield may be regarded as the founder of Calvinistic Methodism. Other names, and especially that of Howell Harris, of Trevecca, should be mentioned in connection with it. In its distinctive form it dates from 1725, but did not completely sever its connection with the Church of England till 1810. In government it is now Presbyterian. Its great seat is Wales and it is claimed as the only denomination in Wales of purely Welsh origin. The Calvinistic Methodists exist in three divisions: the Whitefield Connection, 1741; Courtenay's Huntington's Connection (Huntingdonians) 1748; Welsh Methodists, 1750.

CALVO, kāl′vō, Carlos, Argentine jurist and author: b. Buenos Aires, 26 Feb. 1824; d. Paris 1906. On 25 June 1860 he was accredited to the courts of Paris and London as minister plenipotentiary, and resigned after having fulfilled his special mission. In 1885 he became Argentine Minister at Berlin. In 1869 he was elected a corresponding member of the Paris Academy of Moral and Political Sciences, and later received the decoration of an officer of the Legion of Honour. He wrote numerous works, the most important of which are: 'Complete Collection of Treaties, Conventions, and Other Diplomatic Acts of All the Latin-American States' (15 vols., 1862-69); 'Historical Annals of the Revolution in Latin America' (3 vols., 1864, and late dates); 'International Law in Theory and Practice' (2 vols., 1870-72, 5th ed., in 6 vols., Paris 1896), a work considered by jurists as one of the most remarkable on its subject; 'The Emigration and Colonization' (1875); 'Dictionary of Public and Private International Law' (2 vols., 1885); 'Manual of Public and Private International Law' (3 ed., 1892). The 'Calvo Doctrine,' advanced by him, provided that the collection of pecuniary claims made by citizens of any country against the government of another country should never be made by force. Practical application of that doctrine to crises that arose subsequently was urged by the Argentine Minister for Foreign Affairs, Dr. Luis Maria Drago (q.v.), whose name has therefore been associated with South and Central American protests against the employment of foreign naval or military forces to coerce debtor nations on those continents.

CALVUS, Gallus Licinius Macer, Roman orator and poet, a son of the annalist and orator of the same name: b. 82 a.c.; d. about 47. He left 21 orations, but few fragments survive. One of these, against Vainius, whose counsel Cicero was, produced so powerful an effect that the accused interrupted the orator and exclaimed, 'Judges, am I to be condemned because my accuser is eloquent?' His poems were ranked with those of Catullus. He is often praised by Cicero (Brutus, 289-85; Ep. ad Fam., 15, 21). The fragments of Calvus's writings have been collected by Plessis (Paris 1896).

CALX, properly lime or chalk (hence calcareous earth*); but the term is more generally applied to the residue of a metal or mineral which has been subjected to violent heat, burning or calcination, solution by acids or detonation by nitre, and which is or may be reduced to a fine powder.

CALYCANTHUS, a genus of plants of the family Calycanthaceae. Four species of American fragrant shrubs, often grown for ornament. C. floridus and C. ferritis are found in the Alleghany Mountains from Pennsylvania southward; C. occidentalis, in California. They are popularly known as sweet-scented shrub and Carolina or American allspice. The leaves are green and rather large, and the flowers usually some shade of chocolate or purple; both are sweet-scented. In the northern United States the species are scarcely hardy, though some thrive in the vicinity of New York city upon well-drained, rather rich soil in somewhat sheltered situations.

CALYDON, an ancient city of Eetolia, celebrated in the stories of King Ceneus, the Calydonian boar and Dejanira and Hercules. The Romans, according to their measurement, placed it at seven and one-half miles from the Ionian Sea on the river Euenus. The heroes, Meleager, Tydeus lived there. In the reign of Augustus 31 a.c. the inhabitants were moved to the city of Nicopolis which they founded to commemorate the victory of Actaeon. Recent explorations point to the site of the city at Kastro of Kurtagà on the Euenus.

CALYDONIAN BOAR, in Greek mythology, a boar sent to lay waste the fields of Ceneus, King of Calydon, the ancient capital of Eetolia, when he omitted a sacrifice to Artemis. The goddess sent the boar when Ceneus was absent on the Argonautic expedition. No one dared to face the monster, until Meleager, the son of Ceneus, was bidden by heroes, pursued and slew him. The Curetes laid claim to the head and hide, but were driven off by Meleager. Later accounts make Meleager summon to the hunt heroes from all parts of Greece, among them Atalanta, who gave the monster the first wound. This hunt is often found in Greek art. The best known is in the pediment of the Temple of Athena Alea at Tegea by the great sculptor, Scopas, some fragments of which are now in Athens. Consult Gardner, E. A., 'A Handbook of Greek Sculpture,' (pp. 378-81, London 1911).

CALYMENE, kāl′i-mē-nē, a genus belonging to the fossil order of the trilobites, characteristic of the lower and middle Ordovician formations of the Lower Silurian strata of Europe. In this genus the head is almost semi- circular and deeply divided by longitudinal furrows. The eyes are situated on the lateral lobes. The rings of the thorax and abdomen are difficult to distinguish from each other. The thoracic segments are from 10 to 14 in number. The abdominal rings are distinct and never attached to each other. The genus includes about 20 species, of which the Calymene Flumenbachii may be taken as the type. The members of this genus have the power of rolling themselves up like a ball.
CALYPSO, in Greek mythology, a daughter of Atlas (some say of Nereus and Doris, or of Oceanus and Thetis). She inhabited the woody island Ogygia situated deep in the ocean, and lived remote from all intercourse with gods and men. She rescued the shipwrecked Odysseus and kept him with her seven years; but though she promised him immortality, she was unable to fulfill his desire to return to Ithaca. At the command of Zeus, brought by Hermes, she allowed him to depart on a raft of his own making. Grief for his departure brought about her death.

CALYPTREA, a genus of gasteropod mollusks belonging to the family of the Calyptraeidae, resembling limpets in certain characteristics, but differing from them in structure. This genus consists of small marine shellfish, coiled in form, but sometimes very flat; they are fragile, and are distinguished by a conical shell or testaceous process attached to the bottom of the cavity of the shell. The branchiae of this mollusk are composed of long and thin hairlike filaments. It is sometimes found as a fossil.

CALYPTREIDAE, a family of limpets, including those called slipper limpets or cup-and-saucer limpets. See LIMPET.

CALYX, in botany, the exterior covering of a flower; that is, the outermost floral envelope consisting of a circle or whorl of leaves external to the corolla, which it encloses and supports. The parts or leaves which belong to it are called sepals; they may be united by their margins, or distinct, and are usually of a green color and of less delicate texture than the corolla. In many flowers, however (especially monocotyledons), there is little or no difference in character between calyx and corolla. In some groups of plants the calyx is wanting.

CAM, kä̂n, Augustus Nicolas, French sculptor: b. Paris 1822. He was a pupil of Rude; his first works represent small animals, but he chose the large beasts and birds of prey for his subjects. Among his best-known works are 'Linnets Defending Their Nest Against Rats'; 'Tiger in Conflict with a Crocodile'; and 'Eagle and Vulture Wrangling over the Carcass of a Bear.'

CAM, kä̂n, or CAO, kä̂n, Diogo, Portuguese explorer of the 15th century, who followed up the course of Prince Henry of Portugal, sailed along the west coast of Africa, and in 1484 discovered the mouth of the Congo, near whose bank an inscribed stone erected by him as a memorial was found in 1829. He then continued on to Cape Cross, where he also left a pillar dated 1485. This monument is now at Kiel, and three others which he erected are in the museum of the Lisbon Geographical Society. On Cam's return from his first voyage, his sovereign, Joan II, ennobled him (April 1484). He established Christianity in one of the Kongo states.

CAM, kä̂n, an English river formed by the junction of two streams, one of which (the Granta) rises in Essex and flows northwest, while the other (the Rhee) rises in the north of Hertfordshire, and flows northeast. The united stream flows sluggishly northward through Cambridgeshire, and falls into the Ouse some four miles south of Ely after a course of about 40 miles. The university town of Cambridge is situated on its banks a few miles below the confluence of the head-streams. It is navigable to Cambridge and is famous in connection with the boating races of the students of Cambridge University.

CAM, in machinery, a simple contrivance for converting a uniform rotary motion into a varied rectilinear motion, usually a projecting part of a wheel or other revolving piece so placed as to give an alternating or varying motion to another piece that comes in contact with it and is free to move only in a certain direction.

CAM AND ISIS, a familiar couplet by which the sister universities of Cambridge and Oxford are often mentioned. The allusion is to the rivers on which they are situated.

"May you, my Cam and Isis, prosper long;"  
The right divine of kings to govern wrong."  
POW. "The Ducund."  
"The dropping Muses, (Sir Industry,)  
Brought to another Castalia.  
Where Isis many a famous nursing breed  
Of genius, that they may in ages reared  
In pensive mood."  
THOMSON. "Castle of Indolence."

CAMAGUEY, Cuba, (formerly Puerto Principe), (1) town, capital of the province of Puerto Principe, 170 miles northwest of the city of Santiago de Cuba. It was originally founded in 1515 at Nuevitas, the site of an old Indian village, on the northern coast, but was moved to its present site in 1516. For a time after 1800 it was the seat of government for the Spanish West Indies, and until the end of Spanish rule was an important military post. It is the largest inland city of the island, and is connected with its port, Nuevitas, by railroad. It is the centre of a cattle-raising district, and exports cattle, hides, etc.; sugar also is cultivated somewhat in the vicinity and exported. The town is very medieval in appearance, the streets are narrow and the houses old; during the American occupation a number of wells were bored to obtain a pure water supply, the streets were repaired, a good drainage system introduced and buildings for schools remodeled.

(2) Province, east of the centre of the island, bounded on the east by Oriente and on the west by Santa Clara; area, 11,000 square miles. The north of the province is mountainous, the most of the surface being high tableland affording excellent pastureage. The chief industry is cattle raising, which, though it deteriorated during the war, is being rapidly revived, and the number of cattle largely increased; the finest horses on the island are also raised here. The province is also well wooded, and lumbering is an important industry; the minerals include iron, copper, and asphalt, all of which are mined to some extent, asphalt being of the most commercial importance. General agriculture is carried on mostly in the vicinity of the town of Puerto Principe, and its port, Nuevitas; sugar is the most important agricultural product. The province was a centre of the insurrectionary movement, and Cubitas in the northern part was the seat of the insurgent government in 1896-98. Camaguey is the second province of Cuba in size but is least densely populated.
CAMMIEU, ká-má'-ye, or CAMAYEU, a painting wherein there is only one color, and where the lights and shades are off gold, wrought on a golden or azure ground. When the ground is yellow the French call it cirage; when gray, grisaille. This kind of work is chiefly used to represent bas-reliefs. The Greeks called pieces of this sort μονοχρωμα. The technique is still used in two or three different colors, which, however, do not represent the natural colors of the objects depicted.

CAMAJUANI, ká-má-hwá'-né, Cuba, an inland city in the province of Santa Clara, about 20 miles from the north coast of the island. It has rail connection with the capital and other northern cities. Pop. about 5,000.

CAMALDOLITES, CAMALDULIANS, or CAMALDUNIANS, a religious order established in 1012 by Saint Romuald, a Benedictine of Ravenna and a member of the family of the dukes of Ravenna, in the valley of Camaldoli, near Arezzo, in the Apennines, and continued to exist until 1911. They were originally hermits living in separate cells, but as their wealth increased the greater part of them associated in convents. They existed in Italy, France, Germany and Poland. In the 18th century there were five independent fraternities of them, which are here mentioned in the order of their foundation: (1) at Camaldoli; (2) at Murano in the Venetian territory; (3) on Monte Corona, near Perugia; (4) at Turin; (5) the French fraternity, the first chapter of which was that of Notre Dame de la Consolation. They all held in common white garments, and the austerer rules of the Benedictines. The hermits wore beards, and had still more severe rules than the monks in regard to fasting, silence and penances. Their life was devoted to contemplation rather than to active work. A small branch of the order, consisting of nuns, was founded in 1086, which has now five convents in Italy. There is in the vicinity of Naples a mountain which takes its name from a convent of the Camaldoli situated on its top, from which the traveler enjoys a prospect of remarkable grandeur and beauty. The order has greatly declined, but still has several monasteries in Italy, one in Poland and one in Brazil. Its greatest members have been Gratian, the canonical jurist of the 12th century, and Pope Gregory XVI (1831-46).

CAMALIG, ká-ma-lej, Philippines, a town in the southeast part of the island of Luzon, situated within six miles west-northwest of the city of Albay in a plain near the source of the Juanay River. Hemp-growing is the leading industry. Pop. 14,688.

CAMA Y LIBERMORE, ká-ma'-rá é lv-er-mo-ré, Manuel de la, Spanish naval officer. b. in Malaga in 1836. He was educated at the naval academy in San Fernando, and served in the Mexican campaign as staff officer of the French general, Francois, Viscount de Gravière, and later acted as sailing master and lieutenant of the Villa de Madrid and the Veredora. He was active in the campaign against Peru and Chile, and in the struggle with Cuba (1868-78); and commanded a squadron in the Philippines as captain. Later he became chief of the naval commission to the United States and London, and rear-admiral. He commanded the squadron in the Philippines during the progress of the Spanish-American War. On 16 and 17 June the Cadiz reserve squadron under Admiral Cámara left port and sailed eastward through the Mediterranean. His fleet included troopships convoyed by the Pelayo and the best of the men-of-war, except those with Cervera in the West Indies. The United States consul at Port Said protested against permitting the Spanish fleet to refill its bunkers with coal there; nevertheless Cámara received orders to proceed through the Suez Canal. At this juncture an official bulletin of the Navy Department at Washington announced that Commodore Watson would "take under his command an armed squadron with cruisers and proceed at once to the Spanish coast." That was on 27 June. As though to emphasize the threat came Cervera's defeat on 3 July. On 6 July Cámara's squadron was recalled to protect the Spanish coast; and so Watson's fleet, which had scarcely begun to exist, had yet completely fulfilled its destiny. In his capacity as chief of the training ships for cadets and captain-general of the department of Ferrol, he became vice-admiral in 1903 and retired in the same year.

CAMARASAURUS, ká-ma-ra-só'-rí'su, a genus of amphibious dinosaurs (see DINOSAURIA), resembling the brontosaurus but of more massive proportions, with heavier fore limbs and shorter tail. An incomplete skeleton found in the Jurassic strata near Cañon City, Colo., was the first of these gigantic animals discovered in America. It was deposited in the American Museum of Natural History, New York. The length of this animal was estimated by Professor Cope at 75 feet; its name was suggested by the hollow-chambered vertebrae of the back and neck. The atlantosaurus, of which the femur is over six feet long and two feet across at the head, was probably the same animal.

CAMPARUE, La., ká-má-ró', France, an island in the department of Bouches-du-Rhône, southeast France, formed at the mouth of the river by its two principal branches. It has an area of about 300 square miles. It is protected from the inundations of the river by dykes, and is mostly an unhealthy tract of pools and marshes, only a small portion of it being cultivated. Horses and cattle are raised on the island.

CAMAQUILA, ká-má-ra-lé'ya, a word first used in Spain, but now in other countries also, to express the influence of certain persons in obstructing the operation of the official organs of government. When Ferdinand VII, in 1814, returned to Spain, he was surrounded by flatterers, who prevailed upon him to violate his promise of giving the people a constitution. They were called camarilla either from the room where they remained in waiting, or in allusion to the Council of Castile (Cámara de Castillo). Until the revolution of 1820 the camarilla consisted mostly of men without talent and passionately opposed to everything new; but when the King recovered his power in 1823 they became more influential and have since repeatedly interfered with the ministers.
CAMARINA—CAMBAY

CAMARINA, ká-ma-ré'na, Sicily, an ancient town on the southern coast of the island, founded by the Greeks from Syracuse in 599 B.C. Its first overthrow, which occurred 553 B.C., was the result of a revolt from the parent city. On its reduction it was razed to the ground, but was afterward rebuilt. It was in an exposed position in the Carthaginian and Roman wars, and was several times taken, retaken and destroyed. Its ruins to-day are about five miles in circumference.

CAMARINES, North and South, Philippines, two provinces in the southeastern part of the island of Luzon. Area, 3,279 square miles. The name is also applied more vaguely to the whole of the southeastern peninsula of the island. The formation of the peninsula is volcanic; the Caraballos range of mountains extends its whole length, from north to south, and seven of its peaks are active volcanoes. One of them, which is continually emitting smoke and flame, is well known to mariners coming from the east and forms a kind of natural lighthouse. The most important product is rice. The soil of the two provinces possesses the same remarkable fertility which accompanies all the volcanic formations throughout the archipelago. Tobacco, sugar, coffee, cocoa and indigo are largely produced for exportation; but the chief occupation of the inhabitants of the Camarines is the culture of the pineapple, and the manufacture of pina cloth (q.v.). The women of the Camarines are regarded as the most artistic embroiderers in Luzon of the delicate pina and also display singular skill in the working of gold and silver filigree. All the artificers in precious metals are women; and some articles of jewelry, especially their neck chains, are very beautiful. The agriculture of the Camarines indicates in some respects a degree of progress beyond that of the other provinces of the island. The ox, and occasionally the horse, are used in plowing, instead of the slow, unwieldy buffalo, so generally preferred by the native East Indian farmer. The Camarinions have also discarded the primitive plow, formed from a single piece of crooked timber, with a point hardened by fire; and have substituted in its place a more modern style of implement. The provinces have well-constructed roads; the rivers abound in fish and are crossed by substantial stone bridges. The Naga River, which drains the lakes Bato, Baaq, Buhi and Iryga, and empties into the Bay of San Miguel, is navigable about 40 miles for vessels drawing not more than 13 feet of water. The industrial development of these provinces has been accompanied by a notable increase in population; and this is composed, with but small exception, of the brown race of the Philippines, which has yielded so readily to the influences of Christian civilisation. The Camarines have not had their progress retarded like other provinces of Luzon, by the troublesome presence of the wild negrito race.

CAMASS, a genus (Comassia) of plants of the lily family, including six species, natives of western North America. They have narrow leaves and many-flowered racemes of blue, purple or white flowers. Some of the species are in cultivation. The bulbs of the common camass (C. quamash) of the northern Pacific Coast were a favorite food of the Indians.

CAMASS-RAT, a rodent quadruped of the northwestern United States, similar to the gopher (q.v.). Its chief food is the camass (Comassia esculenta).

CAMBACÉRES, kám-bás-sá-rás, Jean Jacques Régis de, Duke of Parma, French statesman: b. Montpellier, 18 Oct. 1753; d. Paris, 8 March 1824. His zeal and talents soon obtained him distinction, and the office of a counsellor at the cour des comptes at Montpellier. At the beginning of the Revolution he received several public offices, became in September 1792 a member of the Convention, and labored in the committees, particularly in the committee of legislation. On 12 Dec. 1792 he was commissioned to inquire of Louis XVI whom he desired for his counsel, and it was on his motion that the counsel was allowed to communicate freely with the King. In January 1793 he declared Louis guilty, but disputed the right of the court to pass sentence, and voted for his provisional arrest, and in case of a hostile invasion, death. On 24 January he was chosen secretary of the Convention. As a member of the Committee of Public Safety he reported, in the session of 26 March, the treason of Dumouriez. In August and October 1793 he presented his first plan for a civil code, in which his democratic notions were displayed. Subsequently, as a member of the Council of the Five Hundred, he presented the Projet de Code Civil (1796), which became the foundation of the Code Napoléon. On 20 May 1797 he left his seat in the council. A year afterward he appeared among the electors of Paris; and after the revolution of the 30th Prairial, VII (19 June 1799), was made Minister of Justice. On the 18th Brumaire he was chosen second consul, and in that office made the administration of justice the chief object of his attention. After Napoleon had ascended the throne, Cambacérès was appointed arch-chancellor of the empire, and after obtaining many high distinctions, became in 1808 Duke of Parma. During the campaign against the allied powers in 1813, Cambacérès was made president of the council of regency. At the approach of the allies in 1814 he followed the Court to Bayonne, and, from that place sent his consent to the abdication of the Emperor. When Napoleon returned in 1815 Cambacérès was again made arch-chancellor and Minister of Justice, and subsequently president of the Chamber of Peers. After the second fall of Napoleon he was banished, as a regicide, but in 1818 was permitted to return.

CAMPALUC, kám-ba-lúk', the name by which the city we now call Peking became known to Europe during the Middle Ages. It was the form given by Marco Polo (q.v.) to the Tartar word, Pambaluc.

CABAY, kám-há', British India, a seaport of Hindustan. Bombay presidency, the chief town of a native state of the same name, at the head of the Gulf of Cambay, 76 miles north-northwest of Surat. It was once a place of importance, but owing to the silting-up of the gulf, and the bore or rushing tides, has greatly declined. Some of the tides rise 6 to 7 feet in an hour, rising as high as 33 feet, and are very
DANGEROUS TO SHIPPING. AMONG THE BUILDINGS ARE SEVERAL MOSQUES AND HINDU TEMPLES, AND MANY RELIGIOUS STRUCTURES OF THE JEWS. THE NATIVES ARE EXPERT JEWELERS AND GODSMITHS, AND AGATE, CARNELIAN AND ONYX ORNAMENTS ARE EXPORTED. THE TRADE IS CHIEFLY IN COTTON, IVORY AND GRASS; THE LATTER PRODUCT BEING SHIPPED TO BOMBAY. POP. c. 1,870,000.

CAMBERT, KAHN-BAIR, ROBERT, FRENCH MUSICIAN: B. PARIS, ABOUT 1628; D. LONDON 1677. HE FOUNDED THE ROYAL ACADEMY OF MUSIC, NOW THE PARIS GRAND OPERA. HE WAS THE FIRST FRENCH OPERA COMPOSER, HIS WORKS INCLUDING 'LA PASTORALE' (1659), THE FIRST FRENCH MUSICAL COMEDY; 'ARIANET ET BACCHUS' (1661); 'POMONE' (1671); AND 'ADONIS.' FOR 22 YEARS HE WAS ASSOCIATED WITH THE ABBE PERRIN IN THE CONDUCT OF FRENCH OPERA, AND GOING TO ENGLAND SUBSEQUENTLY BECAME 'MASTER OF THE MUSIC' TO CHARLES II.

CAMBERWELL, ENGLAND, A METROPOLITAN AND PARLIAMENTARY BOROUGH OF LONDON, ON THE SOUTH OF THE THAMES, IN SURREY, BETWEEN LAMBETH ANDDeptford. Area, 4,480 ACRES. THE BOROUGH HAS INAGURATED A GREAT WORKING-CLASS HOUSING SCHEME. ITS THREE DIVISIONS, NORTH CAMBERWELL, PECKHAM AND DALWICH, EACH RETURN ONE MEMBER TO PARLIAMENT. POP. (1911) 261,328. CONSULT ALLPORT, 'COLLECTIONS ILLUSTRATIVE OF CAMBERWELL AND NEIGHBORHOOD' (1841); BLANCH, 'YE PARISH OF CAMBERWELL: ITS HISTORY AND ANTIQUITIES' (1875).

CAMBERWELL BEAUTY, THE COMMON ENGLISH NAME OF THE FANESIA OR FANESIA ANTIPOP, A LARGE AND BEAUTIFUL BUTTERFLY FOUND IN GREAT BRITAIN, BUT MUCH MORE COMMON ON THE CONTINENT OF EUROPE AND IN NORTH AMERICA, WHERE IT IS CALLED MOURNING CLOAK. IT MEASURES THREE INCHES OR MORE BETWEEN THE EXTERIOMITIES OF ITS EXTENDED WINGS, WHICH ARE OF A DARK-BROWN COLOR, WITH A BROAD LIGHT-YELLOW BORDER, AND A ROW OF BLUE SPOTS NEAR THE EDGE.


CAMBIV, IN BOTANY, THE LAYER OF DELICATE THIN-WALLED CELLS SEPARATING THE WOOD FROM THE BAST IN A GREAT MANY STEMS AND IN A CROSS SECTION APPEARING AS A RING. THE GROWTH OF THE STEM TAKES PLACE BY THE DEPOSITION, ON THE OUTSIDE OF THE WOOD, OF NEW WOOD-LAYERS FORMED FROM THE CAMBIUM, AND, ON THE INSIDE OF THE BAST, OF NEW LAYERS OF BAST FORMED FROM THE OUTER CELLS OF THE CAMBIUM LAYER. TO THIS CIRCUMSTANCE—that it produces different kinds of cells—it owes its name (connected with the Latin cambire, to exchange). In conifers and dicotyledonous woody perennials the primary bundles are arranged in a circle, and their cambium layers are thus made to form a more or less continuous ring of cambium in the stem. By the deposition of new layers of wood and bast regularly taking place, especially in spring, at the inner and outer surfaces of this cambiumring, the stem is caused to increase in thickness.

CAMBLES, A GLUTINOUS KING OF LYDIA, WHO IS SAID TO HAVE EATEN HIS OWN WIFE, AND AFTERWARD KILLED HIMSELF FOR THE ACT.

for the surcharge of the Tonlé-Tom, the Tonlé-Sap ("Sweet Water River"), expanding in the Great Lake, 100 miles by 25 miles in area, with a maximum depth of 65 feet. The greater part of the country is low, well watered and heavily timbered. The climate presents a dry and wet season (June to November) and is fairly healthy. The soil is amazingly fertile, producing large quantities of rice, besides silk, pepper, maize, sugarcane, cotton, betel, tobacco, indigo, coffee, etc. Timber is abundant. Gold and precious stones are found, besides iron, tin, limestone and salt. The breeding of cattle is a flourishing native industry. Among wild animals are the elephant, wild buffalo, deer and tiger. The Cambodians were formerly a highly cultured and civilized race. Various architectural remains, witnessing to former greatness, are found throughout the country. The present population is very mixed, being composed of Annamites, Malays and Chinese, with a seasoning of aboriginal racial elements. The religion is Buddhism. Polygamy is practised, the number of wives being regulated by the social status of the husband. In early times Cambodia was a powerful state to which even the kings of Siam paid tribute, but it gradually fell into decay, until about the close of the 18th century the Siamese annexed part of Cambodia to their own land, and reduced the rest of the country to a state of dependency.

France, on 11 Aug. 1863, concluded a treaty with the king of Cambodia, Nerodom, placing Cambodia under a French protectorate. This treaty was superseded by that of 17 June 1884, under which the king of Cambodia acceded to all the reforms, administrative, judiciary, financial and commercial, which the government of France might institute. The present King Sisowath succeeded to the throne in 1907. The chief imports are salt, sugar, wine and various manufactured goods, such as textiles and arms; the exports include salt-fish, spices, cotton, tobacco and rice. The external trade is mostly passed through Saigon in Cochin-China. The capital is Phnom-Penh (pop. 54,621). Pop. 1,654,252, of which about 1,100 are Europeans, exclusive of military.

CAMBODIA, or MEKONG, a large river of southeastern Asia, which rises in Tibet, passes through Yunnan, a province of China, Laos, Anam, Cambodia and French Cochin-China, and falls into the Chinese Sea by several mouths, after a course of about 2,600 miles. Its navigation is much interrupted by sandbanks, rapids, etc., at various points of its middle and upper course. The Tonlé-Sap (a lake covering an area of 100 square miles in the dry season and 770 square miles in the rainy season), on the frontiers of Cambodia and Siam, is connected with the Mekong.

CAMBON, käⁿ bôn, Jules Martin, French diplomatist: b. Paris, 5 April 1845. He studied for the law and fought in the Franco-Prussian War, reaching the grade of captain. Entering the civil service, he became prefect ofConstantine in 1878, prefect of the Department du Nord in 1882, prefect of the Rhone in 1887, governor-general of Algeria in 1891 and Ambassador to the United States 1897-1902. In that capacity he represented Spain in drawing up the Spanish-American protocol in 1896. From 1902-07 he was Ambassador at Madrid, and from 1907-13 was Ambassador at Berlin, where he made strenuous and successful efforts to find a peaceful solution of the Agadir crisis of 1913. He is a brother of Pierre Paul Cambon (q.v.).

CAMBON, Pierre Joseph, French statesman: b. Montpellier, 17 June 1754; d. near Brussels, 15 Feb. 1820. Engaged in commercial pursuits, he became interested in the Revolution, and on hearing of the flight of Louis XVI he caused the republican government to be proclaimed in his native town. He was sent to the legislative assembly, and while supporting the cause of democracy, gave particular attention to financial matters. Most of the great measures which enabled the government to get through the revolutionary period were suggested or controlled by him; and to him the honor is due of having laid the foundation of the modern financial system of France. He promoted the confiscation of the estates of the emigrés in 1792, and made, after 10 August, a report in which he argued that Louis XVI, having held a secret correspondence with the enemies of France, should be deposed.

He presided over the last sittings of the legislative assembly, and afterward took his seat as a member of the Convention. Here he opposed with equal energy the partisans of monarchy and of terrorism. When Louis XVI was arreigned before the Convention, he voted for his immediate death, and against the appeal to the people. He opposed the creation of the revolutionary tribunal, and insisted upon trial by jury. At the opening of the Convention, he had been appointed member of the Committee on Finances; 7 April 1793 he entered the Committee of Public Safety. On 2 June, when the Gironists were threatened by the infuriated mob calling for their proscription, he boldly took his place among them, hoping to be able to save them from violence and arrest. The next year he made another report on the administration of finances, which is considered a masterpiece of financial ability, and gives a full sketch of the plan which was afterward adopted for the regular registration of public debt. In the conflict which brought on the revolution of the 9th Thermidor, Cambon took part against Robespierre and his adherents; but though he had been instrumental in their defeat, he was charged with having been the author of a warrant was issued against him. He succeeded in eluding arrest, and, when amnesty was proclaimed by the Convention, he retired to an estate in the vicinity of Montpellier. In 1815 he was elected a member of the Chamber of Deputies. On the second return of the Bourbons, he was exiled as a regicide.

CAMBON, Pierre Paul, French diplomatist: b. Paris, 20 Jan. 1843. He was graduated at the Ecole Polytechnique in 1863, and, after serving as secretary to Jules Ferry, became secretary of prefecture for the Alpes-Maritimes, prefect successively of the departments of the Aube, Doubs and Nord and French resident-general in Tunis. He was appointed Ambassador to Spain in 1880, was transferred to Constantinople in 1890 and to London in 1898. To him is due in large measure the sealing of the Anglo-French entente.

CAMBORNE, England, market town of Cornwall, 11 miles northwest of Falmouth, situated on the slope of a gently rising hill. There
is a granite church in the Perpendicular style, restored in 1862. It also contains a market-hall, a mining school, a workingman's institute, and a museum of mineralogy. Near it are extensive lead, tin and copper mines, and mining machinery is manufactured. Pop. 15,829.

CAMBRAI, kà̃brẵ, or CAMBRAY, France (Flemish, KAMBRYK), fortified city on the Scheldt, in the department Nord, 37 miles south-southeast of Lille by rail. From this place the linen cloth known by the name of cambric got its name. Cambrai is the seat of an archbishop. The Revolution stripped it of all its principal ornaments. The beautiful cathedral and the tomb of its archbishop, the celebrated Fénélon, were razed to the ground. There is a new monument to the memory of Fénélon in the present cathedral, a modern building of indifferent architecture. There is a large and handsome modern Hôtel de Ville and an ancient belfry tower. Cambrai is the seat of a diocesan seminary, communal college and has a valuable public library. Cambric and other linen goods, cotton, leather goods, sugar, soap, paper, furniture, etc., are manufactured; and there is a trade in grain, oil-seed, hemp, etc. Cambrai is the Camaracum of the Romans. In 1508 the league against Venice was concluded at Cambrai between the Emperor Maximilian, Louis XI of France, and Ferdinand of Aragon; and in 1529 the peace with Charles V. Louis XIV took Cambria from the Spaniards in 1677, and it was finally confirmed to France by the Treaty of Nijmegen in 1678. Pop. 21,791.

CAMBRIA, the Latin name of Wales (the Roman Britannia Secunda), derived from Cymri, the name of the branch of the Celts to which the Welsh belong, by which they have always called themselves.

CAMBRIAK from "Cambria," an ancient name for Wales) is a term applied to the earliest time period of the Paleozoic Era, and to the system of rocks laid down during that period. It was first applied by Murchison and Sedgwick to rocks of England and Wales, about 1835, and indicates the time when animal life on the earth was already highly differentiated. All the great groups of the animal kingdom except the vertebrates were present then and definitely characterized. The principal types, so far as the fossil evidence goes, were Brachiopods and Trilobites, but many others existed, such as mollusks, marine worms, siliceous sponges, graptolites and jellyfish, and by the end of the period starfish and crinoïds. It is probable that plants, such as seaweeds, existed, but the evidence is very obscure. The climate during the Cambrian period was probably warmer, even up to the Arctic Circle, but not torrid. This evenness of temperature may have been due to a much larger part of the earth's surface being covered by water than in later time, or to a difference in the composition of the atmosphere, more carbon dioxide being present. At the beginning of Cambrian time the North American continent was probably larger than now. On the east a sound stretched from Labrador to Alabama, separating an island known as Old Appalachia, which extended east beyond the present coast. Central United States was largely land. On the west, a second sound extended from the Arctic south into Nevada and California, separating another land mass on the west, which also probably reached beyond the western coast.

During Cambrian time the continental land mass slowly sank, and by the end of the Cambrian a great interior sea covered the whole Mississippi Valley and large areas both east and west. Changes in land and sea were also going on in other continents, large parts of which were under water during late Cambrian time. The period was without notable folding, but was marked by great volcanic activity in Wales and Scotland. In China, Norway and possibly at other points, rocks of very early Cambrian, or else of very late Alggonkian Age, bear evidence of glacial origin.

The Cambrian system is fairly well defined at its base, since the rocks are deposited upon the upturned, eroded edges of Alggonkian and older strata, indicating a great time break. The top of the Cambrian grades into the Ordovician, so that geologists are not able to define the line of demarcation. In North America the rocks of the Cambrian system are divided into three series, as follows: (1) The Lower Cambrian, or Georgian, (2) the Middle Cambrian or Acadian, and (3) the Upper Cambrian, or Potsdam (Saratogan). The Lower Cambrian rocks are largely restricted to the long narrow sounds already described. As the continent gradually sank, the areas of Cambrian deposition became larger, and Middle and Upper Cambrian sediments were laid down over much of central United States from the Appalachians to the Sierra Nevada, south as far as northern Arkansas. They have since been eroded from parts of this area, and in still other parts lie hidden below more recent deposits. Cambrian rocks outcrop in large areas in the Appalachian Mountains, the Adirondacks, central Wisconsin, the Ozarks and in many isolated patches in the Rocky Mountains, as well as at numerous other points. The rocks indicate generally a period of tranquil change, the ocean slowly advancing over the sinking continent and islands, just as one may see it to-day along great stretches of coast. The rocks are chiefly shallow water formations, including conglomerates, sandstones and shales, containing fossils by no means unknown. In a few places as at South Mountain, Pa., there are rocks representing lava and volcanic ash interstratified with detrital sediments. In the Appalachian region, the Cambrian sediments vary from 3,000 to 12,000 feet in thickness. Over central United States they are much thinner, but in British Columbia they are reported to reach the enormous thickness of 40,000 feet.

In Europe the Cambrian rocks are generally developed more fully than in North America; thus the conglomerates, sandstones, shales, slates and quartzites of the Welsh Cambrian are fully 20,000 feet thick and contain much volcanic material. They are rocks indicating shallow-water conditions, and show three divisions. They extend from Wales, along Sweden, Norway and Lapland into Russia, having in Sweden a thickness of 2,000 feet. To the east the Cambrian formations thin out, and in central Russia die out altogether, the Ordovician resting directly on the Archaean. There are considerable areas of Cambrian in Germany, Bohemia, France, Portugal and Spain; also in
CAMBRIC — CAMBRIDGE

northeast China, in the Salt Range in India, in Australia and in Argentina.


Charles Laurence Dake,
Assistant Professor of Geology and Mineralogy,
University of Missouri School of Mines.

CAMBRIC, a fine, thin kind of linen cloth manufactured originally, it is said, at Cambrai (q.v.) in French Flanders, whence the name. Cambric is manufactured in the north of Ireland, in England, Switzerland and France, and is now chiefly used for handkerchiefs. The name is also applied to a cotton fabric which is in reality a kind of muslin.

CAMBRIDGE, Ada, the pseudonym of Mrs. George Frederick Cross, Australian novelist, dau. of Sain, Norfolk, England, 2 Nov. 1844. She was married in 1870 to Rev. G. F. Cross and went with him to Australia, where she resided in bush country districts. She is the author of 'My Guardian' (1877); 'In Two Years' Time' (1879); 'A Merchant' (1882); 'A Marked Man' (1891); 'The Three Miss Kings' (1891); 'Not All in Vain' (1892); 'A Little Minx' (1893); 'A Marriage Ceremony' (1894); 'Fidelis' (1895); 'A Humble Enterprise' (1896); 'At Midnight' (1897); 'Mother Familien' (1898); 'Path and Goal' (1900); 'The Devastators' (1901); 'Thirty Years in Australia' (1903); 'Sisters' (1904); 'A Platonic Friendship' (1905); 'A Happy Marriage' (1906); 'The Eternal Female' (1907); 'The Retrospect' (1912); 'The Heart in the Dark' (1913).

CAMBRIDGE, Adolphus Frederick, 1st Duke of, b. London, 24 Feb. 1774; d. 8 July 1850. He was the youngest son of George III, and the uncle of Queen Victoria. He entered the British army as ensign when 16 years of age, and completed his education at the German University of Göttingen. He leaned at first to the side of the opposition on the question of the French war, but afterward sided with the government. He served in the Hanoverian and British armies in several campaigns on the Continent. In 1816 he was sent to Hanover as vicerey, and administered the affairs of the kingdom with wisdom and discretion. In 1837, on the separation of Hanover from the British Crown, he returned to England again. From that period until his death he was best known to the public as the president of charitable societies.

CAMBRIDGE, George William Frederick Charles (2d Duke of), English general, son of the preceding; b. Hanover, 26 March 1819; d. Hanover, 31 Dec. 1894. His rise in the army was phenomenally rapid, and was due to his close relationship to the Crown. When a lad of 19 he became a colonel, and at 26 was a major-general. In 1850 he succeeded his father as Duke of Cambridge, in 1854 was advanced to lieutenant-general, and in 1856 to that of general. He commanded the two brigades of Footguards and Highlanders which formed the first division of the British army. He led these troops into action at the battle of Alma, and at Inkerman had a horse shot under him. He was constitutionally not well adapted for high command in the field, lacking the imperturbability of the born soldier. After his experiences at Inkerman his physician directed him to withdraw for a time from camp life. He retired first to Pera, and soon after to England. On the resignation of Viscount Hardinge in 1856, he was appointed commander-in-chief of the British army. As commander-in-chief he opposed most of the reforms introduced into the army, including short service and the abolition of purchase; but he loyally carried out changes which he did not approve. He retired in 1865. Consult Sheppard, 'Private Life of H.R.H. the Duke of Cambridge' (London 1906); Verner, 'Military Life of the Duke of Cambridge' (2 vols., London 1905).

CAMBRIDGE, England, an inland county bounded on the north by the county of Lincoln; on the west by Northampton, Huntingdon and Bedford; on the south by Hertfordshire and Essex; and on the east by Suffolk and Norfolk. A great part of the northern half of the county belongs to the fen district; farther south it is undulating, and in the southeast some heights occur. The principal rivers are the Cam or Granta, and the Ouse, with the Nene in the north. An important portion of the county, including the Isle of Ely, belongs to the great artificially drained tract known as the Bedford Level (q.v.). About nine-tenths of the total acreage of the county is now productive, and a greater proportion of land is under corn crops than in any other county in the kingdom. Potatoes, turnips and mangold are the chief green crops. The southern portion of the county abounds in dairy farms, celebrated for the production of excellent butter and cheese. The part of the county extending from Cogmagong Hills to Newmarket, and the parliamentary borough of Cambridge, each returning one member to Parliament. Administratively the ancient county embraces the two counties of Cambridge and the Isle of Ely. There are two municipal boroughs, Cambridge and Wisbech. The educational institutions include a day training college for schoolmasters, and the new Homerton undenominational training college for women at Cambridge, and a theological college founded in 1876 at Ely; there are also more than 225 elementary schools in the county. Area, 553,241 acres. Pop. 190,074. See also CAMBRIDGE, University of.

CAMBRIDGE, England, capital of the county of Cambridge, is situated on the Cam, about 56 miles north by east by rail from London. It is a municipal and parliamentary borough, the seat of a celebrated university (see
CAMBRIDGE, University of), and has a large agricultural market.

Geology.— The geological formation of Cambridge and the surrounding district consists chiefly of clay. The following strata are to be found — Chalk, Marl, Cambridge Greensand, Gault, Kimmeridge Clay, Oxford Clay, Amphiill Clay, Cheraton Clay, and some recent alluvium which borders the rivers and tributaries, consisting of peat, sandy loam, etc. The town is made up of three main thoroughfares, two running north and south and the other east and west.

Public Buildings, Libraries, etc.— The city possesses a Guildhall, including municipal buildings, law courts and public free library. There is also a spacious corn exchange, attended weekly by buyers from all parts of the United Kingdom, and a cattle market. Addenbrooke's Hospital is a noted institution, connected as it is with the Cambridge University Medical School. Cambridge was one of the first towns to establish a public free library, which now comprises a central library and a number of branches with a collection of upwards of 50,000 volumes.

Churches.— Cambridge is fortunate in the number of its ancient churches, two of which are worthy of mention. The church of Saint Benedict's is the oldest in the pre-Conquest date. It possesses a tower in the Saxon style of architecture. That of the Holy Sepulchre or "Round Church" is one of four round churches in England, and was probably in existence about the year 1130. The largest parish church is that of Saint Mary the Great (College Church), built in the perpendicular style. Other churches of interest are the Abbey (early English, 13th century), Saint Edward (rebuilt in the 14th century with the exception of the tower which is a work of the 12th century), Saint Michael (13th century), Trinity (about 1274), Saint Mary the Less (1340), Saint Botolph (14th century) and Saint Peter, which has examples of 12th century architecture. The church of Great St. Mary in Cambridge dates from the year 1457, and it is now well represented by its churches. The Roman Catholics have a fine church built in the early decorated style. It was commenced in 1887, through a donation from Yolande Marie Louise de Puffendorf, large congregations. Johnny Stittle, the hedges, occupied a unique position at the end of the 18th and beginning of the 19th century, drawing a large congregation from both town and University. Thomas Hobbes was among the first to let out horses for hire, and the originator of the proverb "Hobson's Choice."

Education.— Cambridge has 20 public elementary schools, including higher grade schools, among which may note the Perse grammar schools, founded by Dr. Stephen Perse in 1615. The Wesleyans are represented in education by the Leys school, the Roman Catholics by Saint Edmund's House, the Presbyterian Westminster College, and more recently from Cheshunt, Herts, to Cambridge, preliminary to the erection of a new college. Homerton College has about 150 female students in training for educational duties.

Railroads.— The railway companies which have connections at Cambridge are the Great Eastern, the Great Northern, the Midland and the London North Western.

Recreation Grounds.— Cambridge is fortunate in its number of common lands and recreation grounds, numbering in all and having a total area of 300 acres. Of the recreation grounds Parker's Piece is a noted cricket and football ground, where all the University matches were played, until they purchased their own grounds.

Government.— The corporation of Cambridge, under the "Municipal Reform Act," consists of a mayor, 10 aldermen and 30 councilors. The University also returns its quota of two aldermen and six councillors. The town returns one member to Parliament.

History.— There is every proof that in its early days Cambridge was an important trading centre. Its situation on the Cam made it easily accessible from the surrounding district for miles around, and provender, fuel and merchandise were conveyed by water to all parts of East Anglia. It was the seat of Stourbridge Fair, one of the largest fairs in England. The Romans occupied the town is evident from the fact that numerous Roman remains have been found at various periods. Miles of ancient earthworks, said to be of British origin, surround Cambridge, and in the town itself there is a large mound called "Castle Hill," probably of Saxon origin and raised as a defense against the incursions of the Danes. In the years 870 and 1010 the town was destroyed by the Danes. William the Conqueror built a castle here in 1068. The year 1110 is alleged to be the date of the origin of the university, at which time, we read that learned monks visited Cambridge to teach philosophy and other sciences. Richard II held a Parliament at Cambridge in 1388.

The town was frequently visited by the plague ("Black Death"), and in 1630 the mortality was terrible. At the time of the Civil War Oliver Cromwell (formerly a student of Sidney Sussex College) represented Cambridge in Parliament, and the town supplied a large number of men for the Parliamentary forces. The plague at Downside did considerable damage both to the colleges and to the Parish churches in 1643. Queen Victoria and her consort visited Cambridge in 1845 and again in 1847, and as Chancellor of the university, the influence for good, exercised by the Prince Consort, was predominant. The King and Queen visited Cambridge on 1 March 1904 to open the new University museums. The second meeting of the British association was held at Cambridge in 1833, and subsequent meetings were held in 1845, 1862 and 1904. Apart from the University, Cambridge would lose much of its importance. The colleges with their various styles of architecture, surrounded by gardens and 'college walks,' are a constant source of delight. The river Cam winds its course through the college grounds for a distance of about three-quarters of a mile. Nine bridges connect the colleges and grounds where nature and art combine. Below the town, the river is the scene of the well-known college boat races which occasion the visit of thousands of people.
Area and Population.—The town covers an area of 3,278 acres. Much house property has been destroyed to make room for the continuous additions to colleges and university buildings, with the result that residents have migrated to adjacent districts. Pop. 40,022.

Bibliography.—Atkinson and Clark, "History of Essex" (1870); on Harvard, "History of Cambridge" (1819); Clark, "Historical and Descriptive Notes on Cambridge"; Cony- beare, "History of Cambridgeshire" (1897); Cooper, "Annals of Cambridge, 693–1853" (5 vols.); "Memorials of Cambridge" (3 vols., 1865); Stubbs, "Cambridge and its Story" (1903).

CAMBRIDGE, Ill., the county-seat of Henry County, a village on the Rock Island and Peoria Railroad, about 28 miles southeast of Rock Island. Surrounded by a productive agricultural district, it has a thriving domestic and export trade in farm produce, grain and cattle, etc. Pop. 1,277.

CAMBRIDGE, Mass., city and one of the county-seats of Middlesex County, situated on the Charles River and the Fitchburg division of the Boston and Maine Railroad, also connecting with the Boston and Albany Railroad; opposite and joined by nine bridges. It was founded in 1630-31, under the name of "Newe-Towne," or "Newtown," and did not receive its present name until several years later. In 1636 the General Court appropriated $2,000 to locate a school in Old Cambridge, which later became Harvard College, now Harvard University. In 1631 Cambridge was 35 miles long and only one mile wide, including the townships now incorporated as Billerica, Bedford, Lexington, Arlington, Brighton and Newton, all these having been gradually separated from it. The city was formerly divided into villages called Old Cambridge, Cambridgeport, East Cambridge and North Cambridge, names which are still used to designate certain districts. It has grown into a populous centre, manufacturing glass, furniture, organs, steam-engines, etc., the total value of which amounts annually to over $45,000,000. Nearly 1,200 retail establishments supply the wants of Cambridge, paying $2,250,000 a year in wages and having sales of over $15,000,000. The first printing office in the United States was located in Cambridge, and the "Bay Psalm-Book," published by Stephen Day and printed in 1640, was the first book from this press. Cambridge has now extensive printing establishments, including the Riverside Press, the Athenaeum Press and the University Press. For historical and literary associations, Cambridge is one of the most famous cities in the United States. The "Craige House," built by Col. John Vassall in 1759, was Washington's headquarters in 1775-76, and afterward became the home of the poet Henry W. Longfellow until his death. On Elm avenue is "Elmwood," the birthplace and home of James Russell Lowell, who lived here 1819-91. A part of the place, bought by public subscription, is preserved as a public park. This city was the home of Oliver Wendell Holmes, William Henry Channing, Margaret Fuller Ossoli, Col. Thomas Wentworth Higginson, Louis Agassiz, John Fiske and Charles Eliot Norton. The fine city hall and land for a park was the gift of a former citizen, Frederick H. Ringde, who also presented the city with a public library, an institution now called the Ringde Manual Training School, and other benefactions which amount to more than $1,000,000. The beautiful Mount Auburn cemetery is partly in Cambridge and partly in Watertown. Among important buildings are those of Harvard University; Radcliffe College; Cambridge Hospital; Manual Training school; the 1st and High Schools; Public Library; and Middlesex County Courthouse. Much has been accomplished toward developing a system of parks which includes nearly the entire river front, and extends around the manufacturing district. In two recent years the total building operations in new factories, fine apartment-houses and private residences amounted to $5,000,000. The total value of taxable property is $130,000,000. The city buildings, land and equipment are valued at $4,000,000; its parks at $3,000,000, and it owns its waterworks which cost $6,500,000. The administration consists of a mayor and city council. Pop. 114,000. Consult Bacon, "Cambridge and Vicinity" (Newark 1892); Page, "History of Cambridge" (Boston 1877); Eyst, "History of Cambridge" (Cambridge 1913). See HARVARD UNIVERSITY.

CAMBRIDGE, Md., a city and county-seat of Dorchester County, 58 miles southeast of Baltimore on the Choptank River near Chesapeake Bay and on the Seafood and Cambridge Railroad. Cambridge was settled in 1664 and was incorporated as a city in 1900. It is governed by a mayor, elected every two years by the city council, which includes the mayor and four aldermen. Cambridge has important manufactures of underwear and lumber and as the centre of a fertile agricultural district has an active trade in farm produce and live stock. Fruit, vegetable and oyster canning industries are carried on to a considerable extent. Pop. 6,407.

CAMBRIDGE, N. Y. village of Washington County, on the Delaware and Hudson Railroad, 28 miles northeast of Albany. The Cambridge Valley Agricultural and Stockbreeders' Association is located here and seed, steel plow, chaplet and knitting industries are carried on. The village was incorporated in 1866. Pop. 1,727.

CAMBRIDGE, Ohio, city and county-seat of Guernsey County, on the Baltimore and Ohio and Pennsylvania railroads, 55 miles north of Marietta. It is situated on a hill 800 feet above sea-level, in a coal and iron region which has also deposits of pottery clay. The industries are chiefly mining and manufactures connected with these resources. The United States census of manufactures for 1914 reported 39 industrial establishments of factory grade, employing 1,656 persons, of whom 1,435 were wage earners, receiving, annually, $1,112,000 in wages. The capital invested aggregated $2,969,000, and the year's output was valued at $3,924,000: of this, $416,000 was the value added by manufacture. Natural gas is used for heating. The city owns and operates the water works. The city has five banks, courthouse, children's home and Carnegie Library. It was settled in 1804.
was incorporated as a city in 1887 and received a new charter of administration in 1893. A mayor, elected every two years, and a council govern the city. Pop. 13,000.

CAMBRIDGE, University of. Situated at Cambridge, England. Its origin is very obscure, and of its early history, before the 12th century, there are only very scanty records. It is clear that a university existed long before the foundation of the oldest college, and that it was powerful enough to claim and to obtain from the town very important privileges, such as immunity from taxation, the right to test weights and measures and to prescribe what amusements should be allowed or forbidden. From the bitter feeling aroused by the possession of these and other privileges frequent serious outbreaks of hostilities arose between the town and the university, resulting in the wanton destruction of valuable records, which has left little or no material for a connected history. It is probable that the university owed its origin to the schools in connection with the priory of Saint Frideswyde and the conventual church at Ely. The earliest recognition of Cambridge as a university is contained in a writ of the 3rd year of Henry II, 1121, ordering all clerks who had been excommunicated for their adherence to Louis, son of the king of France, to depart the realm. The number of students was increased in the same reign by a migration of students from Paris in 1229, and further by a like migration from Oxford in 1240. In the early part of the 13th century students lived where they pleased, but in time they inaugurated a system of hostels or lodging-houses, in which a number had to live under the supervision of a superior; and out of this system of hostels sprang the collegiate system. The oldest of the colleges, Peterhouse, was founded in 1284 by Hugh de Balsham, bishop of Ely; it was followed by Clare College, founded in 1335 by Lady Elizabeth, granddaughter of Edward I; Pembroke Hall, in 1347, by Marie de St. Paul; Gonville Hall, afterward Gonville and Caius College, in 1348 by Edmund Gonville; Trinity Hall, in 1350, by William Bateam, bishop of Norwich; Corpus Christi College, in 1352, by the joint efforts of two Canons of Ely; St. John's College, in 1376, by John Christi and the Guild of the Blessed Virgin; King's College, in 1441, by King Henry VI; Queen's College, in 1448, by Margaret of Anjou, though it was not till 1479 that it received its code of statutes from Elizabeth Woodville, the consort of Edward IV; Saint Catherine's Hall, in 1452, by Robert Wodelarke, provost of King's College; Jesus College, in 1496, by John Alcock, bishop of Ely; Christ's College, in 1505, by the Lady Margaret, Countess of Shrewsbury; New College, in 1505, by the same Margaret; Emmanuel College, in 1508, by the Lady Margaret; Magdalene College, in 1542, by Sir Thomas Audley; Trinity College, formed by the union of the earlier foundations of Michaelhouse, 1324, and of King's Hall, 1337, and founded in 1546 by Henry VIII; Emmanuel College, in 1584, by Sir Walter Mildmay, a college dear to all Americans as that in which John Harvard, founder of Harvard College, was educated; Sidney Sussex College, in 1536, by the Lady Frances, Countess of Sussex; Downing College, in 1800, by Sir George Downing; Selwyn College Public Hostel, founded in 1882 in memory of George Augustus Selwyn, late bishop of Lichfield, former Vice-Chancellor of New Zealand. Each of these colleges is a separate corporation governed by its own statutes and practically independent of the university, though the connection between the two is necessarily very close, as every member of the university is a member of some one of the colleges, as a non-collegiate student. The head of a college is styled the master, except in the case of King's College, where he is styled the proctor, and of Queen's College, which is ruled by the president. Other college officers are the tutor, who stands in loco parentis to the undergraduates, and the dean, who is responsible for the services in the college chapel, and for college discipline.

A code of statutes was given to the university by Queen Elizabeth, and this code remained in force till 1588, when a new code was framed by a royal commission; this latter code was again revised in 1852, when they took their present form. In 1874 all regalia were finally abolished except for degrees in divinity; and in 1894 the university surrendered the last of its privileges over the town, which it had retained since the 13th century, and then only put an end to the bitter feeling which had existed for centuries between the town and the university, and which had led to frequent outbreaks of hostilities between the two bodies.

The university was incorporated in the reign of Elizabeth, by the name of "The Chancellor, Masters and Scholars of the University of Cambridge." The executive authority of the university rests in theory with the chancellor, who is elected for life; but as he is non-resident, it is practically in the hands of the vice-chancellor, who is elected annually from among the heads of colleges. The ultimate decision of all questions touching academic policy rests with the senate, a body composed of all those members of the university who have proceeded to the M.A. or some higher degree, and whose names are on the registers of members of the senate. All legislative proposals so far as they are consistent with the statutes, which can only be altered by act of Parliament, are framed by the vice-chancellor in conjunction with the senate, a body elected by the resident members of the senate and consisting of the chancellor, the vice-chancellor, four heads of colleges, four professors, and eight other members of the senate. These proposals, having received the sanction of the council, are offered to the senate in the form of bills or resolutions, and must pass the senate before they can take effect. Of the other officers of the university the most important are the two proctors, whose duty it is to attend to the discipline of all persons in status pupillari and to read the grades in the senate house; the registrar, who keeps the archives of the university; the public orator, who is the voice of the university on all important occasions, who writes letters in the name of the university and is admitted to honorary degrees in a Latin speech; the librarian, who has charge of the university library. A general board of studies supervises the system of teaching as a whole, and each department of study is controlled by a professor and a syndicate or board. The teaching of the
undergraduates is undertaken partly by the university and partly by the colleges. It takes mainly the form of lectures, delivered either by the university professors or readers, and open to all members of the university; or by college lectures to members of particular colleges or groups of colleges.

The academic year is divided into three terms: the Michaelmas term, lasting from 1 October to 19 December; the Lent Term from 8 January to within a few days of Easter; the Easter Term from three weeks after Easter to 24 June. The undergraduates reside either in rooms belonging to the several colleges or in rooms in the town licensed for the purpose. They dine together in the college hall, but all other meals are taken in their own rooms. Academic dress, a gown and square college cap, must be worn in the college hall and chapel. Before proceeding to any examination for a degree they must have resided for the greater part of each of the three terms; and must have passed the previous examination, commonly called the "little Go," a somewhat elementary examination in classics, mathematics and divinity. Exemption from this examination can be obtained by passing various non-university examinations. The student can then, if he wishes to proceed to an "Honors" degree, devote the rest of his time to his special subject, and having kept his terms, is qualified to become a candidate for honor in a tripos, as honor examinations are called. If he wishes merely to obtain a pass degree he must first pass the general examination of somewhat similar nature to the previous, but more advanced, and can then proceed to one of the special examinations, as they are called. These examinations are in the same subjects as the tripos examinations, but the questions set are of a much less advanced nature. A student who passes a tripos is called an honor man; one who passes in a special examination is called a pass man (commonly "Pollman," from οἱ πολλοὶ). The names of successful candidates are arranged in three classes, called in the case of the mathematical tripos, wranglers, senior optimes and junior optimes; in the case of the examinations merely first, second and third. Under the rule that every student before proceeding to a degree must have kept residence at least nine terms, there are some important exceptions. Graduates of other universities, British and foreign, who can produce evidence of special qualifications, can qualify for the B.A. degree by passing a tripos examination, or by submitting for approval a dissertation on some subject connected with the special branch of study. Students, from various educational institutions for adults both at home and in the colonies, which are said to be "affiliated" to the University, are allowed practically the same privileges. Further, diplomas in public health, psychological medicine, anthropology, tropical medicine, agriculture, geography, mining engineering and forestry are granted, after examination, to persons who are not members of the university. Having obtained the B.A. degree the student can then, after the lapse of three years, apply for the M.A. degree, and thereby, for the first time, he obtains a voice in the government of the university. He can exercise a vote in the senate, and can "non-
been established just outside Cambridge for the education of women. The students at these colleges are admitted to university and college lectures and to the various examinations for honors. The names of those who pass are placed in the published lists, and certificates are granted to them. Many of them have obtained the highest honors, but the university confers no degrees upon them. Two movements of the last half century have served to bring the university *into closer connection with education generally throughout the country.* By the local examinations, established in 1858, the standard of instruction in so-called middle schools has been raised to and maintained at a high degree of excellence; and the movement has spread beyond all expectations. The other movement, known as the University Extension Movement, which originated in a course of lectures delivered in one or two of the large towns in the north of England in 1867, has had an equally remarkable success. The scheme is an attempt to solve the problem of how much of what the universities do for their non-students can be done by university lectures for persons unable to get to the university. The method of teaching *has four characteristic features — the lecture, the class, the weekly paper work, and the examination.* The members of the university whose names were on the board in 1915 numbered 14,417, of whom 10,908 were members of the senate or other graduates, and 3,449 undergraduates. A tabulated statement issued at the end of 1915 showed that 10,250 were serving in war duties. In that year the enrolments of undergraduates numbered 1,097, having shrunk to one-third of the usual number owing to war conditions. The ordinary income of the university for 1916 was £37,184, that of the colleges £237,405. The war has also affected adversely the finances of the university, which is faced with a probable deficit at the end of 1916 of £13,500.

Bibliography.—Cooper, *Annals of Cambridge*; Mullinger, *History of the University of Cambridge*; *Statutes and Ordinances of the University*; *Student’s Handbook to the University and Colleges of Cambridge*; *Cambridge University Calendar*; *Quarterly Review* (April 1906).

CAMBRIDGE MANUSCRIPT, the CODEX CANTABRIGIENSIS or BEZÆ, the most famous of the uncial MSS. in the University Library, Cambridge, England, consisting of a copy of the fou: Gospels and the Acts of the Apostles. It was presented in 1581 to the University of Cambridge by Theodore Beza (q.v.). The Codex Beza and the Codex Laudianus at Oxford differ widely in text from all texts of other codices. Scrivener, the editor, and other critics look upon these divergences as interpolations of which the Codex Beza is said to contain no less than 600. Scrivener, nevertheless, believes that the Codex Beza is derived from an original of not later than the 3d century. Bornemann on the other hand contends that the Codex Beza contains the original text and that the majority of both church and state demands toleration and latitude of religious opinion. Hence they were frequently termed latitudinarians (q.v.). This position was the result of a faith in reason and a con-
viction that free inquiry and discussion could not be prejudicial to theological truth, and that rigid uniformity of doctrine is neither possible nor desirable. At the same time they distinguish between dogma and true religion. The former is external and necessarily changes from time to time. Religion is the spiritual life springing up in the soul, the union with the divine, which manifests itself through the moral life. The spiritual life is no mere subjective fancy, but is the true reality, more real and abiding than the world of sense and matter.

In philosophy, the Cambridge Platonists were idealists, emphasizing the reality of the ideal essences of things and the highest truth and reality that these possess, both in the intellectual and moral sphere, as opposed to what is material and sensuous. Cudworth, who was the most important representative of the school, names his chief works ‘The True Intellectual System of the Universe,’ and ‘The Eternal and Immutable Principles of Morality.’ From these titles the general standpoint of the whole school appears. Cudworth was acquainted with the writings of Descartes and corresponded with him on philosophical subjects, but the real inspiration of the school came from Plato and Neo-Platonists like Plotinus, Proclus, Hierocles, all of whom are abundantly quoted in uncritical fashion. Neglect with too, their thought and activity were influenced greatly by Hobbes (q.v.), who stands for materialism and for relativism and a naturalistic system of ethics. Indeed the work of Cudworth and Henry More, the two most prominent writers of the school, may be said to be explicit attempts to refute Hobbes. Cudworth’s work is the more ponderous and learned, abounding in quotations drawn from many sources. More we find a more mystical tendency, with perhaps deeper speculative insight.


James E. Creighton,
Professor of Philosophy, Cornell University.

CAMBRIDGESHIRE, England, an inland eastern county of England; greatest length, about 46 miles: breadth, 33 miles: area, 898 square miles. Arable land, meadow and pasture constitute about three-fourths of the county, the rest being fens. The surface is marshy, flat and thinly wooded, except in the southern portion, which is somewhat elevated and on the chalk formation. The northern section forms part of the Bedford Level. The principal watercourses are the Lark River, the Nene, which borders the county on the north, and the Ouse, which crosses the middle of the country from east to west, with its tributary the Cam. All of these are navigable for some distance. For parliamentary purposes the county is divided into three divisions (northern or Wisbech, western or Chesterton, and eastern or Newmarket) and embraces also the parliamentary borough of Cambridge, each of which returns one member. Cambridge University also returns two members. In the higher sections of the land is a heavy loam, the black, spongy soil of the fens, when drained and burned, in dry years, produces large crops of wheat, oats, barley, potatoes, cole-seed, hemp, hay and flax; fine butter and cream cheese are produced on the meadows of the Cam; and the Isle of Ely, a part of the fen-tract and within the Bedford Level, is noted for its garden vegetables. Cattle and sheep are reared on the thin chalky soils, and horses, cattle, sheep and pigeons on the fens. The manufactures are mostly done for second-hand use, used in the agricultural industry; apart from that, brewing and malting are the chief industries, and there are paper and parchment mills, and coarse earthenware and needles are manufactured. Cambridgeshire was anciently the seat of a powerful tribe, the Iceni. There are interesting Roman remains, and the county is specially rich in ecclesiastical buildings replete with architectural, historic interest. Pop. 198,074.

Cambronne, käh-brôн, Pierre Jacques Étienne, Count of, French general. b. Saint Sebastian, near Nantes, 26 Dec. 1770; d. 5 March 1842. He served on the national guard in the Vendée in 1792; distinguished himself by the capture of a Russian battery at Zurich in 1799; and took part in the campaign in 1800–13. He went to Elba with Napoleon, and returned with him in 1815. Napoleon made him general and gave him the rank of count. At the battle of Waterloo he commanded a division of the Old Guard, and is credited with having made the famous reply to the demand for surrender, ‘La garde meurt et ne se rend pas.’ (‘The guard dies, but never surrenders’). It is now certain, however, that he did not say this, but gave himself up as a prisoner to General Halkett, and was taken to England. At the time of the restoration of the Bourbons he was on the list of proscriptions, but was exonerated by two court-martials, and in 1820 appointed commandant of Lille by Louis XVIII.

Cambscan, a prince of Cambaluc (Peking), whose name is a corruption of Genghis Khan, while the description applies apparently to his grandson, Kublai Khan. This was Milton’s form of the Cambyskan of Chaucer’s fragment of a metrical romance, ‘The Squieres Tale.’ Spenser continues and finishes the tale in his ‘Faerie Queene’ (IV, ii and iii); and John Lane, a friend of Milton’s father, also wrote a continuation. Some of the romantic elements in it are widespread in Oriental story, occurring in the ‘Arabian Nights,’ the ‘Panchatantra’ and elsewhere.

Cambyse, käm-bsèz̩, I, Persian king. His historical character is involved in great doubt, but he is commonly identified as the son and successor of Teisipus, and father of Cyrus the Great (q.v.).

Cambyses II, king of the Medes and Persians: d. 522 b.c. He was the son of Cyrus the Great, and grandson of Cambyse I, and became, after the death of his father, king of the Medes and Persians, 529 b.c. In the fifth year of his reign he invaded Egypt, killed King Psammetichus III at Pelusium, plundered Memphis, and conquered the whole kingdom.
within six months. He now wished to send a fleet against Carthage, to conquer Ethiopia, and to obtain possession of the temple of Jupiter Ammon. He sent out three expeditions, however, did not take place, because the fleet, which was manned with Phcenicians, refused obedience to him in a war against their kindred. The army which was sent against the Ammonites perished in the desert; and to these expeditions, however, whose head he himself had set out against the Ethiopians, were compelled by hunger to retreat. From this time he gave himself up to the greatest cruelties. On his entrance into Memphis, seeing the Egyptians engaged in the celebration of a feast in honor of their god Apis, whom they had found, he believed that they were rejoicing at his misfortunes. He caused the holy bull to be brought before him, slew him with his own sword and caused the priest to be scourged with rods. To drown his remorse he indulged in wine. No relation was held sacred by him when intoxicated. He caused his brother Smerdis, a dream concerning whom had disturbed him, to be murdered. His sister and wife Atossa, who lamented the death of Smerdis, he killed with a blow of his foot. These and other acts, almost indicating insanity, had irritated his subjects. A magian availed himself of his discontent, and obtained possession of the throne under the name of Smerdis, whose death had been concealed. Cambyses had resolved to go to Susa, in order to punish him, when, according to the account of Herodotus, as he was mounting his horse, he received a wound in the hip from his sword, in consequence of which he soon died, at Ecbatana, Syria, leaving no children. Somewhat different accounts are given by Ctesias and others. See CURUS; DARIUS; MEDIA; PERSIA. Consult Lincke, ‘Rambyses in der Sage, Literatur und Kunst des Mittelalters’ (in Eber’s ‘Festschrift,’ Leipzig 1897).

CAMDEN, Charles Pratt (1st Earl of) of English statesman: b. 1713; d. London, 18 April 1794. After studying at Eton and King’s College, Cambridge, he entered as a student at Lincoln’s Inn, and in due time was called to the bar. In 1754 he was chosen member of Parliament for the borough of Downton. After acquiring great reputation as an advocate, he was, in 1757, appointed attorney-general, and in the same year was elected recorder of the city of Bath. While he held the office of chief justice of the common pleas Wilkes was arrested on a general warrant as the author of the ‘North Briton.’ He was committed to the Tower as a state prisoner; and being brought, in obedience to a writ of habeas corpus, before the Court of Common Pleas, Chief Justice Pratt discharged him from his confinement on 6 May 1763. The behavior of the judge on this occasion, and in the consequent judicial proceedings between the printers of the ‘North Briton’ and the messengers of the House of Commons, and other agents of the ministry, was so acceptable to the metropolis that the city of London presented him with the freedom of the corporation, in a gold box, and requested to have his picture. In July 1765 he was raised to the peerage, by the title of Baron Camden; and about a year after made lord chancellor. In this capacity he presided at the decision of a suit against the messengers who arrested Mr. Wilkes, when he made a speech, in which he stated that ‘it was the unanimous opinion of the court, that general warrants, except in cases of high treason, were illegal, oppressive and unconstitutional.’ On his opposing the taxation of the American colonies, he was deprived of the seals in 1770. He came into office again as president of the council, under the administration of the Marquis of Rockingham, in March 1782; on whose death, he resigned the following year. He soon after, however, resumed his place under Mr. Pitt, and in 1786 was made Earl Camden and Viscount Bayham. His popularity was very great in the American colonies, as is shown by the many counties, towns and villages named in his honor.

CAMDEN, William, English antiquary and historian: b. London, 2 May 1551; d. Chiselhurst, Kent, 9 Nov. 1623. He was educated at Christ’s Hospital and Saint Paul’s and Oxford. In 1575 he was appointed second master of Westminster School, and at this time began to make collections for his greatest work the ‘Britannia,’ written in Latin and giving an account of the British Isles from the earliest ages. It was published first in 1586, and gained a high reputation at once. It was revised and enlarged by the constant work and study of Camden, and by 1607 had passed through six editions. In the same year it was translated into English by Philemon Holland; by Edmund Gibson in 1722 (2 vols.); by Gough and Nicols (2d ed., 1800). Hume, in his ‘History of England’ ranks Camden’s works among the best historical productions composed by any Englishman.

In 1593, Camden became head master of Westminster, for which school he drew up a Greek grammar (1597). The same year he obtained the office of Clarendon King-at-Arms. In 1622 he founded a professorship of history at Oxford which he endowed with the valuable manor of Bexley in Kent. He was buried in Westminster Abbey. His house at Chiselhurst was the residence of Napoleon III (1871). His other works consist of ‘Annales Rerum Angllicarum et Hibernicarumregnante Elizabethe, ad annum salutis’ (1559, latest ed., 1717), ‘A Collection of Ancient English Historians’ (Frankfort 1603, 6th ed., 1607); ‘An Account of the Monuments and antiquities of the Kingdom of England and Westminster Abbey’ (1600); ‘Narrative of the Conspiracy called the Gunpowder Plot’ (1607) written in Latin at the King’s command.

CAMDEN, Ala., town and county-seat of Wilcox County, on the Louisville and Nashville Railroad, 60 miles southwest of Montgomery. The centre of the fertile Black Belt of Alabama, it has cotton, cottonseed oil, stock raising and lumber interests. Pop. 648.

CAMDEN, Ark., city and county-seat of Ouachita County, 115 miles southwest of Little Rock, on the Rock Island, the Southern, the Saint Louis and Iron Mountain and other railroads and on the Ouachita River. The city has a library and courthouse, machine shop, cottonseed-oil mills, lumber mills, washtub factory, gloves, door factories, spokes, wagon works and a cotton compress. There is a large river trade in cotton, lumber, pork and live stock. Pop. 3,995.

CAMDEN, Me., town and summer resort 37 miles southeast of Augusta, served by the Eastern Steamship Company’s vessels. Besides
its summer trade it has important wool and felt manufacturing interests. Pop. 3,015.

CAMDEN, N. J., city, port of entry and county-seat of Camden County, on the Delaware River, opposite Philadelphia, with which it is connected by several ferries. The city is situated on a level plain and the streets cross one another at right angles. It is noted for its immense market gardens and important manufactory and is the site of several large ship building concerns. Area, five square miles. According to the latest Federal census Camden had 817 manufacturing establishments, employing $30,000,000 capital and 20,000 persons; paying $10,000,000 wages. The most important industries are foundry and machine-shop-products, ship-building, worsted goods, oil cloth, boots and shoes, masonry, textile fabrics, talking machines, saws, pens, iron mills, etc. The United States census of manufactures for 1914 recorded 343 industrial establishments of factory grade, employing 25,727 persons, of whom 22,490 are wage earners, receiving annually $12,967,000 in wages. The capital invested aggregated $101,- 433,000, and the year's production was valued at $71,405,000: of this, $35,436,000 was the value added by manufacture. There are nine banks, with a combined capital of $3,000,000. The assessed value in 1915 exceeded $80,000,000, and the tax rate was $2 per $100. In 1917 there were in the city more than 200 miles of paved streets, 60 miles of sewers, 115 miles of water mains; and gas and electric street lighting and waterworks plants, the latter owned by the city. The notable buildings are the city hall, county buildings, hospitals and churches. At the close of the school year 1915 there were 38 public school buildings, 20,000 pupils, 510 teachers, a public and private high school. The city was settled in 1681 by William Cooper and was incorporated as a city under an act passed 14 Feb. 1828. Pop. 102,465.

CAMDEN, S. C., town and winter resort, county-seat of Kershaw County, at the head of navigation on the Wateree River, and on the Atlantic Coast Line, the Southern and the Sea- board Air Line systems, 32 miles northeast of Columbia. In a fertile, productive region, it has manufactures of cotton cloths, yarns and oil, bricks and lumber articles, and trades in naval stores, cotton and rice. Quakers from Ireland settled here in 1750 and received a town charter in 1791. Here 16 Aug. 1780, Baron De Kalb was mortally wounded during the victory of the British under Lord Cornwallis over the Americans under General Gates; and here 25 April 1781 the British under General Rawdon drove back the Americans under General Greene at the battle of Hobkirk's Hill. During the Civil War General Sherman's troops 25 Feb. 1865 sacked and almost totally destroyed the town. Pop. 3,569.

CAMDEN, Battle of, a battle fought near Camden, S. C., 16 Aug. 1780, between the American troops under Gates and the British under Lord Rawdon. Shortly after the British captured Charleston in May, all South Carolina was in their hands except for the guerrillas in and near Marion, Ninety Six, and Camden. Gates, attacking them at different places, was defeated, and the British captured Savannah and occupied trading stations. Washington had already sent De Kalb (q.v.) with 1,400 Maryland and Delaware regulars, among the best troops in the army, to save it, but the new disaster called for fresh efforts and a first-rate new commander of the Southern Department to succeed Lincoln. Washington wished to send Greene; but a popular clamor for Gates, who was so steadfastly credited with the victory of Cowpens, led Congress to give him the post. He took command at Hillsborough, N. C., where De Kalb was vainly waiting for General Caswell and the North Carolina militia to come up from South Carolina. Gates therefore, determined to march south and join Caswell, and thus reinforced, seize Camden and the Wateree, near which was their camp—the strategic centre of the State, and the converging point of the chief northern roads. It was held by Lord Rawdon with a comparatively small force. A fortnight's starving march of 150 miles, in the course of which he picked up a company of Virginia regulars and the North Carolina men, brought him in front of Rawdon, strongly posted across the road 15 miles northeast of Camden. He might either attack with superior forces or hold Rawdon with a part while he sent the rest around his flank to seize Camden in the rear; but he did neither, and, after waiting two days without apparent prospect, moved north to Clermont, or Rugely's Mill, and assumed a delaying position, 13 miles north of Camden. Here he was joined by 700 Virginia militia, but sent off 400 of his splendid Maryland regulars to help Sumter cut the British communications far to the southeast, and Cornwallis joined Rawdon, giving the British 2,000 trained men. Gates had no intelligence department, and supposed he still had only Rawdon's small force before him; and about 10 p.m. of 15 August started down the road to surprise Rawdon, Cornwallis at the same hour starting north to surprise him. The vanguard met about 3 a.m. a few miles above Camden, and the Americans were routed; but some British prisoners informed Gates that Cornwallis was in front with 3,000 men. Gates had 3,052, most of his nominal force being on paper or helpless with dysentery; and over half of them were militia who had never been under fire and did not even understand using a bayonet. De Kalb, the brave but judicious officer, wished to fall back on Rugely's Mill; but the other officers thought it too late to retreat, and Gates deployed his men, with as bad judgment as the decision to fight at all. The road ran through a level field flanked by swamps, so that everything depended on the firmness of the front rank; but he massed all the regulars on one wing and all the militia on the other. De Kalb held the right opposite Rawdon, with the Delaware regiment and the 2d Maryland brigade in front, the 1st Maryland in reserve; the left wing had the Virginia militia in front and the North Carolina troops in the rear, opposed to Col. James Webster, with Tarleton's cavalry in reserve. Gates' tactics were as ill-judged as his arrangement; he ordered the first charge made by the Virginia men, who did not even know how to march in order. They became tangled and while trying to reform, Webster's onrush broke them in wild panic; they threw down their loaded guns with bayonets set, without firing a shot, and for the guerrillas in the near vicinity and the North Carolina men fired several volleys, but all the rest fled like their neighbors, and the one exception soon shared their flight. Meanwhile, the 2d Maryland twice drove back Rawdon, then broke his ranks with a bayonet charge,
CAMELIDÆ

1 Guanaco

2 Dromedary

3 Two-Humped Camel
and held the field. But Webster and Tarleton, following the routed mob, had flankd the 1st Maryland and after an obstinate fight crowded it off the field; and, taking the 2d Maryland in the rear, compelled it too, to retire, after a fierce resistance. De Kalb fought to the last, and was captured, mortally wounded, with 11 wounds. The stubborn fight of the regulars is shown by the fact that the Delaware troops were nearly annihilated, and the Maryland regiments lost nearly 300 killed. There were about 1,000 killed and wounded, and as many prisoners taken, with seven cannon and 2,000 muskets. The British lost 324.

For the time the American cause in the South was ended. Gates escaped to Hillsborough, but was shortly supplanted by Greene, who wrought a wonderful transformation in a few months.

CAMDEN SOCIETY. An English association established in 1838 at London, for the purpose of publishing historical and anti-

quarian information, named in honor of William Camden. Its publication began in 1841, the first series including 10 volumes. The second series up to 1900 included 63 volumes. In 1901 a new series was begun. Up to 1913, 23 volumes have been published.

CAMDEN TOWN, England, a district of London in the Metropolitan borough of St. Pancras and county of Middlesex. It takes its name from the Earl of Camden who acquired property here by marriage. The houses, which are in general of recent erection, are regular and substantial buildings. The district lies northeast of Regent's Park and north of the Euston station of the London and North Western Railroad.

CAMEL, a large ruminant of the genus Camelus, family Camelidae (q.v.), two species of which have been domesticated since prehis-
toric times, and used as riding-animals and beasts of burden in the desert regions of the Old World. Although much search has been made, no wild species of camel can be found except one breed, the single-humped variety, discovered by Prejevalsky, which inhabits central Asia, northward to Siberia, but it is not certain whether it represents an original wild species, or is a degenerate race long ago escaped from domestication.

The Arabian camel (Camelus dromedarius) has one hump on the shoulders; the Bactrian camel (C. bactrianus) two. These are composed of muscle, flesh and fat, which in times of famine is reabsorbed to a large extent. After it has been exhausted, a rest of three or four months, with abundance of food, is necessary to restore it. The former is the more common species, and is used from Mongolia and northwest India throughout south-central Asia, Asia Minor, Arabia and northern and eastern Africa, and to some extent in Spain and else-
where. At the time of the rush of gold-seekers to California about 1850, efforts were made to naturalize camels in the arid regions of the southwestern United States, as a means of carrying supplies to the army posts there, but they proved unsuccessful, mainly on account of their intractable and vicious disposition.

The original home of the single-humped camel is uncertain, but as it is better adapted to a sandy region than is the Bactrian species, it is thought to have been in the Sahara or Arabian desert. Its peculiar adaptability to life in sandy regions is noticeable in many ways. The callous cushions (pads) on its feet are protected upon the chest and the joints of the legs, on which it rests when rising, kneeling or lying down, and protect these parts from abrasion by the sharp sand. Its wedge-shaped cutting-teeth are well fitted for cropping the short, shrubby plants of the desert. Its long eyelashes protect it from the glaring sun and from the drifting sand; and the ability to close the oblique nostrils at will prevents the entrance of dust. The most remarkable provision for life in arid regions, however, is found in the structure of the stomach, the interior of which has no villi on its surface. Both the compartments of the paunch contain a number of pouches or cells in their walls, each of which may be closed and separated from the remainder of the paunch. These are filled and cleared out, when the camel drinks, and by these means it can store more water than is requisite for its immediate use, and so save up a store which may gradually be drawn upon during long journeys over waterless districts. The sense of sight and smell are very acute, and it is capable of discerning water at a great distance. By reason of these qualities it has been a most important factor in the colonizing of the countries that lie south and east of the Mediterranean, Black and Caspian seas, and such deserts or fertile areas as are separated by desert waters; in fact students of civilization believe that these regions could hardly have become the abode of a settled civilization had it not been for this useful animal.

The Bactrian camel is of smaller size and heavier build, and, by its harder and more cloven feet, and longer and finer hair, is better adapted to a rocky and cooler region. Its habi-
tat is central Asia. Like the southern species it has wonderful endurance, withstands the terrific summer heat of Persia and the Tibetan plains, and the Arctic cold of the passes of Hindoo-Kush and Mongolia. They have been successfully employed as army transports by the English in northwestern India and central Tibet for many years, through all weathers, trains of these camels, sometimes of many thousands, were almost the only means by which tea and other merchandise was transported between China and Russia.

The many breeds of camel exhibit great diversity. Some are those bred only for the saddle, others as baggage-carriers or draft animals, for they are also trained to haul carriages in harness. Properly, a "dromedary" is any camel of either species of a saddle-breed, distinguished for its speed and ease of gait. As a beast of burden the camel has great powers of endurance. The Arabian species carries twice the load of a mule, while it is not unusual for the Bactrian species to carry half a ton weight upon its back; by reason of which it is sometimes poetically termed the "ship of the desert." Caravans frequently contain as many as 1,000 camels, which move along at a steady and uniform pace of about two and a half miles an hour. When bred especially for the purpose they have been known to carry a traveler 100 miles a day. They move with a pacing motion, lifting the feet on the same side successively.
Their value money is about the same as that of horses of similar grade and purpose.

The camel serves the nomadic inhabitants of Arabia and the Sahara and the East in many ways besides as a riding animal or beast of burden. It gives them hair that may be woven into the coarse fabric for tent-covers and ropes, or the finer shawls and rugs that are often of great market value. Its milk and flesh are food and its hide and bones are utilized, while its dried dung serves as fuel when no wood is obtainable; and from its tracks, in reading which the Bedouins are amazingly skilful, the nomad derives information of interest and importance as to the movements of neighbors or the strategy of enemies. This animal forms an important element in the economy of the civilized people of those regions, in warfare as well as in agriculture and commerce. A camel-corps has long been a regular part of the organization of the British army in Egypt and in northeastern India, serving as effective cavalry.

**CAMEL**, a water-tight box or caisson, used to raise a sunken vessel or to float a vessel over a shoal or bar. Its invention is ascribed to the Dutch and its first use is said to have been about 1668. It is sunk by the admission of water and is attached to the vessel, after which the water is pumped out, and the camel, rising by its buoyancy, lifts the load. Modern camels are built of steel and fitted with machinery for working the chains which support the wreck or attach it to the camel.

**CAMEL-BIRD**, a book-name of the ostrich (q.v.).

**CAMEL-CRICKET**. See MANTIS.

**CAMELFORD**, England, village on the Camel, 28 miles northwest of Plymouth. The streets are spacious and well paved, but the houses are in general very indifferent. Five miles to the northeast of Camelford are the ruins of King Arthur's castle of Tintagel, and about two miles to the north are the celebrated slate quarries of Delabole. The inhabitants are chiefly engaged in agriculture.

**CAMELIDEAE**, a family of ruminant mammals, including the Old World camels (genus Camelus) and New World guanacos and vicuñas (genus *Lama*), as the existing remainder of a divergent group formerly closely connected both in structure and in geographical distribution. It forms a distinct section of the *Ruminantia* named *Tylopoda*, in reference to the character of the feet, in which only the third and fourth toes are developed, and these are embedded in a cutaneous pad, forming a broad elastic sole to the foot. The two metapodial or "cannon" bones of each of the long limbs are separated for a considerable distance at the lower end, where the articular surfaces, instead of being pulley-like, with deep ridges and grooves, as in other recent split-hoofed animals (*Artiodactyla*), are rounded and smooth. The toes terminate in small nails, and the weight of the animal rests upon the padded sole of the foot instead of on hoofs, in adaptation to the soft, sandy soil of deserts, in which this race of animals seems to have lived ever since its origin. The dentition of the prolonged jaws has certain peculiarities. The full number of incisors is present in youth, but in the upper jaw these disappear, except the outermost, which persist through life, while those in the lower jaw are permanent. Canines are present in both jaws. The molars are of the selenodont type. The neck is very long and flexuous; the shoulders are high; and the hinder part of the body is much contracted and drooping in appearance. The tail is well developed and the skin is thick and with horns and the nostrils are high and may be closed against the admission of dust; and the lips are prolonged and flexible. There are no horns or antlers in either sex. The interior anatomy is peculiar, principally in the character of the digestive organs, described in the article CAMEL. See CAMELIDEAE, FOSSIL.

**CAMELIDEAE, FOSSIL.** The evolution of the camel (q.v.) through the Tertiary and Quaternary periods is nearly as completely known as that of the horse, and is hardly less instructive. The camels now inhabit central Asia and northern Africa, their size as a gazelle, in North America. No fossil camels or llamas are found in these countries in deposits much older than the Quaternary. But in the Tertiary strata of North America have been found a series of animals which appear to be the direct ancestors of this family, and contemporaneous with the primitive hoofed animals of the earliest Eocene. The earliest member of this series, ancestral probably to the camels among other ruminants, is *Trigonolestes* of the Lower Eocene, smaller than a domesticated rabbit, with the complete series of incisor, premolar and molar teeth, the molars of the primitive buno dont type (see *Bunodont*) and probably five complete toes, the side toes very slender, and the metapodials all separate. In the Upper Eocene stage, *Protolophaeus*, as large as a jack rabbit, the molars have become selenodont (q.v.), as in modern camels, but with shorter crowns, and the side toes in the hind leg are represented only by splints. In the Oligocene stage, (*Protobrotherium*), as large as a modern camel, the molars have longer crowns, the splints are reduced to small nodules of bone and the metapodials, though still separate, are closely appressed. In the Miocene stage (*Procamelus*, etc.) the metapodials are sometimes separate, sometimes united; the incisors and premolars are generally reduced in size and the anterior upper incisors are often lost; and the form of the teeth and skull comes closer to the modern type. The Pliocene camels (*Pluochena*, etc.) are still closer to the modern type, all with united metapodials and reduced incisors and premolars, and at this epoch they spread to South America and the Old World, the gradual rising of the continents having made land connections between them about this time. During the Pleistocene epoch the camels all became extinct except the Camels (*Camelus*), the direct ancestors of the Arabian dromedary which they still survive in the alien continents to which they had wandered.

The most remarkable peculiarity of the camels is the adaptation of the stomach, which enables the animal to go a long time without water (see *Camelus*). There is no direct evidence of the evolution of this character. But the cushioned foot, equally an adaptation to desert life, is not indicated (by the form of the toe bones) in any ancestral camel pre-
vious to the Miocene, from which time it became gradually more marked. We may suppose, therefore, that the earlier ancestors of the camel were antelope- or deer-like in their habitat, and were gradually adapted to desert life.

Besides the main line of descent there were, especially in the Miocene, side branches now extinct, one of which (Aficamelus) was single clavate giraffes in proportions, although not related to the giraffes, which were evolved in the Old World at the same epoch.

It is a general law in the evolution of any race of animals that at each succeeding stage in its development the progressive characters appear at an earlier period in the lifetime of the individual. The young individuals of one stage resemble the adults of the preceding stage, while the old individuals take on some of the characters of that next succeeding. This is well illustrated in the camels, especially of the Miocene epoch; in young individuals the metapodial are always separate, as they are in all adult camels of the Oligocene, and they are usually not completely consolidated until a comparative late period. In modern camels and llamas, they are consolidated before birth. The anterior incisors and premolars usually drop out in old individuals of Miocene camels; in the later stages they are minute stumps or scales which disappear early in life.

CAMELIA, ka-mel'-ya, a genus of plants belonging to the family Ternstræmiææ, beautiful flowering shrubs, natives of Asia. The name Camellia was given to this genus by Linneaus in honor of Kamel or Camellus, a Moravian Jesuit. Camellia japonica, as it grows in the woods and gardens of Japan and China, is a lofty tree of beautiful proportions, and clothed with a deep green, shining foliage, with large, elegant flowers, either single or double, and of a red or pure white color. There are numerous varieties of this species in China, the greater part of which have found their way to Europe and America, while other new varieties have been produced by breeding. The double-white, double-striped and double-waratah, the last so called from the central petals resembling those of the waratah plant of Australia, are considered the finest varieties, and both grow and flower well. The peony-flowered and fringed are also much admired. The oil-bearing camellia (C. sasanqua) is cultivated for its seeds, from which an oil is expressed that is very generally used by the Chinese in their cookery. It thrives best in a red sandy soil, and attains a height of six to eight feet, producing a profusion of white blossoms and seeds. Besides these species C. reticulata is cultivated.

The single red camellia is propagated by cuttings, layers and seeds. It forms suitable stocks on which the others are either inarched or budded and engrafted. The cuttings to be selected are the ripened shoots of the preceding summer; these are taken off in August, being cut smoothly at a joint or bud; two or three of these cuttings then planted firmly in the soil with a dibble. Inarching or engrafting is performed early in spring, when the plants begin to grow. A few seeds are sometimes obtained from the single red and semi-double camellias, and from the single waratah. These require two years to come up, but make the best stocks of any.

AMELOPARD. See Giraffe.

AMELOPARDALIS, one of the northern circumpolar constellations added by Hevelius in 1690. It is a large, irregularly shaped constellation, something like the animal, and is more than 40° in length, with its head close to the North Pole. It borders upon Ursae Minor, Draco, Ursa Major, Lynx, Auriga, Perseus, Cassiopeia and Cepheus. It contains no stars brighter than the fourth magnitude, and was put in to fill up a part of the sky otherwise uncovered by constellations. Being introduced later than Bayer's time, it has no letters except α, β, and γ, which Baily introduced into the "B. A. C." in 1845. While these have not been universally accepted by astronomers, they will probably be adopted in a general revision of the northern constellations.

AMELOT, in the Arthurian legends, the city where King Arthur's palace with the Round Table was located. Tennyson, in "The Coming of Arthur," describes the rich and splendid royal court, and mentions it in others of the "Idyls of the King" and in "The Lady of Shalott." It is also referred to by Shakespeare in "King Lear." The site of Camelot has been much in dispute; Shakespeare supposed it to be in Somersetshire; Tennyson and Capell located it at or near Winchester; and Caxton placed it in Wales. The monks of Glastonbury were chiefly responsible for the Somerset theory, which they maintained for the purpose of attracting thither pilgrims and so enriching their monastery.

AMELAE'S HUMP, one of the peaks of the Green Mountains, in Vermont, 17 miles west of Montpelier. Its height is about 4,100 feet.

AMELAE'S THORN, a genus of plants belonging to the family Fabaceae. They are herbaceous or half-shrubby plants, with simple leaves, minute stipules, axillary peduncles terminating in spines, and red flowers arranged in racemes. Only three species of this genus are known, Alhagi camelorum, A. gracorum and A. mauro- rum. They grow in the deserts of Egypt and the East, and their common name is derived from the fact that they afford a food much relished by camels. The species yield a gummy, saccharine exudation like manna.

AMELAE. See KAMEN.

AMEOS. Certain carved reliefs on stones, shells or other substances in which the engraver takes advantage of the medium having two or more super-imposed layers or stratifications of different colors or tones to obtain the most striking effect. The derivation of the word is contested. The late Rev. Charles King, one of the most prominent collectors and authorities, says the term comes from the Arab word cam-an, a flower, and it was used since the Crusades. He says the term camahuutm (from the Syriac chemeia, a charm) first appears in the 13th century. In early times the cameo has also been termed cademus. In modern cameo examples the relief or subject is composed from the upper layer and the lower layer is utilized as background. The substance used covers a wide range, among others: Agate, onyx, sardonyx, opal, amethyst, emerald,
CAMERA—CAMERA LUCIDA

Julien de Fontenay, known in art as Coldore, did such splendid work that Queen Elizabeth employed him at her English court, where he produced things in turquoise and onyx (one is in the Victoria and Albert Museum, London, another in the Cabinet de France, Paris). Henri IV was extremely infatuated with cameos and wore 12 of them as buttons (they represented the 12 Caesars), also a cameo in his own person, which are in the Cabinet de France. Among the noted family of Pichlers, gem engravers who did fine cameo work, are Giovanni, of Florence, and Luigi, second son of Antonio; the latter was Austrian court engraver under Francis I. In the 17th century the cameo was so much in vogue that the celebrated Flemish artist Rubens designed a number of copies of antiques. In the 18th century Jacques Guay, of Marseilles, did beautiful work; Jean Laurent Nater, of Nuremberg, was great in imitating antiques, and even the Marquis de Pompadour engraved and signed the Genius of Music cameo. Artist Bonché designed cameos and Louis Chapat, and the most noted cameo artist of all, Joseph Pichier, who have left us were worn as animate art. The Simona (father and son), as well as Berini and Jéffroy, belong to the well-known cameo artists of the 19th century. Bernardo Pistrucc did fine work in London. A Scotsman named James Tassie reproduced (late 18th century), to propagate art knowledge, beautiful copies in glass of antique cameos which are collected by connoisseurs of this day on their art merits; they are fetching $10 or more these days though sold originally at $2.50; their colors are very brilliant, but these pieces closely resemble antiques. Besides the collections in Paris already mentioned, there are extensive cabinets at Dresden, Vienna, the Saint Peters burg Hermitage Museum, Florence, Rome, Naples and London.


CLEMENT W. COUME.

CAMERA, Photographic, a camera obscura so constructed that sensitized plates or films may be placed at the back and receive the image. There are many styles of camera in use, those of the tripod variety being used for portraits and landscapes where a steady support is required and the hand camera for instantaneous exposures, used by tourists on account of its convenient shape and size. See CAMERA OBSCURA; PHOTOGRAPHY.

CAMERA LUCIDA (Lat. ‘light chamber’), an optical instrument employed to facilitate the sketching of whole figures, as they act by total reflection, and may have various forms, of which that proposed by Wolleston, and illustrated in the accompanying figures, is one of the commonest. The essential part is a totally reflecting prism with...
CAMERA OBSCURA

four angles, one of which is 90°, the opposite one 135° and the other two each 67° 30'. One of the two faces which contain the right angle is turned toward the object to be sketched. Rays falling in a straight line on its face, as seen by the observer, are totally reflected from the face εσd to the next face σd, whence they are again totally reflected to the fourth face, from which they emerge in a straight line. The eye (pp) placed so as to receive the emergent rays will see an image of the object in a direction of right angles to that in which the object lies. In practice the eye is held over the corner σ of the prism in such a position that one-half of the pupil receives these reflected rays, while the other half receives light in a parallel direction outside the prism. The observer thus sees the reflected image projected on a real background, which consists of a sheet of paper for sketching. He is thus enabled to pass a pencil over the outlines of the image—pencil, image and paper being simultaneously visible. It is very desirable that the image should lie in the plane of the paper, not only because the pencil-point and the image will then be seen with the same focusing of the eye, but also because parallax is thus obviated, so that when the observer shifts his eyes the pencil-point is not displaced on the image. The introduction of an ordinary "stop" as used in photography remedies this defect, although greatly reducing the volume of light passing. As the paper, for convenience of drawing, must be at a distance of about a foot, a concave lens, with a focal length of something less than a foot, is placed close in front of the prism in drawing distant objects. By raising or lowering the prism in its stand (Fig. 2), the image of the object to be sketched may be made to coincide with the plane of the paper. The prism is mounted in such a way that it can be rotated about either a horizontal or a vertical axis; and its top is usually covered with a movable plate of blackened metal, having a semi-circular notch at one edge for the observer to look through.

Another form of the camera lucida, that of Amici, an Italian optician, is sometimes preferred to that of Wollaston, inasmuch as it allows the observer to change the position of his eye considerably without ceasing to see the image of the object he is tracing. The prism in this case is triangular in shape, and one of the angles is a right angle. In using it, the right angle is turned upward, so that one of the perpendicular faces is turned toward the object in an oblique direction, while the edge of the other perpendicular face meets a transparent glass plate at right angles. The rays from the object falling upon the face of the prism which is turned toward it are, after being more or less refracted, thrown upon the base of the prism, from which they are again totally reflected in the direction of the other perpendicular face. In emerging from the prism of this face they are again refracted and thrown upon the transparent glass plate. By this, again, the rays are partially reflected, being thrown upward in the direction of the eye of the observer, who, looking through the plate, sees an image of the object on a sheet of paper beneath, the outlines of which can be traced by a pencil as before. Perhaps the most important use of the camera lucida is its adaptation and attachment to the microscope; but here also direct photography has almost wholly superseded handwork.

CAMERA OBSCURA (Lat. "dark chamber"), an optical instrument employed for exhibiting the images of external objects in their forms and colors, so that they may be traced and a picture formed. From certain scattered observations in the writings of Friar Roger Bacon, in the 13th century, it would appear that he was acquainted with the principle upon which the camera obscura is constructed, but the first complete description of this instrument is found in the "Magia Naturalis" of Giambattista della Porta, published in 1569, and Porta is commonly credited with its invention.

In its simplest form the camera obscura consists of a darkened chamber, into which no light is permitted to enter except by a small hole in the window-shutter. A picture of the objects opposite the hole will then be seen on the wall, or a white screen placed so as to receive the light coming through the opening. The images thus obtained become sharper as the size of the hole is diminished; but this diminution involves loss of light, so that it is impossible by this method to obtain an image at once bright and sharp. This difficulty can be overcome by placing a lens in the opening in the shutter. If the objects in the external landscape are all at distances many times greater than the focal length of the lens, their images will all be formed at sensibly the same distance from the lens and may be received upon a screen placed...
at this distance. The images are inverted, and are of the same size whether the lens is in position or not, so long as the screen remains fixed; but they are far sharper and more distinct when the lens is used. As an attraction at seaside resorts and other places of amusement, the camera obscura consists of a small box, generally 11 by 12 by 10 inches, covered by opaque curtains and having at its top a revolving lantern, containing a lens with its axis horizontal, and a mirror placed behind it at a slope of 45°, to reflect the transmitted light downward of a sheet of white paper lying on the top of a central table. Images of external objects are thus depicted on the paper, and their outlines can be traced with a pencil if desired. It is still better to combine lens and mirror in one by the arrangement represented in section in the figure. Rays from external objects are first refracted at a convex surface, then totally reflected at the back of the lens (or prism), which is plane, and finally emerge through the bottom, which is concave, but has a larger radius of curvature than the first surface. The two refractions produce the effect of a converging meniscus. The camera obscura, which was formerly chiefly employed for purposes of amusement, has now become well known from its adaptation to photography. See Photography.

CAMERARIUS, ká-má-rá̂t-rōos, Joachim, German Jesuit and educator: b. Bamberg, 12 April 1500; d. Leipzig, 17 April 1574. His proper name was Liebhard but he changed it to Camerarius, because his ancestors had been chamberlains (Lat. camerarius) at the court of the bishops of Bamberg. At the age of 13 he entered the University of Leipzig. In 1518 he began to teach Greek at Erfurt; in 1521 he taught at Wittenberg, where he became the friend of Melancthon; and in 1541 he undertook a professorship at Leipzig, which he retained until his death. He contributed not only to the progress of knowledge by his own works and by editions of classical authors, but also by a better organization of the universities of Leipzig and Tübingen and of the gymnasium at Halle. He took an important share in the political and religious affairs of his time, and in 1555 was deputy of the University of Leipzig to the Diet of Augsburg. His critical judgment was superior to that of Melancthon, whose equal he was in classical studies, and he must be ranked as the greatest German classicist of his century. Together with many theological and biographical books, his works include editions of Homer, Homeric Poems (with the so-called schola of Didymus, Basel 1541); Greek Elegiac Poets (Basel 1550); Theocritus (Frankfort 1545); Sophocles (Basel 1556); Herodotus (Basel 1540 and 1557); Theophrastus (Basel 1541); coeditor on Galen (Basel 1538); Quintilian; Cicero (1540); and several others. Consult Bursian, Geschichte der klassischen Philologie in Deutschland (pp. 185–90, Munich 1883), and Sandys, 'A History of Classical Scholarship' (Vol. II., Cambridge 1908).

CAMERARIUS, Rudolph Jakob, German botanist: b. Würtemberg, 12 Feb. 1665; d. Tübingen, 10 Sept. 1721. He is known as the discoverer of the sexual relation in plants. He was in charge of the botanical gardens at Tübingen and was also a medical professor.

CAMERINO, ká-mè-rí-nô (ancient Camerinum), Italy, a town in the province of Macerata, 41 miles southwest of Ancona, between the Chienti and the Potenza. It is the seat of an archiepiscopal dating from 1787, and contains some good public buildings, among which are the archiepiscopal palace, the ducal palace, the cathedral built in 1832, occupying the site of a temple of Jupiter. There is a university, founded in 1727, and a bronze statue of Sixtus V, erected in 1587. Silk is grown and manufactured here. Pop. 11,689.

CAMERLENGO (lt. camerlingo, 'a chamberlain'), one of the highest officers of the Vatican court, who controls the finances and secular interests of the Pope. A cardinal camerlengo, during a vacancy in the Holy See, takes charge of all the temporalities, and presides over the apostolic chamber or palace. The other cardinals assist in spiritual offices. There is also a camerlengo of the Sacred College of Cardinals, and a camerlengo of the Roman clergy.

CAMERLYNCK, ká-mér-lînk, Achille, Belgian sociologist and Biblical scholar: b. Reninghelst, Belgium, 9 May 1869. He was educated at Routers, Bruges and at the University of Louvain. He was ordained priest in 1894, and from 1899 to 1910 was professor of Scripture and sociology at the Seminary of Bruges. In 1910 he became dean of Ostend and rector of Saints Peter and Paul, Ostend. He is a member of the Belgian Superior Council of Labor and the Belgian Society of Sociology. He is the author of Saint Irénée et le canon du Nouveau Testament (1896); 'De quarto Evangelii auctore dissertato' (2 vols., 1898–99); 'Quelques considérations sur la base philosophique du socialisme scientifique contemporain' (1900); 'De l'opportunité d'une enquête ethnographique et sociologique sur les peuples incultes' (1905); 'Compendium Introductioinis generalis in Sacram Scripturam' (2 vols., 1911–13); 'Evangeliorum et Apostolorum, Martinum, Matthaeum, Marcum et Lucanum synopsis' (with Dr. Coppieters, 1908). He edited Van Steenkiste's 'Commentarius in Epistolam Catholicam' (5th ed., 1909) and 'Commentarius in Actus Apostolorum' (6th ed., 1910), and was a contributor to 'Collationes Brugenses,' 'The Catholic Encyclopedia,' and 'Annales de la Société Belge de Sociologie, etc.'

CAMERON, Agnes Deans, Canadian educator, traveler and lecturer: b. Victoria, B. C., 1863; d. there 1912. She taught for 18 years and became widely known for her interest in exploration and national development, giving lectures in Canada, Great Britain and the United States, based on personal observation of the natural resources of Canada, during travels all over the little known country extending to the Arctic Ocean. She was elected vice-president of the Canadian Women's Press Club in 1909. She was associate editor of the Educational Journal of Western Canada, and author of 'The New North' (1909) and 'The Outer Trail' (1910).

CAMERON, Arnold Guyot, American educator: b. Princeton, N. J., 4 March 1864. He was graduated at Princeton University in
1886, and during the next two years studied abroad. In 1888-91 he was professor of French and German languages and their literatures in Miami University; in 1891-97 assistant professor of French in the Sheffield Scientific School of Yale University; and in 1897 accepted the chair of French at the John C. Green School of Science of Princeton University. He is editor of the textbooks ‘Daudet,’ ‘Mérimée,’ ‘Lût,’ ‘Coppee and Maupassant,’ and ‘The Goncourts,’ and has lectured on literary topics.

CAMERON, Sir Charles, Scotch journalist and politician; b. Dublin, 1841. He was educated at Madras College, Saint Andrew's, Trinity College, Dublin, and at medical schools in Paris, Berlin and Vienna. He edited the North British Daily Mail from 1864 to 1874, and from the latter year till 1900 was one of the members of Parliament for Glasgow. The adoption of six-penny telegrams was the result of a resolution which he introduced in the House, and he was likewise instrumental in the conferring of municipal franchise upon women in Scotland. He was knighted in 1893.

CAMERON, Sir Charles (Alexander), Irish physician; b. Dublin, 16 July 1830. He was elected public analyst for the city of Dublin in 1862. In 1867 he was elected professor of hygiene and chemistry in the Royal College of Surgeons in Ireland. He was knighted in 1886 in recognition of his services to public health. He has written ‘Chemistry of Agriculture’ (1857); ‘Lectures on Public Health’ (1868); ‘History of the Royal College of Surgeons, Ireland, etc.’ (1886); ‘Elementary Chemistry and Geology’ (1886); ‘Reminiscences’ (1913).

CAMERON, Charles Duncan, English soldier; d. 1870. He served in the Kaffir War (1846-47) and in the Crimean War at the defense of Karas. In 1860 he became British consul in Abyssinia. He undertook two years later to deliver a letter from Queen Victoria to King Theodore, and was imprisoned by the King for 14 months on the charge of interfering with the inquilin polity of that country. He was released only to be shortly imprisoned again, together with Rassan, agent of the British government, and others, their final release being effected by the advance of English troops upon Theodore's stronghold at Magdala in April 1868. An account of these matters by Cameron was published in the Parliamentary Printed Papers (1868-69).

CAMERON, Sir Douglas Colin, Canadian knight and statesman; b. Hawkesbury, Ontario, 1854. He became a prosperous lumber capitalist with business interests in Manitoba, British Columbia and Ontario. He was prominent as a Liberal member in the Ontario legislature 1902-03, in 1911 received the appointment of lieutenant-governor of Manitoba and was knighted in 1914.

CAMERON, Edgar Spier, American mural artist; b. Ottawa, Ill., 26 May 1862. After early study and training in New York and Paris, he, with Walter McEwing and Robert Reid, were selected to execute the mural paintings for the Chicago World Fair. The decorations in the Library of the Supreme Court, Spier's work, III., were representative of mural work, while distinctive easel work includes 'The Youth of Christ,' his most important work. 'Glass Blowers' and 'Dreamland,' exhibited at Berlin in 1910. From 1891-1900 he was art critic and correspondent of the Chicago Tribune, and at the Paris Exposition, 1900, was a member of the international jury. MARGARET CAMERON, his wife, is well known for successful portraiture and genre work.

CAMERON, Frank Kenneth, American chemist; b. Baltimore, Md., 2 Feb. 1869. A student at Johns Hopkins University, after instructing at Cornell and at the Catholic University of America, he was associated with the United States Department of Agriculture and became head of the laboratory of soil chemistry. His technical writings include numerous departmental bulletins and 'An Introduction to the Study of the Soil Solution' (1910); and 'The Soil Solution, the Nutrient Medium for Plant Growth' (1911).

CAMERON, George Frederick, Canadian poet; b. New Glasgow, Nova Scotia, 1854; d. 1885. He was educated at Queen's University, Kingston, Ontario; resided for a time in the United States; returned to Canada, and edited the Kingston News. As a lyrical poet he received high praise from leading critics, his songs on Spanish expression in Cuba being especially full of fire.

CAMERON, James Donald, American capitalist and politician; b. Middletown, Pa., 14 May 1833. He is the oldest son of Simon Cameron (q.v.), and was graduated from Princeton College in 1852. He devoted himself to business pursuits and in 1851 was made vice-president and two years later president of the Northern Central Railroad. He remained in this office till 1874. In 1876 President Grant appointed him Secretary of War, and in 1877 he succeeded his father as United States senator from Pennsylvania. He was re-elected in 1883 and 1890. He retired in 1897. He was prominent in the campaign of 1876, first as opposing the nomination of Blaine, and then in working for Hayes' election. But Hayes refused to continue the Cameron in the Cabinet. In 1880 he was chairman of the Republican National Committee. Consult McClure, 'Old Time Notes of Pennsylvania' (Philadelphia 1905).

CAMERON, John, Scottish scholar; b. Glasgow 1579; d. there, 13 May 1625. He was educated at the University of Glasgow, and at the age of 20 held an appointment there as reader in Greek. In 1600 he went to the Continent, where his ability and erudition secured for him several appointments at Bergerac, Sedan, Saumur and other seats of learning. Returning to Great Britain in 1620, he was two years later appointed principal of the University of Glasgow; but in less than a year returned to Saumur, and thence to Montauban, where he received a divinity professorship. Here, as at Glasgow, his doctrine of passive obedience made him many enemies, by one of whom he was stabbed in the street, and he died from the effects of the wound. Sir Thomas Urquhart styles him a 'walking library,' and Milton, 'an ingenious writer in high esteem.' He was considered one of the best scholars of his day; in Biblical criticism he was inclined to be perverse; where there was argument, he usually chose the opposite view to that held by other divines, especially Beza. His theolog-
ical opinions were of a somewhat lax character, his eight works, in Latin and French (10 vols., 1610–42) being said to be the foundation of Moses Amyraut's doctrine of universal grace (1634). His followers are sometimes called Cameronites. His collected works were published with a memoir by L. Cappel (Geneva 1642).

Cameron, Sta Matthew Crooks, Canadian statesman and jurist: b. Dundas, Ontario, 1822; d. 1891. He was called to the bar of Upper Canada in 1849, and was first returned to Parliament in 1851. He subsequently sat in the provincial legislature of Ontario; was provincial secretary 1867–71; commissioner of Crown lands 1871; and leader of the opposition 1872–76. He was appointed to the bench in 1878, and in 1884 became chief justice of the Court of Common Pleas of Ontario. He was knighted in 1887.

Cameron, Richard, Scottish Covenant: b. Falkland, Fifeshire, 1648; d. Ayrmoss, 22 July 1680. He was at first a school-master, and for a time was tutor in the family of Sir Walter Scott of Harden. Being converted to the presbyterian faith, he became an enthusiastic votary of the Covenant. On 20 June 1680, in company with about 20 other persons, well armed, he entered the village of Sanguilar, and proclaimed at the cross that he and those who adhered to him renounced their allegiance to the King on account of his having abused his government, and also declared a war against him and all who adhered to him, at the same time avowing their resolution to resist the succession of his brother, the Duke of York. The privy council immediately put a reward of 5,000 merks upon Cameron's head, and 3,000 upon those of Cargill and Douglas, his associates, and parties were sent out to waylay them. The little band kept together their arms for a month in the mountainous country between Nithsdale and Ayryshire. But on 22 July, when they were lying in Ayrmoss, near Auchinleck in Ayryshire, Bruce of Earlshall approached them with a party of horsemen from much superior in numbers. A brief skirmish took place, in which the insurgents were allowed even by their enemies to have behaved with great bravery; but nothing could avail against superior numbers. Cameron, being among the slain, his head and hands were cut off and carried to Edinburgh, along with the prisoners. Consult Herkies, 'Richard Cameron' (in 'Famous Scots Series,' New York 1890). See Cameronians; Cameronian Regiment.

Cameron, Simon, American statesman: b. Donegal, Lancaster County, Pa., 8 March 1799; d. there, 26 June 1889. He learned printing and in 1820 he was editor of a paper in Doylestown, Pa., and in 1822 held a similar post in Harrisburg. He then interested himself in banking and the building of railroads, and for a time served as adjutant-general of Pennsylvania. In 1838 he was commissioner to settle accounts with the Wimehago Indians and was accused of swindling them. From 1845 to 1849 he was United States senator from Pennsylvania, elected for the Democratic party. He became a member of the Republican party on its formation, and in 1850 was again elected United States senator. He was unsuccessfully supported for the offices of both President and Vice-President in the National Convention of 1860, and in 1861 was appointed Secretary of War by President Lincoln. He advocated the arming of fugitive slaves and other extreme measures. In January 1862 he resigned from the cabinet, and was appointed Minister to Russia. He succeeded in gaining the support of the Russian government for the Union. In November of the same year he resigned, and lived in retirement till 1866, when he was again elected to the United States Senate. In 1872 he became chairman of the Committee on Foreign Affairs. In 1877 he retired from the Senate in favor of his son, James Donald Cameron. His influence over the Republican party was strong, and his power in the politics of his State practically absolute. The control was transferred later to M. S. Quay and Boies Penrose. Cameron was the first powerful State "boss" in American politics. His ideals may be gathered from his definition of an honest politician as "one who will stay bought when he is bought." He was a vigorous opponent of civil service reform during the administration of President Hayes. Consult McClure, 'Old Time Notes of Pennsylvania' (2 vols., Philadelphia 1905).

Cameron, Verney Lovett, English traveler in Africa: b. Weymouth, 1 July 1844; d. Leighton Buzzard, 26 March 1894. He entered the British navy in 1857, and in 1872 was chosen by the Royal Geographical Society of London to conduct an expedition for the relief of Dr. Livingstone. He was only in time to meet the remains of Livingstone at Uyanwembe, but pushed onward to Ujiji on Lake Tanganyika, and partly circumnavigated this great sheet of water, establishing the fact that its outlet was the Lukuga. Not being able to follow the Lualaba River downward, he continued his journey westward to Benguela, and was thus the first to cross tropical Africa from east to west. Returning to England in 1876, he was raised to the rank of a commander. In 1878 he made a journey through Asia Minor and Persia in order to satisfy himself of the feasibility of a railroad connecting India with the Mediterranean, and in 1882 with Sir Richard Burton explored the country behind the Gold Coast. He published accounts of his journeys in his 'Across Africa' (1877); 'Our Future Highway to India' (1888); 'To the Gold Coast for Gold' (with Sir R. F. Burton, 1883). He died from an accident in the hunting field.

Cameron, Mo., city of Clinton County on the Chicago, Rock Island & Pacific and the Chicago, Burlington & Quincy railroads, 50 miles northeast of Kansas City. The dairying industry is important, gloves are manufactured, municipal waterworks and electric lighting plants are operated and Missouri Wesleyan College is situated here. Pop. 2,980.

Cameron, Texas, city, county-seat of Milam County, on the Gulf, Colorado & Santa Fé and the San Antonio & Aransas Pass railroads, 53 miles south of Waco. Stock raising and cotonnerc are paramount; coal and timber are exploited from neighboring deposits. Cameron was founded in 1875. Pop. 3,263.
CAMERON HIGHLANDERS—CAMILLUS

CAMERON HIGHLANDERS, the old 79th Regiment in the British army, raised in 1793 by Allan Cameron of Erroch. It wears the Highland dress and forms the first battalion of the King’s Own Cameron Highlanders. Its depot is at Inverness and its record office is maintained at Perth. A second battalion is now linked with the regiment, the first being known as the 79th Foot.

CAMERONIAN REGIMENT, a British regiment raised in 1689 among the Camerons of the west of Scotland to support William III, and long famous as the 26th Regiment. It fought in the first battle of the Cameronians, Scottish rifles (Regimental District No. 26; Depot and Record Office Hamilton, N. B.), the second battalion being the old 96th Regiment. It takes its name from William Cameron, and its origin goes back to the time when the Covenanters went armed to public meetings.

CAMBRONIANS, a sect of Scotch Presbyterian dissenters, named after Richard Cameron. James I had enforced on his Scottish subjects a liturgy which the people abhorred, and this led, in 1638, to the formation of the Cameronians, who upheld half of the true religion and the freedom of the kingdom. The organization of the Scottish presbytery was still further completed in the adoption of the Presbyterian form of Church government, a Calvinistic concept, and the two catechisms, which documents are the standards of the Scottish Kirk to this day. Throughout the revolution of 1688 the Camerons maintained inflexible hostility to the royal usurpation of religious freedom. They supported the Prince of Orange as the rightful King of England, but were displeased and disappointed by the form in which the Presbyterian Church was restored. In 1709 they exerted all their influence against the union of Scotland and England. The prelacy of this denomination was not organized until 1 Aug. 1743, when an act of toleration was procured in their favor. They still have a distinctive existence in Great Britain and America, under the name of Reformed Presbyterian.

CAMEROONS, kā’moōnz’, or KAMERUN, a German colonial possession in West Africa having originally an area of 191,130 square miles, which was increased in 1911 to 295,000 square miles by France agreeing to cede the Kongo territory as compensation for loss of German influence in Morocco. It is bounded by Lake Chad on the north, French Congo on the east and south, Spanish Guinea on the southwest and the Bight of Biafra and Nigeria on the west. From the sea to Lake Chad it measures over 700 miles, and its greatest breadth from east to west is 600. The territory receives its name from the Cameroon River, which enters the Bight of Biafra by an estuary nearly 20 miles wide. The swamps along the banks of the river render this district unhealthy for Europeans. Northwest of the river lies the volcanic group called the Cameroon Mountains, which rise to a height of 13,760 feet. The lower slopes of these mountains are more healthy and are covered with ebony, redwood and palm trees. The climate is warm and the River is the much longer Mbam, entering the Bight of Biafra a little south of the former, and navigable for 40 miles inland to Idia.

Among cultivated plants are the banana, oil-palm, cocoaanut, groundnut, manioc, yam, sweet-potato and colocasia; of more recent introduction are cacao, coffee, tobacco, etc. Among the minerals are gold and iron. There is a considerable trade in cotton, ivory and oil. The inhabitants are almost entirely of the Bantu stock, widely diffused throughout the more southerly portion of the continent, and many of them have almost regular European features. The coast of the Cameroon territory was annexed by Germany in 1884, and the interior was afterward acquired, the whole having been a German colony under a governor. The seat of government was at Buea, situated 3,000 feet above sea-level near the coast. At Duala there was a commodious floating dock; 150 miles of railroad had been constructed and there was wireless communication with Berlin through Togoland. The colony had never raised sufficient revenue to meet its expenditure, the last figures of which were 588,300, with receipts £56,300, imports £1,712,000 and exports £1,165,000.

In August 1914 operations were begun by the British against the Cameroons, which culminated in January 1916 when 14,000 native troops and 900 officers withdrew over the southwestern frontier into Spanish Guinea and there gave up their arms. A month later the northern garrison capitulated.

CAMLING, kā-mĕl’ing, Philippines, town of Luzon, Tarlac province, on the Camiling River, 80 miles northwest of Manila. Fine timber, rice, corn and sugar are the chief products. The place has an unwholesome reputation as a hiding place for thieves and outlaws. Pop. 26,000.

CAMILLA, in Roman fable, a virgin, said to have been a daughter of Metabus, a Volscian king, and to have aided Turnus against Æneas (Virgil, Æneid, vii). She was slain by Arruns, an Etruscan ally of Æneas (Virgil, Æneid, xi, 648-833).

CAMELLE, kā-mēl’, the heroine of Dumas’ novel, and the play adapted from it. (See LA DAME AUX CAMELIAS); also the heroine of Corneille’s Les Horaces; founded on the old Roman legend of the Curtiati.

CAMILLUS, Marcus Furius, Roman patriarch: d. 365 B.C. He is famous as the deliverer of the city of Rome from the Gauls. He first came into notice as consular tribune in 403 B.C. His military successes were numerous, but the accounts of them have become mixed with considerable mythological fiction. In 396 B.C. he was made dictator during the Veientine War, and captured the town of Veii after it had defended the Roman power for more than 10 years. In 394 B.C. Camillus besieged the Falerii, and by an act of generosity induced them to surrender. Three years later the envy and jealousy of enemies caused him to fall for a time, and he was living in retirement when the Gauls, under Brennus, invaded and captured Rome, with the exception of the Capitol. Camillus was now appointed dictator a second time, and was successful in repelling the invaders, rebuilt Rome and gained new victories over the Volsci and others. In 386 he was elected dictator for the third time and refused the office. In 381 he carried the Roman arms
to victory against Preneste and other Latin towns. For the fourth time he became dictator in 368, but abdicated in the same year. A new invasion of the Gauls called him, at the age of 80, once more to that position, and he defeated and dispersed the barbarians near the site of Alba Longa, and concluded a peace between patricians and plebeians and aided in passing the Licinian Laws. He erected a temple to Concordia near the Capitol, retired from public life, and died of the plague in about 365 B.C., universally respected and lamented. See ROME, HISTORY, and consult Plutarch, 'Camillus.'

CAMINATZIN, kā-mē-nā-tān', or CACU-MAZIN, Mexican king: d. 30 June 1520. He was nephew of King Montezuma and reigned over Tezcuco at the time of the Spanish conquest. Caminatzin, with more courage and enterprise than his uncle, proposed to his subjects a declaration of war against the foreigners. The proposal was received with enthusiasm, and Caminatzin called upon the Spaniards to leave the country immediately or to expect to be treated as enemies. Montezuma invited his nephew to Mexico to become reconciled with the Spaniards. The answer of Caminatzin was that he could enter Mexico only to destroy the tyrants of his country. Montezuma then despatched secret agents to Tezcuco to get possession of the young prince by whatever means. His first officers and nearest friends were corrupt, and he was delivered by them to Cortés and imprisoned. He perished during the evacuation of Mexico by the Spaniards.

CAMISARDS, kām'-zārds, Protestants in France (in the Cévennes), who, in the beginning of the 18th century, in consequence of the persecution to which they were exposed after the revocation of the Edict of Nantes in 1685, rose against the royal deputies. The name is usually thought to be derived from "camise," a provincial form of the French word "chemise," signifying a shirt or smock, and it is said to have been applied to them because their ordinary outer garment was a smock or blouse. The first occasion on which they broke out into open revolt was the assembly of the royal deputies on the night of 24 July 1702, when 50 of them attacked the house of the Abbé du Chayla, one who had signalized himself by his cruelty during the persecutions. They set free the prisoners whom they found confined in the dungeons, and put the abbé himself to death. This was the signal for a general rising of the mountaineers. The government sent troops to punish the authors of these acts. A certain Jean Cavalier, a peasant, whom a fortune-teller had pointed out as the deliverer of Israel, placed himself at the head of the Camisards. His unlimited authority with his adherents, his talents and courage, enabled him to oppose the measures of experienced generals with so much success that negotiation was substituted for force. The Marshal Villars in 1704 made a treaty with Cavalier, by virtue of which Cavalier himself was received into the royal service as a colonel. This treaty, however, did not satisfy his associates, because it did not compensate them for their losses and on that account Cavalier was reproached as a traitor who had sacrificed the cause of his coreligionists to his own interest. At the court, too, he was received with coldness, so that in a short time he was glad to go into voluntary exile. He went to England, where Queen Anne gave him a favorable reception. Voltaire, who became acquainted with him in London, speaks of him in high terms. At the time of his death Cavalier was general and governor near Paris. The name camisars blancs (white camisars), or cadets de la croix (cadets of the cross), was given to a band of Roman Catholics formed to put down the Calvinistic Camisards, who were called camisars noirs, or black Camisards. See also FRANCE—HISTORY.

CAMLET, or CAMLET, (in French, camelot), a name applied in England to a fabric made of long wool, hand-spun, sometimes mixed with cotton or linen yarn. Various derivations of the word are given. Some consider it to be of the same root with camel, because it was originally made of camel's hair; others derive it from the Arabic chamal, signifying fine, because according to them it was originally made of the fine hair of the Angora goat.

CAMMAERTS, cām-'mārts', Emile, Belgian poet and journalist. He gained a worldwide celebrity by his fierce poetic denunciations of the German invasion of Belgium in 1914. But though his muse at times rises to impassioned heights, it is rather as the poet of domestic joys and sorrows that he shines; it is through the tender details of his descriptions that he makes his best verses. With a number of exiled literary and artistic compatriots, Cammaerts issued in 1916 a work in recognition of the help given by the British empire and the United States during the great War. It bore the title of "A Book of Belgium's gratitude. Consul, to the poet. Let to the poet, and autres poèmes" (New York 1916) : Chants patriotiques et autres poèmes, in French and English.

CAMMERHOFF, John Christophe Frederick, Moravian bishop in America: b. near Magdeburg, Germany, 28 July 1721; d. Bethlehem, Pa., 28 April 1751. He was educated at Liena, and at the age of 25 was consecrated a bishop in London and came to America as Bishop Spangenberg's assistant. He preached in Pennsylvania and New York, but his greatest successes were made among the Indians. The Iroquois adopted him into the order of the Oneida nation, and gave him the name of Gallichio, or "A Good Message." In 1750 he undertook amid great hardships a tour to Onondaga. It occupied three months, embraced a distance of 1,600 miles and was filled with hair-breath escapes. He was too weak to endure such enterprises, and died the following year. The Iroquois mourned him as a brother and said of him "He was an honest, upright man, in whose heart no guile was found." Thirty years later Zeisberger heard his name mentioned among them with deep respect and veneration. The memory of his devotion and irrepressible missionary zeal has ever been held in honor by the people of his faith.

CAMÕES, kā-môn'ēsh, or CAMÕENS, Luiz Vaz de, Portuguese poet: b. Lisbon probably 1524 or 1525; d. 1797. His father, Simon Vaz de Camões, was a ship-captain, who perished by shipwreck on the coast of Goa about 1552. Camões studied at Coimbra, of which his uncle, Dom Bento de Camões became chancellor in 1539, the year of Luis'
entrance to the university. At that time writers were esteemed in proportion as they imitated the ancients. Camões was inspired by the history of his country, and by the manners of his age. His lyric poems, like the works of Dante, Petrarch, Ariosto and Tasso, belong to the literature formed under the influence of Christianity. After the completion of his studies he returned to Lisbon, where he fell deeply in love with a lady of the palace, Catharina d’Atayada. Violent passions are often joined with great talents—Camões had both. He was exiled to Santarem on account of disputes in which his love for Catharina involved him. From despair he became a soldier, and served in the fleet which the Portuguese sent against Morocco. He composed poetry in the midst of battles, and as danger kindled his genius, so genius animated his courage. An arrow deprived him of his right eye before Ceuta. He hoped that his wounds would receive a compensation, though his talents were not appreciated; but envy opposed his claims. Full of indignation, he sought himself neglected, he retired to the Moluccas in 1553 for India. His powerful imagination was excited by the heroic deeds of his countrymen in this quarter, and although he had much reason to complain of them, he could not resist the desire of celebrating their glory in an epic. But this vanity of mind, essential to the poet, is not easily united with the moderation which a dependent condition demands. Camões was displeased with the abuses of the government in India, and wrote a satire, which caused his banishment to Macao. Camões was recalled from the Moluccas, but after three years of captivity a new viceroy recalled the decree of banishment against him, and appointed him administrator of the effects of deceased persons at Macao. His chief poem, the ‘Lusiad,’ was composed partly during the period of his captivity, and partly while he held the office of administrator. Camões was at last recalled from his banishment. At the mouth of the river Mekon, in Cochín-China, he was shipwrecked, and saved himself by swimming—holding in one hand about ten of the 5367 MSS of his poem, the only treasure which he rescued from the waves. In Goa he encountered new persecutions; was confined in prison for alleged embezzlement of funds entrusted to him during his tenure of office at Macao, and not allowed, until his friends became responsible for him, to embark and return to Lisbon in 1569. King Sebastian, yet hardly past the age of childhood, took an interest in Camões. He accepted the dedication of his epic (which appeared in two editions, varying both in the text and the orthography, in 1572), and being on the point of embarking on his expedition against the Moors in Africa, felt more sensibly than others the genius of the poet, who, like him, loved dangers if they led to glory. On 12 June, 1577, before Alcâçaç in 1578, and with him the royal family became extinct, and Portugal lost her independence. Every source of assistance, as well as every hope of Camões, was destroyed by this event. So great was his poetry that at night a slave, whom he had brought with him from India, begged in the streets in order to support the life of his master. In this misery he yet wrote lyric poems, some of which contain the most moving complaints. This hero of Portuguese literature, the ornament of his country and Europe, died in a hospital, neglected. In 1596 a splendid monument was erected to his memory. Vasco da Gama’s expedition to India is the subject of his great poem. The parts of it which are set to music are the episode of Ines de Castro, and the appearance of Adamastor who, by means of his power over the storms, aims to stop Gama’s voyage when he is about to double the Cape. In conformity to the taste of the time, Camões united in this poem a narrative of the Portuguese history with the splendor of poetic description, and Christianity with mythological fables. He pleased himself with tracing the descent of the Portuguese from the Romans, of whom Mars and Venus are considered the progenitors and protectors. Since fable ascribes to Bacchus the first conquest of India, it was natural to represent him as jealous of the undertaking of the Portuguese. If the imitation of the works of classical antiquity has been of any disadvantage to the ‘Lusiad,’ the injury consists, perhaps, in a diminution of the originality which one expects in a work in which India and Africa are described by an eye-witness. The general interest of the poem consists principally in the patriotic feeling which pervades it. The national glory of the Portuguese appears here in every form which invention can lend to it, and therefore the countrymen of Camões must naturally admire this poem more than foreigners. Some critics pronounce the ‘Lusiad’ a mere powerful and pure historical painting by Tasso. ‘The Poem Delivered.’ A valuable edition of the ‘Lusiad’ (Os Lusiadas, etc.) was published by Joze Maria de Souza-Botelho (Paris 1817). It has been translated into English by Fanshaw, Mickle and Duff; by J. J. Aubertin (with Portuguese text), and by Sir R. F. Burton (with ‘Life of Camões, Commentary,’ etc.; 6 vols., London 1881). The works of Camões, besides the ‘Lusiad,’ consist of sonnets, songs, odes, elegies, eclogues, redondilhas, epigrams, satires, letters and three dramas, ‘A Cidade do Falecimento’ and ‘The Poem Delivered.’ A valuable edition of the ‘Lusiad’ (Os Lusiadas, etc.) was published by Joze Maria de Souza-Botelho (Paris 1817). It has been translated into English by Fanshaw, Mickle and Duff; by J. J. Aubertin (with Portuguese text), and by Sir R. F. Burton (with ‘Life of Camões, Commentary,’ etc.; 6 vols., London 1881). The works of Camões, besides the ‘Lusiad,’ consist of sonnets, songs, odes, elegies, eclogues, redondilhas, epigrams, satires, letters and three dramas, ‘A Cidade do Falecimento’ and ‘The Poem Delivered.’
CAMOMILE. See Chamomile.

CAMONICA, kä-mô'-nê-kä, or VALLE CAMONICA, a valley in North Italy, in the province of Brescia, formed by two branches of the Rhetian Alps, watered by the Oglio, and stretching about 50 miles from north-northeast to south-southwest as far as Lake Isco. It is a mountainous thoroughfare between Italy and the Tyrol. It has quarries for iron, copper, lead, marble and slate. Its soil is fertile, agriculture being one of the leading occupations; maize, grapevines and mulberry trees are extensively cultivated.

CAMORRA, an association in Naples, the members of which (Camorristi) carried on extortion as a regular business and were found at markets, fairs and public gatherings in the exercise of their employment. The band became known in 1820, when it was not political but social, originating in the Neapolitan prisons, then filled with victims of Bourbon misrule. It was carried into the city in 1830 and became a political body of great influence in 1848. A determined effort was made to exterminate it in 1877, but in spite of the lessening of their power it has still remained vigorous. In 1900, a government inquiry was made in the course of a libel suit, the result of which was the formation of the Honest Government League and the consequent defeat of the Camorra in the municipal elections of 1901.

They were divided into several classes,—those who dressed as gentlemen and mingled with people of rank; those who practised their work on tradesmen and the like; and the political and murdering camorrists. There were various ranks and grades which might be attained in the Society, and certain ceremonies of a very severe character were celebrated. The Association extended its ramifications over entire Naples. It had central stations in all of the large provincial towns and 12 in the city of Naples. Consult Monnier, 'La Camorra' (Florence 1863); Alongi, 'La Camorra' (1890); Heckethorn, 'Secret Societies of All Ages' (London 1897).

CAMOUFLAGE, ca' moo-fläzh. This art is in reality an adaptation of the science of color to meet man's requirements according to the plan of nature's protective coloring but the idea may be greatly extended in scope as will be briefly suggested in the following paragraphs. It is well known that many species of birds, fishes and animals assume colorings and patterns which quite effectively conceal them in their natural environments. Some of these change their colorings and patterns from season to season and the chameleon and certain fishes have the ability to alter their color very quickly to an approximation of that of their immediate surroundings. Some fishes are also able very quickly to imitate approximately the pattern of the background upon which they are placed. The effectiveness of this scheme of protective coloring has indicated to man the possibility of providing protective concealment for men, batteries, etc., in warfare and in other activities and the science of color has revealed other ways to be employed. In warfare the aim is to provide a covering which closely imitates that of the surroundings. In order to provide effective concealment it is necessary to consider the character of the lighting and herein the greatest obstacles are usually encountered because of its changeableness. The scheme will be introduced by means of a few examples. It is easy to mask a battery in the summer time and green foliage by using a screen of green branches, grass, etc. The duck-hunter utilizes a suit of grass or a blind of vegetation in the same manner. In other seasons suitable changes in the screens may be made to it. Soldiers are used to move about in a snow-covered winter landscape which is devoid of vegetation this may be accomplished by means of white clothing and even white masks or paint on their faces. On an overcast day the concealment may be accomplished quite effectively but on clear sunny days the shadows cast upon the surface of the snow and the shadows on the various contours of the form usually render complete deception impossible especially if the soldiers are moving. If the winter landscape is not wholly barren of trees or shrubs and the soldier is on stationary outpost duty, a dark gray cloak is effective. In the case of vessels it has been found that a mottled pattern of grays has been quite effective toward rendering them indistinguishable or practically invisible. If they lie low in the water it is obvious that the deception is generally more successful. However, the appearance of the surface of the water varies with the lighting and with the character of the sky and of the waves. It is obvious that the surface of the water assumes many appearances with a given lighting and sky condition, including the calm smooth surface, the choppy sea and the long swells or rolling sea. To a distant observer these differ least in appearance on a uniformly overcast day. On a sullen day there are usually bright high-lights on the waves which are reflected images of the sun. Furthermore the surface color of the water is largely due to reflected images of the sky and clouds. The color of a smooth surface of the water at some distance from a given observer appears to him quite similar to that of the lower portion of the sky in the direction in which he is gazing. This is readily seen if a diagram is made and the optical reflection—the angle of incidence is equal to the angle of reflection—is applied. When small waves are running, beautiful color-effects are seen if the color of the zenith or upper portion of the sky differs materially from that of the lower sky near the horizon, as is usually the case after sunset. Such a surface of water appears to be a series of stripes alternating in color. From the simple diagram previously suggested it will be seen that the lagging side of a wave is reflecting toward the observer an image of a patch of sky near the horizon and the advancing side is reflecting an image of a patch somewhat nearer the zenith. If these patches are different in color, the beautiful effects already mentioned are accounted for. These different appearances of the water have been discussed in order to show that the best protective coloring for vessels differs according to lighting, sky condition, and surface character of the water. In other words, practical, several removable coverings differing in pattern, could be provided. In general the most suitable color is bluish gray but there is always the difficulty with glistening high-lights, even if
smoke can be suppressed or avoided. It is a comparatively simple problem to provide a coating for rendering a low-lying ship inconspicuous or even invisible under specific conditions of lighting, sky and surface of the water; however, in practice a compromise must be made in order that one coating will serve well under all conditions. In marine camouflage the outline of the vessel is important for it is usually seen against the sky by the submarine or distant enemy. The science of color can be used effectively in revealing guns, soldiers, etc., belonging to the enemy if they have not been provided with coverings closely resembling their environments. The plan is quite the reverse of camouflage in that it aims to augment the contrast in hue or in brightness. In general, all objects are “colored”; that is, relatively few objects are without hue. The latter are the whites, blacks and intermediate grays. We see an object only when there is a contrast between it and its background or immediate surroundings. This contrast may be in hue or in brightness but usually it is a mixture of both. Camouflage aims to eliminate these contrasts. It is a fact of color-science that a colored object — for example, a pigment — will not appear, in general, the same under two different illuminants. Both the hue and value or reflection factor of a colored object change with the illuminants. For example, in Fig. 1 are shown the relative values or brightness-contrasts of six colored fabrics under red, green and blue lights, respectively, as indicated. For example, the lower middle one, which was a blue fabric, is very dark under red light and is very bright under blue light. This experiment is significant in indicating the possibilities of using various colored screens before the eyepieces of field glasses and telescopes. A study of a landscape by means of such filters may reveal objects owing to the augmented contrast which would not be otherwise sufficiently conspicuous. Experiments made by the author before the beginning of the European War indicated such possibilities. For example, a khaki cloth amid green foliage may be made to appear darker or brighter than the surrounding green foliage by viewing it through blue-green and yellow-orange filters respectively. Actual measurements of the ratio of the brightness of the khaki cloth to that of a green leaf were respectively 0.7 through a blue-green filter, and 1.5 through a yellow-orange filter. These ratios are on the basis that, under daylight illumination, the two objects appeared of the same brightness when viewed without colored filters. The applications of colored screens to field glasses appears to be well worth while for many purposes outside of warfare. In order to meet all the conditions to be found, a series of filters, say blue, green, yellow, orange and red, could be provided in pairs for field glasses and arranged in a convenient manner for quickly changing from one set to another. These screens should be as pure in color as practicable. Another promising filter is a yellow or canary screen whose object would be to eliminate the bluish haze which is usually present in distant landscapes. A large percentage of light is sacrificed with such screens but fortunately the intensity of daylight is usually far greater than is necessary. It is doubtful that artificial light will play an appreciable part in the art of camouflage in warfare; however, it has possibilities in other fields in certain developments in color-effects applicable to the stage, etc. Applying the principle already discussed briefly in connection with Fig. 1 it is possible to relate various colors with certain patterns in such a manner that certain parts of the scene will disappear completely under a given illuminant. For example, a gray on a red background is readily distinguished under ordinary light because of the difference in brightness and in hue. Under a red light there will be no difference in hue if the red background has been properly selected in relation to the illuminant. There remains, then, only the possibility of a contrast in brightness which depends upon the relative amounts of light reflected by the gray and red objects. If the gray is properly selected it will appear of the same brightness as the red background under the red light and therefore will be indistinguishable or invisible. By the use of the same principles applied to a number of pigments (those having the quality of high transparency being more satisfactory), striking disappearing effects can be obtained by varying the color of the illuminant. The effect which is possible by applying these principles is illustrated in Fig. 2 although rather feebly,

![Fig. 2 — Illustrating changing of scenery by the use of colored lights or camouflage applied to canvas](image-url)
CAMP

possibilities on the stage, in displays and in advertising. Ordinary pigments are not as satisfactory as water colors or paints made by coloring a white base with aniline dyes. In applying the art of camouflage it is seen that the science of light and color contains the underlying principles. With a thorough acquaintance with these methods can be accomplished, some of the efforts of the enemy to conceal soldiers, batteries, etc., could be rendered ineffective by utilizing colored screens on telescopes and field glasses unless the colors were very carefully chosen by the enemy. For example, for perfect concealment the object must possess the same color as its surroundings, not only as viewed by the eye but as analyzed by the spectroscope. This point is too intricate to discuss in detail but in color-work it is always well to remember that in respect to color the eye is synthetical and not analytical. In other words, the eye records only the integral effect of the spectral colors of which ordinary colors consist. For example, two yellows may appear the same to the eye even though they may be quite unlike in spectral composition. If the latter is true, the two yellows will not in general appear alike under any other illuminant. Camouflage has been practised in all wars, but in the European War of 1914 it has been highly developed. Consult Luckiesh, M., 'Color and Its Applications.'

M. LUCKIESH.

CAMP, kāmp, Maxime du. See DU CAMP, MAXIME.

CAMP, Walter, American manufacturer and writer: b. New Britain, Conn., 7 April 1859. He was educated at the Hopkins Grammar School and at Yale University, from which he was graduated in 1880 with the degree of A.B. For over 30 years he has been associated with the New Haven Clock Company, of which concern he is now president. He was active in the management of athletics at Yale, giving especial attention to football. On this sport he became a leading American authority, and was in demand on various committees which undertook the revision of football rules and brought about the present system of play. He became a member of the Yale University Council. He is a prolific writer on sports, of articles relating to the effect of sport and play-grounds on the development of character; is sports editor of various periodicals; also, a liberal contributor on sporting topics to The Century, Harper's, Collier's, Saint Nicholas, and numerous other American and English magazines. He is editor of The Boys' Magazine; editor-in-chief of 'The Young People's Library.' He is author of 'The Substitute' (1895); 'Jack Hent of Yale' (1909); 'Old Ryerson' (1911); 'Danny Fists' (1913); 'Captain Danny'; 'Danny the Freshman'; 'Bridge Don'ts'; 'Auction Bridge Don'ts'; 'Auction Bridge up to Date'; 'Book of College Sports'; 'American Football'; 'Football Facts and Figures' (1886); 'Football'; 'Yale, Her Campus, Class-Room and Athletics'; 'Drives and Puts,' with Lillian Brooks (1899).

CAMP, in military use, the place and aggregate body of tents or huts for soldiers in the field. In modern times a difference is often made between camp, bivouac and cantonment, the first signifying the quarters of an army sheltered in tents; the bivouac, the situation of one which dispenses with them, and remains either entirely in the open air, or, when time allows it, in huts built of branches, etc.; the cantonment when the troops occupy buildings in towns or villages. Camps, in a general sense, are of very ancient origin, since almost all nations in their infancy lived as nomads, dwelling in tents, as is the case with many tribes in Asia and Africa at the present day, for example, the Arabs. Among the Greeks, the Lacedaemonians seem to have been the first who devoted attention to the art of forming military camps. The form which they adopted was the circular, that being the form which was best calculated to enable the general, who had his tent in the centre, to have a view of the whole camp, and to dispatch assistance in the shortest possible time to any part of the camp that might be attacked. The Romans probably first carried the art of encampment to a high degree of perfection, on account of their many wars in distant and a given illuminant, though they may be quite unlike in spectral composition. If the latter is true, the two yellows will not in general appear alike under any other illuminant. Camouflage has been practised in all wars, but in the European War of 1914 it has been highly developed. Consult Luckiesh, M., 'Color and Its Applications.'

M. LUCKIEH.

CAMP, kāmp, Maxime du. See DU CAMP, MAXIME.

CAMP, Walter, American manufacturer and writer: b. New Britain, Conn., 7 April 1859. He was educated at the Hopkins Grammar School and at Yale University, from which he was graduated in 1880 with the degree of A.B. For over 30 years he has been associated with the New Haven Clock Company, of which concern he is now president. He was active in the management of athletics at Yale, giving especial attention to football. On this sport he became a leading American authority, and was in demand on various committees which undertook the revision of football rules and brought about the present system of play. He became a member of the Yale University Council. He is a prolific writer on sports, of articles relating to the effect of sport and play-grounds on the development of character; is sports editor of various periodicals; also, a liberal contributor on sporting topics to The Century, Harper's, Collier's, Saint Nicholas, and numerous other American and English magazines. He is editor of The Boys' Magazine; editor-in-chief of 'The Young People's Library.' He is author of 'The Substitute' (1895); 'Jack Hent of Yale' (1909); 'Old Ryerson' (1911); 'Danny Fists' (1913); 'Captain Danny'; 'Danny the Freshman'; 'Bridge Don'ts'; 'Auction Bridge Don'ts'; 'Auction Bridge up to Date'; 'Book of College Sports'; 'American Football'; 'Football Facts and Figures' (1886); 'Football'; 'Yale, Her Campus, Class-Room and Athletics'; 'Drives and Puts,' with Lillian Brooks (1899).

CAMP, in military use, the place and aggregate body of tents or huts for soldiers in the field. In modern times a difference is often made between camp, bivouac and cantonment, the first signifying the quarters of an army sheltered in tents; the bivouac, the situation of one which dispenses with them, and remains either entirely in the open air, or, when time allows it, in huts built of branches, etc.; the cantonment when the troops occupy buildings in towns or villages. Camps, in a general sense, are of very ancient origin, since almost all nations in their infancy lived as nomads, dwelling in tents, as is the case with many tribes in Asia and Africa at the present day, for example, the Arabs. Among the Greeks, the Lacedaemonians seem to have been the first who devoted attention to the art of forming military camps. The form which they adopted was the circular, that being the form which was best calculated to enable the general, who had his tent in the centre, to have a view of the whole camp, and to dispatch assistance in the shortest possible time to any part of the camp that might be attacked. The Romans probably first carried the art of encampment to a high degree of perfection, on account of their many wars in distant and a given illuminant, though they may be quite unlike in spectral composition. If the latter is true, the two yellows will not in general appear alike under any other illuminant. Camouflage has been practised in all wars, but in the European War of 1914 it has been highly developed. Consult Luckiesh, M., 'Color and Its Applications.'

M. LUCKIESH.
there was a gate. That behind the prætorium was called porta prætoria, the one on the opposite side porta decumanus. The other two were at the ends of the prætoria, and were called respectively porta principalis dextra and porta principalis sinistra. The camp was improved in strength and convenience according to the time that it was occupied, and in some cases, from the want of the men, it was made the basis of their military operations.

After the invention of gunpowder, entrenched camps, such as that just described, proved of very little service, as they afforded no protection against projectiles shot from long ranges, and it became necessary to keep the mass of the army not actually engaged at such a distance in the rear of the fighting line as to be beyond the reach of the most powerful guns of the enemy. In the European War ranges as high as 18 miles were attained, and in a few instances 20 miles was recorded for a few shots from each new gun. The camp, in the old sense, therefore, has lost its former significance, and has become little more than a depot or stockade for the people living on the line and its immediate supports being protected underground in dugouts and bombproof constructions.

With the advent of the fighting aeroplane a new danger has to be met. These machines may rise behind the enemy lines to a height where they are no longer visible, and travel many miles to the rear of an opponent's fighting line and drop high explosives upon a camp which is safe from gunfire. In these conditions the camp must be so disguised by the art of camouflage (q.v.) as to be indistinguishable from the adjacent country when viewed from above by the aviator. The camp defenses then become reduced to two: (1) Against spies; and (2) against aircraft. For the former, quick-firing guns which may be pointed upward at a high angle, are mounted on automobile trucks, and stationed at outlying points surrounding the camp. It has recently become common to form camps in time of peace for the sake of disciplining the soldiers to a camp life, and exercising them in the evolutions and manœuvres of actual warfare. These are called camps of instruction, of which examples are seen in the United States, where the organizations of the different States are accustomed to annual encampments for these purposes; also in the camp for British troops at Aldershot, and temporary camps throughout Great Britain for the training of the militia and volunteers, and in the like customs and establishments of other countries. Such camps are generally of a permanent type, with substantial buildings and arranged to provide many more of the comforts of life than is usual with camps in the field.

In the United States army the duty of selecting the site and laying out the camp devolves upon the engineer corps. This section of the work of the engineers is termed technically "castrametation." The practice followed requires that the site shall be on slightly sloping ground, surrounded with open space, and far from exposure. The surface should be well covered with short grass, and the subsoil should be sandy or gravelly. For a summer camp a high and breezy spot is selected: for a winter camp a site with a southern exposure, and a windbreak of woods toward the north. The water supply should be pure, abundant and reasonably accessible. Good roads should approach the camp site from several directions, and pasture and supplies should be available near by. The streets of the camp are ditched on both sides, and each tent is surrounded with a shallow trench. The streets are swept daily, and no refuse is permitted to lie between the tents. As a protection against epemics, the camp is moved to a new site every two or three weeks. The United States soldier carries as a part of his pack a half of a "pup" tent, which but need to the half carried by another soldier forms a shelter for the two men. When set up it covers a ground area of six feet in length and four feet in width, and is three feet high at the peak. A regiment of 2,200 men requires an area of close to 30 acres, equivalent to a plot of ground about 1,100 feet square. For the permanent camp of instruction there is required also a considerable area for drills, parades and manœuvres. This need not be directly adjacent, but should be conveniently near the camp, and be readily accessible by rail. Consult Moss, J. A., "Manual of Military Training" (Menasha, Wis., 1915); and "Training Officers' Manual" (Menasha, Wis., 1911).

CAMP ALLEGHANY, W. Va., a Confederate camp where an engagement took place 13 Dec. 1861. After the affair at Camp Bartow, 3 Oct. 1861, the Union troops had remained at Cheat Mountain Summit. Gen. R. H. Milroy, who was in command 12 Dec. 1861, determined to attack Camp Alleghany, the summit of Alleghany Mountain, to which the Confederates had fallen back from Camp Bartow, and which was held by Col. Edward Johnson, with 1,400 men and eight guns, partially entrenched. With 1,800 men Milroy marched to Camp Bartow, 12 December, and made his dispositions. One column of 900 men, under Col. James A. Jones, was to ascend the mountain, until near its summit, when, leaving the road, it was to move to the left and attack Johnson's right and rear, while another column of 900 men, under Col. G. C. Moore, was to follow the Greenbank road and by a circuitous route, concealed by heavy forests, assail Johnson's left. The attacks were to be simultaneous at 4 A.M. of the 13th. Jones started at midnight, gained his assigned position on time, and waited for Moody, but his presence being discovered, he was quickly engaged and for a time met with success, driving the Confederates before him, but Johnson rallying his troops on that flank and fighting desperately, Jones was repulsed after a two-hours' contest, leaving his dead and many wounded on the field. While Jones was being driven from Johnson's right Moody was slowly approaching his left. He had been delayed by the difficulties of his route, and it was after 8 o'clock when he became engaged, and was met by such a severe fire of artillery and musketry that he could make no progress, but continued a desultory skirmish until afternoon, when he fell back, and the whole Union force, without a man, marched back to Cheat Summit. The action was the most severely contested one of the West Virginia campaign of 1861. The Union loss was 20 killed, 107 wounded and 10 missing; the Confederate loss 20 killed, 98 wounded and
CAMP BARTOW. or GREENBRIER RIVER, W. Va., a place where an engagement in the Civil War was fought, 3 Oct. 1861. On 2 October the Confederates held Camp Bartow, where the road from Beverly to Staunton crosses the Greenbrier River, with about 2,500 men and eight guns, under command of Gen. H. R. Jackson. Gen. J. J. Reynolds, commanding the Union troops at Cheat Mountain Summit, 12 miles west, concluded to feel Jackson's position and, if possible, force it. He marched at midnight of the second with about 5,000 men and 13 guns, drove in a picked post west of the Greenbrier on the morning of the third, and coming to within 600 or 700 yards of Jackson's entrenched position beyond the stream, opened on it with his artillery, the Confederates promptly replying. Several guns were disabled on either side, and Reynolds then, under cover of a demonstration on Jackson's left, moved with six regiments to turn his right. The regiment to make the demonstration on the left crossed the stream, but was quickly driven back, and the six regiments were about to cross the stream on Jackson's right they were met by such a severe fire of artillery and musketry that Reynolds deemed further effort inadvisable and withdrew with a loss of 43 killed and wounded. The Confederate loss was 39 killed and wounded. Consult 'Official Records' (Vol. V).

CAMP DISEASES, disorders common to camp life and more or less incidental to the conditions of active military service, which are often such as to increase the virulence of ordinary diseases. They are generally of epidemic or infectious type, due in large measure to overcrowding and uncleanness. The formerly dreaded scourge known as camp fever, or typhus, is now easily controlled by keeping the men free from the body lice which carry the disease from one man to another. Improper food, exposure to wet and to extremes of temperature, hard muscular labor, unhygienic surroundings and immoral or intemperate habits, contribute to the general conditions in which disease flourishes. Some of the troublesome infectious diseases of military life are: Asiatic cholera, bubonic plague, cerebrospinal meningitis, diarrhoea, dysentery, influenza, malaria, measles, mumps, typhoid fever and tuberculosis. Typhoid fever has been enormously decreased through inoculation with anti-typhoid serum. Alcoholism and venereal diseases depend on personal habits; bronchitis, frost-bite, pneumonia, rheumatism, snow-blindness and sunstroke come from exposure to the weather. Scurvy was formerly common, but it is now not often met with, owing to scientific feeding. From forced marches or severe exertion the modern soldier often suffers from heart-trouble, which often permanently incapacitates him for further service. However, the medical corps of modern armies are so efficient that the proportion of cases of sickness and of deaths resulting therefrom is less than in most well-organized communities at home, owing doubtless to the fact that in the army the orders of the medical staff are compulsory.

CAMP FIRE CLUB OF AMERICA, a social organization with headquarters in New York city, incorporated in 1904, devoted, in the interests of higher sport, to the protection of wild animals, birds and fish, and the preservation of forests. Formulated by the well-known naturalist, Dr. William T. Hornaday, its code of ethics forbids "the killing of all female hoofed animals, the sale of wild game for food, declares a good photograph of a large wild animal in its haunts entitled to greater credit than the dead trophy of the animal, and counsels the greatest conservatism in the killing of all kinds of game, and strict observance of all legislation calculated to protect and increase the supply of game." Membership now numbering nearly 500 and including well-known American sportsmen, writers on outdoor life, painters and sculptors of animal and bird life, is limited to "those who have camped in the wilderness a total of 30 days or more, and who have successfully hunted and killed at least two specimens of big game." The club has energetically initiated and supported legislative action in the interests of its purposes, notably the Hornaday clause in the 1913 tariff law "prohibiting the importation in the United States of wild birds' plumage for millinery purposes."

CAMP FIRE GIRLS, an organization designed to assist in the development and dissemination of the home spirit, differing in this respect most strikingly from the organization called "Girl Scouts" which duplicates Baden Powell's original "Boy Scouts" of England, and so is primarily military and patriotic. The distinction becomes clearer if we recall the founder's words: "Here is an organization [Camp Fire Girls] that is back of the home. It is helping girls and mothers to discover that there are more interesting and happy things to do and relationships to enjoy in connection with everyday life than are to be found in the commercially supplied amusements." Its president is Dr. Luther Halsey Gulick; the organization dates from 1911; the membership in 1916 was given as 7,000.

CAMP HOSPITALS. See HOSPITALS. MILITARY.

CAMP-MEETINGS, gatherings for religious purposes, held usually in thinly populated districts, and continued for several days at a time, with the view of securing prolonged and uninterrupted spiritual exercises. Assemblies of a like kind have been more or less usual at various periods in the history of the Christian Church; but it was in connection with Methodism in the United States that such meetings became especially prominent. The introduction of the protracted camp-meetings into England in 1799 by Lorenzo Dow led to the separation of the Primitive Methodists from the Wesleyans. See CHAUTAQUA.

CAMP SCHOOLS, summer camps for girls and boys affording opportunities for physical training and educational advantages. In some of the camps, regular instruction is given in school subjects, mainly to assist students who have failed of promotion in school or who wish to prepare for entrance examinations. In other camps, there is no formal study of school subjects, but instruction is provided in nature study, camp craft, manual training, photography, music, besides the usual activities in land and water sports. In addition to this, the camps

CAMPA. See ANTL.

CAMPANA, kâm-pân’ya, Girolamo (called de Veagn), Italian sculptor; b. Verona 1552; d. about 1623. He was a pupil and assistant of Cataneo, many of whose works he completed. His earliest known work is a statue of the Doge Leonardo Lovedan in SS. Giovanni e Paolo, Venice. Among his own works are the bronze group for the high altar of San Giorgio; a Madonna and child in San Salvatore; the Saint Anthony in San Giacomo de Rialto, considered his masterpiece, and the altar in the Santi Giovanni e Paolo (all at Venice). Padua, Verona, and Udine also possess beautiful specimens of his art. His technical ability was of a high order and his treatment of decorative effects was highly successful. However, he was fettered by the mannerisms of his age.

CAMPAGNA DI ROMA, Italy, a territory which comprehends the greater part of Old Latium, from 30 to 40 miles wide and 100 long. By it is usually understood the desert plain which begins near Ronciglione or Viterbo, and including the Pontine Marshes, extends to Terracina. In the middle of this region lies Rome, on its seven hills, and on the Tiber. A sandy plain stretches along the Mediterranean. The ground is never more than 200 feet above sea-level and is entirely volcanic. The lakes of the Campagna are evidently craters of extinct volcanoes. Thus the Lake Regillus above Frascati lies at the bottom of an inverted cone of hard, black lava, rising in wild and naked masses from 40 to 60 feet high. The craters containing the lakes of Albano and Nemi have a very regular conical form. The Lake of Albano is also remarkable for its aqueduct, or emissarium, one of the most ancient and excellent works of the Romans, which discharges the waters of the lake through the mountains. It answers its original purpose even at the present day. There are, also, many sulphur springs here, particularly between Rome and Tivoli, where the water issues almost boiling from the earth, and forms the Lake of Solfatara, which contains floating islands, consisting of a calcareous deposit, that collects round substances thrown in to the water. The vapors which rise from the ground all over the Campagna, and especially in the neighborhood of this lake, render the whole district unhealthy. The soil of the Campagna is in general dry, but very fertile in the lower parts. In the middle of the summer, when fivers render a residence in the Campagna very dangerous, all the inhabitants who can do so take refuge in the neighboring towns or in Rome itself; or they may retire with their cattle to the mountains. Besides huts, innumerable ruins of temples, circuses and monuments are scattered over the Campagna, particularly near the Via Appia; and long rows of aqueducts, some in ruins, some in a state of preservation, are overgrown with ivy and other plants. In the winter flocks of sheep pasture in these solitudes; during the summer they are driven up the Apennines. Herds of half-wild cattle remain during the whole year in the Campagna. The herdsmen are mounted, and armed with long lances, with which they manage the cattle very skilfully. Scarcely a ninth part of the Campagna is cultivated, the rest is used for pasturage. In the times of the ancient Romans, this dreary solitude exhibited a smiling picture of abundance and fertility. Yet even in those times the climate was far from being a healthy one. Strabo, Livy, Cicero, Horace and others agree in describing the districts in the neighborhood of Rome, Ardea and other towns within stones throw what is now the Campagna di Roma, as extremely unwholesome, especially at certain seasons of the year; and it was only through the greatest exertions on the part of the ancient cultivators, and the numerous aids to cultivation that stood at their command, that this tract, now so desolate, was then made so productive. Several of the popes, particularly Pius VI, have attempted to lessen the insalubrity of the air by the draining of the Pontine Marshes which form the southern portion of the tract. In recent years the Italian government has taken up the problem, and has accomplished much in the way of reclamation by planting eucalyptus trees, and by drainage and other works, thereby increasing the healthfulness of this historic region.

CAMPAGNOLA, Domenico, Italian painter and engraver: flourished about 1520. He was probably born at Padua, where he was a rival of Titian in painting the frescoes in the Scuola del Carmine and in the Scuola del Santo. He is considered one of the best painters of the Venetian school, and his work as an etcher is less important. Of 14 engravings which are known to belong to him, 10 are dated 1517, and one, ‘The Descent of the Holy Ghost,’ bears the date 1518.

CAMPAN, kânp’n, Jeanne Louise Henriette, French authoress (GENEST): b. Paris, 6 Oct. 1752; d. Mantes, 16 March 1822. She became reader to the daughters of Louis XV; gained the favor of the wife of the Dauphin, afterward Queen Marie Antionette, who gave her in marriage to the son of her private secretary, M. Campan, and appointed her the first lady of the bed-chamber. Mme. Campan gave her patroness many proofs of fidelity and attachment and wished to follow her into the temple after 10 Aug. 1792, which, however, Pétion did not allow. After the fall of Robespierre, Madame Campan established a boarding school for the education of young ladies at Saint Germain, which soon acquired a wide reputation. On this account Napoleon appointed her the principal of an institution founded by him for the daughters of the officers of the Legion of Honour, and she was organized and superintended for seven years. After the restoration Louis XVIII abolished the institution, and Madame Campan lost her
situation. Her only son died in 1821, in consequence of ill treatment inflicted because he was a relation of Marshal Ney. She published 'Mémoires de la vie privee de Marie Antoinette' (1823); 'Journal anecdotique' (1824); 'Correspondance inédite avec la reine Hortense' (1835); 'De l'éducation.' Consult Flamermont, Jules, 'Les mémoires de Madame de Campan' (1862). Ney was in 1826.

**CAMPANA, kämp-pá'na, Pedro (in the Netherlands known as Peter de Kempeneer), Flemish painter of Spanish descent: b. Brussels 1503; d. there 1580. In 1530 he went to Italy for study of the Italian masters; he visited Venice and then the patronage of Cardinal Grimani, for whom he painted several pictures. At Bologna he painted some of the decorations of the triumphal arch for the reception of Charles V; he later lived in Seville, Cordova and other cities of Andalusia, and in 1562 returned to Brussels where he became chief engineer of the Duke of Alva, and in 1563 became art director and maker of cartoons for the Brussels tapestry works. In style he combined to some extent the characteristics of the schools of Antwerp and the Flemish painters. His best-known work is in the cathedral at Seville, the 'Descent from the Cross.' His 'Purification' and 'Resurrection' are also in the Seville Cathedral; other paintings of his are in the same city and he also painted the altar-piece of the church of Santa Anna in Triana, a suburb of Seville. The National Gallery, London, contains his 'Christ Preaching in the Temple.'**

**CAMPANARI, Giuseppe, Italian operatic baritone: b. Venice 1859. Both as orchestral 'cello player and soloist with the Boston Symphony Orchestra 1884–93, he became known to cultured musical circles, and attained national reputation by his appearance as Tomino in the first American production of 'Pagliacci.' He was a member of the Metropolitan Opera Company 1895–98, later confining himself to concert work with occasional appearances in opera. His musical career began as a 'cellist at La Scala Opera House, Milan, where he also studied singing.**

**CAMPANELLA, kämp-pá'n-dž'la, Tommaso, Italian philosopher: b. Stilo, Calabria, 5 Sept. 1589; d. Paris 1639. He displayed great quickness of parts when quite young, and at the age of 15 entered into the order of the Dominicans. He studied theology and other branches of knowledge with assiduity, but was principally attracted by philosophy. The opinions of Aristotle, then generally taught in the schools, appeared to him unsatisfactory; and in 1591 he published at Naples a work entitled 'Philosophia Sensibis Demonstrata,' intended to show the futility of the prevailing doctrines. He claimed that God alone is pure Being, and that being implies as its essence the power whereby it acts, the knowledge that reveals it to itself, and the love which inclines it to will its good. He held a political theory based on the idea of, and individual liberty. This book procured him some admirers, and more enemies. He then went to Rome, and afterward to Florence, where he was well received by the Grand Duke Ferdinand. In 1598 he returned to Naples, and revisited shortly after Calabria, where, in the following year, he was arrested on a charge of conspiracy against the Spanish government, to which Naples was then subject. A scheme was imputed to him of having engaged the three aids of Marie Antoinette' (1823); 'Journal anecdotique' (1824); 'Correspondance inédite avec la reine Hortense' (1835); 'De l’éducation.' Consult Flamermont, Jules, 'Les mémoires de Madame de Campan' (1862). Ney was in 1826.

At length, in 1626, Pope Urban VIII procured his removal to Rome, and in 1629 gave him his liberty, and bestowed on him a pension. Dreading some further persecution from the Spaniards, he withdrew in 1634 to France, where he was honorably received by Louis XIII and Richelieu, and much esteemed by the learned men of that country. He died at the monastery of his order. Campanella was a firm believer in astrology and magic. Among his numerous works may be mentioned 'Atheismus Triumphatus' (1631); 'Monarchia Messiae' (1633); 'Prodromus Philosophiae Instaurande' (1617); 'De Sensu Rerum et Magia' (1620); 'De Monarchia Hispanica Discursus' (1640); 'Epistolae epistolicae partes quattuor, hoc est de rerum natura, hominum moribus, politica, cui Avistas solis adiuncta est, et Æconomica' (1622). A 'Life of Campanella,' by Baldacchini, was published at Naples (1840–43).**

**CAMPANERO, See Bell-Bird.**

**CAMPANI-ALMENIS, kämp-pán'ě al-mě'nís, Matteo, Italian merchant and statesman, fl. 17th century. In optics, his greatest achievement was the manufacture of the object-glasses through which Cassini discovered two satellites of Saturn. He wrote 'Horologium solo naturae motor' (1678), a work on the construction of clocks.**

**CAMPANIA, Italy, an ancient province of the Roman republic and empire, and a department of the modern kingdom of Italy, lying along the Tyrrenhian Sea and bounded on the land side by Latium, Campania, and Lucania, which, partly on account of its natural curiosities, including Vesuvius, the Phlegrean fields, the Lake of Avernus, and partly for its remarkable fertility, was a favorite resort of the distinguished Romans, who built there magnificent country-houses. Cuma, Puteoli, Naples, Herculaneum, Pompeii, Baiae, Stabiae, Surrentum, Nola, Teynium, Venafrum and Capua, the principal cities of Campania, are names rich in classical associations. The Appian and Latin ways led into the interior of this charming province. The early inhabitants were of the Oscan race, who were displaced by the Greeks; the latter founding the cities of Cumae and Neapolis. The Etruscans later obtained possession of it, but the Oscan element was still considerable and so remained until the time of its Romanization about 90 B.C. Cicero had a villa at Pompeii and under Augustus, Campania and Latium formed the first district of Italy. The vineyards of Mons Massicus and Ager Falerum were famous at an early period, as also the olives of the country and the olive oil. Campania is the most beautiful and fruitful part of Italy, and no traveler can wish for a more delightful country than the fields of Campania, filled in the month of April with barley four feet high, and adorned with lofty poplars, which are connected by luxuriant vines, forming a
CAMPANILE—CAMPANINI

Canopy over the fields. "There," says Goethe, "it is worth while to till the ground." The modern department of Campania includes the provinces of Avellina, Benevento, Caserta, Napoli and Salerno, covering an area of 6,227 square miles. Pop. (1 Jan. 1915) 3,426,754.

CAMPANILE, käm-pä-na'le, a detached tower containing bells. Campaniles are most common in Italy. Several of them have deviated considerably from the perpendicular, in consequence of their great height and narrowness of base. The earliest examples date from the 5th century and are circular in form, the most notable examples being those of the basilicas of Saint Apollinare Nuovo and Saint Appollinare in Classe at Ravenna. After the 8th century the square design prevailed. Brick was always used in Rome, while marble or stone entered into their composition in northern Italy. The campanile of Pisa, called Torre Pendente (or Leaning Tower), is one of the most remarkable. Its architects were Bonano of Pisa, and Willhelm of Innsbruck, and it was begun in 1174. The building consists of eight stories, each one of which is surrounded by columns, and it inclines nearly 13 feet from the perpendicular. Another celebrated campanile is that which was begun at Florence in 1334, after the designs of Giotto, and finished by Taddeo Gaddi. Its height approaches 300 feet, and it is adorned with 54 bas-reliefs, and 16 statues, representing biblical, pagan and allegorical subjects. Giotto intended to surmount this tower with a spire nearly 100 feet high, but his intention was never carried out. The Torre degli Asinelli and the Torre di Garisenda at Bologna are also remarkable specimens of the campanile. The campanile of Saint Mark's Church, Venice, is probably the best known to Americans. Begun as far back as 888 by Pietro Tribono, it did not assume the form which tourists are familiar with until 1590. For centuries its majestic height dominated the city. Its pinnacle was about 325 feet from the ground.

In 1417 a marble top was put on the old tower. One hundred years later it was crowned with the figure of an angel nearly 16 feet high. Simple in design, the campanile stood out in sharp contrast with the famous belfry of Florence.

The Loggetta at the foot of the campanile was built by the famous Jacopo Sansovino, and was the rendezvous for the nobles of the town. Sansovino adorned it with reliefs and with bronze statues of Minerva, Apollo, Mercury and Peace. The bronze doors of the vestibule have long been regarded as masterpieces that deserve to rank by the side of the work of the great Italian sculptors. Like many another Italian structure, the Loggetta lost much of its old-time significance. From a meeting-place for the nobles it degenerated into a waiting-room for commanders of the guards during the sessions of the great council. Latterly it was used for auctions and lottery drawings.

The tower was peculiar in that it had no staircase. It was ascended by a winding inclined plane, and ended in a few steps. The tower was always open; but visitors were not allowed to enter alone. For that reason a single traveler was compelled to engage a bystander to accompany him.

From time immemorial a watchman was stationed in the lantern. In the days of the grand maritime Venetian republic it was from the tower that the watchman caught the first glimpse of home-coming war vessels. In modern times the watchman no longer scanned the horizon for vessels, but kept a lookout upon the city for fires.

The campanile served other purposes as well. It was also used for the purpose which its name signifies. According to some authorities, four bells were hung in the olden days in this tower, to be sounded for different purposes. La marangola was sounded at dawn to call the laboring classes; la settimazzona opened the official bureaus; la trotterar called the councils to duty; and the bell del maleficio tolled out the requiem for those who were put to death. A fifth bell was later brought from Candia and tolled only on Ascension Day. In 1518 there hung halfway up the tower a wooden cage, in which prisoners were kept until they were starved to death. Scientifically the tower was of interest by reason of the fact that from it Galileo made many observations. On the morning of 14 July 1902, the campanile collapsed and fell with a great crash into the square. The church of Saint Mark and the palace of the Doges were not damaged, but the campanile in falling carried away the Sansovino Loggetta and the library of the Royal Palace. Steps were taken at once to rebuild and the cornerstone of the new edifice was laid on 24 April 1903. A strengthened pile foundation was put in place and the campanile re-erected in the form it had presented since being remodeled in 1517. A study of the data provided by the examination of the remains of the fallen tower showed that the bricks had been used for various purposes at a previous stage, in arches, fortifications, tops of walls, etc. The most important fact was that they were not Venetian, but Roman bricks. Moreover, when they were manufactured, they were not manipulated like modern bricks, but formed from slices of clay, as they were found without the natural layers being disturbed. This process resulted in each individual brick being able to support a weight quite four times as great as the modern brick. The bricks examined are of the 1st century. One bore the impression of a horseshoe, proving the debated point that horseshoes were then in use. In the Renaissance period a few campanili of note were erected; the finest is that of San Giorgio Maggiore by Palladio and Scamozzi in Venetia. It is of brick with a marble superstructure and has a spire. Modern examples of this kind of construction are the campanile of the Capitol at Rome, the Victoria Tower by Barry at the Houses of Parliament, Westminster, the great tower of the Basilique du Sacré Cœur, Montmartre, Paris, and the memorial tower in the Brown University campus at Providence, R. I.

CAMPANINI, käm-pä-ne'ne, Italo, Italian singer: b. Parma, 29 June 1846; d. Vigatto, 23 Nov. 1896. His father was a blacksmith. At 14 the boy enlisted in Garibaldi's army and served in two campaigns, after which he worked at his father's trade until the age of 18. Meanwhile, having shown that he possessed an excellent voice, he had taken singing lessons, and after spending a year at the Conservatory in Parma, he appeared in that city as the noted
in ‘La Sonnambula,’ but suffered failure and ridicule. He still continued to sing in public, and in 1869 began to study under Lamperti, a celebrated teacher of Milan. In that city, at La Scala, he sang in ‘Faust,’ and immediately was acclaimed a great tenor. He appeared in London in 1872, and in the following year made his first visit to the United States, appearing with Niisson at the Academy of Music, New York, in ‘Boris.’ Afterward, in this country and Europe, he sang with great success, and was regarded as the foremost tenor of his time. The partial failure of his voice, mainly through an affection of the throat, caused some interruption of his career but scarcely diminished his popularity until near the close of his life.

**CAMpanula, Bell Flower, or BellWort, a genus of annual, biennial and perennial herbs of the family Campanulaceae.** The species, of which there are about 300, are almost all natives of the cooler parts of the northern temperate zone, and among them are some of the most widely grown garden plants, which are popular on account of their bell-shaped blue, violet or white flowers, and the ease with which they are cultivated. *C. rafunculus*, native of Europe, Asia and North America, is the bell of Scotland, so frequently mentioned in literature. Several species are natives of North America.

**CAMPANULACEAE, a family of herbaeous and shrubby plants, generally abounding in a bitter, white juice. Their leaves are alternate and entire or toothed, rarely opposite. Their flowers usually form spikes, thyrsi or heads. They have a monosepalous calyx, with four, five or eight persistent divisions, and a regular, monopetalous, usually bell-shaped corolla, having its limb divided into as many lobes as there are divisions of the calyx. The stamens are five, the anthers free, or brought together in the form of a tube. The ovary is inferior or semi-inferior, with two or more cells, each containing numerous seeds. The style is simple, terminated by a lobed stigma, sometimes surrounded by hairs. The fruit is a capsule crowned by the limb of the calyx, with two or more cells opening either by means of holes which are formed near the upper part, or by incomplete valves. The seeds are very small and very numerous. These plants are chiefly natives of the temperate and colder climates of the northern hemisphere.

**CAMPANULARIANS, or SERTULARIANS, hydroids of the order Calyptoblastea, formerly called Campanulariae. They are always colonial and possess hydrotroche, and in many cases medusa, with auditory organs on the flaps. The ectoderm is protected by a horny or chitinous sheath (perisarc) enveloping the zooids. The hydroids retract, when disturbed, into small cups (hydrotroche), arranged in opposite rows or the sides as in *Sertularia* and, occasionally at the ends of the stalks, as in *Campanularia*, while the sheaths (gonothece) protecting the medusa-buds are distinguished by their much larger size and cup-shaped form. The Sertularians abound on seaweeds, and may be recognized from their resemblance to mosses. The medusae of these and many other hydroids can be collected by a tow-net, and emptied into a jar, where they can be detected by the naked eye after a little practice. It is possible that the extinct palaeozoic group, Graptolites, belong near the Campanularians, as they have a similar perisarc composed of cells (hydrotroche). Consult Agassiz, A., ‘The American Zoology, an Illustated Catalogue of the Museum of Comparative Zoology at Harvard College, No, 2, Cambridge 1865;’ Agassiz, E. C. and A., ‘Seaside Studies in Natural History (Boston 1871); Nutting, ‘American Hydroids’ (‘Special Bulletin of the U. S. National Museum’; Washington 1900), contains a full bibliography.

**CAMPARDON, Emile, French writer; b. Paris 1834. He was educated at the Ecole des Chartes, and then had charge of the archives there. In this position he had opportunity to examine the documents relating to the 18th century and the period of the French Revolution. He has written among other historical works ‘History of the Revolutionary Tribunal of Paris’ (1861); ‘Marie Antoinette at the Conciergerie’ (1862); ‘Madame Pompadour and her Courts’ (1863); ‘Unpublished Documents of J. B. Poquein Moliere’ (1863); ‘Voltaire, Unpublished Documents’; ‘The Royal Academy of Music in the 18th Century; and ‘Memoirs of Frederic III, King of Prussia’ (with E. Bourticar).

**CAMPBELL, Alexander, known as the founder of the Disciples of Christ or ‘Campbellites’: b. Ballymoney, Antrim County, Ireland, 12 Sept. 1788; d. Bethany, Va., 4 March 1806. His mother’s ancestors were French Huguenots. His father, Thomas Campbell, a clergyman and teacher in the Church of the Covenanters and Seceders, in April 1807 sailed from Londonerry to Philadelphia and located at Washington, Pa. (one year after the establishment of Washington College). Young Alexander embarked with the remainder of the family in October 1808, but the ship was wrecked on the coast of Scotland which gave him an opportunity to attend Glasgow University for a year. In August 1809 he again embarked with the family and after arriving at New York went directly via Philadelphia and over the mountains to Washington, Pa., where, under the direction of his father, he prepared for the ministry.

In March 1811, at West Liberty, Va., he married Miss Margaret Brown of Buffalo Creek, Brooke County, Va., and thereafter resided at the home of his father-in-law, from whom he later (1814) received a deed for the home property. Immediately following his marriage he took steps to become naturalized. In the same year he was licensed by a church, and began near home a series of preaching tours. In 1812, after following his father in a movement to reunite different religious denominations, he took the lead in organizing the Disciples of Christ (q.v.), based on the doctrine that the Bible should be used as the only text. Through his preaching tours, which in later years were gradually extended throughout the South and Middle West and eastward to Massachusetts Bay, he became widely known. He also won a wide reputation through his pub-
lic debates with prominent Presbyterian minis-
ters in 1820–23, and later through more fa-
mous debates with Robert Owen in 1829 and
Archbishop Purcell in 1837. In 1818–19 he es-

tablished Buffalo Seminary and sent for his
father to assist in the work of instruction; and
in 1823 he established the Christian Baptist,
which in 1826 became the Buffalo Baptist En-
blisher and continued under his editorship until
1865. In 1827, finding it inconvenient to mail
his letters and publications at West Liberty, he
succeeded in establishing at his residence at
Buffalo a post-office under the name of Bethany,
which also became the name of the town later
laid out by him (1847). He thus obtained the
franking privilege which enabled him greatly
to extend his correspondence. In 1829–30 he
represented Brook County in the Virginia Con-
stitutional Convention. In the debates he took
an active part in urging a system of free popu-
lar education and a more equitable representa-
tion of the western counties in the legislature.
In 1840 beginning with an endowment from his
own means, he founded Bethany College, which
was chartered in 1851, and he remained presi-
dent of the institution until his death. In 1847 he
visited England, France, Scotland and Ireland.
In 1850 by invitation, in connection with one of
his eastern trips, he made an address in the
House of Representatives at Washington.
CAMPBELL continued to write and preach until
1865. He published many religious volumes, including hymnbooks and a translation of the New Testament. In
1861 he published the Memoirs of Thomas
Campbell, his father and associate, who died at
Bethany on 4 Jan. 1854.

CAMPBELL, Alexander, American politi-
cian: b. Concord, Pa., 4 Oct. 1814; d. La Salle,
III., 9 Aug. 1898. He received a common-school
education and entered the iron business, re-
moving to Illinois and attaining prominence in
local politics. He was mayor of La Salle, III.,
in 1852, a member of the Illinois legislature in
1858 and a member of Congress in 1875. He
was widely known as the "father of the Green-
back party."

CAMPBELL, Sir Alexander, Canadian statesman:

b. Yorkshire, England, 9 March 1822; d. Toronto, 24 May 1892. He began the practice of law in 1843 as a partner of Sir John A. Macdonald. In 1858 he entered the legis-
lative council, and in 1863 was elected speaker. In
1864–67 he was commissioner of Crown
lands. He was a delegate to the Confederation
conferences in 1864, received a nomination to the Dominion Senate (1867), where he was the
government leader, and was Postmaster-General
in the first Federal Cabinet. In 1873 he be-
came Minister of the Interior. With the
other Cabinet officers, he resigned in the same
year on account of the Pacific Railroad scandal.
On the return of Macdonald to power, he was
successively Receiver-General of Militia and
Defense and Postmaster-General. From
1881–85 he was Minister of Justice, and from
1887–92 lieutenant-governor of Ontario. He
represented Canada at the Colonial Conference
held in London in 1887. He was created K.C.
M.G. in 1879.

CAMPBELL, Archibald. See Argyle,
CAMPBELL of.

CAMPBELL, Bartley, American drama-
tist: b. Allegheny City, Pa., 12 Aug. 1843; d.
Middletown, N. Y., 30 July 1886. He entered
journalism early in his career and established
the Evening Mail in Pittsburgh (1868) and the
Southern Magazine in New Orleans
(1869). His first drama that met with success
in New York was A Fair Warning, appearing in
1879. 'Fairfax, or Life in the Sunny South,' and
'The Galley Slave,' were on the metropolit-
ian boards during the same season. Included in
his plays are 'Matrimony'; 'The White
Slave'; 'Siberia'; and 'Paquita.' Several of
his plays were brought out in England. He
was manager of the Fourteenth Street Theatre,
New York, for some time. He became insane
in 1886 and died in an asylum.

CAMPBELL, Beatrice Stella Tanner (Mrs
Patrick Campbell), English actress: b. Lon-
don 1867; married in 1884 to Patrick Campbell,
who was killed in 1900 in the Boer War. Her
first appearance on the professional stage was
made in 1888 at the Alexandra Theatre in Liver-
pool. She has been particularly successful in
such plays as 'The Second Mrs. Tanqueray,'
'John-a-Dreams' and 'Signs of Life'
by Mrs. Ebbsmith. She has also appeared in such
Shakespearean roles as Juliet, Ophelia and
Lady Macbeth in conjunction with Sir John
Forbes-Robertson; and has played Mélisande
to the Pelléas of Sarah Bernhardt. She has
frequently visited the United States, playing in
most of the leading cities. She married in
1914 George Cornwallis-West.

CAMPBELL, Sir Colin, English soldier
and administrator: b. 1776; d. 1847. He was
first a midshipman; then entered the army,
fought with Wellesley in India, 1801–04, and
was present at the battle of Assaye. He served
also in Denmark and the Peninsula, and was
on Wellington's staff at the battle of Waterloo.
He was lieutenant-governor of Nova Scotia,
1834–40, and of Ceylon, 1839–47.

CAMPBELL, Sir Colin (Lord Clyde),
British general: b. Glasgow, 20 Oct. 1792; d.
14 Aug. 1863. His father was a merchant,
named Macliver. He was educated at the ex-
 pense of his mother's brother, Col. John
Campbell, and owing to an error of the Duke
of York's when the youth was introduced to
him as a candidate for a commission, assumed
the name of Campbell. Entering the army in
1806, and serving in the Peninsula War (1810–
13), he was severely wounded at the siege of
San Sebastian and the passage of the Bidasao.
He served in Nova Scotia in 1814, and then
passed nearly 30 years in garrison duty at
Gibraltar, Barbadoes, Demerara and various
places in England, in 1837 becoming lieutenant-
colonel of the 98th Foot. He served in India
prior to the Crimean War, on the outbreak
of which, in 1854, he was appointed the engin-
eers of the Highland brigade. The victory
of the Alma was mainly his; and his, too, the
splendid repulse of the Russians by the "thin
red line" in the battle of Balaklava. When, on
11 July 1857, the news reached England of the
sepoys mutiny, Lord Clyde was at once in the
command of the forces in India. He effected the relief of Lucknow on 19 March
1858, and succeeded in quelling the mutiny.
He was created Baron Clyde in July of the same
year.
CAMPBELL, Colin, Scottish clergyman and Egyptologist: b. Campbeltown, Argyllshire, 1848. He was educated at the universities of Edinburgh and Heidelberg, entered the ministry of the Established Kirk of Scotland, and has been minister of the parish of Dundee from 1883. He preached nearly every year from 1883 to 1900 lectures in the Theological Institute of Balmoral Castle and Crathie Parish Church, and has published ‘The First Three Gospels in Greek’; ‘Critical Studies in Saint Luke’s Gospel’ (1891); ‘Two Theban Queens’ (1909); ‘Two Theban Princes’ (1910); ‘The Miraculous Birth of King Amon-hotep III and Other Egyptian Studies’ (1912).

CAMPBELL, Douglas Houghton, American educator: b. Detroit, Mich., 16 Dec. 1859. He was graduated at the University of Michigan in 1882 (Ph.D. in 1886), and then studied in Europe for four years. Returning he was professor of botany in the University of Indiana till 1891, when he was called to the similar chair in Stanford University. He is author of ‘Elements of Structural and Systematic Botany’ (1890); ‘Structure and Development of Mosses and Ferns’ (1895); ‘Lectures on the Evolution of Plants’ (1899); ‘A University Textbook of Botany’ (1902); ‘Plant Life and Evolution’ (1911).

CAMPBELL, Edward de Mille, American industrial chemist: b. Detroit, Mich., 9 Sept. 1852. He studied at the University of Michigan, and after serving as chemist to the Ohio Iron Company in 1886, to the Sharon Iron Company, Pennsylvania, in 1887, to the Dayton Coal and Iron Company, Tennessee, in 1888, from assistant professor in 1890 he advanced to the position of director of the chemical laboratory at his alma mater, the University of Michigan, in 1905.

CAMPBELL, George, Scottish clergyman: b. Aberdeen, 25 Dec. 1719; d. 6 April 1796. He was educated at Marischal College, and afterward articled to a writer of the signet at Edinburgh. In 1741 he relinquished the law and studied divinity at Aberdeen. He was ordained in 1748, became pastor of a church in Aberdeen 1757, where he was a fellow member of Thomas Reid in a philosophical society, and in 1775 was appointed principal of Marischal College. In 1763 he published his celebrated ‘Dissertation on Miracles,’ in answer to Hume’s essay. In 1771 he was chosen professor of divinity, and in 1776 gave to the world his ‘Philosophy of Rhetoric,’ which established his reputation as a grammarian and critic. His ‘New Translation of the Gospels’ appeared in 1778. Consult the biography by Keith prefixed to Campbell’s ‘Lectures on Ecclesiastical History.’

CAMPBELL, Sir George, English administrator and author: b. 1824; d. London, 18 Feb. 1892. He was educated at Haileybury for the East Indian service and held several important posts under the Indian government. He represented the Kirkcaldy burghs in the House of Commons from 1860 till 1875. He was sent to India in 1875 until his death. The success that had attended him as an administrator in India did not follow him as a politician. He published ‘India as It May Be;’ ‘The Ethnology of India’ (1865); ‘Handy Book of the Eastern Question’ (1870); ‘Black and White in the United States;’ ‘The British Empire’ (1887); ‘Memoirs of My Indian Career’ (1893).

CAMPBELL, Harry, English physician: b. Margareting, Essex, England. He studied medicine at Saint Bartholomew’s Hospital College and was appointed to the staff of North-west London Hospital, 1886, and that of Welbeck Street Hospital, 1896. He has published ‘The Physiology of Eyesight’ (1885); ‘The Caustion of Disease’ (1889); ‘Flushing and Morbid Blushing’ (1890); ‘Differences in the Nervous Organization of Man and Woman’ (1891); ‘Headache and Other Morbid Cephalic Sensations’ (1894); ‘Respiratory Exercises in the Treatment of Disease’ (1898); ‘On Treatment’ (1907).

CAMPBELL, Helen Stuart, American author: b. Lockport, N. Y., 4 July 1839. She was educated at Mrs. Cook’s Seminary, Bloomfield, N. J., 1850–58, and very early began contributing to periodicals. From 1881 to 1884 she edited Our Continent (Philadelphia). Her especial interest has been in social and ethical questions, such as the condition of the poor, household management, etc., and her writings for the most part consist of essays and stories illustrating these topics. Chief among them are ‘The Ainslee Series’ (1864–69); ‘Six Simons’ (1878); ‘Unto the Third and Fourth Generation’ (1880); ‘Under Green Apple Boughs’ (1881); ‘The Easiest Way in Housekeeping and Cooking’ (1881); ‘The Problem of the Poor’ (1882); ‘Mrs. Herndon’s Inoculation: a Novel’ (1885); ‘Female Prisoners of Poverty’ (1887); ‘Prisoners of Poverty Abroad’ (1889); ‘Roger Berkeley’s Probation’ (1881); ‘Anne Bradstreet and Her Time’ (1892); ‘Women Wage-Earners’ (1893); ‘In Foreign Kitchens’ (1894); ‘Some Passages in the Practice of Dr. Martha Scarborough’ (1893); ‘Ballantyne: a Novel’ (1901).

CAMPBELL, Henry Donald, American scientist: b. Lexington, Va., 29 July 1862. He was graduated at Washington and Lee University in 1882; later studied at Berlin and Heidelberg, and in 1887 became a professor of geology and biology at Washington and Lee University. He was made dean in 1906 and was acting president of the university January to July 1912.

CAMPBELL, James Edwin, American politician: b. Middletown, Ohio, 7 July 1843. After an academic education he was admitted to the bar. During the Civil War he served for a time in the navy and was with the Mississippi and Red River flotillas. He was a Democratic member of Congress, 1883–89; governor of Ohio, 1890–92. He was defeated for re-election by William McKinley, afterward President of the United States. In 1895 he was again a candidate, but was defeated by A. S. Bushnell.

CAMPBELL, James Mann, Scottish-American clergyman: b. Scotland, 5 May 1840. He received his education at the universities of Edinburgh and St. Andrews. He became a Presbyterian minister in 1869 and went to the United States. He has lectured much on religious themes and has published ‘Unto the Uttermost’ (1889); ‘The Indwelling Christ’ (1895); ‘After Pentecost, What?’ (1897); ‘The Teachings of the Books’ (1899); ‘ Clerical Types’ (1900); ‘Bible Questions’;
CAMPBELL, James Valentine, American jurist: b. Buffalo, N. Y., 25 Feb. 1823; d. Detroit, Mich., 26 March 1890. His family moved to Detroit in 1826. He was graduated at Saint Paul's College, L. I., in 1841; was admitted to the Michigan bar, 1844; practised with success until 1857. He was then elected a judge of the Supreme Court of Michigan, re-elected at every succeeding election, and was chosen chief justice, for five terms in succession. From 1859 he lectured for 20 years in the law department of the University of Michigan. Much of his leisure was devoted to literary and historical studies, especially the history of Michigan and the Northwest Territory. Until 1854 he was a Whig, but thereafter acted chiefly with the Republicans. He wrote 'Outlines of the Political History of Michigan' (1867).

CAMPBELL, John, American editor: b. Scotland 1653; d. March 1728. He was one of a large number of Boston booksellers and public officials whose relationships are not determinable. John, as postmaster, was the news centre of the New England provinces; and in 1703 was writing 'news letters' of European news to Governor Winthrop of Connecticut and perhaps to other governors, made up of information received from arriving travelers, etc., with inferences as to New England policy. In 1704 he concluded to make these public and for sale; and on 24 April issued the first news paper, the Boston News Letter (q.v.), which he edited till 1722. In 1719 he was deprived of the postmastership. He was justice of the peace for Suffolk County for some years.

CAMPBELL, John. See Argyle, CAMPBELLS OF.

CAMPBELL, John, British historian: b. Edinburgh, 8 March 1708; d. 28 Dec. 1775. His writings before 1742 were published anonymously. From 1755 to the close of his life he was agent of the British government for the province of Georgia. Among his works are 'A Concise History of Spanish America' (1741); 'Lives of the English Admirals' (1744); 'A Survey of the Present State of Europe' (1750); and 'Trade of Great Britain to America' (1772). He also wrote many of the biographies in the 'Biographia Britannica,' and Samuel Johnson makes many allusions to his erudition and popularity.

CAMPBELL, John (BARON), Lord High Chancellor of England: b. Springfield, near Cupar, county of Fife, Scotland, 15 Sept. 1779; d. 22 June 1861. He was educated at the grammar school of Cupar, and at 12 entered the University of Saint Andrews (1791) for the purpose of studying for the Church. After remaining, however, for some years at college, he resolved to abandon the clerical profession, and determined to try his fortune in London. In 1798 he quitied his native country for the metropolis, where he became reporter and theatrical critic on the Morning Chronicle. In November 1800 he entered as a student of Lincoln's Inn, and in 1806 was called to the bar. He traveled the Oxford circuit, and obtained considerable practice. In 1830 he was elected member of Parliament for Stafford, and in 1832 was appointed solicitor-general. In 1834, on the retirement of Sir William Horne, he became Attorney-General, and the same year was elected one of the members of Parliament for the city of Edinburgh, serving till 1841, when he was created chancellor of Ireland, and raised to the peerage as Baron Campbell of Saint Andrews. He had scarcely, however, assumed his official duties in Ireland, when he quitied office with the Melbourne ministry; and having now more leisure, he edited his 'Lives of the Chancellors,' the first series of which was published early in 1846. On the accession of Lord John Russell to power in that year Lord Campbell accepted the chancellorship of the exchequer, but shortly after the accession of Queen Victoria, he was appointed to the exchequer, and in 1859, on Lord Palmerston's resumption of the premiership, Lord Campbell reached the highest legal dignity in the British empire, becoming Lord High Chancellor. Consult 'Life of Lord Campbell,' by his daughter, the Hon. Mrs. Hardcastle.

CAMPBELL, John Archibald, American lawyer: b. Washington, Ga., 24 June 1811; d. Baltimore, 12 March 1889. He was graduated from the Georgia University in 1826 and was admitted to the bar in 1829 before coming of age, by virtue of a special act of the legislature. Removing to Alabama he soon became prominent in his profession, and in 1853 was appointed associate justice of the Supreme Court of the United States, resigning in 1861. He was subsequently appointed Confederate Secretary of War, and was one of the commissioners named by President Davis to meet President Lincoln and Secretary Seward at the conference in Fortress Monroe in February 1865. He was imprisoned some months after the close of the Civil War and on his release resumed his legal practice.

CAMPBELL, John Douglas Sutherland. See Argyle, CAMPBELLs OF.

CAMPBELL, John Lyle, American chemist: b. Rockbridge County, Va., 7 Dec. 1818; d. Lexington, Va., 2 Feb. 1886. He was graduated at Washington College (now Washington and Lee University) in 1843. On leaving college he became assistant in the academy at Staunton, Va., and afterward had charge of a similar institution in Richmond, Ky. In 1851 he was called to the chair of chemistry and geology at Washington College, an office which he continued to occupy until his death. He was a recognized authority on the geology of Virginia, and wrote reports on that subject as well as frequent contributions to the scientific journals. Among his larger works are 'Geology and Mineral Resources of the James River Valley' (1882), and 'Campbell's Agriculture: a Manual of Scientific Agriculture for the School and Farm' (Philadelphia 1859).

education at Edinburgh Academy, and afterward attended the University of Glasgow and Trinity and Balliol colleges, Oxford. Ordained in 1857, he became vicar of Milford, Hants, in the following year, a post which he held till his appointment, in 1863, as professor of Greek in Saint Andrew's University, a position he held until 1892. The 1894-95 series of Gifford Lectures at Saint Andrews was delivered by him. As a writer he is known mainly by his editions and translations of ancient Greek authors, the chief of which are Plato's 'Theaetetus' (1851); Plato's 'Sophist and Politicus' (1867); 'Sophocles—The Plays and Fragments' (1879); 'Sophocles in English Verse' (1873-83); 'Eschylus in English Verse' (1890); and Plato's 'Republic', (with Benjamin Jowett 1894); 'Tragic Drama in Eschylus, Sophocles and Shakespeare' (1904); 'Paralipomena Sophocles' (1907). 'The Christian Ideal,' published in 1877, is a volume of sermons; and his other works include a 'Guide to Greek Tragedy' (1891); 'Life of James Clerk Maxwell' (with W. Garnett 1882); 'Life of Benjamin H. Spalding' (1888); 'Religion in Greek Literature' (1898), the substance of his Gifford Lectures.

**CAMPBELL, Mrs. Patrick. See CAMPBELL, BEATRICE.**

**CAMPBELL, Reginald John, English Congregational clergyman:** b. London, 1867. After receiving a collegiate training at University College, Nottingham, and Christ Church College, Oxford, he entered the Congregational ministry in 1895. He first held the pastorate of the Union Church, Brighton, where he quickly acquired celebrity as a preacher. He succeeded Dr. Parker at the City Temple, London, in 1903, continuing there until his resignation in 1915. For a time his attitude to the fundamental doctrines of Christianity occasioned alarm among orthodox Congregationalists, his 'New Theology' (1907), which set ethics above dogma, being especially the centre of attack. By 1915 he had swung in the other direction, for in October of that year he announced his intention of seeking orders in the Anglican Church, and was ordained to the diaconate at Birmingham, 24 Feb. 1916. He has published 'The Making of an Apostle' (1898); 'The Restored Innocence' (1898); 'A Faith for To-day' (1900); 'Christianity and the Social Order' (1903); 'Thursday Mornings at the City Temple' (1908).

**CAMPBELL, Robert, British fur trader and explorer:** b. Glenlyon, Scotland, 1808; d. 1894. He entered the service of the Hudson's Bay Company in 1832; and in 1838 began a series of explorations in the Northwest, in the course of which he discovered Frances Lake, the Pelly and Loups rivers and the upper Yukon, which he traversed under the impression that it was the Colville, but the identity of which he subsequently established.

**CAMPBELL, Thomas, British poet:** b. Glasgow, 27 July 1777; d. Boulogne, France, 15 June 1844. He was educated at the University of Glasgow, where he distinguished himself by the excellence of his poetical translations from the Greek. After leaving the university he resided for a short time in Edinburgh; and sprang suddenly into fame by publishing, in 1799, 'The Pleasures of Hope.' It produced an extraordinary sensation, and soon became a familiar book throughout the kingdom. This was due not more to the graces of its style than to the noble purity of its thoughts. After the publication of 'The Pleasures of Hope' he went to Germany, where he met Klopstock at Hamburg, and visited the scene of the battle celebrated in 'Gebhard,' one of the most famous of his poems. The appearance of the English fleet caused him to leave Altona, where he resided for some time. During this tour several of his best lyrics were written or suggested, among them 'The Exile of Erin,' 'Ye Muses, ye Elysian Bards,' and the 'Banim of the Baltic.' In 1803 a new edition of 'The Pleasures of Hope,' with other poems, appeared, and in that year he married. Settling in London, he devoted himself to literary work; and in 1805 obtained a pension of £500, through the influence of Fox, of whose politics he was an admirer. After this he appears for a time to have given his attention less to poetry than prose, but in 1809 he again made his appearance as a poet, and published 'Gerrard of Wyoming,' which was followed by 'The Poem of Samson,' considered superior to 'The Pleasures of Hope.' In 1814 he visited Paris, and in the following year he received a legacy of over £4,000. In 1820, by his 'Specimens of the British Poets,' accompanied with critical essays, he proved himself the possessor of great critical acumen and an admirable prose style. In 1820 he became editor of the New Monthly Magazine, a position which he held till 1830. As an editor he was a signal failure. In 1824 he published 'Theodore,' which, though not devoid of fine passages, scarcely sustained his reputation. For many years he took an active interest in the emancipation of Greece and Poland, and in the foundation of the London University, of which he considered himself the originator. He was lord rector of the University of Glasgow from 1826 to 1829. In 1828 his wife died, and thenceforth his vigor, both bodily and mental, began to decline; and though he afterward published 'Letters from the South' (1837), describing a visit which he had paid to Algiers, and 'A Life of Mrs. Siddons' (1834-40), 'Life of Petrarch,' and either wrote or edited 'The Life and Times of Frederick the Great,' he failed to equal his more youthful efforts. In 1831-32 he was editor of the Metropolitan Magazine, and in 1832 he founded the Polish Association. Among his works not mentioned above are 'The Advent,' a hymn; 'Love and Madness'; 'Lord Ullin's Daughter'; 'The Wounded Hunsar'; 'Gilderoy'; 'The Soldier's Dream'; 'Judith'; 'The Name Unknown'; 'The Turkish Lady'; 'Lochiel's Warning'; 'The Rainbow'; 'The Last Man'; 'Navarino'; 'Pilgrim of Glencoe'; 'Moonlight,' etc. See Beattie, 'Life and Letters of Thomas Campbell'; and Redding, 'Literary Reminiscences of Campbell.'

**CAMPBELL, Thomas W., American clergyman:** b. Three Rivers, Quebec, Canada, 24 Sept. 1851. He was graduated from Union University in 1879, and became a Methodist minister. Joining the Reformed Episcopal Church, he was elected a bishop in 1891, and presiding bishop in 1894. In 1895 he moved to Brooklyn, N. Y., to become pastor of the Reformed Episcopal church of the Reconciliation,
and resigned to enter the Presbyterian Church in 1808. In October 1899 he became pastor of the Noble Street Church, Brooklyn, N. Y.; resigned October 1905; organized Stoney Brook Association and Assembly; secretary and manager till May 1915.

**CAMPBELL, William, American soldier:** b. Augusta County, Va., 1745; d. Rockey Mills, Va., Aug. 1781. He was of Scottish descent. Commissioned a captain in the first regular troops raised in Virginia in 1775, and later becoming a colonel of militia, he distinguished himself greatly in the battles of King’s Mountain and Guilford Courthouse. His military career was short but brilliant, and on all occasions marked by conspicuous bravery. Lafayette gave him the command of a brigade of riflemen and light infantry. Washington, Gates and Greene, the Virginia legislature and the Continental Congress expressed their high sense of his merits and services. He was taken fatally ill a few weeks before the siege of Yorktown. He married a sister of Patrick Henry. Consult Warfield, E. D., (in the Magazine of History, January, 1887).

**CAMPBELL, Wiliam Lowndes, English royal governor of South Carolina:** b. (?) d. 5 Sept. 1778. He was the youngest son of John, 4th Duke of Argyle. He received a captaincy in the British navy, 20 Aug. 1762; was a member of Parliament in 1764, and governor of Nova Scotia, 1766-73. In 1774 he was appointed governor of South Carolina, entered upon his duties in June 1775, was courteously received by the people, for whom he professed great friendship. The hollowness of his promises was soon proved, however, of doing his residence in Charleston unsafe, he fled on board a British man-of-war, where he was soon joined by his wife, who was a Miss Sarah Izard, sister of the patriot, Ralph Izard, who belonged to the wealthiest family in the province. In 1776 Campbell served as a volunteer on board the Peter Parker’s flagship, Bristol, in the attack on Fort Sullivan, 28 June, and was severely wounded early in the action, while in command of the lower deck. He ultimately died from the wounds he received at this time. Consult McCrady, ‘The History of South Carolina in the Revolution’ (Vol. I., 1901).

**CAMPBELL, William B., American soldier and statesman:** b. Sumner County, Tenn., 1 Feb. 1807; d. near Lebanon, Tenn., 31 Aug. 1867. He was educated in Abingdon, Va., and studied law at Winchester, Va., in the then noted law school of the Hon. St. George Tucker. He began the practice of his profession in 1829 at Carthage, Tenn., was elected attorney-general of his district in 1830, a member of the legislature in 1835. He resigned and raised a company of dragoons to serve in the war with the Indians in Florida in 1836. In this year also he formed a volunteer company, of which he was made captain, and fought in the Creek and Seminole War as part of the 2d Tennessee Volunteers under Col. William T. Rose. In 1837 Captain Campbell was elected to the United States Congress and served four terms successively. In 1844-45 he served as major-general of his military division. He was colonel of the 1st Tennessee Regiment in the Mexican War. He was present at Matamorcas (Palo Alto), Monterey, where he was conspicuous for his gallantry. He was at Vera Cruz on 22 March 1847 and at Cerro Gordo, 18 April 1847. In all he displayed unfailing courage and great capacity as commander. On his return to Tennessee Colonel Campbell was elected unanimously circuit judge in his native place. He held the post for several years, filling it with dignity and wisdom. In 1851 he was elected governor of Tennessee, serving one term and declining re-election. He was a member of Congress in 1865-66. In his public life he escaped to a marked degree the censures and criticism incident to public station, as a result of his integrity and untiring devotion to duty.

**CAMPBELL, William Wallace, American astronomer:** b. Hancock County, Ohio, 11 April 1862. After graduation from the University of Michigan he was professor of mathematics at the University of Colorado in 1886-88, and instructor in astronomy and assistant in Detroit Observatory, University of Michigan, in 1888-91, making a specialty of comet observations and orbit computation. He became astronomer in 1891, and director in 1901 of the Yerkes Observatory, and also had charge of eclipse expeditions to India, Spain and Flint Island. He received several medals in recognition of his work, including the Janssen prize of the Paris Academy of Sciences in 1910 and the Bruce gold medal in 1913. Besides many papers on the motion of solar eclipses, stars, comet orbits and on the spectra of nebulae, comets and stars, he has published ‘The Elements of Practical Astronomy’ (1900); ‘The Return of Halley’s Comet’ (1909) and ‘Stellar Motions’ (1912).

**CAMPBELL, William Wilfred, Canadian poet:** b. Berlin, Ontario, Canada, 1 June 1861. He was educated at Toronto University and the Episcopal Theological School, Cambridge, Mass., and was for some years in the Episcopal Ministry in Canada, in order to devote himself entirely to literary pursuits. He has published ‘Lake Lyrics’ (1889); ‘The Dread Voyage’ (1893); ‘Mordred, a Tragedy,’ and ‘Hildebrand’ (1895), the latter two being dramas in blank verse; ‘Beyond the Hills of Dream’ (1899); ‘Sights of S. Britain’ (1906); and the novels, ‘Ian of the Orkneys’ (1906); ‘A Beautiful Rebel’ (1909); and ‘The Canadian Lake Region’ (1910).

**CAMPBELL-BANNERMAN, Sir Henry, English statesman:** b. 7 Sept. 1836; d. London, 22 April 1908. He was the son of Sir James Campbell, but added the surname Bannerman, under the will of a maternal uncle. In 1868 he was elected member of Parliament for Stirling borough. From 1871-74, and from 1880-82, he was financial secretary of the War Office; 1892-94, Secretary of Admiralty; 1894-95, Chief Secretary for Ireland; 1896 and 1892-95, Secretary of War. In February 1899 he became leader of the Liberal party; on 4 Dec. 1903 succeeded Sir Arthur Balfour as Premier. He distinguished himself by his patience and common sense. He gathered around him a min-
CAMPBELL ISLAND—CAMPE


CAMPBELL ISLAND, a lonely island in the Pacific Ocean in lat. 52° 32' S., long. 169° 9'E., 36 miles in circumference. Though very mountainous, it has several good harbors. It is a dependency of New Zealand and 180 miles south of the Auckland Islands. It is volcanic, with a rich and rare flora.

CAMPBELFORD, Canada, town in Northumberland County, Ontario, beautifully situated on the Grand Trunk Railway, 32 miles west of Belleville and on the Trent Valley Canal. It manufactures woolens, has pulp, paper and flour mills, bridge works and shoe factory. Pop. (1911) 3,051.

CAMPBELLITES, followers of Rev. John McLeod Campbell, who was deposed from the Church of Scotland in 1831 for teaching the universality of the atonement. He established a church at Glasgow in 1833. The name is also applied to members of the Church founded in the United States by Alexander Campbell. See Disciples of Christ.

CAMPBELL'S STATION, Tenn., the scene of an engagement between Federal and Confederate forces, 4 Nov. 1863. Gen. Braxton Bragg, who was besieging Chattanooga, detached Longstreet's corps of 10,000 men and 35 guns, with Wheeler's cavalry force of 5,000 men, to capture Burnside or drive him out of East Tennessee. Longstreet reached the south bank of the Tennessee, near Loudon, on the 13th, and that night and next day laid bridges at Huff's Ferry, two miles below Loudon, and began crossing his infantry. Burnside, who was holding the north bank of the river from Kingston to Lenoirs, concluded to leave one brigade at Kingston and retire the rest of his command to Knoxville, about 30 miles, where he had prepared to make a stand behind defensives works. He skirmished sharply with Longstreet's advance on the 14th and gradually fell back on 15th, at night concentrating Hartranft's and Ferrero's divisions of the 9th corps and White's of the 23d, at Lenoirs. He had about 5,000 men. Longstreet followed, attacked during the night and was repulsed. Before daybreak of the 16th Hartranft, with his division of cavalry, was put on the march to secure Campbell's Station, the intersection of roads coming from the south. After destroying many wagons and contents, taking the teams to assist his artillery over the bad roads, axle-deep in mud, Burnside followed with the other two divisions, artillery and trains, closely pursued by Longstreet, with Hood's division, commanded by Gen. Micajah Jenkins, with whose advance his rearguard had several sharp encounters. McLaw's division of Longstreet's corps took a more direct road to the left, the two roads intersecting about a mile southward of Campbell's Station, 15 miles south of Knoxville. Hartranft reached the coveted point in advance of McLaw's and, turning west on the Kingston road, deployed his division in such manner as to confront McLaw's, and at the same time cover the Lenoir road, along which the trains were moving in advance of the infantry. He had scarcely made his dispositions when McLaw appeared and attacked, but Hartranft held on until cavalry, with the trains and the remainder of the troops, had passed and the troops taken position, when he fell back and formed on the left of White's division, in position half a mile beyond the junction of the two roads, Ferrero's division on White's right, and the artillery on commanding ground sweeping the road and the open country in front. The jaded train continued on the road to Knottsville. McLaw's advanced and drew up in the plain, but the forbidding aspect of Burnside's artillery, which opened viciously on him, forbade direct attack with infantry, whereupon he opened with artillery, and Longstreet continued attacks upon both flanks of Burnside's line, which were made and nicely repulsed; but, largely superior in numbers, Longstreet was able to move around both flanks, especially on Burnside's left, which obliged him to fall back to a ridge nearly a mile in the rear. This he did in a handsome manner, though under a heavy and constant fire, and closely pressed on all sides. It was four o'clock when Hood's division made an attack on Burnside's left, which was repulsed, McLaw attacked his right and was thrown back, and Longstreet then prepared for a general advance of his entire line, but before his preparations were completed it was becoming dark and his train secure and well on the road. Burnside, after dark, resumed his march. His advance reached Knoxville about daybreak next morning, 17 November, Longstreet warily following during the day, and the siege of Knoxville began. In this action at Campbell's Station and the skirmishes preceding it at Huff's Ferry, Lenoirs, and on the march, the Union loss was 303 killed and wounded, and 135 missing. The Confederate loss is not definitely known. Hood's division, the most seriously engaged, lost 174 killed and wounded; the loss of McLaw was much less. Consult Official Records (Vol. XXXV); the Century Company's 'Battles and Leaders of the Civil War' (Vol. III); Woodward's 'Burnside and the 9th Army Corps.'

CAMPBELLTON, Canada, seaport in Restigouche County, New Brunswick, on the Intercolonial Railway. It is the northernmost town in the province and a great centre for hunters of game. Light and water are municipally owned. Its industries include foundry and machine shops, lumber, shingle and planing mills, woodworking factories, etc. Pop. 3,817.

CAMPBELTOWN, Scotland, seaport and popular summer resort, famed for its scenic and historic attractions, in Argyllshire, on a fine bay indenting the southeast point of the Kintyre peninsula, 82 miles by water southwest of Glasgow. Whisky distilling is the chief industry, producing annually over 2,000,000 gallons, half of which is exported. Coal is mined, woolens manufactured, shipbuilding with allied industries carried on and the fisheries are important. The ruins of the ancient church founded by Saint Columba, and the sculptured granite cross of archaeological fame, from Iona, stand in the principal street. An ancient stronghold of the Macdonald of the Isles, here in 1647 at Dunaverly Castle 300 of the Macdonalds were slain after their surrender. Pop. 9,500.

CAMPE, kâm'pê, Joachim Heinrich, German teacher and juvenile author: b. Deensen,
Brunswick, Germany, 29 June 1746; d. 22 Oct. 1818. He studied at Halle for the Church, acted for some time as a teacher in various positions. He ardently supported the education reforms of Basedow whom he succeeded during the year 1777 as the head of the Philanthropinum in Dessau. In 1786 he was chosen by the government of Brunswick to superintend and reform the schools of that duchy, but his radical views brought him into conflict with the Church and government and he was unable to put them through. He became likewise the head of a schoolbook publishing house at Brunswick, and his own works, which were issued from it, contributed greatly to extend its reputation. These consist principally of educational works and books for youth, the most successful being 'Robinson Crusoe der Jungere,' an adaptation of Defoe's 'Robinson Crusoe.' This attained an immense popularity, being translated into almost all the languages of Europe. He also wrote a 'History of the Discovery of America,' Consult Leyser; 'Joachim Hoffman,' 2 vols. (1784; 2d ed. 1786).

CAMPECHE, or CAMPEACHY, Mexico, seaport town in the state and on the bay of the same name, on the west coast of the peninsula of Yucatan, about 100 miles southwest of Merida, with which it is connected by railroad. Under the Spanish régime Campeche was one of the three open ports of this coast, and its general aspect still gives evidence of its former wealth and importance. Founded in 1540 on the site of a native village, of which there are interesting remains, the city has witnessed many important events down to the revolution of 1842. It contains a citadel, a university with a museum, a hospital and a handsome theatre. Campeche is an important mart for logwood or Campeachy wood, of which great quantities are exported. Other important products are wax, cedars and henequen or sisal-hemp, sugar, salt, mahogany and hides. Owing to the shallowness of the roadstead large vessels have to anchor five or six miles off. There is a lighthouse on the coast at the point Pop. 10,207. The state of Campeachy has an area of 18,991 square miles. Pop. 87,000. The Bay of Campeche, part of the Gulf of Mexico, lies on the southwest of the peninsula of Yucatan, and on the north of the province of Tabasco.

CAMEGGIO, kām-pē′jō, or CAMEGGI, Lorenzio, Italian ecclesiastic: b. Bologna 1472; d. Rome, 25 July 1539. He succeeded his father as professor of law in the University of Padua in 1511, and gained a high reputation. When holding this office he married, and became the father of several children, but having lost his wife, took orders. Pope Julius II made him bishop of Petri, and Léo X., after giving him a cardinal's hat, employed him on several important missions, the execution of which gave him some prominence in connection with the Reformation. One of his missions was to Germany, for the purpose of regaining Luther; and another to England, to attempt to levy a tithe for defraying the expense of a war against the Turks. He failed signally in both, but ingratiated himself with Henry VIII., and was made a cardinal by the archbishop of Bologna (1524). Under Clement VII he was sent as legate to the Diet of Nuremberg, where he vainly endeavored to unite the princes in opposition to Luther; and to the Diet of Augsburg. He again visited England, with extensive powers to decide in the question of divorce between Henry VIII. and Queen Catherine; but his temporizing measures lost him the confidence of all parties, as well as his bishopric of Salisbury. Notwithstanding his repeated failures, he remained high in favor at the papal court. At his death he was archbishop of Sabina. His tomb is in the church of Saint Maria of Trastevere.

CAMPEN. See KAMPEN.

CAMPEN, Jacob de. See KAMPEN, JACOB DE.

CAMPEN, Jan van. See KAMPEN, JAN VAN.

CAMPER, kām′për, Pieter, Dutch anatomist: b. Leyden, 11 May 1722; d. The Hague, 7 April 1789. He distinguished himself in anatomy, surgery, obstetrics and medical jurisprudence, and also as a writer on aesthetics. From 1750 to 1755 he was professor of medicine at Franeker, and from the latter date to 1763 at Amsterdam. Henceforth till his resignation in 1773 he held a professorship at Groningen. His 'Dissertation on the Natural Varieties,' etc., is the first work in which was thrown much light on the varieties of the human species, which the author distinguishes by the shape of the skull. His 'Treatise on the Natural Difference of Features in Persons of Various Countries and Ages,' and one on 'Beauty as Exhibited in Ancient Paintings and Engravings,' followed by a method of delineating various sorts of heads with accuracy, is intended to prove that the rules laid down by the most celebrated limners and painters are very defective. His general doctrine is, that the difference in form and cast of countenance proceeds from the facial angle. His collected writings were published under the title 'Œuvres qui ont pour objet l'histoire naturelle, la physiologie et l'anatomie comparée' (3 vols., Paris 1803).

CAMPEDOWN (Dutch, Camperdon), Holland, a stretch of sandy hills or downs in the province of North Holland, between the North Sea and the small village of Camp, off which the British, under Admiral Duncan, gained a hard-won victory over the Dutch, under De Winter, 11 Oct. 1797. For this victory Admiral Duncan was raised to the peerage as Viscount Duncan of Campedown. His son became Earl of Campedown, and this title still belongs to a descendant.

CAMPERO, Narciso, nār-thē′sō kām-pē′rō, Bolivian statesman and soldier: b. Tojo (now in Argentina) 1815; d. Bolivia 1896. He studied and traveled in Europe, and on his return entered the Bolivian army, and rose to the rank of brigadier-general. He was Minister of War in 1872. After the overthrow of Hilarión Darío in 1880 he was chosen President of Bolivia. He commanded the combined forces of Peru and Bolivia in Tacna campaign, but was defeated at Tacna, 26 May 1880. Internally, his administration was quiet.

CAMPHAUSEN, kām′fōw-zēn, Wilhelm, a German military painter: b. Düsseldorf, 8 Feb. 1818; d. there, 16 June 1883. He studied under Alfred Rethel and Carl Sohn. His
paintings include 'Cromwellian Troopers' (National Gallery, Berlin); 'Doppel after the Assault' (same); 'Charles I at Naseby' (Kunsthalle, Hamburg); 'Tilly at Breitenfeld' (Cologne Museum); 'Napoleon III after Sedan,' and portraits of Emperor William, Bismarck and Wolz. He was at first of the romantic school, and although his best works are historical, they are depicted with fine attention to detail and realism.

**CAMPHENE, or CAMPHINE, (1)** a general name for those terpenes which are solid at ordinary temperatures (see **TERPENE**); (2) a purified form of turpentine, obtained by distilling that substance over quicklime in order to remove the resins that the crude product contains, and widely used as an illuminating oil before petroleum was available.

**CAMPOL, a substance now better known as borneol (q.v.).**

**CAMPHOR, a white, translucent, crystalline substance occurring in the wood and bark of the camphor laurel (Cinnamomum camphora, or Laurus camphora), a tree indigenous to Japan and central China, and cultivated in many warm countries. The camphor "gum" is obtained by distilling the leaves, bark and chips of the wood with steam and afterward driving out the water and volatile oils from the distillate with a low degree of heat, and then subliming the gum at 350°F. Purified camphor consists of a clinging mass of tough, colorless, hexagonal crystals which break apart readily, but cannot be reduced to powder except with the addition of a little alcohol—which evaporates spontaneously during the grinding. It has the chemical formula C_{10}H_{16}O, melts at 350°F., boils at 500°F., and sublimes to an appreciable extent at practically all temperatures. It has a strong, pleasant, characteristic odor, and a peculiar, cooling, aromatic taste. Its specific gravity is about 0.992, and it dissolves to a slight extent in water, and freely in alcohol or ether. Small shockings of it exhibit lively motions when thrown upon a water-surface that is absolutely free from oily matter. (See **SURFACE TENSION**). It is familiar about the household, on account of its use for protecting furs and woolen fabrics from the attacks of moths and other insects, and in domestic medicine. It is also employed in the manufacture of celluloid and various explosives.

"Synthetic camphor" is the name given to a camphor artificially prepared from turpentine oil. It is identical with natural camphor except that it is optically inactive. The process by which it is made consists of first converting the turpentine into pinene hydrochloride (which is known commercially as "artificial camphor") and then changing this to camphene by the elimination of the hydrogen chloride. Oxidation of the camphene by any of several patented processes yields the synthetic camphor.

The name "camphor" has been given to many similar substances of widely different derivation: as peppermint camphor (menthol); cedar camphor (from the oil of juniper); cubeb camphor (from the oil of cubebus); thymol (from the oil of thyme), etc. At one of the government experiment stations in the United States a good yield of natural camphor has been secured from young seedlings, mown down like grass at the close of the first season's growth, and distilled in the green state. See **BORNEOL**.

**CAMPHORIC ACID, an organic substance crystallizing in colorless, needle-like, monoclinic crystals, and obtained by oxidizing camphor by boiling it with concentrated nitric acid, or with an alkaline permanganate. It has the formula C_{10}H_{16}O, and a specific gravity of 1.19, and melts at about 370°F. It is almost insoluble in cold water, but is soluble in hot water, alcohol and ether. Camphoric acid has a limited use in medicine in the treatment of chronic disorders of the respiratory system.

**CAMPHUYSEN, kâmp'hoi-tzên, Dirck Ra-felz, Dutch theologian and poet:** b. Gorkum 1586; d. Dokkum, 9 July 1627. He lost his parents at an early age, and was left to the care of an elder brother, who, thinking that he observed in Rafelsz an inclination for painting, placed him as a pupil in the studio of the artist, Dirck Gouwerts. He soon abandoned art to devote himself to theology, which was the reigning passion of the age. He embraced the doctrines of Arminius, and shared in the persecutions under which Arminianism then suffered; was expelled from the city of Vleuten; became a fugitive from village to village, a prey to suffering and privation and found now in writing short poems his only relief and consolation. These are generally upon religious subjects, and are characterized by a remarkable degree of feeling. Recent art criticism has shown that the paintings formerly attributed to him were, in point of fact, by the other Camphuysens, his nephews, R. G. and J. G. Camphuysen, or his son, Gouvert.

**CAMPI, kâm'pē, a group of Italian artists who founded what is known in painting as the school of Cremona. Of the four of this name, Giulio, Antonio, Vincenzo and Bernardino, the first and the last are the best known. Giulio (b. probably about 1500 or 1502, d. in 1572), the eldest and the teacher of the others, was influenced by Giulio Romano after 1540; as his paintings of that period proved show and acquired from the study of Titian and Porporone the skill in coloring which gave the school its high place. Bernardino (b. about 1522, d. about 1590 or 1595) was the greatest of the school. He took Romano, Titian and Correggio in succession as his masters. It is important to note that, while the first three—Giulio, Antonio and Vincenzo—were brothers, the common assumption that the fourth, Bernardino, belonged to the same family, is not supported by any positively known facts.

**CAMPINAS, kam-pē'nas, Brazil, town on the Piracicaba River, state of São Paulo, 114 miles by rail from the port of Santos, and 65 miles northwest of São Paulo. It is an important coffee exporting centre, also producing sugar, corn and fruits. The situation of the town is unhealthy. Pop. 34,000.**

**CAMPION, Edmund, English theologian:** b. London, 25 Jan. 1540; d. 1 Dec. 1581. He was educated at Christ's Hospital and Saint John's College, Oxford, and distinguished himself greatly, becoming B.A. in 1561 and M.A. in 1564. Though at first a Roman Catholic he adopted nominally the Reformed faith and took deacon's orders in the Church of England.
When Queen Elizabeth visited Oxford in 1566 he was selected to make the oration before her, as formerly while at school he had been chosen to make the oration on the death of Mary on her accession. He went from college to Ireland, and while there wrote the history of that country, a superfluous work of no real value, and connected himself with the Roman Catholic Church. His enthusiasm leading him to seek to make proselytes to his new faith, he was seized and imprisoned; but after a short time effected his escape to the Low Countries, and soon after joined the English college of Jesuits at Douay, passed his novitiate as a member of that Society, and became distinguished for his piety and learning. At Rome in 1573 he was admitted a member of the order of Jesuits, after which he resided for a time at Vienna, where he composed a tragedy, which was received with much applause and acted before the Emperor; and at Prague, where he taught rhetoric and philosophy for six years. Sent by Gregory XIII on a mission to England in 1581, he challenged the universities and clergy to dispute with him. His efforts were followed by so large a number of conversions as to disquiet the ministry of Elizabeth; and he was arrested and thrown into the Tower upon a charge of having excited the people to rebellion, and of holding treasonable correspondence with foreign powers. Being tried, he was found guilty, condemned to death for high treason and executed at Tyburn. The insults of the populace attended him to the Tower, where torture was fruitlessly applied to extort from him a confession of treason or a recognition of the supremacy of the English Church, and after his death a fragment of his body was sent to each of the principal towns for exposure. Besides his history of Ireland, he wrote 'Decem Rationes' ("Ten Reasons"), and compiled a 'Universal Chronology,' and collections of his letters and several essays were published after his death. He was beatified by Leo XIII in 1886. His biography has been written by Richard Simpson (London 1857), and a complete list of his works is to be found in De Backer's 'Bibliothèque de la Compagnie de Jésus.'

CAMPION, Thomas, English poet: b. London, 12 Feb. 1567; d. London, 5 March 1619. His father died when Campion was nine years of age, and his mother soon after. His stepfather, Augustine Steward, sent him to Cambridge. He had intended studying law at Gray's Inn, but did not practise and was not admitted to the bar. Information concerning the rest of his life is vague. In 1606 he appears as a physician in London, where he remained until his death. He wrote a volume of 'Poems' (1595), being Latin elegies and epigrams. He wrote a masque for the occasion of the marriage of Lord Haynes, and three masques for the court of James I. He published (1610-12) four 'Books of Airs,' containing songs written by himself to airs of his own composition; the first book contains 'Day Diu', 'Ditty of Mora,' 'Motte,' 'Conceits of Lovers'; the third and fourth are not distinguished by any separate sub-title. In his songs the verse and the music are most happily wedded. He was very popular in his own day, he soon sank into oblivion. His works are full of freshness and charm. Consult the edition by A. H. Bullen, which excludes 'A New Way'; 'Songs and Masques' (ed. by Bullen, 1903, with an introduction by Janet Dodge); 'Poems' (ed. by Vivian, 1907); 'Complete Works' (ed. by Vivian, Clarendon Press, 1908).

CAMPLI, kâmp-plî, Italy, a town in Naples, in the province of Teramo, and five miles north of the town of Teramo. It has a cathedral, three churches, an abbey, several convents, a hospital and a mont-de-piété. Pop. 7,230.

CAMPO BASSO, kâmpô-bâsô, Niccolo (Conte di), Italian soldier: fl. in the latter half of the 15th century. He had first supported the house of Anjou in the kingdom of Naples, but afterward transferred his services to their opponent, Charles the Bold, Duke of Burgundy. At the siege of Nancy, in 1477, on the approach of a superior force under Ferrand, Duke of Lorraine, to relieve the place, Campo Basso deserted to the enemy immediately before battle. The Burgundians were in consequence defeated, and the Duke himself slain. The treacherous Italian was supposed to be the murderer.

CAMPOFORMIO, Italy, town 66 miles northeast of Venice, famous for the treaty of peace between Austria and France which was signed in its neighborhood, 17 Oct. 1797. Its chief provisions were that Austria should cede the Belgian provinces and Lombardy to France, receiving in compensation the Venetian states.

CAMPO MAJOR, Portugal, city of Alemtejo province, 11 miles northeast of Elvas. Situated at an altitude of nearly 1,000 feet, a meteorological station is maintained here. Wine and woolen goods are manufactured. The town is celebrated in literature and history by Scott's ballad, 'The Bold Dragoon,' depicting an incident of the siege in 1811 during the Peninsular War. Pop. 6,000.

CAMPO SANTO ('holy field'), the name given to a burying-ground in Italy, best known as the appellation of the more remarkable, such as are surrounded with a double and richly adorned. The most famous Campo Santo is that of Pisa, which dates from the 12th century, and has on its walls frescoes of the 14th century of great interest in the history of art. Among more modern Italian cemeteries, that of Genoa is distinguished for its magnificence.

CAMPO SANTO OF THE DISSENT-ERS. See BUNHILL-FIELDS.

CAMPOAMOR Y CAMPOSORIO, kâmpÔ-â-môr e kâmpô-ô-so-rô. Ramon de, Spanish poet: b. Navia, 24 Sept. 1817; d. 11 Feb. 1901. He studied medicine with great enthusiasm and thus got his first love of science which never left him and which continued to influence powerfully all his literary work and, to a certain degree, his political and social writings. But though his love of science remained with him he soon tired of medicine and turned to literature. Realizing that his education was superficial, he laid in a thorough knowledge of the literature and art of his own and foreign lands, he shut himself up in the public library and went through a self-imposed course of reading intended to help him to a literary life. His literary work, which at the beginning was as much journal-
istic as anything else, early brought him into prominence in political circles and he received one political office after another. When Christina fled from Spain in 1840, Campanoamor defended her and ever afterward he continued to show admiration for and devotion to her. Naturally, holding these views, he was a Conservative, views which were somewhat modified in his later days. But to his political views we owe a great deal of his prose work which was looked upon as one of the most powerful influences at work in Spain in the middle of the last century. This political work brought to Campanoamor, among other offices, those of governor of Alicante and Valencia and State Counsellor under Alfonso XII (1874). The political views held by him at this period of his life are pretty fully and forcibly expressed in 'Polémicas con la Democracia,' and other works of a like nature, which present vividly the burning political and social questions of the day. Even his philosophical works, mostly of an eclectic tendency and subjective idealism, are influenced by political ideas and the struggle in which he was engaged.

Already when scarcely out of his teens, Campanoamor began to be recognized as a poet of force and futurity, and the Liceo Artístico, of which he was a very active member, published a volume of his poems in 1840 and followed up with his 'Fabulas' two years later. In the same year a Madrid house published 'Los ayes del alma'; all of which brought him immediate popularity and gave him an entrée into journalism and literary life. He became an editor on El Español, a most valued contributor to El Heraldo, one of the strongest and most feared political writers of the day, and one of the most prolific contributors in Spain to magazines, reviews and newspapers. His work was widely copied by the provincial press, so that his name was soon found among the best known in literary circles and by the general public wherever the Spanish language was spoken. With this publicity his popularity as a writer grew with great rapidity. In 1862 he was elected a member of the Spanish Academy. Gradually he grew tired of political controversy and, in his latter days, he devoted his time and energy to work of a strictly literary nature, in which poetry began to take the foremost place.

Juan Valera, the great Spanish critic, has said of Campanoamor that love and joy are the characteristics of the first half of his life. This is not altogether true, for the sadness, bitterness, mild cynicism and scepticism of his later writings show through frequently in his earlier work. Yet, he is ever the artist and his touch is sure and true. A word painter, he is vivid, passionate, yet ever true to nature. As a poet and thinker, as a molder of new forms of expression and shades of thought, he is in the forefront of Spanish poets of the past century. The various faults attributed to him by his severest critics are but the reflection of the age in which he lived and labored; for he is at once realistic, sceptical and spiritual, all in a mild way that conveys the impression that faith and doubt are constant occupants of his thought. In the mastery of his art we are conscious that he is toying with a constantly intruding paganism. For he is a veritable creature of moods, passing from the highest pinnacle of joy to the lowest depths of despair. As a poet, Campanoamor possesses a style characterized by much variety and lending itself to exactness of reasoning and of form of expression, to facility of character painting and naturalness of dialogue. This combined with his power of story construction, his directness of presentation and his energy and directness of style, rather than his facility of political thought, created for him a place in the field of political controversy.

Campanoamor ranks higher as a poet than as a prose writer or philosopher. Among his best known poetical works are 'Dolores' (1840); 'Los ayes del alma' (1842); 'Fabulas' (1842); 'Ternezas y flores' (1843); 'Colon' (1851); El Drama Nacional'; 'Cuentos amorosos'; 'Pequeños poemas'; 'Nuevos pequeños poemas' (1887); 'Dolores y cantares' (1882); 'Poemas y fabulas'; and 'Humoradas.' His dramas, which were never successful on the stage, include 'El honor'; 'Guerra á la guerra'; 'El palacio de la verdad'; 'Glorias humanas'; 'Cuerdos y locos.' His most important prose works are 'Historia critica de las Cortes reformadoras'; 'Filosofia de las leyes'; 'Las polémicas con la Democracia'; 'El Personalismo'; 'Lo Absoluto'; 'El ideismo'; 'Canovas'; 'La Politica.'

JOHN HUBERT CORNYN,
National University of Mexico.

CAMPOBASSO, Italy, city, capital of Campobasso (formerly Molise) province, on Monteverde in the Apennines, 2,200 feet above sea-level, 170 miles by rail east-southeast of Rome. It is a busy agricultural market centre with long-established manufactures of steel and iron ware, notably cutlery. It has a healthful climate, good educational institutions, a cathedral, and the romantic ruins of a feudal 15th century castle overlooking the city. Pop. 17,000.

CAMPOBELLO, New Brunswick, an island, eight miles long, in Passamaquoddy Bay, Charlotte County, situated outside of the Maine boundary, in lat. 44° 57' N. and long. 66° 55' W. It is noted as a summer resort, where the summer and lead ores exist, the inhabitants are chiefly engaged in the herring, mackerel and cod fisheries. From 1769 Admiral Owen's family retained it as private possession. It was acquired in 1880 by a group of capitalists from Boston and New York. Pop. 1,230.

CAMPODEA, a wingless insect of the order Thysanura. Owing to its very primitive features it has been regarded by Brauer and by Packard as being the form nearest related to the probable ancestor of all insects. It is a little white insect living under stones. The body is long and narrow, each thoracic segment being equal in size, the antennae being long and narrow, while the body ends in two very large, slender, many-jointed appendages. It is very agile in its movements and might be mistaken for a young centipede (Lithobius). Though allied to the bristle-tail (Lepisma) it is still more primitive. The mouth-parts have not degenerated but are partly withdrawn within the head. It has a pair of short vestigial legs on the first abdominal segment. This and other features suggest its origin from some form
CAMPOS, kám'pōs, Arsenio Martínez de, Spanish military officer: b. Segovia, Spain, 14 Dec. 1831; d. 3 Sept. 1900. He was graduated at the Military Staff School in Madrid and appointed a lieutenant in the army in 1858; served on the staff of General O'Donnell and became chief of battalion in the Morocco campaign of 1859; was on duty in Cuba with the rank of colonel in 1869–72. Returning to Spain, he became a leader in the restoration of the monarchy (1875). With General Jovellar, he called Alphonso XII to the throne; was made commander-in-chief of the Catalonia district, and crushed Don Carlos at Peña de Plata in 1876. For these services he was promoted captain-general. In 1877 he was appointed commander-in-chief in Cuba, and brought the revolution to a close chiefly by means of concessions, which, as Minister of War and Premier in 1879, he endeavored unavailingly to carry out. He was Minister of War in 1881 and 1883, and commander of the Army of the North of Spain in 1884–85, president of the Spanish Senate in 1885 and captain-general of New Castile in 1888. In April 1895 he was appointed governor-general and commander-in-chief in Cuba, but in January 1896 was recalled to Spain. He found the insurrection more formidable than he had anticipated, and his failure to pursue a vigorous war policy caused much dissatisfaction in Spain. On his arrival in Madrid he repeated his belief that the trouble in Cuba could only be ended by granting reforms. In 1899 he was, for the third time, president of the Senate. For accounts of his important connection with Cuban affairs, see SPAIN—HISTORY.

CAMPOS, Brazil, city of Rio de Janeiro state, on the Parahyba River, 30 miles from the sea at the head of navigation for small ships, and 116 miles northeast of Rio de Janeiro city. The trading center, since its establishment in 1730, of a fertile alluvial sugarcane growing region, also producing coffee, rice, cotton and tropical fruits, its chief industrial establishments are sugar refineries. Campos is the starting point for several small independent railroad lines and communicates indirectly with Rio de Janeiro by way of Macuca. The city, electrically lighted, has many fine buildings. Pop. of city 22,500; of municipal boundaries 78,000.

CAMPRA, André, French composer: b. Aix, Provence, 4 Dec. 1660; d. Versailles, 29 July 1747. He served as master of the King's chapel, and composed for the Royal Academy of Music. He ranks among the most distinguishers composers of operas, his themes being classical love stories, notably 'Hesione' (1700); 'Iphigenie en Tauride' (1711); 'Triomphe de l'Amour'; 'Les Amours de Mars et de Vénus.'

CAMPU, CAMPUS, or CAMPULUNG, Roman city and summer resort, capital of Muscel department, in the Carpathian Mountains, at the head of a gln of the Tirgului River. It is the terminus of a branch railway from Ploesti, exporting the products of its paper mills, operated by river water power. Besides ancient Roman remains there are also an interesting 13th century monastery and a cathedral. Pop. 13,000.

CAMPUS MARTIUS (known also as Campus, merely) was a large place in the suburbs of ancient Rome, consisting of the level ground between the Quirinal, Capitoline and Pincian hills and the river Tiber. From the earliest times it seems to have been sacred to the god Mars, from which circumstance it received its name. It was originally set apart for military exercises and contests, as also for the meetings of the comitia by tribes and by centuries. In the later period of the republic, and during the empire, it was a suburban pleasure ground for the Romans, and was laid out with gardens, shady walks, baths, etc. After the time of Julius Caesar it became crowded with public buildings and monuments. Consult Platner, 'The Topography and Monuments of Ancient Rome' (pp. 339–92, New York 1911). The district is now called Campo Marzo, in which the greater part of modern Rome lies.

CAMPUS SCCELERATUS, a name given to a spot within the walls of Rome, and close by the Porta Collina, where those of the vestal virgins who had transgressed their vows were entombed alive (Liv. viii, 15), from which circumstance it took its name.

CAMUCCI, kā-moo-chē'ne, Vincenzo, Italian historical painter: b. Rome, 21 Feb. 1771; d. there, 2 Oct. 1844. He followed the academic-classical style, and is generally regarded as the most notable successor of Mengs in Rome. Among his best-known works are 'Death of Caesar' and 'Death of Virginia' (originals in Capodimonte at Naples); a altar-piece representing the incredulity of Thomas (in Saint Peter's, Rome); portrait of Thorwaldsen, painted in 1808; portrait of Pius VII, painted 1814; portraits of the King and Queen of Naples, painted in 1814; 'Christ Blemished by the Children,' painted for Duke Blacas d'Aulps, 1820; portrait of Pius VIII, now in Cesena, 1829; 'Virgin Reading Aloud from His Own Poems,' painted for Prince Alexander of Russia, 1839; and 'Camillus Preserving the Capitol,' painted for the King of Sardinia, 1840.

CAMUS, kā'mūz, Armand Gaston, French revolutionist: b. Paris, 2 April 1740; d. 2 Nov. 1804. A zealous and ascetic Jansenist and a master of ecclesiastical law, he was elected advocate-general of the French clergy, and in 1789 member of the States-General by the people of Paris. He now appeared as the resolute foe of the ancient régime, gained possession of and published the so-called 'Red Book,' with its details of expenditures so disadvantageous to the court and its ministers. While attempting to capture Dumouriez he was himself captured and, after two years in Austria, was exchanged for the daughter of Louis XVI. He was absent in Belgium during the King's trial, but sent his vote for death. He was made member and afterward president of the Council of Five Hundred, but resigned in May 1797 and devoted his time to the direction of the conservator of the national archives, and as such preserved the old documents of the abolished
corporations and institutions, and wrote several legalistic works. CAMWOOD, BARWOOD, or RINGWOOD, a red dye-wood (Baphia nitida) obtained in Brazil and also in Africa of the family Leguminosae. It once was common in the neighborhood of Sierra Leone, and was also found in Tonquin and other parts of Asia. The woody rind is a very fine color, and is principally used in turnery for making knife-handles and similar articles. The dye, mordanted with alum and tartar, obtained from it, is brilliant, but not permanent.

CANA OF GALILEE, town in Palestine, at no great distance from Capernaum (or Capharnaum), remarkable chiefly as having been the scene of our Lord's first miracle. It was there that He turned water into wine (John ii, 1). It was also the city of Nathanael and the place where Jesus, having been appealed to by the nobleman from Capernaum on behalf of his dying son, gave a word effected the cure:

A long-established tradition has identified it with a village bearing the name of Kefr' Kenna, which lies about four miles northeast of Nazareth; but in recent years two other sites have been mentioned by Bible students as possible claimants, namely, Kanet-el-Jehil, about six miles farther north, and Ain Kana, which lies somewhat nearer to Nazareth. It is to be said that Kefr' Kenna is at present a village of about 600 rough and uncivilized inhabitants, but has two churches, one Franciscan, one Greek. At Kanet-el-Jehil there are only ruins. The argument in favor of Ain Kana is purely etymological and is not supported by tradition.

CANAAN, kā'nān, the ancestor of the Canaanites (q.v.). He was the son of Ham and the father of Sidon and Heth (Gen. x, 6ff.) and the brother of Cush, Mizraim and Put. In Rabbinical literature he is the first of the seven sinners who made idols for the heathens (Chronicles of Jerahmeel, p. 167). He was predestined for this and similar sins, as he was born on the Ark, contrary to God's wish that the sexes be separated therein. The curse of Noah (Gen. ix, 18-22) descended on him because of the sin of his father, Ham (Gen. ix, 20-27), which story many biblical scholars believe the have been told at first of Canaan. Probably this conclusion was reached because it was contrary to Jewish sentiment for an innocent man to be punished for the sin of another. The story of the curse was written, according to some, to account for and justify the servile condition of the Canaanites and the Israelitish supremacy.

CANAAN and CANAANITES, geographical and ethnological terms applied to the country and the inhabitants of southern Syria in general. The country extended from the foot of Mount Hermon to the lower end of the Dead Sea, including territory both east and west of the Jordan; that is, Judea, Phoenicia and Philistia proper. Ethnologically the name was applied to all of the heathen peoples (Jebusites, Hittites, Amorites, etc.) whom the Israelites found west of the Jordan. The country is in some instances called Canaan, and in consequence it appears (e.g., Hos. xii, 8: Is. xxiii, 8) in the general sense of merchant. The geographical inference is that the land was originally a small strip of coast, gradually extended by conquest. The etymology has been derived from the dialectic word meaning "low," because of the fact that in Egyptian the word appears with the article prefixed "the canaan;" but this derivation has been contested, and the suggestion has been made that the land took its name from the people, not vice-versa.

The earliest mention of "Canaan" is found in the Amarna tablets where the name is used interchangeably with "Amurrû" for the land subject to the Amorite Aziru (163, 41) (see AMORITE), but mostly as a general nomenclature of Syria. In the Egyptian inscriptions, Canaan (Ka-n’n) is mentioned at the time of Seti I, and within the territory of Phoenicia in the days of Rameses III; and the "land of Canaan" apparently as Philistia in two papyri from the 19th dynasty. Coins from the time of Antiochus IV and his successors bear the legend of "Laodicea, a metropolis in Canaan."

What the original language of the Canaanites was we do not know, but in later times it was understood to mean Hebrew or the closely allied Phoenician dialect.

On the basis of the Egyptian and Assyrian inscriptions the history of Canaan may be divided into three periods: (a) the pre-Israelitish, from about 3800 B.C. down to the definite constitution of Israelitish supremacy; (b) the Israelitish supremacy from about 1100 B.C. — 740 B.C.; (c) decline of this supremacy ending in the absorption of Canaan by Assyria and Babylonia 588 B.C. After the return of the Hebrews from the so-called Babylonian exile, the history of the north and south becomes involved in the various attempts to found a world power by Persia, Macedonia and Rome. The characteristic note in the history is the impossibility of political union among the various peoples, probably due to the split-up nature of the coast lands which they inhabited. Consult the Tel-Al-Amarna Letters (ed. by Winckler with trans. 1896); Sellin's report of the excavation at Tel Tanners; Vincent, 'Canaan' (1902); Benigeri, 'Hebraïsche Archäologie' (1907); Bohl, 'Kanaänäer und Hebräer,' and any of the biblical dictionaries.

CANA-BOTA, a large shark (Hexanchus or Notidanus) which frequents the waters of the Bay of Biscay and the Mediterranean. Specimens have been found in the waters near the West Indies.

CANCCE, kān'kē, (1) in Greek mythology, a daughter of Aeolus and Enarete, who was punished by death because of her unlawful passion for her brother; she is mentioned in Gower's 'Confessio Amantis,' and in Chaucer's 'Man of Law's Tale.' (2) In Chaucer's 'Squire's Tale' the daughter of King Cambuscus, who being the possessor of a magic ring, can understand the love plaint of a female hawk.

CANAUCHUS, Greek sculptor of the 6th century, B.C. He was a native of Sicyon in Achaia. His most celebrated works were two statues of Apollo, one in bronze executed for the temple of Apollo at Phthiitia, and the other for the city of Thebes. Representations of the statue of Miletus have come down to us on the coins of the period.
DOMINION OF CANADA
AND
NEWFOUNDLAND

SCALE
Statute Miles, 250 = 1 Inch.

The Rand McNally & Co.'s New 11 x 16 Map of
Dominion of Canada and Newfoundland.
Copyright by Rand McNally & Co.
CANADA—GEOGRAPHY (1)

CANADA, Dominion of. In the following series of articles will be found a comprehensive treatment of Canada—its history, government, economic development, religious and social activities, etc.

1. Geography 22. Literature
2. Outline History and Political Development 23. Canadian Universities
3. The Era of Early Discovery 24. Religious Conditions
4. Under French Rule 25. Roman Catholic Church in Canada
5. Great Britain’s Fight with France for North America 26. Population; Racial Distribution and Immigration
6. Under British Rule to Confederation 27. Canadian Pacific. 28. Immigration
7. The Maritime Provinces to Confederation 29. Military System
8. Confederation 30. The Acadian Refugees
9. Since Confederation 31. The Quebec Act
10. The Canadian West 32. The Alliance Treaty
11. The Settlement of the Canadian West 33. The Amherst Treaty
12. The Constitution 34. Clergy Reserves
13. Local Government 35. Segregated Tenure
14. Imperial Federation 36. Hudson’s Bay Company
17. Primary Education in Canada 39. Agriculture
18. Secondary Education 40. Forest and Lumber Industry
19. Higher Education 41. The Grain Trade
20. Public Finance 42. Minerals
21. Technical Education in Canada 43. Fisheries
22. Catholic Education 44. Manufactures
23. Labor Movement 45. Commerce, Tariffs and Trade
24. Labor Movement 46. Commerce, Tariffs and Trade
25. The Grander Movement 47. Banking System
27. Labor Movement 49. Currency, Coinage and Banking
28. Labor Movement 50. Legal Tender

1. GEOGRAPHY. I. GENERAL.—Area and Boundaries.—With the exception of Alaska, Greenland, Newfoundland, and the two small islands of Saint Pierre and Miquelon, all the northern half of the North American continent is comprised in the Dominion of Canada. Alaska, the great peninsular projection at the northwest corner of the continent, with a narrow strip of coast depending from it southward, belongs to the United States; Greenland, a huge island at the northeast corner, is Danish; Newfoundland, another island blocking the mouth of the Saint Lawrence estuary on the east coast of British, and Saint Pierre and Miquelon, lying off Newfoundland, are French. To the north of the continent there is a cluster of large islands, divided from the mainland and from one another by comparatively narrow channels. All of these form part of Canada and are included in its area, but as yet they have been only partially explored, and their exact dimensions are not known. The official estimate, as nearly accurate as it can be made at present, gives the total area of Canada, including the great fresh-water lakes wholly within its boundaries, as 3,729,665 square miles. The boundaries separating Canada from its only continental neighbor, the United States, are to a greater extent meridians of longitude or parallels of latitude. Between Canada and Alaska, beginning from the north, the boundary follows Iona from 140° W. from the Arctic Ocean to Foxe Basin, St. Elias. 20 miles of the Pacific, from which point it is an irregular line running about parallel with the coast round the heads of all bays and inlets of the sea at a distance of 20 to 30 miles inland. It reaches tide-water again at the head of Portland Channel, down which it passes, terminating in the Pacific Ocean. All the islands of the coast south of lat. 54° 40’ belong to Canada as far as the southern extremity of Vancouver Island, except that a cluster of small islands between the southern end of Vancouver Island and the mainland, but south of lat. 49°, are included in the territory of the State of Washington. The international boundary begins again in Juan de Fuca Strait. It takes a devious course from Vancouver Island to lat. 48° on the coast of the continent, and then follows the 49th parallel as far east as Lake of the Woods. A water boundary here begins, up Rainy River and its headwater series of lakes, cutting across the height of land to another chain of small lakes and following Pigeon River to its mouth in Lake Superior. From this point the boundary is the chain of Great Lakes and the Saint Lawrence River to its intersection with lat. 45°. The line now follows a more or less arbitrary course along the 45th parallel for some distance, then rising irregularly to the north almost to lat. 47° 30’, then down the upper course of the Saint John River as far as Grand Falls, then due south to the Saint Croix River, which it follows to the Bay of Fundy. The areas in square miles of the individual provinces and territories since the realignment of territory in 1912 are as follows:

<table>
<thead>
<tr>
<th>Province</th>
<th>Land (sq. mi)</th>
<th>Water (sq. mi)</th>
<th>Total (sq. mi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prince Edward Island</td>
<td>2,184</td>
<td></td>
<td>2,184</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>21,058</td>
<td>360</td>
<td>21,418</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>7,091</td>
<td></td>
<td>7,091</td>
</tr>
<tr>
<td>Quebec</td>
<td>690,865</td>
<td>15,969</td>
<td>706,834</td>
</tr>
<tr>
<td>Ontario</td>
<td>1,494,880</td>
<td>41,381</td>
<td>1,536,261</td>
</tr>
<tr>
<td>Manitoba</td>
<td>228,950</td>
<td>19,906</td>
<td>248,856</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>243,872</td>
<td>8,318</td>
<td>252,190</td>
</tr>
<tr>
<td>Alberta</td>
<td>222,925</td>
<td>2,360</td>
<td>225,285</td>
</tr>
<tr>
<td>British Columbia</td>
<td>333,416</td>
<td>2,439</td>
<td>335,855</td>
</tr>
<tr>
<td>Yukon District</td>
<td>306,760</td>
<td></td>
<td>306,760</td>
</tr>
<tr>
<td>Northwest Territories</td>
<td>1,077,926</td>
<td>34,298</td>
<td>1,112,224</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,603,910</td>
<td>125,755</td>
<td><strong>3,729,665</strong></td>
</tr>
</tbody>
</table>

Main Physical Features.—The four principal surface divisions are: (1) The Appalachian region, forming the extreme southeastern corner; (2) the Laurentian plateau or peneplain, with its fringes and outliers of lowlands, comprising the remainder of the eastern half of Canada; (3) the central highland of the mountain region to the west. Each of these divisions represents, on the whole, a different geological formation and has its own peculiar physical features. I. The Appalachian region of Canada is the northern extremity of the system of parallel ranges of mountains pushed up, as it were, from the southeast against the great archean, or Laurentian, area. The ranges all run from southwest to northeast, the Nova Scotian peninsular being without a corresponding extension in the United States. The hills are composed of older rocks, rising out of the carboniferous strata which once overlay the whole district, but of later formation than the Laurentian plateau to the north. They are much weathered and the river valleys have been comparatively well eroded. II. The Laurentian plateau or peneplain which covers about half the entire area of Canada is, geologically speaking, the nucleus of the continent. It presents a shield-shaped surface of archean rocks, broken into the north by Hudson Bay, and extending south to the Saint Lawrence River.
As is implied by calling it a peneplain, it is a much-weathered surface, nowhere rising to any great height, but maintaining a fair elevation above the sea. The greatest elevations are along the west shore of Hudson Bay. It is a country of hard, crystalline rocks, everywhere scored by glacier action, and sparsely covered with soil in which pine, spruce and other northern trees grow more or less densely, giving place in the higher latitudes to mosses and lichens. As a result of the melting of the glaciers which covered this region in the last geological period, the whole surface is a net-work of small lakes and streams. The latter have been unable to wear down the hard rocks to any appreciable extent, and consequently present all diversities of level with many falls and rapids in their course.

The western limit of the plateau is marked by a series of great lakes, from Great Bear Lake in the north to Lake Huron near the southern extremity. Adjoining the Laurentian plateau on the north and south there is, as it were, a fringe of later geological formations. Most of the large islands north of Hudson Bay as of the mainland west of it appear to consist chiefly of older sedimentary rocks in undisturbed arrangement, but the partial glaciation of these islands has hitherto prevented any detailed geological or other survey. South of the Laurentian plateau again occurs a lowland area, consisting of the valley of the Saint Lawrence River and the peninsula enclosed by the three lower members of the chain of great lakes. It is small in extent, but of great importance in the history of Canada, because the first European settlements were established herein within its limits and it still contains the greater part of the population. III. The central plain is of vast extent, reaching from the Arctic Ocean to the Gulf of Mexico, so that only its northern portion lies in Canada. It is the elevated bed of a carboniferous sea, and from a breadth of 800 miles at the international boundary it is gradually narrowed toward the north by the westly trend of the Laurentian plateau and broken into by subsidiary ranges of the Rocky Mountains. Still farther north, where it terminates at the Arctic Ocean, it again expands to a width of about 300 miles. There are three steppes of different elevations in this great plain, rising from east to west, and the general slope is from the southwest downward to the east and north. IV. The fourth great region, the mountain belt, is also of vast extent, being traceable in greater or lesser width from the Tierra del Fuego, at the extremity of South America, to the farthest western point of Alaska. In Canada this mountain, or Cordilleran, region attains a breadth of about 400 miles, the greatest average elevation being in the southern portion. The Rocky Mountains, the most easterly range, are paralleled by a succession of smaller ranges, the most westerly of which is represented by the mountains of Vancouver Island and the Queen Charlotte Islands. The geological age of this division is more ancient than that of the central plain, and the changes in the crust have been violent and abrupt. From the base of the Rocky Mountains, the youngest of the ranges of the Cordilleran System.

**Altitudes and Slopes.**—The greatest altitudes in Canada are in the Saint Elias range of mountains, a small group near the Alaska frontier, not far from the Pacific Ocean. Mount Logan is the highest of these and is estimated at 19,539 feet. The next greatest elevations are in the ranges along the west shore of Hudson Bay and the parallel ranges immediately to the west, where several peaks exceed 12,000 feet, although only one, Mount Robson, possibly reaches 13,500. The height of the ranges west of the Rocky Mountains becomes less and less as they approach the Pacific Ocean, and in Vancouver Island the highest peak is under 7,500 feet. The next greatest altitudes are in the extreme east of the Laurentian plateau, in northern Labrador, where a range of hills occurs, bordering on the Atlantic Ocean, which attains a height of 6,000 feet. Elsewhere in Labrador the Laurentian plateau seldom exceeds 1,800 feet, and on the west side of Hudson Bay the Laurentian area is lower and gradually merges in the central plain. The Appalachian region contains ranges of low hills nowhere exceeding 4,000 feet, which is only reached in the extremity of the Gaspé peninsula. The central plain rises in three steppes from the valley of the Red River, about 800 feet, downward to the foothills of the Rocky Mountains, where it has an extreme elevation of 4,200 feet and an average elevation of about 3,000 feet. The Saint Lawrence lowlands are nowhere much higher than 1,000 feet, or about 500 feet above Lakes Huron and Erie, and sink gradually with the Saint Lawrence River to its mouth.

**Water Ways.**—The distribution of land and water in Canada has rendered the interior continental area peculiarly accessible. The Gulf of St. Lawrence is a large arm of the sea affording ready means of entrance from the east; and leads to the broad estuary of the Saint Lawrence River. Exploration naturally followed this highway. No mountain barriers occur to obstruct or divert approach by the rivers Saint Lawrence and Ottawa to the chain of great lakes that extend to the very centre of the continent. The length of continuous waterway from the Atlantic Ocean at the Straits of Belle-Isle to the head of Lake Superior is 2,388 miles. Similarly Hudson Bay, a huge landlocked sea, communicating with the Atlantic by Hudson Strait, reaches even farther west than Lake Superior to the south of it. It was by way of Hudson Strait and Hudson Bay that the English explorers arrived at the great interior plains, just as the French voyageurs penetrated to the same region by the Saint Lawrence and the Great Lakes. The first systematic attempt at settlement of what is now the province of Manitoba, where the prairies begin, was by way of Hudson Bay, when Lord Selkirk established his colony of Highlanders at the junction of the Assiniboine and Red rivers in the first years of the 19th century. Two great waterways are found in the central area leading up from Hudson Bay and from the Arctic Ocean to the very base of the Rocky Mountains. These are the Nelson-Saskatchewan and the Mackenzie-Athabasca river systems, both of which were well-traveled highways for voyageurs and fur-traders long the unexplored territories. When the Red River Valley had reached the Ontario peninsula. In the Appalachian region there is one river of considerable length, the Saint John, which flows across the ranges into the Bay of Fundy. The mountain region possesses
its great rivers in the Columbia, the Fraser and the Yukon, all of which originate at the western base of the Rocky Mountains and empty into the Pacific Ocean, are obstructed by numerous and fierce rapids and have not afforded the same facilities for navigation as the rivers of the central and eastern areas. In recent years, however, the Yukon has become a great highway leading to the gold-fields of Alaska and the Klondike is no longer an isolated region.

Climate and Vegetable Productions.—

The climate of Canada has the usual characteristics of a continental climate in its extremes of heat and cold, but the presence of vast bodies of water, Hudson Bay and the Great Lakes, in the very heart of the continent, has introduced modifications of temperature which differentiate Canada from other great continental areas. Thus, the Laurentian lowlands enjoy a temperate and fairly equable climate, and are wholly free from the advent of the whirling winds. The central prairies, moreover, though subject to extremes of temperature, obtain sufficient moisture for growing wheat, except in the extreme southwestern portion. Here an area of aridity has been established, and this semi-arid region which has so great an extension south of the international boundary. The grassy plains are liable to frosts in the early and late summer, perhaps in consequence of the general slope down toward the Arctic Ocean, with no intervening chain of mountains. It has been found, however, that where the ground has been broken up for agriculture over considerable areas these unseasonable frosts do not occur, and at the same time there is a marked tendency to an increase in the average precipitation. The western portion of the central plain enjoys milder winters than the eastern, owing to the phenomenon known as Chinook winds, which cross the mountain ranges from the west and descend upon the plain as warm, dry winds, evaporating moisture and raising the temperature. This contrast is even more marked in the north than in the south of the area. In the mountain region great variations are presented both in temperature and humidity. The southern lowlands, extending up to the crest of the first range of mountains upon it have a very mild and very moist climate. The western slopes of the ranges farther inland also receive abundant rainfall and are clothed with dense forests. But the interior plateau receives very little moisture, and its altitude and dryness combine to give it extremes of temperature in summer and winter. The northern part of the Laurentian plateau on either side of Hudson Bay is, for climatic reasons, almost uninhabitable. This is a fact that clings to the southern portion of the same plateau give place to grasses, sedges and mosses, and ice remains in the rivers and lakes throughout the brief summer. This tundra region, some of which has not yet been explored, covers an area of perhaps 200,000 square miles, equal to one-fourth of Hudson Bay, and presents under the name of "the Barren Grounds," and half as much east of Hudson Bay, in the Labrador peninsula. The climate of the Appalachian region is influenced by its proximity to the Atlantic Ocean, and presents a milder type of climate. There are three well-defined belts of vegetation in eastern and central Canada. The southern part of the central plain is a region of treeless, grassy prairies, once the home of countless buffalo. In the extreme north, on either side of Hudson Bay are the Arctic tundras, the Barren Grounds, where only moses and other hardy plants grow, and where the only feeding for enormous herds of caribou and a smaller number of musk-oxen. Between these two treeless regions is the great forest belt which covers the whole of eastern Canada and extends across the central plain to the mountains, verging considerably south in consequence of the decreasing severity of the winters, until in the valley of the Mackenzie River it reaches beyond the Arctic circle. In the northern latitudes the forest is composed chiefly of pine, spruce, tamarack and aspen poplar, but in its southern extension, and especially in the Saint Lawrence lowlands and the Appalachian region, deciduous trees, such as the maple, beech and ash, are mingled with the conifers and even replace them in the river valleys. Before the advent of the whites the natives cut down the trees and farther north, and forest is giving place to farms wherever the soil is suitable. The prairie region is being rapidly converted to agricultural uses, even the semi-arid corner being capable of cultivation by the aid of irrigation. The mountain region, throughout almost its entire extent, is heavily wooded near the coast and on the western slopes of the inland range. The enormous height and girth to which trees of some species, such as the Douglas fir and western red cedar, may attain are well known. The river valleys and alluvial flats of the southern portion are suitable for agriculture, but the interior plateau does not receive enough moisture and is given over to ranching.

II. THE PROVINCES.—[For the sake of convenience and completeness, the physical features and topography of the provinces comprising the Dominion are here briefly treated. The articles in this work on the individual provinces should be consulted for further information.]

Nova Scotia.—Third in area to the United States, Nova Scotia, the most southerly member of the Appalachian region in Canada, consists of a peninsula about 250 miles long and 100 at its greatest breadth, and its continuation, the island of Cape Breton, which is separated from Nova Scotia proper by a narrow strait, the Gut of Canso. More or less parallel to the length of the peninsula run ranges of low hills, which near the Atlantic become mere ridges of rock. The country on this, the southern side of the province, is wild and seacoast, and dotted with small lakes. Agriculture is confined to the alluvial land along the river valleys, and the villages and towns for the most part are situated on the coast at the heads of the numerous bays which here indent it. The north shore of the peninsula is of a totally different aspect. The extended ridge of trap which forms the southern shore of the Bay of Fundy is broken into in a few places only, and long narrow bays are thus formed, into which the tide rushes with gushing force. The agricultural district of the province is behind this protecting wall of trap, and the hills beyond are covered with fertile soil and clothed to their tops with dense hardwood forests. The marshes
formed by the enormous tides of Minas Basin and Chignecto Bay, the two heads of the Bay of Fundy, have been reclaimed and diked, and form the most fertile pasture country. The orchards of the sheltered valleys on this side of the peninsula are celebrated. The chief region of mining and industrial development is the northeast portion, facing Northumberland Strait and the Gulf of Saint Lawrence. Here coal and iron are extensively worked; gypsum also occurs in large quantities and is exported principally from the district around Minas Basin. Gold, on the other hand, is found in the wild rocky region along the southern or Atlantic coast, and is mined on this side from one end of the peninsula to the other. The fisheries of Nova Scotia have always been an important industry, carried on from every harbor of the province. Cape Breton Island, of irregular shape, about 100 miles long by 80 broad, forms part of the province of Nova Scotia. An arm of the sea, entering from the northeast, almost divides the island in two; actual division is accomplished by a canal across the narrow neck of land. A great part of the island to the north is a high table-land, and the valley formed by Port au Bras d'Or channel is the most picturesque district in the province. At the east side occur the coal and iron ore deposits which are making Sydney, its chief town, one of the industrial centres of Canada.

New Brunswick.—The second in importance of the maritime provinces is New Brunswick, occupying the centre of the Appalachian region of Canada. It forms an irregular square of about 200 miles in extreme length and breadth, bounded on the north by the Bay of Chaleur and the province of Quebec, on the east by the Gulf of Saint Lawrence and Northumberland Strait, on the south by Nova Scotia (at the isthmus) and the Bay of Fundy, and on the west by the State of Maine and the province of Quebec. Two lines of hills traverse the province; one follows the coast-line of the Bay of Fundy, the other, starting from the same southwestern angle, runs diagonally across the province to the northeast. Between the two lines is a broad, rolling table-land, sloping down to the east coast, and beyond the diagonal range of hills the northwest region of the province is a rolling country, fertile and well suited for agriculture, but at present covered with forests. New Brunswick is a country of fine rivers, which have cut broad valleys through the soft rocks of the interior and afford access from the sea-coast to the innermost recesses of the province. The Saint John River flows south from the extreme northwest angle, entering the Bay of Fundy not much more than 30 miles from the international boundary. The Saint Croix, forming the boundary, also falls into the Bay of Fundy. The Restigouche, flowing into the Bay of Chaleur, the Miramichi into Miramichi Bay in the Gulf of Saint Lawrence, and the Richibucto, into Northumberland Strait, are the other large rivers. A dense forest, chiefly spruce, still covers most of the province, and lumbering is the principal industry. The fisheries are second in importance. Agriculture follows the river valleys mainly, but the marsh lands at the head of the Bay of Fundy have been converted into rich pastures, and new land in the interior is continually being brought under cultivation. In time, no doubt, the whole of the level area in the centre of the province will be devoted to agriculture, when the forest wealth has been exhausted in that region. The mineral resources of New Brunswick have not yet been developed to any extent.

Prince Edward Island.—Prince Edward Island, the smallest province of the Dominion, is an island in the Gulf of Saint Lawrence, 145 miles long, with an extreme breadth of about 30 miles, separated from New Brunswick and Nova Scotia by Northumberland Strait, which varies from 9 to 30 miles in width. The curving coast on the north side of the island is broken by a deep bay with a narrow entrance, and terminates in long, narrow points. The south coast is very irregular, presenting a succession of bays and inlets. The island has a uniform, gently undulating surface, everywhere fertile, and for the most part cleared of woods and brought under cultivation.

Quebec.—The oldest province, Quebec, formerly a French colony, is still largely inhabited by French-speaking people, although in the extreme south a group of counties, commonly known as the Eastern Townships, were settled almost exclusively by English-speaking Canadians. The province of Quebec is the largest in Canada. It now embraces the whole of the Labrador Peninsula except the strip of eastern coast which belongs to Newfoundland. Its western boundary is Hudson Bay, James Bay and a north and south line from near the southern extremity of James Bay to the head of Lake Timiskaming, an expansion of the upper Ottawa River. The southern boundary is irregular, consisting of the Ottawa River nearly to its mouth, then the 45th parallel of latitude, and the rest of the international boundary eastward as far as New Brunswick, and finally the Restigouche River and the Bay of Chaleur separating it from that province. The island of Anticosti and the Magdalen group in the Gulf of Saint Lawrence belong to Quebec. The whole of the valley of the Saint Lawrence River, from a short distance above Montreal, lies within its boundaries and constitutes the Eastern townships, the chief agricultural district. The principal affluents of the Saint Lawrence are also cultivated, and two new agricultural districts, that watered by the upper Ottawa and the country about Lake Saint John, out of which flows the Saguenay River, are also a great influx of settlers. Except for the northern portion of the Labrador peninsula and the area in the extreme northwest of the province, which drains into James Bay, all the rivers empty into the St. Lawrence River or Gulf. From the north come the Ottawa, the Saint Maurice and the Saguenay, and many others of less note farther east, while from the south the only ones of importance are the Richelieu, flowing from Lake Champlain, and the Saint Charles, emptying nearly opposite the city of Quebec. The general slope of the country is thus apparent. The southern edge of the Laurentian plateau, which runs not far from the Ottawa and Saint Lawrence rivers, comes quite down to the eastern coast. South of the Saint Lawrence River the fertile lowlands are bounded by the ranges of the Appalachian system, which approach ever nearer to the river until, in the Gaspé peninsula, they also reach the water's edge. Next to agri-
culture the chief industry of the province is lumbering. The immense extent of the forests on the Laurentian plateau provides a source of supply that is virtually inexhaustible, and the recent development of the manufacture of pulpwood has given new value to the smaller and softer trees such as the spruce. The mineral wealth of Quebec is at present undeveloped. Recent geological investigations have proved the existence of copper, platinum and antimony in the southern part of the province. Most of the best quality is found in the southeastern part and virtually constitutes the world's sole supply of the mineral. Mica is also mined.

Ontario.—The province adjoining Quebec on the west, Ontario, is the most populous and wealthy of Canada. It extends from the province of Quebec to Lake of the Woods. It is bounded by the province of Quebec from its southeastern extremity on the Saint Lawrence River to James Bay in the north. Its northeastern boundary is that between Hudson Bay. On the west a wholly artificial boundary line separates it from the province of Manitoba, consisting of the boundary of the old province of Manitoba running due north from the Lake of the Woods, and then a line running northeast from the northwestern corner of the old Manitoba to Hudson Bay where the 89th meridian of west longitude intersects the shore of the Bay. The southern boundary is the international boundary formed by the chain of Great Lakes and the Saint Lawrence River. The whole of the province is thus to the north of the great waterway, but as both the Great Lakes and the Saint Lawrence River in its upper course lie at the very southern limit of the area which they drain, Ontario contains all the tributary rivers of the Saint Lawrence system as far down as the Ottawa River. These, however, are not as numerous as might be expected, for the height of land between the Hudson Bay and Lake Superior slopes runs very near to the lake. Almost all the northern part of the province, therefore, drains into James Bay and Hudson Bay by many rivers of fair size, of which the chief are the Severn, Albany and Moose rivers and their tributaries. Lake Nipigon, which flows south exceptionably into Lake Superior. In the extreme west a corner of the province belongs to the Lake Winnipe area. There are no ranges of mountains in Ontario. The Laurentian plateau includes the northern half of the province, while the rest is part of the Saint Lawrence lowlands. The lowlands, and especially their western extremity, the peninsula between Lakes Huron, Erie and Ontario, are the chief agricultural district, provided with an excellent climate and soil, and its southern portion is the principal fruit-growing district in Canada, the chief products being peaches, grapes, strawberries and apples. Hops, tobacco and flax are also cultivated successfully in this part of Ontario. The northern part of the province beyond Lakes Huron and Superior has recently begun to be opened up, and its agricultural possibilities are being developed with great rapidity. Lumbering has always been the chief industry and the timber limits producing pine have begun to show signs of exhaustion. The increasing demand for wood-pulp has however given new value to the great northern belt of forest, which is mainly spruce. Ottawa is the chief centre of the manufacture of lumber; its situation on the Ottawa, the great log-carrier of two provinces, and the magnificent water-power of the Chaudière Falls, utilized for operating the sawmills, give it advantages over all competitors. The mineral resources of Ontario have begun to be turned to account. In the western part of the Ontario peninsula petroleum wells have long been worked but production is now diminished. The comparatively rare metal, corundum, occurs in southern Ontario. The province ranks third among the silver-producing countries of the world, owing to the recent discoveries in the Cobalt district. Copper is mined in increasing quantities in the Sudbury district, which is also rich in nickel. In production of nickel Ontario now ranks easily first among countries. Iron is found in many different localities but the ore is principally mined in the Algoma district. The water-power of the rapids in the Saint Mary River connecting lakes Superior and Huron has been utilized, and great iron and steel manufactures have been established at the town of Sault Ste. Marie.

Manitoba.—The next province westward is Manitoba. It extends from the international boundary on the south to Hudson Bay and the 60th parallel of latitude on the north. It is bounded on the east by Ontario and on the west by a line running north and south, coinciding with long. 102° in its northern portion as far as lat. 56°, but from there south trending slightly eastward until it intersects the international boundary in long. 101° 20'. The southern part of the province is one of the chief wheat-growing districts of Canada. It consists of a perfectly level plain, the alluvial bed of a former lake, through which winds the Red River. This first prairie steppe is bounded on the east by the Laurentian plateau which covers all the eastern part of Manitoba beyond Lake Winnipe. Westward, an escarpment, nowhere rising higher than 500 feet above the level of the first steppe, runs in a northwesterly direction and marks the beginning of the second prairie steppe, which presents a more undulating surface. The area covered by this steppe is considerable. Lake Winnipeg, a very large lake, is within the boundaries of Manitoba, as are also Lake Manitoba and Lake Winnipegosis, with others of smaller size. The chief river of the southern part of the province is the Red River which enters Manitoba from the south and empties into Lake Winnipeg. At Winnipeg the Red River is joined from the west by the Assiniboine, which with its affluent waters all the southwestern part of the province. The northern portion of the province, added in 1912, contains the lower course of the Churchill River and the whole of the Nelson River which flows out of Lake Winnipeg. These are the two largest rivers of the province. The Saskatchewan also, which flows into Lake Winnipe, and thus may be considered as the upper course of the Nelson River, passes through Manitoba in the latter part of its lower course. The predominating interest of the province is agricultural. The largest territory recently added to the area is forested to a considerable extent and may prove to contain valuable minerals. But at present both
lumbering and mineral industries in the province are in their infancy.

Saskatchewan.—The province of Saskatchewan, established by Act of Parliament in 1905, is bounded on the south by the international boundary and on the north by the 60th parallel of latitude, and extends from the Manitoba boundary westward as far as the 110th meridian. It is thus a huge rectangle about equally divided between prairie and wooded country, the limit of each being nearer than the latitude would indicate, and wheat can be grown successfully in the valley of the Peace River near the northern boundary of the province. Besides agricultural possibilities, there are mineral resources of great value, as yet only partially developed. Coal is found throughout a large area, and in various formation, from anthracite to lignite. Bitumen (in the "tar sands" of northern Alberta), oil and natural gas are also important assets.

British Columbia.—British Columbia occupies the whole of the mountain region from the international boundary to lat. 60°. It also cuts off a portion of the central plain, where the eastern boundary of the province leaves the Rocky Mountains and runs north along long. 120°. Vancouver Island and the other islands off the mainland are included in the boundaries of the province. West of the broad chain of the Rocky Mountains, which form the eastern boundary, three other ranges run approximately north and northwest, the northern part of the province, being extinguished northward by the more recent upheaval of the Rockies, whose axis inclines to north-west. These smaller and lower ranges are, in order from east to west, the Purcell, the Selkirk and the Columbia systems. Near and parallel to the Pacific coast another broad mountain system, the Coast Range, extends northward into Yukon Territory and Alaska, where it reaches its greatest elevation. Between the Coast and Columbia ranges there is the interior plateau, about 100 miles in breadth and from 2,000 to 3,000 feet in elevation. To the north it is cut off by transverse ranges of mountains. Vancouver Island and the Queen Charlotte islands are the unsubmerged remains of a subsidiary mountain range in the Coast Range. The rivers and lakes of British Columbia occur in deep valleys between the ranges. The Columbia River and its chief affluent, the Kootenay, take a remarkable course through the valleys between the ranges, running north and south in great loops. The lake-like expansions of both rivers form the chief navigable inland waters of British Columbia. The Fraser River which rises in the Rocky Mountains flows at first north, but soon turns westward round the head of the Cariboo Mountains, and finally runs almost due south cutting a deep channel in the interior plateau. It breaks through the Coast Range and reaches the sea not far from the international boundary. Its chief affluent is the Thompson. Both are very turbulent streams and form an additional obstacle rather than an assistance to inland communication. The northern half of the province is still very imperfectly explored. In a central elevated plateau many rivers take their rise in extensive lakes, such as lakes in the Fraser, others, such as the Liard, east into the Mackenzie basin, others again like the Skeena and Stikine westward into the Pacific Ocean. What British Columbia lacks in a system of navigable inland waterways is more than made up by its densely-forested coast line, where many magnificent harbors for sea-going vessels of any draught are available, from Port
1 Mt. Assiniboine, the Matterhorn of the Canadian Rockies

2 Mt. Robson, the Monarch of the Canadian Rockies
Simpson and Prince Rupert at the north to Burrard Inlet at the south extremity. The coast of Vancouver Island is also well supplied with harbors. British Columbia, although possessing less territory, is not without its agricultural industries. The interior plateau forms a good ranching country, and in the sheltered valleys, where irrigation can be introduced, fruit farms are very successful. Lumbering is one of the great industries of the province, and timber is cut in the northern districts and freighting roads and even of prospecting. The most important mining industry, however, is coal mining. Vast deposits have been explored and are being worked in various parts of the province, and coal is now being exported to Nanaimo and Comox and in the Rocky Mountains at Crow's Nest Pass. Another great industry of British Columbia is the salmon fishery, which is carried on chiefly at the mouth and in the lower reaches of the Fraser River. Canneries are also established at the mouths of the Naas, Skeena and other rivers.

Yukon.—The Territory of Yukon, under the government of a governor and an executive council, in part elective, lies north of British Columbia and is bounded on the west by Alaska. It has also a northern coast-line on the Arctic Ocean, but a comparatively short one, its eastern boundary being an irregular line sloping from southeast to northwest, for the most part following the easternmost range of the Rockies. The Yukon river, the outlet of the Mackenzie river basin, for the mountain boundary is low and the upper waters of many streams tributary to the Liard River, which flows into the Mackenzie River, take their rise in the eastern part of the Territory and flow south. In the north portion also the Peel River flying parallel to the Mackenzie, is contained within the boundaries of the Territory for most of its course, but bursts through the mountain barrier near its mouth and empties into the Mackenzie where the delta of the latter begins. The great part of Territory, however, is watered by the Yukon and its tributaries, the Teslin, Lewes, Pelly, Stewart and Klondike rivers, all flowing from southeast or east, and in the northern portion the Porcupine, which begins by flowing northeast as if to join the Mackenzie, but turns sharply and flows due west until it crosses the boundary into Alaska. The mountain system of the Territory is the series of parallel ranges of the Rockies, decreasing in elevation as they run farther north and turning eastward into the Alaskan peninsula.

The Northwest Territories.—The remainder of Canada, north of the provinces and east of the Yukon Territory, including the islands in the Arctic Ocean, is broadly described as the Northwest Territories, the former provisional districts of Mackenzie, Kee-watin and Franklin having been discontinued. This vast country is under the direct control of the Dominion government. It is very sparsely populated by Indians and Eskimos, together with a few white trappers. It is employed by the Hudson's Bay Company, and missionaries. The valley of the Mackenzie River in the west is fertile and covered with trees almost to the very mouth of the river in the Arctic Ocean. The climate in that region is not so severe as to be harmful to activities which would seem to imply: the summers, though short, are hot and the summer days long, and vegetables and some cereals have been raised by Hudson's Bay Company's agents at most of their posts in the district. Coal moreover occurs and also pitch, petroleum and natural gas. The fur trade, which is still a considerable industry, is carried on over the whole area covered by the sub-Arctic forest, and much of this vast northern territory will remain the home of many species of fur-bearing animals as long as the forest remains to shelter them. But the northern portions of the country on each side of Hudson Bay must remain a hunting country only. The Arctic archipelago has at present only a sentimental value, and the seal fishery is important and there are undeveloped salmon and other fisheries along the coasts of potential wealth. The series of daring British explorers who, in their search for a northwest passage, discovered the various islands and claimed them for British territory, are commemorated in the names given to the islands themselves and to the principal bays, straits and headlands. For ordinary purposes and for men of the white race they are utterly uninhabitable.


Editorial Staff, Review of Historical Publications Relating to Canada.

2. OUTLINE HISTORY AND POLITICAL DEVELOPMENT (1534 to 1918). When the Dominion of Canada came into existence in 1867 the word 'Canada' received a wholly new significance. Its origin is
doubtful but it was applied loosely in the early time to the regions occupied by France on the Saint Lawrence, called by the French themselves New France. When in 1673 France surrendered her New World territory to England the term "Canada" was commonly used for the new British dominions. In 1774 these dominions, including part of the Canadian Northwest and what is now the northern tier of western American States, were officially called the "Province of Quebec." Canada does not appear technically until 1791, when the name was used in a constitution given to Upper and Lower Canada, practically the Quebec and Ontario of the present time. Later these provinces were known as Canada East and Canada West. Not until 1867 did Nova Scotia and New Brunswick become a part of Canada. In considering the history of Canada as we now understand the word, it is important to remember that it includes a settlement of the French in the provinces of Nova Scotia, New Brunswick, Lower Canada, Upper Canada, etc., until 1867.

In the succeeding articles the epochs in Canadian development are treated in detail. It is sufficient here to outline the chief phases of Canadian history. The French were the first to recognize the resources and the value of Canada. The French had been the first to come to Canada, in the 16th century, and they had founded La Salle's colony. The French missionaries were the first to enter Canada, in the 17th century, and they had founded Montreal in 1642, but it was long after the first colony was founded.

The second epoch is that of French colonization and exploration until the final struggle with Britain for the country. When the first pioneer efforts were over France undertook the serious work of colonization, with Quebec as her centre of influence. Her aim was to transplant French social life to North America. Huge grants of land were given to seigneurs who were to play the role of lords in Canada, with vassals looking to them for land and paying rent for the land which they occupied. The system was ungenial to the new world, but it survived during the whole period of French supremacy and is a picturesque and interesting phase of French colonization. See article SEIGNIORIAL TENURE.

The first permanent settlement apart from trading posts occupied only in the summer was at Port Royal, now Annapolis, in Nova Scotia. Here the French planned really to till the soil and develop the country. From the first the colony had a terrible struggle for life. In 1613 the English from Virginia destroyed it, and, after it was restored to France in 1632, the adjacent American colonies were always planning to drive out the French. After a chequered history they at last succeeded in 1710, during the reign of Anne, in taking final possession of the fort, and it became Annapolis. The quiet village of the present day was thus the object of strife between two nations for well nigh 100 years.

Samuel de Champlain was one of the pioneers at Port Royal, but in 1608 he turned to the Saint Lawrence and made the beginnings of Quebec, long the centre of political and commercial life in Canada. By instinct Champlain was an explorer. Like others of that and a later time he hoped that the Saint Lawrence might be a water route to China. To Lake Huron and Lake Ontario Champlain penetrated, but the obstacles were enormous. The Iroquois Indians were hostile to the French from the first, and it is hardly strange that with their menace added to the natural difficulties Champlain could do but little of lift the veil from the North American interior.

Nor was he left free from European rivals. The English followed the French to the Saint Lawrence. Quebec they attacked and captured in 1629, and over it the English flag floated for three years. When in 1632 France recovered the place the fortunes of Canada were committed to a great commercial company. This company was called the Company of New France. Champlain was to be lord of the land and to have in his hands the work both of trade and of settlement. In France it had the powerful support of Cardinal Richelieu, but when at Quebec in 1635 Champlain died, New France lost its ablest leader, and the company lost interest. In the end it failed. Both in India and in America in the 17th century the French commercial companies had no success while their English and Dutch rivals succeeded.

After 1635 Canada was the scene of varied activity. It was an age of religious zeal in Europe, and the Jesuit and other missionaries planned to convert and control the savage native tribes of the country. In what is now northern New York, in Ontario, and in Quebec the missionaries did heroic work. Since the French missionaries were the friends of the Huron tribe, the relentless Iroquois, bent on destroying the Hurons, pursued too, the French. By 1649 the Huron settlements and the French missions were alike destroyed, and the French were driven back for a time to their base at Quebec. They had founded Montreal in 1642, but it was long only a fortified outpost to check the Iroquois.

But missions represent only one, if the dominant, phase of French interest. The great interior Exercises all the fascination of the unknown upon the chivalrous minds of the French explorers. Radisson, La Salle, Marquette, Joliet are only the best known of the leaders who penetrated to the interior before 1700. On Lake Huron, Lake Michigan, Lake Superior, on the Mississippi, even in the far west of Canada and the United States the survival of French names to this day bears witness to the activity of these explorers. It was a French Canadian, La Vérendrye, who first advanced so far across the prairie as to justify a belief, still held by many, that he came in sight of the Rocky Mountains. But this was not until 1743, and it now appears likely that he did not advance beyond the Black Hills in South Dakota.

Between missions and discovery the slow and laborious work of colonization was in danger of being forgotten, but there grew up gradually on both sides of the Saint Lawrence and near the mouths of its tributaries, colonies of French farmers. The river was their highway. For protection from the Indians they lived as close together as possible and so they divided the land
into long narrow strips with the houses stretching in a line on the river front. To the present day it is the most conspicuous feature of the French Canadian farms. Colonization was slow work. Adventurous Frenchmen preferred the wild life of the forest, and it was so difficult to attract settlers that in 1700 there were hardly more than 6,000 Europeans in the whole of New France. They enjoyed no semblance of political liberty. Between an aggressive church and a ignorant people, the French province of New France was a mere vassal state. The subjection of the French habitation is in striking contrast with the liberty of New England. Toward the end of the 17th century New France was committed to a very able Governor, Frontenac (q.v.). He had a definite program. He would curb the Church, which aimed to exclude settlement from the interior so that the missionaries might be alone with and thus continue to control the Indian tribes; he would hold back the English, build a chain of forts from the Saint Lawrence by the Great Lakes and the Ohio to the mouth of the Mississippi to shut them out from the West, and finally drive them into the sea. It was a great plan, but it required resources beyond anything that France could command. In Europe she was fighting William III of England (q.v.) with all her people and needed all the strength she could muster. So Frontenac died in 1698 with his plans unrealized, but he had done a definite work. The mission stage was ended in New France. Entrenched on the Saint Lawrence and soon on the Mississippi, France was ready to engage in the supreme struggle to make the interior French and to build up a great transatlantic empire for the glory of the French nation.

The next epoch in Canada’s history covers the prolonged struggle resulting in the British conquest. Probably impossible of realization in any case, the plan of a French empire in America was ended by Louis XIV’s misfortunes in Europe. With a great alliance against him, the British, obliging to make the Peace of Utrecht (q.v.) in 1713. In this he surrendered his claims to Hudson Bay, to Newfoundland and to Nova Scotia. This was the beginning of the end. Though in Cape Breton, France built a great fortress, Louisbourg, so as to command the Saint Lawrence (q.v.), her allies and needed all the strength against her were too great. Walpole managed to keep Great Britain at peace until 1744, but when war then broke out France and England engaged in a final struggle for which reason. The Treaty of Aix-la-Chapelle (q.v.), in 1748, did not really bring peace. Both sides were preparing steadily for renewed conflict. On the Ohio, on the Atlantic Coast, on the Great Lakes, on the Saint Lawrence, a deadly conflict went on after 1755, and when on a September day in 1759 Wolfe (q.v.) defeated Montcalm (q.v.) before Quebec, the issue was at last decided. By the Treaty of Paris (q.v.) in 1763, France surrendered her dominion of New France to Great Britain.

The 4th epoch in Canadian history covers British rule from 1763 to the Confederation of the Provinces in 1867. After the conquest in 1763, Canada was for a time governed by the British without creating a special constitution for the country, and not until 1774 did the Quebec Act (q.v.) provide for a permanent system. The Quebec Act played a great part in both American and Canadian history. It set up a despotic system of government, and it aimed to bring the whole western country under this despotic régime at Quebec. While introducing British criminal law in the country, it re-established the French civil law. The seigneurs retained their feudal rights, the Church was given legal power to collect the tithe.

In the English colonies the Quebec Act caused discontent. They did not desire despotism as a neighbor; they did not wish to be checked in the West, they disliked the legal establishment of Roman Catholicism, and when the colonies revolted the Quebec Act was one of their grievances. They resolved to attempt the overthrow of British rule in Canada and allied, as they hoped, with the conquered French rising against their new masters they planned to make the revolt continental in character. But in 1775 and 1776 the American army failed to take Quebec; and some of the French showed fight on behalf of Great Britain. Soon the plan to drive the British from Canada was abandoned and the country remained firm in its British allegiance.

Probably with this failure the die was cast finally; it is certainly true that the intervening seven score years have never seen the hope of the prospect of the union of Canada with the United States. When the Loyalists, driven from the United States, found homes in Canada they treasured bitter memories of the revolutionary struggle and rendered the prospect of union even more remote. But once settled in Canada these refugees from the United States demanded the self-government which they had enjoyed at home, and at last in 1791 the British Parliament established Lower Canada and Upper Canada each with a legislature of its own and with some, though not a complete, measure of self-government. In 1812 the United States and Great Britain drifted into war, and the second failure at that time to overthrow British rule in Canada confirmed the results of the defeat before Quebec in 1776.

In 1837 there was armed rebellion in the two Canadas. In Upper Canada the inhabitants claimed the complete control of their own affairs that the Colonial Office in London persistently refused, and to which the government took up arms. In Lower Canada there was a war of races. The French majority demanded that they should dominate in the councils of the country. The English minority, allied usually with the governor, resisted this claim, and at length some of the French also appealed to arms. Each revolt failed completely, but the risings threw into a clear light the causes of discontent in Canada and in time a remedy was furnished.

Lord Durham, an English radical Whig, went out to rule Canada with despotic authority and to restore order, in a very able report, published in 1839, urged that the English province and the French province should be united under one legislature. This was done. In 1841 Canada received a new constitution and in 1848 for the first time, the people of the two provinces could demand respect and consideration. With more than a million people Canada could no longer be treated as the child of the Colonial Office. After a few doubtful years under the new constitution, the Earl of Elgin, the governor-general sent out from England, defi-
nitely, amidst some riotous events in 1849, recognized the supreme authority of the Canadian Parliament in internal affairs. Since that time political warfare in Canada has been between Canadian parties and not between Canada and the Colonial Office.

But the union of the two provinces contained nothing of finality. Lord Durham had hoped that the union of British Columbia and the Province of Canada would precipitate the French. Instead the French asserted themselves and, since each province equaled the other in the number of its representatives, the work of government under the party system proved extremely difficult. A better political temper was growing up throughout British North America. Once free to control their own affairs the provinces saw the advantages of union. Their insight was quickened when in 1860 an advantageous Reciprocity Treaty with the United States came into effect. In self-defense it became necessary to increase the commercial and political strength of the provinces. With surprising rapidity negotiations were successfully concluded between 1864 and 1866, and in 1867 the Dominion of Canada came into existence.

The events connected with Confederation furnish a distinct epoch in Canadian history. In the next and concluding epoch the various provinces have been welded together until a real national life has appeared. The development of Federal government in Canada presents some interesting contrasts with the Federal system in the United States. Sir John Macdonald (q.v.) aimed to make the Federal power strong, the Provincial power relatively weak, and, since his was a master mind that directed Confederation, the Canadian constitution reflected his views. The powers of the provinces are strictly defined, the undefined residue remaining with the Federal government. Carrying out his views Macdonald frequently tried to curb the provinces, and advancing as an end there was a cry for provincial rights. In spite of Macdonald's desires, development in Canada has been rather in the direction of strengthening the authority of the provinces, but it is still true that a province in Canada does not represent a State of the Union in political authority. The Federal government can disallow Provincial legislation; it can dismiss a Provincial lieutenant-governor and has done so more than once. But as a result of the experience of half a century, a fairly stable balance between the two jurisdictions has now been reached. During this time a real unity has grown up in Canada, and it makes Canadians, as it long since made Americans, one in sentiment from ocean to ocean. The French-speaking province of Quebec is perhaps a partial exception. But on most great questions of national interest Quebec, too, is at one with the rest of Canada.

Bibliography.—The beginner in Canadian history cannot do better than read A. G. Bradley's little volume called Canada (Longmans, Green & Co., London) as also his larger volume, Canada in the Twentieth Century, which describes present-day conditions. He might substitute the more scientific volumes on Canada in Sir Charles Lucas's Historical Geography of the Countries of Canada, under French Rule, by Sir Charles Lucas; Canada under British Rule, by J. D. Rogers; Canada, Geographical, by J. D. Rogers (Clarendon Press). Professor W. L. Grant's school book, the History of Canada, is the best small book on Canadian history. Miss Agnes C. Laut's volume, Canada, the Empire of the North (Toronto), has imagination and vitality.

The most exhaustive general work on Canada is Canada and Its Provinces (Toronto), a huge two-operative work by Professor C. W. Colby (22 vols.). Kingsford's History of Canada in 10 volumes (Toronto) is full but lacks method. The Chronicles of Canada, (Glasgow) are 32 small, readable volumes, sold only by subscription; Stephen Leacock has in the series three volumes, The Dawn of Canadian History, an account of early discovery; The Mariner of Saint Malo, a life of the first French discoverer in Canada, Jacques Cartier; and Adventures in the Far North, an account of the Arctic. To find the Northwest Passage, which includes the tragic story of Sir John Franklin. Other well-known writers, such as Miss Agnes C. Laut, Colonel William Wood, Sir Joseph Pope and Professor C. W. Colby, have volumes in the series, which covers the whole history of Canada. The Canadian Historical Society publishes biographies of the chief leaders in Canadian history.

For special periods, Biggar's Early Trading Companies of New France (University of Toronto) is a learned account of early discovery. The history of the French régime has been told with great literary charm and ripe scholarship by Francis Parkman (Boston). His volumes can be read with pure enjoyment. The Pioneers of France in the Early World is an account of Cartier, Champlain and other early leaders. The Jesuits in North America describes heroic and tragic missionary labors. The Old Régime in Canada describes the planting in Canada of the French type of society which still endures in the province of Quebec and the Great West and of Frontenac and New France under Louis XIV describes French efforts and policy in North America at the end of the 17th century, while A Half Century of Conflict (2 vols.), Montcalm and Wolfe (2 vols.) and The Conspiracy of Pontiac (2 vols.) give the story of the final long struggle between France and Britain which in the end brought Canada under the British flag. George M. Wrong's Fall of Canada (Clarendon Press) may be said to supplement Parkman by its full account of the last year of French rule. Wood's Fight for Canada covers the Seven Years' War in Canada.

Of English speaking Canada the story has as yet been less thoroughly told and one or two of the following works are out of print. Bourinot, Canada under British Rule (Cambridge University Press) in a brief outline. Bradley's Making of Canada (Constable) and Lucas's History of Canada, 1763-1812, and his The Canadian War of 1812 (Clarendon Press), both cover this history down to 1815 including the War of 1812-15 with the United States. The later period has not yet been covered in a single adequate work and the story must be studied in the lives of the chief actors. The most interesting book on the history of Canada, as Wallace's The Family Compact, Grant's Tribune of Nova Scotia (Howe), and Sir Joseph Pope's Day of Sir
John Macdonald. In the ‘Makers of Canada’ there are some excellent lives: Lindsay’s ‘William Lyon Mackenzie’ tells the story of the leader of the Canadian Reformers and his ‘Lord Sydenham,’ an account of the governor of Canada who brought about the Union of 1841; Parkin’s ‘Sir John Macdonald,’ a good account of that statesman; and Skelton’s ‘Day of Sir Wilfrid Laurier.’ Dent’s ‘Story of the Upper Canadian Rebellion’ and his ‘Last Forty Years, Canada since the Union of 1841’ are interesting but not now out of print. Boyd’s ‘Sir George Etienne Cartier’ (New York) is a very full recent account of the French Canadian leader in the federation movement. Sir Joseph Pope’s ‘Life and Times of Sir John Macdonald’ (London, Arnold) and Sir John Willson’s ‘Sir Wilfrid Laurier and the Liberal Party’ (Toronto, Morang) each in two volumes, are very full and excellent. Siegfried’s ‘The Race Question in Canada’ (London) is a penetrating study of French ideals.

The vital phase of the later history of Canada is the expansion of the West. Miss Agnes C. Laut’s ‘Conquest of the Great North-West’ (Toronto) is a stirring account of the Hudson Bay Company. Short’s ‘Vikings of the Pacific’ (New York) is the story of discovery from the Pacific side. Sir William Butler’s ‘The Great Lone Land’ and ‘The Wild North Land’ (London) are vivid accounts of life on the prairie before the settlers came in. Burne’s ‘Search for the Western Sea’ (Toronto) is a record of the discovery of the West. Milton and Cheadle’s ‘The North-West Passage by Land’ (London) is an equally vivid account of crossing the Rocky Mountains in the sixties and should be supplemented by G. M. Grant’s ‘From Ocean to Ocean,’ written 10 years later (Toronto 1873). Hayden’s ‘The Riders of the Plains’ (London) describes the work of the mounted police in the West, work that has kept the frontier life of Canada almost free from crime. Laut, ‘The Canadian Commonwealth’ (Indianapolis) is a racy discussion of present day problems. The Constitution of Canada will be found in Egerton, ‘Federations and Unions in the British Empire’ (Clarendon Press).

On Canada’s relations with the Empire ‘The British Empire’ (Pollard, editor) and The Round Table, a quarterly, should be consulted by serious students. The University of Toronto Library publishes an annual ‘Review of Historical Publications relating to Canada,’ in which all books on Canada are reviewed from year to year (21 vols. up to 1918). Larned’s ‘Literature of American History’ (American Library Association) has a good Bibliography of Canada.

GEORGE M. WONG,
Professor of History, University of Toronto.

3. THE ERA OF EARLY DISCOVERY.

The early history of Canada from 1497 to 1632 may for the sake of convenience be divided into four periods: (1) The period of the early explorations along the Atlantic seaboard, 1497–1533; (2) the discovery and occupation by the Spanish of the gulf and river of Saint Lawrence, 1534–43; (3) the rise of the fur-trade, 1544–1612; and (4) the first permanent colonization, 1613–32.

The Explorations along the Atlantic Sea-
the modern Table Hill in 57° 40'. Since they had not penetrated to the bottom of Davis Strait they naturally supposed it was merely a gulf of the Sea of Baffin. Sailing north along Cape Breton Island they gave to Cape Ray the name of "Cape Saint George," and called Saint Pierre, Miquelon and Langley islands the "Trinity group." Since their provisions were none too plentiful they decided to turn their course westward and explore New England and Point aux Basques for more of the Table Hill in the north. Following on down this coast, which in their opinion was that of Asia, they reached Cape Race and the region explored in the previous summer. Proceeding on toward the south they reached the western coast of New York. They were now much struck by the distance westward they had come. The East coast of Greenland lies in 43° while the longitude of Sandy Hook is 74°, which is only four degrees of a degree less than that of Cuba. Cabot could well say, therefore, that he had now "sailed in this tracte so farre towarde the weste, that he had the Ilande of Cuba on his left hande in the same degree of longitude, in the west of Ireland, the country of the Great Khan. Although silk and brazil-wood grew at the spot where he landed, it was his intention on the next voyage to proceed on down that coast till he reached China. But before all this was accomplished his men came the spices and precious stones he had seen at Mecca. Henry VII was delighted and granted Cabot a yearly pension of £20. On 3 Feb. 1498 new letters patent were issued authorizing Cabot to prepare a fresh fleet of six vessels. In order to secure skilled seamen and probably also to hear news of what Columbus had done, Cabot about this time made a trip to Lisbon and Seville. In Lisbon he came across a certain João Fernandes, called "Labrador," because he owned land on the island of Terceira. When Cabot informed this man of his discovery, Fernandes in turn told him how he himself had also visited a region to the west of Iceland and north of the point in Asia reached by Cabot. The latter's curiosity was roused. Here was perhaps a shorter way of returning to Asia than by crossing again the dreaded western ocean. On Cabot's return to Bristol with Fernandes, a brief consultation with the merchants of that town who had been trading to Iceland seemed to Cabot that this was the best route to take. By the beginning of May the two vessels manned by 300 men were in readiness. Since it was known that Cabot was taking the route via Iceland, "in his company sailed also out of Bristol three or foure small ships fraught with slieght and grosse merchandizes, as course cloth, caps, laces, points and other trifles." Early in June they reached the east coast of Greenland a little north of Cape Farewell. As Fernandes had already told them of this region they named it the "Labrador's Land." On coasting north along this desolate shore, they found the ice to grow steadily thicker and heavier and the cold to become more and more intense. It was also noticed that the coast trended continually eastward. Finally on 10 June in late 60° 30' the crews mutinied and refused to proceed further in that direction. Cabot was thereupon obliged to turn his ships about and to head back to the south. On reaching Cape Farewell, the sailors west and explored the southern and also the western coast of Greenland. On meeting with ice again on the west coast they once more headed west until they arrived off the coast of the present Labrador, near
discovery of this mainland and the appearance of its inhabitants excited considerable interest, more especially English interest, and several English vessels, under the leadership of John Cabot, explored the region to the south. The autumn passed, however, without anything being seen of him or his vessel. In that summer an English expedition had been dispatched to the same coast by João Fernandes, now a naturalized Englishman, and several other English merchants, but on their return in the autumn with three Indians they reported that they had seen nothing of Gasper Corte-Real. In January 1502 his rights were transferred to his brother Miguel, who left Lisbon on 10 May with three vessels to search for his lost brother. They reached Newfoundland toward the end of June and on the 24th of that month named the modern Saint John's, "the river Saint John," in commemoration of the feast of Saint John the Baptist. To facilitate the search each ship was ordered to visit a certain portion of the coast and to return to Saint John's by 20 August. Two of the vessels returned at the date fixed but the vessel of Miguel never did more. Another English expedition also visited the same coast in that year and on 20 September King Henry VII granted a pension of £10 each to two naturalized Portuguese in consideration of the true service which they have done unto us to our single pleasure as Capitaines into the newe founde lande." No trace had been seen by them, however, of either of the missing Corte-Reals. In the hope of finding some trace of them, King Manoel dispatched two vessels to that coast in the following year, but neither of these vessels nor those which were sent out in that year by the merchants of Bristol saw any trace of them. They were thereupon given up for lost. The rich codfishing on this coast had now become so well known that in 1504 the French and Bretons began to resort thither. Two years later a tax was laid on the cod from these parts taken to Portugal. The French rapidly increased in numbers and in 1512 when the first Spanish expedition to this coast was fitted out the latter got their pilots in Brittany. By 1519 the French fleet numbered 100 sail and included vessels from Dieppe all the way down to Bayonne. In 1520 Alvares Fagundes of Vianna in Portugal explored the region between Saint Pierre and Miquelon and the coast of Nova Scotia. On his return he received a grant of these regions from the King of Portugal. It is possible that a colony was sent thither in 1525. In this same year the Emperor Charles V dispatched Estevan Gomez (q.v.), who had sailed with Magellan, to discover in the north a strait similar to the strait of Magellan in the south. Gomez explored the Bay of Fundy and then followed the coast southward as far as the West Indies. On his return to La Corunna with a ship-load of Indian bones he got a grant of 1,527 "two English vessels, the Sanson and the Mary-of-Giford, the latter being a three-masted barque of 250 tons' burden, were sent out to find a northwest passage. On meeting with icebergs at the mouth of Davis Strait they headed south. On 1 July in 52° a storm separated them and the Sanson was never heard of again. The Mary-of-Giford on reaching Saint John's on 3 August found "eleven sail of Normans and one Britaine and two Portugall Barkes and all a fishing." Finding no news here of the Sanson, she continued her course to the south "oftentimes putting her men on land to search the state of those unknown regions." On one of these occasions the Italian pilot, who may possibly have been Giovanni Verrazano, who had explored this coast for Francis I in 1524, was killed by the Indians. In the middle of November the Mary-of-Giford reached the West Indies. Being refused permission to enter San Domingo, she set sail again for England. In the course of her voyage she had met more than 50 French, Portuguese and Spanish fishing-vessels, which shows the proportions to which the codfishing on the Banks had then attained. Each year in fact the numbers increased.

The Discovery and Occupation by the French of the Gulf and River of Saint Lawrence, 1534-43.—Though during the course of the first three decades of the 16th century various English, Portuguese, French and Spanish expeditions had explored the seaboard of eastern North America none of them had penetrated into the interior. The first to do this were the French in 1534. The French fishermen who resorted every summer to that portion of this main coast which was rich in cod had noticed that a bay, called by them the "Bay of Castles," lay off the land thereabout, extended so far inland that not one had ever been able to reach the head of it. It was just possible, therefore, that this might be the entrance to a strait similar to that found by Magellan in the south. On this being reported to the authorities at home an expedition was dispatched from Saint Malo in the spring of 1534 under the pilot Jacques Cartier with orders to explore this opening. Cartier reached Bonne Espérance Harbor inside the Strait of Belle Isle (then called the "Bay of Castles") on Wednesday, 10 June. Having discovered on examining the coast beyond this point with the long-boats, that it was completely barren and rocky, sail was made on Monday, 15 June, from Bonne Espérance Harbor in order to explore the land seen to the south. Following this south shore of the Strait of Belle Isle they were led steadily down the west coast of what we now call the island of Newfoundland. Off Saint George's Bay to the north of Cape Ray they had stormy weather for a week, which forced them to beat up and down. On resuming their course southward they fell in with the Bird Rocks, which lie 55 miles north-northwest of Cape Breton Island. The island to the south of these they named "Brion Island." After the Admiral of France. From the currents observed here Cartier surmised that the opening beside Cape Breton Island was a strait and that one could sail from Brion Island directly into the Atlantic. "Should this prove to be the case," added Cartier, "it would mean a great saving both in time and distance should anything of importance be discovered on this voyage." As is well known, this opening, Cabot Strait, is now used quite as much as the Strait of Belle Isle. Leaving
Brion Island on Saturday, 27 June, they crossed over to the Magdalen Islands, by which they coasted the northwestern corner until the following Monday, 29 June, when on the wind veering to the south they had to set sail toward the west. They were under the impression that these islands formed the main shore on the south side of the gulf, and when on Tuesday morning, 30 June, they reached Cacumpeque Bay in Prince Edward Island, they believed that this latter formed part of the same main shore with the Magdaelens. The western end of the island of Prince Edward Island from the mainland, was mistaken for a bay and called "Saint Leonore's Bay" in memory of a Breton bishop whose festival is celebrated on 1 July. Coasting northward along the New Brunswick shore they believed on reaching Chaleur Bay that they had at last found a passage into the South Sea. On Thursday, 9 July, they discovered that it was merely a deep bay, "whereat," says Cartier, "we were much put out." On account of the heat of the sun they called it the "Bay of Heat." Pursuing their course northward they entered Gaspé Bay, where they were detained for ten days by bad weather. On Friday, 24 July, the day before they set sail, they set up a cross 30 feet high as a landmark and also seized the two sons of an Indian chief who had come down to the sea with his tribe to fish. Rounding the peninsula of Gaspé, they were heading straight for the mouth of the Saint Lawrence, when one of the mirages so common in those parts led them to believe that this passage between Gaspé and Anticosti was merely a land-locked bay. They consequently crossed over and followed the south shore of Anticosti as far as the eastern extremity of that island. Continuing on along the north shore of Anticosti they set off on a long circuit round the point of its western end and finally brought back to the Strait of Belle Isle or the "Bay of Castles," whence they had set out. The fishermen's statement had been fully confirmed. This narrow opening had turned out to be a great gulf with probably a sound entering from the Atlantic near Brion Island. There was also a prospect that the opening they had just discovered in the northwest corner of this gulf would yet lead them into the South Sea. Setting sail from Belle Isle on Saturday, 15 August, they reached Saint Malo in safety on Saturday, 5 September. As they were in great hopes that the opening in the northwest corner of this large inland gulf would eventually lead them to the South Sea, a fresh expedition consisting of three vessels was sent out under Cartier in the spring of 1535 to explore it. Passing through the Strait of Belle Isle and along the north shore of the gulf they anchored on Monday, 9 August, in a small bay on the Quebec shore, opposite Anticosti. As the following day was the feast of Saint Lawrence, this bay was christened "Saint Lawrence's Bay." The name afterward spread by mistake to the whole gulf and was finally extended to the river. The two savages who had passed the winter with Cartier in France, now informed him that the land on the south side of this Saint Peter's Strait was an island and that further west he would come to the mouth of a very large river. Where that river rose they did not know. With this information he helped Cartier proceeded through the passage north of Anticosti and passing on up the gulf entered the river Saint Lawrence which separates the two savages called it the "River of Hochelaga." On arriving at the mouth of the Saguenay his Indian guides informed him that this river took its name from a kingdom lying toward the northwest which was "rich and wealthy in precious stones." Pleased with this information Cartier pushed up on the "River of Hochelaga" until he reached a large island which he named the "Island of Orleans" after Francis I's third son, Charles, Duke of Orleans. On the banks of a small stream which he named "Saint Lawrence stood the home of the two Indians who had passed the winter in France. For this and other reasons Cartier laid up his two largest vessels in this stream and with his third vessel and two long-boats pushed on westward to visit another Indian village called Hochelaga. The shallow water at the head of Lake Saint Peter, which he named the "Lake of Angouleme" after Charles, Duke of Orleans, checked the further progress of the sailing vessel which had to be left behind there. Pushing on in their long-boats they reached the Huron-Iroquois village of Hochelaga on the island of Montreal at the foot of the Lachine rapids on Saturday, 2 October. On the following morning a visit was paid to this village and an ascent was also made of a mountain near at hand which Cartier named "Mount Royal." From this point they had a magnificent view of the surrounding country. They specially noticed the rapids, which checked further progress westward and heard from the savages that there were falls of water beyond. Just above the rapids another river entered the main stream. According to the savages this was the best route to the kingdom of Saguény, whose inhabitants were clothed like the French and had great stores of gold and other precious metals. Cartier made his way back to his vessels on the Saint Charles and in the course of the winter, during which part of his crew was carried off by scurvy, sought to obtain as much information as possible about this northern Mexico called by the savages the "kingdom of Saguény." That King Francis might have as much information as possible on this subject Cartier, on the day he had a large cross erected to mark the French possession of this region, ordered his men to seize the chief of this village and eleven others whom he placed on board his vessels as prisoners. Leaving the Saint Charles with only two of his vessels on Saturday, 6 May, he passed down the south shore of the Saint Lawrence and the passage to the south of Anticosti Island, which on his first voyage he had mistaken for a bay. From Chaleur Bay he steered for Brion Island and discovered after leaving it that the coast to the south was not the main shore but a group of islands. Heading still to the east he reached...
Cape Breton Island and found his conjecture as to the existence of a strait here to be correct. After touching at the islands of Saint-Pierre and Miquelon he left one of his long-boats in a small harbor 10 miles north of Cape Race and then on Monday, 9 June, set sail for home. They reached Saint Malo in safety on Sunday, 16 July.

During the wars in which France was then engaged, nothing further was done until the winter of 1540-41, when an expedition was organized to proceed to the conquest of this rich kingdom of Saguenay. While Cartier was to act as pilot, the command of the land forces was given to a Picard nobleman named Roberval, who had distinguished himself in the recent wars. Through a delay about the artillery, the latter was not able to be ready in time, so Cartier set sail from Saint Malo alone with five vessels on Monday, 23 May. They had a bad passage out and having waited some time in Newfoundland for Roberval did not reach the island of Orleans until the end of August. Cartier took up his quarters this time at the river of Saguenay, and some week later he sent back two of his vessels to France with letters unto the King and to advertise him what had been done and found: and how Monsieur de Roberval was not yet come, and that he feared that by occasion of contrary winds and tempests he was driven backe againe into France. Five days later Cartier set off in two long-boats to re-examine the rapids of Hochelaga and find out what arrangements should be made for passing them in the spring with the vessels of Saint John's. At anchor there in the harbor of Saint John's he was much surprised one morning to see Cartier arrive. According to Cartier's account hee could not with his small company withstand the Savages, which were about two days in making, him. On being commanded, however, by Roberval to return he and his company, mooved as it seemeth with ambition, because they would have all the glory of the discouerie of those partes themselves, stole privly away the next night and departed home for Brittany. Roberval was thus obliged toward the end of June to make his way up the Saint Lawrence alone. He took up his quarters in the buildings at Cap-Rouge which Cartier had vacated. On 14 September he sent back to France two ships "to carrying news unto the king and to come backe againe ye were next ensuing furnisht with victuals and other things." During the course of the winter 50 of his people were carried off by scurry, so that when he set sail from Saint John's in the spring of 1542 he had but 8 boats and 40 men. The remainder who only numbered 30 were left in charge of the fort. How far up the Saint Lawrence Roberval penetrated we do not know; for no further account of his movements has come down to us. It seems probable, however, that after penetrating a short distance up the Ottawa and getting a sprinkling of gold he returned to Cap-Rouge where he found Cartier, who had been sent out to bring him home. In the course of the autumn the rest of the men returned. On the failure of this expedition becoming generally known a new proverb was coined. When any object in appearance of value was found to be worthless, it was called a "Canadien diamond."

The Rise of the Fur Trade, 1544-1612.—

During the 10 years in which the French had been busy exploring the gulf and river Saint Lawrence and seeking to reach the mysterious kingdom of Saguenay, the number of vessels of various nationalities engaged in the fishing trade along the Atlantic seaboard had been steadily increasing. On his arrival at Saint John's, Newfoundland, on 8 June 1542, Roberval had found "seventee shippes of fishers," which were six more than Rut had met there in August 1527. Out of this annual fishing trade, which was carried on along the coast from Belle Isle to Cabot Strait, gradually grew the fur trade. The fishermen, when riding at anchor in a bay or inlet, found that the savages of the neighborhood were always ready to part with their furs for a mere trifle. Since these furs sold in Europe at a high price, the practice grew up among the fishermen of bringing out each year a supply of trinkets on purpose to barter for furs. The returns were so good that in process of time some vessels made a specialty of the fur trade. Thus in 1569 we have in the records of the French vessel du Havre that "had a trade with the people of divers sorts of fine furres." In 1581 some Saint Malo merchants sent a small barque of 30 tons into the upper Saint Lawrence, and so successful did the voyage prove that in the following year they dispatched a ship of 80 tons. In 1583, in which year the merchants of Saint Malo sent three vessels to the Saint Lawrence, Stephen Bellinger of Rouen "brought home a kynde of muske called castor; divers beasts skynnes, as beares, otters, martens, lucernes, seals, buffs, dere skynnes, all dressed and painted on the innerside with divers excellent colours." In the following year the merchants of Saint Malo brought back with them two savages in order that they might learn French and afterward facilitate more extended trading relations. The result was that in 1585 they sent 10 ships into the Saint Lawrence. In January 1588 two of Cartier's descendants obtained a monopoly of this fur trade, but so great was the outcry raised by the other excluded merchants that in May the monopoly was revoked. The trade continued to remain open like the fishing trade until 1599. In addition to cod, some of the vessels fished for furs, and toward the close of the century there was a great development of the walrus-fishing. In the spring of 1591 the Bonaventure of Saint Malo made her way to the Magdalen Islands in the Gulf of Saint Lawrence, where she "slewe and killed to the number of fifteen hundred morses or oxen" as the walruses were then called. With the 40 tons of train-oil into which these were boiled down she reached the mouth of the English Channel in safety, but was there captured by an English vessel from Bristol. Relying on the information thus ob-
tained, a vessel was sent thither from Falmouth in 1593, and though she took certain Sea-
oxen, it was "nothing such numbers as they might have had, if they had come in due sea-
son," for they arrived late in the summer. In the spring of 1594 the Grace of Bristol set sail to
Anticosti, "being informed that the Whales which are deadly wounded in the grand Bay
(the Gulf of Saint Lawrence), and yet escape the fisher for a time, are wont usually to shoot
themselves on shore there." Finding no whales she made her way back to the bay of Placentia
in Newfoundland, where she met "fishermen and sailors of Saint John de Luz and of Sibiburo [Ciboure] and of Biskay to the number of three score and odd sayles." After fishing there for some time she made her way to Ferryland on the east coast, where lay "two and twenty sayles of Englishmen." In that port she "made up her
fishing voyage" and set sail for home. In the summer of 1597 the Hopewell of London, of 120
tons, was driven away from the Magdalen by two ships of Saint Malo and two others of
Ciboure, "in the mouth of the Loire. Since this last hailer from a Catholic part of France it was decided to capture her. "We first," says the account, "sent our boat aboard the Rocheller to certify him that we were his
friends and to request him not to hinder our fight with the enemy. This message being sent,
we made all the haste we could unto the ship of Belle Isle, which first began with us with three
great shot, one whereof hit our main-top
saile, but both the other missed us. And we also sent one unto them, then being approached
were unto them ten or twelve of us went in a
shallop to enter them. And when we boarded
them in our boat, they betokee themselves to their close fights, playing chiefly upon us with shot and pikes out at two meeres' breadth. We entered very dangerously, escaping meere dangers both by shot and pike. Some of our
men were wounded, but no great harme was
done." With this prize the Hopewell returned to England. In the following year an unsuc-
sessful attempt was made to establish a colony on Sable Island. The Marquis de la Roche
had obtained his first letters patent authorizing him to occupy land in the region of
Newfoundland in 1577, and in 1578 he had set sail therewith two vessels. The "pinnace," however, had been obliged to return through "fowell weather," and, though the larger vessel, after being "well beaten by four English ships which this French ship had thought to have robbed," had "taken her course for Newfoundland, we do not know what was done there. It is probable, however, that La Roche merely selected a spot for settlement, since it was not until 1584 that the colonists were embarked. Unfortunately "his greatest ship of 300 tons was blown away westward and there was never anything more heard of them," before the war of the west coast of France, and so the expedition came to naught. From 1589 to 1590 La Roche was kept a prisoner by the Duc de Mercœur, but on his release he made a fresh attempt to establish a colony. In the summer of 1598 he landed on Sable Island 60 "sturdy male and
female beggars," taken from the prison of
Normandy. On reaching this island, on the mainland he was blown all the way back to
France. No fresh attempt was made to con-
tinue his colony, and when the remnant was
succeeded by a fishing vessel in 1603, only 11
persons were still alive. On this failure of La
Roche's colony, no sign was left that France
claimed the region of the Saint Lawrence as
her own. To remedy this state of affairs a monopoly of the fur trade for 10 years was
granted in the spring of 1599 to a fur trader of
Honorfleur, who yearly out of a certain vessel
of the Saint Lawrence. The condition was that he should people the country each year with
50 colonists. In fulfilment of this agreement, on the conclusion of his annual barter with the
Montagnais at Tadoussac in the summer of
1599, he left behind 16 men barded together
for warmth in a small log hut at the mouth of the Saguenay. On the return of the vessels in the following summer, no fresh colonists were landed and only five of the former batch were found. The French took this as an occasion to claim their exclusive rights to the fur trade. To quiet matters, a commission was appointed in the winter of 1602-03, which recommended the admission of certain Rouen and Saint Malo traders on condition they should bear their share of the cost of colonization. Before, however, more colonists were sent out it was deemed advisable to explore the country in detail in order that the best site available might be chosen for the settlement. This survey was carried out in the summer of
1603 by Samuel de Champlain, an officer of the
navy, and Dupont-Grave, one of the fur traders. The result was that in the spring of
1604 a fresh monopoly for 10 years was given to a company formed by the Sieur de Monts
on conditions, but not without a year should be taken out. The first settlement was
formed in the summer of 1604 on the island of
Sainte Croix, in the Bay of Fundy. "The Fort
hee [De Monts] seated at the end of the Iland,
opposite to the place where he had lodged his
Canon, which he considered the end to command the river up and down. And out of the same Fort was the Switzerland lodging, great and large, and other small lodgings, representing as it were a suburb. Some had housed themselves on the firme lande neere the brook. But within the Fort was Monsieur de Monts his lodging made with very faire and artificil Carpentrie worke, with the Banner of France upon the same. At another part was the store-house wherein consisted the safety and life of everie one, likewise made with faire Carpentry worke and covered with reedes. Right over against the said store-house were the lodgings and houses of these Gentlemen; Monsieur D'Orrille, Monsieur Champlain, Monsieur Chat. Brouager. Opposite to Monsieur de Monts, his said lodging, there was a galerie covered for to exercise themselves either in play or for the workmen in time of raine. And between the said Forte and the Plaforme, where lay the Canon, all was full of gardens whereunto everie
one exercised himself willingly.* The winter of 1605–06 proved severe on the exposed islet of Sainte Croix, where it turned out to be extremely sandy, that in the following summer the settlement was transported across the Bay of Fundy to the harbor of Port Royal (now Annapolis Basin), where the buildings were put together in the form of a large square. The winter of 1605–06 again proved a hard one, however, and, owing to the late arrival of the company's vessel, not only were all the furs taken by interlopers, but the colonists themselves finally embarked in two small boats in order to find a fishing vessel willing to take them back to France. They fortunately met their own vessel, in which they returned to Port Royal. In the spring of 1607, however, the company's monopoly, which had legally seven years more to run, was suddenly repealed through the intrigues of the Hatters' Corporation of Paris. Nothing remained but to send out a vessel to bring home the colonists at Port Royal, which was done.

The regions farther to the west, exploration De Monts now turned his attention to the Saint Lawrence. In order that he might retrieve a part, at least, of his losses, King Henry IV allowed him a monopoly of the fur trade there for one year. In the summer of 1605, accordingly, Champlain repaired to that part of the river called Quebec, or "the Narrows," where he constructed a trading-post. It was hoped that this would not only give them an advantage over the other competitors in the years of open trade, but would also hold the warlike nation of the Iroquois in check and allow the Algonquins, who came down every summer with furs from the upper Ottawa, to go backward and forward on the Saint Lawrence in all security. When Henry IV heard of the construction of De Monts' post at Quebec, he renewed his monopoly for another year. Taking advantage of this, Champlain, in the summer of 1609, accompanied the Montagnais and the Algonquins on the warpath against the Iroquois. In order to see the palaces of which they had heard so much, and also have their share of the victory over the Iroquois, the Hurons, who dwelt beyond the Algonquins on the shores of Georgian Bay, came down to Quebec, for the first time, in the summer of 1609. In the spring of 1610, Champlain combined force of 200 Iroquois on Lake Champlain. At the sight of the French and the report of their firearms the enemy broke and fled. The Hurons were delighted, and promised to come down henceforward every summer to the annual barter. In was same year (1609) the Sieur de Poutrincourt (see BIENCOURT DE POURTRINCOURT, JEAN) established himself with his family in the buildings formerly occupied by De Monts' colony at Port Royal. He continued to reside here until his home was burned by the English in 1613. Although during the winter of 1609–10 De Monts sought to have his monopoly renewed, or at any rate the trade reserved to him, in the region explored by Champlain in his expedition against the Iroquois, the king took the advice in the spring of 1610 the fur trade was thrown open to the merchant marine of France to the same extent as the cod, whale and walrus fishing. The result was that so many traders resorted to the country that summer that many ships found it impossible to get rid of even a portion of their cargoes. There was a similar inroad in the summer of 1611. The result of this competition were soon apparent among the savages. Not only did they ask more for their furs, but they also began to have a poor opinion of the palefaces, whom they saw even strip blood-stained furs off the corpses of dead Indians. De Monts also felt it to be unjust that he should be put to the expense of keeping up the post at Quebec when no advantages were accorded him in return. During the summer of 1612 Champlain was kept in France by a fall from a horse, and he improved the opportunity by seeking to bring about a better order of things in the Saint Lawrence. Through his efforts the system of open trade was brought to an end in the autumn of 1612.

The First Permanent Colonization, 1613–32.—In order that the licentiousness of a few merchants should not spoil the trade in the upper Saint Lawrence and ruin the prospects of exploring, with the help of these Indians, the interior of the country, the King's uncle, the Comte de Soissons, to apply in the autumn of 1612 for a monopoly of the fur trade above Quebec. This was granted on condition that, during the 12 years it lasted, six families a year should be taken out by the company. Although Soissons died a few weeks later, the monopoly was transferred, at Champlain's request, to Soissons's nephew, the young Prince de Condé. As no time was left to form the company before the trading season opened, Condé merely issued licenses to seven merchants to barter above Quebec. They were each to place four men at Champlain's disposal in case he had need of them. On account, however, of the licentiousness of some of the traders in the previous summer when Champlain was absent, neither the Algonquins nor the Hurons put in an appearance in 1613 at the rapids. At this Champlain set off up the Ottawa with a few attendants, and by his exertions induced over 80 canoes to come down to the barter. In the same summer of 1613 an English vessel from Virginia destroyed De Poutrincourt's home at Port Royal, and also captured a French vessel sent out by the Jesuits to form a colony at Mount Desert, on the New England coast. In the summer of 1614, however, the formation of the new company for trade in the Saint Lawrence. On the failure of the La Rochelle merchants to appear, the whole of the shares were divided among the traders of Rouen and Saint Malo. On reaching the annual barter at the Lachine Rapids in the spring of 1615, Champlain found that his absence in the previous summer had made the Indians doubt his friendship. In order to regain their confidence, and also explore the regions farther to the west, he set out with the Hurons on their return. He was thus able during the winter of 1615–16 to learn much of the geography of the present western Ontario as well as the region about Lake Ontario, to the southern shore of which he accompanied a war expedition against the Iroquois. So greatly were they impressed with the help thus accorded them that they accompanied Champlain in great numbers on his return to the Saint Lawrence in the spring of 1616. For this reason, also, the barter of 1617 and 1618 were greatly attended. Notwithstanding this increase of trade, the company...
unfortunately did nothing toward establishing a local source of supply, and paid almost no attention to colonization. Only one family was brought out, and it was treated in an extremely unjust manner. Not only were none of its members allowed to engage in the fur trade, but while paying very high prices for all the stores bought from the company they were obliged to sell their own produce at the very low prices current in France. When Champlain, as the representative of the vicerey, sought to secure the fulfilment of these conditions as to colonists, defense and local sources of supply, he simply made himself disliked. In the spring of 1619 they even refused him a passage to Quebec. At the King's express command he returned there in 1620, only to find the factory so tumble-down that the rain came in on every side. When this was notified to the admiral of France, who had succeeded Condé as vicerey, he at once revoked the monopoly of the company and gave the trade to the wealthy merchants, William and Emery de Casson. The old company, however, appealed to the King. Pending his decision both parties sent out vessels in the summer of 1621 and each left servants of its own to winter at the factory. In the course of the winter of 1621-22 these two companies amalgamated with a fresh monopoly which was to run until the year 1635. Unfortunately this united company neglected colonization and local sources of supply as much as its predecessor. The result was that in the spring of 1623 when the vessels arrived late they found that for some months all the inhabitants of the factory had been living on roots and berries. The same state of affairs recurred a few years later. Champlain, who was still governor, did his best to keep this united company up to its engagements, but whenever he returned to France everything was allowed to go to ruin. Although on his departure in the autumn of 1624 he left the new factory almost completed, he found on his return two years later that not a single nail had been driven in since he went away. "It could have been finished," said Champlain, "if in a fortunat, had they been willing to work, but that is just what they will not do." As little attention was paid to a local source of supply, and when, in the summer of 1627, the principal supply-ship failed to appear, the outlook for the winter was far from bright. To make matters worse, war broke out between England and France in the spring of 1628 and several Factory ships were sent into the Saint Lawrence. Although Champlain bravely refused to surrender the factory, the fleet sent out to Quebec by a new company which Riche- lieu had formed was captured below Tadoussac. At the same time a Scottish colony was founded at De Poutrincourt's old quarters at Port Royal. In the winter of 1628-29 these Scottish and English merchants formed themselves into one company and sent out two fleets in the spring of 1629. While one brought fresh stores to Port Royal, the other entered the Saint Lawrence and summoned the factory at Quebec to surrender. As no help of any sort had come since 1627 and all the inmates had been living for some time on roots and berries, Champlain was forced to comply. In July 1629 a French flag was run up on the flagstaff. The new company formed by Richelieu, called the Company of New France, also sent out a fleet, however, which not only succored the small French post at Cape Sable, below Port Royal, but also succeeded in dislodging Lord Ochiltree, who had formed a settlement on Cape Breton Island. He and his people were taken prisoners, and out of the material of their buildings a new French fort was constructed in one of the neighboring harbors. Here a garrison of 40 men was left. In the autumn of 1629 the French applied for the restitution of Quebec, since it had been surrendered after the conclusion of peace on 29 April. King Charles I acquiesced, but the negotiations dragged on until the spring of 1632. In the meanwhile both companies sent out provisions to their posts; the Company of New France to Cape Sable and Cape Breton Island, and the English and Scottish company to Port Royal and Que- bec. Finally, on the conclusion of the Treaty of Saint-Germain-en-Laye on 20 March 1632, the post at Port Royal was made over to the Company of New France, while the old United Company was allowed to engage in Quebec for one year in order to recuperate itself for its heavy losses. In the summer of 1633 its servants retired and the whole of New France passed into the hands of the Company of New France, which held it until the year 1664.

H. P. Biggar,
Author of 'The Early Trading Companies of New France.'

4. UNDER FRENCH RULE (1632-1755)- When the Treaty of Saint Germain-en-laye (1632) restored to France (see FRANCE—His- tory), her possessions in North America, Acadia and Canada were still savage wastes. Prior to this date Port Royal and Quebec had hardly advanced beyond the status of convenient landing points, while Tadoussac and Three Rivers were mere rendezvous for barter. In theory the profits of the fur trade were enormous, but disaster or disappointment seemed to follow each venture with dismal regularity. At the same time the attempt to establish permanent colonies had been attended by only a moderate degree of success. Louis Hébert and a few of his followers remained at Quebec for 21 years before the surrender of that place to the English, but their privations were constant and severe. Those who supported themselves by agriculture were less than a score and the total popula- tion barely passed 100. As for the missionary efforts, which constituted a third form of French activity in Canada, neither Jesuits nor Recollets had gained more than a handful of converts and a certain amount of friction between the two orders already existed. One hopeful sign was indeed visible, for in 1627 the Company of New France took form with Richelieu (q.v.) and other prominent people at its head, but this organization (better known as the Company of the Hundred Associates) was just beginning to show signs of vitality when Quebec fell (1629) into the hands of Kirke (see KIRKE, SIR DAVID). The general state of the situation can be described in a single phrase. Though individuals had displayed great offense and splendor and heroism, the French as a nation had not impressed them- selves deeply upon the western hemisphere.
Between the Treaty of Saint Germain-en-Laye and Wolfe's decisive victory over Montcalm's forces, a period of over 127 years marked the extent of genuine colonization. It cannot be said that in wealth and population New France kept pace with the English colonies from Massachusetts to Georgia; but while the economic basis of the French was less solid, their geographical range was wider and their institutions were equally distinctive. For a century and a quarter France continued to be an active competitor for the control of this continent and maintained a strong foothold upon it. Moreover, the Canadian French, the habitants, developed feelings of local pride and patriotism which, though they did not begot political restlessness, are not less noticeable than the pride and patriotism of the English in America. From 1632 to 1759 New France was a colony peopled by vigorous and resourceful inhabitants. Unfortunately it possessed a defective system of administration, but its annals are adorned by noble deeds and its history presents a characteristic form of civilization.

Of the two regions which France regained in 1632, Canada was destined to be the more important and to be held upon the firmer tenure. Acadia with its long frontier of seacoast lay open to easy attack from the side of New England and after 1621, when James I gave Sir William Alexander the charter of Nova Scotia (see NOVA SCOTIA-HISTORY) its population contained a Scottish element. At the moment when Port Royal fell to the English for the second time (1628) the ablest and most loyal Frenchman in Acadia was Charles de la Tour, but on the formal restoration of the colony four years later Isaac de Razilly, a relative of Richelieu, was appointed royal lieutenant. During his lifetime the French in Acadia proved able to hold their own against New England and even to destroy posts which the English had established on the coast of Maine. De Razilly's death, however, precipitated an acute quarrel between de la Tour and the able, unscrupulous Charnisay, who had come to the colony with de Razilly in 1632. The prosecution of the feud between these rivals led, among other things, to a famous siege of Port Royal and a spirited but fruitless defense of the stronghold by Mme. de la Tour in her husband's absence. The long and bitter broil ended peacefully enough in the marriage of de la Tour and Mme. Charnisay after the death of Charnisay and Mme. de la Tour, but meanwhile the prosperity of Acadia had been seriously hampered by a domestic feud which unsettled the whole administrative system and raised the issue of Catholic versus Huguenot. In 1654 Acadia was seized by the English for the third time and held till 1667, when France regained it by the Treaty of Breda (see BREDA, TREATY OF). During the greater part of the next 20 years peace between the two nations prevailed along the Atlantic coast, broken by occasional hostilities which was always in dispute; but with the renewal of hostilities in the reign of William III Acadia suffered severely and had not repaired her losses when the war of the Spanish Succession (see Succession Wars) broke out. This time the contest for supremacy reached a final settlement in one part at least of the New World. Nicholson's occupation of Port Royal (which he recaptured from the French) in 1750, together with Marlborough's victories in Europe combined to secure Acadia to England by the Peace of Utrecht (1713) (see Utrecht, Peace of). But even then the triumph of the English was not complete, for the island of Cape Breton still remained in the hands of France and the guns of Louisburg, guarding the entry to the Gulf of Saint Lawrence, declared more plainly than words that the Atlantic seaboard would not be surrendered to England without a further struggle. In marked contrast to their precarious hold upon Acadia, the French built up along the shores of the Saint Lawrence a colony which, whatever its shortcomings, did not change hands with every generation. Canada was far from invulnerable, as the capture of Quebec by Kirke had already proved and as its siege by Phips (see Phips, Sir William) was to prove once more in 1690; but long stretches of wilderness separated it from the English settlements, while the navigation of the river presented grave difficulties to the French fleet. The fate of Sir Hoveden Walker, whose powerful fleet was shattered among the shoals of the Egg Islands (1710), shows that sea power could not be brought to bear against Canada so readily as against Acadia, and the fierce raids of Frontenac illustrate with equal force the ability of the French to defend themselves by land. French rule in Canada lasted long enough and was sufficiently secure to furnish a great object lesson in colonial method. Apart from military history and the pathos which belongs to the loss of an empire, the life of New France is more interesting in the 17th than in the 18th century. The two generations that elapse between the return of Champlain (q.v.) and the death of Frontenac (q.v.) (1633-98) are marked by a series of striking exploits and the establishment of fixed institutions. Energy and enthusiasm abound; the explorer and the missionary are lavishing their lives on causes which mean infinitely more to them than any form of personal ambition; the colonist is becoming a native, a habitant, whose concerns are increasingly associated with America; problems of Church and state are arising to vex the souls of governors and prelates. On every side there are signs of that fresh vigor which derives its impulse from the novelty and charm of the wilderness. In dealing with the progress of Canada during the middle and latter part of the 17th century it is necessary to distinguish between the regions which were claimed by right of discovery and those which were effectively occupied by settlement. Before Frontenac's death lands had been cleared and rendered fit for cultivation at a good many points between Tadoussac, where the Saguenay enters the Saint Lawrence, and Montreal. Above Lake Saint Louis there were forts at important strategic points like Kingston (then Fort Frontenac) and Detroit, but for agricultural purposes the colonial zone stopped at the Lake of Two Mountains. Further to the north the Saint Lawrence the French were led inev-
itably to the Great Lakes and thence by an easy passage to the Mississippi. Thus their explorations belong no less to the history of Illinois, Michigan and Wisconsin than to that of Canada. In the Laurentian Valley the river was another Nile with a further element added, besides being the great local thoroughfare it was a highway that opened the route to the mother country. If, unlike the Nile, its waters could not be made to produce a rice crop, they abounded in the fish which were so necessary to the food of a Catholic family. The system of land allotment sprang from the one cardinal condition of life on the banks of a central stream. Each peasant had his strip of water frontage, however narrow, and was able at a moment’s notice to embark in his own bateau or canoe. The only towns of Canada were Quebec, Three Rivers and Montreal, all situated on the Saint Lawrence, and no permanent settlements were made in any part of the country unless within easy reach of it or its tributaries. The men of the taxing or service companies were really less suited to farming than the south, and in the valley of the Richelieu, the outlet of Lake Champlain, many of the best seigneuries sprang up. The settlement of the Richelieu Valley was also intended to provide a bulwark against the Iroquois.

Closely connected with the distinction which has just been made between the Laurentian Valley and the back or upper country (pays d’en haut) is the contrast between peasant and woodsman. According to the system of land tenure that prevailed in Canada under the Old Regime rural society was divided between the seigneurs or landlords and the seigneuriales or tenants. In Canada, as in France, gentility and the possession of an estate went together, but there is this important difference between the feudalism of the mother country and the colony, that whereas in France the peasants bore appreciable burdens during the 17th century, in Canada no seigneuriale could be seriously crippled by the taxes or services to which he was bound. Feudalism, an institution of the 9th century, could not be transplanted without change to the New World in the age of Louis XIV. The French of Normandy and Brittany made admirable colonists, when once they had been induced to embark in a great enterprise, but proved conditions must be held out before emigrants would come forward. Moreover in a country of virgin forest it was impossible that peasants should be taxed as their kindred were in a land of ancient cultivation. In view of these considerations the habitants received their farms on very reasonable terms. How moderate were the demands of the seigneur may be seen from a single instance. A deed of 19 June 1664 concedes a lot of land three arpents in front by 40 in depth (about a hundred acres) in consideration of 20 sous and one good five capon for each arpent of front and one sou of cens, payable at the principal manor-house of the seigneur on Saint Martin’s day in each year so long as the grantee shall occupy the land. The habitant had in a certain sense the character of a woodsman, for a large part of his time was devoted to hewing down the forest, but he was not a woodsman in the fullest sense of the word. Besides the stationary peasant who cultivated his strip of land in the valley of the Saint Lawrence, the population of New France embraced many restless and adventurous spirits who roved the woods, traded in beaver skins whenever they could elude the monopoly, intermarried with the Indians and evaded the restraints of civilization without punishment from civil or ecclesiastical law. The coureurs de bois (wood-runners), this type of colonist whose generic name, was one of the most remarkable adventurers that this continent has ever seen. Though his vices were an object of scandal to the missionaries and his legal immunity to the government, he possessed the virtues of fearlessness and initiative to an exceptional degree. The comrades of Magellan and Drake were no more daring or resourceful than the coureurs de bois who pressed on from the valley of the Saint Lawrence into the wilds of the pays d’en haut and found amid the dangers of forest or prairie the fullest excitements of a nomadic life. Their names, for the most part, have perished; but legends like that of the Chasse-galerie bring to the memory of all the habitants of the country of the New France, and found amid the dangers of forest or prairie the fullest excitements of a nomadic life. Their names, for the most part, have perished; but legends like that of the Chasse-galerie bring to the memory of all the habitants of the country of the New France, and

In passing from these general statements regarding country and inhabitants, it is hard to say whether a place of greater prominence should be given to the government or the Church. One should be careful not to represent the French Canadians of the 17th century as slaves—a tendency too current among English writers at the present day. The feudalism of New France was feudalism in its most mitigated form and the habitant was not, like the landless peasant of the lower countries, in the same position as a serf in England. Nevertheless French Canada was overshadowed by two institutions which visibly embodied authority as authority was not visibly embodied in New England or the Old South. Whether or not paternalism was the bane of Canada is an open question to be answered by the historical student in accordance with his own scheme of philosophy. The broad fact is that the Crown and the Clergy divided between them an extremely large part of the wealth of the world in which the habitant lived. From 1632 to 1663 the affairs of Canada were controlled, under the Crown, by the Company of the Hundred Associates. Had this corporation been better managed, or rather had it been actuated by a larger sense of duty than it showed, a more distinguished reputation and eventually handed over to the King a flourishing possession; but looking only to the greatest immediate return it wasted a fine opportunity and does not merit comparison with either the East India Company (see EAST INDIA COMPANIES) or the Hudson’s Bay Company (q.v.). After 1663 executive power in Canada was bestowed by the King to the governor and the intendant, with whom were associated the bishop and a board of councilors varying in number from 5 to 12. The governor, who was always a noble, held the highest office in the colony though he did not possess so much real power as the intendant. He commanded the forces, was the channel of diplomatic intercourse with the English and the Indians, occupied the relation of the colonial society and was authorized to follow his own judgment regarding matters of emergency. With finance, however, he had little or nothing to do, and from the whole field of civil administration, he was excluded by the intendant at his side of the intendant. This official-be
longed ordinarily to the middle class and had been trained to law or business. The Crown seems to have acted on the maxim "Divide and Rule." Both governor and intendant were required to keep a large amount of criticism and gossip. The intendant passed judgment on the acts of the governor and the governor was not slow to express his opinion concerning the administration of the intendant. Neither received untrammeled authority, for an autocratic King like Louis XIV insisted upon reserving the use of his prerogative. The government of New France was less rigid and cumbrous than that of the Spanish possessions under Philip II, but the principle of absolutism carried out at such a distance from the court could not fail to impair the efficiency of administration.

The position of the Church in New France cannot be properly described unless a reference is made to the domination which controlled Europe during the age of colonization. Seventeen years before Cartier's first voyage to the Saint Lawrence (1534) Luther had denounced the sale of indulgences at Wittenberg. In the interval between Cartier's first voyage and the death of Calvin (1541) a struggle between the Church and the Reformers was being fought which was to form the mood of devotion that prompted Frenchmen to leave the civilization of Europe for a life of privation among the barbarous heathen of Canada. Here the colonizing impulse proceeded solely from a desire to spread the faith. With Olier and Des Jardins the Society of Notre-Dame de Montréal, there was no thought of gaining wealth through the fur trade. The charter of the Society expressly states that its members detach themselves from all regard to temporal interest and take for their one purpose the conversion of the natives. From 1642 to the close of the century Montreal was an outpost of civilization and Christianity, exposed to frightful dangers, as the exploit of Dollard (1660) and the Lachine Massacre (1689) testify, but defended by men who cared more for religion than for life. In the relations of the Church with the habitants friction seldom arose. There is reason to believe that the Jesuits incurred some unpopularity because they did not favor the appointments of curés in the outlying districts, but for the most part the attitude of the peasants toward the clergy was one of complete deference. Until 1665, when the Carignan Regiment came to Canada, religious life in New France was not remarkable for any of the many features of a theocracy. Religion was supported by the state and derived a strong support still from the energy of the religious. The prevalent mood was pietistic and public opinion sanctioned the ecclesiastical punishments which were called forth even by minor offenses against morals. Apart from Church festivals the routine of daily life at Quebec or Montreal made little provision for relaxation or entertainment. Taverns were under the ban, dancing parties were prohibited and the general demeanor of sobriety would have met favor in the eyes of a New England Puritan. The coming of the Carignan Regiment broke in on this religious Arcadia and proved an entering wedge for frivolity, but in the early days the temper of New France was deeply religious, if not ascetic. One other aspect of ecclesiastical affairs deserves emphatic notice. While the clergy had to do with a docile population and were animated by pure enthusiasm in their work among the Indians, the religious life of the colony was not free from friction. The Jesuits, the Recollets, and after them the Sulpicians, felt that their interests were threatened by the enmity of the Jesuits. The Jesuits in turn prevented...
the Abbé de Quelus, an able Sulpician, from being made bishop of Quebec, casting their influence in favor of Laval (see Laval, Montmorency, Francis Xavier Merri, 1601) on the question of precedence, and with Avan- geau, whom he defeated in the question of selling brandy to the Indians. The difficulty over precedence brought in the whole issue of Church and state; the quarrel over the brandy question was less lofty but more practical. The position of the Church was that brandy should not be sold to the savages under any circumstances. The general, though not the invariable, position of the government was that if the French did not sell brandy to the Indians the latter would buy rum from the Dutch and English. The Church as a whole and the habitants as a whole lived on excellent terms; but there was much friction between the religious orders, the coureurs de bois were a thorn in the side of the clergy, and a governor of secular tastes, like Frontenac, made up a running feud with the hierarchy for years.

The mention of Frontenac’s name recalls a striking personality, for of all the governors who were sent out to New France during the long reign of Louis XIV he must be called the ablest and most formidable. That his policy toward the Church was judicious or free from prejudice cannot be maintained, nor can it be forgotten that his memory is defaced by the stain of fearful massacres. But he was bold, resourceful and thoroughgoing. His name is connected to the interests of Canada. Throughout both periods of his rule (1672-82; 1689-98) he was master of the situation as none of his predecessors had been, and during the seven years of his absence from the colony the failures of La Barre and Denonville served to set off his virtues in the strongest light. The main political problems with which he had to deal were the enmity of the Iroquois, the aggressive policy of the English as suggested by Governor Dongan, and the external French influence from the Great Lakes into the valley of the Mississippi. Speaking broadly the Iroquois were the chief menace of Canada in the last part of the 17th century as the English were its chief menace in the first part of the 18th. As the most formidable Jesuit martyrs, Jougues and Brébeuf, met death at their hands; the most brilliant deed of courage which the annals of New France contain was Dollard’s flight against them at the Long Sault; it was in their face that Madeleine de Vercheres shut the door of her father’s fort. Whether left to themselves or set on by the English they had every disposition to molest the French. The spirit of conciliation they mistook for weakness and, as Frontenac saw, the only way to impress them was by a show of strength. In 1698 he ravaged their country more thoroughly than De Tracy had done 30 years earlier, burned their palisades, destroyed their corn and convinced them that he had a power which they must respect. The next year they returned to the attack, opening the language of humility. Frontenac’s attack upon the English dates from the beginning of his second term of office. Returning to the colony in 1689 he found that French prestige had vanished almost wholly during his absence. To impress the Indians and terrorize the English he equipped those raiding parties which carried the torch and the tomahawk into Mississauga Falls and Casco Bay. As a tour de force of endurance, this winter campaign of the French was a remarkable feat, but the atrocities which accompanied it cannot fail to awaken the deepest abhorrence. Parkman finds extenuation for Frontenac in the hardship of the quarters, in no whit more ruthless than his times and his surroundings, and some of his contemporaries find fault with him for not allowing more In- dian captives to be tortured. Many surpassed him in cruelty, none equalled him in capacity and vigor. Everything considered, this must be called a mitigated sentence, and apart from all considerations of humanity it may be doubted whether Frontenac’s policy of carnage was a sound one. Its momentary success in impress- ing the Indians was not an equivalent for the spirit of vengeance which it awakened among the English. From 1690 forward New France and New England have their rancorous en- mities which continue to exist quite irrespective of peace or war between the two. Phips may be turned back from Quebec but the memory of massacre endures until French power in Canada has been destroyed. A much brighter feature of Frontenac’s régime is the progress made by French exploration in the Far West. While the famous journey of Mar- quette (q.v.) and Joliet (q.v.) down the upper waters of the Mississippi (1673) may be more fitly connected with the names of Courcelle (q.v.), Frontenac’s predecessor, and of Talon (q.v.), the territory which these intrepid explorers of La Salle (q.v.) and Tonty (q.v.) fall within the period of Frontenac. It was by favor of Frontenac that the fort at Cataracouti (now Kingston) was placed in La Salle’s hands, thus enabling him to establish a fixed base at the east end of Lake Ontario for his operations on the Great Lakes and beyond. As far as the Huron country the French had been on familiar ground ever since the days of Champlain, but their chief triumphs in opening up the hinterland were won under Frontenac.

The 18th century opened for New France with bright prospects which were destined never to be realized. The war that closed at the Peace of Utrecht was celebrated (q.v.) by the most celebrated of the Jesuit martyrs, Jougues and Brébeuf, met death at their hands; the most brilliant deed of courage which the annals of New France contain was Dollard’s flight against them at the Long Sault; it was in their face that Madeleine de Vercheres shut the door of her father’s fort. Whether left to themselves or set on by the English they had every disposition to molest the French. The spirit of conciliation they mistook for weakness and, as Frontenac saw, the only way to impress them was by a show of strength. In 1698 he ravaged their country more thoroughly than De Tracy had done 30 years earlier, burned their palisades, destroyed their corn and convinced them that he had a power which they must respect. The next year they returned to the attack, opening the language of humility. Frontenac’s attack upon the English dates from the beginning of his second term of office. Returning to the colony in 1689 he found that French prestige had vanished almost wholly during his absence. To impress
Europe. Until 1745 its strength remained untested, but the French themselves thought it impregnable and the English looked upon it with distrust. The War of Austrian Succession offered an excuse. Massachusetts was ready for the attack. Governor Shirley (see Shirley, William) devised the plan, which was daringly executed by a colonial fleet under William Pepperell (q.v.) in co-operation with four British men-of-war. The capture of Louisbourg by a militia force was the greatest humiliation which France had suffered in America and its restoration by the Peace of Aix-la-Chapelle (1748) (see AIX-LA-CHAPELLE, TREATIES OF PEACE CONCLUDED AT) came to New England as the sorest affront which it had ever received at the hands of the home government.

At the Peace of Utrecht New France contained a population of rather more than 25,000. In 1750, when Canada was ceded to England, the number of inhabitants had increased to about 60,000. It is obvious that this rate of increase was trivial in comparison with the progress of the English colonies during the same period, and when we remember the unusual fecundity of the French Canadians, some special reason needs to be assigned for the slow development of the colony. The cause of this striking phenomenon will be found in the fact that immigration was not spontaneous, as in the case of the English colonies, but controlled by government. Partly owing to the institutions which prevailed in France during the 17th and 18th centuries, and partly owing to gross mismanagement of colonial affairs by the court of Versailles, New France was handicapped in the long race with its southern rivals. This fact must be brought out because it is often erroneously stated that the Frenchman has never made a good colonist. The biography of Canada from Champlain to Montcalm gives the direct negative to such an idea: Maladministration, the lack of local self-government and excess of loyalty to inherited institutions account for the defeat of the French in America rather than the want of promptness, courage, industry and resource. It must be remembered, moreover, that the English colonies took root in a soil which was fitted to stimulate rapid growth. The long calm which followed the Peace of Utrecht (1713-42) was often broken by signs of acute restlessness. As early as 1725 the Marquis de Beauharnois, who had become governor in succession to Vaudreuil, was busy with schemes for keeping the English within the limits they already occupied. This meant that their expansion northward should be checked in the vicinity of Lake George and their expansion westward by the range of the Alleghenies. Far from losing their love of exploration, the French pushed farther and farther westward with each decade. Michilimackinac was to Verendrye and Silesia from Frederick the Great, one of Verendrye's sons caught the first glimpse of the Rocky Mountains. In America the hostilities which accompanied the War of Austrian Succession centred at Louisbourg and accordingly this conflict affected Canada less than the two preceding wars had done. But every man of colonial origin, English and Irish as well as French, who adhered to the Peace of Aix-la-Chapelle was merely an armistice. Unsettled boundaries suggested endless friction, especially in Acadia and the Ohio Valley. The line which was run by Céloron de Bienville at the instigation of France at excluding the English from the Ohio and, according to patriotic opinion in such colonies as New York, Pennsylvania and Virginia, amounted to a cens censibus. Before the development of the western trade the English and French had been separated by a wide zone of wilderness. The expansion of both races brought them face to face at the junction of the Alleghany and the Monongahela. Should the stronghold built in this angle be called Fort Duquesne or Pittsburgh? Here was an issue on which hinged the future of a continent. It was the misfortune of the French both at home and in Canada that their administrative system suffered from the worst evils of a corrupt absolutism. At Versailles the folly and extravagance of Louis XV, at Quebec the unthinking policies of the Intendant Bigot, were but a poor preparation for war. And so the small but valiant race of the Canadian French bore the burden of vices not their own when they entered upon the last act of an irrepressible conflict. See also the articles in this section—GREAT BRITAIN'S FIGHT WITH FRANCE FOR NORTH AMERICA; THE CLERGY RESERVES; SEIGNIORIAL TENURE.

Charles W. Coley, Formerly Professor of History, McGill University.

5. GREAT BRITAIN'S FIGHT WITH FRANCE FOR NORTH AMERICA—1753-43. For several years previous to the formal declaration of war between England and France, in 1756 (see CANADA—UNDER FRENCH RULE), the stirring events in the Ohio Valley and in distant Acadia foreshadowed a great crisis, during which territorial disputes, aggressions and political intrigues would be lost sight of for the moment, and the question paramount would be the supremacy of France or of England in North America. The policy of France, as dictated from Versailles, had not been broad enough to successfully promote colonization, in the sense of expansion, or even to maintain permanent occupancy, although this was much desired. And the honest designs of her colonial administrator, La Galissonniere, to increase the dominion of his royal master, at an opportune moment, met with no responsive aid. The mother country was wedded to schemes of aggrandizement at home, and was inclined to leave her colony to work out its own future. Besides, the French then, as now, were rather a stay-at-home people. New France was consequently weak in soul, English and French alike, in a position to retain her empire in the North, and, moreover, her influence was being undermined by official corruption. Great Britain, on the other hand, had the real advantage of superior numbers in the New World, although she had no definite colonizing policy, being smarting from the effects of an earlier administration, due rather to ignorance than to knavery. The disputes touching possessions in Acadia were of long standing. By the 12th
article of the Treaty of Utrecht (see URECHT, PEACE OF), Nova Scotia, within its ancient boundaries, had been ceded to the Crown of England. A controversy soon arose over the interpretation of a certain clause. Great Britain claimed that her possessions under the Treaty of Utrecht were of the same extent as those in Canada, as defined by the Treaty of Breda; but France protested that the territory she then received was quite distinct from the ancient boundaries, which confined Nova Scotia to a portion of the southern peninsula. At the conclusion of the Treaty of Aix-la-Chapelle (see AIX-LA-CHAPELLE, TREATIES OF PEACE CONCLUDED AT), when Louisbourg (q.v.) was restored to the French, the boundary questions were referred to commissioners, each Court agreeing that, until a decision was reached, no fort or settlement should be attempted upon the debated ground. But the shrewd La Galissonnière, disregarding the stipulation, if he was ever officially acquainted with it, commenced the construction of forts, and fomented discontent and claimed it for England. The importance of Nova Scotia in the future development of Canada was apparent to each nation, both from a strategic and commercial point of view, but neither power could furnish the necessary colonial resources to arm the sufficient strength to support its ambition. The policy of Great Britain toward Nova Scotia was most short-sighted. Instead of encouraging the emigration of a desirable class, intended to grow up with the Acadians and form a united and loyal people, she allowed the French for nearly 40 years, to regard the country in the light of an exclusive settlement. It is true that they were good subjects; but they were French at heart, and it remained to be proved whether, under extraordinary pressure, their sympathies would incline to France or not. The possibility of such a contingency was for years practically ignored, but when it was seriously considered the methods adopted were ill-advised. The lands of the French were divided and subdivided, until nearly all was ceded; but Great Britain decreed that new lands could be acquired only by Protestants. The question of religion, therefore, became a condition of tenure. Shirley (see SHIRLEY, WILLIAM) was largely responsible for the government of Nova Scotia, was firmly convinced that until French influence was exterminated British interests could not flourish; and so be endeavored to effect the conversion of the inhabitants, suggesting that rewards be given to those who renounced their faith. The King favored an assurance that the people should enjoy the exercise of their religion, but Shirley, in a proclamation, omitted the passage as dangerous. The home government then consented to a scheme for promoting the loyalty of the province by the importation of foreign Protestants, to mingle with the Acadians—a fusion possible under the British flag; but doubtful at such a critical moment, when the military organization was wanting to protect the frontier, or to inspire confidence in the stability of British institutions. Government agents in Geneva, and elsewhere, were active in advertising in the papers for settlers, and bargaining with poor artisans. But the scheme fell through; though at last 3,000 good settlers were landed at Chiboucto Bay in 1749, from which at length sprang the important naval port of Halifax (q.v.). In the meantime, however, a great struggle was impending, which led to the deportation of 8,000 Acadians (see article ACADIAN REFUGEES), whose subsequent misery and suffering contribute the darkest page to the history of New England. At the same time allegiance was demanded by Governor Cornwallis, which from time to time was deferred. While, on the other hand, the fiery zealot, Le Loutre (see Le LOUTRE, LOUIS JOSEPH), backed by the Indians, exercised every effort to influence over the people. Le Loutre detested the English, and was generally successful in persuading the unhappy people that an oath of allegiance to a Protestant monarch was very much like being disloyal to their faith, the penalties for which did not cease with their natural existence. But, although the dark deeds which were being enacted in 1753, concerning Nova Scotia, had a distinct bearing upon the approaching conflict, they were of secondary importance, and were claimed by the colonists, when compared with the prize which both France and England coveted—the possession of the Ohio Valley. The details of the contest in this section cannot be given here. (See BRADBURY, EDWARD, COLONIAL WAR IN AMERICA; FONT NÉCESSITÉ, PITTSBURGH, HISTORY; WASHINGTON, GEORGE). The effect of Braddock's defeat was felt in the expeditions of Shirley against Oswego (q.v.), and in that of Johnson against Crown Point (see CROWN POINT, FORT OF). A body of provincials had been raised, and placed under the command of Johnson for the reduction of Crown Point. But Dieskau intercepted, and almost captured, a detachment of this expedition. Reinforcements arrived at a critical moment, and the tables were turned by the capture of Dieskau. This circumstance was made a great deal of, but, nevertheless, Crown Point was un molested, and still in the hands of the French. War and bloodshed had desolated the homes of the colonists, and over all of them hung the dread of the tomahawk and the scalping knife of the Indian. Panic-stricken, they could devise no means of defense, and surrender seemed preferable to flight or massacre. The Indians were still at peace, the determination of the British had driven into exile the unhappy Acadians. But their own position there was by no means to be envied. British prestige was indeed at a low ebb in America, when the struggle between the two powers was superceded by a contest between the two two powers, which commenced officially when King George II signed the declaration of war against France in May 1756. The situation in New France was indeed acute. Agriculture had been neglected, grain was scarce, horses were slaughtered for food, famine was imminent. But it should be borne in mind that this deplorable state of affairs was not the inevitable outcome of the struggles through which New France was forced to pass, but the condition actually created for profit, toiled for and plotted for by Bigot, in order that he might appear as the real savior of the distressed colony. The advice of the intendant to his somewhat weak-kneed, and certainly dishonest, henchman, Vergor, to "cut and slip,
and make hay while the sun shone, in order that he might have the means to build a château in the midst of it. He did not count on the rapidity with which the war would terminate, as he intended to follow himself, though on a grander and more colossal scale. New France was to be pillaged. The people must be subdued, and bodily suffering would prove effective when less persuasive methods might fail. New life was to be infused to the colony for a moment when the Marquis de Montcalm (q.v.) arrived in Canada in the spring of 1756, with 1,200 troops and ample supplies. No better general could have been chosen than Montcalm. In fact, men of his mold were just what New France needed most at this time. He was an excellent soldier and had already won renown. He was loyal to his sovereign, at a time when loyalty was not profitable; he was brave and courteous, and he dearly loved France. Vaudreuil, the governor, was a Canadian, and attached to the land of his birth, but he despised every form of interference from France. Hence there was constant friction. Bigot, the representative of the King, loved his master and the cause for which he fought more than he understood in which they contributed to his needs; and his needs were of abnormal proportions. The conduct of Montcalm throughout the war, until the supreme hour when he yielded up his life in defense of the colony, formed a striking and pleasing contrast to the actions of his two colleagues. He was also fortunate in the chief officers under him.

England was far less happy than France in the choice of the commander-in-chief of her forces. Lord Loudon was marched out of the fort. Then followed a frightful scene, which has unjustly tarnished the memory of Montcalm. The Indians, disapproving of the plunder to which they looked forward at the sack of the fort, fell upon the prisoners with fury, and horribly massacred nearly 100 before any means could be taken to prevent them. Montcalm and Lévis did their best to arrest the fury of the savage hordes and save many lives; but the mischief was done, and dire vengeance was threatened. Notwithstanding the dismal failure of Loudon, Pitt was still determined to reduce Louisburg, which was to be made the chief objective in the campaign of 1758. Loudon had been recalled, and the command was entrusted to a man who had already done good service in Germany. The chief officers under him were Lawrence and Wolfe. The force consisted of about 12,000 men. On the 2d of June part of the fleet anchored in Gabarus Bay, a few miles from Louisburg, Boscauen being the admiral in command. The expedition was a joint one, both naval and military. Wolfe was the most conspicuous figure of all present. His brigade made the real attack from the boats, while Whitmore's and Lawrence's supported him by feints in other places. The landward siege was well pressed home, and Louisburg, the gateway of New France, soon fell, and being shortly after razed to the ground, literally became a thing of the past.

Success had attended British arms in other quarters. Bradstreet at the head of 3,000 men had captured Fort Frontenac, which the unwisdom of Vaudreuil had left inadequately supported, although it was a most important post commanding Lake Ontario and serving as a
base for the Ohio forts. De Noyan, the governor, had demanded reinforcements, but, in the place of troops, Vaudreuil had dispatched a one-armed man to his assistance, and, as resistance was futile, capitulation followed. Fort Duquesne had also become a British post, and now bore the name of Fort Pitt. Forbes, in the face of great difficulties, had endured the perils and suffering of a winter's march; and, when at last his bravery and determination had triumphed over every obstacle, and the fort was in sight, he found that it had been evacuated. With the evacuation fell all harmless occupation, Abercromby was making a worse mess of affairs at Ticonderoga (q.v.). The French had been expecting an attack at this vital point, which commanded the route by way of Lake Champlain, and threatened Montreal. A large body of men had been ordered there in the spring by Montcalm; but the withdrawal of so many troops under Loudon had convinced Vaudreuil that it would be an opportune moment to create a diversion on the St. Lawrence. With the aid of the Acadians, 1,600 men were detached for the purpose. By the middle of June Montcalm had only 3,000 men at Ticonderoga, the battalions of La Sarre, Languedoc, Bearn, Béarn, Gueugne and Royal Roussillon, with two good engineers. The place was by no means strongly fortified, but works were hastily thrown up in advantageous positions. In the meantime the formidable army under Abercromby, consisting of regulars and provincials, in all 15,000 men, was encamped about half a mile from the fort. But the real head of the army, Lord Howe, the best soldier in America, as Wolfe had said, had been killed in a prelimin ary skirmish, and the commander was powerless to act. Something had to be done, however, and Abercromby moved his whole force against Carillon. Montcalm's army had been increased by 500 men under de Lévis; and after a seven hours' blundering assault, Abercromby was completely outgeneraled and had no retreat. The victory covered Montcalm with glory, and he is frequently referred to as "the hero of Carillon." But although he had won glory for French arms, the victory was a blow to the prestige of Vaudreuil and signified the farther accentuation of discord which produced serious results in future operations.

In 1759 Pitt was at last in a position to put his greater scheme into practice. The tide of war was almost on the turn, and he seized opportunity beforehand. The Seven Years' War (q.v.) was being waged in many parts of the world; in fact, in a purely military sense, there were several different wars going on at the same time. But there was one great connexive force which made them one, and that was the British navy. Formed into the very middle of their great imperial war, which began after the fall of the Stuarts in 1668, and was continued as one single age-long and world-wide struggle for the over-sea dominion, it was now to be strengthened by the battle of the Plains of Abraham. The heart of it lay in the fight for American dominion; and the central episode of this fight itself is to be found in the expedition against Quebec, which culminated in the renowned battle of the Plains of Abraham. The four real conquerors of New France are Pitt, Anson, Saunders and Wolfe. The names of Pitt and Wolfe have always been on every tongue; but the equally important ones of Anson and of Saunders have been unduly forgotten. Pitt, of course, was the originator and in himself, the most important of the four.

As the whole fortunes of the war were really determined by the British command of the sea, it is absolutely necessary to understand the naval side of the campaign, not only for its own sake, but also for the sake of its relation to the whole work of the army. In the ever-memorable year of 1759, it was entirely due to the navy that England remained safe at home, and it was more than half due to the navy that she emerged as a conqueror abroad. France had prepared a gigantic scheme of invasion. One fleet was to sail for Ireland, where the troops were to be met on landing by a general rising in their favor. The Jacobites were to be stirred into insurrection by another French fleet destined for Scotland; and a third, larger than both the others united, was to convey innumerable troop-boats across the Channel, as they made a dash for the south of England. To guard against this national danger the navy then had to face their first regular test of blockade ever known. Boscawen blockaded Toulon, Hawke blockaded Brest, Rodney cruised off Havre and Admiral Smith kept the reserve fleet always ready in the Downs. Meanwhile, however, Pitt was preparing a counterstroke; not at France herself—where she would be stronger than England in a campaign fought out on her own home base—but at her over-sea possessions in Canada, from which she was separated by those 3,000 miles of hostile waters, which the British command of the sea had practically made a British possession. Thus Montcalm had to await attack in utter isolation, on the far side of an immense stretch of territorial waters, across which Wolfe advanced in perfect safety to meet him. And it is in this battle that the British navy's squadron was not only a strong one, for it comprised a full quarter of the whole navy, but that it was playing an integral part in a universal scheme of strategy—for all seas are strategically united. Wolfe's campaign was only a landing-party on a large scale. There were twice as many seamen as landsemen engaged in the taking of Quebec. Saunders had over 18,000 sailors, more than two-thirds of whom belonged to the navy, while Wolfe had less than 9,000 soldiers. The total British force, therefore, amounted to 27,000 men. Saunders and Wolfe received their secret instructions from the King in February, and immediately after sailed for Nova Scotia. The final rendezvous was Louisburg, where over 8,000 men were assembled in April. On 1 June the fleet began its dangerous voyage, with no less than 200 vessels of all sorts and sizes. It was navigated in perfect safety to the Island of Orleans, where it arrived on 27 June, and was not discovered until the tremendous gun salute two days later, nor by the costly display of fireworks, in the shape of fire ships, destined to work its destruction. The picket boats met the attack well up stream, and, "taking hell in tow," as a bluejacket forcibly expressed it, put all the enemy's vessels ashore, where they burned them-
selves out. Wolfe established three camps. The principal one was at Montmorency, just beyond the falls. The second was on the island of Montmagny, where the water was very convenient for a hospital and stores. The third was at Point Levis, which Vaudreuil foolishly refused to occupy, in spite of Montcalm's sensible advice, and which was consequently left open for Wolfe to build his batteries on. These batteries literally pounded the town to pieces; as a manuscript note on a plan of the siege in the French War Office truly remarks, "ce ne fut pas un siège, mais un bombardement." Among other projectiles of all kinds, 36,000 solid cannon balls were fired from this caign of vantage. Montcalm's position was still immensely strong, in spite of the loss of the Levis Heights. The upper town of Quebec is built upon the extremity of a long promontory which is bound on the south by steep cliffs, 200 or 300 feet sheer up above the Saint Lawrence, and on the north by lower, but still easily defensible, cliffs overlooking the valley of the Saint Charles. The town was held by 2,000 men under de Ramezay. It had a double line of batteries, with redoubts in the middle. The French disposed of trenches and enfilade fire, along the water front below them. The only open ground in the vicinity was round the mouth of the Saint Charles. But this was well entrenched, and the trenches were carried on continuously for seven miles along the Beaufort shore to the Montmorency, opposite Wolfe's camp.

Wolfe's first attempt to break through was made some distance up the Montmorency, where he tried to force his way across the fords and so attack the entrenchments in the rear. But he was repulsed with loss, in a bush-fight in which his regulars were at a great disadvantage. His second attempt was a more serious one. On 31 July he tried to carry the Montmorency Heights by storm, a mile on the Quebec side of the falls. But as his troops had to be collected from several quarters, in full view of the French, Montcalm easily anticipated him at the right spot, before he could deliver the assault. Besides the heavy guns, the French plan could not be carried out even according to Wolfe's intentions, because the grenadiers, 1,000 strong, suddenly broke into a wild charge before being properly formed up, and lost nearly half their numbers in a fruitless effort to scale the heights. Then a terrific thunderstorm burst on the scene of carnage, making the heights more slippery than ever, and so he had no choice but to call off his men at once. After this repulse Wolfe fell seriously ill, and toward the end of August he gave his brigadiers, Monckton, Townsend and Murray, a memorandum of three other plans for assaulting the trenches and asked them "to consult together for the public utility." Their council of war resulted in a complete rejection of all his suggestions; because, as they well remarked, the storming of such works from open ground would certainly be both difficult and dangerous. Moreover, even if the works themselves were carried, there would still remain the fortified lines of the rest of the promontory beyond, to keep him out of Quebec, until the lateness of the season would compel him to raise the siege. Their own plan was to take all the available men up the Saint Lawrence, and land at any suitable point between Cap Rouge, which was nine miles, and Pointe aux Trembles, which was 22 miles, above Quebec. Wolfe informed Pitt, in a dispatch written on 2 September, that he had acconised in this plan, and intended to put it into operation at once.

The Montmorency camp was cleverly evacuated, without the loss of a man, by a general naval and military demonstration against the entrenchments, which made the French feel sure that another attempt to storm the position there was about to take place. From 7 to 10 September the rain suspended all operations; and on 10 September Wolfe made his final reconnaissance. He was already well posted on the lie of the land in every direction, and the idea of attacking above Quebec was thoroughly familiar to his mind long before it was mentioned by his brigadiers. On 19 May he had said to his uncle, that he "reckoned on a smart action at the passage of the Saint Charles unless we can steal a detachment up the river and land it there, four, five miles, or more above Quebec." This plan was better than the brigadiers', as it contemplated seizing the ground much closer to Quebec than the finest objective point they proposed trying. At the final reconnaissance he chose the Founon, where a path led up to the Plains of Abraham, within two miles of the walls. If he could get up there without any serious check, he saw that he could forestall Montcalm by forming a line less than three-quarters of a mile from the city, where the promontory was narrow enough to be commanded by his small army, and where the mixed regulars and irregulars of New France would be forced to meet his homogeneous British red-coats on a flat and open ground. The French were on the alert everywhere along the north shore, from the falls up to Pointe aux Trembles, a distance of 29 miles — except just at the Founon itself. They could not tell what Wolfe was about, nor where the bulk of his men were, behind the impenetrable screen of the ubiquitous British fleet. They were naturally very apprehensive of another desperate attack on their trenches; they were well prepared against an assault upon the town, which was so strongly fortified by nature; while the constant movement of the fleet, and occasional landings from it, in the vicinity of Pointe aux Trembles, 22 miles up, made them think that any new plan would probably take the form of an advance in force by land from somewhere whereabouts. One man, indeed, besides Wolfe, was thinking of the Founon, and that man was Montcalm. On 5 September he had sent the regiment of Guienne, to the Heights of Abra- ham, but Vaudreuil withdrew it on 7 September, and left no defense there, except the puny Samos battery near Sillery Point, and 100 mi- litiamen at the top of the Founon, under the treacherous Verger. Even on 12 September, the very eve of the battle, Montcalm had again ordered the same regiment back, this time to the Founon itself. However, Vaudreuil had again countermanded the order, saying, "We'll see about it to-morrow." But Wolfe himself was up there on that very eve. The account of the battle of the Plains of Abraham, see Colonial Wars in America; Montcalm; Quebec; Wolfe.

The winter at Quebec, after its capture, was a terribly trying one for the little British gar-
rison; and so many men died of scurvy that, in the following April, when de Lévis marched out of Montreal with 7,260 men, expecting several thousand more to join him on the way, Murray could only muster 3,886 effectives. There was a second battle of the Plains, in which Lévis defeated Murray, who in less than two hours lost over one-third of his men. A second investment followed, and Lévis was in the act of advancing to storm the walls, when the vanguard of the British fleet suddenly entered the harbor. The French had now no choice of action. They hurriedly abandoned their camp, and retreated, in all haste, on Montreal, both by land and water. Then, step by step, the final British advance converged on the doomed colony. Murray came up steadily from Quebec, in close touch with Lord Colville’s squadron, which the French had absolutely no means of resisting. Haviland advanced from the south by way of Lake Champlain; while Aberhart, with the main army, came down the Saint Lawrence from the Lakes. When the united British army, 17,000 strong, actually landed on the Island of Montreal, the few remaining outposts were taken, and de Lévis in a body, and he found himself left with only some 2,000 of the faithful French regulars. The capitulation of New France occurred two days later, on 8 Sept. 1760. The French troops were disarmed. The Canadians had already dispersed. The American militia went back to their homes. The fleet sailed away to their stations. The British regulars took up their winter quarters. And the New Regime began. The Seven Years’ War is one of the most pregnant events in history; and its results have continued to exert a vast determining influence on the fortunes of every world power, down to the present day. In Europe it foretold the ultimate decline of France and Austria, and the ultimate rise of Prussia to the leadership of Germany. But its significance for the English-speaking peoples lies mainly in the fact that it was the most truly imperial war they ever waged; and its most dramatic episode—the battle of the Plains of Abraham—will serve to mark forever three vital stages in three great epochs of modern times—the passing of Greater France, the coming of age of Greater Britain and the birth of the United States.

ARTHUR G. DOUGHTY,
Dominion Archivist; Author of 'The Battle of the Plains,' etc.

6. UNDER BRITISH RULE TO CON- FEDERATION (1760-1864). At the moment when Vaudreuil (see VAUDREUIL-CANAV- NAL, PIERRE) capitulated to Amherst (September 1760) (see MONTREAL—History) there were no English in Canada save the troops and a few civilians who had come with them. But, outwardly at least, this act of surrender placed the French Canadians and the English colonists in America on the same basis as subjects of the British Crown. One sovereignty was thus established over a vast area where dwelt two races whose origins, sentiments, faith and institutions might have been so different. The sharpest contrast. A century later the face of the situation was profoundly changed. The American Revolution had created a second sovereignty in this region at a time when the population of Canada was almost wholly French, and yet by 1860 the Canadian English had come to outnumber the Canadian French. The maintenance of the bond with Great Britain, the rise of the United States and the influx of English settlers are the broad conditions which have affected the progress of Canada since the cession.

Three years elapsed between Vaudreuil’s surrender and the Treaty of Paris, which confirmed Great Britain in the possession of her American conquests. During this interval the country remained under military rule, and though General Murray’s relations with the subject population were marked by sympathy and tact, it was impossible that a sense of permanence should be inspired by such a document as the Act of Capitulation. The text of the treaty, in its turn, left many essential points unsettled, especially in the domain of law, and not until 1774, when the Quebec Act was passed, did French Canada receive from the British Crown and Parliament a charter upon which it could rely. The first 14 years of British rule were, however, a time of great importance in that the experience gained during this period suggested to Canada a kind of national force at the present day. The mass of the French population, seigneurs and habitants alike, accepted the change of masters in a spirit of resignation. Their courageous support of Montreal and Lévis is proved by a large variety of evidence. They seem to have shown as much daring as the French regulars, together with a superior knowledge of the country and a better grasp of the tactics which were suited to American warfare. That the deportation of the Acadians had stimulated their resistance to the British is more than probable, but in any case loyalty and patriotism would have led them to make a brave defense. Once beaten, they accepted the situation frankly and were not encouraged to rebel by that restlessness of the Indian tribes which took form in the conspiracy of Pontiac (1763-64) (see PONTIAC). The contrast between their docility and the growing dissatisfaction of New England and Virginia did not fail to leave an impression on the official mind both in Quebec and London. The result was that when difficulties arose between them and their English fellow-subjects the government was not disposed to espouse the cause of the latter. Apart from the respect for their property, the guarantee of their religious institutions was the question which came nearest to the hearts of the French Canadians. By Article 27 of Vaudreuil’s Capitulation it was agreed that "the free exercise of the Catholic, Apostolic and Roman religion shall subsist entire in such manner that all classes and peoples of the town and rural districts, places, and distant posts may continue to assemble in churches, and to frequent the sacraments as heretofore, without being molested in any manner, directly or indirectly." This clause of the capitulation was confirmed at the Treaty of Paris (see PARIS, TREATIES OR) with the condition "as far as the laws of Great Britain permit," but any restriction which might seem to be placed upon religious toleration was to be removed by means of a separate treaty rather than real. The communities of nuns were not disturbed even at first, and after a few years of deprivation large estates were restored to the Sulpicians. The Jesuits also would probably have received a continuation of their endowment for the special circumstances attending their
suppression in France shortly before the Treaty of Paris of 1763 and the partial suppression in 1773. As it was, the scrupulous care with which governors like Murray and Carleton (see CARLETON, SIR GUY) carried out the policy of toleration reassured the hierarchy and made it a firm supporter of British rule. Had there been no other factors in the political life of the country than the government and the French Canadians, the first years of the new order would have been peaceful enough. It is true that the commission of Governor Murray (1763) was marked by incidents of less auspicious than the assembly as might hereafter be convened by the governor and council it shall, before their sitting, take the oaths mentioned in the act entitled 'An Act for the further security of his Majesty's person and government, and the succession of the Crown in the heirs of the late Princess Sophia, being Protestants,' etc. In other words, every French Canadian who aspired to sit in the assembly of the colony must subscribe to the disqualification of the adoration of the Virgin and the sacrifice of the mass. Such language (borrowed from the laws of England) would have seemed offensive had political life become active in the colony, but as no assembly was convened till 1791 it remained shorn of practical significance. Real difficulty sprang less from the disaffection of the "new subjects" than from the presence in Canada of certain "old subjects," that is to say, of the English who had come to Quebec and Montreal at the close of the war. Here was a fresh element in the population, small but active and bitterly opposed to the recognition of French institutions. Prior to the outbreak of the Revolution an influential proportion of the English living in Canada were natives of the American colonies who had moved to the northern part of the British dominions with the design of enriching themselves through the fur-trade. Their antagonism to the French was prompted partly by race and religion but also by dissatisfaction with the French law, discouraged the use of the French language, destroyed or fettered the hierarchy, and incidentally have made themselves a dominant class. At no time before the passage of the Quebec Act could they have numbered more than a fifteenth part of the population, but, owing to the strength with which they raised the cry of the ruling race, they enjoyed a position of great prominence. Unfortunately for the success of their program, they incurred the dislike of the local authorities by an extreme radicalism of utterance and demeanor. Carleton, in particular, discounted them and held them to be infected with the mutinous views which were becoming so increasingly prevalent in the English colonies.

Sir Guy Carleton, afterward Lord Dorchester, is the most striking figure in Canadian history from the Conquest to the days of responsible government. The close friend and confidant of Wolfe, he began his career as a soldier. Circumstances made him an administrator and he ended by reaching the full stature of a statesman. Those who approve the policy embodied in the Quebec Act will, of course, rank him higher than he will be ranked by those who deny the wisdom of that far-reaching measure, but regarding the quality of his mind, the firmness of his temper and the justice of his intentions, opinion is undivided. After serving with distinction in the campaigns of 1759 and 1760 he returned to Canada as administrator of the government in 1766. In 1769 he became governor-in-chief; and from this date until his final surrender of power remained among all Englishmen the leading authority on Canadian affairs. The Quebec Act was the fruit of information and advice which he supplied; it was he who repelled Montgomerie's invasion, and the Constitutional Act of 1791 which gave the colony its first training in self-government was largely his work. During a formative period of 30 years his policy of generosity toward the defeated race was the policy of the British government. Murray, whose language reflected his personal resentment, says of the "old subjects": "I retract them in general the most immoral collection of men I ever knew." Carleton, though less severe in his strictures, formed a highly unfavorable opinion of them and expressed his preference for the French Canadians with perfect freedom. According to his forecast, which in this respect has not been altogether justified, the valley of the Saint Lawrence was unlikely to be inhabited by any large number of Englishmen. Most of the English who were then resident in Montreal and Quebec had come in the train of the troops and would probably return with them. The traders had not been successful and would soon disappear. To quote his own words, it remained that "barring a catastrophe too shocking to think of, this country must to the end of time be peopled by the Canadian race." The Canadians, he continues, are not a migration of Britons, who brought with them the laws of England, but a populous and long-established colony. Thus believing that the French could never be supplanted he concluded that their customs, ecclesiastical and legal, should be retained. A detailed statement regarding the Quebec Act will be found elsewhere (see the article THE QUEBEC ACT). Here it need only be said that its territorial provisions were extremely distasteful to the English colonies and that its concessions to the French Canadians have supplied a solid ground work for their loyalty to the British Crown. Whether Sir Biennent Taché was correct when he said, "The last gun that will be fired for British supremacy in America will be fired by a French Canadian," must be termed matter of conjecture; but the sentiment which prompted him to speak so fervently was gratitude for the Quebec Act. This measure provided an unobjectionable oath of allegiance, sanctioned the Roman Catholic religion in so far as it did not conflict with the King's supremacy, and ordained that "in all matters of controversy relating to property and civil rights, resort shall be had to Upper Canada as the rule for the decision of the same." Hence English criminal law and French civil law were established side by side in the regions covered by the act. When Upper Canada was constituted in 1791 it received the common law of England unmodified and un-
limited, but French civil law still survives in the province of Quebec.

At the same time when Great Britain was endeavoring to meet the wishes of her French subjects, the question of Canada was becoming an additional source of friction between the mother country and her older colonies in America. Not only did the English colonies disapprove a policy which heaped such favors upon the French, but some of them represented the King's disposition of the recently acquired territory to the west of the Alleghenies. In the royal proclamation of 1763 nothing was said concerning the government of this valuable region, an omission which disappointed Virginia and other colonies ambitious of expansion. Worse still, the Quebec Act handed over the western country to Canada, shutting out the older colonies and rendering an immense area subject to the operation of French civil law. At any time such action would have provoked remonstrance; in 1774 it quickened the resentment which had been gathering strength ever since the passage of the Stamp Act. How prominent Canada was in the eyes of the Continental Congress may be inferred from the decision, speedily formed, to gain control of it by force. The sequel was a severe blow to the Revolutionary cause. Montgometry (see Montgomery, Richard), advancing by Lake Champlain and the Richelieu, occupied Montreal and nearly succeeded in capturing Carleton, who was the head and front of the defense. Simultaneously Benedict Arnold (q.v.) made his way through the woods of Maine to the valley of the Chaudière and despite dreadful privations appeared before the walls of Quebec. On the arrival of Montgomery from Montreal a siege was commenced, but the sufferings of the troops proved so intolerable that it was decided to carry the town by assault. On 31 Dec. 1775, the two generals made a desperate attempt to force a passage through the streets of the Lower Town. During the fight which ensued Montgomery was killed and the British encountered Carleton drove out the invaders with heavy loss. The war in Canada dragged on during the greater part of 1776 but before the close of that year the Americans had been repulsed at all points and the issue, so far as it affected Quebec, was decided. In the British laws enacted by the Quebec Act the later accretions of English-speaking colonists will range themselves. As the bulk of the new population professed the deepest affection for Great Britain, a separatist movement was not to be thought of, but it was equally certain that disagreement would arise within Canada over the issue of legal and ecclesiastical institutions. As early as 1785 the Loyalists resident on and near Lake Ontario sent a petition to England praying that they might enjoy the blessings of the British constitution and of exemption from French tenure of property. Carleton, now Lord Dorchester, was eminently suited to effect an arrangement between the Loyalists and the French Canadians, toward both of whom he was drawn by feelings of strong sympathy. After establishing the 1788 special regulations for the administration of districts inhabited by Loyalists, he assisted in the preparation of the Constitutional Act (1791), a measure which was designed to do away with the grievances of the Loyalists without creating a sense of grievance among the French. Under the Constitutional Act, which in the British Parliament received support from Pitt and Burke, a division was made between Upper and Lower Canada. For each of these provinces a act created a legislative council and an assembly, but no independent power with respect to tariff legislation was granted. Clergymen of whatever denomination were declared ineligible to sit either in the council or the assembly, but freedom of worship was guaranteed to all. Catholicism in perpetuity and the Protestant clergy received as an endowment one-seventh of all waste lands belonging to the Crown. Some idea of the relative importance of the two provinces at this date may be gathered from the fact that in Lower Canada the legislative council was to
CANADA—UNDER BRITISH RULE TO CONFEDERATION (6)

consist of not less than 15 members, while in Upper Canada the minimum number was placed at 20. The difference in the representation between the number of members in the assembly — the minimum of 50 in Lower Canada as opposed to a minimum of 16 in the other province. Although grave troubles afterward arose under the operation of the Constitutional Act, the measure seems to have encountered little opposition in Canada save from the English minority in Quebec, whose leaders looked forward with discontent to the prospects of political inferiority. No tests excluded Roman Catholics from the council or the assembly, and after the elections of 1792 the latter body in Lower Canada contained 34 French as against 16 English members.

Within six months from the day when the first Canadian legislature met, Great Britain joined Austria and Prussia in their war against revolutionary France. While British North America was not drawn into the vortex of England's contest with the Convention, the Danes, the French, and the American empire, it felt the influence of that long struggle in more ways than one. Besides Canada's part in the War of 1812, which was a by-product of the larger strife, one must mention the attempt of French republicans to make trouble for England in Lower Canada, and a certain neglect of Canadian issues by the home government which may be ascribed to the pressure of more critical questions in Europe. At about the same time when Genet was endeavoring to raise the United States against Great Britain, agents of the National Convention sought to provoke a disturbance among the habitants of Quebec. The execution of McLane and the imprisonment of Fréchette for life are the chief incidents in this abortive undertaking. Of much more consequence was the failure of the colonial office to watch the working of the Constitutional Act in Lower Canada. The council, whose members were appointed by the governor, speedily became a stronghold of English interests. The assembly, whose members were chosen by popular vote, assumed no less speedily a French complexion. As the council considered itself to represent the dominant power and was quite free from the control of the assembly, it was naturally in this sense extraneously offensive to the French majority in the other house. The Constitutional Act gave representation but did not recognize the principle of ministerial responsibility to the popular branch of the legislature. In an age of mounting democracy, this type of government was open to fierce attack, especially when the question was complicated by racial prejudice. Between 1791 and 1812 the most maladroit governor of Lower Canada was Sir James Craig, who for three years (1808-10) carried on open strife with the assembly and finally had recourse to a coup d'état. In his assault upon the Canadien, a Nationalist newspaper, he unwarrantably arrested Bedard as the publisher of treasonable articles, dismissed Panet, the editor, imprisoned him, and eventually imprisoned six of the leading members of the assembly. Craig's action was due to a sincere belief that the French Canadians were disloyal because they criticized the conduct of the war and they had been identified by any notable dissensions. Through no fault of her own, and simply by virtue of being a British possession, Canada was drawn into the War of 1812 (see United States—War of 1812). Among the causes of the war, the only one which concerned her directly was the ill-founded contention that English officials were trying to stir up an Indian attack upon the American colonists in the West. From the outbreak of hostilities till the conclusion of peace Canadians of both provinces conducted the defense of their country in a truly patriotic spirit. The Loyalists were stimulated by the memory of their expatriation and fought enthusiastically for the British cause under Brock and Sheaffe. The French Canadians guided by Bishop Plessis (see Plessis, Joseph Octave) of Quebec, himself the descendant of a New England captive, displayed an attachment to England which had not been so clearly apparent at the time of Montgomery's invasion. Salmon's victory at Chateauguay proved that the French peasants had not lost their ancestral courage or their knowledge of the methods to be pursued in guerilla warfare. At Queenstown Heights (see Queenstown) and Lundy's Lane (see Lundy's Lane, Battle of) the Loyalists acquitted themselves well in the open field. The War of 1812 contributed much to the formation of a patriotic sentiment which was independent of provincial boundaries. The political unrest which affected most civilized countries in the generation following the battle of Waterloo appeared in Canada under an acute form and was not quieted until after the rebellion of 1837. The Upper Province, free from the problem of a mixed nationality, had hitherto been undisturbed by violent disputes, but as time went on the Constitutional Act was found unsatisfactory — or rather, the act gave no redress of the grievances which grew up under the existing system of administration. In Lower Canada the claims of the assembly found an eloquent champion in Louis Joseph Papineau (q.v.), the most prominent French Canadian of his generation. It should be clearly pointed out that the grounds of discord were different in this case, the development of agitation went on simultaneously and the two movements, each proceeding from its own set of conditions, reacted strongly on each other. English radicals and French radicals were brought into close sympathy as agitators by their common opposition to the established order. In both cases there were minorities whose privileges depended upon the maintenance of the constitution and the bitterness of the struggle for responsible government was intensified by the presence of these vested interests. In Upper Canada the contest between officialism and reform did not centre round the first principles of politics so much as it did round the exercise of power by certain individuals. The main strife was one of old settlers against new arrivals; the main issue in the lower classes was the political issues coming in to complicate the situation and render it disagreeable. A few families of Loyalist stock constituted a local oligarchy from which were drawn the chief officials of the colony. As the number of this ruling class belonged almost wholly to the Anglican
Church, and used their influence freely to benefit the Anglican clergy, they provoked the opposition of the dissenters who formed a majority of the more recent immigrants. The political solidarity of Anglicanism and the "Family Compact" led both to be denounced by the champions of responsible government—Robert Gourlay, William Lyon Mackenzie, Dr. Ralph and Egerton Ryerson. The clergy reserves were represented as a symbol of government by privilege and Roman Catholics united with Protestant dissenters to demand the application of the laws of Upper Canada to the support of schools. It will be seen that these sources of discontent were hardly of a fundamental character, but the population of Upper Canada was not one to bear political grievances lightly. In Lower Canada the situation was more intricate and more serious. When the excitement caused by the War of 1812 had died away, the relations between council and assembly resumed their former rancor, while the assembly and the executive became involved in a prolonged dispute over the sum of $10,000. By the financial provisions of the constitution certain revenues were at the disposal of the Crown and the assembly had control of certain other revenues which originally were much smaller. Through the expenses of the colony, the assembly's share of the revenue kept growing larger in proportion to that of the Crown, and at the same time the Radicals discovered that they could place the government in a very awkward position by refusing their consent to appropriations. The advent of which the assembly possessed through its power to keep up a perpetual dispute over fiscal matters was used with much tactical cleverness, though perhaps with less genuine patriotism than might have been desired. The fight against privilege (and there can be no doubt that the council had excessive privileges) was accompanied by a revival of racial feeling among the French Canadians. With Papineau for their leader the Nationalist majority in the assembly used language which showed that their brightest ideal was not summed up in subjection to British sway. Gradually the English element was eliminated from the ranks of the reformers, and though a few politicians of English birth (the so-called "Irishmen") during the disturbances of 1837 his sole hope of success lay in the support of the French. Under such a system of government as was provided by the Constitutional Act, the role of the governor assumed a degree of importance which it does not possess at present in any self-governing colony of the British Empire. Had able men than Sir Francis Bond Head and Lord Gosford represented the Crown in Upper and Lower Canada during the acrimonious debates of 1836, there might have been no breach of the peace. As it was risings took place in both provinces, the Radicals of Upper Canada being encouraged by some initial successes which the party of Papineau had gained in the autumn of 1837. The rebellion cannot be dignified by the name of "Rebellion," for its revelations were accompanied by slight fatalities and the issue was never in doubt. The French Canadian peasants who took the field were defeated at Saint Charles and Saint Eustache, and in Upper Canada the appeal to force collapsed after a farcical skirmish at Montgomery's Tavern, near Toronto. In 1838 fresh disturbances occurred at a few places in Lower Canada, only to be repressed with a promptness which showed the futility of further resistance. Apart from the domestic bitterness occasioned by these outbreaks, they were the cause of a diplomatic crisis in that the American sympathizers of Mackenzie's American sympathizers led to strained relations between Great Britain and the United States. The burning of the Caroline (q.v.) and the fight at Pelee Island (q.v.) were international episodes of the first importance. The best fruit of the rebellion was Lord Durham's report and the transformation of British colonial methods which followed it. In 1838 the Earl of Durham (see DURHAM, J. G. L., EARL OF) was sent to Canada as governor-general and given a commission to investigate the state of the country. The blue-book in which he described the causes of the rebellion and suggested remedies for obvious evils is held, by common consent, to rank first among the documents of the Colonial Office. Whether the commission was chiefly the work of Charles Bulwer, or by both in conjunction with Gibbon Wakefield, the report as it stands is a classic in political literature. The two essential recommendations which it makes are that responsible government be freely conceded and that the provinces of Upper and Lower Canada be reunited with a view of allaying the racial discord which had raged so fiercely in Quebec under the Constitutional Act. The Union Act of 1840 was the immediate sequel of Lord Durham's proposals and a first step toward the political consolidation of British North America. The salient feature of this constitution may be defined as the transfer of political power to an assembly which was chosen on a very democratic basis, though not by universal suffrage. The legislative council, with members appointed by the Crown, was retained, but real authority centred in the popular branch of the legislature. To the assembly each province contributed 42 members and it was provided that a general election should be held every four years, subject to the chance of a dissolution by the governor-general during the interval. The Union Act had imperfections and inconveniences which finally furnished a strong argument for Papineau during the disturbances of 1840-67 Canada gained a political training which was invaluable and escaped from the worst of the anomalies that had provoked the rebellion. At first the act seemed to favor the English, inasmuch as French were to be an official language; but in 1848 it was restored to its former position of parity. With the establishment of democratic principles the party system reached a maturity which before had been unknown in Canada. Lapointe (see LAPIONTAINE, SIR LOUIS H.), Baldwin (see BALDWIN, ROBERT), McNab (see MCBNAR, SIR ALAN N.), Macdonald (see MACDONALD, SIR JOHN A.), Brown (see BROWN, GEORGE), Cartier (see CARTIER, SIR GEORGE E.), and many other accomplished politicians found free scope for their engagements in the ranks of Reformers or Conservatives. Much of the legislation which marks this period (for example, the abolition of seigniorial tenure in 1854) was designed to adjust the life of Canada to modern conditions. Given at the cost of partitioning with a picturesque instinct or discarding an ancient view of the
relations which should subsist between church and state. The Reformers, however, had no exclusive possession of the liberal spirit, for it was a Conservative administration which abolished the clergy reserves. Education in both provinces began to receive an amount of attention which had not been paid to it hitherto. Judged also by economic results the progress of Canada under the Union Act was extremely satisfactory.

As the confederation movement is considered separately (see the article on The Confederation), it will be unnecessary to discuss here the causes which suggested to Canadians a larger political conception than is represented by the Union Act. But in conclusion some reference should be made to the progress of Canada as affected by its relations with England on the one hand and with the United States on the other. From 1840 onwards the country enjoyed self-government in all matters of an imperial character, but it remained a colony and never considered itself to be a co-ordinate part of the British empire. In the second quarter of the 19th century the fixed belief of English ministers was that colonies are a kind of fruit which drops off the parent tree when it has become ripe. The rebellion of 1837 coming when liberal principles were triumphant in the mother country prompted the adoption of a generous colonial policy which has never been abandoned, but its effect upon the rise of imperial sentiment was only indirect. Yet notwithstanding the absence of a full partnership between Canada and England, the loyalty of the colony was signally illustrated during the first century of British rule. Despite friction between races, the pressure of foreign invasion and the existence of political privilege in both provinces, the attachment of an overwhelming majority of the population to British institutions and the British connection remained firm even throughout the decades that preceded the rebellion. The division which the American Revolution created between the United States and British North America could not fail to affect the fortunes of Canada in the most vital manner. Apart from the distractions caused by the filibustering raids of 1838, the question of boundaries was for long periods together unpleasantly prominent. The Webster-Ashburton Treaty of 1842, though it was received with great dissatisfaction in New Brunswick and Quebec, did good rather than harm by settling an irritating dispute. The Reciprocity Treaty of 1854, which was largely due to the efforts of Lord Elgin, brought the two countries into more direct contact than ever before, promoted friendly intercourse, and opened a source of prosperity to Canada during the 13 years of its existence (1854–67). Its repeal by the United States was in large measure due to a resentment which had arisen from Great Britain's attitude during the American Civil War. The fact remains that in its birth year the Dominion of Canada was excluded, by action not its own, from reciprocity in natural products with the United States. See the articles Union Pacific Rule; The Clergy Reserves; Seigniorial Tenure.

Charles W. Colby,
Formerly Professor of History, McGill University.

7. THE MARITIME PROVINCES TO CONFEDERATION. The early history of the three eastern seaboard provinces of Canada is an important incident in the long dramatic struggle between France and England for world-empire. Their place on the map linked their destinies with those of New France on the one hand, and of New England on the other. The tale of their settlement and organization into communities is part of a greater story, the overflow of European peoples into the New World. They have been profoundly affected by great events outside their borders, European wars and political changes on this continent; and if they have not as yet reacted on the history of the world, as a nation they are young; their history is yet to make.

Nova Scotia.—In 1604, Sieur de Monts, a Huguenot gentleman adventurer and trusted soldier of Henry IV, made a voyage to the great Atlantic peninsula, which is now called Nova Scotia (q.v.). He was to found a colony in return for his broad patent to trade in furs. After exploring the rugged eastern and southern coast-line, he discovered the beautiful Annapolis Basin, and wintered, suffering terribly, on the island of Saint Croix. The next year, after searching as far south as Cape Cod for a suitable place, he turned back to the Annapolis Basin, and planted his colony on its shores, naming the cluster of huts Port Royal. The colony did not flourish, and, in 1613, it was destroyed by a force under Argyll from the newly-founded colony of Virginia.

The French name for the country was Acadie, a musical native word, often mistaken for Arcady. It means "abounding in," as in Shu-benacadie, and conveys the idea of a wilderness, comprising what is now Nova Scotia, New Brunswick (q.v.) and part of Maine. In 1621, this territory was granted by James I to Sir William Alexander (q.v.), a Scottish gentleman, to be colonized on a plan distinctly medieval. Alexander was to parcel out his province into "baronies," six miles long by three deep, to gentlemen, who were to "plant" them with settlers. Each baronet was to have almost regal powers within his own domain, even striking his own coinage, and "repelling" criminals from the King's courts of law to his own. The colony was to be a new Scotland, even by a legal fiction, part of the county of Edinburgh. One small settlement was actually made on the Annapolis Basin in 1629, but it came to nothing, and the colony handed back to France in 1632, by the treaty of Saint Germain-en-Laye. Still, to this day, the baronets of Nova Scotia form a distinct order in the British aristocracy, and the provincial flag bears the azure saltire of Sir William Alexander and the red lion of Scotland ramping in gold.

For 22 years, the French had undisputed
Canada — The Maritime Provinces to Confederation (7)

possession, and succeeded in planting a colony on the feudal pattern, as far removed as possible in principle from republican New England. The farms were given to the military in paternal; the land was held by seigneurs and titled by a dotile tenancy. The habitants were chiefly unlettered peasants from the country about Rochelle. In Acadie, they found broad marsh lands beside tidal waters, resembling the country they had left, but with long dykes of logs and earth on the river banks, and peacefully cultivated the rich fields the salt tides fertilized. Population grew slowly. In 1671, there were 378 persons in the colony; in 1683, 600, chiefly about Port Royal. An interesting census of Acadie was made in 1686 by de Meulles, intendant of New France, who visited the scattered settlements and numbered the families, acres of cleared ground, boys, girls, foolis, horned cattle, swine and sheep in each of the new Colonies which had grown to 10,331, including 30 soldiers at Port Royal. Although thickest about the seat of government, the Acadians had spread along the coasts and so far as the Bay of Fundy. Many women were in the habit of bringing wheat, peas and rye and raising cattle, sheep, swine and poultry; they also built small boats for the shore fisheries. An observer relates that when the manure-heaps beside their barns grew unmanageable, they moved the barns. Few women came with the first settlers, who married with the Indians, and always lived on friendly terms with them. Priests of the Sulpicians and Missions-Étrangères were their trusted guides both before and after the English conquest. See article Acadian Refugees.

Throughout this period, the chief interest lies in the shifting fortunes of one family. Claude de St. Etienne, Sieur de la Tour, a ruined Huguenot gentleman of Champagne, came out early in the 17th century, with his son, Charles Amador, a boy of 14, to better himself in the new colony. After Argall's raid, the two lived for years like Indians among the Indians. Their stronghold was Fort Saint Louis, or Sable, now Annapolis Royal, and Port Lamour. In 1627, Charles petitioned Louis XIII to be made commander of the coasts of Acadie, and his father took the petition to the French Court. On his return voyage the next year, he was captured by Kirk's fleet and taken prisoner to England. Here he became a friend of Sir William Alexander, married a maid of honour to Queen Henrietta Maria and was made a baronet of Nova Scotia, as well as his son, with large grants of land to support their titles. With his wife he came back to Cape Sable, where Charles held the one solitary post for France in Acadie. By persuasion, and at last by force, he strove to win his son over. Failing in both, he begged permission to live in Acadie, rather than return to England in shame, or to France and lose his head. This Charles granted, and Claude with his bride, this effects, two valets and two femmes de chambre disembarked. In 1635 Denys the historian found them living there in comfort.

Charles' loyalty by making him his lieutenant-general in Acadie. In 1632, Isaac de Razilly took possession of the province in the name of France; his chief officers were La Tour the younger and D'Aulnay Charnizay. On the death of de Razilly in 1636, the territory was divided between the two; La Tour established himself in baronial state at the military on his Huguenot bride, but D'Aulnay made Port Royal, across the bay, his headquarters. D'Aulnay intrigued against his rival at the court of France and procured his recall to answer charges of fraud upon de Biencourt, his former officer. La Tour went with his forces to go to France, and tried to enlist the Puritans of Boston on his side. Failing them, he obtained help from Rochelle; the proud city of the waters* sent him supplies, munitions of war and 140 soldiers in the Clement. When the Clement arrived in the spring of 1643, she found Port Saint John closely beset by D'Aulnay and 500 men. Being closely pressed, La Tour and his devoted wife slipped through the blockade by night, reached Boston safely, returned with reinforcements and drove D'Aulnay back to Port Royal. But D'Aulnay's hate was not easily tilled. He went to France to raise another force against his enemy. At the same time, Madame La Tour went to Rochelle, to gather more of hostile arms and help growing wheat, pease and rye and raising cattle, sheep, swine and poultry; they also built small boats for the shore fisheries. An observer relates that when the manure-heaps beside their barns grew unmanageable, they moved the barns. Few women came with the first settlers, who married with the Indians, and always lived on friendly terms with them. Priests of the Sulpicians and Missions-Étrangères were their trusted guides both before and after the English conquest. See article Acadian Refugees.

Throughout this period, the chief interest lies in the shifting fortunes of one family. Claude de St. Etienne, Sieur de la Tour, a ruined Huguenot gentleman of Champagne, came out early in the 17th century, with his son, Charles Amador, a boy of 14, to better himself in the new colony. After Argall's raid, the two lived for years like Indians among the Indians. Their stronghold was Fort Saint Louis, or Sable, now Annapolis Royal, and Port Lamour. In 1627, Charles petitioned Louis XIII to be made commander of the coasts of Acadie, and his father took the petition to the French Court. On his return voyage the next year, he was captured by Kirk's fleet and taken prisoner to England. Here he became a friend of Sir William Alexander, married a maid of honour to Queen Henrietta Maria and was made a baronet of Nova Scotia, as well as his son, with large grants of land to support their titles. With his wife he came back to Cape Sable, where Charles held the one solitary post for France in Acadie. By persuasion, and at last by force, he strove to win his son over. Failing in both, he begged permission to live in Acadie, rather than return to England in shame, or to France and lose his head. This Charles granted, and Claude with his bride, this effects, two valets and two femmes de chambre disembarked. In 1635 Denys the historian found them living there in comfort.

Charles' loyalty by making him his lieutenant-general in Acadie. In 1632, Isaac de Razilly took possession of the province in the name of France; his chief officers were La Tour the younger and D'Aulnay Charnizay. On the death of de Razilly in 1636, the territory was divided between the two; La Tour established himself in baronial state at the military on his Huguenot bride, but D'Aulnay made Port Royal, across the bay, his headquarters. D'Aulnay intrigued against his rival at the court of France and procured his recall to answer charges of fraud upon de Biencourt, his former officer. La Tour went with his forces to go to France, and tried to enlist the Puritans of Boston on his side. Failing them, he obtained help from Rochelle; the proud city of the waters* sent him supplies, munitions of war and 140 soldiers in the Clement. When the Clement arrived in the spring of 1643, she found Port Saint John closely beset by D'Aulnay and 500 men. Being closely pressed, La Tour and his devoted wife slipped through the blockade by night, reached Boston safely, returned with reinforcements and drove D'Aulnay back to Port Royal. But D'Aulnay's hate was not easily tilled. He went to France to raise another force against his enemy. At the same time, Madame La Tour went to Rochelle, to gather more of hostile arms and help growing wheat, pease and rye and raising cattle, sheep, swine and poultry; they also built small boats for the shore fisheries. An observer relates that when the manure-heaps beside their barns grew unmanageable, they moved the barns. Few women came with the first settlers, who married with the Indians, and always lived on friendly terms with them. Priests of the Sulpicians and Missions-Étrangères were their trusted guides both before and after the English conquest. See article Acadian Refugees.

Throughout this period, the chief interest lies in the shifting fortunes of one family. Claude de St. Etienne, Sieur de la Tour, a ruined Huguenot gentleman of Champagne, came out early in the 17th century, with his son, Charles Amador, a boy of 14, to better himself in the new colony. After Argall's raid, the two lived for years like Indians among the Indians. Their stronghold was Fort Saint Louis, or Sable, now Annapolis Royal, and Port Lamour. In 1627, Charles petitioned Louis XIII to be made commander of the coasts of Acadie, and his father took the petition to the French Court. On his return voyage the next year, he was captured by Kirk's fleet and taken prisoner to England. Here he became a friend of Sir William Alexander, married a maid of honour to Queen Henrietta Maria and was made a baronet of Nova Scotia, as well as his son, with large grants of land to support their titles. With his wife he came back to Cape Sable, where Charles held the one solitary post for France in Acadie. By persuasion, and at last by force, he strove to win his son over. Failing in both, he begged permission to live in Acadie, rather than return to England in shame, or to France and lose his head. This Charles granted, and Claude with his bride, this effects, two valets and two femmes de chambre disembarked. In 1635 Denys the historian found them living there in comfort.

Charles' loyalty by making him his lieutenant-general in Acadie. In 1632, Isaac de Razilly took possession of the province in the name of France; his chief officers were La Tour the younger and D'Aulnay Charnizay. On the death of de Razilly in 1636, the territory was divided between the two; La Tour established himself in baronial state at the military on his Huguenot bride, but D'Aulnay made Port Royal, across the bay, his headquarters. D'Aulnay intrigued against his rival at the court of France and procured his recall to answer charges of fraud upon de Biencourt, his former officer. La Tour went with his forces to go to France, and tried to enlist the Puritans of Boston on his side. Failing them, he obtained help from Rochelle; the proud city of the waters* sent him supplies, munitions of war and 140 soldiers in the Clement. When the Clement arrived in the spring of 1643, she found Port Saint John closely beset by D'Aulnay and 500 men. Being closely pressed, La Tour and his devoted wife slipped through the blockade by night, reached Boston safely, returned with reinforcements and drove D'Aulnay back to Port Royal. But D'Aulnay's hate was not easily tilled. He went to France to raise another force against his enemy. At the same time, Madame La Tour went to Rochelle, to gather more of hostile arms and help growing wheat, pease and rye and raising cattle, sheep, swine and poultry; they also built small boats for the shore fisheries. An observer relates that when the manure-heaps beside their barns grew unmanageable, they moved the barns. Few women came with the first settlers, who married with the Indians, and always lived on friendly terms with them. Priests of the Sulpicians and Missions-Étrangères were their trusted guides both before and after the English conquest. See article Acadian Refugees.
Col. Francis Nicholson, took Port Royal after a brief but gallant defense by Subercase. Port Royal at once became Annapolis Royal, in honor of the reigning sovereign, but it was not until 1713 by the Treaty of Utrecht (q.v.), and assiduously against the will of Louis XIV, that Acadie became finally a part of the British Empire.

From 1710 to 1749 a small British garrison at Annapolis Royal held the province tenaciously for England. The fort, though well placed, and a Vauban plan, was ruinous; the earthen walls were always crumbling into breaches; the gun-carrigages would not bear the guns; the barracks were roofless; for years the men were without bedding, stockings, greatcoats or medicines. Supply-ships from England came once a year and brought provisions for nine months instead of 12. The hostile population would not take New England money for it must have been of evil. His authority would not honor the governor’s drafts; the Boston merchants refused credit. During Walpole’s long peace England seemed to forget the lonely garrison, while the French priests were agents for the French government, undermining the English. Louisbourg, the new French city on the island of Cape Breton, was yearly growing in power; millions of livres were spent on its defenses, for France was bound to win back her lost province. All the time, convinced of its importance to the empire, one discouraged English governor after another held doggedly to his post.

The government was military, not civil, for the Acadians being Roman Catholics were, by the laws of England, incapable of voting; but at least one official regretted that they could not be given representation. They were governed by their deputies, the “ancienst” and most reputable men of each parish, chosen every year or about 11 October. These were responsible for the good behavior of their districts and for the execution of orders transmitted by the governor-in-council. Philipp, colonel of the 20th regiment, was governor for about a year. He was a hardy fisherman, who presided twice, but resided mainly in London, while lieutenant-governors, chiefly regimental officers, Armstrong, Cosby, Mascarene, administered the colony. The governor was supreme; but to assist him, he had a small council, whose functions were advisory and executive. These officials did their best to advance British interests, giving the litigious Acadians justice in their endless disputes, and making wise suggestions for the improvement of the colony, which had vacancies that led to rivalry in the Duke of Newcastle’s closet of unopened dispatches.

On the outbreak of the War of the Spanish Succession (see Succession Wars) the men of Massachusetts rose and by splendid audacity struck down the stronghold of French power, Louisburg; but that glorious adventure belongs to the annals of New England rather than of Nova Scotia. In the summer of 1744, gallant old Mascarene sustained two hot sieges in his ramshackled stronghold, but the first force was led by young Belleisle and other Acadians; the second, by Du Vivier, a descendant of Charles de la Tour. In 1746, Ramezay encamped against him, awaiting D’Anville’s armada, but did not fight. The same winter, he surprised Noble’s force at Grand Pré, and killed, wounded or took prisoner nearly 200 men.

When the war ended by the Treaty of Aix-la-Chapelle in 1748, Cape Breton was restored to France, and Louisburg, the Dunkirk of America, resumed its old attitude of menace to the very life of the English colonies. Then at last sluggish England moved to save the key to her possessions over-see. Nova Scotia was to have an effective garrison to counter-check Louisburg. In June 1749 a fleet of 13 transports, bearing some 3,000 colonists, and escorted by the sloop-of-war Sphinx, reached the great three-fold harbor of Chebucto, long known for its excellence to French and English mariners. The leader of the expedition was Col. Edward Cornwallis, twin brother of the gay archbishop of Canterbury, and uncle of the Lord Cornwallis, who surrendered Yorktown. His authority did not see service at Fontenoy and Preston Pans, and although his military reputation was afterward clouded by his share in the Rochefort and Minorca fiascos, he did his work as a city-builder well. The new military post, Halifax (q.v.), was quickly laid out. The Acadian population organized into a militia and a rough line of stockade and block-house run along the streets of tents and log-huts. In spite of the character of the settlers, trade-fallen soldiers and sailors, and the plague that carried them off in hundreds; in spite of Indian massacres, opposition from local smugglers, extortions of Boston merchants, discouragements from the home government, Cornwallis made Halifax a place on the map of the world. The founding of Halifax brought about the second capture of Louisburg, leaving the way free for Quebec (q.v.) and the downfall of the French power in America. Emigrants from Old and New England flocked to the new city. In 1750 and again in 1752, some hundreds of settlers came from the Palatinate. After a brief stay in Halifax, they were transferred to the island-studded bay of the La Hève, the old headquarters of de Razilly, where they have grown into a race of hunters and fishermen in his own town, Lunenburg, is the Gloucester of Canada.

In 1752, Cornwallis returned to England crippled by rheumatism, but his successors, Hopson and Lawrence, built strongly on the foundation he had laid. Their great problem was the growth of French power in the fortress of Louisburg and in the Acadian population. Under English rule, the habitants were far happier than under their old masters. The nominal government at Annapolis Royal had been powerless for good or evil, but legally it did not extend beyond a cannon-shot from the walls of Fort Anne. It was precisely under English rule that the Acadians increased and multiplied, and, beginning to press upon the means of subsistence, spread outward, round the Bay of Fundy, to the marsh-lands on the further shore. Their law-suits were nearly always over disputed lands, or boundaries. In 1755, they numbered about 10,000 persons. England and France were then mustering all their forces for the coming struggle of the Seven Years’ War. No one could foretell that it would be final or which country would win. England seemed to be at the lowest ebb of fortune and spirit. Brown’s lugubriousété—The Maritime Provinces to Confederation (7) — 393

male predicted her immediate downfall. France seemed strong in the New World; she had hemmed the disunited English colonies in with a chain of forts from the mouth of the Mississippi to Louisiana. Louis XVI had never ceased to regret the loss of Acadie or to plan for its recovery. The province was the pivot of the whole situation in the east. In these circumstances, the presence of the alien French population in it constituted a grave danger. The claim has been set up that they were neutrals; they had this idea themselves; but this strange notion was simply due to the impotence of the British government. They were no more neutrals than the people of Alsace and Lorraine were after their transfer to Germany in 1871. They were British subjects by conquest, by treaty, by the formal taking of an oath of allegiance and by the common law of nations, but they refused to consider themselves as such. They imagined subjects against another war, or the return of the Pretender. Whether they left the province or remained in it was not a matter of indifference. If they stayed, they afforded a shield to hostile operations; if they went, they would strengthen and feed the garrison of Louisbourg. In this dilemma, the old proposal of Shirley’s was renewed, their deportation. In the autumn of 1755, after Braddock’s defeat gave the signal for war, this was done. The idea originated in New England and was carried out by New England men, acting under the orders of Governor Lawrence. At Grand Pré, Pisiquid, Chignecto and Annapolis Royal, the men were called together and made prisoners, and placed on board the transports; their families followed them. The embarkation consumed long weeks. Finally the ships sailed and distributed the unhappy people among the Atlantic colonies. In all, some 7,000 persons were in this way removed from the province. Opinions differ as to the measure. The French theory is the natural brutality of the English; one writer finds his reason for it in the greed of Lawrence to seize on the belongings of the poor peasantry. The general English view is that it was a war all round, but imperative for self-preservation; and this theory has the support of Parkman.

With the deportation of the Acadians came peace with the Indians. In 1761, Argimoooh, "the great witch," and his braves buried the hatchet in Halifax and washed the war-paint from their bodies. Now for the first time settlers were safe outside the pickets of the city; and the country began to fill up. Emigrants from Connecticut occupied the waste lands of the North, New Englanders settled in the Gaspe and the Western Isles settled about Pictou harbor. Presbyterians from the north of Ireland found homes in Colchester. Before and after the Revolutionary War, thousands of devoted Loyalists came to the province, some to remain, some to pass on. Shelburne, a city of these exiles, numbering 10,000 at one time, passed away like a gipsy encampment. The long wars of peace began with countless inroads upon the wilderness. In a century the Acadians had spread, cleared forest and shore, and settlements were eating into the forest, and hamlets were springing up beside the empty harbors. Before the end of the century, the great industries of shipbuilding and the fishery were in their vigorous infancy. The American Revolution left few marks on the history of the province: efforts were made to bring the colony into revolt with the rest, one daring man planned the siege of Halifax, and some of its patriots with the rebels were tried for treason. There was even something like a tea riot in Halifax; but the conservative forces held the province firm. Halifax prospered, as it always did in war-times, through supplying the army and navy, and the sale of the many prizes brought to port. With the return of peace, the tide of prosperity promptly ebbed. In three great wars since its founding, Halifax was a nest of privateers, which brought large returns to their owners.

Colonial government was at first military. All power was vested in one man, the governor, or his lieutenant-governor, who was usually a soldier. To advise him, he had a council, and his instructions were those of the Crown. As the Acadians were incapable of representative institutions, they were governed through their deputies. Members of the old council were sworn into the new one by Cornwallis, who became governor. His large instructions empowered him to summon assemblies and make laws; but the first assembly was not elected until 1758. From this time, the chief power passed from the governor to the council, a small coterie of Halifax officials and merchants, appointed for life, who sat in secret session and were not responsible to the people. The powers of the assembly were curiously limited, and friction between the two bodies was constant. Governor succeeded governor, almost always an army officer with high Tory views of prerogative and military conceptions of his office. He was gently guided through his unfamiliar civic part by permanent officials in the council like Richard Bulkeley, who came out as aide to Cornwallis and died provincial secretary in 1800. The tone of society as well as government was conservative, not to say reactionary. This state of things lasted until well into the fourth decade of the 19th century. With its large military system as all poor parliaments lived by supplying them, Halifax was in many respects an English garrison town in America. In the first session of the House of Assembly, the Church of England was established by law; the first college was modeled on Oxford, and its statutes required subscription to the Thirty-nine Articles both at matriculation and on taking a degree.

The agitation for reform began outside, for the country was pitted against the city. Jotham Blanchard and Edward Carhart of the Gilead and the Western Isles settled about Pictou harbor. Presbyterian from the north of Ireland found homes in Colchester. Before and after the Revolutionary War, thousands of devoted Loyalists came to the province, some to remain, some to pass on. Shelburne, a city of these exiles, numbering 10,000 at one time, passed away like a gipsy encampment. The long wars of peace began with countless inroads upon the wilderness. In a century the Acadians had spread, cleared forest and shore, and settlements were eating into the forest, and hamlets were springing up beside the empty harbors. Before the end of the century, the great industries of shipbuilding and the fishery were in their vigorous infancy. The American Revolution left few marks on the history of the province: efforts were made to bring the colony into revolt with the rest, one daring man planned the siege of Halifax, and some of its patriots with the rebels were tried for treason. There was even something like a tea riot in Halifax; but the conservative forces held the province firm. Halifax prospered, as it always did in war-times, through supplying the army and navy, and the sale of the many prizes brought to port. With the return of peace, the tide of prosperity promptly ebbed. In three great wars since its founding, Halifax was a nest of privateers, which brought large returns to their owners.

Colonial government was at first military. All power was vested in one man, the governor, or his lieutenant-governor, who was usually a soldier. To advise him, he had a council, and his instructions were those of the Crown. As the Acadians were incapable of representative institutions, they were governed through their deputies. Members of the old council were sworn into the new one by Cornwallis, who became governor. His large instructions empowered him to summon assemblies and make laws; but the first assembly was not elected until 1758. From this time, the chief power passed from the governor to the council, a small coterie of Halifax officials and merchants, appointed for life, who sat in secret session and were not responsible to the people. The powers of the assembly were curiously limited, and friction between the two bodies was constant. Governor succeeded governor, almost always an army officer with high Tory views of prerogative and military conceptions of his office. He was gently guided through his unfamiliar civic part by permanent officials in the council like Richard Bulkeley, who came out as aide to Cornwallis and died provincial secretary in 1800. The tone of society as well as government was conservative, not to say reactionary. This state of things lasted until well into the fourth decade of the 19th century. With its large military system as all poor parliaments lived by supplying them, Halifax was in many respects an English garrison town in America. In the first session of the House of Assembly, the Church of England was established by law; the first college was modeled on Oxford, and its statutes required subscription to the Thirty-nine Articles both at matriculation and on taking a degree. The agitation for reform began outside, for the country was pitted against the city. Jotham Blanchard and Edward Carhart of the Gilead and the Western Isles settled about Pictou harbor.
fax magistrates, in plain terms, of pocketing public money. Their indignation was extreme and they began a libel suit against the daring editor. If truth is libel, Howe had no case; and no lawyer would undertake it. Howe conducted his own defense, and by a brilliant address to the jury secured a triumphant acquittal. From that hour he was the idol of the people, whose cause he had espoused. On the other hand, several hot upholders of the existing order challenged him; he fought one duel, and, having proved his courage, wisely declined further argument by pistol. Howe was a good example of the popular tribune, emotional, eloquent, social, with the faults of such a nature, but possessing tact withal and the statesman's insight into great problems far beyond the ken of provincial politicians. On such questions as the union of the remaining British American colonies, communication between them, the federation of the empire, Howe was far in advance of his time, and his ideas were formative. Henceforth, his career was in politics, rather than in the law. In 1832, Elgin, Lord of All the Isles, recalled him to Halifax in 1836, he at once attacked existing abuses in a series of resolutions, which served chiefly as a program of reform. Soon afterward he began an important correspondence with Lord John Russell, the colonial secretary, upon the difficulties of local government. As a result, the latter instructed Sir Colin Campbell, the governor, to introduce certain of the changes suggested by Howe. This Sir Colin refused to do, and Howe began an agitation which led to his recall. He was succeeded by Lord Falkland, whose remedy for the trouble was coalition in the council. Four of the old council were dismissed, and four Liberals, Howe among them, took their place. But the two interests were irreconcilable: Howe and his friends soon resigned, and began to lay before the people the evils of the irresponsible system. In the election of 1847 Howe and his party swept the country. The new assembly passed a vote of want of confidence in the council, which then dissolved. After a period of weakness, the Liberals were re-established, and the principle of responsible government was established.

The situation of the colonies remaining to Britain on this continent in the first half of the 19th century was of course much less pleasant than it had been before 1760. Nova Scotia was largely virgin forest, with struggling towns and widening clearings: Lower Canada was alien in speech and religion; both passed through the throes of rebellion. The Great West was supposed to be uninhabitable. The provinces by the sea were poor, thinly settled, each with its own government and its own tariff wall against the rest. The 20th century dawns on a united and prosperous country stretching from the Atlantic to the Pacific. For years Howe pointed out the value of union, for the object lesson of the Great Republic was hard to mistake. But here, as in the case of the 13 colonies, before and after they achieved their independence, each province had its own pride, interests and jealousies. Besides these, the geographical barrier to communication was insurmountable; but the locomotive engine changed the face of affairs and provided the solution of the problem. The universal fever for building railways reached the provinces. The first railway in Nova Scotia united Windsor, Halifax, and Truro; the first in New Brunswick, Saint John and Shediac. A bolder idea was to join the provinces, inland and seaboard, by an intercolonial railway. If united for commerce, why should not the colonies be united for government?

It cannot be said that anywhere in the Maritime Provinces was there a popular movement in favor of union. It was the thought of a few strong, far-seeing men, with powers of persuasion, like Macdonald in the West and Howe in the East. Nova Scotia has the honor of leadership in bringing about the Charlottetown conference. When the question came, in 1848, Howe was in opposition, and Tupper carried the resolution through the House. By a curious irony of fate, Howe was now led to combat the very measures he had fought for so long. He took advantage of his opponent's failure to submit such an important measure to the verdict of a popular election and he roused the people into fury against confederation. They were bought and sold, he told them, "for 80 cents a head, the price of a sheepskin." In the next election, the great issue was repeated. The union. Howe re-carried the country, and Tupper was the only conservative returned. Howe tried every legal means to detach his province from the union, but the British government refused to reconsider the measure in Parliament, and Howe would not appeal to Washington, or have recourse to arms. He sought "better terms" for his province from the Dominion government, and entered the Macdonald ministry to assist in working out the problems of the new experiment in government. Though not a consistent man, Howe was a great man; with all his faults, he loved Nova Scotia well, and Nova Scotia will long cherish his memory.

New Brunswick.—The waterway of the Saint John as a greater Indian road, attracted the attention of the French fur traders early in the 17th century. La Tour fixed his headquarters at its mouth. It is still the main artery of the province. There were also French settlements on the rivers and harbors, such as the Miramichi, the Restigouche, and the St. John. The town of Rochelle was partly fortified; the town at Beauport's Point had 200 houses and a chapel. These settlements were not permanent. There was a small colony from Massachusetts at Maugerville on the Saint John; in 1760; but the history of New Brunswick as a political unity begins with the close of the American Revolutionary War.

In some respects, the struggle of the 13 colonies for independence was a civil war, for all the colonists were not of the same mold. Some of the best regiments on the King's side were raised in America. For instance, Fanning, the second governor of Prince Edward Island, at one time judge of the Supreme Court of North Carolina, raised and commanded the King's American Regiment. When the British cause was lost, such forces were disbanded, and the citizen soldiers, impoverished by eight years of war, could not or would not live under the new government. Many of the official class, the Episcopal clergy among them, were also on the losing side. For the defeated, there was no mercy; the fierce republicans would not let them live in the country. After the surrender at Yorktown (q.v.), thousands of these unfortunate fathers of New York and other seaports. No provision was made for
them in the terms of peace; but public sympathy was aroused on their behalf, the British Parliament took generous measures for their relief, Sir Guy Carleton stood their friend. Ships were provided to carry them away, large grants of land were made to them in the loyal colonies, with tools, supplies and provisions for one, two, or three years. Some went to England, but the great majority found homes in the northern wildernesses. There some 30,000 exiles, many of the educated and cultured classes, found refuge. In American history these are the Tories, traitors to their country; in Canadian history, they are the United Empire Loyalists, the makers of the new Dominion. More than any other class of emigrants, they formed present Canadian sentiment and institutions.

The great emigration took place in 1783. On 18 May a fleet of 19 transports, with some 3,000 Loyalists on board, reached the mouth of the Saint John. Here a great stream of 450 miles pours through a narrow break in the rocks into a small harbor, where the flood-tide rises 26 feet. As the tide ebbs leaves 12,000 squatted ships aground. All round are desolate hills masking the fertile region beyond. This unpromising site the Loyalists chose for their city. They were men of the 8th, 9th, 19th regiments, the New Jersey Volunteers, and the Queen’s Rangers. The grantees’ list show good substantial English names. The “fall” fleet brought 1,200 more, and Parrtown, so called in honor of Governor Parr, of Nova Scotia, began its career with a population of 5,000. Politically, it was situated in Sunbury County, Nova Scotia. Soon the Loyalists showed active discontent at Governor Parr’s delay in making out their grants, and in giving them representation in the House of Assembly and, in spite of his opposition, they succeeded in persuading the British government to erect their county into a separate province with a royal governor, council and House of Assembly of their own. This was done in 1784, and the province of New Brunswick was created by royal charter, with Carleton, brother of the famous Sir Guy Carleton (q.v.) for governor. His commission and instructions were practically the same as those given to Cornwallis in 1749. This council of 12 members exercised both executive and legislative functions. The first House of Assembly, of 45 members, was elected, not without riot, in 1785, and met for the first time in the following January. In this year, Parrtown was incorporated as Saint John (q.v.); it was the first city in British America to receive a charter. It is modeled on the charter of New York, and gives the mayor the office of garbling spices and the right to appoint the bearer of the great beam. No emigrant or other person could sell goods without first obtaining the freedom of the city. From the founding of the province until 1832, no changes were made in the constitution. As in Nova Scotia, the prevailing ideas were high Tory; and popular rights received little attention.

New Brunswick’s chief wealth is her great forests; and her two chief industries, lumbering and ship-building, soon sprang up: but agriculture languished. Population followed the waterways, the natural timber roads from the interior. Down to the time of the Crimean War the timber-trade was fostered by last legislation. The province grew, but not steadily: periods of prosperity were followed by periods of depression. Many emigrants brought out by the timber-ships simply passed through to the United States. The Reciprocity Treaty of 1852 was a boon to the Maritime Provinces: its abrogation injured trade.

During the War of 1812, the province was harried by some sea-hogs, and New Brunswick was not invaded, like Upper Canada, because New England was opposed to the war. In the provincial sea-port privateering also flourished. Dalhousie College was founded with customs money taken at Castine by an expedition from Halifax. After 1815, settlers from the United States began to occupy disputed territory between New Brunswick and Maine. The boundary between the two, left vague by the treaty of 1783 almost led to war. The northwest line was to run due north from the source of the Saint Croix River to the height of land between the Saint Lawrence and the Atlantic. Instead of one chain of high lands, there are two chains: between them lay the disputed territory, comprising some 20,000 square miles. In 1794, a commission was appointed to determine the line. The Americans wished to extend the due-north line to the Mètis River in Quebec: the British wished to make Mars Hill the limit, and they could not agree. Another attempt at settlement was made by the Treaty of Ghent. The King of the Netherlands was appointed arbitrator, but his award was not accepted. In 1839, the difficulty became acute. Some lumber-thieves cut timber on the disputable land; the governor of Maine sent a sheriff and posse to drive them out, and New Brunswick lumbermen resisted the officers of the law. The squabble roused intense feeling on both sides. The governor of Maine called for 10,000 troops to guard the State’s rights. The governor of New Brunswick, Sir John Harvey, sent two line regiments with artillery and volunteers to the scene of action. Nova Scotia voted all her militia and £100,000 to aid the sister colony; the Canadians also put. Thomas Carleton, brother of the famous Sir Guy Carleton (q.v. for governor. His commission and instructions were practically the same as those given to Cornwallis in 1749. This council of 12 members exercised both executive and legislative functions. The first House of Assembly, of 45 members, was elected, not without riot, in 1785, and met for the first time in the following January. In this year, Parrtown was incorporated as Saint John (q.v.); it was the first city in British America to receive a charter. It is modeled on the charter of New York, and gives the mayor the office of garbling spices and the right to appoint the bearer of the great beam. No emigrant or other person could sell goods without first obtaining the freedom of the city. From the founding of the province until 1832, no changes were made in the constitution. As in Nova Scotia, the prevailing ideas were high Tory; and popular rights received little attention.

New Brunswick’s chief wealth is her great forests; and her two chief industries, lumbering and ship-building, soon sprang up: but agriculture languished. Population followed the waterways, the natural timber roads from the interior. Down to the time of the Crimean War the timber-trade was fostered by last legislation. The province grew, but not steadily: periods of prosperity were followed by periods of depression. Many emigrants brought out by the timber-ships simply passed through to the United States. The Reciprocity Treaty of 1852 was a boon to the Maritime Provinces: its abrogation injured trade.

During the War of 1812, the province was harried by some sea-hogs, and New Brunswick was not invaded, like Upper Canada, because New England was opposed to the war. In the provincial sea-port privateering also flourished. Dalhousie College was founded with customs money taken at Castine by an expedition from Halifax. After 1815, settlers from the United States began to occupy disputed territory between New Brunswick and Maine. The boundary between the two, left vague by the treaty of 1783 almost led to war. The northwest line was to run due north from the source of the Saint Croix River to the height of land between the Saint Lawrence and the Atlantic. Instead of one chain of high lands, there are two chains: between them lay the disputed territory, comprising some 20,000 square miles. In 1794, a commission was appointed to determine the line. The Americans wished to extend the due-north line to the Mètis River in Quebec: the British wished to make Mars Hill the limit, and they could not agree. Another attempt at settlement was made by the Treaty of Ghent. The King of the Netherlands was appointed arbitrator, but his award was not accepted. In 1839, the difficulty became acute. Some lumber-thieves cut timber on the disputable land; the governor of Maine sent a sheriff and posse to drive them out, and New Brunswick lumbermen resisted the officers of the law. The squabble roused intense feeling on both sides. The governor of Maine called for 10,000 troops to guard the State’s rights. The governor of New Brunswick, Sir John Harvey, sent two line regiments with artillery and volunteers to the scene of action. Nova Scotia voted all her militia and £100,000 to aid the sister colony; the Canadians also put. Thomas Carleton, brother of the famous Sir Guy Carleton (q.v. for governor. His commission and instructions were practically the same as those given to Cornwallis in 1749. This council of 12 members exercised both executive and legislative functions. The first House of Assembly, of 45 members, was elected, not without riot, in 1785, and met for the first time in the following January. In this year, Parrtown was incorporated as Saint John (q.v.); it was the first city in British America to receive a charter. It is modeled on the charter of New York, and gives the mayor the office of garbling spices and the right to appoint the bearer of the great beam. No emigr
As in other colonies, the irresponsible council became an abuse, and many were the contests between it and the assembly. In 1832, a second council was established with executive, but not legislative functions. This was done by the home government in its desire for uniformity in the colonial governments; but the parliamentary aspect of the question with respect to an effective executive council or cabinet to carry out the will of the majority were slow in being understood. It was six years later before the executive included a member of the elected assembly. Slowly the province worked out the problem of self-government. In 1839, when Sir John Harvey read to his legislature, Lord John Russell's despatch on tenure of office, and unlike the governor or Nova Scotia was in accord with its proposals, the assembly, after full debate, actually refused the boon of responsible government. In 1848, however, the modern system in essential particulars was recognized by formal resolution. Charles Fisher, and L. A. Wilmot, afterward judge and lieutenant-governor, were the leading reformers, and two of the most prominent of the reformers, looking at the wrong done by the system, and Sir John Harvey, in were in complete sympathy with the popular movement.

New Brunswick was represented at the Charlottetown conference, where the preliminaries of confederation were discussed. At the Quebec conference, the leading men of the opposition as well as of the party in power were delegates. The 72 resolutions then agreed upon were to be submitted to the various legislatures for their approval. Before the New Brunswick assembly they could be dissolved, and in the new House, a large majority were pledged to oppose them. This led Nova Scotia to withhold the resolutions, as no vital union could be effected with the upper provinces that left out New Brunswick. However, when the House opened in 1866, the majority committed themselves to the policy of union in the speech from the throne. The House dissolved on the issue, and, sentiment having changed, in the new election, the unionists were returned by a large majority. New Brunswick had been out of the federation since its original members of confederation. See article Confederation; also New Brunswick.

Prince Edward Island.—The large crescent-shaped island in the southern part of the Gulf of Saint Lawrence is supposed to have been discovered by Cabot, and afterward by Cartier, who named it Isle Saint Jean. After the conquest, it was still called Saint John's Island until 1780, when the local legislature named it New Ireland, an act disallowed by the British parliament. It was governed from Louisbourg. In 1752 the population was 1,354. Three years later, after the fall of Beaumont and the expulsion of the Acadians, many took refuge there. At the fall of Louisbourg in 1758, the population was at least 4,000 souls, in four thriving parishes. The fertile "Garden of the Gulf," as the islanders love to call their little sea-girt province, was even then worthy of the name. Casgrain calls it a second Acadie; for hence also the Acadians were expelled. When Captain Holland made his survey in 1764, he found only 30 Acadian families "on the footing of prisoners," and a tiny British garrison in a miserable fort.

In 1763, the year of its cession to England, Lord Egmont proposed a plan of settlement worthy of Sir William Alexander in its feudal character. One feature was a chain of baronial castles from one end of the island to the other; but the plan was never carried out. In 1767, the entire island was divided into 67 lots or townships, of some 20,000 acres each, and granted, by lot, in one day to a number of influential Englishmen, on the old condition of settling so many emigrants within a certain time; they were to pay a perpetual quit-rent, or land-tax. Here began the curse of the absentee landlord, which laid the island under a blight for more than a century. At first, it was annexed to the government of Nova Scotia, but in 1768 it was, on the petition of a majority of the proprietors, erected into a separate province. In 1770, the first royal governor, Colonel Patterson, arrived with his official staff, whose salaries were to be paid from the Public Treasury. The formative ideas here were also high Tory. Roman Catholics were not permitted to settle; no schoolmaster from England might teach without a license from the Bishop of London. Population grew slowly; for few of the proprietors fulfilled the conditions on which they got the land. In 1773, the first House of Assembly was elected. Its first act was to confirm all the past proceedings of the governor and the council.

On the outbreak of the Revolutionary War, two American vessels, sent to cruise in the Gulf for British ordnance stores, raided Charlottetown and carried away some prominent officials. For this Washington cashiered the delinquent officers and released the prisoners with expressions of regret. Another raiding expedition from Machias came to nothing, and the island remained free from molestation till the close of the war. In 1781, proceedings were begun in the Supreme Court against the townships in arrears with the quit-rents, and various holdings were escheated and sold, it was thought, without due notice to the landholders. The unimproved waste land was an obstacle to colonization; the owners neither planted settlers nor paid the quit-rents, on which the revenue depended. The landlords argued for the defense, that some of them were officers on active service, that the war had prevented settlement, and that the lands were sold to persons on the ground at absurdly low prices. In rebuttal, Patterson urged that in the midst of a disastrous war, both money and purchasers were scarce; the island might have been captured or ceded back to France. He admitted that he bought up escheated lands, but held he was within his rights as a citizen in doing so; he had also, at his own risk, saved out of the sales, various lots for the absentee owners. In response to various petitions from the proprietors, the home government granted them relief, and sent a draft bill to Governor Patterson, making the sales voidable. This he was to submit to the assembly, but he suppressed it for two years. A new assembly was elected in 1784. It resolved to complain to the King against the governor for disposing of the lands so hastily, when he dissolved it.
The war was now over; the exiled Loyalists were pouring into Nova Scotia, and Patterson hoped to divert the desirable stream of emigration into his own province. Many Loyalists came; by special favors he secured them to his interest. Many of them settled on the lands sold in 1781, and in 1785, secured an assembly certain to support him. It passed an act approving his conduct in escheating the unimproved estates, but the home government disallowed the act and recalled the disobedient official. In 1789, he was again admitted at last to the English Draft Act, already mentioned, to the assembly, which passed it with haste, as also another act of the governor's framing restoring the escheated lands to the rightful owners, but saddling them with heavy expenses; this the home government disallowed and dismissed the members of the council concerned in it.

The new governor, Edmund Fanning (q.v.) arrived in November, but Patterson refused to vacate his office, and the winter was spent in the assembly of fifty or more members, but in the spring, Fanning was firmly established. The escheated lands remained in the quiet possession of their purchasers, some of whom came to terms with the original grantees. Fanning was a native of New York, a graduate of Yale, and a D.C.L. of Oxford. Through the Revolutionary War, he commanded the King's American Regiment and was twice wounded. In his administration, the land question smouldered. The chivalrous Earl of Selkirk, who also settled settlers in Upper Canada and the Northwest, brought out in 1803, 800 of the Clan Ronald Macdonalds and settled them about Point Prim.

Fanning was succeeded by Des Barres, a Swiss officer in the British service, famous for his surveys, his amours and his great age; he jumped over a settle when he was more than a hundred years old. His administration was uneventful, but not so that of his successor. Charles Douglas Smith, brother of the famous Sir Simon, who died in Acre, was a fine example of the old-fashioned high Tory royal governor. His first address to the assembly, when it met in November 1813, was insolent and dictatorial. In the following January, he adjourned it and did not convene it again until 1817. Between this and 1820 the legislature was three times assembled and dissolved, after short sessions, by this exponent of personal rule. His proceedings in regard to the quit-rents were also oppressive. In 1818, in opposition to the express commands of the home government, Smith enforced the payment of quit-rents in arrears. His action, however, the British government disallowed, and ordered part of the exactions to be refunded. Then, for three years, no attempt was made to collect the odious tax; in some instances payment was refused by the receiver-general. In 1823 another effort was made by the governor to enforce payment. The Gaelic-speaking Highlanders of King's County were required to pay duties that seemed obsolete, or give promissory notes at 10 days. In the depth of winter, they must haul their farm produce to Charlottetown and sell at a sacrifice to meet these demands. Without a legislature, the people petitioned High Sheriff MacGregor to call public meetings for the discussion of grievances. The gathering at Charlottetown drew up an address to the King, rehearsing a long list of charges against the governor, and requesting his recall. Smith retorted by opening a libel suit in the Court of Chancery, over which he himself presided, against the committee on the King's address in the House of Assembly. He claimed to prevent the petitions reaching England, but the custodian of them escaped to Nova Scotia. For merely publishing an account of the proceedings the editor of the local paper was brought into the Court of Chancery for libel. When he revealed the names of the men who had been admonished by the chancellor-governor in the vein of Jeffreys. This energetic ruler, who shook his fist at the speaker of the assembly and gave him three minutes by the watch to adjourn the House, was recalled in 1824, when he had brought his long-suffering province to the verge of rebellion.

Governor succeeded governor; the island grew in population and prosperity; fisheries and husbandry throve; but the land question was not yet definitely decided by the fact that the original proprietors had died and bequeathed or had transferred their rights in the island. In 1859 Sir Samuel Cunard (q.v.), the Halifax merchant who founded the famous line of steamers, proposed that the whole question be referred to a commission of three members, one to be appointed by the Crown, one by the island Assembly and one by the proprietors. To this all agreed. Howe was the nominee of the Assembly. The commission sat in the Colonial Building in Charlottetown, examined many witnesses, though not on oath, and heard counsel on behalf of both parties. They afterward visited the shire towns and acquired a vast amount of information on the difficulties. Their report is dated 18 July 1861. It condemns the original method of granting the island, commends the land purchase act, by which the Selkirk and Worrell estates had been acquired for the people, and considers some such system to be the solution of the vexatious problem. It recommends the British government to guarantee a loan of £100,000, which would enable the local government to enter the open market for the purchase of estates. But the home government refused to be bound by the findings of the commission. The old difficulty remained until the island came into the Confederation in 1873, when the Dominion government placed $800,000 to the credit of the province for the purchase of estates and the local legislature made the sale of estates, on evaluation of commissioners, compulsory.

Charlottetown was the scene of the historic conference of delegates from the maritime provinces to discuss union, when the representatives of the Canadas came knocking at the door, but the islanders were not in favor of any change in their status. There was prejudice, the conception of a new nation was hard to grasp and the main issue was befogged by parish politics. Although islanders took part in the Quebec and London conferences also, the island remained outside Confederation until 1873, when the crippling of the provincial means by extensive railroad building led the people to a reconsideration of the matter. The Dominion government gave generous terms, and the little province, while losing nothing of autonomy, entered
into a larger national life. See articles in this
series on Confederation; Since Confederation;
Constitution; Agriculture; Fisheries; Manufac-
tures; The Forests and Lumber Industry; Minerals;
Geography; Prince Edward Island.

ARCHIBALD MACMACHAN,
Professor of English Literature, Dalhousie Col-
lege, Halifacs.

8. CONFEDERATION. In 1837 there
took place two rebellions: one in Upper and
British, the other in Lower and French, Can-
da, simultaneous, but almost unconnected,
and scarcely united in sympathy, since the Brit-
ish Protestants of the upper province were by
no means fraternally linked with the French of
the lower. In Upper Canada the rebellion was
a rising of a democratic party, including many
of the most recent colonists and some from the
United States, against the personal rule of the
imperial governor and the domination of a po-
litician. Lord Durham nicknamed the Family Compact,
and consisting largely of U. E. Loyalists, which
monopolized public offices and emoluments. Its
leader was Lyon Mackenzie, a man honest and
right in his main aim, if responsible govern-
ment is right, but wanting in wisdom and
capacity as a leader. The object of the extreme
wing was an independent republic or annexa-
tion to the United States. That of the less
extreme wing was responsible government on the
British model. The political crisis and the
outbreak of civil war were brought on by the
indiscretion of an inexperienced governor, Sir
Francis Bond Head, who (1835-38) threw him-
self into the arms of the Family Compact and
the Tory party. In Lower Canada the rebellion
was a rising of the French, the conquered race,
who formed the great majority, against the
monopoly of office and power by the British
and conquering race, exercised largely through
a council appointed by the imperial governor.
Its object was the assertion of French equality
and right. It had been preceded by a series of
angry controversies between the French
patriots and the governor with his British
councillors and the Colonial Office at their
back. Both rebellions were quelled (1838) with
ease, without much bloodshed, that in
Upper Canada by the loyal militia, that in
Lower Canada by the Queen's troops. There
were few executions, but some of the leading
insurgents were driven into exile. The constitu-
tion of Lower Canada was suspended, but
that of Upper Canada was not.

The Liberal party in the mother country was
now in the ascendant, having carried Par-
liamentary reform. It looked with sympathy on
the struggle of the Canadians for free institu-
tions. Lord Durham (q.v.), son-in-law of the
Whig Prime Minister, Earl Grey, and though
an aristocrat a strong Liberal, was sent out
(1838) to study the situation. In a report of
remarkable ability, which has been regarded al-
most as the gospel of colonial liberty, he de-
cided in favor of extending to Canadian respon-
sible government on the British model,
requiring the governor, instead of ruling per-
sonally, to be guided, like the British sovereign,
by the advice of responsible ministers, who
were to be elected by the free will of the people.
The report at the same time recom-
}(399)
self with the exercise of an informal influence, rendered important by his character and ability. He could even flatter himself that he did more in this way than he could have done with the formal powers of the governor. He came in, however, for the last of the storm. The Liberal party, now in power, passed an act called the Rebellion Losses Act (1849), indemnifying those who had suffered losses by the destruction of their property in the suppression of the rebellion. This the Tories regarded as the indemnification of the rebels. Their cry was taken up by the Tory party in Great Britain. Elgin gave his assent to the act, reluctantly it seems, in compliance with the rule which required him to be guided by the vote of Parliament and the advice of his responsible ministers. The Tories, now playing the part of insurgents in their turn, rose, burned the Parliament House at Montreal (1849), with its irreplaceable archives, and stoned the governor-general, who had a narrow escape from their fury. After the Rebellion Act had been assented to and was supported by the home government. After this his reign, or rather his term, was peaceful and generally popular, though more popular with the Liberals than with the Tories. The triumph of the free trade policy in Great Britain and American aid had made the friction less. Navigation Acts and was excluded from the market of the United States, bred commercial depression and discontent. The consequence was a manifesto signed by leading commercial men and pointing to union with the American republic as a remedy in the last resort. To put an end to this movement by removing its cause, Lord Elgin went to Washington and negotiated a reciprocity treaty with the United States (1854). This, following the repeal of the Navigation Acts and the release of the Canadian trade from the fetters which they imposed, restored prosperity, allayed discontent and put an end to the desire of annexation.

After the Rebellion Act, the most hotly debated of the political questions was that of the secularization of the clergy reserves (1854) (see CANADA—CLERGY RESERVES), tracts of land, which, before the revolution of 1837, the Crown of England had established in Canada, had been set apart for the maintenance of the clergy of the state church. After a long struggle secularization was carried, and the state church, with its privileges, ceased to exist. King's College, Toronto, which, so far as the teaching staff was concerned, had, like Oxford and Cambridge, been Anglican, was turned into the University of Toronto (see TORONTO, UNIVERSITY OF), and thrown entirely open to all denominations. Under Bishop Strachan, the powerful Anglican leader of the day, high Anglicans seceded from the University of Toronto and founded the University of Trinity College (1852). Other churches, during the continuance of the exclusion, had obtained charters for universities of their own, and dissipation of resources not more than sufficient, if collected, to maintain one great university, was the result.

The abolition of the seigniories (1854) in French Canada (see article SEIGNIORIAL TENURE), relics of the Old Bourgeois regime, the oppressive privileges of the seignior, was another change obviously demanded by the new order of things. It was accomplished peacefully, without violation of the rights of property, and with entire success. Another necessary change was the abolition of the aristocratic custom of primogeniture in succession to land, for which was substituted the democratic principle of equal partition, "giving up," as the movers called it. The Tory party, sympathizing with aristocracy, faintly resisted the change. The progress of democracy was further marked by a change in the constitution of the Legislative Council which formed the Upper House of Parliament. Instead of being nominated by the Crown, as it had hitherto been, it was in 1856 made elective.

The party system of government was now in full play, but the principles and relations of parties were far from being definite or stable. There was a Tory party representing the U. E. Loyalists, and the traditions of the Family Compact under the leadership of Sir Allen MacNab, who opposed the secularization of the clergy reserves and the most pronounced of the imperialists. There were on the other side moderate Liberals under Baldwin and more advanced Liberals under Hincks. But the lines of political party were crossed and perplexed by the nationality of French Quebec. The French Catholics, instead of succumbing to British predominance as Durham had imagined that they would, closed their ranks, showed their force, played on the balance between the British parties and put a Frenchman, in the person of La Fontaine, at the head of the government. For a time it became an understanding that a government, to hold its ground, must have a double majority; that is, a majority both in the British and the French province. The act of reunion had given to the provinces general representation in Parliament, though the population of the French province was much larger than that of the British. Presently the balance of population turned in favor of the British province. The Liberal leaders of the British masses, the most prominent of whom, at least, demanded a rectification in its favor. With the political strife about representation by population, "Rep. by Pop.," as it was called, mingled the religious antagonism between the British and the predominance of the Roman Catholics of the lower. The great advocate of representation by population, and at the same time the extreme exponent of the feelings of the Protestants against the Catholics, was George Brown (q.v.), a Scotch Presbyterian, and founder of the Toronto Globe, the most powerful organ of the British Canadian press in those days. On the other side appeared Mr., afterward Sir, John Macdonald (q.v.), one remarkably gifted with the arts of party management, and with an address in dealing with men which in his chief antagonist, George Brown, was wanting. Macdonald supplanted in the leadership of his party the old-time Tory, Sir Allan MacNab (q.v.), Liberalized it, and set it free from all incumbrances in the way of reactionary principles by which, up to this time, it had been weighted in the struggle for place. It was a stroke of strategy something like that performed in England by Sir Robert Peel (q.v.) when accepting the conscriptions of the Reformers and his party from Tory to Conservative. Between Macdonald and Brown there was, and to the
end continued there to be, enmity, personal as well as political. But Brown was no match for Macdonald in playing the party game. Once for a moment, by a casual defeat of the government of which his rival was a member, he set his foot on the steps of power (1858); but he immediately fell again. Sir Edmund Head, then governor-general (1855-61), having, by an unwonted exercise of the prerogative, which Brown furiously resented, refused him the dissolution and appeal to the country which he demanded (1858). Questions and principles of all sorts were crossed by personal ambitions and connections, as well as by the national sensibilities of Quebec, which naturally carried her to the side of the Conservatives rather than to that of the advocates of representation by population, the hot Protestants and the Orange.

The end, after a rapid succession of changes of ministry, producing a total instability of government, was a ministry with a majority so narrow that it was said that the life of the government was on the page one: finding a member at the moment of critical division. The upshot was a deadlock. The relation between the two races, owing to the persistent attacks of George Brown's party on the French Catholics, had at the same time become critical and dangerous. From this position an escape was sought by merging the antagonism of British and French Canada in a confederation of all the British colonies in North America. The credit of proposing confederation has been assigned to different politicians, to George Brown, to Sir John Macdonald, to Sir Alexander Galt. Of the party leaders, it was George Brown who first came forward holding out his hand to his rival, Sir John Macdonald, to propose coalition for the relief of the situation. But Mr. Brown's original proposal was not a confederation of all the provinces, but a substitution of a federal for the legislative union between the British and the French province. What Sir John Macdonald, as a strong Conservative and monarchist, was not for a federal but a legislative union of all the North American colonies under the British Crown. What all alike wanted was a relief from the situation, and for this purpose a coalition government was proposed. Among its first operations, Sir John Macdonald and George Brown, with followers of both, was formed (1864). The fact is that the real author of confederation, so far as British and French Canada was concerned, was deadlock.

The three maritime provinces, Nova Scotia, New Brunswick and Prince Edward Island, were inclined to a separate union among themselves, especially with a view to a reduction of the expenses of government. A conference of delegates from those three maritime provinces was held at Charlottetown (1864). To that conference delegates were sent by the coalition government of Canada to propose a wider union. The result was a conference at Quebec (1865), at which 12 delegates were present from New Brunswick, 3 from Nova Scotia, 7 from Prince Edward Island, 2 from Newfoundland. That conference sat for 18 days and passed 72 resolutions on which the act of union was afterward based and which each delegation undertook to submit to its own government.

By the Parliament of the two Canadas the scheme was at once accepted and by a large majority, though there was a long debate in which a speaker of the opposition glanced at the geographical unfitness of the long and broken line of provinces for political union. New Brunswick, not being adroitly approached, at first rejected the scheme, but presently acquiesced. In Nova Scotia the resistance was very strong, but it still remains a mystery by what arguments a legislature elected expressly to oppose confederation was brought round to its support. Brought to a vote, however, the legislature of Nova Scotia was. Howe, after a vain appeal to the British Parliament to set Nova Scotia free, himself took office in the confederation government. Prince Edward Island held out, but came in at last. British Columbia threatened repudiation of the union, till the construction of the Canadian Pacific Railway, which was the condition of her entrance, was assured. Newfoundland still remains unfederated. But a great addition was soon afterward made by the purchase of the Hudson's Bay country now comprising the province of Manitoba and the Northwest Territories. The accession of Newfoundland alone is wanted to complete the scheme of confederation. The scheme having been framed by the colonial legislature, was laid for revision before the British government, and by it embodied in the British North American Act. (30 and 31 Vict. Cap. 3; 1867).

When confederation was passed, party lines were drawn again. Brown seceded from the confederation government and the political enmity between him and Sir John Macdonald became as bitter as before.

The Federal constitution was never submitted, like the Constitution of the United States, to the people. It was alleged that in a general election which followed, and in which the confederation government was sustained, the people virtually expressed their approbation. But it is obvious to remark that in this election other issues were also hit, and other influences, that of party especially, played their part. So that it cannot be truly said that the constitution of Canada has even been distinctly ratified by the Canadian people. See articles on this subject: UNDER BRITISH RULE TO CONFEDERATION; THE MARITIME PROVINCES; CONFEDERATION; SINCE CONFEDERATION; IMPERIAL FEDERATION; CONSTITUTION. See also the history of the different provinces in this work.

GOLDWIN SMITH,
Formerly Regius Professor of Modern History of the University of Oxford, and Emeritus Professor of Cornell University.

9. SINCE CONFEDERATION. On 1 July 1867 there were great rejoicings in Canada for it was the birthday of the new Dominion. But at that time the work of founding a Canadian nation was only begun; much remained to do. As it stood on 1 July 1867 the Dominion included only four of the five provinces, New Brunswick, Quebec and Ontario, (qq.v.) and of these Nova Scotia was profoundly discontented and, since her people had never voted upon the question, desired to withdraw from the confederation. Nor did Canada possess the entire East. The two important islands, New-
In 1870 it was not easy for Canada to assert her authority in the remote settlements on the Red River. She might not use for military purposes the territory of the United States, which offered the most convenient route, and she was therefore obliged to send troops through the vast wilderness lying north of Lake Superior. The late Lord Wolseley, then holding a military command in Canada, was chosen to lead a small army to Fort Garry and did the work with brilliant success. After a toilsome journey through hundreds of miles of wild and barren country, Wolseley at length reached Fort Garry only to find that Riel and his provisional government had fled at the approach of the Canadian force. Rebellion crushed, the work of pacification was conducted partly with the aid of Mr. Donald A. Smith, later Lord Strathcona, an official of the Hudson Bay Company. Manitoba soon became a full-fledged province in the Canadian federation and has since played an important part. In view of the present status of Winnipeg, the third city in Canada, with perhaps 150,000 inhabitants, it is interesting to remember that it had not even the telegraph in 1870 and that the railway did not reach the town until 1878.

The trouble in Manitoba settled, Canada had next to pacify her remote Pacific Province, separated from her by an immense and almost unpeopled wilderness. In 1871 British Columbia entered the confederation on the condition that a railway across the continent should be begun within two years and completed within 10. At the time the province contained but a few thousand people of European origin, and there were complaints in eastern Canada that the vast expenditure involved in the bargain would burden too heavily the country's resources. But, on pain of her withdrawal from the union, British Columbia insisted angrily that the bargain should be carried out, and her attitude brought to the front the building of the trans-continental line which was to prove of supreme moment to Canada.

That Canada's small population should spend a hundred million dollars on this undertaking was a stupendous proposal; on the basis of the proportionate cost of each head of population a project for the United States to spend $2,000,000,000 would be its equivalent. If the railway was the condition of national existence in Canada, and in the end the thing was done. Not, however, before the project had long disturbed Canadian political life and threatened to overwhelm its promoters with ruin. When the Canadian Pacific Railway (q.v.) was projected, Canada was face to face with the question that has perplexed all the progressive states of modern times. Should the railway be a government or a private enterprise? Though a similar line the Inter-Colonial Railway, connecting the eastern provinces, was a state enterprise, the cabinet of Sir John Macdonald shrank from saddling the country with so vast a burden as a railway to the Pacific, and it was resolved to hand over the task to a private corporation.

In 1872 there was a general election in Canada, and in the session of Parliament which followed the Canadian Pacific Railway Company with Sir Hugh Allan as president, secured a charter to build the line. With the assurance of assistance from Canada amount-
ing to many millions. But when, as a result of the exposure by the opposition, the fact came out that Sir Hugh Allan had contributed more than $350,000 to Sir John Macdonald's campaign fund, the recent election by the Pacific Scand- dals brought the downfall of the Government, which had accepted the obvious bribe. Amidst great excitement Sir John Macdonald resigned and the Liberals with Mr. Alexander Mackenzie (q.v.) as prime minister took office in November 1873.

For five years the Liberals remained in power. Throwing less energy into the construction of the Pacific Railway than had been promised, they met naturally with discontent in British Columbia. The menace of withdrawal from the confederation was renewed and at length the matter was referred for arbitration to Lord Carnarvon, the Colonial Secretary, in London. He decided that the original terms which too onesidedly a pro-cradle doctrine under which a trans-continental railway should be opened by the end of the year 1890. When the Liberal Government thought even this almost impossible of accomplishment, a Carnarvon Team entered Separation became the war cry in British Columbia. Financial depression overtook Canada in 1876-78 and this heightened the difficulty of the question. But in 1876 the Governor-General of Canada, the Earl of Dufferin, visited British Columbia to soothe her discontent, and he helped to tide over the period of danger. It is interesting to speculate whether an attempt to withdraw from the Canadian union would have been resisted, if necessary, by force of arms. Probably the Canadian and Imperial governments would have agreed in using coercion.

The financial depression that helped to delay settlement for British Columbia produced effects in Canada even more far-reaching, for it led to the cleavage of political parties on the question of Protection (q.v.) or Free Trade (q.v.). In 1878 Canada had a tariff of 17½ per cent, which was hardly sufficient for her growing revenue requirements. During a generation she had tried to secure free exchange of all agricultural products with the United States, and in 1854 Lord Elgin had succeeded in making a Reciprocity Treaty on this basis. But the treaty was not long in force and when abrogated at the close of the Civil War a heavy tariff upon Canadian products was soon imposed by the United States and over at last Canada tried to secure the reversal of this policy but always in vain. Meanwhile the low Canadian tariff permitted American manufacturers to supply the Canadian market at prices with which necessarily smaller producers in Canada could hardly compete, and in time the cry for increased Protection was often heard. Had Mr. MacKenzie's Government taken it up in 1878 probably Sir John Macdonald would have rallied his forces under the banner of Free Trade. But when the Liberal leader refused tenaciously to adopt Protection Sir John Macdonald proclaimed it as a National Policy for building up Canada, and the Canadian electorate, forgetting the discredit which attached to him in connection with the Pacific scandal, returned him to power by an overwhelming majority. Since that time Protection has retained its hold upon Canada, for though the Liberals favored free trade they disturbed the system but slightly on their advent to power in 1896.

An era of great expansion followed the adoption of a protective tariff in 1879. A great many factories were set up, ships were built, and the building of the Pacific Canadian Railway was pushed on with unparalleled energy; in 1885, five years before the time named in the contract, the last spike was driven in the line connecting Western and Eastern Canada and British Columbia's grounds for discontent were finally removed. Once completed the road's value not only to Canada but to Great Britain was soon apparent. Not only did it unite the Canadian provinces; it furnished a ready all-Canadian land route to the East. The Canadian Pacific Railway Company in time established lines of steamers crossing both the Pacific and the Atlantic, and the highway, looked upon as a doubtful possibility in 1878, has now become one of the chief arteries of world commerce.

The completion of the Canadian Pacific Railway was almost coincident with a second rebellion of half-breeds in the Canadian West. On the banks of the Saskatchewan, not far from a village called Prince Albert, a colony of these people had long lived remote from the larger world, and when their country was invaded by the pioneers of modern movement, they began to doubt whether they should be left in permanent possession of the lands they had long occupied. Upon these lands they were technically squatters for they had no patents and no surveys had been made. When at length Canadian surveyors came to lay out their fields on a uniform plan, disregarding the divisions which they had established, the half breeds protested and demanded that they should be granted patents for their lands as they stood. At Ottawa their protests were filed but remained unheeded. The official mind was aghast at the prospect of land grants not based upon the usual survey; the half breeds could get nothing done and they grew ever more restless at the supposed menace to their rights. Disinterested observers sent to Ottawa warnings of a probable rising but official negligence was invincible, and the result of neglect and delay was that in March 1885 the aspiring half breeds attacked a body of police, killed 12 out of 40 engaged, and defied the authority of Canada. Since it was not unlikely that they would be joined by the Indian tribes the outbreak was serious.

The half breed leader was the same Louis Riel (q.v.) who had caused trouble in 1870. On its bands the Government now had a difficult task. As in 1870 it might not send troops through the United States, and the railway on the north shore of Lake Superior connecting Eastern and Western Canada was not yet completed. In bitter March weather, with the thermometer often below zero, the regiments of militia summoned from Eastern Canada, all unprepared by previous hardship to endure the cold, traversed the desolate shores of the frozen region. Sometimes in open flat cars, for more than a hundred miles on foot, they proceeded over the snow. An experienced officer of the expedition declares that the task was more severe than Napoleon's passage of the Alps, for Napoleon had a beaten road and an abundant commissariat, while both were wanting in the Canadian wilderness. The regi-
mements soon poured into the West in overwhelming force and though the few half breeds made a stand against great odds, they were quickly crushed. Their Indian allies the Canadian troops warily followed to their almost trackless haunts, and so the rebellion was put down. A few of the rebels were hanged; a good many of the Indians were imprisoned; Riel, the leader was taken, and then his fate became a question of national concern in Canada.

With Riel the French Canadians had ties of faith and of blood. French Canadians had been pioneers in the Northwest and at times they had dreamed of holding that vast region for their language and faith. If fate was against them, if it was the Anglo-Saxon who was occupying the country and in influence was destined to dominate, none the less was chivalrous support due to the few people who stood in the West for the ideals of France and of the Roman Catholic Church. In 1870 Riel had appealed not in vain to the French in Quebec for help in his time of trouble and it was probably the strength of their sympathy which then saved him from the scaffold. Since in 1885 the men who took up arms had more real grievances the Church espoused their cause. In the Province of Quebec Liberals and Conservatives forgot their quarrels in the name of justice and French Canadian nationality against rigorous treatment of the rebel leader, Louis Riel. On the other hand the English demanded that the law should take its course. Riel had led a revolt in which lives of citizens were lost. If he was a murderer the penalty of murder was his due. The demand was too urgent to be disregarded. Riel was tried; in the eye of the law the penalty of his crime was death, and in November 1885 he was hanged at Regina, the capital of the Northwest territories. See RIEL, REBELLION; see also article JESUITS ESTATES ACT for another religious and racial question in Canada in 1888–89.

The government’s course in regard to Riel was a defeat for the French Canadian bishops who had played an active part in political life. They claimed that even in secular affairs the authority of the bishops was final and that when they spoke the laity were bound to obey. If the Church chose to indicate her desires in regard to the political life of the community, it was the duty of the voters to heed the voice of his spiritual directors. Some of the bishops claimed the right to use spiritual censures to influence electors. Newspapers which opposed the wishes of the hierarchy must not be read by the faithful, and when L’Elécteur, a daily newspaper in Quebec, opposed the bishops’ Mandements in 1896 it was denounced from the altar, and under penalty of grievous sin and the refusal of the sacraments all the bishops forbade formally anyone to read it, to subscribe or contribute to it, to sell it or in any manner whatever to encourage it. The denunciation commanded obedience and made the continued existence of the paper under its existing name impossible. It promptly became Le Soleil, and seemed to supercede the Mandements. The incident showed the authority claimed and exercised by the bishops.

With this attitude on their part occasions of strife were not likely to be wanting. In 1890 the Manitoba government passed an act establishing a non-sectarian system of education. Owing to the peculiar conditions of older Canada the Protestant minority in the province of Quebec had secured the constitutional right to devote the taxes paid by them for education in support of their own schools. In Ontario the Roman Catholic minority possessed a similar privilege. For some time Manitoba had followed the example of Ontario, but, impressed by the obvious advantages of a uniform system, the legislature passed the Act of 1890 which deprived Roman Catholics of former privileges. At once a vehement agitation broke out. The Federal government possesses, within certain limits, the right of disallowing statutes enacted in the provinces and urgent demand was made upon the government of Sir John Macdonald to disallow the Manitoba School Bill. This, on the ground that Manitoba was acting within its constitutional rights, the government refused to do. Appeal was then made to the courts to determine the authority of the respective governments in the matter and the case was finally carried to the Privy Council in London, which decided that the Federal government possessed the right of intervention in regard to the Manitoba schools.

Extraordinary pressure was then brought to bear upon the Federal government. The hierarchy of the province of Quebec took up the question with much heat, while the Protestant province of Ontario was also aroused in support of the opposite side. In 1891, when Sir John Macdonald died, his successors were left with the legacy of the Manitoba school question. The agitation dragged on for five or six years. Retreat from their position the Manitoban government would not, and finally, in 1896, the Federal government endeavored to put through Parliament a remedial bill for restoring to the Roman Catholics of Manitoba the privileges which had been taken away.

It was this question that brought the downfall of the Conservative party so long dominant in Canada, a process accelerated by evidence adduced in 1891 of a share by responsible leaders in the misuse of public funds. In 1896 Sir Charles Tupper (q.v.) became Prime Minister and in a general election appealed to the country to do justice to the minority in Manitoba. On this question many of his Conservatives seeking election, it was the duty of the voter to heed the voice of his spiritual directors. Some of the bishops claimed the right to use spiritual censures to influence electors. Newspapers which opposed the wishes of the hierarchy must not be read by the faithful, and when L’Elécteur, a daily newspaper in Quebec, opposed the bishops’ Mandements in 1896 it was denounced from the altar, and under penalty of grievous sin and the refusal of the sacraments all the bishops forbade formally anyone to read it, to subscribe or contribute to it, to sell it or in any manner whatever to encourage it. The denunciation commanded obedience and made the continued existence of the paper under its existing name impossible. It promptly became Le Soleil, and seemed to supercede the Mandements. The incident showed the authority claimed and exercised by the bishops.

With this attitude on their part occasions of strife were not likely to be wanting. In 1890 the Manitoba government passed an act establishing a non-sectarian system of education. Owing to the peculiar conditions of older Canada the Protestant minority in the province of Quebec had secured the constitutional right to devote the taxes paid by them for education in support of their own schools. In Ontario the Roman Catholic minority possessed a similar privilege. For some time Manitoba had followed the example of Ontario, but, impressed by the obvious advantages of a uniform system, the legislature passed the Act of 1890 which deprived Roman Catholics of former privileges. At once a vehement agitation broke out. The Federal government possesses, within certain limits, the right of disallowing statutes enacted in the provinces and urgent demand was made upon the government of Sir John Macdonald to disallow the Manitoba School Bill. This, on the ground that Manitoba was acting within its constitutional rights, the government refused to do. Appeal was then made to the courts to determine the authority of the respective governments in the matter and the case was finally carried to the Privy Council in London, which decided that the Federal government possessed the right of intervention in regard to the Manitoba schools.

Extraordinary pressure was then brought to bear upon the Federal government. The hierarchy of the province of Quebec took up the question with much heat, while the Protestant province of Ontario was also aroused in support of the opposite side. In 1891, when Sir John Macdonald died, his successors were left with the legacy of the Manitoba school question. The agitation dragged on for five or six years. Retreat from their position the Manitoban government would not, and finally, in 1896, the Federal government endeavored to put through Parliament a remedial bill for restoring to the Roman Catholics of Manitoba the privileges which had been taken away.

It was this question that brought the downfall of the Conservative party so long dominant in Canada, a process accelerated by evidence adduced in 1891 of a share by responsible leaders in the misuse of public funds. In 1896 Sir Charles Tupper (q.v.) became Prime Minister and in a general election appealed to the country to do justice to the minority in Manitoba. On this question many of his Conservatives seeking election, it was the duty of the voter to heed the voice of his spiritual directors. Some of the bishops claimed the right to use spiritual censures to influence electors. Newspapers which opposed the wishes of the hierarchy must not be read by the faithful, and when L’Elécteur, a daily newspaper in Quebec, opposed the bishops’ Mandements in 1896 it was denounced from the altar, and under penalty of grievous sin and the refusal of the sacraments all the bishops forbade formally anyone to read it, to subscribe or contribute to it, to sell it or in any manner whatever to encourage it. The denunciation commanded obedience and made the continued existence of the paper under its existing name impossible. It promptly became Le Soleil, and seemed to supercede the Mandements. The incident showed the authority claimed and exercised by the bishops.
issue in regard to Manitoba had been obscured or the "habitant" wished to assert his right to pass freely through the United States in matters independent of the views of the hierarchy. At any rate Mr. Laurier became Prime Minister of Canada. The Manitoba government made some minor concessions and the matter passed out of view, but an important warning against interference with the 'American' contention that the boundary line followed the sinuosities of the shore. A disputed boundary is always dangerous. Besides this question there were other matters requiring settlement between the United States and Canada, and at last, in 1898, a Joint High Commission, including prominent representatives of both the American and British side, was appointed and sat for some weeks at Quebec and then at Washington. In addition to the Alaska boundary the commission was, if possible, to agree upon a settlement of the differences in regard to the seal fishery in Behring Sea and the Atlantic fisheries; and besides minor matters was to consider the general trade relations between the two countries. Points of variance proving too great, the commission effected nothing; but in the end the two governments agreed that six jurists of repute, three to represent each side, should be appointed with authority finally to settle the Alaska boundary. In the end a majority of the commission gave a decision favorable to the claims of the United States. Lord Alverstone, the British commissioner who supported the American contentions, was severely censured in Canada for an attitude that seemed more diplomatic than judicial, but in spite of a passing irritation there was general satisfaction that a troublesome issue had at last been settled. See Alaskan Boundary Commission.

It has been said that the politics of Canada are railways. A land country so vast, means of transportation are of vital moment. Thus it happened that, after the Canadian Pacific Railway was completed, plans were soon on foot for other transcontinental lines. Since the Canadian Pacific Railway ran near the southern frontier, new lines, it was thought, should open up regions farther north. In 1903 Sir Wilfred Laurier announced that the government of Canada had plans for a new transcontinental railway. The government was to complete the railway from Manitoba, New Brunswick, to Winnipeg, while from that point to the Pacific Coast, at what is now Prince Rupert, the Grand Trunk Pacific Railway Company was to build the line and it was to operate this section and also that from Winnipeg to the Atlantic to be leased to the company by the Canadian government. A little earlier a private firm, Messrs. Mackenzie and Mann, had matured plans for a similar line to cross the Rocky Mountains farther south. The firm had only the capital of remarkable energy. It was by means of government bonuses and guarantees of its bonds that the necessary money was to be obtained. In the end it secured guarantees of this kind amounting to about $250,000,000. Efforts to unite the two plans and to build a single new line were unhappily, not successful. At the present time (1918) both lines have been nearly completed. Their cost has been very great and it came at a time when taxation grew heavier as the great war approached. Three transcontinental railways for a country with a population of less than 8,000,000 were a heavy burden. In 1917 the Canadian government took over the Canadian Northern which could not meet the interest on its bonds and there is, at the moment of writing some
prospect that, to promote economy and efficiency, the government will, for the duration of that period of permanence, control also the Canadian Pacific and the Grand Trunk Pacific with its parent company, the Grand Trunk. The government of Canada will then direct three vast railway systems, each of them stretching from the Atlantic to the Pacific. The economic effect of the Canadian Pacific on the Canadian economy was obvious in 1905 when, from a part of the former Northwest territories, were created two new self-governing provinces, Saskatchewan and Alberta, which together fill the gap between Manitoba and the east and British Columbia on the west. In the background of Canadian politics lurks always religious and racial strife, since two-fifths of the population are Roman Catholics and form a minority so powerful as to keep alive the suspicions of the Protestant minority. In creating the two new provinces, Sir Wilfrid Laurier proposed to allow the majority in a school district to determine the religion, if any, to be taught in the school, the minority to have separate schools with the state paying one-half the costs of the schools set up by taxes on its supporters. Any government grant was to be equitably divided. Since 1875 the Roman Catholics had had the right to separate schools in the territory affected. The policy of the Prime Minister secured the strong support of the Catholic clergy of Quebec but it was as firmly opposed by a larger number of Protestants. A crisis in the government followed and, in the end, the bill was so modified as to place the proposed schools under effective state control. All the demand for sectarian and racial privileges regarding education was pressed. Ruthenians, Poles, Germans and others, besides French in Manitoba, demanded the right to have schools conducted in their own language and declared that this was a sacred heritage, not to be denied to their children without gross injustice. For a time in Manitoba some half dozen languages were used in the schools with official sanction. The need was urged of requiring English in all the schools, if a common Canadian nationality was to be fostered. In 1915 the former Conservative government of Manitoba was defeated and in 1916 the new Liberal government passed a measure requiring the use of English as the teaching language in all the schools and, for the first time, making elementary education compulsory.

The strife in Manitoba angered the French element in Canada. They urged anew the rights guaranteed to their language. Without doubt the original constitution of Manitoba, created in 1870, had set up a bi-lingual system, with French and English on an equality. The truth is that, in a majority at first, the French in the province had by 1916 become relatively unimportant. It was undoubtedly a grievance that rights formerly enjoyed by them should be swept away. The strife spread eastward. Under what is known as Regulation 17, the province of Ontario took steps to ensure that, except in a strictly limited number of admitted cases (French and English), English alone should be used. In Quebec where the majority is French no one challenged the right of the English element to schools using their own language. Though, in fact, in Ontario no constitutional provision supported bi-lingualism, the French urged that, on any basis of justice, the French minority should have the rights in education which the English minority enjoyed in Quebec. The English element in Ontario, it was declared passionately, was persecuting those who used French. Their French press carried on a violent agitation, answered in kind by the Orange men of Canada West. It was obvious that the French tongue would go the dominance of the French-speaking priest. The claim that constitutional guarantees protected the right to use French in the Roman Catholic separate schools of Ontario was negatived on appeal to the Imperial Privy Council, the tribunal to determine finally such constitutional disputes. Trifling as such questions seem, they yet served to make the French, dominant in the province of Quebec, resentful and suspicious, and this no doubt affected their attitude when the European War broke out in 1914.

In 1911 the government of the United States entered into negotiations with the government of Canada for a wide measure of reciprocity in trade, to be kept up by members of both political parties in Canada, but it soon became clear that financial interests in Canada feared the dominance of New York, that Canadian industries were alarmed lest a protective tariff should disappear, and that the Canadian railways, running for thousands of miles east and west, feared a loss through the diverting of the carrying trade southward to the lines of the United States. In the background was the fear of those attached to the political themes that the Canadian trade would discriminate against Great Britain in favor of the United States with the result either of bringing Canada into the American Union, or, at any rate, of severing the tie with Great Britain and softening up a republic of Canada. The political campaign revealed the profound attachment of the Canadian people to Great Britain. An election in September 1911 resulted in the defeat of Sir Wilfrid Laurier, who had made the reciprocity proposal. Mr. Taft, a Conservative government under Mr. (now Sir) Robert L. Borden came into power and the proposals for reciprocity were dropped.

In 1914 came the Great War and the whole life of Canada was soon to be affected. On this event, discussed elsewhere (see CANADA AND THE WAR). In 1917 Canada celebrated the 50th anniversary of the Federal union created in 1867. It had been a period of varied fortune, of reverses as well as of successes. The population had doubled and the 6,000,000 people of Canada in 1917 represented about the same number that the United States had had a hundred years earlier. Not until toward the end of the first decade of the 20th century had the development of Canada been very rapid. By 1911 a remarkable immigration movement was at its height. More than half a million settlers from the United States had by that time found new homes in Canada. Settlers from Great Britain and from continental Europe were also flocking in. In the Prairie country, largely almost tenanted, was filling up rapidly with varied types of human beings. Probably, considering the small population of Canada, they came too rapidly, for half a million newcomers in a single year could not be readily
assimilated when the new arrivals represented about 1 in 10 of the existing population. For the transport involved railways were built in the West too rapidly to be profitable. Even before 1914, depression in all parts of the Western world had tended to check the tide of immigration, and, for the time, the war, begun in that year, suspended it completely. Probably, on the whole, this suspension was in the best interests of Canada, since it ended a speculative fever in regard to lands and brought optimists face to face with stern reality. Already there is a talk of a depopulation of the Prairies in the wake of the war. In a world shattered by war’s disasters it will be a problem for the wisest statesmanship to use the undeveloped resources of Canada to create homes for the landless and penniless who will turn from devastated Europe to the founding of a new life in the West. (See CANADA — POPULATION, IMMIGRATION AND DISTRIBUTION). In Canada, as in every belligerent country, the great war is producing far-reaching effects. Since the war began one by one the trade barriers between the two great powers of the Pacific have imposed such restrictions and prohibitions on the traffic in intoxicating liquors as practically to annihilate it. At the time of writing, from Ontario westward every drinking place in every county of Quebec, including the great city of Montreal, will have done the same thing, and in the Maritime provinces, farther east, by local option, a similar result is nearly achieved. It is likely that by 1920 liquor will not be sold by retail anywhere in Canada except for medical purposes.

When the war broke out, in 1914, Canada had a party government, the result of the victory of reciprocity in 1911. In 1915 the term of five years for which a Parliament is elected expired, but, by agreement between the two great parties, the period was extended by a year. As the war went on, the need was felt of united support of the government so as to avoid the dissipation of energy by party strife. In the summer of 1917, Sir Robert Borden made proposals to Sir Wilfrid Laurier to unite in forming a Cabinet in which the two parties should be represented equally, but this offer the Liberal leader declined. He would not accept the policy, insisted upon by Sir Robert Borden, of compulsory military service in order to keep the Canadian divisions in France. The French Canadians, who are more than a quarter of the people of Canada, had shown themselves hostile to conscription, and on this issue Sir Wilfrid Laurier stood with the members of his own race.

English-speaking Liberals refused, on this point, to follow the lead of Sir Wilfrid Laurier, and the autumn of 1917 saw the formation in Canada of a Unionist government, led still by the former Conservative Prime Minister, Sir Robert Borden, but composed in about equal proportions of Conservatives and Liberals. Since, without practically unanimous consent, the term of Parliament could no longer be extended, an election followed in December 1917, with the result that Sir Wilfrid Laurier led the forces opposed to conscription.

In his own province of Quebec he achieved a personal triumph, carrying 62 out of 65 seats. From the other provinces, however, he secured little more than a score of supporters, and the Unionist government was sustained by an overwhelming majority. The policy of compulsory military service was pressed with energy and Canada has proclaimed to the world her resolve to make every sacrifice to stay in the war to the end.

The disappearance of party government is already producing far-reaching effects on the political life of Canada. The old spoils system had long corrupted politics and this system the Union government has swept completely away. Appointments to the whole civil service are now controlled by a non-partisan Civil Service Commission. Purchases for the government service are made by a committee of experts without regard to party claims. In abolishing the old system, Canada has lagged far behind both Great Britain and the United States, but her reform now promises to be thorough. In respect to other changes Canada is likely to be conservative. Socialism has, as yet, produced little effect on a country where nearly every farmer owns the land he tills and the artisan and the laborer earn high wages. It is still problematical what the war will have on the relations of Canada with Great Britain. It has already demonstrated three things: Canada’s resolve to settle for herself the part, if any, she shall take in British wars; the solidarity of Canadian opinion with that of the other British peoples on the issues of the present war; and the affection and mutual confidence which exists between the peoples scattered in all parts of the world who have a common British allegiance. Whether out of the welter of the war will come a closer political union of the peoples of the British empire for their common defense it is impossible now to say. The question will receive increased attention after the war. It is certain that a unity of aims already exists which will hold together these people whatever political form their union may assume.

GEORGE M. WONG,
Professor of History, University of Toronto.

10. THE CANADIAN WEST. It is doubtful if a British sovereign ever made a more munificent grant to a company of his subjects than did Charles II, in the year 1670, to "The Governor and Company of England trading into Hudson Bay." The sweeping terms of the royal charter defined an area stretching from Hudson Bay to the Rocky Mountains, to which was given the name of Rupert’s Land, in honor of the King’s cousin, Prince Rupert, the company’s first governor. In spite of the hostility of the French Canadian government and the competition of rival traders, the Hudson’s Bay Company succeeded in holding this territory down to the date of its cession to Canada two centuries later. Although a century had elapsed since Sir Francis Drake had sighted the snowy peaks of the Pacific Coast, and half a century since the ill-fated Henry Hudson had discovered the bay which became at once his grave and the monument of his achievement, yet the history of the Canadian West may be said to have commenced from the founding of the Hudson’s Bay Company. See CANADA — THE HUDSON’S BAY COMPANY.

The presence of the English company upon the shores of Hudson Bay was from the outset a serious menace to French Canadian influence in the Northwest. The newcomers were drawn-
ing off the trade of the northern tribes. English and French were face to face in a struggle for commercial supremacy in the West, and their rivalry was bound sooner or later to break into a clash of arms. The Hudson's Bay Company hastened its position by the establishment of four trading-posts: one upon the west shore near the Nelson, and the other three, Forts Albany, Hayes and Rupert, on the south arm of the bay. In the spring of 1686 the progress of trade was rudely interrupted. Captain De Troyes, a company of 80 adventurous Frenchmen, ascending the Ottawa, worked their way slowly by stream and lake over the height of land to the neighborhood of James Bay. So sudden was their coming, and so spirited their attack, that the three lower forts fell almost without resistance.

In 1677 Pierre le Moyne D'Iberville, who had been De Troyes' right-hand man, entered Hudson Strait, under orders from Quebec, to attack Fort Nelson, the most important trading-post on the north side of Canada. The Pilote, under the command of the Peletier, became separated from the rest of the fleet and fell in with three English ships belonging to the Hudson's Bay Company. In the encounter which followed the Pilote sank one of the enemy's ships, while another was disabled, which was the third made off under full sail. Rejoined by his missing ships, D'Iberville soon forced Fort Nelson to surrender. In 1713 the Treaty of Utrecht put an end to hostilities and left the English traders in undisturbed possession of their posts.

Meanwhile French Canadian traders were extending their trade beyond Lake Superior. With these there was ever present the desire to find La Mer de l'Ouest, which they thought could not be far distant. The ambition to discover this Western Sea possessed the mind of Pierre Gaultier de Varennes de la Vérendrye, the commander of a little post on Lake Neepigon. It was late in August 1731 that Vérendrye and his party passed over Le Grand Portage leading over the height of land to the waters flowing toward Lake Winnipeg. The mouth of the Maurepas (Winnipeg) River had been reached when troubles began to crowd upon the unfortunate explorer. The men who were to found a colony were not what he expected, and a mutiny arose. His wife, his only child, died of smallpox. He died of disease on the 10th of September, at the age of 48. His body was buried on the banks of the river. The explorers who accompanied him finished the work of building a fort at the mouth of the river, and they were followed by a party of 100 men, under the command of his son, who named the place Fort Gaspé.

During the last century of the French régime the Hudson's Bay Company had held its own throughout the dangers of war and the competition of trade. Its forts had fallen into the hands of De Troyes and D'Iberville, but had been regained by the Treaty of Utrecht (q.v.). Though the dangers of war were past, the rivalry of the Canadian traders had still to be met. Despite the long overland journey, the latter penetrated to the neighborhood of Hudson Bay, attracting the Indians with showy trinkets, and too often with brandy. The majority of the natives, however, were not easily drawn away from the old company's forts. Every spring the rivers and lakes were dotted with fur-laden canoes making their way to Lake Winnipeg, the meeting place of the hundreds of canoes from the surrounding country. As many as 500 canoes in a year made the long and toilsome journey to York Factory. Here they exchanged their dearly earned furs for coats, blankets, kettles and tobacco, or for necessities of the hunt, such as guns, powder, powder-horns, shot, hatchets and knives.

The conquest of Canada by Great Britain brought about an immediate and complete change in the fur trade. With the passing of the French régime, monopoly and licenses disappeared. The officers of the French company withdrew from the country rather than live under the British flag. The coureurs de bois, suddenly cast adrift, lacked the capital necessary to continue the fur-trade. New employers, however, with whom co-operation was possible, were found in the East, up the Ottawa and across Lake Superior to Grand Portage, where they formed a flourishing community. The newcomers, who at first traded individually, decided upon union, a decision which led to the founding in 1783 of the Northwest Company. Under the stimulus of competition the operations of both companies quickly extended northward to Lake Athabasca and westward to the foot-hills of the Rockies.

The necessity of enlarging the field of trade gave a remarkable impulse to exploration. In penetrating the unknown lands, north and west, the pioneers spread and rendered invaluable service to their country. The honor of leading the way into the northland belongs to Samuel Hearne, a servant of the Hudson's Bay Company. Setting out from Prince of Wales Fort, Hearne succeeded in reaching the Coppermine River. He was the first white man to arrive at the Arctic shores from the interior. The men of the Northwest Company were not slow to follow the example of their rivals. No name holds a prouder place in the annals of American travel than that of Alexander Mackenzie. Fort Chipewyan, situated upon the shores of Lake Athabasca, the trade centre of the north, was the starting point of his two great journeys. The Western Sea, the elusive goal of Vérendrye's travels, was the object of Mackenzie's quest. His first journey, made in 1789, terminated at the Arctic Ocean. Choosing a more westerly stream for his second attempt, Mackenzie ascended the Peace River to its source in the Rockies, crossed the height of land, and, after descending the Fraser River a short distance, struck out across country for the sea. The successful issue of the journey was proclaimed by the following words inscribed upon the face of a rock overlooking the waters of the Pacific: Alexander Mackenzie from Canada by land, the twenty-second of July, one thousand seven hundred
and ninety-three. Two other Nor'westers, Simon Fraser and David Thompson, also made their way to the Columbia, the former in 1808 by the river which bears his name, the latter in 1811 by the Columbia.

While British explorers were forcing a way across the continent, British seamen were making good the country's claim to the Pacific Coast. In 1778 Capt. John Meares touched at Nootka on Vancouver Island. At this centre of trade Lord Selkirk was it who first conceived the idea of planting a settlement at the heart of the continent. From the Hudson's Bay Company he secured a grant of 110,000 square miles in 1787, which he called Assiniboia. Settlers were hurried out from Scotland, and in 1812 a small company, 70 in number, made its way inland from York Factory.

The newcomers were looked upon as intruders by the Nor'westers, who suspected that Lord Selkirk, being a shareholder in the Hudson's Bay Company, had planted his colony to interfere with the trade of the Canadian company. The early years brought trying experiences to the settlers. So short a supply of food that the governor, Miles Macdonell, issued a proclamation to the effect that "no provisions, flesh, fish, grain or vegetables were to be taken out of the lands of the settlement for a year." This action brought the hostility of the Nor'westers to the point of violence. Some of the colonists were bribed to desert, the remainder were driven out by a band of Métis, or half-breeds. Almost immediately, however, the refugees returned, reinforced by another company of immigrants, and the new arrivals came Robert Semple as governor.

Meanwhile Lord Selkirk had arrived in Canada. Hearing at Montreal of the fortunes of his colonists, he had engaged the services of 100 of the best soldiers and set out for the West. While he was yet on the way, stirring events were happening in the Red River Valley. The Nor'westers, angered by the destruction of their fort on the Red, besmirched themselves to destroy the settlement. A strong band of half-breeds was gathered at Fort George in Saskatchewan under the leadership of Cuthbert Grant. On 19 June 1816 Governor Semple was informed that a body of horsemens was approaching over the prairie. Taking a small force, he marched out to inquire the purpose of the intruders. This move precipitated a skirmish at a spot now marked by the Seven Oaks monument. When the firing ceased Semple and 21 of his followers lay dead or mortally wounded. By this disaster the settlers were forced to again leave their homes.

The news of Seven Oaks was a signal for great rejoicing at Fort William, the headquarters of the Northwest Company. The joy of the Nor'westers, however, was rudely dispelled by the sudden arrival of Lord Selkirk. The latter, acting in the capacity of magistrate, arrested several of the leading partners, and sent them down to York; but the following spring he pushed on to the Red River, where he promptly restored the ejected colonists to their farms, settled his soldiers about Fort Douglas and made a treaty with the Indians.

When the news of the tragic death of Semple and his men reached England, the imperial government at once interfered. Both parties to the quarrel were ordered to give up all posts and property seized. The death of Lord Selkirk in the year 1820, though to be regretted, was beneficial to the West, removing as it did the last obstacle in the way of a union of the fur companies.

After the union, which took place in 1821, the management of the company's affairs rested with an official known as the governor of Rupert's Land, assisted by a council of chief factors and traders. A strong man was needed for the governorship, and such an one was found in the person of a young Scotchman named George Simpson, who remained as governor of the company during the next 40 years. To the enterprise of the Hudson's Bay Company, in no small measure, Great Britain owes her control of the Pacific Coast. From the north Russia, from the south the United States, were pressing vital claims which threatened to shut out Great Britain entirely from the sea. Under Simpson's aggressive administration the country between the Rockies and the Pacific was occupied. A fleet of six armed vessels protected the company's coast trade, of which Fort Vancouver was the centre.

Meanwhile the Selkirk settlement, clustering about the historic walls of Fort Garry, was winning its way to prosperity. The hardships of pioneer life in the East were here repeated. Spade and hoe, sickle and cradle, flail and quern, all told of the day of small things. A series of disasters, in the form of grasshoppers and floods, failed to shake the courage of the sturdy settlers. The growth of the colony made necessary a change of government. The people complained that the members of the council of Assiniboia were paid servants of the company, and did not, therefore, represent the popular will. Discontent was a sign of progress, a sign that the settlers were growing beyond the control of a fur company.

The steadily growing importance of the Pacific country made it imperative to determine the boundary line between America and British territory in the West. The 49th parallel was the accepted line as far as the Rockies, and it was agreed that for the time being the country beyond the mountains should be "free and open" to both nations. In 1846 the Oregon treaty continued the boundary line along the 49th parallel to the channel separating Vancouver Island from the mainland. The line was to follow this channel southwesterly to the Pacific Ocean. For several years the ownership of the island of San Juan was in dispute. The question was finally referred for settlement to the German Emperor, who gave his award in favor of the United States. To maintain order among the lawless miners whom the discovery of gold had drawn to the Pacific Coast, a separate government was established on the mainland. New West-
minister, on the Fraser River, became the capital. This arrangement, however, proved unsatisfactory; and at times there was talk of annexing Vancouver Island to the United States. Fortunately a strong British sentiment prevailed, which led to the reunion, in 1866, of the island and the mainland, to form the province of British Columbia. Victoria was chosen as capital.

The British North America Act made provision for the admission to confederation at any time of British Columbia, Rupert's Land and the North-West. The first Dominion Parliament petitioned the British government to hand over to Canada Rupert's Land and the North-West. It was claimed that the rule of a fur company did not tend to the general development of the country, and, moreover, that the extension of the Dominion westward would be a safeguard against any aggression on the part of the United States. The Hudson's Bay Company finally surrendered to Canada its control of Rupert's Land and its property there. The company, in return, received the sum of £300,000, one-twentieth of all land thereafter surveyed for settlement, and also retained its posts and trading privileges.

At the time of confederation (q.v.), the only occupants of the land beyond Lake Superior were roving bands of Indians, a few scattered traders and 12,000 settlers in the valley of the Red River. Ten thousand of these 12,000 were half-breeds, Scotch and French. Into this community, without warning, flocked Canadian surveyors to lay out roads and townships. The country had been handed over to Canada and the interests of the natives were to be sacrificed. Such was the thought of the half-breed element. The storm centre was the French half-breed party, the Métis, led by Louis Riel (see RIEL REBELLION). There was no one in the colony to restrain the latter's madness. Fort Garry was seized and a provisional government established. There was every prospect, however, of a bloodless revolution, but suddenly Riel, in a moment of recklessness, ordered the execution of a young Ontario immigrant named Thomas Scott. The news of this brutal murder raised a storm of indignation in the East. In a remarkable show of the volunteer force under the command of Col. Garnet Wolseley reached Fort Garry, only to find that the instigators of the rebellion had fled across the American border.

Out of the strife of rebellion arose a new province. Even while Wolseley's force was on its way up from the East, the Manitoba Act passed the Canadian Parliament. Manitoba was admitted into confederation as a full-fledged province. The claims of the half-breeds were fully met by a generous land grant. Many of Wolseley's men remained in the new province to share in its making. The little settlement about Fort Garry was soon transformed into the populous city of Winnipeg. Manitoba drew her first governor from the far East, in the person of distinguished Nova Scotian, Adams G. Archibald.

A year later the westward expansion of confederation was continued. British Columbia became part of the Dominion, subject to a very important condition, namely, that a transcontinental railroad should be begun within two years and completed within 10 years from the date of union. In 1872, therefore, Sir John A. Macdonald introduced the question in Parliament. The great enterprise was well under way when the ministry, charged with corruption, was forced to resign. Alexander Mackenzie, who succeeded Sir John, proposed to construct the road gradually, as the finances of the country allowed. This delay put a severe strain upon British Columbia's loyalty to the Dominion. The Macdonald government, returning to power in 1878, immediately took up again the railway question. Construction had begun from both ends; and with such vigor was the work pressed forward that the last spike was driven by Lord Strathcona in November 1885. The completion of a transcontinental railway cemented the bond binding the East and the West.

No sooner was order restored after the Riel rebellion than settlers began to flock into Manitoba. Many farmers from eastern Canada moved west, while from Europe came an ever increasing stream of Scandinavians and Germans. The newcomers spread beyond the limits of Manitoba, many finding their way into the valley of the Saskatchewan, a few even to the foothills of the Rockies. This Northwestern Territory was governed by the lieutenant-governor of Manitoba and a council of 11 members. In 1876 a change took place. The eastern section of the country, called Keewatin, was placed under the personal control of the lieutenant-governor of Manitoba, while the western was given to a resident governor and a council of five members. A few years later four districts were organized, Alberta, Assiniboia, Athabasca and Saskatchewan. Regina, being situated upon the main line of the Canadian Pacific Railway then under construction, was chosen as the seat of government.

The advent of the railway gave promise of peaceful and rapid progress, when suddenly a second rebellion broke out. At the close of the Red Rettlement at the situation, that suddenly Riel, in a moment of recklessness, ordered the execution of a young Ontario immigrant named Thomas Scott. The news of this brutal murder raised a storm of indignation in the East. In a remarkable show of the volunteer force under the command of Col. Garnet Wolseley reached Fort Garry, only to find that the instigators of the rebellion had fled across the American border.

Out of the strife of rebellion arose a new province. Even while Wolseley's force was on its way up from the East, the Manitoba Act passed the Canadian Parliament. Manitoba was admitted into confederation as a full-fledged province. The claims of the half-breeds were fully met by a generous land grant. Many of Wolseley's men remained in the new province to share in its making. The little settlement about Fort Garry was soon transformed into the populous city of Winnipeg. Manitoba drew her first governor from the far East, in the person of distinguished Nova Scotian, Adams G. Archibald.

A year later the westward expansion of confederation was continued. British Columbia became part of the Dominion, subject to a very important condition, namely, that a transcontinental railroad should be begun within two
1 Mount Sir Donald, and the Illecillewaet Glacier, Selkirk Mountains  
2 Lachine Rapids, St Lawrence River
then drove out the garrison of Fort Pitt. When the report of the rebellion reached Ottawa, the Dominion government took prompt action. The call was met with an eager response on all sides. In spite of the great distance, within less than two months 4,400 men were placed in the field, all save the Winnipeg contingent being from eastern Canada.

General Middleton, commander-in-chief of the Canadian militia, who arrived at Qu’Appelle in advance of the main force, made the Canadian Pacific Railway the base line of his operations, and prepared to crush the rebellion in all its centres at once. Three places were in immediate danger: Prince Albert, Battleford and Fort Pitt; three relief expeditions were provided for in the plan of campaign. General Middleton was to advance from Qu’Appelle to Batoche, Riel’s headquarters, Colonel Otter from Swift Current to Battleford, and General Strange from Calgary to Edmonton. The three movements were successfully carried through, the divided forces converging upon Battleford. The bulk of the fighting fell to Middleton’s column, which met with determined resistance both at Batoche and on the banks of the South Saskatchewan. With Riel, Poundmaker and Big Bear finally in custody, the rebellion was at an end. Riel and eight Indians suffered the death penalty.

The rebellion was not without its good results. In recognition of their growing importance, the Northwest territories were granted representation in the Dominion Senate and House of Commons. The need of a stronger government in the Northwest became obvious. The old council was abolished and its place taken by an elective assembly, which first met in 1888, at Regina. But this was not of course a final settlement and in 1905 the vast district between Manitoba and British Columbia was divided into two self-governing provinces—Saskatchewan and Alberta.

The discovery in 1897 of rich deposits of gold in the Yukon (q.v.) was the signal for an influx of fortune-hunters. As a result the long standing dispute over the Alaskan boundary was settled by the cession of Alaska from Russia in 1867, the United States secured all the rights of that nation as laid down in the treaty of 1825 between Russia and Great Britain. The interpretation of the terms of the treaty was left to a commission, composed of three representatives from the United States, two from Canada and Lord Alverstone, the chief justice of England. The commission met in London in September 1903. The decision was, upon the whole, favorable to the American claims. See ALASKAN BOUNDARY COMMISSION.

The growth of the West during the last 30 years has been very marked, the inevitable result of the expansion of the Canadian railway system and the resultant influx of settlers. The lines now cross Canada from coast to coast: the Canadian Pacific (q.v.), the Canadian Northern (q.v.) and the Grand Trunk Pacific (q.v.), the eastern section of which is called the National Transcontinental (q.v.). These transcontinental railways, with their branch lines, have opened up immense tracts of territory to the settler; and in addition a line is under construction from The Pas, on the Saskatchewan River, to Fort Nelson, on Hudson Bay, a distance of 410 miles.

DAVID M. DUNCAN,
Author of 'The Story of the Canadian People,'
Collegiate Institute, Winnipeg.

11. THE SETTLEMENT OF THE CANADIAN WEST.—Without a just appreciation of the attractions and possibilities of the "Canadian West," as the larger half of the Dominion situated west of Lake Superior has commonly been called, neither the Canada of to-day nor that of the future will ever be understood. One of the first acts of statesmanship after the consummation of confederation (see CANADA—CONFEDERATION) was the purchase by the Canadian government from the Hudson’s Bay Company (see CANADA—HUDSON’S BAY COMPANY) of the immense territory forming the basin of Hudson Bay and known as Rupert’s Land, over which that company held proprietary rights. British Columbia, in 1871, entered the Dominion thus brought up to her borders. Some 14 years later followed the completion of the Canadian Pacific Railway (q.v.), which extended the Canadian self-confidence in so young a country. A railway was needed to fulfill the conditions upon which British Columbia had joined the Confederation, and without it the vast territory between that province and Ontario could not be developed nor preserved to Canada. The purchase of Rupert’s Land created the conditions which brought about and justified the building of the first transcontinental railway, and the prolonged discussions over the policy of the government of the day in respect to the public assistance given to that road began the process of popular education in eastern Canada in the extent and resources of the West. A seemingly limitless sphere for internal development gradually was revealed, and the necessity on two occasions for the employment of armed force against half-breed rebellions, with some sacrifice of blood, sealed the sense of possession. Pioneers proved the fertility of the soil and the richness of the mines, and with the assurance of a rapidly increasing population the whole national life received an access of vigor and hopefulness. External policy, as well as internal, was influenced. A country that could produce and export staple foodstuffs in quantities capable of indefinite multiplication, and had vast stores of timber, coal and metals could support great home industries and also become a prominent factor in international trade. It could work at home and bargain abroad. It could make choices. The idea of the trade union of the British dominions, for example, presented itself in practical form largely because of the potentialities of the Canadian West. Population only was needed to show results, and the movement of population into this part of Canada is therefore a subject of interest and importance.

The country lying west and northwest of Lake Superior in Canada is of vast extent and great variety. It includes the extreme western end of the province of Ontario, the provinces of Manitoba, Saskatchewan, Alberta and British Columbia, while beginning again at the east and lying to the north of these districts are the Northwest territories and Yukon. Prior to 1905 the only provinces were Manitoba and
British Columbia. The remainder constituted the territories. Now the territories signify the vast northern region stretching from Labrador to Yukon. The land area in these districts in acres is:

<table>
<thead>
<tr>
<th>District</th>
<th>Area in acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario (western end), approximate</td>
<td>20,000,000</td>
</tr>
<tr>
<td>Manitoba</td>
<td>41,106,900</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>155,092,480</td>
</tr>
<tr>
<td>Alberta</td>
<td>120,715,000</td>
</tr>
<tr>
<td>British Columbia</td>
<td>227,305,400</td>
</tr>
<tr>
<td>Northwest territories (Labrador to Yukon)</td>
<td>1,197,475,200</td>
</tr>
<tr>
<td>Yukon</td>
<td>1,337,113,280</td>
</tr>
</tbody>
</table>

For present purposes the northern territories, with the exception of Yukon, may be disregarded, since they have not yet attracted population to any marked degree. The western end of the province of Ontario is rich in timber and minerals, and possesses stretches of good agricultural land. The prairie region begins at the eastern boundary of Manitoba and extends to the Rocky Mountains, embracing the provinces of Manitoba, Saskatchewan and Alberta: where the prairie extends eastward, it is flat, broken by hills and some rocky ridges and drained by great rivers that flow eastward and northward into great lakes with outlets into Hudson Bay. No richer agricultural lands and no better grazing grounds exist than are here found. Of the 350,000,000 acres in this combined district it would be idle to estimate the proportion of good grain land. It is very large, as attested by the successful farms now scattered throughout the whole region. In 1903 only 3,073,424 acres had yet been put under crop. By the year 1917 the area under crop had grown to 24,938,700 acres. British Columbia is a land of magnificent mountains rich in minerals, and of valleys of the very highest agricultural possibilities, nearly the whole clothed with splendid forests. See the articles in this series: Agriculture; Minerals; The Forests and Lumber Industry.

In 1901 the Canadian West, not including the portion of Ontario, was shown by the census to have a population of 1,742,182. Out of this number 498,347, or 28.6 per cent, had been born in the U.S., 337,478, or 20.4 per cent, had been born in the eastern provinces of Canada, 341,960 or 19.6 per cent had been born in the British Isles, 509,509 or 29.2 per cent had been born in foreign countries, while 37,618, or 2.2 per cent had failed to give their birthplace or been born at sea. By origin 95,238 were of British stock, 152,137 of German stock, 114,877 of Austro-Hungarian stock, 95,106 of Scandinavian, 83,635 of French, 43,676 of Russian and 32,167 of Chinese and Japanese, and in addition to these 78,717 were Indians and 108,905 of unknown origin. To understand the peculiarity and the rate of the movement of population into the Canadian West indicated by these figures, many general considerations must be borne in mind. Conditions as they have existed in the United States are among the most important of these considerations. Until the closing years of the last century the United States was an irresistible magnet. It drew from the movable population of all countries. From Canada itself it attracted a larger proportion of the native population than from any other country. Its relative advantages over Canada, in the eyes of those who sought to better their condition, consisted in its advanced stage of development. Not only were there more varied employment and larger opportunities in industrial and commercial life, but its fertile lands were opened up by railways from 10 to 40 years before those in the Canadian West and the mineral wealth of its western mountains was discovered and advertised to the world years before the riches of Canada in this respect were even suspected. The prairie regions of the Canadian West had to wait for transportation facilities, and then they had to wait until their profiteness was established. Since people are not predisposed to believe in the security of agriculture in northern latitudes, this meant, practically, that they had to wait until the prairies in the United States were tested right up to the border. Before that time even official crop returns could not be widely effective as inducements to immigration. Moreover streams of migration are prairie, to an extent. Where many have gone others tend to follow.

To what extent the United States drew upon Canadians up to 1900 is shown in the census returns of that year which record the residence in that country of 1,181,795, that is, in Canada and Newfoundland. How little the United States had given in return appears from the comparatively small number of 127,899 natives of the United States resident in Canada when the Canadian census was taken in 1901. But the flow of population from Canada to the United States has been checked and the tide has turned, and from census returns of 1 June 1911 it is shown that there were 303,680 natives of the United States resident in Canada, of whom 168,278 were males and 135,402 females; and during the years 1912 to 1917, inclusive, the immigration returns show the arrival in Canada of natives of the United States to a total number of 538,815. Canada has made steady and substantial progress of 455,575. But the flow now provide opportunities for all her own people who desire industrial employment. But what is of more direct importance to the present subject, the cheap, good lands in the United States are now, more than in 1901, making for security and a good birthrate among the farming population have created a host of land seekers of native birth, and the price of land has rapidly risen. In the Canadian West, on the other hand, millions of acres of the most fertile land are obtainable at moderate cost; this land has been proved, and railway facilities and railway rates put the crops within profitable reach of the markets.

The history of the settlement of the Canadian West may conveniently be divided into three periods: the first embracing the time before railway facilities existed or, say, up to 1885; the second from 1885 to 1901; and the third beginning in 1901. So far as the prairie division is concerned fur traders visited it and dwelt in it from time ancient. The West was made at colonization previous to that of Lord Selkirk in the decade succeeding 1812. That his venture, beset with misfortunes though it was, left a permanent result was shown by the fact that in 1875 as many as 530 of the original Selkirk settlers or their white children were
found to claim the grants of land offered by the Canadian Parliament. Other independent colonists had made their way into the country and there were, of course, the employees of the Hudson's Bay Company, but in 1869, when the population of the Territories was made, the total white population numbered only a few hundreds. Some members of the military expedition of 1870 remained as settlers and other accretions were received at about the same time. In 1871 the Dominion government appointed the first immigration agents in the West, one in Manitoba and another in the Territories, and authorized the establishment of an "immigration shed" at Winnipeg, a hamlet then possessing 241 inhabitants. The work of promoting immigration to Canada had been undertaken by the Federal government in 1868, the provincial governments co-operating, and the appointment of agents in the West brought that section into direct touch with the general system having agents in Great Britain and Europe. It is interesting to note that in the inauguration of Canada the Resettlement Act of 1872 the agent at Winnipeg estimates the arrivals during the year at 1,400, of whom 954 came from Ontario, 78 from Quebec and 115 from the United States. During 1872 and 1873 the government entered into negotiations with a number of German municipalities living in southern Russia who desired to emigrate. Delegates visited Canada and in 1874 1,349 of these people settled in southern Manitoba. This is important, not only because it led to further immigration from the same source but also because the attention of the Dominion government was thus directed to the question of special colonization in the West. In 1874 Scandinavian and Icelandic delegates were shown through the country and a small beginning was made in a maritime settlement through the moving up from Ontario of 285 Icelanders. The years 1874 and 1875 may be noted also because the Dominion government thereupon appointed Canadian immigration agents in the United States, chiefly for the purpose of effecting a re-admission of some of the 1,349 who had obtained and agents reported some 400 repatriated Canadians as immigrants into the West in 1876 and some 800 in 1877. In 1879 a delegation of tenant farmers of Great Britain visited the country and their reports resulted in an increase in immigration from the British Isles. The projected transcontinental railway had met with difficulties and delays, but in 1875 work was begun at Thunder Bay, the head of Lake Superior, on the line to Winnipeg, and in 1878 a line from the United States border at Pembina was completed to Saint Boniface, opposite Winnipeg across the Red River. Although the line from Lake Superior was not completed until 1883, the line from Pembina increased the facilities for reaching Winnipeg (q.v.), and the railway builders' work contributed to the"boom in real estate, accompanied by a rush of speculators and prospective settlers. In 1881 the immigration agents estimated the arrivals in Manitoba at about 25,000, in 1882 at almost 70,000, and in 1883 at 93,000. Eastern Canada and the United States contributed the great proportion of these visitors, as most of them proved to be. The boom "burst" in 1883. By the census returns for 1881 some estimate of what was per- manent in the immigration of the previous years can be reached. Manitoba was given a total population of 65,954, of whom 18,020 were born in Manitoba itself, and 6,422 in the Territories. Of these two classes 6,767 were English, 4,075 Scotch, 1,260 Irish, and 656 German; the half-breeds were not separately enumerated. From outside the largest number was furnished by the province of Ontario, namely, 19,125; Quebec supplying 4,085 and Nova Scotia 820. Natives of England and Wales numbered 3,457, of Scotland 1,836, and of Ireland 1,949; of America 5,651, chiefly Mennonites; Germany, 220; Norway, Sweden and Denmark, 121; and France, 81. The United States had contributed 1,752. In the same year the white population of the Territories was 6,974, of whom 517 were born in Ontario, 101 in Quebec, 98 in England and Wales, 136 in Scotland, 62 in Ireland, 27 in France and 116 in the United States. As the Canadian Pacific Railway was pushed through real settlement followed at a faster rate than ever before and in 1885 when the first train was run from Vancouver to the Fraser mouth the net gain in population from the principal sources, over the figures just given for 1881, was: From Ontario 14,996, from Quebec 1,891, from Nova Scotia 497, from New Brunswick 363, from England and Wales 886, from Scotland 4,146, from Ireland 753, from Iceland 1,500, from the United States 578; while each of the other countries showed small gains. The chief sources of increases in the Territories were Ontario 8,300, Quebec 1,200, England and Wales 3,790, Scotland 2,000, and the United States 890.

It will not be necessary to follow in detail the records of the succeeding years up to 1901, which form the second period. The Canadian Pacific Railway Company, which had received large grants of land, became an additional agent in the organizing of immigration movements as also to a limited extent did the colonization societies which had purchased tracts of land in 1882, 1883 and 1884. A movement which began in 1889 and 1890 and ultimately attained considerable proportions did not in fact come from Austria-Hungary. The year 1890 was marked by a considerable immigration from Great Britain. Migration from the eastern provinces of Canada remained moderate until 1898. In 1899 over 7,000 Doukhobors were brought in and established in colonies. According to the census of 1901 Manitoba had a population of 238,934, not counting Indians and half-breeds. Those born in Canada numbered 164,582. Of the Canadians 67,506 were born in Ontario, 8,492 in Quebec, 1,536 in Nova Scotia, 820 in New Brunswick, 419 in Prince Edward Island and 167 in British Columbia. In England there were born 20,036, in Scotland 8,099, in Ireland 4,537, and in Wales 356; in Austria-Hungary 11,570, in Russia 6,034, in Iceland 5,403, in Germany 2,283, in Norway 2,090, in Sweden and Denmark 2,090, in France 1,470, and in the United States 6,922. The Territories had a population of 185,335, exclusive of Indians and half-breeds. Of the 65,231 born in Canada, Ontario was the birthplace of 28,229, Quebec of 4,075, Nova Scotia of 4,075, British Columbia of 120, and Prince Edward Island of 88. Those born in England numbered 10,752, in Scotland 4,226, in Ireland 2,158, and in Wales 186; in Austria-Hungary 13,407, Russia 14,585, Norway,
Sweden and Denmark 2,462, Germany 2,170, France 1,023, Iceland 424 and the United States 1,257.

Before touching the movement of the later years into the prairie region a few words may be said of the progress of settlement in British Columbia. In 1901 the population of that province was 149,708, again excluding Indians and half-breeds. The composition of the population of British Columbia differs from that of the districts we have just been considering in several interesting respects. In the first place, it contained in 1901 relatively a larger number born in the United States, namely, 17,164. Then there were 14,576 Chinese and 4,515 Japanese. Ontario contributed 23,642, but Nova Scotia came next among the provinces with 4,603. These features are easily explainable. The chief attractions of British Columbia have been its mines, its forests, and its fisheries. The first named have in many different years caused rushes from the United States and they have been an added attraction to the people of the province of Nova Scotia. The man from Ontario is a good pioneer under any conditions. A main cause of the rush to California has been that California has had a great many gold rushes and it has been a race for gold. The first gold rush to British Columbia occurred in 1858, nine years after the memorable rush to California. It is said that between 20,000 and 30,000 prospectors from California invaded the province in that year. Systematic exploration, however, was not attempted and the mining population came and went in waves, the years 1858, 1861, 1864, 1865, 1869 and 1872 marking the influxes. Up to 1893 nearly all the gold produced has been placer gold and the values ran from $705,000 in 1858 to $3,913,563 in 1863, continuing at an average of over $3,000,000 until 1868, when with variations a decline set in. The working of lode mines since 1893 has given an element of permanence to the mining population and the annual product of gold has for the past 10 years been between five and six million dollars in value. The copper, silver, zinc and lead mined exceed gold in their total value, copper in 1917 reaching the value of $2,704,494 before coal, of which British Columbia has enormous deposits, shows a steady increase and the annual product now exceeds 2,000,000 tons. In 1917 2,964,993 tons of a value of $7,294,325 were mined. The magnificent timber resources of the province have given employment to an increasing number of men and the yield of the fisheries has grown from $104,697 in 1876 to $14,637,346 in 1917. In 1871, when British Columbia became a province in the Dominion, the population was 36,247, of whom 25,661 were Indians. In 1881 it had increased to 49,548, in 1891 to 98,173, in 1901 to 178,657, in 1911 to 392,480.

The Yukon territory might perhaps be classed with British Columbia. In 1896 the gold discoveries were made there which caused the famous rush in 1897. The census of 1901 gave the Yukon a population of 24,357, exclusive of Indians and half-breeds. Natives of the United States numbered 6,707, of Ontario 1,940, of Quebec 347, of New York 265, of England 1,133 and of Germany 746; not specified 6,573. Pop. (1911) was only 8,512.

The part of Ontario included in the Canadian West has interests of its own in mines and fertile land, but its progress in settlement has been largely bound up with that of the prairie region to the west. The mines in the Lake of the Woods district caused the establishment of the town of Port Arthur and a continuation of prosperity of which, however, came to depend to a great extent on the lumber industry for the supply of the demand in Manitoba and the territories. Port Arthur and Port William on Thunder Bay, Lake Superior, are at the head of lake navigation on the Canadian route, and the summer traffic in goods for the West and in grain and flour from the West is there transshipped, the towns possessing immense storage and shipping grain elevators. These towns are growing rapidly, particularly since 1901, and their growth will keep pace with the development of the West. The completion of the Canadian Northern Railway between Port Arthur and the wheat fields, running through the southern part of the province, has not only assisted Port Arthur but has opened up the valley of the Rainy River and new centres for the lumber industry. In 1911 Rat Portage, now Kenora, had a population of 6,156, Port William 16,499 and Port Arthur 11,226. Since 1901, especially of the two last mentioned towns, has greatly increased and new towns have sprung up along the line of the Canadian Northern.

The third period in the settlement of Manitoba and the Territories began in 1901. Conditions to which reference has previously been made had developed and the time was ripe. In the United States a greater movement of land-seekers was taking place than at any previous time, with the exception perhaps of the early eighties, and good available lands for pioneers were fast becoming occupied. This movement was not directly from the more thickly settled Eastern and Middle States to new lands, but from these States to the Northwestern and Southwestern States. The newcomers were willing to buy lands under cultivation at prices which were comparatively high to the men who had broken them. It was the men who had entered the Northwestern States as pioneers 10, 15 or 20 years before who were offered tempting prices, and in thousands decided to become pioneers again. This movement of population was directed by the railway companies and by private land companies, the managers of which had their connections in all parts and thoroughly understood the business of land settlement. The new feature in the history of immigration into the Canadian West in 1901 was the advent of these United States land companies. As soon as prospects seemed to indicate a good crop in that year, their agents appeared in considerable numbers and purchased large tracts. This continued in 1902. To show the magnitude of the operations it may be mentioned that one of these companies purchased in one block about 1,100,000 acres. The lands thus secured could be offered to land-seekers in the United States at from $4 to $10 per acre. In certain localities, or in the case of improved farms, the price was higher. The man who could sell his farm in the Dakotas, Montana and South Dakota for $30 to $75, or even $100 per acre was offered land in Canada, which returns showed was capable of producing more bushels to the acre, for a price which would not only pay the expenses of the transfer but leave him with a
bank account. In most cases the large blocks of land purchased were sold in smaller lots to middlemen and the holder of agency thereby largely increased his land distributed. Enterprises of Canadian land companies also existed and greatly increased in numbers. By 1903 the first phase of this new development, that is, the purchase of large blocks of land by speculating settlement companies, had almost come to an end. The policy of the government is opposed to selling except to the actual settler and the Canadian Pacific Railway Company, the Hudson's Bay Company and the Canadian Northwest Land Company, the other largest owners of land, were likewise unfavorable to the too extensive operations of speculative middlemen.

It was to the interest of the railway company, particularly, to secure the actual settler as soon as possible and it was believed that prices could most effectually be kept at an attractive level by retaining the retail selling of the lands in the hands of the company. Large sales were, however, made by these Canadian companies in blocks as well as in farms, and it is of interest to note how great an increase in land values accrued as shown by the report of the land sales department of the Canadian Pacific Railway Company for the years 1901 and 1910. During the first year, a total of 831,732 acres was sold for $2,668,837, the average return being $3.18 per acre. In 1910, the sales of agricultural land aggregated 975,030 acres, for $14,468,564.33, being an average of $14.84 per acre. Included in this area were 145,421 acres of irrigated land, which brought $26.59 per acre, so that the average price of the balance was $12.78 per acre. The Canadian Northern Railway Company has also an extensive land grant, from which they had sold in 1910 246,966 acres at an average price of $10.36 per acre, compared with 116,652 acres for $1,691,722.37, an average of $9.36 per acre, in 1909.

Among the factors at work during this period, the immigration department of the government must be given a chief place. The States. To this fund the Dominion government, the government of the province of Manitoba and the city of Winnipeg gave contributions. The effect of the increased immigration from the United States was not alone in additions to population from that source, but the fact that United States farmers were seeking Canadian lands was an excellent advertisement in Europe. The most telling advertisement of all, however, were the splendid crops of 1901 and 1902. The government returns of wheat, oats and barley for Manitoba and the Territories, now the provinces of Alberta and Saskatchewan, for the years 1900, 1901, 1902, 1910, 1913, 1916 and 1917 are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Wheat Acres</th>
<th>Bushels</th>
<th>Yield per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>2,495,474</td>
<td>23,456,985</td>
<td>9.48</td>
</tr>
<tr>
<td>1901</td>
<td>2,516,332</td>
<td>62,820,283</td>
<td>24.90</td>
</tr>
<tr>
<td>1902</td>
<td>2,603,698</td>
<td>67,634,117</td>
<td>25.16</td>
</tr>
<tr>
<td>1910</td>
<td>7,867,432</td>
<td>110,186,704</td>
<td>12.73</td>
</tr>
<tr>
<td>1915</td>
<td>13,887,715</td>
<td>260,187,100</td>
<td>25.97</td>
</tr>
<tr>
<td>1916</td>
<td>14,362,809</td>
<td>242,314,000</td>
<td>16.87</td>
</tr>
<tr>
<td>1917</td>
<td>13,619,410</td>
<td>211,953,100</td>
<td>15.56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Oats Acres</th>
<th>Bushels</th>
<th>Yield per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>833,410</td>
<td>16,654,322</td>
<td>19.98</td>
</tr>
<tr>
<td>1901</td>
<td>919,390</td>
<td>39,899,854</td>
<td>42.32</td>
</tr>
<tr>
<td>1902</td>
<td>1,035,427</td>
<td>14,073,120</td>
<td>13.78</td>
</tr>
<tr>
<td>1910</td>
<td>3,880,606</td>
<td>106,163,510</td>
<td>27.35</td>
</tr>
<tr>
<td>1915</td>
<td>6,480,681</td>
<td>279,691,000</td>
<td>45.37</td>
</tr>
<tr>
<td>1916</td>
<td>7,539,487</td>
<td>313,916,000</td>
<td>42.52</td>
</tr>
<tr>
<td>1917</td>
<td>8,559,500</td>
<td>254,817,200</td>
<td>29.78</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Barley Acres</th>
<th>Bushels</th>
<th>Yield per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>152,569</td>
<td>3,141,357</td>
<td>20.58</td>
</tr>
<tr>
<td>1901</td>
<td>215,711</td>
<td>7,331,255</td>
<td>33.98</td>
</tr>
<tr>
<td>1902</td>
<td>369,204</td>
<td>10,249,536</td>
<td>27.62</td>
</tr>
<tr>
<td>1910</td>
<td>667,171</td>
<td>13,587,900</td>
<td>20.07</td>
</tr>
<tr>
<td>1915</td>
<td>1,171,082</td>
<td>36,003,000</td>
<td>30.74</td>
</tr>
<tr>
<td>1916</td>
<td>1,391,296</td>
<td>33,419,000</td>
<td>24.02</td>
</tr>
<tr>
<td>1917</td>
<td>1,850,000</td>
<td>40,384,100</td>
<td>21.83</td>
</tr>
</tbody>
</table>

The area under wheat, oats and barley in what are now the provinces of Manitoba, Saskatchewan and Alberta was in 1900, 2,481,453 acres, and in 1917, 2,028,910 acres. The total production was, respectively, 43,252,664 bushels and 507,214,400 bushels. For the year 1917, the field crops of the Dominion were as follows:

<table>
<thead>
<tr>
<th>Crops</th>
<th>Area (acres)</th>
<th>Busheles Per Acre</th>
<th>Total Yield (bushels)</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall wheat</td>
<td>725,300</td>
<td>21.50</td>
<td>15,533,450</td>
<td>$323,366,900</td>
</tr>
<tr>
<td>Spring wheat</td>
<td>14,030,590</td>
<td>13.50</td>
<td>218,299,400</td>
<td>409,000,000</td>
</tr>
<tr>
<td>Corn</td>
<td>15,313,400</td>
<td>30.25</td>
<td>403,009,800</td>
<td>277,065,300</td>
</tr>
<tr>
<td>Barley</td>
<td>2,392,200</td>
<td>23.00</td>
<td>55,037,750</td>
<td>59,954,400</td>
</tr>
<tr>
<td>Peas</td>
<td>211,880</td>
<td>18.25</td>
<td>3,837,220</td>
<td>36,670,000</td>
</tr>
<tr>
<td>Peas, beans</td>
<td>198,881</td>
<td>13.25</td>
<td>3,026,340</td>
<td>10,724,100</td>
</tr>
<tr>
<td>Beans, wheat</td>
<td>72,857</td>
<td>13.75</td>
<td>1,247,400</td>
<td>6,493,400</td>
</tr>
<tr>
<td>Buckwheat</td>
<td>395,977</td>
<td>18.00</td>
<td>7,149,400</td>
<td>10,443,400</td>
</tr>
<tr>
<td>Mixed grains</td>
<td>497,236</td>
<td>32.50</td>
<td>16,157,080</td>
<td>18,801,750</td>
</tr>
<tr>
<td>Flax</td>
<td>919,500</td>
<td>6.50</td>
<td>5,934,900</td>
<td>15,737,000</td>
</tr>
<tr>
<td>Corn for stock</td>
<td>234,339</td>
<td>33.00</td>
<td>7,762,700</td>
<td>14,207,200</td>
</tr>
<tr>
<td>Potatoes</td>
<td>656,958</td>
<td>121.50</td>
<td>79,892,000</td>
<td>80,904,400</td>
</tr>
<tr>
<td>Turnips, etc.</td>
<td>218,233</td>
<td>290.75</td>
<td>63,451,000</td>
<td>29,233,000</td>
</tr>
<tr>
<td>Hay and clover</td>
<td>8,225,034</td>
<td>1.66</td>
<td>13,684,700</td>
<td>141,376,700</td>
</tr>
<tr>
<td>Fodder corn</td>
<td>366,518</td>
<td>7.34</td>
<td>2,690,570</td>
<td>13,834,900</td>
</tr>
<tr>
<td>Sugar beets</td>
<td>14,000</td>
<td>8.40</td>
<td>117,000</td>
<td>763,800</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>109,825</td>
<td>2.39</td>
<td>262,400</td>
<td>3,041,300</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>42,602,288</strong></td>
<td></td>
<td><strong>1,144,636,450</strong></td>
<td></td>
</tr>
</tbody>
</table>

The area in field crops in the Dominion increased from 19,763,740 acres in 1900 to 30,556,106 acres in 1910, and to 42,602,288 acres in 1917; and the total values of field crops from $194,953,420 in 1900 to $384,513,795 in 1910, and to $1,144,636,450 in 1917. The estimates for 1916 the average value of farm lands in Canada was $40.95 per acre; the average wage of farm help (including board) was $43.23 per month for males and $22.46 for fe-
The Canadian constitution is embodied in the act of the British Parliament called the British North America Act, which can be amended only by the power by which it was passed. In common with the other colonies, self-governed as they are styled, Canada remains in the allegiance of the British Crown, retains the constitutional forms and nomenclature of the monarchy, and is, to a certain, though of late years diminishing, extent, under the actual control of the Imperial government. The legislation of the Imperial Parliament is, with certain exceptions, binding upon Canada. To the King's government under the control of the Imperial Parliament belong the treaty-making power — with the exception of commercial treaties — and the power of peace and war. By the Imperial government the governor-general, the legal head of the Dominion is appointed. The supreme jurisdiction is still the British Privy Council, and in it is vested the interpretation of the Canadian constitution. The fountain of honor is Imperial. The territory of the Dominion is part of the domain of the Crown at the disposal of the Imperial government, which has exercised its power in boundary cases. The tendency, however, since confederation, has been constantly toward practical independence. The veto power has been very sparingly exercised, and only in exceptional cases, as in that of copyright where the colonial act conflicted with the Imperial law. Appeal from the colonial courts to the Privy Council has been restricted. Military occupation has ceased. The military administration has passed, not without friction, into the hands of the Canadian Minister of Militia, and the Chief of the General Staff, as the principal military officer is called, is his subordinate. In commercial relations Canada is autonomous. The dispensation of titles and decorations to which great influence is attached, still remains Imperial, though even in this the wishes of the Canadian government probably make themselves felt.

The Dominion of Canada and the other self-governing dependencies of the British Crown faithfully reproduce the forms of monarchy. The governor-general of Canada, as the representative of the British sovereign, has the prerogative of calling and dissolving Parliament, of appointing the members of the Privy Council, of nominating the Senate. Parliament is opened by him with a "speech from the throne." But, like the monarch whom he represents, he reigns but does not govern. Very rare have been the instances since the confederation, and those not cases of general policy, in which he has exercised his personal power. Only of the pageantry of his office and of his assumption of state has there since confederation been an increase, favored by those who desire to foster the monarchical sentiment. The lieutenant-governors of provinces, nominally appointed by him, are really appointed by his ministers, and almost invariably from the ranks of their own party. When one of them was dismissed it was apparently against the wish of the governor-general and in a case where a reference to the home government the governor-general was directed to conform to the opinion of his constitutional advisers.

The legislative power is divided between the
central legislature and those of the provinces; the subjects of legislation assigned to each being by the act establishing the executive and legislative authority of the Parliament of Canada extends to (1) the public debt and property; (2) the regulation of trade and commerce; (3) the raising of money by any mode or system of taxation; (4) the borrowing of money on the public credit; (5) military service; (6) the census and statistics; (7) militia, military and naval service and defense; (8) the fixing of and providing for the salaries and allowances of civil and other officers of the government of Canada; (9) beacons, buoys, lighthouses, and Sable Island; (10) the making of rules for the planting and propelling of (11) quarantine and the establishment and maintenance of marine hospitals; (12) the coast and inlet fisheries; (13) ferries between a province and any British or foreign country, or between two provinces; (14) currency and coinage; (15) banking, incorporation of banks and the issue of paper money; (16) savings banks; (17) weights and measures; (18) bills of exchange and promissory notes; (19) interest; (20) legal tender; (21) bankruptcy and insolvency; (22) patents of invention and discoveries; (23) copyright; (24) Indians and lands reserved for the Indians; (25) naturalization and aliens; (26) marriage and divorce; (27) the criminal law, except the constitution of courts of criminal jurisdiction, but including the procedure in criminal matters; (28) the establishment, maintenance and management of penitentiaries.

To the provincial legislatures are assigned (1) the amendment from time to time, notwithstanding anything in the act, of the constitution of the province; (2) navigation and shipping; (3) the office of the lieutenant-governor; (4) direct taxation within the province in order to the raising of a revenue for provincial purposes; (5) the borrowing of money on the sole credit of the province; (6) the establishment and tenure of provincial offices, and the appointment and payment of provincial officers; (7) the management and sale of the public lands belonging to the province, and of the timber and wood thereon; (8) the establishment, maintenance and management of public and religious charities and institutions; (9) the establishment, maintenance and management of hospitals, asylums, charities and elernosynary institutions and in and for the provinces, other than marine hospitals; (8) municipal institutions in the province; (9) shop, saloon, tavern, auctioneer and other licenses, in order to the raising of a revenue for provincial, local or municipal purposes; (10) local works and undertakings other than such as are of the following classes: (a) Lines of steam or other ships, railways, canals, telegraphs and other works and undertakings connecting the province with any other or others of the provinces, or extending beyond the limits of the province; (b) lines of steamships between the province and any British or foreign country; (c) such works as, although wholly situate within the province, or the operations of which are declared by the Parliament of Canada to be for the general advantage of Canada or for the advantage of two or more of the provinces; (11) the incorporation of companies with provincial objects; (12) the solemnization of marriage in the province; (13) property and civil rights in the province; (14) the administration of justice in the province, including the constitution, maintenance, organization of provincial courts, both of civil and of criminal jurisdiction, and including procedure in civil matters in those courts; (15) the imposition of punishment by fine, imprisonment or other punishment for enforcing any law of the province made in relation to any matter coming within any of the classes of subjects enumerated in this section; (16) generally all matters of a merely local or private nature in the province.

Powers not specifically given to the provinces are reserved to the Dominion, whereas under the American constitution powers not specifically given to the Federal government are reserved to the States or to the people.

The judges are appointed by the Federal government and, as in Great Britain, for life or during good behavior, in contrast with the practice of the United States, where judges are elected for a term of years. They can be removed only by the governor-general on an address from both houses of the legislature.

The Canadian Parliament consists, like the British Parliament, of a House of Commons, in which supreme legislative power practically resides, is elected almost by manhood suffrage; but by the Military Voters Act of 1917 the wives, widows, mothers and daughters of men who had served in the military or naval forces of Canada or Great Britain during the Great War were given the right of voting in the election of that year. The North America Act apportions representation to the several provinces on the principles of population and provides for decennial readjustment to meet changes in the balance of population. Members of both houses are paid; in Great Britain only members of the House of Commons. The senators are appointed nominally by the Crown, really by the head of the party in power, and almost invariably on party grounds. Senatorships are for life, not hereditary like seats in the House of Lords, so that the political analogy is imperfect. On the other hand, the party which appoints the Canadian Senate, controls it. It might otherwise block legislation and there would be no remedial force, while the British House of Lords, it is well understood, must give way to the will of the nation when it is declared. As it is, when the outgoing party happens to retain a majority in the Senate, there is danger of a block. The House of Commons is elected for a term of five years, subject, however, to the prerogatives of dissolution. An amendment to the British North America Act was, owing to war conditions, passed in 1916 specially extending for one year the term of the Parliament then expiring.

The provincial legislatures are miniatures of those of the Dominion. The forms like those of the Dominion Parliament, the lieutenant-governor formally nominating the ministers, as does the governor-general those of the Dominion. The practical working is popular, elective and partisan. The party divisions run through the provinces severally as well as through the Dominion at large. Quebec and Nova Scotia, like the Dominion Parliament, have each two chambers; the rest have only one. The Federal government has a veto on provincial legislation.
The treatment of the Northwest territories, as provinces, presents a certain analogy to that of the Territories of the United States, executive and legislative powers being given to a lieutenant-governor with an elective council subject to instructions by order under Federal council or by the Canadian Secretary of State. The provincial government is by law bi-lingual; the French language as well as the English being recognized, though practically English prevails. The civil law, in which the Coutume de Paris and the Code Napoleon are blended with the common and statutory law of Great Britain, remains the law of Quebec.

In its generally democratic character the Canadian constitution approaches that of the American republic, but in their structure they materially differ. The American constitution, in accordance with the principle laid down by Montesquieu (q.v.), separates the executive from the legislative. The members of the President's council, miscalled a cabinet, have not seats in the legislature, nor is their continuance in office dependent on its support. They are nominees of the President. Under the Canadian constitution, as under the British, the members of the cabinet have seats in the Parliament, on the confidence of which their tenure of office depends, and in which they initiate and control legislation. The head of the American republic is elected for a term certain. The terms of members and the times of election are fixed by law, whereas the Canadian Parliament is called in the name of the Crown by the Prime Minister, the head of the party in power, who will be in the majority, and of his party the prerogative of summoning and of dissolution. The members of the Canadian Senate are chosen by the head of the party in power, whereas the American Senate, formerly elected by the legislatures of the several States, are now (since 1913) elected by popular vote. Thus the Canadian constitution lends itself more aptly to the working of the party system of government, which, with all its accessories, political and moral, has prevailed, though the general influence of the party must be stronger than it is in the United States.

In Great Britain the Cabinet, in which the real power of government resides, is a growth of political party unrecognized by law, while the Privy Council, recognized by law, has become honorary. In Canada the Privy Council is the Cabinet, at the same time conferring the honorary rank, but the relation to the Crown, the relation to Parliament and the working of the system in both cases are the same.

The British North America Act does not, like the American constitution, prohibit the establishment of a particular religion by the state. It leaves untouched to the Roman Catholic priesthood of Quebec the power of levying tithes on the people of their own community. The Roman Catholic education perpetuates the privilege of denominational schools. Since confederation the government of Ontario has practically aided a denominational university. But since the secularization of the clergy reserves and the opening of the Universities of Toronto, non-denominational, the state with religion may be said to have been established as a general principle and may be regarded as practically part of the constitution. See the articles in this series: Confederation; Local Government; Imperial Federation; Under French Rule; Under British Rule; Goldwin Smith.

13. LOCAL GOVERNMENT. Under the British North America Act of 1867, which is virtually the constitution of the Dominion of Canada, the organization of local government is placed within the jurisdiction of the several provinces. There is consequently considerable variety in the structure of rural and urban government in the different parts of the Dominion. Certain general features are, however, to be observed. The fundamental principle of organization is that of local autonomy by the means of representative elected bodies. The provinces are divided into counties, subdivided into townships, in which again school sections are formed. The county and the township are not everywhere found side by side. Indeed, the provinces of Canada present the same contrast between the predominance of the township and the county as is found in the United States. In Nova Scotia and New Brunswick the county is the unit of local government; in Ontario and Quebec both are found. Under the law in existence throughout the West the township system prevails, the county being only a judicial area. In addition to these rural areas of government, there are found incorporated villages, towns and cities. In Ontario and Manitoba incorporation takes place by virtue of a general statute; elsewhere it is done by special legislation. The details of local government may best be understood by first passing in review the organization and powers of rural governing bodies in the different provinces, and then treating separately the question of town and city government and municipal franchises. Ontario, the most populous of the provinces, contains 38 county corporations and 423 townships. Both of these divisions vary greatly in size and population. The largest county (Grey) contains 1,092,027 acres, the smallest (Brant) only 213,905 acres. Thirty-two townships contain less than 20,000 acres, 11 of them more than 80,000 acres each. There are in addition the districts of Muskoka, Parry Sound, Nipissing, Muskoka, Lake of the Woods, Thunder Bay, Kenora, Sudbury, Temiskaming and Rainy River, not yet organized as counties, but in the settled portions of which over 200 townships have been incorporated. The affairs of the townships are managed by a reeve and from one to four deputy reeves, according to population, elected yearly. For the county there is a county council, composed of the reeves and deputy reeves of the towns, not being separated towns, and of the villages and townships in the county. The franchise for all local elections is extremely wide. It includes every person of 21 years and upward, rated for real property to an extent varying from $100 in the townships to $400 in the cities; those assessed for an income of $400, and farmers' sons of full age living at home. The township council, concerned with the maintenance of roads and bridges, the levy and collection of school taxes and the collection of the county tax. Assessors appointed annually by the township council make a valuation of real and personal property. The other principal officers of the township are the treasurer and the township clerk. The latter, though legally holding office at the pleasure of the council, enjoys a practically permanent tenure. He prepares the collector's rolls, statute
labor lists, voters' lists, etc., registers births, deaths and marriages and performs many other duties assigned to him by the statutes. The county council meets at the "county town," under the presidency of a warden whom it elects annually. It acts largely through committees, both standing and special. It appoints a treasurer, a county clerk, an engineer, a public school inspector and two auditors. The county council provides accommodation for the courts of justice, maintains county buildings, roads and bridges, houses of refuge, etc. The county rate is collected with the local taxation, but the county council has power to "equalize" the valuations of the local assessors if it thinks necessary. For organization of school districts, and control of schools in Ontario and elsewhere, see article on Public Education in Canada. Local government in the province of Quebec is organized under a municipal code enacted by the legislature (24 Dec. 1870), and revised in 1888. The larger towns and the cities are incorporated under special charters granted by the legislature. Of the country towns are divided into parishes, others into townships. For each county there is a council composed of all the mayors of the included municipalities. At its head is a warden (préfet) whom it annually elects. The county council meets in regular session four times a year; its duties consist chiefly in the construction and maintenance of roads, bridges, etc., the locating of the Circuit Court, provision against forest fires, etc. The subordinate local councils (parish, township, united township, village and town) consist of seven councillors elected annually throughout the province, each council having a mayor as its head. The powers of these minor councils extend to highways, bridges, ferries, regulation of public health, etc. For all local purposes direct taxes are levied on all real estate, except the property of the government and that of religious and educational institutions. (For organization, etc., of schools, consult article on Public Education.) The Seigniorial tenure of land, which once covered with its duties part of local administration, is also treated in a separate article. The local government of New Brunswick is regulated by a consolidated statute of 1898. Each county has an elected council, meeting twice a year. The larger cities have a mayor and council, the county council as well as their own local council. The officers of the parishes are appointed by the county council. In Nova Scotia there are elective county councils, choosing its own wardens. Their by-laws are subject to the approval of the legislature. The counties of Prince Edward Island are elective and judicial areas, but owing to the small size of the province the legislature itself acts as the organ of local government; villages and town are, however, incorporated with elected councils. In Manitoba, Alberta, Saskatchewan and British Columbia, local government centres in the township, administered by a council of four to six members, with a reeve at its head. The unorganized territories (Yukon, British Columbia) are controlled by the Dominion government, and have no representative institutions. The government in Canadian cities is regulated by statutes of the provincial legislatures. This fact permits of frequent change, and a continuous development of organization to meet the circumstances of the hour. In Toronto, for example, and in many other cities, the organization changes from year to year such alterations of the city charter as seem advisable. In the majority of the Canadian provinces, towns and cities are incorporated by special legislation; in Ontario and Manitoba, by virtue of general statutes on incorporation by the lieutenant-governor. Even in these provinces, however, special acts of incorporation are usually passed in order to provide borrowing powers. The typical form of Canadian urban government consists of a single chamber of aldermen (varying in number from 9 to 26) with a mayor. Both the mayor and council are generally elected for one year. In Montreal and Quebec the mayor is elected for two years, and in the latter city is chosen from among the aldermen. In Montreal, Quebec, Winnipeg, Brandon and Vancouver the aldermen are elected for two years. A board of control (the mayor with four aldermen), whose function is to prepare the annual estimates, has been adopted for the cities of Ontario having a population of 15,000 or over. In Montreal the affairs of the city are administered by the mayor and four controllers, specially elected for four years, the council of aldermen acting in a legislative and supervising capacity. Municipal offices are, in most cases, filled by appointments made by the mayor or the council. In the cities of Ontario and British Columbia, in Winnipeg, Charlottetown and Saint John, police appointments are made by commissioners independent of the civic government. The liquor licenses are almost everywhere under the control of the provincial authorities. The municipal suffrage in Canada is more restricted than the rural or parliamentary. Throughout Ontario, in Montreal, Quebec, Calgary and the four largest cities of British Columbia a special qualification of real property or income is demanded. The chief sources of civic revenue are found in taxes on real property, betterment taxes, and, in some cases, license taxes and percentage receipts from city franchises. Municipal indebtedness, incurred mainly for streets, sewers, waterworks and education, has much increased of late years, and in Montreal, Toronto, the cities of Quebec and the western provinces it grew rapidly from 1910 to 1917 concurrently with an amazing increase in property values. The net debt of Montreal at the beginning of 1917 was $97,790,779, of Toronto about $44,000,000. Except for waterworks there is but little municipal management of public works. Winnipeg, New Westminster, Three Rivers and a number of minor towns in Ontario own and operate electric plants; Calgary and Brandon operate their own street railways. Street railway franchises are granted for periods varying from 15 to 30 years; in Toronto, Montreal, Hamilton, Ottawa and Halifax the city receives a percentage of the receipts. Bibliography.—Meredith and Wilkinson, 'Canadian Municipal Manual' (Ontario 1917); University of Toronto Studies, Vol. II, Nos. 1-2; Report of Ontario Assessment Commission (1901-02); Bourinot, 'The Government of Canada'; Johns Hopkins University Studies in History; Municipal Undertakings; Canada Year-Book (annual; official).

STEPHEN LEACOCK, Professor of Economics and Political Science, McGill University.
14. IMPERIAL FEDERATION. Imperial federation is the name given to the various projects for revising the relations between Great Britain and her colonies, so as to give to the latter a share in the government of the empire, with a view to relieving the increasing burden of national defense, naturally suggest that the colonies should contribute to the imperial revenue; on the other hand, such a contribution, unless accompanied by a voice in the councils of the mother country, would constitute a tax without representation, so abhorrent to Anglo-Saxon ideas. Such was the situation during the great controversy of the 18th century between Great Britain and her North American dependencies, and such is again the situation at the present day. Even in the 18th century various proposals were made for solving the colonial difficulty by admitting American representatives to the British Parliament. Governor Pownall (see Pownall, Thomas), Edmund Burke (q.v.), and Adam Smith and its place was taken by another measure. But the difficulty of communication rendered any such federation impracticable. During the middle period of the 19th century it was currently believed that the manifest destiny of the colonies was independence. With the passing of that idea has arisen the demand for a closer bond of union. The imperial federation movement originated in the early '70s, an informal conference for discussing the subject being held in 1871. In 1884 the Imperial Federation League was founded, its first chairman being the Right Hon. W. E. Forster (q.v.). Lord Rosebery (q.v.), the Right Hon. E. Stanhope (sometime Secretary of State for the colonies), and Sir Frederick Young (q.v.) (whose work, 'Imperial Federation,' had appeared in 1870) were interested in the movement from its inception. A significant event was seen in the London colonies conferences of 1887, to which representatives of both the self-governing and the Crown colonies were summoned, and at which the subjects of imperial defense and trade were discussed. In 1892 a committee of the Imperial Federation League presented a practical scheme of federation. It recommended the institution of a council of the empire, to which delegates should be summoned from the self-governing colonies, the Crown colonies and India. The function of the council was to consist in the regulation of imperial defense. It was recognized, however, even at this stage of the movement, that there was no sufficient unanimity among the members of the league in reference to the details of the plan to be adopted to enable them to work effectively toward a common end. The league, whose work was declared to be only preliminary and preparatory, was dissolved in 1893 and its place was taken by a number of organizations having each a more definite purpose. Of these the United Empire Trade League became the advocate of the commercial union of the empire by means of protective duties. The Imperial Federation (Defense) Committee urges combined action for defensive purposes, the establishment of a navy supported by joint contributions being its immediate object. Most important, perhaps, is the British Empire League, established in 1894 and extended to the Dominion of Canada. The program of the league aims at the permanent unity of the empire, the promotion of trade and inter-communication, the holding of periodic conferences and co-operation in national defense. In Canada, indeed, the movement had already made considerable progress. The Imperial Federation League in Canada had been formed in 1893, and subsequently established at various places in the Dominion. Under the auspices of the organizing committee of the league a distinguished Canadian, George Parkin, delivered addresses throughout Canada, and in 1899 was sent, on behalf of the representation of the Australasian colonies. In 1894, at the instigation of the Canadian government, a conference was held at Ottawa to discuss intercolonial trade and communication. The Imperial government, Canada, Cape Colony and the Australasian colonies were represented. Resolutions were adopted in favor of reciprocal preferential duties among the colonies. A still more important conference was held in London in 1897 on the occasion of the jubilee celebration of that year. In 1901, the conference of the Canada, Newfoundland, New South Wales, Victoria, Queensland, South Australia, West Australia, Tasmania, New Zealand, Cape Colony and Natal discussed with the Right Hon. Joseph Chamberlain (q.v.) the position of the colonies, the commercial and political relations of the mother country with the colonies. In reference to the former, a resolution was unanimously adopted favoring the 'denunciation at the earliest convenient time of any treaties which now hamper the commercial relations between Great Britain and her colonies.' The premiers also undertook to confer with their colleagues to see whether a preference could advantageously be given by the colonies to the products of the United Kingdom. In reference to political relations, the majority of the premiers endorsed the following resolutions: (1) "That the present political relations between the United Kingdom and the self-governing colonies are generally satisfactory under the existing condition of things." (2) "That it is desirable, whenever and wherever practicable, to group together under a federal union those colonies which are geographically united." (3) "That it would be desirable to hold preliminary conferences between the self-governing colonies and Great Britain for the discussion of matters of common interest." From the first of these resolutions Seddon of New Zealand and Sir E. N. Braddon of Tasmania dissented, on the ground that the time had already come for a reconstruction of political relations. The Canadian government in the next year (1898) extended to Great Britain and to such British colonies as should reciprocate a tariff preference of 25 per cent, increased in 1900 to 33 1/2 per cent. In the summer of 1902, on the occasion of the coronation of King Edward VII, a further colonial conference was held between Secretary Chamberlain and the premiers of the self-governing colonies. The meetings of the conference, of which there were 10 in all, were also attended by several ministers of Australia and Canada then present in London, and by the members of the British Cabinet whose departments were concerned in the discussion. Chamberlain submitted a paper showing the disproportionate burden of the imperial defense at present borne by the United Kingdom. "If you are prepared at any time," he
said, "to take any share, any proportionate share, in the burdens of the empire, we are prepared to meet you with any proposal for giving to you a corresponding voice in the policy of the empire." No definite conclusion was reached for the alteration of present political relations beyond the following resolution: "That it would be to the advantage of the empire if conferences were held, as far as practical, at intervals not exceeding four years, at which questions of common interest affecting the relations of the mother country and His Majesty's colonies in England could be discussed and considered as between the Secretary of State for the colonies and the prime ministers of the self-governing colonies. The Secretary of State for the colonies is requested to arrange for such conferences after communication with the prime ministers of the respective colonies. In case of any emergency arising upon which a special conference may have been deemed necessary, the next ordinary conference to be held not later than three years thereafter." On behalf of the Commonwealth of Australia £200,000 a year was offered toward the cost of the Australian Naval Squadron and naval reserve, from New Zealand £40,000 for the same purposes, from Cape Colony £50,000, and from Natal £50,000 for the same purposes. Canada, generally, and from Newfoundland £3,000 for maintaining a branch of the Royal naval reserve. The grants were subject to ratification by the colonial legislatures. Resolutions of a general character in favor of preferential trade were also adopted by the congress. The Australian contribution met with sharp criticism from the Melbourne Age as involving taxation without representation. In February 1903 the British Empire League in Canada passed a resolution against the abstention of Canada from naval contributions, and declared that "it would be proper for her . . . to contribute a fair and reasonable share toward the annual cost of the navy of the United Kingdom." During the period that elapsed between the conference of 1902 and the outbreak of the European War the movement of opinion in regard to Imperial organization was very noticeable. It was especially stimulated by (a) the continued discussions of the question of tariff reform which involved the possibility of preferential and reciprocal duties in favor of the colonies, (b) the increasing imminence of war with Germany which would necessitate a common effort of Imperial defense and (c) the periodic assemblage of the conferences which naturally called forth public discussion throughout the empire. Four distinct currents of opinion became more and more clearly defined in the ebb and flow of debate. One of these favored the retention, indefinitely, of the status quo. Another opinion of a kinship in nature, which gained ground very rapidly with the progress of the century, favored the reorganization of the empire, not in the form of a centralized Federal state, but as a group of separate units in permanent alliance, not independent bodies sharing the supreme power. This scheme is best set forth in Mr. Richard Jebb's 'British Alliance' (1913). It may be said to represent the views during the period in question of Sir Wilfrid Laurier (consult Imp. Conference Report 1911, esp. pp. 122, 123) and of the South African party led by General Botha in South Africa, and of the Labor and Socialist parties throughout the empire. A third current of opinion revived the idea of Imperial federation in the sense of a central government with supreme power over defense and taxation. This view was supported by such influential leaders as the late Lord Grey (cd. 1917), Lord Milner, Sir J. Ward, Premier of New Zealand, the late Sir Starr Jameson (the Dr. Jameson of the "raid") and others. It led to the formation throughout the empire of a powerful chain of affiliated associations known as the Round Table Groups for impartial study but leaning heavily toward centralization. The leading spirit of this movement was Mr. Lionel Curtis, who had been one of those instrumental in forming the Union of South Africa (1910) and who spent some years in visiting all self-governing parts of the empire to organize the Round Table Groups. On the basis of the work of the groups Mr. Curtis published in 1916 a volume called 'The Problem of the Commonwealth,' a brilliant presentation of the case for centralization. A fourth and last current of opinion, necessarily somewhat veiled, is that favoring the breaking up of the empire into independent states. This is presumably the goal of Mr. Henri Bourassa and the party of French nationalism who follow his lead. (Consult Bourassa, 'Que Devons-Nous à l'Angleterre' ('1915); 'National Problems' (1916), etc.). Independence is generally held to be the aim, proximate or distant, of the Nationalist party of South Africa headed by (General) Judge Hertzog. A proper appreciation of these divergent views enables one to understand the full significance of the great Imperial conferences of 1907 and 1911 and the subsidiary conferences of 1909 (consult Reports of Conferences, also Jebb, R., 'The Imperial Conference' (11)). The conferences of 1907 and 1911 showed a strongly marked divergence between the partisans of nationalism and those of federalism. The adoption of the name Imperial Conference in place of Colonial Conference (1907) marks the opening of a new era. The proposal of a central body to be called the Imperial secretariat, advocated by the New Zealand and Australian delegates and those from the Cape and Natal, in 1907 was opposed by the Canadian delegates and the British government and by the Canadian delegates and those from the Transvaal. But it must be remembered that under the existing Cabinet system the delegates to the conference represent at a given time only one colonial party. In the place of a secretariat there was created a division of the colonial office known as the Dominions department, and the name "dominion" replaced colony in the official designation of the self-governing dependencies. In 1909 a special naval conference was summoned. A great step forward was already officially declared to exist, by Sir Edward Grey as Foreign Secretary speaking in the House of Commons, and "emergency" offers of assistance had been made by New Zealand and Australia. In the old principle of centralized control of maritime defense was abandoned in favor of a scheme of "fleet units" presented, perhaps reluctantly, by the Admiralty (consult Report of Conference, Cd. 4948). The conference of 1911 witnessed a pitched battle on the subject of imperial re-
organization, Sir J. Ward bringing forward a complete Federal scheme which was overwhelmed by the powerful opposition of Mr. Asquith (then British Prime Minister), Sir Wilfrid Laurier and their followers. The much-needed statement of Mr. Asquith to the effect that Imperial responsibility cannot be shared, and of Sir Wilfrid Laurier "Canada need not necessarily take part in a British War," should be read in their context (consult Report of Conference). The conference left the Imperial situation as it was in this sense, the same, i.e., without representation and no representation without taxation) in which it had been since the Imperial Federation Movement began. Meantime certain definite steps were being attempted toward more adequate Imperial defense on the lines suggested in the conference of 1909. The Canadian government (Liberal) passed in 1909 a Naval Act for the creation of a separate Canadian navy. The incoming Conservative government (1911) repealed the Act; but found their own naval needs (that of presenting dreadnoughts to the British government for an indefinite period) defeated in the Senate, that body being still Liberal. During the same period a separate "Royal Australian Navy" scheme (also for dreadnoughts and ships completed during 1913 and the naval establishments at Sydney and elsewhere in Australia taken over by the Commonwealth (1 July 1913). The advent of the war has obviously altered the situation. The war efforts of the dominions have been made entirely on a voluntary basis, the nominal legal sovereignty of the British Parliament not being brought into play. The consultations and conference, and especially the general Imperial conference of 1917, were devoted to the immediate aim of the prosecution of the struggle, the question of reorganization remaining in abeyance. But it is generally agreed that at the close of the war the time will have come for a reopening of the whole question of future Imperial relations. See the articles in this series: SINCE CONFEDERATION; CANADA AND THE EUROPEAN WAR; CANADIAN WAR ECONOMICS; and consult in addition to the works noted in article above, Cunningham, 'Scheme for Imperial Federation' (1884); Baldwin, C. S. (ed.) 'The Empire and the Century: a Series of Essays' (1905); Hurd, P., and Hurd, A. S., 'The New Empire Partnership' (1916); Keith, A. B., 'Imperial Unity and the Dominions' (1916); Parker, 'Imperial Federation' (1892); Silboum's, P. A. B., 'The Governance of Empire' (1910); Smillie, E. A., 'Historical Origins of Imperial Federation' (1910); Worsfold, W. B., 'The Empire on the Anvil' (1916).

STEPHEN LEACOCK, Professor of Economics and Political Science, McGill University.

15. CANADA AND THE EUROPEAN WAR. Though the world at large was surprised by the outbreak of the great war, there was, in fact, for this little justification. Alarms enough had been given. In 1909 there was in England an acute crisis in regard to expenditure to meet Germany's naval preparations. The crisis extended to Canada, which was without either an army or a navy. Appeals were made in the Canadian Parliament that the country should put itself in a position to do something effective in case of a conflict. These demands embarrassed the government of Sir Wilfrid Laurier. His strength was in the French-speaking province of Quebec, where the people, 70% of whom were Frenchmen, felt that a naval war would be a war upon France, the mother-land of their race, and not stirred by the sense of unity with British ideals felt in English-speaking Canada, were disposed to make preparations only to meet the dangers of a direct attack on Canada. The most violent spokesmen (no taxations without representation and no representation without taxation) in which it had been since the Imperial Federation Movement began. Meantime certain definite steps were being attempted toward more adequate Imperial defense on the lines suggested in the conference of 1909. The Canadian government (Liberal) passed in 1909 a Naval Act for the creation of a separate Canadian navy. The incoming Conservative government (1911) repealed the Act; but found their own naval needs (that of presenting dreadnoughts to the British government for an indefinite period) defeated in the Senate, that body being still Liberal. During the same period a separate "Royal Australian Navy" scheme (also for dreadnoughts and ships completed during 1913 and the naval establishments at Sydney and elsewhere in Australia taken over by the Commonwealth (1 July 1913). The advent of the war has obviously altered the situation. The war efforts of the dominions have been made entirely on a voluntary basis, the nominal legal sovereignty of the British Parliament not being brought into play. The consultations and conference, and especially the general Imperial conference of 1917, were devoted to the immediate aim of the prosecution of the struggle, the question of reorganization remaining in abeyance. But it is generally agreed that at the close of the war the time will have come for a reopening of the whole question of future Imperial relations. See the articles in this series: SINCE CONFEDERATION; CANADA AND THE EUROPEAN WAR; CANADIAN WAR ECONOMICS; and consult in addition to the works noted in article above, Cunningham, 'Scheme for Imperial Federation' (1884); Baldwin, C. S. (ed.) 'The Empire and the Century: a Series of Essays' (1905); Hurd, P., and Hurd, A. S., 'The New Empire Partnership' (1916); Keith, A. B., 'Imperial Unity and the Dominions' (1916); Parker, 'Imperial Federation' (1892); Silboum's, P. A. B., 'The Governance of Empire' (1910); Smillie, E. A., 'Historical Origins of Imperial Federation' (1910); Worsfold, W. B., 'The Empire on the Anvil' (1916).

STEPHEN LEACOCK, Professor of Economics and Political Science, McGill University.

15. CANADA AND THE EUROPEAN WAR. Though the world at large was surprised by the outbreak of the great war, there was, in fact, for this little justification. Alarms enough had been given. In 1909 there was in England an acute crisis in regard to expenditure to meet Germany's naval preparations. The crisis extended to Canada, which was without either an army or a navy. Appeals were made in the Canadian Parliament that the
Canada—Canada and the European War (15)

Britain Canada was most ready to give, but Canada did not enter the war as a child coming to the help of a parent. It was in the spirit of patriotism in a great crusade that the Canadians wished to join English, Scotch, Irish, Australians and others in fighting side by side with the French and other allies. No doubt it was due to Canada's political tie with Great Britain that her people were even more quickly involved. They had no suspicion of aggressive designs on the part of Great Britain and thus met with quick sympathy her resolve, after the invasion of Belgium, to declare war. On the natural life of the issue itself and not through any compulsion to follow Great Britain, Canada fought. It was certain that, in time, the people of the United States would view the war exactly as the Canadians viewed it.

The outbreak of war saw stirring days in Canada. The Minister of Militia and Defense, General Hughes, later Sir Sam Hughes, had great energy and force, though he was attacked by critics for rashness in words and for ill-considered, impulsive and arbitrary actions. In public, however, his courage and his energy in defense. In his support it must be said that he brought a fiery enthusiasm and energy to his task of making preparations for war. Under his direction a military camp was formed at Val Cartier, near Quebec. When the war came out few realized the long and desperate struggle that lay ahead and the Canadian government planned to send to Europe only a single division of 20,000 men, fully equipped for war. So eager, however, were the volunteers for service that by 7 Sept. 1914, a month later, all of the men of Canada had under arms 43,000 men. On 3 Oct. 1914, there steamed out of Gaspe Basin on the lower Saint Lawrence, escorted by a formidable array of warships, the greatest force which, as yet, had ever crossed the Atlantic. On board were 33,000 Canadian soldiers, most of whom, two months earlier, had been civilians with little thought of ever taking part in war. At the moment when this fleet sailed, the Canadian government announced the recruiting of a second division and, by April 1915, the movement to Europe of this force began. At the end of 1915 Canada had more than 200,000 men under arms. By this time it was clear that there could be no reserve in regard to Canada's participation, and yet she was completely milt to the full extent of her men and resources. By the end of 1917 she had sent 400,000 men over-seas and was raising an additional 100,000. At the time of writing she has four divisions in the fighting line, her casualties almost amount to many more than the total number of men in the first division which she sent over seas, and a steady stream of new men is still flowing to Europe, together with another and sadder flow of thousands of wounded and disabled men back to Canada from the front. If the United States is to take part in the war on the same scale, the republic will send to Europe six or seven million men. Australia and New Zealand have sent an even greater proportion of their manifold.

The battle of Saint Julien, the name now generally used, and those which immediately followed are momentous in the history of modern war. They were fought by newly-levied forces of good mettle can, after six or eight months of training, hold their own against the fiercest onslaught of professional armies. Not only so, but the training in initiative learned in civilian life made such men into resourceful fighters. It was the Canadians who first kept enemy nerves on edge by trench raids and they proved good bombers, woods men, roadmakers and generally handy men as need arose. As we have seen there had been

Vol. 5-23
nervousness in Canada as to the bearing of troops on the battle-line who, officers and men alike, had been untrained civilians less than a year earlier. Saint Julien and the experience which followed relieved anxiety on this score and since that day Canadians, civilians and military alike, had had calm confidence in the capacities of the Canadian divisions at the front. During the first years of the war the chief command of the Canadian forces was held by an officer of the regular British army, at first General Alderson and later, from 9 May 1916, Gen. Sir John Bulfin. But at the time of writing the Canadians have been, since 19 June 1917, under the supreme command of Gen. Sir Arthur Currie, who, three and a half years ago, was a business man in the Canadian West. His success is one chief proof furnished by Canada of the rapidity with which, in conditions of war, the civilian soldier may become effective.

After the first trying test at Saint Julien, the Canadian army settled down to do its share in the drainage of the Flanders. The three chief scenes of war in which the Canadian divisions took part were at Ypres; on the Somme, in the great offensive of the summer of 1916; and before Lens, chiefly in the fighting of 1917. In what is now known as the battle of Saint Elois, on the Ypres line, beginning on 3 April 1916 and lasting many days, the Germans made a terrific concentration of artillery fire on the Canadians. There were three Canadian divisions in the line of battle. The hope for British advance did not succeed, in spite of local successes. The battle of Sanctuary Wood, in the same area, a terrible struggle, was fought in June 1916, and the Canadians held the ground after incurring fearful losses. The outstanding result of the long fighting was that the British continued to hold the Ypres salient upon which the Germans had concentrated their fiercest attacks. In September of that year the Canadian divisions were on the Somme where in many weeks of hard fighting their most complete victory was at Courcelette. The Somme offensive was not the striking success which had been hoped for, but it was successful enough to cause a considerable German retirement in that sector.

While the Ypres salient will probably always be regarded as the chief battlefield for the Canadian troops during the war, the city of Lens is an objective for which they went through every hard fighting, off being withdrawn from the Somme. In the early spring of 1917 the British planned a great offensive and, by the fortune of war, the Canadian troops were in the hottest part of the attack. On 6 April 1917, the allied forces were cheered by the entrance of the United States into the war. Three days later, as if to celebrate it, they made the great attack at Vimy. Nearly 20,000 prisoners, 200 guns and some 300 machine guns fell to the British. The Canadians took part in the attack on the portion of the line called Vimy Ridge, an area 3,000 by 3,000 yards was then that Vimy became a greater name in the military annals of Canada. The city of Toronto has undertaken, when the war is over, to restore the village of Vimy as a memorial of Canada's part in a striking military success.

By midsummer of 1917 the British had fought their way to points close to Lens and then prepared for a new offensive in that region. This took place in the last days of October and early in November. The most striking feat of the Canadians in this offensive was the capture on 6 Nov. 1917 of the strongly defended village of Passchendaele. This furnished the dramatic climax to the Canadian fighting of 1917, beyond which the present record does not go.

Before the close of the year 1917 the Canadian casualties amounted to about 6,000 officers and 124,000 men. A good many of the wounded returned to the fighting line, but the list of final losses in the Canadian army makes a grim record. Exact figures are not yet available, but by the end of 1917 the dead, including those killed in action, dead of wounds or disease, and missing and counted dead, amounted to some 2,000 officers and 38,000 men, a total of 40,000 men — numbers slight compared with the losses of the nations in Europe, but yet appalling. To such great losses indeed must be added those of wholly or partly disabled men of whom the number must be nearly as many.

In spite of such losses, the war has had a stimulating effect upon Canadian character and production. For the first time in the history of the world a great army from America has fought in Europe to redress that balance of the Old World which, a century ago, England restructured in the new, by coming to the support of the Monroe Doctrine. It marks an epoch in the history of Canada and the Canadian divisions, to be followed in 1918 by divisions from the United States, should thus fight in Europe in a cause in which neither of them had any thought of direct gain beyond their own security. Nothing in the history of the world has ever been known quite like it, said a distinguished French general. *My countrymen are fighting within 50 miles of Paris . . . But . . . the Canadians at Ypres fought with supreme and absolute devotion for what to many of them must have seemed simple abstractions; and that nation which will support for an abstraction the horrors of this war of all wars will ever hold the highest place in the records of human valor. Precisely the same spirit brought the United States to the war.*

Facility of communication has made the whole modern world a unit. The idealism of the western peoples is practical, for, to each of them, danger and security alike involve a world-wide range of forces.

Not less on the material than on the moral side has Canadian life been stimulated. Canada has supplied vast quantities of munitions for the allied armies fighting in Europe and the skill and enterprise of her industrial leaders have made marked advances. In spite of the drain of war upon her male population, agricultural production has been increased and Canada remains one of the chief exporters in the world of food supplies. The enhanced value of her commodities has been so great that almost to counterbalance the drain of male life from the war. For the first time in history the Canadian government has secured huge loans from the masses of the Canadian people. For the first time also Canada has a heavy trade balance in her favor, due chiefly to the increase of munitions. It is an unexpected result of war that this former
debtor state, borrowing large sums, has now become a creditor state financing great supplies of munitions for the Allies. See also since Confederation (article 9).

The full story of Canada's part in the war has not yet been told. (For later details see War, European.) The 'Canada Year Book' published annually by the Ministry of Trade and Commerce at Ottawa contains much statistical information. Canada's Flanders by Sir M. H. Artt, now Lord Beverbrook (New York), is a semi-official account of Canada's part in the war. Two volumes have been published bringing the narrative to the end of 1916.

George M. Wrong,
Professor of History, University of Toronto.

CANADA — CANADIAN WAR ECONOMICS.

In common with most commercial countries, Canada had enjoyed a period of remarkable expansion and prosperity, for at least 10 years previous to 1913. During this period her internal economic expansion and external trade increased at an exceptionally rapid rate. This was chiefly due to the fact that Canada possessed the largest remaining area of unoccupied lands and other virgin natural resources, under climatic and social conditions attractive to European and American settlers. With an influx of over 2,000,000 immigrants, accompanied by over $1,000,000,000 of foreign capital, it was inevitable that values, even on the soundest basis, should very rapidly increase, and equally inevitable, under conditions of free individual investment, that a considerable increase in exports. The sudden arrest of a number of these undertakings not only checked general speculation, but brought about a rather severe reaction in the older industries dependent on the regions of special expansions. These in turn checked enterprise in many other lines of trade. In brief, a period of stagnation and readjustment had set in during 1913-14.

Such was the condition of Canada when the European War burst upon the world. Naturally the Canadian situation was not improved by the initial paralysis produced by the declaration of war, and the dislocation of international trade. Within a few months, however, the demand for men and equipment relieved the growing stagnation of the labor market and stimulated those industries and trading houses which were able to furnish the various lines of army equipment, or could most rapidly adapt themselves to the new and urgent demands occasioned by the war. The full import of many thousands of men involved the employment of many others in furnishing sustenance, equipment and transportation. The Canadian forces when equipped were rapidly sent overseas. The government, for the first time in its history, undertook to bear the whole expense of equipping, transporting and maintaining at the front its entire force. This involved very important consequences for Canadian trade and exchange, and, incidentally, for the statistics of import and export.

The expansion of Canada for the decade from 1903-13 having been accomplished very largely through foreign capital, practically the whole of this capital came to the country in the shape of goods, thus extending the increase in the imports. Since, however, only a limited number of immigrants were at first employed in meeting their own primary wants, the feeding, housing and general maintenance of a rapidly increasing population made great demands upon the agricultural and other products of the country which would otherwise have been sent abroad increasing the export returns. Thus (the epoch of internal prosperity and expansion of 1903-13 was marked by rapidly increasing imports, without any corresponding increase in exports. For the fiscal year 1912-13, the excess of imports over exports amounted to $298,750,-000, on a total trade of $1,095,000,000. The sudden arrest of imports through the falling off of foreign investment and the corresponding decrease of foreign re-exports, was of course felt in Canada. Import duties on foreign produce formerly required in the country rapidly readjusted the balance of trade. Within two years, including the first eight months of the war, the adverse balance of imports had been reduced from $298,000,000 to $36,000,000. Thereafter the effect of the war became very evident. Supplies for the maintenance of the men abroad, and the war equipment sent to them, so far as could be produced in Canada, were absorbed. On the other hand, such foreign supplies as they were furnished with in Europe did not appear as imports to Canada. Taking the latest returns available, we find that for the 12 months, ending November 1917, the Canadian exports exceeded the imports by over $563,000,-000 in a total trade of $2,586,000,000. In point of percentage this slightly more than reverses the exceptional excess of imports over exports before the war. Nothing more directly illustrates the remarkable revolution in Canadian external trade in passing from a condition of domestic expansion, through immigration and foreign investment, to the participation in a world war requiring the export of all available resources for the supply of the Canadian army and the needs of the Allies.

The great volume of Canadian recent aggregate trade was due chiefly to three factors, in addition to the central one already indicated. The first and most obvious is the great increase in prices, the usual accompaniment of war conditions. Second is the fact that the munition and other industries connected with the war have required the import of large quantities of machinery, raw materials and partly manufactured goods, which enter into the production of the finished articles as finally exported. The other factor is the greatly increased import, during the past two years, of articles of use and luxury for home consumption, due to the exceptional prosperity and spending power of that large section of the population which has benefited financially by the operations of the war.

This last factor is a rather interesting and important one, not by any means confined to Canada; but, in conjunction with the other
forces, accounting for a very considerable ele-
ment in the general increase in prices and the 
higher cost of living generally. As has been 
already pointed out, the first effect of the war 
was to aggravate the depression which the 
recent reaction from exceptional prosperity 
had produced, but the double demand for men, 
on the one hand to enlist for military service 
and on the other to furnish the supplies and 
services necessary to their participation in the 
war, led, before many months, to the absorption 
of all the efficient man-power of the country. 
The demand, however, being far from satisfied, 
not only did wages rise in all activities directly 
or indirectly connected with the war, but, to an 
increasing degree, other elements in the popu-
lation, such as women and youths of both sexes, 
and elderly persons, found employment at 
hitherto unknown rates of remuneration. Thus, 
not only was the family income increased 
through its head, but often doubled and even 
trebled through the remunerative employment 
of several of its other members. Further, while 
over 400,000 men were taken overseas for mili-
tary service, the families of those dependent 
on them were provided for by separation allow-
ances, assigned pay and special contributions 
from the Patriotic Fund, while many of their 
relatives and dependents were among those who 
received extra employment, and, as was just 
and proper, in proportion to their qualifications, 
were given the preference in such employment. 
It goes without saying that those who were for-
tunate enough to control or have investments 
in munition industries, or other enterprises 
profitably affected by the war, received a rise 
in profits and incomes much beyond what 
were customary, even in the days of expansion 
before the war. Some of these capitalists and 
merchants, it is true, have had to contribute 
various percentages of their gains through the 
war profits and income taxes, but the very 
volume of the taxes is an index of the excep-
tional revenue remaining with those who pay 
them.

It cannot be forgotten, however, that one 
considerable element in the community suffers 
more or less heavily from the war without any 
appreciable redress. This is made up of those 
living on fixed incomes or annuities, and cer-
tain professional or other salaries, which, for 
various reasons, have not been increased; also 
those furnishing services, or conducting various 
lines of business which have not been benefited 
by the war, but perhaps the reverse. Such per-
sons, according to their previous social status, 
must meet the steady increase in the cost of liv-
ing, and the many other calls upon their means 
without any offset. Their only resource is to 
continually curtail, as best they can, their 
former standard of living, while the majority 
of their neighbors are at the worst holding their 
own, but in most cases enlarging their expendi-
ture.

With the government and its colossal expendi-
ture, on the one hand, and hundreds of thou-
sands of war-prosperous citizens on the other, 
completely out of proportion to the needs of the 
industry, it is inevitable that prices must soar, 
the volume of money and bank returns expand, 
and imports for domestic consumption increase 
not merely in value but also in quantity. Pre-
suming that people indulge in luxuries only 
after the necessaries of life are secured in suf-
ificent measure, and that even in the necessaries 
they may pass from lower to higher grades of 
quality, the Canadian trade returns for the past 
two years indicate that not only does the pros-
perous element in the country completely offset 
those who are forced to curtail their former 
scale of living, but rolls up a large balance on 
the other side. It is true that only certain im-
ports can be cited in proof of this situation, 
inasmuch as, in many lines, the quantity and 
value taken for domestic consumption cannot be 
separated from the quantity and value taken for 
manufacturing purposes, or for reshipment to 
the troops overseas. Thus, only for the past 
two years have passenger automobiles been 
separated, in the trade returns, from all forms of 
automobiles and motor trucks; hence only for 
that time can one safely determine to what 
extent the increased import represents com-
mercial or war needs as distinguished from per-
sonal use and enjoyment. So in the tobacco 
imports, it is impossible to accurately distin-
guish between the increased consumption in the 
country by a considerably diminished male 
population and the increased demand in the 
overseas to soldiers at the front. We must also 
recognize that much of what goes to the soldiers 
at the front is not sent directly from Canada, 
but furnished from Britain and France or pur-
chased at the canteens, from funds contributed 
for that purpose. In the case of many other 
articles, however, whether of ordinary supply 
or of pure luxury, what the trade returns show, 
allike in actual volume of goods and in the 
money values of these, is that the activity as 
well as the relative spending power of the 
people has very greatly increased during the 
war. A few typical articles may be mentioned, 
the increased import of which will serve to 
indicate this interesting economic effect of the 
war.Boots and shoes, gloves, hats, various fancy 
articles, furs, glass ware, phonographs, piano 
parts and musical instruments generally, cheap 
pictures, precious stones, carpets, shirts, stock-
ings, especially silk stockings, underwear, cot-
tons, lace, embroidery, knitted goods, stoles 
of all kinds for personal wear, tweeds, passenger 
automobiles, etc. The last is a typical case. 
Leaving values out of account we find that for 
the eight months ending November 1915, the 
total number of automobiles and passenger 
automobiles and motor trucks, was 4,887. For 
the next two years, taking the same eight month periods, the numbers of 
passenger automobiles alone were for 1916, 8,491, 
and for 1917, 12,156.

Notwithstanding, however, the increased ex-
penditure of the Canadian people as a whole, a 
sufficient surplus of funds has been available 
from their incomes to enable them to raise, 
without any serious difficulty, increasingly large 
domestic loans for the use of the government in 
the prosecution of the war. The following 
have been the special domestic war loans 
effected by the government; in November 1915, 
$100,000,000, September 1916, $100,000,000, March 
1917, $150,000,000, November 1917, $400,000,000. 
Large sums of gold are not only to have been supplied 
to the government in the purchase of war certifi-
cates and in special loans. Most of the in-
creased capital for war industries has been sup-
plied from within the country, while the banks 
have been assisted in borrowing abroad and in 
purchases in Canada. There are also the loans for
municipal and provincial purposes which have been largely taken up within the country. The increasing prosperity of Canada and Canada trade, it has been the good fortune of the country not to experience any appreciable dislocation of its normal trade connections since the outbreak of the war. Before the war nearly 90 per cent of Canada's exports of trade was with the two countries, Great Britain and the United States, and during the war that percentage has been practically maintained. Before the war 85 per cent of Canadian imports came from the same countries, and the only effect of the war has been to raise the percentage to a little over 90 per cent. At the same time, the details of the trade with these countries has naturally been considerably altered. There has been a very considerable diversion of the exports of Canada to Britain, and a corresponding transfer in the source of Canadian imports from Britain to the United States. When the war is over, therefore, we may expect very little change in the direction of nine-tenths of our world trade, beyond the remnant of details as between Canada and her two chief trading allies. The loss of trade with the enemy countries has been of no material importance to Canada as a whole, though it naturally affected somewhat seriously a few trading houses.

As to the changes in the nature of the products called for owing to the war, it is to be observed that a veritable revolution has been wrought in one department of Canadian export, that of manufactures. Fifty-four million dollars represented the value of the export of the Canadian manufactures in 1913, increasing to $69,000,000 for 1914, $191,000,000 for 1915 and $440,000,000 for 1916; while for eight months to November 1917, the amount was $489,000,000. This increase of course represents munitions of war of all kinds and involves a correspondingly great increase in imports of materials and equipment which enter into their production. The usual allowance must of course be made for increased free credit. The fact that the munition industries and their subsidiary dependents indicates the difficulty of inducing labor and capital to turn, during the war at least, from these tempting fields of sure profits and high wages to the more uncertain realm of agriculture. At the same time the next largest export has been in agricultural products, which, though less in aggregate value than manufactures, indicates a larger actual return from the point of view of the trade balance, apart from individual profits. The increase in agricultural exports has been due more to the proportion of certain products sent abroad, and the high values attached, than to an actual increase in the agricultural production of the country, which naturally varies with the harvests. The great harvest of 1915 has not been since approached. The exported agricultural products, apart from animal products, increased from $127,000,000 in 1914 to $364,000,000 in 1916, and for the eight month period to November 1917, amounted to $384,000,000. Next came animal products, increasing from $68,000,000 in 1914, to $117,000,000 in 1916, and $124,000,000 for the eight months of the past year. The export of the products of the mine, the fisheries and the forest have not materially increased for the past couple of years.

Altogether a close survey of the economic conditions in Canada, since the outbreak of the war, compels the general conclusion that, whatever reaction may require to be faced at the close of the war, whatever may be the subsequent effect of the great national debt which Canada in common with the other belligerent nations is piling up, and whatever readjustment may be necessary to meet the changed economic conditions and relationships of the outside world, the chief effect of the war up to 1918 has been to increase the prosperity of the Canadian people as a whole, to increase their command of ready money, and, in consequence, to raise, for large numbers at least, their physical standard of living.

Adam Shortt,
Chairman Board of Historical Publications,
Public Archives of Canada.

16. DIPLOMATIC RELATIONS OF THE UNITED STATES WITH CANADA.
The long Anglo-American peace, beginning in 1783, broken only once by a short period of war, and reinaugurated in 1814 by the Treaty of Ghent, is the more remarkable and significant because it has been maintained across the longest international boundary in the world without costly fortifications or a period of national youth and aggressive westward movement, and in the face of repeated friction and irritation arising from a long series of international problems—many of which were serious in their nature and difficult of solution, or adjustment, sometimes even threatening actual collision. In the war of the Revolution and in the negotiations of peace at its close the United States hoped to obtain Canada, but in the end was able to get only the region north of the Ohio which had been annexed to Canada by the Quebec Act (q.v.) of 1774 and was regarded as necessary for the future growth and safety of the Union. Great Britain rather reluctantly agreed to the water boundary through the lakes. The Canadians objected to this line of boundary and especially to the amputation of the territory north of the Ohio which under American control might be subject to conditions injurious to the Canadian fur trade and export trade to the Indians. They also desired to exclude the Upper Lakes from the Saint Lawrence and all tributaries by making the boundary at the height of land, or at least to limit the size of American vessels upon the lakes. The early British trade policy in relation to the United States was largely determined by a desire to stimulate Canada to furnish the British West Indies with American products carried via the Saint Lawrence, thus reversing geographic conditions with a view of attaching Canada to Great Britain.

Canada's remaining hope to continue the control of the interior Indian trade received its first shock by the American organization of the Northwest Territory under the ordinance of 1787 and the consequent plans of future roads and river improvement.

Serious questions and complications confronted the new American government which was inaugurated under the new Federal constitution in 1789. The boundary was unmarked. Influenced by Canadian traders who urged that the boundary should have been established south of the lakes, the British government still held
the lake posts on American territory which it had agreed in 1783 to abandon without delay. British officers also seriously interrupted the fur trade of American citizens, by duties levied on American vessels and by the exclusion of American citizens from the navigation of the American side of the boundary waters, although at one time in 1790 Lord Dorchester suggested that the British government favored an alliance with the United States.

Washington, believing the retention of the posts prevented the possibility of securing a perfect tranquility of the Indians of the Northwest and fearing that the retention would result in retaliatory legislation against commercial relations with Great Britain, sent Jay to negotiate a treaty. This treaty provided for evacuation of the posts by 1796, freedom of intercourse and trade across the border and a commission to determine the boundary. In the United States this treaty was strongly opposed by certain citizens who advocated prevention of Lake Indian wars with Canada and were disappointed in failing to get egress of American vessels from the lakes to the Atlantic via the Saint Lawrence, and the prohibition of the importation of arms and warlike stores by way of the lakes.

The international boundary, although defined by the treaty of 1783, was not easily marked by the surveyors whose governments were not able to agree upon a starting point at the extreme eastern end of the line, and who encountered other difficulties all the way to the Lake of the Woods. Not until 1798, after 15 years of controversy, was the identity of the Saint Croix River determined, the agreement being reached through a joint commission as arranged by a provision of Jay's treaty, and this was the limit of progress made on the determination of the boundary before the War of 1812.

New sources of irritation on the lake frontier continued to arise. Canadians regarded the Louisiana Purchase as a step toward acquisition north of the lakes and, although they still attracted a large part of the Indian trade of the Northwest they induced the British government in 1807, in the negotiations of a treaty to replace the temporary provisions of the Jay treaty, to request an amendment which would admit their traders and the Hudson Bay Company to participation in the Indian trade of the Louisiana Purchase. By 1808, relations became much strained. Canadian traders asked redress for injuries resulting from exclusion from Louisiana, from American assessment of portage duties and from American interference with Canadian boats which had approached too near to particular American lake ports or shores.

Finally, the Indian troubles of 1811 aroused the American frontiersmen of the Northwest to demand the prevention of further relations between the Indians and the Canadian traders; and the lake frontier became the theatre of the principal military operations of the War of 1812, begun largely with the purpose of the conquest of Canada as a means of terminating British-American trade with the Northwest Indians and giving Americans control of trade on the lakes. See Boundaries of the United States.

One of the most important struggles in the peace negotiations which resulted in the Treaty of Ghent was to secure the continuation of American rights upon the lakes, where the British sought exclusive control, and upon the adjacent southern shores where the British by an ultimatum sought to establish an Indian barrier against further American aggression upon Canada. The boundary remained as before the war. The part of Maine occupied by the British during the war was returned. See Ghent, Treaty of.

Meanwhile, there was an increase of American trade across the northern boundary east of Lake Ontario which was not stopped by the Embargo Act of 1808 nor by the later war embargo by which the Madison government sought to prevent trade with the enemy. The Treaty of Ghent, without mention of the ostensibly possible causes of the war, provided for arbitration of various matters in dispute. It contained a provision for the definite establishment of the exact boundary line by joint commission. In 1817, and with some reason for the danger of future collision and sources of misunderstanding from rival navies on the lakes, an agreement was negotiated providing for mutual disarming of those waters, except four vessels on each side restricted as to size and duties. Although peace existed in fact, there were many unsettled questions, some of which naturally became more important and more serious by the changes of time— influenced not only by development at the East but by the extension of virile peoples westward to the Pacific. The meaning and import of certain words, used in the treaty of 1783, relating to boundaries were still unsettled and continued a source of dispute between the nations for nearly 30 years. There were also new sources of irritation resulting from the war, and from economic and political policies. Canada could not forget that the closed war was an expression of an American policy of territorial absorption which had long been apprehended by Canadian statesmen as a step toward acquisition north of the lakes.
with Montreal and Quebec under the provisions of the Jay treaty which were extinguished. The parties made no new permanent agreement on the subject. She also refused to recognize the principle of the American claims to a natural right to navigate the Saint Lawrence to the sea. Fortunately the importance of the latter question was later diminished by a convention by which connected Lake Champlain and Lake Erie regions with the Hudson River, and thereby with the sea.

Commercial relations, as defined by the treaty of 1815, remained unsatisfactory until 1831 when the United States, after persistent efforts, obtained the privilege of trade with the British West Indies. Fishing rights were defined by a treaty of 1818 which also postponed a dangerous dispute by providing for joint occupation of distant Oregon until later provisions could be made for the adjustment of the boundary there. So, until new conditions produced the need of new adjustments, the people of each country fished together in the unsettled waters. So, too, did the buffalo rabbits and other animals together in the unsettled territory bordering the Pacific Ocean north of the Columbia. At the same time the American claim to Oregon was reinforced by a provision of the Spanish (Florida) treaty of 1819, ratified in 1821, erecting the first international boundary line which touched the Pacific Ocean. The Passamaquoddy question was settled in 1817 by actual agreement of two commissioners, one selected by the King of England and the other by the President of the United States, and which contained the general principle that the northern boundary of the Louisiana Purchase was settled at the 49th parallel westward from the Lake of the Woods to the Rocky Mountains, in 1818. The boundary through Lakes Ontario, Erie and Huron was satisfactorily settled by two commissioners who met at Utica in 1822.

The claim for slaves carried away, referred after 1818 to the Emperor of Russia who made a compromise award, was later (1822) referred to four commissioners, was deterred and its amount and was finally terminated by the payment of a lump sum determined by the two governments.

The Northwest boundary question, the running of a line from the head of the Saint Croix along the highlands and the 49th parallel to its intersection with the Saint Lawrence, proved most difficult. In accord with the Treaty of Ghent it was submitted to a commission which toiled five years, 1816–21, only to reach a hopeless disagreement, the point selected for the northwest angle of Nova Scotia by differing opinions being 105 miles apart. By a subsequent convention of 1827 the question was referred to the King of the Netherlands, who in 1831 made a compromise decision which neither country would accept. By 1838, it reached an alarming stage in the Maine-New Brunswick controversy, coincident with the excitement of the Upper Canadian rebellion of 1837–38 and incidents resulting therefrom, including the entry of the United States into the neutrality along the Niagara frontier illustrated by the case of the Caroline which for its unneutral service was seized on the American side of the Niagara by a small British expedition. Later, in 1840 it was further complicated by a new source of friction resulting from the arrest of Alexander McLeod, a Canadian deputy sheriff who was arrested on the American side of the river and held for prosecution and a murder which had occurred in connection with the seizure of the Caroline. The acquittal of McLeod, in 1841, terminated a serious source of international embarrassment and smoothed the way for the friendly conferences between Webster and Ashburton with the wisdom of diplomacy to maintain peaceful relations. Finally, in 1842, after three years of great activity in search for the Northeast boundary, accompanied by a display of vast ingenuity in treaty interpretation, topographical theories and cartographic controversy, the question was settled by the Webster-Ashburton treaty which each country regarded as a capitulation. British-Americans who were debared by the treaty from the most direct and practical line of railway communication between Halifax and Quebec long continued to feel that their interests had been sacrificed to exaggerated fear of breach with the United States. The State of Maine which mourned the loss of jurisdiction, and Massachusetts which lost six miles of its border with the loss of lands in the disputed area, each received a solace of $150,000 from the United States government.

In 1846 the Oregon boundary question, which was an increasing source of dangerous tension between the two countries, was settled by the American acceptance of the British offer of the 49th parallel west of the Rockies, but reserving to the British-Americans all of Vancouver Island—a geographical exception which contained the germ of another boundary dispute which was settled in 1872. General claims of citizens of each country were submitted to arbitration by a convention of 1853, which provided two commissioners and an umpire or arbitrator chosen by the two. The commissioners in 1854–55 settled all claims successfully, and entirely satisfactorily to everybody except some who lost. It gave important decisions regarding fishery rights and rendered awards in the McLeod and Creole cases.

Meantime, for nearly a decade the conditions of international amity had steadily improved except in certain sections of the United States influenced by immigrants from Ireland who preached the antipathy aroused by O'Connell's agitation and subsisted of Irish nationality. From 1815 for nearly four decades, during which fishery and boundary questions were also prominent subjects of discussion, Canada persistently solicited commercial reciprocity with the United States. Finally, after the repeal of the English corn laws in 1846 and the repeal of the navigation laws in 1849, she expressed a growing sentiment in favor of closer relations, commercial and political; and many, both in England and America, seemed to consider that by her own consent she would ultimately be annexed to the United States. In 1850, certain Englishmen, interested in checking and diverting the trend of events, urged that the construction of Whitney's proposed railroad through the western part of Canada to the Pacific would result in the inevitable loss of Canada. In 1854, a reciprocity treaty was negotiated with the expectation that it would result in the gradual, quiet and peaceful settlement of the Canadian question by growth of close relations which possibly would develop
into annexation; but conditions were soon changed with the rise of a protective tariff movement in Canada, under leaders who after 1859 affirmed the right of Canada to regulate her own tariffs without interference from England. In 1866, the reciprocity treaty was terminated by notice of the United States, partly under the influence of a resolution originating in certain Confederate operations from Canada during the American Civil War.

In the meantime, new conditions on the Pacific and west of Lake Superior threatened to complicate Anglo-American relations and finally induced the British government and Upper Canada to take steps to secure confederation and consolidation of the British-American provinces in order to counteract the danger of American annexation of the West. The later American acquisition of Alaska, which was regarded as a counter movement against British-American consolidation, contributed much to the stimulus of a determined Anglo-Canadian policy to complete the scheme of confederation by including British Columbia and the northwestern territory of the Hudson Bay Company, and by opening a trans-Canadian railway to the Pacific. The latter was conceived as a Canadian countermovement to frustrate American influence in British Columbia. In 1890-91, Irish Fenians threatened to complicate international relations by plans to invade Canada. In spite of the proclamation of the President, they persisted until their collections of money were exhausted and their intoxicated sentiment was sobered by the conviction of the futility of their project. At the same time, Senator Sumner, influenced by Cobden’s views of 1849, in regard to closer relations between the United States and Canada and especially stimulated by the question of the Alabama claims and by the danger of Fenian disturbances which were excited by the proximity of the British flag, proposed to remove all causes of international dispute with Great Britain by the withdrawal of the British flag from all British America, but his views met not universal favor by the Grant administration and the Grant administration. The Treaty of Washington, negotiated after the United States dropped her flag-withdrawal proposal, was a great landmark in the adjustment of international boundary questions. It substantially disposed of three disputed questions: Alabama claims, the San Juan boundary and the Northeastern fisheries. It also contained several clauses which directly affected subsequent relations between Canada and the United States. It established agreements in regard to bonded transit, certain features of the coasting trade, the navigation of certain rivers and canals (including the Welland and Saint Clair flats canals) as roads of commerce, and the use of the Saint John River by American lumbermen. It recognized the Saint Lawrence as forever free, and gave to Canada the right to navigate Alaskan waters. It failed, however, to renew the principle of the reciprocity treaty, which was requested by the British-Canadians and declined by the Americans. Although there was a marked improvement of international feeling, various controversies continued to arise at different times. Canadians complained because they did not get the free use of certain State canals which they supposed they had secured by treaty in 1871. When Canadian authorities protested, the United States government replied that it had no control over State canals and could not compel States to act in the matter. Because in 1885 the United States refused to pass through the Sault Saint Marie Canal a Canadian vessel loaded with troops on their way to suppress the Riel rebellion, and because in 1892 President Harrison laid a retaliatory or discriminating tolls on freighters moved through this canal bound for Canadian ports, the Canadians were led to build a canal of their own on the other side of the river. Tariffs often ruffled the temper of the people on the border. Canada by various pilgrimages to Washington made persistent efforts to secure a renewal of the reciprocity treaty; but to these friendly advances the American government declined to respond with equal ardor, probably influenced largely in this policy of reserve by the fact that Canada possessed no treaty-making powers except through the British government. After 1873 the demand for protective duties became general among large classes of Canadian people. In the 1890s, notably, the legislation was successful in Canada; and at the next session of the Dominion Parliament, a tariff was enacted. Since that time, both countries have found occasion to complain of new tariff bills. The American Congress placed duties on coal, lobsters, eggs, etc.; Canadian legislation excluded American cattle, and laid a retaliatory tax on lobster cans. Americans responded to Canadian retaliation by threatening to stop the transmission of goods in bond, and by new tariffs. The provision of the Tariff Act of 1894 continued to be a source of more or less irritation. Incidentally, it may be stated that complications of threatening relations have often been largely the result of the necessity of indirect negotiations through the mother country, thus taking the feeling of responsibility from Canada who complains that her interests have been sacrificed by British diplomacy. A former Canadian official, summarizing the history of treaties affecting Canada, once said: “Like animals doomed to vie at the banquet of science, Canada has been unsparingly operated upon for the good of the Empire.” In 1887, the right of Canada to negotiate her own commercial treaties with foreign powers was conceded by Great Britain; but an determinate of such treaties should be conducted by the British Minister and the Canadian envoy acting together and with equal powers. In 1890, the Canadian Dominion government, by its protest to the British Colonial office, prevented the execution of the Blaine-Bond reciprocity treaty between the United States and Newfoundland, and proceeded first through the British Minister at Washington and later through Secretaries Foster and Blaine, to renew previous efforts to secure commercial reciprocity. Some more recent questions may here be sketched very briefly. The Bering Sea controversy, arising in 1886, finally found a way for settlement by arbitration in 1893. Thereafter, still remained several questions for international negotiations, including protection of fur seals, the fisheries, the Alaskan boundary, reciprocity, transit questions, alien labor laws, mining rights and naval armaments on the lakes. A treaty to settle these matters was made in 1898-99 through a joint high commis-
tion, of which Lord Herschell was chairman, consisting of six members from each country. Although the commission failed to make any agreement on several subjects it made little progress on others (including reciprocity) and finally split and suffered shipwreck on the Alaskan boundary on which the Canadian commissioners demanded a settlement before they would enter into any agreement with the other party. Some one, perhaps with facetious intent, has explained the failure of this commission in contrast with the success of that of 1871 by stating that the latter contained only one Canadian and four English statesmen, while the former contained only one English and four Canadian statesmen. But the action of the Dominion members concerning Alaska does not seem strange to one familiar with the history of American-Canadian relations in regard to boundaries—a source of almost constant discussion, punctuated by bitter contentions, for over a century. Fortunately, in the case of the Alaskan boundary a temporary adjustment was secured by a modus vivendi effected in 1899, and after long negotiations a final agreement was submitted to the arbitration of a joint commission of six impartial jurists of repute (three Americans, one Englishman and two Canadians) who settled it by a decision which may perhaps be regarded as a reasonable compromise.

For several years, the North Atlantic Coast fisheries threatened to disturb friendly commercial relations. The fishery agreement of the Treaty of Washington was terminated in 1885 by the required notice given by the United States in 1883, thus removing from conditions existing under the treaty of 1818, and soon resulting in Canadian enforcement of irritating restrictions on the fishing grounds. In 1888, a modus vivendi was reached by an international commission (of three Englishmen and three Americans). This modus vivendi was continued both by Canada and by Newfoundland until the question was settled by The Hague tribunal in 1910, although Premier Bond of Newfoundland proposed to abrogate it after the failure of the Hay-Bunau Varilla treaty of 1905. The chief remaining obstacles to friendly relations between Canada and the United States have recently been removed. Additional security for the future was made by the negotiation and ratification of an agreement in 1901 11 years after the Senate had refused to approve a similar treaty. This treaty provides, with some restrictions, that differences of legal character, or relating to treaty differences which cannot be settled by diplomatic means, shall be referred to the permanent court of arbitration established at The Hague in 1899. The settlement of the various points at issue had a fortunate culmination in the recent settlement of the fishery dispute by The Hague award. In conformity with the provisions of the treaty of arbitration, a special agreement of 1909 was arranged with the concurrence of the governments of Canada and Newfoundland, submitting to The Hague court of arbitration any question relating to the industries of the North and the coast arising under the Treaty of 1818. The board appointed to consider the case contained six members, of which one was the chief justice of Canada and another a justice of the United States Circuit Court of Appeals, acting with an Austrian, a Hollander and an Argentine. The result seemed to satisfy both Canada and the United States, each of whom appeared to have won a victory.

Sources of future dispute have been lessened by a Waterways Treaty of 1909 which provides for the establishment of an international joint commission of the United States and Canada (a miniature Hague tribunal) consisting of six members (three appointed by each government) to exercise jurisdiction in cases involving the use, obstruction or diversion of boundary waters, and with authority to inquire and report on other matters of difference along the frontier or to decide upon such questions as may be referred to it.

The question of trade relations between Canada and the United States remains unsettled. The efforts of the United States to remove certain difficulties, arising from the passage of the Payne-Aldrich tariff bill of 1909 by the American Congress, resulted in the appointment of a commission and the negotiation of an agreement (January 1911) to secure restricted reciprocity by concurrent legislation at Washington and Ottawa. This agreement provided for fuller and freer trade relations, and which after a sharp political struggle passed both houses of Congress, became the chief issue of a keenly fought campaign in Canada and was lost (September 1911) by the overwhelming defeat of the Liberal Laurier government which had held power for 15 years. The feeling of mutual respect and cordiality between the two countries has been strengthened by their conviction of common interest and by their practical co-operation to preserve the world peace against the attacks of Germany and her allies. See ALABAMA CLAIMS; ALASKA BOUNDARY COMMISSION; BERING SEA CONTROVERSY; BOUNDARIES OF THE UNITED STATES.

Bibliography.—Anderson, David, 'Canada, or A View of the Importance of the British-American Colonies' (1814); Atchison, Nathaniel, 'Points to be Discussed in Treaty with the United States' (Pamphleteer 1815); id., 'American Encroachments' (Pamphleteer 1816); Callahan, J. J., 'The Alaska Purchase and America-Canadian Relations' (1908); id., 'The Neutrality of the American Lakes' (1898); Dunning, W. A., 'The British Empire and the United States' (1914); Foster, John W., 'Diplomatic Memoirs' (Vol. II, 1909); Hodges, Thomas, 'British and American Diplomacy Affecting Canada' (1900); Roberts, C.G.D., 'History of Canada' (1897); Smith, E., 'England and America after Independence' (1900).

JAMES M. CALLAHAN,
Professor of History and Political Science, West Virginia University.

17. PRIMARY EDUCATION. Previous to 1867 there existed in Canada four provinces, practically independent of each other. These were Ontario, Quebec, Nova Scotia and Prince Edward Island. These provinces especially Ontario and Quebec, differed very greatly. Speaking generally, the people in Quebec were of French origin and spoke the French language. They were nearly all Roman Catholics. In Ontario most of the people were of British descent. The English language was the ordinary medium of communication. The great majority were Protestants—Anglicans,
Presbyterians and Methodists being most numerous. When in 1867 confederation was effected, education was entrusted to each of the provinces, the Federal government merely retaining the right to introduce remedial legislation when rights or privileges of minorities were interfered with. Naturally, the systems worked out in each of the provinces differed in essential details—the governing bodies, the form of administration, the programs of studies and methods of instruction, varying to suit local conceptions.

Since 1867, five other provinces have joined confederation—New Brunswick, British Columbia, Manitoba, Saskatchewan, and Alberta. These have in turn developed systems suited to their needs.

**Education Free.**—Generally speaking, primary education is free to all pupils of school age, that is, from 5 or 6 years to 18 or 21. In one of the provinces a fee may be charged, but this is merely nominal. In kindergarten schools and secondary schools, the payment of fees as specified by teachers, municipal, and district aid is sometimes permitted.

**Central Governing Bodies.**—In every case the system is administered by a central authority. In Prince Edward Island the board of education consists of the executive council, the principal of Prince of Wales College and Normal School, and the chief superintendent of education, the last-named officer being appointed by the lieutenant-governor in council. In New Brunswick the board of education consists of the lieutenant-governor, the executive council, the chancellor of the provincial university and the chief superintendent of education, who is appointed by the lieutenant-governor in council. In Nova Scotia the council of public instruction consists of members of the executive council, of whom five shall form a quorum, and the chief officer is a superintendent of education appointed by the lieutenant-governor in council. He is appointed by an advisory board of seven members, appointed by governor-in-council or elected by the teachers. In Quebec the council of public instruction consists of (1) the Roman Catholic bishops of the province, (2) an equal number of Roman Catholic laymen, (3) an equal number of Protestants. The last two of these, together with the lieutenant-governor in council, form the council of public instruction. This council of public instruction is divided into two committees known as the Roman Catholic and the Protestant committee, each being concerned with the administration of schools of its own kind. The two committees may have associated with them persons chosen or elected because of expert knowledge. The practical administration of schools is carried on through a superintendent of education, who is appointed by the lieutenant-governor in council, and through two secretaries, one for each section of the council of public instruction. In Ontario the department of education consists of the executive council or a committee thereof, and the head of this department is known as the minister of education. The practical administration is conducted by a superintendent of education who is assisted by chosen specialists and specially qualified school inspectors. In Manitoba the executive council forms the department of education. One of the members of the executive council is known as the minister of education. Under his direction, a superintendent of education and a body of specially chosen workers assist in the work of administration. An advisory council on the education of the deaf is chosen by the government, the inspectors and the teachers of the province, has authority in such practical matters as the framing of a program of studies, the certification of teachers, the authorization of textbooks.

In Saskatchewan and Alberta the form of government and administration is quite similar to that of Ontario. In British Columbia the council of public instruction is composed of the executive council, and the work under its direction is carried on by a superintendent of education. Recently steps have been taken looking toward closer co-operation among the four western provinces in all matters pertaining to elementary and secondary education and education of defectives.

**Local Self-Control.**—Though the governing bodies just mentioned regulate education as regards the organization, government, examination and inspection of schools, the certification and training of teachers, the supply of textbooks and other matters of like importance, yet much power is given in most of the provinces to local school boards. Each district selects its own teacher, but must not take any one who has not a certificate to teach in the province. Within limits each school board selects the building it considers most suitable under the circumstances and equips it as it may desire. There is wise supervision in matters of this kind to prevent undue expenditure and to guard against overcrowding of pupils, unsanitary conditions and lack of apparatus. In British Columbia the council of public instruction is supreme in all matters, virtually doing away with district control, except in the selection of teacher. In certain districts in Manitoba and Alberta the settlers are non-English and in some cases are not well enough acquainted with Canadian ways to organize and administer their own schools. A public trustee is appointed by the government to act in such cases, with the result that the schools and teachers' residences in these districts are fast becoming quite as good as any in the country.

**The Religious Difficulty.**—The constitution of the governing bodies in education indicates the lieutenant-governor in council is charge of educating and administering school systems because of the conflicting religious beliefs of the people. A closer examination emphasizes this fact. In Quebec there are two systems of schools—one for Roman Catholics, one for Protestants. In Ontario there is a system of separate schools. In Manitoba, which until 1890 had Protestant schools and Roman Catholic schools, there is now but one system. There are in the province many schools conducted by religious communities. Some of these have regularly qualified teachers and are ranked as ordinary state schools, receiving a share of the legislative grant. In Winnipeg, and at other points, the Roman Catholic ratepayers support, at their own expense, an independent system of schools. In Alberta and Saskatchewan there is provision made for separate schools, but all schools follow the same program of studies, are under the same inspection and teachers must qualify in the same way. In Nova Scotia, British Columbia and Edward Island the schools are: strictly non-sectarian. The complaints
arising from changes made in the school acts, especially in Manitoba, have led to prolonged controversies and interesting court decisions.

Religious Exercises and Religious Teaching.—Closely connected with the separate school question is that of religious teaching and religious exercises. In British Columbia, schools must be conducted on a strictly secular and non-sectarian basis. No religious dogma or creed shall be taught. The Lord’s Prayer may be used in opening or closing school. No clergyman of any denomination shall be eligible for the position of superintendant, teacher or trustee. In Manitoba, schools may close with the reading of the Bible without comment and the recitation of the Lord’s Prayer, and it is possible for clergymen or their appointee half an hour before closing to give religious teaching to those of their own denomination. In Ontario every public school shall be opened with the Lord’s Prayer and closed with the reading of Scriptures and the Lord’s Prayer, or the prayer authorized by the department of education. Teachers who have conscientious scruples in this matter may be relieved. Attendance during religious exercises is not compulsory. Religious teaching may be given by the clergy or their representatives after the regular hours of school. In Quebec, in the Roman Catholic schools, there is daily prayer and systematic daily instruction in the catechism. In Protestant schools the first half hour is devoted to prayer, Scripture reading, instruction in morals and Scripture history. No denominational teaching may be given. A conscience clause is operative. In New Brunswick the teacher may open and close the school by the reading of Scripture and by offering the Lord’s Prayer. In Prince Edward Island the school is opened with Scripture reading, but no comment or explanation is permitted. In Nova Scotia the law is practically the same as for the last two provinces, local option being permitted. In Saskatchewan and Alberta the school may be opened by recitation of the Lord’s Prayer. Religious instruction may be given during the last half hour of the day, but attendance is not compulsory for pupils.

The Language Problem.—There has been not a little difficulty with regard to the language employed as medium of instruction in the schools. In Quebec, both English and French are officially recognized. In Ontario the school act provides that English shall be the language of instruction, except where this is impossible because of the pupil’s unfamiliarity with the language. An attempt in 1912 and 1913 to make regulations covering this point led to a heated discussion. The famous “Ottawa case” was fought out in the courts. In Saskatchewan, Alberta and Nova Scotia those of French origin have special privileges, and in the first two provinces any language may be taught to the satisfaction of the ratepayers concerned. But the medium of instruction in regular school hours is English. In Manitoba the Laurier-Greenway compromise made it possible, in any school where 10 or more pupils speaking any language were enrolled, for the parents to demand teaching in that language. This gave rise to what were known as bi-lingual schools with bi-lingual teachers. In some districts teaching in as many as four different languages could have been asked for, and in several schools teaching in three languages was demanded. In 1916 the school act was amended so as to do away with bi-lingualism as a system. English must now be the medium of instruction in all state-aided schools. This would not prevent French, German and other languages from appearing on the program of studies for elementary schools as they now are found on the high school curriculum.

The Support of Schools.—The schools of the Dominion are maintained by a fund drawn from three sources—a state fund, a municipal or county fund and a fund yielded from district assessment. The government aid is distributed in different ways. In Prince Edward Island and New Brunswick the grant depends upon the sex and the grade of certificate of the teacher. In Nova Scotia it depends upon grade of certificate and the number of days school is open. In Quebec the sum depends upon the population of the district, and in Ontario it is divided among the counties, townships, cities, and towns in a similar manner, special grants recognizing the grade of teachers’ certificates and length of experience, and grants to rural schools recognizing school accommodation, equipment, teachers’ certificates and experience and the municipal aid rendered to the school. In Manitoba a definite sum depending upon the total grant available is given to each school open the full year, and a proportionate sum to schools open for less time. In Saskatchewan and Alberta the grant depends upon the size of the district, the number of days school has been kept open, the grade of certificate held by the teacher, and the percentage of attendance. In

<table>
<thead>
<tr>
<th>Statistics Regarding School Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Prince Edward Island</td>
</tr>
<tr>
<td>New Brunswick</td>
</tr>
<tr>
<td>Manitoba</td>
</tr>
<tr>
<td>Quebec*</td>
</tr>
<tr>
<td>Ontario</td>
</tr>
<tr>
<td>British Columbia</td>
</tr>
<tr>
<td>Alberta</td>
</tr>
<tr>
<td>Saskatchewan</td>
</tr>
</tbody>
</table>

*2912
British Columbia the government meets practically all the expense of education except in the case of cities. Here a per capita grant is given, the smaller towns getting a higher rate than the larger cities. In Manitoba, Saskatchewan and Alberta no less than one-eighth of the whole land is set aside for school purposes.

The Salaries of Teachers.—In the older provinces, when free schools were introduced and districts began to be formed, it was natural that every settler should wish to be near the schoolhouse. This led to small school districts. When the burden of supporting the small district fell upon the small district there was a tendency to reduce the salary of the teacher to the lowest amount possible. The result has been most unhappy. In spite of excellent provision for the instruction and training of teachers it is now sometimes impossible to get as many as who are fully qualified for their work as there are schools; and the male members of the profession are becoming fewer every year. Teachers are reluctant to locate in districts where there is great industrial activity and consequent openings for men. Relief can come about in only two ways: (1) There must be an increase of legislative aid; (2) there must be increased local support. The former is probably an impossibility in some of the provinces because of the limited resources; the latter will come only as a matter of education. No people are in a better condition financially than the Canadian farmers. The burdens of taxation are comparatively light. Yet the salaries paid to teachers are very meagre. In Prince Edward Island the average salaries in 1910 ran from $146 to $289 for women, and $201 to $487 for men. In Nova Scotia the salaries vary from $552 for male teachers of the A grade and $358 for female teachers of the same grade, to $222 for males of D grade and $198 for females of the same grade. In Ontario the salaries average $711 for males and $483 for females. In Manitoba the average salary paid is $628—an increase of $154 since 1902. In the new Province of Saskatchewan the rate in 1910 was $1,052 for males and $730 for females holding first-class certificates. In Alberta the simple average was $1,092 and $749 respectively.

With regard to salaries the two things are noticeable: (1) The percentage of female teachers is large; (2) the percentage of trained teachers is small. In Saskatchewan very few of the teachers are untrained; in Manitoba conditions are almost equally satisfactory. In Nova Scotia about 43 per cent of the teachers have taken normal training. In New Brunswick where salaries are small less than 20 per cent of the teachers are men; in Nova Scotia about 18 per cent; in Ontario 24 per cent; in Manitoba 30 per cent; in Saskatchewan about 43 per cent. In the older provinces teachers' pension schemes are in operation and other provinces are considering the matter. The City of Winnipeg has worked out a very satisfactory schedule.

Training of Teachers.—The training of teachers is something to which all the provinces have given much attention, though the system followed is not uniform throughout. In Ontario and the four western provinces, the course was designed to be professional based on academic preparation in the high schools or university. It has not been found possible to adhere to this intention as there are always some branches in which academic instruction has to be given, such as history, geography, the school arts and the newer subjects on the elementary school program. In the eastern provinces the tendency is to combine academic and professional instruction as in American Normal schools. (See Teachers, Professional Training of; Schools, County Training). In some of the provinces a short course of training followed by actual school room experience of a year or two, precedes the longer and more philosophic training. The fact that all certificates are granted by provincial rather than local authorities does much to elevate the standard of the profession.

Teachers' Institutes.—The work of the normal schools is supplemented by teachers' institutes which are of two kinds, (1) Those arranged for and carried on under the direction of the department of education; (2) those which are purely voluntary on the part of the teachers. Those institutes are in effect developing a professional spirit, toward bringing teachers into touch with educational progress in other lands, and toward bringing school and home into closer relationship. The most important of these are the provincial conventions held each Easter. An attempt to hold a Dominion educational association has not met with marked success. Either the territory is too great or provincialism is too marked. Yet such an association could have great value. Such an association and the national bureau of education are two things that have yet to be worked out in Canada.

School Inspection.—In all provinces inspectors appointed or approved by the departments of education report on the conditions of the schools, not only to the central authorities but to the local school boards. In the cities superintendents are employed, and in some of the provinces their reports are accepted by the departmental inspector. The inspectors or superintendents have to be professionally qualified in order to serve. In Canada the machinery of politics is not permitted to control school appointments.

School Libraries.—It is recognized throughout Canada that school libraries are a necessity in education. In most of the provinces grants are made to supplement the grants of trustees. The newer provinces have made the most complete provision by making it compulsory for trustees to spend annually a portion of the regular grant in the purchase of books for library purposes.

Coeducation.—A distinctive feature of Canadian elementary schools is the coeducation of the sexes. There are exceptions to this rule in Quebec and in a few leading cities of the other provinces. In all rural communities coeducation must continue to be the practice, and it is doubtful whether there will be any departure from customary procedure in cities and towns. The results morally and intellectually under present conditions seem as satisfactory as in lands where separation of the sexes is considered a necessity.

Consolidation of Schools.—In most of the provinces the School Act makes provision for consolidation. A consolidation is professional based on academic preparation in the high schools or
able action. There are about 50 consolidated schools in operation, one operating in a school district of 120 square miles. The children prefer to live at least ten miles from such a school, except that a small number of children live within walking distance.

Consolidation can no longer continue all the schools of a district. The little district school will always exist, but the influence of a neighboring consolidated school with its higher organization and better equipment will always urge to greater efficiency.

Compulsory Education.—In all the provinces with one exception education is compulsory. The acts are now enforced more rigidly than ever before. The openings in commercial and industrial life tempt young people to leave school early; some parents, particularly immigrants, are careless; and in many cases the distances from home to school are very great. Nevertheless the "percentage of attendance" is increasing from year to year, there are very few native born who cannot read and write and a large proportion is more familiar with the public school system which recognizes class, race or creed. The school is the most potent agency for unifying the diverse elements of the population. See articles in this series Secondary Education; Higher Education; Catholic Education; Public Education. See also the section Education in the articles on different provinces.

W. A. McIntyre,
Normal School, Winnipeg.

18. SECONDARY EDUCATION. The public high schools of the English-speaking provinces have been modeled more or less upon those of Ontario, which was the first (1844) to organize a system of public instruction. As a result, there is a very general similarity amongst them. Quebec, however, which is largely French and Roman Catholic, with an English-speaking Protestant minority, has organized its high, as well as its elementary schools, in accordance with its exceptional conditions.

Secondary education in Canada is provided for in three main classes of schools which are well distributed geographically and are known sometimes by different names in the different provinces:

(1) Public high schools, in which secondary education alone is provided for. A few take up also the first year or the first and the second year work of the universities. Besides the day high schools, night and summer schools are provided generally.

(2) Public high school grades in connection with the elementary schools, known sometimes as construction, superior or intermediate schools. A few of such grades are as good as the smaller high schools, and may often gradually develop into separate institutions.

(3) A small number of private secondary schools. These have usually elementary grades attached and occasionally do the work of the earlier years of the universities. Their fewness is due chiefly to the extensive systems, which were organized early in the history of most of the provinces. As, however, the wealth increases, more of such schools are established, but they are now, and will likely con-
continue to be, comparatively unimportant factors in the education of the Dominion.

The public schools differ markedly from those of the United States in being organized into one system in each province and in being controlled and supported by the province as well as by the locality. The causes which thus tend to uniformity in the individual systems have in most been reinforced by uniform examinations of the different grades, conducted by the central authority. The state-control is exercised by a minister of education, who is a member of the provincial Cabinet, or by a superintendent of education, responsible to the Cabinet, or by both. Sometimes such controlling officers have associated with them an advisory council, variously constituted, with more or less important powers. The functions of the state are legislative and general. Subject to this oversight, which is exercised both directly and through government inspectors and which prescribes textbooks, courses of study and school regulations, local boards of trustees or commissioners have complete control, appointing the teachers and managing the finances. The boards are thus able to deal with local conditions, while the state connection has secured a measure of uniformity and general efficiency of courses and standards. The state contributes often very liberally to the support of the public high schools, the expense of establishment and the rest of the expense of maintenance being provided for by local taxes imposed by the municipality or district in which the school is situated, and, with few exceptions, by the county. Sometimes small fees are charged, but the general tendency is towards free schools.

The private schools are generally proprietary and of denominational origin; and, as a result, nearly all of them are under denominational control. Although affected in their courses and organization by the denominating public systems, they have no connection with the state, except in the case of a few which are affiliated with state universities, or of some Quebec schools which are subsidized under certain conditions. Except also in Quebec, the public high schools are open to and attended by all denominations. The private schools, on the other hand, are usually sectarian, but the result in most of the Protestant schools is such that they are patronized by the adherents of other churches than those with which they are connected.

All the secondary schools have more or less extended curricula, corresponding to those of the United States high schools; but, as there, the entrance and the leaving standards vary according to the system of organization, the efficiency of the elementary schools, the requirements of the universities, and the wealth and population of the different provinces. The Ontario secondary schools are the best developed and the most efficient, being, as regards standard, on a par with the best in the United States. Besides providing a general education, the Canadian secondary schools prepare for university matriculation, for commercial pursuits, for teachers' academic certificates and some of them for industrial and technical occupations. In one important and far-reaching respect they differ from the high schools of the United States: their teachers must all hold certificates of academic and professional competency, authorized by the respective State Department of Education, and varying in standard and character according to the conditions of the system. Such teachers are usually obliged to attend professional schools. Ontario, however, is exceptional in providing for the professional training of its first class public school and high school teachers in two faculties of education: (1) in the University of Toronto (provincial), (2) and the other in Queen's University, Kingston. Both of these faculties receive provincial aid in the condition that they provide courses approved by the Department of Education. In the other provinces the normal schools provide the general professional training for all grades.

Following are additional details in regard to each of the provinces:

Ontario.—The special secondary schools in Ontario are of two classes, high schools and collegiate institutes. The teachers are of two classes: those with ordinary certificates and those with specialists' certificates, each of the latter having a training of two years in the department. The principal of a high school or collegiate institute must be a graduate in arts of a university in the British dominions. The staff of a collegiate institute must consist of specialists with honor univited. A course in classics, mathematics, moderns and history (including English), and science, and specialists in art and physical culture; and, where the optional subjects, agriculture, household science and the commercial subjects are taken up, with specialists in these departments also. The staffs of the high schools may consist of teachers with ordinary certificates, but many of them are specialists. Some of the collegiate institutes have as many as 35 teachers and only a few of the high schools have not more than two. Both classes of schools must have good accommodations with a minimum equipment of $750 for a high school with two or three teachers; $1,125 for one with four or more teachers; and $1,675 for a collegiate institute. A collegiate institute must have, and a high school may have, a gymnasium, for which the former may receive a maximum grant of $96 a year and the latter of $48.

A high school may be established by a county or a city municipal council with the approval of the minister of education, and such establishment entitles it to a maximum grant of from about $600 to $1,300, according to the grade of the schools, as well as proper maintenance by the county or the municipality in which it is situated. After providing for a minimum grant for each school, the rest of the legislative grant is distributed on the bases of the value of the equipment, the amount of the teachers' salaries, and the character of the accommodations, in a system of apportionment which has been adopted generally and which has greatly stimulated local expenditures and has done much to secure the efficiency of the schools.

Some of the boards of high school trustees are separate from those of the public schools and others, called boards of education, have charge of both classes of schools as in the United States. In constitution, however, they are peculiar in containing a representative of the (Roman Catholic) separate elementary schools, if there should be any such school in a municipi-
pality (the large city of Toronto has two such representatives).

In the separate high schools, with the elementary schools, in localities which cannot maintain a high school, continuation schools which also do high school work of a character sometimes as good and as comprehensive as is done in many of the high schools. These continuation schools may be established with the approval of the Minister of Education by a public or a separate school board or by a union of such boards under conditions which ensure their proper maintenance. Of these schools, there are three grades: Grade A with three teachers, grade B with two, and grade C with one; of these, the grade B schools are the most numerous. The teachers of grade A schools must have the same qualifications as the teachers of high schools; those of grades B and C must hold at least first class public school certificates, many, however, being university graduates. The legislative grants to these schools are proportionately even more generous than that to the high schools, being situated in the rural districts, they commend themselves strongly to the county councils, the support from this source is often proportionately larger than in the case of the high schools.

Pupils pass from the fourth grade of the elementary schools, called public or (Roman Catholic) separate schools (ages 12 to 14 or 15), into the secondary schools on uniform examination papers set by the department of education, the answers to which are read and valued by local boards. Permission, however, is granted to boards to set their own papers or to accept under certain conditions the promotion examinations of the elementary school staffs. The standard of entrance into the secondary schools in Ontario is at least as high as that of the best high schools of the United States.

A number of years ago, the department of education held uniform leaving examinations at the end of the courses of each main division of the secondary schools. As a consequence, however, of the evils associated with so much uniformity, these examinations have been discontinued and the department itself holds only those that are necessary for teachers' certificates. It continues, however, to conduct through a matriculation board, representing the universities of the province, the uniform matriculation examination prescribed by these universities.

The following statistics set forth the general condition of the high and continuation schools:

<table>
<thead>
<tr>
<th>Description</th>
<th>Figures</th>
</tr>
</thead>
</table>
| Total number of high schools (1918), 162, of which 47 are collegiate institutes and 76 are free. Number of teachers, 1,051, of whom 763 are university graduates, and 507 hold honor degrees or the equivalent. Highest salary, $3,500; average for principals, $1,884; for assistants, $1,412. Number of pupils, 28,833 (1917). Total amount expended during the year 1916, $2,488,254, of which $1,339,227 was for the salaries of teachers, $2,488,254 for principal and assistant salaries, $69,227 for maintenance and operation, $109,227. (Grade school attendance), 110,227 Total number of continuation schools (1918), 137, with 241 teachers, of whom 77 are university graduates. Highest salary, $2,000; average for principals, $1,117; for assistants, $78; total number of pupils, 5,982 (1917). Total amount expended for continuation schools in 1916, $306,148, of which sum $224,464 was expended for teachers' salaries. Cost per pupil (on an average attendance), $499. The public secondary school system is so efficient and so popular with all classes that there are only a few private schools. Of these the chief is Upper Canada College (which, however, is only semi-private), an old historic residential and day school, at one time under government control, but now under a board of governors partly nominated and partly elected by the "Old Boys," the state connection being maintained through the Minister of Education, who is an ex-officio member. This college has still a small endowment, but is supported chiefly by fees. It does general and university matriculation work for boys, and is attended by pupils from all parts of the Dominion and even from the United States. Besides colleges for young women, some of which take up the same courses as the high schools, there are a few other colleges for boys, doing general work and that-for university matriculation. Of these, the most important are Saint Andrew's College, Toronto; Bishop's College, Sault Ste. Marie; Trinity College, Port Hope, and the De La Salle Institute, near Toronto. A few also have mixed classes, the chief being Albert College, Belleville, at one time a university, but now affiliated with the University of Toronto (q.v.), which provides courses of various kinds and grades, as far as the end of the university work of the first year. With very few exceptions, all the private schools are connected with religious denominations.

The courses of study are the same for the different grades of public secondary schools: the general courses, the courses for admission to the professional schools for teachers, and the courses for matriculation into the universities. The evolution of the content of the general courses during the last 10 years has proceeded on modern lines; vocational and prevocational courses have been duly provided in connection with the high and continuation schools and in separate establishments.

There are 86 manual training centres and 84 household science centres attended by 14,130 boys and 13,552 girls from the fourth grade (seventh and eighth years) of the public schools and the first two years of the high schools. These centres are well equipped and liberal grants are made by the Department of Education on the usual bases: salaries, equipment, accommodations, with minimum fixed grants. In 1915 the total amount of the legislative grant was $30,200. In 1913 agriculture was introduced into the secondary schools as an optional course covering two or four years. At present 21 schools carry on the work, most of them, however, attempting only the two years' course. These schools also are generously aided by both the Dominion and the Ontario Government.

The Industrial Act of 1911 provides for a system of industrial and technical schools with courses as follows: Day schools: General industrial schools for general basal in the trades; special industrial schools for particular trades; technical high schools and school courses; part time co-operative industrial courses for apprentices; schools for instruction in the fine arts. Evening schools for day workmen and workwomen.
The day and evening schools are liberally supported, the legislative grants apportioned on the usual bases; the maximum grant on salaries for day schools being $5,000 and for night schools $3,000; on equipment for day schools, $2,000, and for night schools, $1,000. The maximum grant for co-operative classes is $875. The total attendance at English model schools in 1917 was 16,688. In some urban centres large sums are expended on capital account; for example, at Hamilton a site for a new technical school has been bought at a cost of $75,000; Toronto recently opened a new technical school costing at least $2,000,000, and London has a new building for a technical school costing $250,000.

The day technical departments of the high schools adapt the ordinary courses to the vocational needs of the communities. At Haileybury, a mining centre, for example, the high school has a mining department in which, since its opening in 1910, 104 boys have been enrolled. Some of the technical schools have already completed buildings and are not so expensive as those of the best schools in the United States.

The agricultural, commercial, and industrial and technical schools and classes are managed by advisory committees consisting of representatives of the high school and collegiate institute boards and an equal number of persons engaged in industrial pursuits approved by said boards. The advisory committees may also co-opt persons engaged in such pursuits who are not members of the school board. The proposals of such committees, however, are subjcet to the approval of the school boards concerned.

Quebec.—Secondary education in Quebec is organized on somewhat different lines from those followed in the other provinces. The Roman Catholic Committee of the Council of Public Instruction names the three chief kinds of public schools, respectively the "primary elementary," "primary intermediate," or model, and the "primary superior" or academy. There are four years of work in the elementary schools, two in the model schools and two in the academies. The model schools and academies, frequently teach also some of the lower grades. The majority of the Catholic model schools and academies are French, the others being English. Secondary education proper is that of the classical colleges.

There are three kinds of Protestant schools, namely, elementary, model, and academy, some of the last mentioned being designated "high schools." Beginning in the year 1915-16 the Protestant Committee adopted a new classification of the grades as well as a new course of study. There are 11 grades, numbered from 1 to 11. The elementary schools teach the first seven grades, the model schools the first nine and the academies the whole 11 grades. Secondary intermediate grade 10 admits to the Macdonald School for Teachers, for the elementary diploma course, and at the end of grade 11 to the model diploma course in the same institution. Grade 11 also affords many students a chance for McCall’s two universities. The principals of the chief Protestant academies are men. The Protestant model schools are practically "intermediate" schools. The academies are secondary schools proper, although including all the earlier grades.

Summarized statistics, 1915-16: Catholic model schools, 689; Catholic academies, 308; Catholic classical colleges, 21. Pupils in Catholic model schools, 108,475, of which 239 were Protestants. Pupils in Catholic academies, 83,227, of whom 339 were Protestants. Total of lay teachers in Catholic model schools and academies, 1,315. Total of religious teachers, 3,385. Protestant model schools, 38; Protestant academies, 41. Pupils in Protestant model schools, 5,416, of whom 334 were Roman Catholic. Pupils in Protestant academies, 12,038, of whom 356 were Roman Catholics. Total of classes in Protestant model schools and academies, 602; of these 66 are without diploma, but in nearly every case the teacher is merely an instructor in physical drill, etc.

The courses of study in all schools are prepared by the Catholic or the Protestant committee, as the case may be, but the general school law of the province makes drawing and agriculture compulsory in all schools. Both of these subjects are extensively taught, and there is a director of drawing for the Catholic schools. The necessity of extending the scientific studies have been carried out for several years now in some of the Catholic normal schools (Ecoles Normales Menagers), and the subjects receive much attention in the convent schools. Manual training is practically confined to the Montreal schools. The Protestant schools of that city maintain also a large commercial and technical high school, at which the yearly attendance averages about 1,600. The technical schools proper of the province, the large ones at Montreal and Quebec particularly, come under the supervision of the provincial secretary, not under that of the Department of Public Instruction. The attendance at these two institutions is not yet as satisfactory as the splendid equipment and the qualifications of the staffs call for; the school at Montreal cost $636,187; that at Quebec $405,359. The Polytechnic School of Montreal, which has been in existence many years and which gives courses in engineering, architecture and the industrial arts, had 140 in 1910-11. The teaching of agriculture in the Protestant and Catholic superior schools has received considerable impetus of late from the aid given by the county demonstrators (graduates of Macdonald College, Sainte Anne, Franche, and Oka) in the form of lectures. In 1910 the Ecole des Hautes Etudes Commerciales (School of Commercial Higher Studies) was opened in Montreal. It is now affiliated with Laval University and give the university courses in arts and science; and their students take university examinations, and receive the university degrees.

Manitoba.—The terms, intermediate schools, high school, collegiate department, collegiate institute, the rate at which the high school is used in Manitoba to denote secondary schools. Intermediate schools are secondary departments of graded schools, the principal devoting his whole time to secondary school work. High schools and Bishop’s universities and collegiate institutes four or more teachers engaged exclusively in secondary school work. There were (1917) 72 intermediate schools, 23 high schools, 4 collegiate departments, 7 collegiate institutes and 2 technical high schools. The whole number of teachers in high and
collegiate schools was 173, which with the 72 teachers in the intermediate schools gives a total of 245. In the intermediate schools there were, in 1916-17, 6,294 students of high school grade, of whom 4,090 were enrolled in high and collegiate schools and 2,196 in intermediate schools and the upper grades of rural elementary schools.

The secondary school program covers three years and includes several courses. The intermediate schools invariably give the course for teachers' certificates and occasionally that for undergraduate matriculation. In the high schools the student can pursue the teachers' course, the university matriculation course or a "combined" course, which admits to the university and to the normal school. In some of the larger collegiate schools a commercial course of two years is given in addition to the preceding. In certain rural centres a course is given in agriculture.

Special grants are paid by the Department of Education as follows: Intermediate schools, $500; high schools $500; fixed grant, $5 per annum per capita, $50 for apparatus and library; collegiate departments, $450 along with per capita, library and laboratory grants; collegiate institutes, special grants to the amount of $1,600 in all in addition to capitation grant of $3.

Principals of intermediate and high schools must hold first class certificates; principals of collegiate schools must in addition be university graduates; professional certificates are required in all cases.

The Winnipeg technical high schools, which cost over half a million each, were opened in 1912. So far as their day school work is concerned these are really manual training high schools, but as evening schools they are continuation schools for adult pupils along industrial and technical lines. Household science, art and physical culture are taught in both the day and the evening classes. In the day school there is a special course for girls, known as the practical arts course, 20 per cent of the matriculation course, 19 per cent. The technical training of the technical schools of Winnipeg is recognized in the requirements for matriculation to the engineering course of the university, and it is probable that some allowance will be made for it in the other matriculation courses also.

Prince Edward Island.—There are no high schools proper in Prince Edward Island, but provision for the work has been made in about 29 schools with high school departments, in 32 graded schools and in some of the best continuing schools for adult pupils along industrial and technical lines. Household science, art and physical culture are taught in both the day and evening classes. In the day school there is a special course for girls, known as the technical course, 20 per cent of the matriculation course, 19 per cent.

All the other schools aim to matriculate pupils into them. All the schools are supported by legislative aid and district assessment, of which the former constitutes about three-fourths of the expenditure. No special grant is made for high school purposes. Whatever is paid extra comes by voluntary vote of the ratepayers of the district. Manual training, household science, physical culture and agriculture are taught in the Prince of Wales College and the Normal School. The teachers so trained, in turn instruct all the pupils in the public schools in physical culture and agriculture or nature study. Physical culture is greatly stimulated by prizes from the Strathcona Trust Fund and agriculture is assisted by the Department of Agriculture. With the exception of the Charlottetown and Summerside schools no instruction is given in manual training and household science.

New Brunswick.—Secondary education in New Brunswick is provided for in grammar and superior schools. The number of the former is 14, with 41 teachers, and the number of the latter is 1,281. Teachers holding license of the grammar school class receive from the government from $350 to $400 a year, according to the length of service of the teacher, and under conditions provided by the Board of Education, but not more than four teachers in any one grammer school can receive this legislative grant. These schools are free to all pupils in the county in grades 8-12. University matriculation examinations are based on the requirements of the high school course, as completed in grade 11. Superior schools may be established in every county—one for every 6,000 inhabitants, and a majority fraction thereof. The principal of a superior school must hold a first class superior license, and receives from the government a grant of $250 to $300 a year, according to the time of service of the teacher, provided the trustees pay the teacher a salary from the district at least equal to the government grant. Superior schools in grade 7 and upward are free to all pupils living in the district in which the schools are situated. Most of the superior schools provide courses in high school work of the same character that are grammar schools. Little progress has been made in secondary vocational training, but the consolidated schools in the high school departments of which agriculture, manual training and household science are taken up. In most of the cities and towns these subjects are taught in grade 9; that is, the first year of the high school, and at the normal school. As yet, however, there is no provision for purely vocational training.

Nova Scotia.—In the public schools of Nova Scotia there are 12 grades, 9, 10, 11 and 12 being high school. Very many of the rural elementary schools have superior grades which do the first and the second year and the third year work of the high schools. In the towns and larger villages the high school departments are separate. The law allows one high school, called the county academy, in each county, to share in the $10,000 which the legislature grants for secondary education, in addition to the other grants to which they are entitled in common with the high school grades generally; provided the county academy is free to each pupil of the county who passes the uniform departmental entrance examinations.
Should, however, the shire town fall below the standard in equipment and accommodations, another may be made the county academy by the council of public instruction. Besides the uniform entrance examinations the education department holds uniform examinations in the courses of all the high school grades, and the universities and colleges of the provinces accept for matriculation the certificate of having passed grade 11 when it indicates a high pass in the subjects they prescribe, or grade 12 pass with 85 per cent pass in the essential matriculation subjects. The grade 12 pass is expected to displace eventually the old grade 11 pass. There are 18 county academies with 59 teachers, of whom 39 are university graduates, class academic being the necessary professional qualification for the high school teachers drawing academic grants. In 1917 the total enrolment in all high schools was 9,088. Of the total attendance 1,853 belonged to the county academies. There were 2,949 pupils in the provincial schools. Nova Scotia has a number of private schools which report an attendance of 450 as doing high school work.

Academic teachers must henceforth be graduates of recognized universities, who must after graduation have passed the provincial university graduates’ testing examination in six subjects, one of which (the major) must be of the standard of university honors distinction. After 30 or 35 years’ service they can retire with an annuity not exceeding $500 per annum.

So far, except in some progressive centres, very little special attention has been paid in the secondary schools to vocational education. Art is an optional subject in the high school course and in the Halifax County Academy there is a three years’ commercial course. In the Nova Scotia Technical College there are two sets of courses, the long course being of university grade and the short course partly of secondary grade. There were also in 1917 local technical schools in seven cities and towns and coal mining and engineering schools. For the school year ending July 1917 the following was the attendance at the different classes of schools: Rural Science School, 148; Agricultural College (regular), 63; Agricultural College (co-educ.), 261; Normal College, 67; evening technical schools, 1,643; coal mining schools, 536; Normal College, 263; total, 2,949.

Alberta.—The administrative unit of the educational system of Alberta is the school district. Any district, when conditions warrant, may, in addition to providing for the elementary or public school grades (1–8), provide for any or all of the high school grades (9–12), with the usual secondary school courses, all being under one school board. The government provides an increased grant for the secondary grades. Grade 11 gives university matriculation standing and admits to a normal school for training as second class teacher, while grade 12 gives first year university standing and admits to normal school for training as first class teacher.

Provincial normal schools containing large practice schools are located at Calgary and Camrose. The other educational institutions which take up secondary school work are the Alberta (Theological) College, the Robertson (Theological) College, the Jesuit College, all of Edmonton; Mount Royal College; Western Canada College; Saint Hilda’s College, all of Calgary; Alberta Ladies’ College at Edmonton; and Knight’s Academy at Raymond.

As in most of the other provinces, the vocational side of education is emphasized in Alberta. The board of education has power to provide instruction in both the primary and secondary grades in manual training, domestic science, physical training, music and art, and courses are given during each summer vacation for teachers of these subjects. An optional commercial high school course of two years has also been established. As to agriculture: The subject is taken up in the last two years of the elementary school course and is supplemented in the higher grades after a course in elementary science; and summer schools are provided for both teachers and inspectors. Moreover, in order to provide for many young men and women who in their earlier years were deprived of school facilities, three schools of agricultural subjects and art, along with the Department of Agriculture, have already been located on three of the demonstration farms of the Department of Agriculture. The courses include scientific and practical agriculture and dairying, and this year 150 pupils are enrolled. The courses include scientific and practical agriculture and dairying, and this year 150 pupils are enrolled.

In some of the larger centres technical schools have been established whose courses cover a wide range of industrial trades. Night schools have also been established, especially in the mining centres. In order also to correlate efforts in these various directions and to afford opportunities for more advanced training, an institute of technology has been established at Calgary.

Saskatchewan.—Since the passing of the Secondary Education Act in Saskatchewan in 1908, 21 high schools have been established, 7 of which have since been raised to the rank of collegiate institutes. In these, 138 teachers were employed in 1916 and the total number of pupils was 3,849. A technical college for boys and girls has been established by the Methodists in Regina and one for boys by the Presbyterians in Moose Jaw.

The total outlay from general revenue in aid of education increased from less than $200,000 in 1904 to approximately $1,000,000 in 1916.

Being a comparatively young province, Saskatchewan has been devoting most of its energy to its public schools. It has, however, made a beginning in elementary industrial training. A board of any district has authority to provide for manual training, household science and industrial training in both day and night schools. The only secondary schools, however, giving courses in these subjects are the collegiate institutes at Regina, Moose Jaw, Prince Albert, Saskatoon, Yorkton, Weyburn and Swift Current. As Saskatchewan is almost purely an agricultural province, special stress is being laid upon agriculture in both the public and the high schools. So far not much has been done in the latter, but the idea is that a majority of them will provide for the subject in the near future. For commerce and the trades little pro-
vision has so far been made in the secondary schools. Three collegiate institutes, however, have been giving exceptionally good courses for a number of years. There is very close cooperation between the Department of Education and the University of Saskatchewan; especially valuable work has been done through the medium of summer courses for teachers and others held at the university during the months of July and August.

**British Columbia.**—Secondary education in British Columbia is provided for in superior and high schools. A superior school may be established where there are at least 10 qualified pupils available. The subjects taught are those of the junior and senior fourth classes of the public schools and the first two years of the high schools. The teacher must hold at least a first-class B. C. certificate. A high school may be established in any municipal school district where there are at least 20 qualified pupils available. The teacher must hold a B. C. academic certificate, and the subjects of the course must be taught. Government assistance to superior and high schools is the same as for other schools, the grant being so much per teacher according to the class of the district, from the lowest in cities of the first class to $480 per teacher in rural municipal districts, with an additional maximum grant of $100. A grant on the same scale is also paid on account of teachers of manual training, domestic science, art and other special subjects, provided such teachers hold B. C. certificates of qualification. Special grants are also made for agricultural education, the greater part, however, being met by a proportion of the special Federal grant. As in the other provinces, the secondary schools are controlled by the Provincial Department of Education and by boards of school trustees, and are visited by provincial inspectors.

The King Edward School, Vancouver, which was established in August 1916, is the only school in the province undertaken as a comprehensive technical course. It is intended that at the end of the third year of the course the pupil shall be able to matriculate into the engineering course of the University of British Columbia. Of manual training center there are 49, with 40 instructors, attended by 992 pupils from the high schools, and of domestic science centers 39, with 20 instructors, attended by 1,406 pupils from the high schools. A commercial course of a thoroughly practical character, following three years, has been established in the larger high schools. In order to provide for the study of agriculture, the Department of Education proposes to establish classes for both boys and girls in certain high and superior schools. Arrangements have already been made to carry on these classes at three high schools and two superior schools. Extensive courses, suitable to the different localities, have also been provided for young men.

**JOHN SEATH, Superintendent of Education, Ontario.**

**19. HIGHER EDUCATION.** The history of higher education in Canada is by no means a homogeneous development in all the provinces. Each province, possessing its own machinery of local government and peculiarities of social and economic condition, has, as might be expected, evolved its own system of higher education. It is, therefore, the more remarkable that the beginnings of university education were almost identical in all the older provinces. This was due to the enlightened policy of the British government, which through the executive heads of the colonies began very early to make provision for future educational needs. In Upper Canada (now Ontario) and New Brunswick this provision took the form of an endowment out of Crown lands for the purposes of higher education. In Nova Scotia, already a self-governing colony, the legislature was encouraged to devote a special grant of money to establish a university and to make an annual appropriation in support of it thereafter, while the Imperial Parliament endorsed this action by voting much more substantial sums both for establishment and for annual maintenance. In Lower Canada (now Quebec) a proposal was made to create an undenominational state university, but the understanding that the Roman Catholic Church to the idea prevented it from being carried out. Thus in each of the four colonies or provinces which at the end of the 18th century made up the settled portion of British North America the policy was established of granting a substantial endowment of a university, either with large land endowments or with the pledge of support by the provincial legislature. The next stage was also alike in all the provinces of older Canada except Lower Canada. In these provinces a narrower view prevailed, and the state college in each, when established, discriminated in favor of the Church of England against other religious denominations. It was an attempt to implant in the colonies the English institution of an established Church, but the conditions in Canada were very different from those in England; the Church of England was numerically hardly stronger than the Presbyterian, Methodist or Baptist bodies separately, and certainly no exclusive right to control the universities should have been given. The other denominations accordingly, seeing the doors of the state institution closed to their members, or open perhaps but with reservations in favor of a rival Church, established their own institutions of higher education. In Nova Scotia there was a single well-supported university in each province there were several universities of a small calibre, none of them, not excepting the state universities, coming up to the standard that had been anticipated when the policy of a single state-supported institution for each province was framed. In course of time the disadvantages of division became more apparent. The denominational character of the state universities was altered and the negotiations for alliance were seriously begun. Up to the present time these negotiations have had no result in Nova Scotia or New Brunswick. But in Ontario a third stage has been reached, and the movement to combine resources has met with partial success. In western Canada the history of higher education is different. Profiting, perhaps, by the experience of the older provinces, the state universities in Manitoba and other western provinces have been established under conditions that prevent them from being controlled in the interests of any denomination.
Nova Scotia.—Taking each province in turn, for a more detailed account, we begin with Nova Scotia, the earliest settled of the English-speaking provinces of Canada. The first attempt at establishing a university was made by an act of the legislature in 1789 incorporating King's College at Windsor, where a seminary had been founded a year before by legislative aid. A grant of £500 for a site was also made and an annual appropriation of £400 for maintenance. In the following year the British Parliament granted £4,000 in further aid of the infant institution. It does not appear that actual university powers were obtained until 1802, when a royal charter was granted. At the same time an annual subsidy of £1,000, which was not discontinued until 1835, began to be made by the British Parliament. The charter gave control of King's College to the authorities of the Church of England in the province, and at the beginning of its career the name of Acadia College was restricted to members of that church the right of entering the college as students, thus completely establishing the sectarian character of the state institution. A majority of the inhabitants of the province were now debarred from sharing in the benefits they had looked forward to, and agitation began for a freer system. In response to this demand Dalhousie College was founded at Halifax in 1821 out of funds at the disposal of the governor for provincial purposes. Attempts at fusion of the two state-endowed colleges were subsequently made from time to time but without success. It was as a result of the refusal in 1835 of the governors of King's College to surrender their charter and amalgamate with Dalhousie College that the Imperial grant of £1,000 was withdrawn. Dalhousie College, though founded in 1821 and soon afterward provided with a building, was not opened for academic instruction until 1838, when sufficient funds had accumulated to enable a beginning to be made. In 1841 university powers were conferred by act of legislature and control was vested in a board appointed by the lieutenant-governor. But a similar mistake had been repeated again in the case of King's College, and Presbyterian influences had been allowed to preside at the organization in 1838. The Baptist body, therefore, seeing one of the state institutions avowedly under Anglican control, the other practically Presbyterian, proceeded to establish a college of its own at Wolfville. It was named Queen's College, and was formally opened in 1839. The act of incorporation conferring university powers was not passed, however, until 1840, and another act in 1848 incorporating King's College at Antigonish, in the year 1855. Under varying conditions higher education in the province continued to be carried on for a number of years by the institutions named, two of them being the recipients of government honors. In 1866, in order for want of funds was closed from 1845 to 1863, and on reorganization at the latter date was given a strictly non-denominational character. But the hope of uniting all the existing colleges in a single state university has not been given up. In 1876 an act of the legislature established the University of Halifax, which should examine and confer degrees upon candidates sent up by the colleges. In the latter, however, gave it no support, and continued to exercise their university functions. In 1881 the legislature withdrew its financial support and at the same time discontinued the annual grant which had hitherto been made to King's College. University federate in Nova Scotia had proved a failure, and no scheme to that effect has since been proposed. A second Roman-Catholic college, College Sainte Anne, was established in Digby County in 1890; and the Seminary of the Sacred Heart, at Halifax, in 1895. New Brunswick.—As early as 1786 an endowment of 2,000 acres near Fredericton, the capital, was set aside for the foundation of a provincial Academy of Arts and Sciences, which became incorporated in 1797 as the College of New Brunswick. In 1805 an act authorizing an annual grant of £100 in addition, which was subsequently increased from time to time up to £8,844, at which sum it has stood since 1829. In 1828 the provincial charter was surrendered to what they had looked forward to, and agitation began for a freer system. In response to this demand Dalhousie College was founded at Halifax in 1821 out of funds at the disposal of the governor for provincial purposes. Attempts at fusion of the two state-endowed colleges were subsequently made from time to time but without success. It was as a result of the refusal in 1835 of the governors of King's College to surrender their charter and amalgamate with Dalhousie College that the Imperial grant of £1,000 was withdrawn. Dalhousie College, though founded in 1821 and soon afterward provided with a building, was not opened for academic instruction until 1838, when sufficient funds had accumulated to enable a beginning to be made. In 1841 university powers were conferred by act of legislature and control was vested in a board appointed by the lieutenant-governor. But a similar mistake had been repeated again in the case of King's College, and Presbyterian influences had been allowed to preside at the organization in 1838. The Baptist body, therefore, seeing one of the state institutions avowedly under Anglican control, the other practically Presbyterian, proceeded to establish a college of its own at Wolfville. It was named Queen's College, and was formally opened in 1839. The act of incorporation conferring university powers was not passed, however, until 1840, and another act in 1848 incorporating King's College at Antigonish, in the year 1855. Under varying conditions higher education in the province continued to be carried on for a number of years by the institutions named, two of them being the recipients of government honors. In 1866, in order for want of funds was closed from 1845 to 1863, and on reorganization at the latter date was given a strictly non-denominational character. But the hope of uniting all the existing colleges in a single state university has not been given up. In 1876 an act of the legislature established the University of Halifax, which should examine and confer degrees upon candidates sent up by the colleges. In the latter, however, gave it no support, and continued to exercise their university functions. In 1881 the legislature withdrew its financial support and at the same time discontinued the annual grant which had hitherto been made to King's College. University federate in Nova Scotia had proved a failure, and no scheme to that effect has since been proposed. A second Roman-Catholic college, College Sainte Anne, was established in Digby County in 1890; and the Seminary of the Sacred Heart, at Halifax, in 1895. New Brunswick.—As early as 1786 an endowment of 2,000 acres near Fredericton, the capital, was set aside for the foundation of a provincial Academy of Arts and Sciences, which became incorporated in 1797 as the College of New Brunswick. In 1805 an act authorizing an annual grant of £100 in addition, which was subsequently increased from time to time up to £8,844, at which sum it has stood since 1829. In 1828 the provincial charter was surrendered to what they had looked forward to, and agitation began for a freer system. In response to this demand Dalhousie College was founded at Halifax in 1821 out of funds at the disposal of the governor for provincial purposes. Attempts at fusion of the two state-endowed colleges were subsequently made from time to time but without success. It was as a result of the refusal in 1835 of the governors of King's College to surrender their charter and amalgamate with Dalhousie College that the Imperial grant of £1,000 was withdrawn. Dalhousie College, though founded in 1821 and soon afterward provided with a building, was not opened for academic instruction until 1838, when sufficient funds had accumulated to enable a beginning to be made. In 1841 university powers were conferred by act of legislature and control was vested in a board appointed by the lieutenant-governor. But a similar mistake had been repeated again in the case of King's College, and Presbyterian influences had been allowed to preside at the organization in 1838. The Baptist body, therefore, seeing one of the state institutions avowedly under Anglican control, the other practically Presbyterian, proceeded to establish a college of its own at Wolfville. It was named Queen's College, and was formally opened in 1839. The act of incorporation conferring university powers was not passed, however, until 1840, and another act in 1848 incorporating King's College at Antigonish, in the year 1855. Under varying conditions higher education in the province continued to be carried on for a number of years by the institutions named, two of them being the recipients of government honors. In 1866, in order for want of funds was closed from 1845 to 1863, and on reorganization at the latter date was given a strictly non-denominational character. But the
formally made. It was left to private enterprise to establish the first university in Lower Canada. In 1813 the Hon. James McGill of Montreal died, leaving by will a piece of land, at a valuation time to time, to the sum of £10,000 for maintenance. A royal charter was obtained in 1820, but the college, bearing its founder’s name, was not opened until 1829, and on the day of its inauguration the Montreal Medical Institute was united to it as its medical faculty and its name. During the first years the college had a precarious existence, its expansion being, to a certain extent, hampered by the constitution of its governing board, but a new charter was obtained in 1852 entirely freeing it from official control. The history of McGill University (q.v.) since that time is a record of steady improvement. It is not identified with any religious body, but there are four affiliated theological colleges — Congregational, Diocesan, Presbyterian and Wesleyan. It owes its present position as one of the leading universities, not only of Canada but of the continent of America, to the generosity of the merchant princes of Montreal, and to the wise and able guidance of Sir J. W. Dawson from 1855 to 1883, and of his successor, Sir William Peterson.

The second university to be established in the province in the interests of the English-speaking inhabitants was in the Church of England Institution at Lennoxville, called Bishop’s College. It was incorporated in 1843, but a royal charter conferring university powers was not obtained until 1853. In the previous year, 1852, a royal charter had also been issued to the corporation of the Grand Séminaire of Quebec empowering it to confer degrees and exercise other university functions, under the name of Université Laval. The university thus established remains the sole Roman Catholic university of the province, with faculties of divinity, law, medicine and arts, having affiliated colleges and seminaries in various towns, and an integral branch of itself at Montreal under the name of Succursale de l’Université Laval.9 Saint Mary’s College at Montreal, under control of the Jesuit order, incorporated in 1852, has since 1859 been entitled to confer degrees of Laval University. There are numerous Roman Catholic colleges affiliated to Laval University, some of them of considerable antiquity. The oldest are Saint Raphael’s College at Montreal, established by the Sulpicians in 1773; those at Nicolet, founded in 1804; Saint Hyacinthe, in 1812; Sainte Thérèse in 1824; Sainte Anne de la Pocatière, in 1827; and L’Assumption, in 1832. The higher education given at these colleges is chiefly theological. James Loudon.

Ontario.—The history of higher education in Ontario is somewhat different from that in the older provinces. In 1798 the legislature set aside an endowment of 500,000 acres of Crown lands for the purposes of higher education, but nothing further was done at that time to carry the project into effect. In 1827, however, a royal charter was granted for the establishment of a university under the name of King’s College. By the terms of the charter, the institution was to be under the control of the Church of England. It was natural that the other religious bodies should enter a vigorous protest against these terms, and when this proved unavailing, should take steps to establish independent colleges. Consequently in 1830 the Methodist Church of Canada resolved to secure the establishment of higher learning in Upper Canada. That this resolve was not due to narrow sectarian prejudices is vouched for by the fact that religious tests were not to be required for admission, and, further, that a distinct stipulation was made with the early suggestion that “this will be purely a literary institution” and that “no system of divinity shall be taught therein.”

In 1836 the college was established in Cobourg under the name of Upper Canada Academy. It was incorporated by letters patent on 12 Oct. 1836 — the first royal charter granted to any Nonconformist institution of learning in the British dominions. In 1841 the first Parliament of Canada extended the charter and changed the name to Victoria College, with power to grant degrees in the various faculties. Work in the faculty of arts was begun in the same year. This was therefore the first university in actual operation in the province. The Presbyterian Church, which two years previously had petitioned the provincial government to endow without delay, an institution or professorships for the education and training of young men for the ministry in connection with the Synod9 had received but little encouragement, and so steps were taken to found a college somewhat after the model of the Scottish national universities. A royal charter was granted on 16 Oct. 1841 for the establishment of Queen’s College at Kingston, and the first classes were opened there in March of the following year.

In the meanwhile affairs at King’s College had been at a standstill. Owing to the pressure of public opinion a modification of the charter had been made by the legislature in 1837, but the chief grievances had not been removed. Teaching was not actually begun until 1843, that is, not until after the two other colleges had been established. The agitation increased in volume and bitterness until in 1849 it effected a complete change in the constitution of the university. The special privileges accorded to members of the Church of England were abolished. From this time on the University of Toronto, as it was now called, was non-sectarian. The immediate effect of this reorganization seemed at first disastrous. Within three years a charter had been granted to a new university in Toronto entirely under Anglican control. Trinity College began work early in 1852, and the university constituency was still further divided. In 1869 three more denominational colleges were opened in Ontario, namely, Ottawa College (Roman Catholic), which in this year was granted the power of conferring university degrees; then became the University of Ottawa; Regiopolis College (Roman Catholic), at Kingston; and Albert College (Methodist Episcopal), at Belleville. In 1878 Huron College (Anglican) at London became Western University, and in 1881 Toronto Baptist College and College were united under the corporate name of McMaster University with full university powers. Not all of these have survived, however. Regiopolis College closed its doors in 1869; and in 1884, in consequence of the union
of the various branches of Methodism in Canada, Albert College was incorporated in so far as its undergraduate work was concerned with Victoria College, and the name of the latter was adopted for Victoria University.

The evils of the multiplication of small colleges brought about their own cure. The enormous expansion of modern science imperatively demanded large expenditures for both buildings and equipment, and none of the existing institutions was able adequately to meet the demand. It was natural therefore that an effort should be made to devise a plan by which the ruinous duplication of expensive apparatus and plant could be avoided. Accordingly in 1884 the Minister of Education called a meeting of the heads of the various colleges and universities of the province for the purpose of discussing ways and means to accomplish this end. The result of these deliberations was that an act was passed by the legislature in 1887 reorganizing the university in order to permit of the federation of the various institutions involved. Queen's University, which at one time had seemed ready to accept the federation idea, finally declined to unite with the institution in Kingston. The only Arts colleges, therefore, to carry out the scheme were Toronto and Victoria. The latter agreed to hold in abeyance its degree conferring power in all departments except Divinity, and in 1891 moved from Cobourg to Toronto. In 1903 Trinity College entered into federation and in 1907 Saint Michael's College (Roman Catholic) also began work as an Arts college of the University of Toronto.

The first 14 years of the 20th century were years of extraordinary expansion for Canadian universities. Queen's University had now a clear field in eastern Ontario and under the late Principal Grant became one of the great universities of the Dominion. The University of Toronto under the late President Loudon, and since 1907 under President R. A. (now Sir Robert) Falconer grew to be one of the largest universities in the British Empire. At the outbreak of the war, which swept it almost clean of men students, as it did most British universities, the enrolment stood at 4,428.

Western Provinces.—Higher education in Manitoba is of recent date. By act of legislature in 1877 the University of Manitoba was established, with the sole power of conferring degrees in arts, law, and medicine in the province; degrees in divinity may only be conferred by colleges affiliated with the university. In its early years the university was an examining and degree-conferring body only, all teaching being left to the affiliated colleges. Later, however, a grant of land was made by the provincial government for the erection of a building for purposes of instruction in the departments of science and for a university library.

There are seven colleges affiliated with the University of Manitoba: Saint Boniface College is a Roman Catholic institution and was established as a small school so early as 1818; Saint Boniface College (which was founded in 1866; Manitoba College (Presbyterian) in 1871; Wesley College (Methodist) in 1888; Manitoba Medical College was affiliated in 1888; the College of Pharmacy in 1902; and the Agricultural College in 1901. All are in Winnipeg except Saint Boniface College, which remains at the town of Saint Boniface, where it was first established. The growth of the institution necessitated new buildings and a site was chosen at Tuxedo Park and building commenced.

In 1903 an ordinance was passed to establish a university for the Northwest territories, which has developed into the University of Saskatchewan. The corner-stone of the first building was laid by Sir Wilfrid Laurier at Saskatoon in 1910 and the university was chartered in 1912. Emmanuel College, founded in 1879 at Prince Albert by Bishop McLean for the training of native helpers, and transferred in 1909 to Saskatoon, was the first of the affiliated colleges. A place of special prominence is given to agriculture at this university. A university for Alberta was founded at Edmonton and the first session opened in 1908. Since then permanent buildings have been erected, and various theological colleges and professional societies affiliated to the university. From 1899 to the opening at Vancouver in September 1915 of the University of British Columbia, the interests of higher education in that province were served by the McGill University College of British Columbia. By independence its branches, one at Vancouver and the other at Victoria, and both affiliated to the McGill University at Montreal.

A. E. Lang,

Victoria College, University of Toronto.

20. PUBLIC EDUCATION. Under the provisions of the British North America Act, control of public education in Canada is vested in the provincial governments. The position of dissentent denominational schools is, it is true, specially safeguarded under the Act (30–31 Vict., c. 3, par. 93), and on their behalf the Dominion Parliament may interpose remedial legislation, but, with this exception, the whole organization, conduct and maintenance of education lies with the provinces. At the time of confederation the provinces then existing had already in operation a system of free elementary schools, which has since been expanded into the present efficient organization. In general there are two fundamental systems of education throughout Canada, one of the Protestant communities, free from the control of religious bodies, and the other of the Roman Catholic French and Irish communities in which education is united with the religious teaching of the Roman Catholic Church. In Ontario, Roman Catholics have the right to form what are known as "Separate Schools" for elementary education, the local rates for the support of these schools being separately levied and applied. In Quebec, Saskatchewan and Alberta similar provisions apply. In the remaining provinces there are no separate schools for Roman Catholic pupils.

The figures of the census of 1911 show the high standard obtained in public education in Canada. In a population of 6,319,160 persons over five years old, only 11.03 per cent are illiterate; in the province of Ontario of the persons over five years old, the illiterates number 8 per cent. The percentage of illiteracy is highest amongst the foreign-born and lowest amongst the British-born population. The latest reports available in 1917 show 1,250,000 pupils in 24,871 primary and secondary schools of Canada with about 30,000 teachers. Except in
the province of Quebec all but a small fraction of these schools are government institutions. Throughout the Dominion the cost of education, although largely paid for by provincial and local, and public elementary education is free, except for certain small fees which are payable in parts of the province of Quebec. With the exception of Quebec all the provinces have laws of compulsory education, but under conditions that differ between one province and another. The schools are co-educational and are controlled (within the scope of provincial statutes and regulations) by locally elected trustees. Secondary schools or departments and colleges or universities for higher education, exist under government control in all the provinces, and the three classes of teaching institutions are more or less coordinated to allow of natural transition from the lower to the higher. Recent movements in the direction of nature study, manual instruction, school gardens, agriculture, domestic science and technical education are all energetically in progress.

For the organization of education it is necessary to consider the provinces separately. Ontario, the most populous of the provinces and the most advanced in matters of education, having largely influenced the educational systems of the other Protestant parts of Canada, deserves the most detailed treatment. The system of public education in Ontario includes kindergartens, public (primary) schools, continuation schools, high schools and collegiate institutes, and a provincial university, the whole forming an organic unit. For the administration of this system, night schools, art schools, model schools, normal schools, teachers' institutes, libraries and technical and industrial schools. Kindergarten schools, admitting children between the ages of four and seven, may be organized at the option of boards of school trustees in cities, towns and incorporated villages. There are at present 216 such schools in the cities and towns of Ontario, with an enrolment of 25,554 pupils. The exercises consist of singing, marching, sewing, object lessons, etc. Above these are the public schools of the province, whose organization (first placed on a comprehensive basis in 1844 by Egerton Ryerson, superintendent of education), owes much to the education system of the State of New York. Every township is divided by its council into school sections, and for each section, each incorporated village, town and city there is a board of trustees. The latter are elected by the ratepayers, both male and female. Within the provisions of the statutes of the province, and the regulations of the education department, the trustees appoint the teachers, determine the salaries and provide and maintain buildings and equipment. The provincial government makes an annual grant of money to each school according to the average number of pupils in attendance. For the rural schools the county council adds an equal grant, the township council contributes $100 ($150 for a school with two teachers), and the remaining funds needed are raised from the ratepayers. In rural towns and villages the legislative grant is supplemented by funds raised by the local authorities. The public schools are free, and under an Act of 1891, trustees are empowered to supply textbooks either free or at reduced prices. In the uniform course of study prescribed by the education department, chief stress is laid on reading, writing, arithmetic, grammar, geographies, provincial and local, and public elementary education is free, except for certain small fees which are payable in parts of the province of Quebec. With the exception of Quebec all the provinces have laws of compulsory education, but under conditions that differ between one province and another. The schools are co-educational and are controlled (within the scope of provincial statutes and regulations) by locally elected trustees. Secondary schools or departments and colleges or universities for higher education, exist under government control in all the provinces, and the three classes of teaching institutions are more or less coordinated to allow of natural transition from the lower to the higher. Recent movements in the direction of nature study, manual instruction, school gardens, agriculture, domestic science and technical education are all energetically in progress.

For the organization of education it is necessary to consider the provinces separately. Ontario, the most populous of the provinces and the most advanced in matters of education, having largely influenced the educational systems of the other Protestant parts of Canada, deserves the most detailed treatment. The system of public education in Ontario includes kindergartens, public (primary) schools, continuation schools, high schools and collegiate institutes, and a provincial university, the whole forming an organic unit. For the administration of this system, night schools, art schools, model schools, normal schools, teachers' institutes, libraries and technical and industrial schools. Kindergarten schools, admitting children between the ages of four and seven, may be organized at the option of boards of school trustees in cities, towns and incorporated villages. There are at present 216 such schools in the cities and towns of Ontario, with an enrolment of 25,554 pupils. The exercises consist of singing, marching, sewing, object lessons, etc. Above these are the public schools of the province, whose organization (first placed on a comprehensive basis in 1844 by Egerton Ryerson, superintendent of education), owes much to the education system of the State of New York. Every township is divided by its council into school sections, and for each section, each incorporated village, town and city there is a board of trustees. The latter are elected by the ratepayers, both male and female. Within the provisions of the statutes of the province, and the regulations of the education department, the trustees appoint the teachers, determine the salaries and provide and maintain buildings and equipment. The provincial government makes an annual grant of money to each school according to the average number of pupils in attendance. For the rural schools the county council adds an equal grant, the township council contributes $100 ($150 for a school with two teachers), and the remaining funds needed are raised from the ratepayers. In rural towns and villages the legislative grant is supplemented by funds raised by the local authorities. The public schools are free, and under an Act of 1891, trustees are empowered to supply textbooks either free or at reduced prices. In the uniform course of study prescribed by the education department, chief stress is laid on reading, writing, arithmetic, grammar, geographies, provincial and local, and public elementary education is free, except for certain small fees which are payable in parts of the province of Quebec. With the exception of Quebec all the provinces have laws of compulsory education, but under conditions that differ between one province and another. The schools are co-educational and are controlled (within the scope of provincial statutes and regulations) by locally elected trustees. Secondary schools or departments and colleges or universities for higher education, exist under government control in all the provinces, and the three classes of teaching institutions are more or less coordinated to allow of natural transition from the lower to the higher. Recent movements in the direction of nature study, manual instruction, school gardens, agriculture, domestic science and technical education are all energetically in progress.
girls. The total expenditure was $3,444,940. One hundred and thirty-two continuation schools intended to provide an education suited to the majority of the agricultural communities have been established. The number of pupils in 1916 was 6,800 with 237 teachers. The total expenditure was $294,125. The total school expenditure for all classes of schools was $17,049,844, the provincial government making a total municipal amount of $1,104,775. Special attention is paid in Ontario to the uniform qualification and training of teachers. The lowest grade of public school teachers (third class) must pass the high school primary examination (Forms I and II) and attend a county model school. Teachers of the second class must pass the junior leaving and attend the provincial normal school. Teachers of the first class must pass the senior leaving examination, and attend the school of pedagogy in Toronto. To hold a position in a high school a teacher must hold a first class public school certificate, or have passed at least equivalent university examinations. For special positions in colleges, higher university standing is demanded, but varying according to the subject. Unless by special permission of the department, only the certificates of the universities in Ontario are accepted. At the head of the system is the Minister of Education, a member of the Provincial Cabinet.

The problem of public education in the Province of Quebec, owing to the division of the population between the French and English races, and the Roman Catholic and Protestant religions, is one of peculiar difficulty. The difference of creeds has led to the establishment of a dual system of elementary, secondary and superior schools. The Roman Catholics of the province, numbering (census of 1911) 1,724,683, had 6,119 schools of all kinds; the Protestant population of 378,549 had 897. At the head of the educational system is a superintendent of public instruction with a council composed of all the Roman Catholic bishops whose dioceses or parts of whose dioceses are in the Provinces of Quebec, now numbering 15, an equal number of Roman Catholic laymen appointed by the Crown and an equal number of Protestants similarly appointed. Within the council are a Protestant committee and a Roman Catholic committee which control the schools of their respective denominations. Each has its elementary, model, normal and high schools and academies. School attendance is not compulsory. In each parish or township there is a board of school commissioners elected by the owners of real estate. These erect and maintain schools, appoint teachers and levy the school tax, which falls on real property only. But in any such district a dissentient minority professing a religious faith different from that of the majority, may organize themselves separately, elect a board of trustees and conduct a school of their own. In the cities and towns there are separate Protestant and Roman Catholic boards of school commissioners. Real estate is taxed for school purposes according to the religious faith of its owner. The municipalities comprisethe sums raised on the rates, and (2) grants made by the Legislature. The former consists of the school assessment, which is levied on all taxable property of a school municipality and the monthly fee, which is collected for every child who attends or who should attend the public schools. The grant of the day and of the night is calculated according to the number of the children enrolled. In 1916 there were 5,908 elementary schools, with 7,982 teachers and 251,492 pupils. The average salary for elementary teachers is male $938 and female $236. There were 1,042 accredited high schools and model schools attended by 196,595 pupils. Of the public schools mentioned above are practically Roman Catholic schools with 897 separate schools attended by 54,745 pupils, of whom nearly all are Protestants. The total school expenditure for the province in 1916 was $11,564,043.64, the government grant amounting to $1,182,837.73.

In each of the three maritime provinces (New Brunswick, Nova Scotia and Prince Edward Island) there is a system of public elementary schools, high schools, and academies (grammar schools in New Brunswick), whose organization closely resembles that of the Ontario schools. In each province the executive council, acting through its superintendent of education, is in fact the head of the system. The elementary schools are free, co-educational, non-denominational, with compulsory attendance, placed under trustees elected in each school district, and supported partly by provincial, county and municipal grants, partly by local assessments. In these provinces the annual "school meeting" of rate-payers which elects the trustees, also votes the amount of money to be locally assessed. In Prince Edward Island in 1916 there were 457 public schools with 595 teachers and 18,362 pupils. The average salary for primary school teachers is male $276-$543 and female $220-$371. There were 28 first class schools (doing high school work) with 1,563 pupils. The total school expenditure for the year was $244,572.90, the provincial expenditure amounting to $173,962.50. In Prince Edward Island the Prince of Wales College at Charlottetown is a secondary school with governmental support, having a normal school department for the training of teachers. In New Brunswick there were 2,020 public schools with 2,141 teachers and 66,044 pupils. The average salary for public school teachers is: Male $290-$873, female $261-$482. There were 39 grammar and superior schools (high school and grammar schools with academies) with 2,365 pupils. The total school expenditure for the year was $1,221,224.71, the government grant amounting to $280,827.35. In certain towns and in some French Canadian settlements there are separate schools for Roman Catholics, attendance at which satisfies the requirements of the provincial law, but the schools are neither supported nor controlled by the state. New Brunswick has a provincial university, whose president is adjoined to the executive council in its capacity of board of education. In Nova Scotia in 1916 there were 2,837 public schools with 3,019 teachers and 99,463 pupils. The average salary for public school teachers is: Male $262-$872 and female $238-$482. There were 64 Provincial high schools (high schools and grammar schools with academies) with 9,726 pupils. The total school expenditure for the year was $1,620,154, the provincial government grant amounting to $414,738.

In Manitoba the executive council, or cab-
CANADA—TECHNICAL EDUCATION IN CANADA (21)

Stephen Leacock,
Professor of Economics and Political Science,
McGill University.

21. TECHNICAL EDUCATION IN CANADA. The term technical education is used with a variety of meanings. The general idea seems to be the use of schools and industrial appliances in preparing young men and women for skilled occupations. Even in Germany, we are told, "the old apprenticeship is dead."

However even the narrower statement seems to be becoming still more limited, for the legal and clerical professions, which seem still to require education and apprenticeship, and even the medical profession, which demands a time course and fixed laboratory work, are not now regarded in the public mind as coming under the heading of technical education. Technical education, in its present more limited use, seems to be regarded as a joint course of proportionate time in the class period of time in the practice of handicraft—sometimes spoken of as a trade or industry. Whether this definition be generally accepted or not, we shall follow it in this article.

In Canada the most notable event in connection with this specific education is found in the appointment in 1910 of the "Royal Commission on Industrial Training and Technical Education." As one of the commissioners on this body the writer may state that it was constituted as a court with seven members from different parts of Canada with a skilled secretary. This body, under the direction of the Dominion government, spent two years or more in (1) taking sworn evidence in Canada from 1,400 witnesses of every class (including the evenings representatives of the "labor organizations") as to their industrial needs. (2) Visiting manufactories, schools and universities in Canada. (3) Going, under government direction, to other countries, including the United States, and in Europe, the British Isles, France, Germany, Switzerland, Holland, Belgium and Denmark. (4) Embodying their report in four large octavo volumes aggregating in nearly 2,000 pages. In their report the Royal Commission gave an elaborate sketch of what they had seen in all these lands and made a recommendation that $3,000,000 a year for 10 years, making a total of $30,000,000, should be appropriated for securing "industrial training and technical education" for as many as sought it among the Canadian people.

In the Canadian Confederation the matter of education is reserved to the nine provinces of the Dominion, viz., Nova Scotia, New Brunswick, Prince Edward Island, Quebec, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia. To meet this demand the Report of the Royal Commission is that while the Dominion will give the money to be supplied and administered by a "Dominion Government Commission" appointed by itself, yet it is to be given through the medium of the provinces under the authority of the several provinces. The suggestion has been cordially received by the various provincial governments, and but for the European War, in which Canada as a part of the British empire is involved, would have been almost certainly carried out.
The Objects of the Royal Commission.— These are: (1) The education of trained teachers and demonstrators to carry out the purposes of the commission. (2) The establishment of classes, courses and schools for industrial training and technical education. (3) Provision to be made for laboratory apparatus and teaching equipment. (4) Scholarships to be given to deserving pupils. (5) Provision for traveling experts to visit institutions. (6) Help for institutions, such as universities and colleges. (7) Promotion of diffusion of scientific and industrial research.

Canada's Present Equipment.

I. Under University Control.— Commencing with the Atlantic coast, the Halifax Technical College is affiliated with several of the universities of Nova Scotia and New Brunswick. It has a competent staff of professors and assistants. Engineering students who take two years in the universities in a suitable course enter in their third year and finish in their fourth in the technical college. This arrangement has proved very successful. An excellent engineering department is found in McGill University, Montreal. This department receives efficient support from the Canadian Pacific Railway, Queen's University, Kingston, Ontario, especially in its mining school, has excellent courses in practical science. Toronto University—the provincial university—has a strong faculty of applied science. The several departments of the faculty distributed in various buildings are: Civil engineering, mining engineering, mechanical engineering, architecture, analytical and applied chemistry, chemical engineering and electrical engineering.

II. Government and Municipal Technical Schools.—The several provinces of the Dominion have their different methods of dealing with technical education, and the newer provinces are much alive to the necessity of such schools. Nova Scotia, though not a large province, has been ahead of the field in providing various kinds of science schools. Much attention has been paid to continuation and night schools. The coal mining schools have been efficiently used in this province. Other mining schools are maintained. Technical schools are maintained in Truro, Amherst, Yarmouth, New Glasgow and Sidney. The province of Quebec has two notable technical schools maintained by the provincial government, besides a number of smaller local schools of this type. (1) Montreal.—This technical school, opened in 1911, is declared to rival any technical school of its class in America or Europe. It was erected and is maintained by the Quebec provincial government. The city of Montreal also assists it. Evening and night classes of every variety are maintained. (2) Quebec City.—A replica of the Montreal school, erected and supported by the government of the province, is three-fifths of the size of the Montreal school. (3) The Shawinigan Technical Institute, on the Saint Maurice River, is a remarkably complete school maintained in part by the Quebec government in a thriving manufacturing town. In the province of Ontario, in 1915, a magnificent technical school was erected in Toronto, at a cost of $1,000,000. The site and equipment, to take the place of one limited in size and efficiency. The new school (with seven acres of floor space) can accommodate 2,500 day pupils and a vast number of night pupils, giving instruction in a great variety of subjects. It represents the aspiration of Toronto to be a great manufacturing centre. (4) Hamilton City, also aiming at being a leading trade city, in 1909 erected a building, costing $100,000, exclusively for technical education. Here, adjacent to a regular collegiate school efficient teaching is given in wood-working, machinery, forging, electrical work, household science, drafting, printing and in fine arts. Brantford, called the 'Sheffield' of Canada, has lately finished a commodious technical school. Woodstock, Kitchener (late Berlin), Peterborough and Saint Thomas are industrial centres with excellent educational facilities. In most of these schools wood-working, building construction, mathematics, mechanical drawing, applied sciences, dressmaking, millinery, commercial work and practical English are largely taught. Many other Ontario towns have technical evening schools. In the mineral region of Ontario on Lake Huron are the well-known schools of Sainte Marie and Sudbury, in which apprentices and workmen receive training in their craft. In Winnipeg, Manitoba, now the third city in size of the Dominion, two great technical high schools—called respectively the Kelvin and the Saint John's—erected by the city itself at a cost of $450,000 each without site, are in full operation, and of the night schools of the city numbering 5,000 in attendance half are in these technical schools. Calgary, a considerable city of Alberta, has shown great enterprise in this direction and has large and very successful schools in many technical subjects.

On the Pacific Coast the city of Vancouver, British Columbia, has gained a high reputation, especially for its technical night schools.

III. Railway Employee Schools.—In Stratford (Grand Trunk shops), in Saint Thomas (New York Central shops), in Montreal (Canadian Pacific shops). A successful training is given to the boys who enter the shops about the age of 13 to 15. The hours in the morning are taken from the company's time, and the teaching is done in the shop precincts. Shop mechanics, workshop practice, mechanical drawing—also mechanics, electricity, car construction, and other, as desired, telegraphy and shorthand are taught.

IV. Agriculture and Horticulture.—The cry of the agriculturist preceded that of the manufacturer and the first ambitious design of Canadians was to improve agriculture. Hence the provincial demand in almost every case is for technology on the farm. After several weak attempts in Nova Scotia at agricultural teaching the college at Truro was begun there in 1905. It has been a popular institution and draws its pupils from the three maritime provinces of Nova Scotia, New Brunswick and Prince Edward Island. The summer school of science, which has existed in Nova Scotia for some 30 years, has been merged into the Agricultural College at Truro, which for the last 10 years (1908-18) has been well maintained in this town. From 200 to 500 teachers of public schools attend the six weeks' course in practical teaching supplied by the Agricultural College at Truro. Technical farms conducted by extension officers of the Department of Agriculture for traveling and maintenance for the session and is doing a large work for the maritime prov-
inches of Canada. Two excellent agricultural colleges are found in the province of Quebec, viz., the Université de Chicoutimi and the Olka College in the Ottawa River District. The former of these is 20 miles from Montreal and its farms and beautiful buildings are the gift of Sir William Macdonald, a wealthy manufacturer of Montreal. It is divided into three sections, agriculture, science and liberal arts. It is a school for teachers and a school for household science. Registration, tuition, board and laboratory fees are charged. Various courses are given in horticulture, farming, etc., making the institution a boon to the province and attracting considerable numbers from other provinces. Chiefly for the benefit of the element of French-speaking people in Quebec, who are largely farmers, the Olka College was, after some 14 years of more or less successful existence, reorganized in 1909. It is affiliated with the French University (Laval) in Quebec. It is well housed and has a farm of 1,800 acres, 700 under cultivation. Its laboratories are well equipped and it has a good technical laboratory. Both the French and English departments are taught in the college. Forestry is taught and Quebec has the most complete fire protection of its forests of any province of the Dominion. The college announcement says: "Agricultural tastes and agricultural education produce a virile nation." The examinations are conducted by the authorities of Laval University. In Ontario, the Provisional Agricultural College of the province is situated near the city of Guelph. It is one of the most notable agricultural colleges on the American continent. It has 40 instructors, and lately a branch for women was opened. In 1909 there were 1,296 students in attendance. It gives courses for rural teachers. The college course that leads to a degree at Toronto University is four years. There are over 5,000 members of the Farmer's Union who are conducting agricultural experiments and reporting each year to the college authorities. This college has been the alma mater of many of the presidents of the Dominion, as well as many of the agricultural colleges in the United States. The Agricultural College of the province of Manitoba, with its 8 or 10 buildings, is the most magnificent of the agricultural colleges of the Dominion. It is affiliated with the University of Manitoba, Winnipeg, and has a complete staff. It has educated hundreds of students and conducts extensive courses, lectures, etc., throughout the province. It aims at reaching large numbers of people by holding summer schools, uniting several professions and devoting itself heartily to prairie life. The Saskatchewan Agricultural College is a part of the University of Saskatchewan, which is located at the city of Saskatoon. Its extensive work has been very widespread. The faculty proposes to develop along lines of investigation, teaching and extension work. Its extension work has taken the following forms: Encouraging agricultural societies and competitions; rock and farming, farmers' institutes, excursions to experimental farms and seed-grain farms, institutes, farmers' women's clubs. The government gives a liberal appropriation for this work. Alberta and British Columbia are newly established universities and both have agricultural farms maintained by the Dominion. No doubt they will develop largely along the line of those of the provinces of Ontario and Saskatchewan. The Conservation Commission of Canada, with its headquarters at Ottawa, has done in its seven years of service in agricultural problems, health, town-planning and forest protection, protection of game and fish, notable work in technical research.

V. Special Features.—In different provinces are found special features: (a) Mining schools with 673 pupils in attendance are found in 29 places in Nova Scotia; (b) in connection with Saskatchewan agricultural department of the University at Saskatoon extension work takes place for experimental farms, farmers' institutes, agricultural societies, farmers' and women's clubs, etc. This is a peripatetic experiment. In 1916 the Dominion government urged on by learned societies established an Honorary Advisory Council of Scientific and Industrial Research in Canada. This council was closely attached to leading departments of the Dominion government at Ottawa. Several of the most prominent scientists of the Dominion, Dr. Macallum, Dr. F. D. Adams, Dr. J. C. McLennan and Dr. A. S. Mackenzie were placed on it. Leaders in trade, agriculture, labor and research were chosen to deal with natural resources, waste products, forestry, farming and pressing industrial problems. This movement has been viewed in Canada with universal approbation.

GEORGE BRYCE, Member of Conservation Commission of Canada; Royal Commission on Technical Education (1910-13), and of Royal Society Committee on Research (1916).

22. CATHOLIC EDUCATION. The French Regime (1608-1760).—During this period education in Canada was almost entirely under the control of the Catholic Church. The first permanent school was the "Little School" founded by the Jesuits at Quebec in 1635. The first institution of higher learning was the Jesuits' College, also at Quebec, opened in 1636 or 1637. It maintained a classical course similar to those of the famous Jesuit colleges of France, and, after 1707, when the public School of Hydrography was attached to it, became a scientific centre of some importance. In 1663 Bishop Laval founded the Seminary of Quebec; in 1668 the Little Seminary, a preparatory school for boys aspiring to the priesthood; and about the same date the model farm and industrial school of Saint Joachim at Cap Tourmente. From 1666 schools for boys were maintained in Montreal by the Sulpician Fathers, and in several smaller towns and villages schools were established by the Recollets. From 1718 to 1730 the Hospitaller Brothers of Montreal, assisted by a royal grant, maintained a kind of normal school, and supported eight teachers in Montreal and neighboring parishes. Convent schools for girls were conducted by the Ursulines at Quebec (1639) and Three Rivers. The Congregation of Notre Dame, founded at Montreal in 1659 by Marguerite Bourgeoys and represented by branches in many of the larger villages. Moreover, by the middle of the 18th century parochial schools existed in the majority of the country parishes. After 1727
teachers were by ordinance placed under the supervision of the parish priests, and were required to teach in the King's
Intendant and from the Bishop or Archdeacon of Quebec. Some country schools had Latin
classes. In general, education was more widespread than might be assumed. A majority, or
at least a very large minority, of the habitants
could read and write. All this was accom-
plished by the free efforts of Church and peo-
ple; no assistance was obtained from govern-
ment, except a few slight subsidies and some
grants of land to religious teaching orders. In
Acadia (now Nova Scotia and New Bruns-
wick) education was more backward than in
Canada. We hear of a seminary and a girls' school at Port Royal (now Annapolis) before
1640, and, after the temporary English con-
quest of 1654, of schools for boys and girls.
These disappeared on the final conquest in
1710. In Cape Breton the fortress-town of
Louisbourg had its own schools, including a
convent of the Sisters of Notre Dame, but
town and schools alike disappeared after the
capture by the British in 1758.

Canada 1760–1867.—The British conquest was
followed by a decline in education. The Church in Canada was thrown on its own re-
sources by the break with France, and hampered by
the prejudices of alien rulers. The British
government tolerated the religious orders of
women, but directed the gradual extinction of
those of men and the confiscation of their prop-
erty, property which Canadians believed to have
been granted, in large part, as an endowment for
education. The Jesuits College was abandoned
in 1768. Both Jesuits and Recollets disappeared
at the beginning of the 19th century, but Sul-
pician exiles from Revolutionary France were
admitted to Canada, and henceforth that order
revived. The government had ordered meas-
ures to be taken—especially the establishment
of Protestant schools—to win the Canadians to
Protestantism, but in fact little attempt at
proselytism was made. Nevertheless the sus-
picions of the inhabitants were aroused, and
there was much misunderstanding. The British
could not close union of religion and national cul-
ture which is so marked a characteristic of the
French Canadian people. In 1791 the colony
was divided into the provinces of Lower Can-
ad, Upper Canada, and Lower Canada, where the inhabitants were chiefly newly-arrived English-speaking Protestants. Parliamentary institutions were conceded, and through these the Catholic people of Lower Canada gradually obtained control of their schools. An attempt in 1818 to give a monopoly of education to the Royal Institution for the Advancement of Learning, a body mainly Eng-
ish and Anglican, was defeated by the hostil-
ity of the people themselves. In 1824 the in-
dependent religious schools, Catholic and Prot-
estant, were recognized by the Legislature, and in
1829 they received state aid. After 1829 the
revenues from the Jesuit estates were devoted to
educational purposes, and in 1839 the Sulpici-
sians were led by Bishop Ignatius Notton to
cede their estate to the government. In Upper Canada Catholics were not numerous. Only a few schools were established, several
by the Rev. Alexander Macdonell (consecrated
Bishop of Kingston in 1826), who brought
teachers from Scotland and obtained a small subsidy from the British government. In 1840
the two Canadian provinces were reunited.
Contrary to expectations, this strengthened the
position of both the King's Intendant and from
the Bishop or Archdeacon of Quebec. Some country schools had Latin
classes. In general, education was more widespread than might be assumed. A majority, or
at least a very large minority, of the habitants
could read and write. All this was accom-
plished by the free efforts of Church and peo-
ple; no assistance was obtained from govern-
ment, except a few slight subsidies and some
grants of land to religious teaching orders. In
Acadia (now Nova Scotia and New Bruns-
wick) education was more backward than in
Canada. We hear of a seminary and a girls' school at Port Royal (now Annapolis) before
1640, and, after the temporary English con-
quest of 1654, of schools for boys and girls.
These disappeared on the final conquest in
1710. In Cape Breton the fortress-town of
Louisbourg had its own schools, including a
convent of the Sisters of Notre Dame, but
town and schools alike disappeared after the
capture by the British in 1758.

Canada 1760–1867.—The British conquest was
followed by a decline in education. The Church in Canada was thrown on its own re-
sources by the break with France, and hampered by
the prejudices of alien rulers. The British
government tolerated the religious orders of
women, but directed the gradual extinction of
those of men and the confiscation of their prop-
erty, property which Canadians believed to have
been granted, in large part, as an endowment for
education. The Jesuits College was abandoned
in 1768. Both Jesuits and Recollets disappeared
at the beginning of the 19th century, but Sul-
pician exiles from Revolutionary France were
admitted to Canada, and henceforth that order
revived. The government had ordered meas-
ures to be taken—especially the establishment
of Protestant schools—to win the Canadians to
Protestantism, but in fact little attempt at
proselytism was made. Nevertheless the sus-
picions of the inhabitants were aroused, and
there was much misunderstanding. The British
could not close union of religion and national cul-
ture which is so marked a characteristic of the
French Canadian people. In 1791 the colony
was divided into the provinces of Lower Can-
ad, Upper Canada, and Lower Canada, where the inhabitants were chiefly newly-arrived English-speaking Protestants. Parliamentary institutions were conceded, and through these the Catholic people of Lower Canada gradually obtained control of their schools. An attempt in 1818 to give a monopoly of education to the Royal Institution for the Advancement of Learning, a body mainly Eng-
ish and Anglican, was defeated by the hostil-
ity of the people themselves. In 1824 the in-
dependent religious schools, Catholic and Prot-
estant, were recognized by the Legislature, and in
1829 they received state aid. After 1829 the
revenues from the Jesuit estates were devoted to
educational purposes, and in 1839 the Sulpici-
sians were led by Bishop Ignatius Notton to
cede their estate to the government. In Upper Canada Catholics were not numerous. Only a few schools were established, several
by the Rev. Alexander Macdonell (consecrated
Bishop of Kingston in 1826), who brought
teachers from Scotland and obtained a small subsidy from the British government. In 1840
the two Canadian provinces were reunited.
Contrary to expectations, this strengthened the
position of both the King's Intendant and from
from 1833 on; a great impetus to this missionary work was given after 1845 when it was largely taken over by the Oblate Fathers.

Confederation (1867).—By the British North America Act of 1867 the provinces of Canada (Upper and Lower Canada becoming Ontario and Quebec), Nova Scotia and New Brunswick were united in federal union to form the Dominion of Canada. Other provinces have since been added. Education was assigned to provincial control, but the provinces were prohibited from interfering with denominational rights as existing at the union, and the Dominion Parliament was empowered to redress any other infringements on the educational rights of religious minorities.

Ontario.—Elementary education is free and compulsory, and is provided by public and separate schools, both under state control. Since confederation the essential elements of the Catholic Separate School system have not been changed. Five or more Catholic heads of families in any locality may maintain a separate school and be exempted from public school rates. Trustees elected by the school supporters administer school business. Their revenues consist of (a) provincial grants, based on attendance, efficiency, etc., and distributed to separate schools; (b) county and other municipal grants distributed on similar bases; (c) rates levied by the trustees on the property of separate school supporters; (d) voluntary contributions, chiefly from church funds. Teachers must have the same qualifications in separate as in public schools. By a decision of the Privy Council in 1906 religious teachers were made subject to this rule, from which they had hitherto been exempt. The older religious teachers were, by legislation of 1907, given, on certain conditions, permanent qualification. Religious instruction is under the supervision of the parish priests. Secular instruction is identical with that in the public schools and the same standards of efficiency are used by the provincial Department of Education. Textbooks are the same, except in English literature, in which extracts from Catholic authors are more largely used, and to some extent in history. Since 1882 the Department has maintained a directory of schools and teachers.

Secondary education is supported by the province partly through advanced classes in public and separate schools, but mainly through high schools. No separate high schools are recognized. Catholic secondary education is offered by private institutions, conducted generally by religious orders. There are 32 of these Catholic high schools, academies and colleges. Almost all such schools prepare candidates for the examination held by the Department of Education, and many are inspected by provincial high school inspectors. The University of Ottawa, conducted by the Oblate Fathers, which was canonically erected by Pope Leo XIII in 1889, is the only active Catholic university. There are English and French courses in arts, and a course in theology. Regiopolis College, closed in 1869 and reopened 1890, offers only secondary instruction. Saint Michael's College, one of the federated arts colleges of the provincial University of Toronto, is the most important center of higher education for English-speaking Catholics. It has the full benefit of the lectures and equipment of the university. University boards, on which Saint Michael's is represented, conduct the examinations—except that the college sets its own papers in philosophy—and confer the degrees. There are 9 professors and 140 students. Women students reside in Loretto Abbey College and Saint Joseph's College. Other colleges doing university work are Assumption College, Sandwich (founded 1855) and Saint Jerome's, Kitchener (1865). In northern Ontario colleges have been opened at North Cobalt (1912) and Sudbury (1913). The principal theological seminaries are Saint Augustine's, Toronto (1913), Saint Peter's, London (1912) and that attached to the University of Ottawa. In 1915 Ontario had 537 Catholic separate schools, with 1,389 teachers, 67,481 pupils and an average daily attendance of 45,733. The total receipts for the maintenance of these schools in the same year were $1,347,502, of which $42,131 was derived from provincial grants and $267,903 from public school rates. The remainder was contributed by the Roman Catholic Church. The total expenditure in the same year amounted to $1,183,847, of which $503,946 was for teachers' salaries and $366,625 for sites and buildings. The expenditure per pupil enrolled amounted to $17.54.

Quebec.—The primary school system is denominational and separate: it is based on religion, and Catholics and Protestants have each a complete and independent organization, receiving equal proportional assistance from government. State control is exercised through the Council of Public Instruction as reorganized in 1876. It is divided into two committees, Catholic and Protestant. Everything relating specially to Catholic schools is within the exclusive jurisdiction of the Catholic committee. The committees meet together to consider matters of common interest. The Catholic committee consists of the superintendent of public instruction, the bishops of Quebec, an equal number of laymen appointed by the lieutenant-governor, and, since 1896, four associate members chosen from the primary school teachers. Primary schools include elementary schools, giving a four years' course; intermediate or model, two years; and superior, or academies, two years. They are "under control" or "independent and subsidized" schools, and they are administered by elected school boards or by other bodies. The province is divided into school municipalities, each electing its school commissioners. The revenues consist of (a) rates levied on property of Catholics; (b) fees; (c) provincial grants; (d) private funds of independent schools. Lay teachers must hold diplomas granted by the central board of examiners. The moral and religious supervision of Catholic schools is exercised by the parish priests. Secular studies are supervised by the Catholic committee. Under it are a Catholic inspector general and divisional inspectors. Although education is neither free nor compulsory, the school attendance is good. In 1912-13, with a Catholic population of 411,701, of the ages 5 to 16 years, there was an enrolment in primary schools of 362,934 (including 4,520 over 16 years) and an average attendance of 287,403.

Secondary education is not under state control, but the province maintains a number of special schools. Among such schools Catholic institutions are normal schools—nine for women
have been opened since 1905.—agricultural schools at Oka and Ste Anne de la Pocatière, a school for higher commercial studies at Montreal, schools for deaf-mutes and the blind, domestic science schools, night schools and schools of arts and manufactures. Catholic secondary education is offered by classical and commercial colleges conducted by ecclesiastics, 19 of which receive an annual subsidy of $1,000 each, and by convent academies for young ladies. A newly established universitiis is Laval, which was canonically erected in 1876. It has faculties of theology, law, medicine and arts and affiliated professional and technical schools. A complete branch of the university was established in Montreal in 1879. Each branch receives a grant of $25,000, and the affiliated Polytechnic School $30,000. The Seminary of Quebec and the Grand Seminary of Saint Sulpice at Montreal constitute the theological faculty, and there are affiliated seminaries. The Sulpician Fathers, besides a college, a philosophical and a theological college in Montreal, have since 1858 maintained the Canadian College in Rome for advanced ecclesiastical studies. In 1915 there were 5,231 elementary schools, controlled 5,151, independent 80; with an enrolment of 211,672, and an average attendance of 166,955. There were 5,576 lay and 949 religious teachers. The model schools numbered 673; controlled 552, independent 121, with an enrolment of 105,831, an average attendance of 89,013; and 3,206 teachers, lay 922, religious 2,284. The academies were 283 in number, of which 128 were controlled and 155 independent. The student enrolment was 75,482, with an average attendance of 65,846; and 286 lay and 2,793 religious teachers. There are 13 normal schools, 2 for men and 11 for women; with 1,134 pupils and 173 teachers. There are three schools for the deaf, dumb and blind, with 515 pupils and 115 teachers. Schools of arts and trade number 11; with 2,515 pupils and 45 teachers. There are 48 night schools, with 3,640 pupils and 107 teachers. Universities and classical colleges comprise *Laval University, Quebec, 87 teachers, 474 pupils; *Laval University, Montreal, 234 teachers and 1,786 pupils; 21 colleges with 737 teachers and 7,788 pupils.

—CONVENTION.—Primary schools are supported and controlled by the state, and no separate schools are recognized by law. Nevertheless in practice many of the public schools, especially in the cities and in Acadian districts, are really Catholic. The law permits the school boards to direct religious exercises to be held for a brief period within school hours, or, if objection is made, after school hours. By a good understanding among all classes, over 30 urban schools, accommodating about 10,000 pupils, are recognized practically as being Catholic and so conducted. Many of them are in charge of religious teachers. There are two academies for boys and 12 for young ladies. That attached to Saint Francis Xavier University is the county academy of Antigonish, and receives state support. Saint Francis Xavier University, Antigonish, though a small institution, maintains high educational standards. It has faculties of arts, law and applied science. Saint Anne's College, Church Point, is the chief centre of higher education for the French population. A theological seminary is maintained at Halifax. The four Catholic institutions of university rank in Nova Scotia have 54 professors and 500 students and the principal secondary schools, 560 professors and 5,000 students. Saint Vincent College and Sacred Heart College, Halifax; Our Lady of Lourdes School, Pictou, and Saint John Baptist Academy, New Glasgow, have 68 teachers and 1,105 students.

New Brunswick.—In 1875 the legislature, which had hitherto granted some stipends for Catholic education, established a non-sectarian system of public schools. The Catholic authorities unsuccessfully sought redress from the Dominion under the terms of the British North America Act. In 1875 a compromise was effected: urban school boards were permitted to lease Catholic school buildings, open public schools therein, and employ qualified religious teachers and others having the confidence of the Catholic clergy. Much the same working arrangement exists in the towns and cities of New Brunswick as in Nova Scotia. There are 14 convent academies for young ladies, several preparatory boys' schools, and three classical colleges—Saint Joseph's, Memramcook (1864), which has the status of a university, and forms an educational centre for the Acadian people; Sacred Heart College, Caraquet (1899), and Saint Thomas, Chatham (1910).

Prince Edward Island.—This province entered confederation in 1871, having then a public non-sectarian school system. There are no separate schools, but Catholics maintain a few private schools, including seven convent academies of the Congregation of Notre Dame and the classical college of Saint Dunstan's at Charlottetown.

Manitoba.—This province was created by an act of 1870 which, in terms resembling those of the British North America Act, guaranteed the permanence of all rights to denominational schools as then existing, and provided for an appeal to the Dominion against infringements of any other educational rights of the future religious minority. In 1871 a school system modeled on that of Quebec was established, with a board of education divided into Catholic and Protestant elements, 12 Catholic and 12 Protestant school sections, and an equal division of provincial subsidies. Later these grants were divided in proportion to school population. By 1890 Protestant school sections had increased to 629, Catholic 50. On that year the legislature created a political department of education, and absorbed all schools into one non-sectarian system, to be supported by taxes which should be levied equally on all property-holders but applied only to schools conducted in accordance with the new regulations of the department. These prohibited all religious exercises except certain scriptural readings and prayers, approved by Protestants but not acceptable to Catholics. The judicial committee of the Imperial Privy Council decided in 1892 that the new laws were valid, as not infringing any right in existence in 1870. The Catholics then sought the other means of redress provided, an appeal to the Governor General. In 1895 the Privy Council declared their appeal to be, legally and materially, well founded, since there had been an infringement of rights acquired after 1870. In 1896 the Dominion government
Introduced into Parliament a bill to remedy the disabilities of Manitoba Catholics. Parliament's term expired before the bill was passed, and in the subsequent elections Wilfrid Laurier and the Liberal party, who had opposed the bill, were returned to power. Laurier, as Prime Minister of Canada, arranged a compromise under which the Manitoba schools are still administered. The trustees of a school may authorize some slight Catholic religious teaching, and one Catholic teacher must be employed in each public school containing 40, or a rural school containing 25 Catholic pupils. The Pope, on the report of his special delegate, Mgr. Merry del Val, declared of the new settlement:

"We have no doubt that these measures have been inspired by a love of fair dealing and good intention. But we cannot conceal the truth. The law made to remedy the evil is defective, imperfect, insufficient." Catholics have never accepted the settlement as satisfactory, but have been compelled to acquiesce in it. In Saskatchewan 17 Catholic schools in number in 1916, enjoy considerable liberty and maintain schools practically Catholic. In Winnipeg, Brandon, and a few other centres, private parochial schools are kept open under greater difficulties. There are Ruthenian parochial schools in Winnipeg and Sifton. Seven convent schools offer secondary education for girls. In 1909 a Lesser Seminary for boys aspiring to the priesthood was established at Saint Mary's College. Higher education is offered by Saint Boniface College, which since 1877 has been a federated college of the University of Manitoba, holding a position somewhat analogous to that of Saint Michael's in the University of Toronto.

British Columbia.—British Columbia entered confederation in 1870. Neither then nor since have separate schools been recognized. Catholics accepted without serious opposition the Public School Act of 1872, which organized a non-sectarian system, but protested strenuously, though unsuccessfully, against the School Tax Bill of 1876, which levied a special head tax for the support of these schools. Catholics maintain a number of private schools: 11 parochial schools, six academies for young ladies, and two day schools.

Saskatchewan and Alberta.—That portion of the Canadian West lying between Manitoba and the Rocky Mountains was in 1875 granted a certain local autonomy by the Northwest Territories Act, and in 1905 was formed into the provinces of Saskatchewan and Alberta. The Territories Act guaranteed to the majority in each district the right to establish such schools as they thought fit, with the concurrent right of the minority to establish separate schools. In 1884 the local legislature organized a school system resembling that of Quebec, with a Catholic and a Protestant section of the board of education, each supervising its own schools. Gradually this system was changed into one approximating to that of Nova Scotia, with the addition of the Provincial school districts of schools as in Ontario. Under the ordinance of 1901, which was the school law when the new provinces were created, education was administered by a political department of state, with a purely advisory education council, two members of which must be Catholics. Religious instruction as directed by the trustees might be given during the last half-hour of the school day in public or separate schools. The religious minority in any section might establish a separate school. Thus the public school in a section predominantly Catholic may be as much a Catholic school as the separate school in one predominantly Protestant. These rights to religious instruction and to separate schools were made permanent by the Dominion acts creating the provinces of Saskatchewan and Alberta. In each province all government schools, Catholic and Protestant, public and separate, are under control of the provincial department of education, are subject to the same regulations and the same inspection, use the same courses of study and the same textbooks and receive grants on the same conditions from the provincial treasury. In Saskatchewan the Catholic ratepayers of a section must support the Catholic school, if there is such. Complete statistics regarding these schools are not available. In 1915 there were 15 Catholic schools in Saskatchewan. There is a considerable number of private educational establishments, chiefly convent boarding schools. In Alberta there is a college, Saint Francis Xavier's, at Edmonton West, and a "Little Seminary" at St. Albert.

James F. Kenney,
Public Archives of Canada, Ottawa.

23. LITERATURE. In any discussion of Canadian literature the first point one must settle is, What is Canadian literature? What are its essential characteristics? Is it the work of men and women living in Canada, whether born there or not; or must we confine it to the writings of native Canadians; is its essential characteristic to be that its matter relates in some way to Canada, whether the author be native or otherwise; or is it to be restricted to that is in its distinctive manner Canadian? And, in any of these cases, is it to be understood as including the quite respectable body of French-Canadian literature? In one of the older countries, the first definition would of course be rejected at once as inadmissible; but the conditions are somewhat different in a young country such as Canada, where one must come down to comparatively recent times to find anything like a large proportion of its writers native born. Yet even in Canada it would be undesirable to accept the first definition without reservations. The second would obviously give but a very limited and inadequate view of the literary product of the country. The third both includes too much and excludes too much. The fourth definition has much to recommend it, but would be exceedingly difficult to apply, and if strictly adhered to would necessarily exclude many important books written by Canadians. Probably the safer plan to adopt here, as in so many other cases, is a compromise, to include the best of what is distinctively Canadian in tone, whether by native Canadian or by adopted Canadian, without excluding that which is merely notorious, is not peculiarly Canadian either in manner or matter. Finally, one can not justly or logically confine a survey of Canadian literature to that which has been written in English. Quebec is as much a part of Canada as Ontario, and the literature of the French-speaking province cannot be ignored unless one is
prepared to set aside a large and important part of the intellectual product of the country.

Canadian literature, both English and French, has the weaknesses, as well as some of the strengths, of a young country. Much of it is crude, particularly that produced in the early pioneer days of the colony. At the same time one finds evidence of a broader outlook, a tone and treatment less trammeled by artificial conventions, than is always noticeable in the literature of older nations. As the country has developed, the crudity has largely disappeared, and at the same time much of the best of what has been produced in Canada since confederation, that is, within the last 50 years, retains the freshness, the atmosphere of youth, the virility, that helped to redeem the literary product of pioneer days from hopeless mediocrity. With a few exceptions, this sketch of Canadian literature will be confined to the confederation period. No attempt will be made to include all the writers of the meritorious writers, of the last half century; the object the writer has in view is rather to consider briefly the work of a few, whose achievement may be taken as fairly representative of the quality and development of Canadian literature.

Of Canadian writers whose work was produced in the years before confederation, one stands preeminently first—Thomas Chandler Haliburton (q.v.). Indeed, it would be equally true to say that Haliburton stands head and shoulders above any other writer that Canada has produced up to the present time. He approached more nearly to the rank of true genius than any other Canadian. He was born in Windsor, Nova Scotia, in 1796; was educated at King's College, in his native town; practiced law in the ancient town of Annapolis; for some years sat on the Supreme Court bench of his province; removed to England in 1856, and became a member of the British House of Commons. He died at his beautiful home on the banks of the Thames in 1865.

Haliburton's life was in every sense a full one. In law, politics and literature, his brilliant intellect and forceful personality put him among the foremost leaders in his day. He was an ardent Imperialist, and at the time when the Little Englander had things all his own way in the British Parliament, he preached the doctrine of a Greater Britain, and bazed the way for a closer union between the mother country and her overseas dominions. As a Nova Scotian, he was a firm believer in the human and material resources of his native province, and used all the power of his virile pen to stimulate the ambition of his fellow-countrymen and drive them out of the narrow groove of provincial self-sufficiency into which they had fallen. The influence of Haliburton's writings extended far beyond the boundaries either of his own province or his own generation. Haliburton was the author of three works of an historical character, 'Historical and Statistical Account of Nova Scotia' (1829), 'The Bubbles of Canada' (1837) and 'Rule and Misrule of the English in America' (1851). His lasting reputation, however, rests upon his works of fiction, or rather of humor. He has been called the "father of American humor." It is hardly too much to say that he was the greatest humorist America has yet produced. He did not depend upon exaggeration to produce the effects he sought. His writings are marked by both wit and wisdom. His humor is always genial. His satire is kind, constructive rather than destructive. He was caustic enough when laying bare hypocrisy, but in sight of the generous purpose that actuated all his works. There is very little plot in any of his books, but his character drawing is inimitable. Sam Slick has been rightly described as "amor omnium et peccator." As the country has grown, and as modern times.

But Haliburton will probably be remembered chiefly by reason of the aphorisms and epigrams that abound in his works. Many of them have become part of our everyday speech. He indeed anticipated more than one famous saying of later writers. The remark of the country girl in 'The Clockmaker,' "I guess I wasn't brought up at all, I grew up," appeared a dozen years before it was repeated in 'Uncle Tom's Cabin'; and Sydney Smith's famous aphorism really belongs to Sam Slick, whom we find saying, "Ain't this a hot day? I do wish I could just slip off my flesh and sit in my bones for a space, to cool myself." It would be idle to attempt to bring together here, even if it were possible, the many wise and witty sayings that Haliburton puts into the mouth of Sam Slick and his other characters. Two or three examples will serve the purpose: "The skn is narrower than the shirt;" "Power has a natural tendency to corrupc;" "what people hope for, they think at last they have a right to;" "a nod is as good as a wink to a blind horse;" "a man who is a slave to his own rules is his own nigger;" "a woman has two smiles that an angel might envy; the smile that accepts a lover before words are uttered, and the smile that lights on the first-born baby and assures him of a mother's love." Haliburton's first book of humor was 'The Clockmaker;' or, The Sayings and Doings of Sam Slick of Slickville, which first appeared in book form in Halifax, in 1837. It was followed by 'The Attaché' (1843-44); 'The Old Judge' (1847); 'Wise Saws and Modern Instances' (1853); 'Nature and Human Nature' (1855). There were several others, but these are the most famous. "The Clockmaker" was translated into German, and 'The Old Judge' into both French and German.

Putting aside several more or less feeble essays in Canadian history, we find in Christie's 'History of Lower Canada' (1848-55) the first noteworthy attempt, after Haliburton, to tell the story of a portion of British North America. Robert Christie (1788-1856) was, like Haliburton, a native of Windsor. He also practised law, and took an active part in the political life of his country. But there the resemblance ceased. As a writer he is almost unbelievably dull. Yet his history is valuable, for Christie was a careful and impartial historian,ind and made full use of the documentary material that he had collected, and much of which has since been lost. "John Charles Dent (1841-88), in his 'Last Forty Years' (1881), deals with the history of the country from the Union of 1841, where Christie leaves off, down to the year 1881. Dent was as conscientious and painstaking as his predecessor, and had the added qualification of a clear and attractive literary style. He also wrote 'The Story of the Upper Canadian
Rebellion' (1885), an admirable work, though somewhat controversial in tone. Dunt was no admirer of Sir John A. Macdonald, the prime minister of the rebellion, William Lyon Mackenzie, and lost no opportunity of expressing his feelings.

The most ambitious work of history yet produced in Canada is 'The History of Canada' of William Kingsford (1819-98). Kingsford was 65 years of age when he began the preparation of his great work, and he toiled at it continuously for over 13-years, living to see its completion, in 10 bulky volumes. His history is heavy in style, and not always to be relied upon for dates and details, but generally speaking it is authoritative, and indispensable to the student of Canadian history.

A number of short popular histories of Canada have been written within the last 20 or 25 years, a few of which only are of sufficient importance to mention here. George Bryce's 'Short History of the Canadian People,' first published in 1887, and recently brought down to date, is a useful and readable work, in the manner of Green's history, though hardly comparable in style; he is, however, generally speaking a Canadian poet and novelist, and is the only author of a very readable 'History of Canada.' A third work of the same class is Sir John Bunchinot's 'Story of Canada,' in the 'Story of the Nations' series.

Among more recent works dealing with individual phases of the history of Canada, much the most notable is 'The Siege of Quebec,' by Arthur G. Doughty, the Dominion archivist, and George W. Parmelee. The work, in six large volumes, is a monument to the accurate and minute care and scholarly accuracy, every detail of the historic siege of 1759, so far as the land operations are concerned. A companion work is William Wood's 'Logs of the Conquest of Canada,' dealing in the same scholarly way with the naval side of the siege. Colonel Wood has told the story of the siege, with equal charm and accuracy, in his 'The Fight for Canada.'

Other notable works, 'Quebec under Two Flags,' 'The Cradle of New France,' and 'The Fortress of Quebec,' by an archivist, without sacrificing any of his scholarly principles, may, when he possesses the time, put life and color into the dry bones of history.

The Winter of 1812 has been the subject of a number of histories written by Canadians and from a Canadian point of view. In fact, the most serious criticism that must be brought against most of them—a criticism that applies equally to many of the attempts by American writers to deal with the same conflict—is that they are hopelessly partisan and one-sided. To this class belong the histories of William F. Coffin, Gilbert Auchinleck and James Hannay. A better trained writer as well as a soldier, of Major John Richardson (1796-1852). It inevitably has the defects of a book written by one who had taken part in the campaign, but Richardson, like most honest soldiers, was not a bitter partisan, and he had the advantage of a writer as well as a soldier.

In 1902 A. C. Casselman brought out a new edition of Richardson's History, enriched with copious notes, an excellent biography and a full bibliography. Another very readable and useful book of Richardson's is his 'Eight Years in Canada,' which covers the period of Lord Durham's mission to Canada, the administrations of Sydenham and Metcalfe.

Two words that admirably illustrate the modern scholarly method of writing history, are Sir C. F. Lucas' 'Canadian War of 1812,' and 'A History of Canada, 1763-1812.' Lucas has made excellent use of the splendid collections of documentary material in the Dominion Archives, brought together by the late Douglas Brymner and his worthy successor, Arthur G. Doughty, and on the whole, for the two periods of which he treats, his works will probably remain, for some time at least, the best available. With Wood's 'Fight for Canada' they form an entirely satisfactory treatment of the history of Canada from the conquest down to the close of the War of 1812.

Charleviox and Lescarbot, Champlain, LaHontan and Hennepin, although their books relate to the earliest history of Canada, can scarcely be regarded as Canadian writers. The first noteworthy history by a French-Canadian was the 'Histoire du Canada depuis la domination Francaise' (1843), followed the next year by 'Histoire du Canada sous la domination Anglaise,' both by Michel Biaud (1782-1857). Between 1845 and 1846 appeared a much more important work, one that still remains as the best general history of the country in French, the 'Histoire du Canada' of Francois Xavier Garneau (1809-66). Garneau's influence was marked upon the intellectual life of French Canada. In 1852 he brought out a new edition of his work, carrying the narrative down to the year 1840, the first edition having stopped at 1792. The history is now being reprinted, with an introduction and very full notes by the historian's grandson, Hector Garneau, and a preface by Gabriel Hanotaux. It has also appeared in an English translation, by Andrew Bell.

Other notable historical works in French, are the 'Cours d'Histoire du Canada' of the Abbé J. B. A. Ferland (1805-65); 'Dix ans d'Histoire du Canada, 1840-50,' by Antoine Gérin-Lajoie (1824-82); 'Histoire de la ruste,' by Louis Philippe Turcotte (1842-78); 'L'Histoire de Quinze Ans,' by T. P. Bedard (1844-1900); and the 'Histoire des Canadiens Francais,' by Benjamin Sulte. The Abbé H. R. Casgrain (1831-1906) was the author of several historical works, dealing with special phases of Canadian history, and marked by charms of style that make them delightful reading.

With a few exceptions, biography in Canada has been confined to the lives of men closely identified with the political history of the country. An important series of biographies, published in 1906, is 'The Makers of Canada,' in 20 volumes, each by a well-known Canadian writer. While inevitably unequal in style and treatment, they are relatively reliable and trustworthy. Adam Shortt's 'Lord Sydenham,' D. C. Scott's 'John Graves Simcoe,' Jean N. McLwraith's 'Sir Frederick Haldimand,' W. D. LeSueur's 'Frontenac,' George R. Parkin's 'Sir John Macdonald,' and Lewis' 'George Brown,' are particularly worth mention. Of earlier works of biography, two of the most valuable are Sir Joseph Pope's 'Memoirs of Sir John Alexander Macdonald,' and Sir J. S. Willisson's 'Sir Wilfrid Laurier
and the Liberal Party. Another admirable piece of biography is Charles Lindsey's "Life and Times of William Lyon Mackenzie." Several attempts have been made to write the life of the brilliant Nova Scotian statesman, Joseph Howe, but none are altogether satisfactory. The best, at any rate, in a literary point of view, is the sketch by the late Principal Grant, published in 1904. One of the best of more recent Canadian biographies is George M. Wrong's "Life of Lord Elgin."

Biography in French Canada has generally been in the form of brief sketches, or collections such as Abbé Casgrain's "Biographies Canadiennes," Bibaud's "Le Panthéon Canadien," and David's "Biographies et portraits." Notable exceptions are the lives of Papineau and Cartier, by the learned librarian of Parliament, Dr. A. D. DeChelles; and Thomas Chapais' "Jean Talon" and "Montcalm." Gravier's "Vie de Samuel Champlain" is an admirable piece of work, but can hardly be classed in Canadian literature.

One of the most important books of travel are associated with the early history of Canada, or of what is now Canada. Excluding the entertaining narratives of those who were merely visitors, there remain such remarkable works as Alexander Mackenzie's "Voyages from Montreal through the Continent of North America" (1801); Bouchette's "British Dominions in North America" (1832); Franchère's "Voyage to the Northwest Coast of America" (1854); Harmon's "Voyages and Travels in the Interior of North America," 1820; Paul Kane's "Rambles of an Artist among the Indians of North America" (1859); Grant's "Ocean to Ocean" (1873); Mrs. Moolide's "Roughing it in the Bush" (1852); and among more recent works, J. W. Tyrrell's "Across the Sub-Arctic of Canada," Coleman's "The Canadian Rockies," S. E. Dawson's "The Saint Lawrence Basin and Its Border-Lands," and L. J. Burpee's "Search for the Western Sea." A number of Canadian books of travel are represented by such readable works as the Abbé Casgrain's "Un pêlerinage au pays d'Evangelie," 1887; Sir Adolphe Routhier's "En Canot," 1881; and "De Quebec à Victoria," 1860; "En Ety de Quebec à Mexico," 1866; and Arthur Buies' "Recits de Voyages," 1890 and "Au Portique des Laurentides," 1891.

English-Canadian verse seems to have had its beginning in Nova Scotia, where in 1825 Oliver Goldsmith, a distant relative of his more famous namesake, published "The Rising Village." The poem, in manner an imitation of "The Deserted Village," records not unsuccessfully or without a certain effectiveness the rude pioneer life of the author's native province. With Charles Sangster (1822-93) came something more of skill in the art of poetry. His "Saint Lawrence and Saguenay" (1856) and "Hesperus" (1860), contain patriotic and other verse of some merit, simple, unpretentious in ideas, but eminently sincere. A poem of an entirely different type, and of much greater power, was Charles Heavysse (1816-76). Heavysse published several volumes of verse, including a number of remarkable sonnets, but the work by which he is remembered is his dramatic poem "Saul," first published in 1857. This is an elaborate piece of work, divided into three parts, each of five acts, and altogether about 10,000 lines. Heavysse was not an educated man, in the ordinary acceptance of the term, but his mind was saturated with the Bible and Shakespeare, and his verse passed in Saul not unlearned in either the sacred book or the great Elizabethan. Saul's vision, on the eve of his death, forms one of the most dramatic passages in English literature. Longfellow described Heavysse as the greatest dramatist since Shakespeare, and Coventry Patmore had him as a more discriminating critic, praised him, and lost him. The year 1880 has been said to mark the Canadian Renaissance, because in that year appeared the first volume of poetry of one of a group of singers described as the Canadian litera-
two dramas, ‘Mordred’, and ‘Hildebrand’ (1895) were powerful in conception though somewhat unequal in treatment. Of all this group of modern Canadian poets, Lampman (1861-99) probably stood first as an interpreter of Canadian scenery. He was a poet first and always. Most of his short life was spent in and about Ottawa, and he knew intimately every beautiful nook and corner of the countryside. His gentle personality breathes through every line of the almost flawless lyrics he left behind. As William Dean Howells said of him, ‘His words were electrical in every line; he made no picture of the nature he loved in which he did not supply the spectator with the human interest of his own genial presence, and light up the scene with the lamp of his keen and beautiful intelligence.’

Only two slim volumes of verse were published during his lifetime, ‘Among the Millet’ (1888) and ‘Lyrics of Earth’ (1896), but after his death his friend and fellow-poet, Duncan Campbell Scott, gathered together with keen and loving care all that seemed worth of preservation and published it with an admirably judicious memoir.

Two other Canadian poets must be mentioned here. Each stands in a class by himself. Robert Service has put into his three books of verse, ‘Songs of a Sourdough,’ ‘Ballads of a Chechako,’ and ‘Rhymes of a Rolling Stone,’ much of the strange fascination of the Yukon, its magnificent mountain scenery, the cruel beauty of its winter nights, the brutality as well as the primitive virtues of the mining camps. William Henry Drummond (1854-1909) discovered to the world the simple, picturesque figure of the Canadian habitant, the peasant of French Canada. In ‘The Habitant,’ ‘Johnny Courteau,’ and ‘The Voyageur,’ he interpreted with kindly sympathy, tender pathos and inimitable humor the life and character of the shrewd and simple-minded farmer of Quebec.

As one finds in the poetry of English-Canadian writers evidence of the influence of Shelley and Keats and Tennyson, so the work of modern Canadian poets reveals their indebtedness to Victor Hugo, Lamartine and Musset. Octave Crémazie (1827-79) is justly regarded as the father of French-Canadian poetry. He has only one volume of verse to his credit, and that was published by his friends after his death, but the sincerity and lyrical quality of his poems, no less than the spirit of patriotism with which they are instinct, have made them an inspiration to his fellow-countrymen. Louis Princet (1839-1908), more versatile and polished than Crémazie, left behind him a larger body of credible verse than any of his contemporaries. His first volume of poetry, ‘Mes Loisirs’ appeared in 1863, and this was followed by ‘Voix d’un Exilé’ (1869), ‘Feu-Mélée’ (1877), ‘Fleurs bordées’ and ‘Oiseaux de Nègre’ (1879); ‘La Légende d’un Peuple’ (1887), and ‘Feuilles volantes’ (1891). Before his death he prepared a collected edition of all his verse that he wished to be preserved. He was essentially a lyrical poet, but, like Crémazie, avoided the passing and fleeting in this sense the sharp line of cleavage between the romantic school of France and the poets of French Canada, who in other respects looked to them for inspiration. Fréchette was beyond question the greatest poet that French Canada has yet produced. A contemporary of his, Pampville Le May, with less fine craftsmanship and versatility than Fréchette, but a more vivid imagination, has won for himself a secure place in the hearts of Canadians. He sings the songs of the people, he is a poet of the soil. In 1865 he published his ‘Essais poétiques.’ This was followed by a fine translation of ‘Evangeline’ (1870); ‘Les Vengeances’ (1875); ‘Fables Canadiennes’ (1881); ‘Petits Poèmes’ (1883), and ‘Goutelettes’ (1894), the last a remarkable collection of sonnets. Another member of the same group was Wilfrid Coté, a French-Canadian despite his English name. Chapman (1850-1917) put much very creditable verse into his four books, ‘Les Québécoises’ (1876); ‘Feuilles d’Erable’ (1890); ‘Aspirations’ (1894), and ‘Les Rayons du Nord’ (1910). In 1895 a new school of French-Canadian literature had its birth in Montreal, of which Emile Nelligan and Albert Lozeau are the most notable exponents. These modern Canadian poets have attempted to transplant the spirit of Verlaine and Baudelaire into the not altogether congenial atmosphere of Quebec. Yet they have produced some work of much more than passing interest.

It is impracticable here to do more than indicate very briefly the work in fiction thus far achieved by Canadians. James de Mille (1836-80) found leisure amid the preoccupations of his life as a college professor to write a number of romances and tales, the best of which were ‘Helena’s Household’ and ‘The Dodge Club.’ William Kirby (1817-1908) was the first Canadian novelist to make use of the rich mine of romantic material offered by the early history of his country. His one romance, ‘The Golden Dog,’ still remains in many respects the best thing of its kind produced in Canada. Sir Gilbert Parker stands easily first among Canadian novelists. Since the publication of ‘Pierre and His People’ in 1892, he has written a succession of novels, romances and short stories, all good of their kind, and most of them dealing with some phase of Canadian life or history. Charles W. Gordon (Ralph Connor) has given us in ‘Black Rock,’ ‘The Sky Pilot,’ and his later novels, admirable pictures of life in the backwoods, lumber camps and mining camps of Canada. Norman Duncan in ‘Dr. Luke of the Labrador,’ and his fine series of boys’ stories, has written of the sea and those who make their home upon its waters. Charles Roberts, already considered as a poet, is also favorably known as the author of a large number of very readable romances and short stories. Lucy Maud Montgomery (Mrs. McDonald) has made the little province of Prince Edward Island famous by her altogether delightful stories, ‘Anne of Green Gables’ and its successors. It may be convenient to include here the works of Stephen Leacock, who is perhaps rather a humorist than a novelist, and perhaps rather a wit than a humorist. His ‘Literary Lapses,’ ‘Nonsense Novels’ and ‘Sunshine Sketches of a Little Town,’ are brilliantly clever essays in a field that has hitherto been untried in Canada.

In French-Canadian fiction Philippe Aubert de Gaspé stands pre-eminent. He wrote only one romance, ‘Les Anciens Canadiens,’ but that is almost a national epic, and altogether a remarkable piece of work. He began to write it in his
74th year. "De Gaspé," says Camille Roy, "is at once the most eloquent, the most simple, the most winning narrator of Canada's past—a true epic singer of a marvellous phase of its history." "Les Anciens Canadiens" was translated into English by Charles Roberts. P. J. O. Chauveau wrote in 1853 one of the first Canadian novels, "Charles Gourin," a not very remarkable novel of manners. Antoine Gérin-Lajoie's "Jean Rivard" is of the same type, but more successful as a true picture of the life of a French-Canadian habitant. G. B. de Boucherville was the author of a very readable novel, "Une de perdue et Deux de trouvées." Other novels with a purpose are J. P. Tardivel's "Pour la Patrie"; Ernest Choquette's "Claude Paysan," and Hector Bernier's "Au large de l'Ecuelle." Among the best examples of the historical novel in French Canada are Joseph Marmette's "Charles et Eva," "François de Bienville," "L'Intendant Bigot," and "Le Chevalier de Mornac"; Napoleon Bourassa's "Jacques et Marie"; Mlle. Angers' "L'Oubliée"; and B. Robichaud's "Le Centurione." What Camille Roy has written of French-Canadian literature may very fairly be said of the entire body of Canadian literature. It has no doubt at times been unduly limitative, yet it must be acknowledged that, taken as a whole, the literature is indeed Canadian, and that in the life of the people is reflected and perpetuated. Many of its works, the best in prose and in verse, breathe the perfume of the soil, and are the expression—original, sincere and profound—of the Canadian spirit.

Closing this sketch it is proper to refer to some of the intellectual influences that have helped to make Canadian literature what it is. First of these are the universities. McGill and Laval in Quebec, Toronto and Queen's in Ontario, King's and Dalhousie in the maritime provinces, to mention but a few of the more prominent colleges, have had an increasing influence in moulding the intellectual life of the Dominion. The establishment of the Dominion Archives at Ottawa, and provincial archives at the University of Victoria and other provincial capitals, with their growing treasures of documentary material, has helped to turn Canadian historians from secondary to original sources, and to make their product more scholarly and more authentic. In the following year an act was passed incorporating King's College, and in 1802 it received a royal charter and a provincial grant. It was founded as an Anglican institution—a character it still retains. One of its statutes provided that "no member of the university shall frequent the Romish Mass, or the meeting-houses of Presbyterians, Baptists, or Methodists, or the Conventicles or places of worship of any other dissenters from the Church of England." As three-fourths of the population came under this comprehensive test," an agitation was speedily set on foot for its removal, which failing, Pictou Academy was founded in 1816 as an undenominational college. Two years later Dalhousie College was founded at Halifax as a provincial university modeled on the Scottish pattern, and was opened for teaching in 1838. An applicant for a position on the original teaching staff of Dalhousie College was a distinguished Baptist, the Rev. Dr. Crawley, but as his application was not entertained—it was alleged an act was passed incorporating the Baptist and the Baptists were unrepresented on the staff, the drastic remedy was taken of founding (1838) a denominational institution, Acadia College, Wolfville. The Presbyterian College, established in affiliation with Pictou Academy in 1820, has made no fewer than four migrations, and is now located at Pine Tree Hill, near Halifax. Saint Francis Xavier College was founded at Antigonish in 1854, and is the chief Roman Catholic foundation in the maritime provinces. Other institutions belonging to the same communion as Nova Scotia are Saint Mary's College, Halifax, founded in 1860; College Sainte Anne, founded on behalf of the French population by the Eudist Fathers in 1890; and the Seminary of the Holy Heart, founded at Halifax in 1895, also by the Eudist Fathers. Two attempts have been made to unify the university system of the province by the foundation of a University of Halifax, embracing all the degree-conferring colleges of the province, but these have been unsuccessful. New Brunswick College was founded at Fred-
ericton in 1800 as an Anglican institution; in 1829 it received a charter as King’s College, and in 1839 it became denominational and received a charter as the University of New Brunswick. The University of Alberta was founded in 1892 to serve the higher educational needs of the Methodists of the maritime provinces; and in 1864 Saint Joseph’s College, Memramcook, was established by the Religious of the Cross for the Acadians and others of that communion.

Quebec.—McGill University, Montreal, had its origin in the bequest by James McGill, a public-spirited citizen of Montreal, of land and buildings on the outskirts of Montreal, and the sum of £10,000 for university purposes. The college received a royal charter in 1821, was formally opened in 1829, and has always been denominational. The University of Bishop’s College, Lennoxville, is an Anglican institution, was founded as a high school in 1843, and received a royal charter as a university in 1853. Laval University, Quebec, was founded in 1852 and named in honor of the first bishop of New France, who founded the seminary of Quebec in 1654, and of which it is the legitimate successor. Bishop’s formed a branch establishment, or second seat, at Montreal.

Ontario.—Governor Simcoe was the first to propose the establishment of a university in Upper Canada, but it was long after before any scheme took definite shape. The contingency of the province to the United States, the high educational standard even then attained in that country, and the absence of educational facilities in upper Canada, forced the well-to-do to send their sons across the border for education, where, at the formative period of their lives, they were subjected to the influence of American textbooks and American teachers and breathed the atmosphere of an anti-British democracy—a condition of affairs that was little to the liking of the new church and state men who formed the official class in Upper Canada. John Strachan afterward Anglican bishop of Toronto, obtained in 1827 a royal charter for the founding of King’s College. When the original charter lapsed, the Thirty-nine Articles being a condition for the holding of office by the staff and council. This attempt to establish an Anglican monopoly in higher education was as hotly resisted by the majority of the people of Upper Canada was the endeavor to create a monopoly in religious endowments, and gave rise to an educational controversy that continued for 22 years. Little was accomplished toward founding the college for a number of years; in 1837 an amended charter abolished the denominational test, but left the sore open by permitting the theological chair to remain in Anglican control. In 1843 King’s College began operations in Toronto. Other colleges were concurrently founded under denominational auspices, Regent’s College was founded by Bishop Macdonell at Kingston as a Roman Catholic institution in 1837, but owing to financial difficulties, closed its doors in 1869. Queen’s College, Kingston, a Presbyterian institution, was incorporated in 1852 and began the work of teaching in 1842 in a "sackboard building. Victoria College, a Methodist institution, was incorporated by act of Parliament in 1841 and opened at Cobourg in 1843. Knox College, Toronto, which derived its impulse from the Scottish Church disruption of 1843, was opened by the Free Church of Scotland in 1844. Sir Ignatius College, Ottawa (College of Bytown), was founded by Bishop Guigues of Ottawa as a Roman Catholic institution, and erected into the University of Ottawa in 1856. Between 1843 and 1849 five legislative attempts were made to deal comprehensively with the university problem, but in the latter year the Baldwin Act completely secularized King’s College and transformed it into the University of Toronto. Bishop Strachan, now an old man of 72, faced the new situation, which imposed a "godless university" on the province, with indomitable courage; he proceeded to England and after a vigorous campaign obtained a royal charter in 1852 for the University of Trinity College, which remains to this day a monument of his pertinacity and embodies his ideals in higher education—a denominational, collegiate and residential institution modeled on Oxford and Cambridge, in preference to the professorial teaching of the Scottish university system of which he was himself a products. Saint Michael’s College (now the Western University) was established at London in 1863, and Wycliffe College, Toronto, was founded in 1879 by the Low Church party, both being offshoots of Trinity College. Saint Michael’s College, Toronto, was founded as a Roman Catholic institution by Bishop Charbonnel in 1851. A bill introduced into the Parliament of United Canada, by Mr. (afterwards Sir Francis) Hincks, providing for the separation of the teaching function from that of examining and conferring degrees, received the royal assent in April 1893, and from that date until federation University College represented the teaching side of the University of Toronto. In 1860 a Baptist college was opened at Woodstock, the theological teaching in which was later taken over by McMaster University; Toronto, founded by the munificence of Senator William McMaster, and which obtained a charter in 1887. The provision of denominational colleges in Ontario was thus more than ample; and with the advent of the Canadian University Act, those colleges which run the means of subsistence, and meantime adequate funds with which to finance the expensive modern equipment in science and medicine were urgently required. A movement for federation had been gathering force since 1874, and 10 years later it took active shape when Mr. G. W. (afterwards Sir George) Ross, the then provincial minister of education, summoned a meeting representative of the various colleges, to consider the question. Following on a series of discussions extending over three years, a federation act was passed in 1887, under which all the federating colleges find representation on the senate of the University of Toronto. The theological colleges of Wycliffe, Knox and Saint Michael’s were the first to accept federation; Victoria entered in 1890; and the medical faculty of Trinity University was incorporated in 1903. Queen’s University, which ceased to be a distinctly Presbyterian institution in 1912, and McMaster University remain outside the federation.
on the model of London University — the constituent colleges being those of Saint Boniface (Roman Catholic), Saint John's (Anglican), and King's (Presbyterian). Wesley College (Methodist) became affiliated in 1888. The University of Saskatchewan was founded at Saskatoon in 1909, when Emmanuel College, Prince Albert, which was originally founded by Bishop McLean in 1859 as a college for native Indians, was changed. The University of Alberta was founded by the provincial legislature in 1906, provision was made for a site at Edmonton in 1907, and the first session opened in 1908.

British Columbia. — In 1907 an act was passed by the provincial legislature setting apart lands as a university endowment, in the following session the institution was incorporated, and in 1915 it was opened at Vancouver.

D. S. DOUGLAS, Editorial Staff of The American, Toronto.

25. RELIGIOUS CONDITIONS. The religious and ecclesiastical life of Canada cannot be understood without some reference to the sources from which it sprang. The same great forces and influence which molded the history of the Old World re-appear here, but modified in their action and combinations by the new and freer environment in which they work. Broadly speaking, the three great British peoples which form the bulk and basis of the Dominion, brought with them the Anglican, Presbyterian and Methodist forms of religion, while latterly the tides of alien immigrants have brought with them varieties of the Eastern and Western Catholic churches. The dominating religious life of Canada is Protestant, save in the province of Quebec which is almost exclusively Roman Catholic and French-speaking. As a whole Canada is distinctively a Christian country, not so conservative on the one hand as Great Britain, or on the other hand so liberal as the United States, 85 per cent of the population belonging to the Roman, Presbyterian, Methodist and Anglican churches.

General History.—The Roman Catholic Church is the oldest and largest of the ecclesiastical bodies in Canada. It has its chief seat in the province of Quebec. In Canada, under French rule, it was all-powerful, and in its origin it was distinctively missionary. The Jesuits were the pioneers and, from the Saint Lawrence to the Rockies, have left an imperishable record. While to-day the largest section by far of the Roman Catholic is French speaking, a considerable body of Roman Catholics is found in the other provinces representing in their lineage and traditions the Catholics of the north of Scotland and south of Ireland. In the western provinces from Winnipeg to the Pacific the Roman Catholic Church is strong in influence and membership. See the article on the ROMAN CATHOLIC CHURCH.

The Church of England in Canada began with the settlement in Nova Scotia (known of old as Acadia) of certain English immigrants who came in government ships to Halifax in 1749, and built Saint Paul's Church for the people's worship (1750). The incoming of the United Empire Loyalists (Americans who determined to remain loyal to the British Crown) in 1783-84 gave a great impetus to the Church of England, for the vast majority of them were Episcopalians, and in 1787, 1788, and 1789, Saint John's, Saint Mary's, and Saint George's were consecrated in Lambeth in England, as bishop of Nova Scotia, the first bishop of the Church of England in Canada. His diocese included New Brunswick, Newfoundland, Prince Edward Island and Upper and Lower Canada. In the year 1793 Dr. James Macpherson was consecrated bishop of Quebec, and all Canada west of Quebec was under this jurisdiction until 1839 when Dr. John Strachan was made bishop of Toronto, the Anglican population of Upper Canada comprising his episcopate. About this time the new Canadian spirit of the church began to manifest itself. Before this the Anglican Church had depended for its support largely upon the charity of the missionary organizations of the mother church in England, especially the Society for the Propagation of the Gospel, which in 1842 was felt that self-respecting Canadian churchmen should begin to support their own church and ministry, and the Church Society of the Diocese of Toronto became the pioneer of the system of parochial self-support. Now this system is universal in the Canadian church. Another very remarkable event in the life of the Canadian church was the emergence of the democratic and independent spirit of self-government. All the bishops of the Anglican Church in Canada were accustomed to receive their commission from the British government, and their consecration in England, and the members of the church had nothing whatever to say in the matter. But after no little discussion and difficulty the Canadian bishops determined to have their own jurisdiction and synods, and in the years 1857-59 asserted their ecclesiastical independence by holding synods in Toronto and Quebec where the clergy and laity meeting on equal footing might transact the affairs of the church. The year 1862 marked also a new era in the history of the Canadian Church, for in that year Dr. Lewis was elected bishop of the diocese of Ontario, and instead of crossing the ocean for consecration at the hands of the archbishop of Canterbury was consecrated in Canadian soil by Canadian bishops. From that time the church expanded remarkably, and whereas a little over a century ago there was only bishop and a few scattered clergy for all Canada there are now 28 dioceses with 187 clergy, nine church colleges and three church universities; two missionary dioceses in China and Japan, a large body of missionaries in Japan, China, India, Africa, Palestine and South America with native workers, and Christian schools and orphanages ample, but in over 2,000 churches and Sunday schools; and over $3,500,000 contributed annually for church purposes and missions. The laws of each diocese are under the control of the Synod of the Diocese which as a rule meets annually and is composed of the clergy and lay representatives from each parish and mission. The whole church in Canada is represented in the General Synod which meets once every three years, presided over by the leading archbishop, who is the Primate of the Church of England in Canada. The outstanding features of the progressive life of the Anglican (or Protestant Episcopal) Church in Canada during the past few years, have been the remarkable progress...
of the missionary life of the church at home and abroad, the stimulation of the Sunday school and educational work by the establishment of the Sunday school commission, the publication of the Canadian Hymn Book (the Book of Common Praise) as the one book for use in all the churches, and the revision of the Prayer Book as the Canadian Book of Common Prayer approved by the General Synod held in Toronto, September 1915.

The Presbyterian Church in Canada traces its descent to several distinct sources. The attempt made in the 17th century to found Huguenot settlements failed disastrously and few traces remain of their existence. Among the Presbyterian Loyalists who came to Canada at the close of the Revolutionary War there was a goodly number of descendants of Huguenots. In 1749 Protestant colonists were brought into Nova Scotia from the Highlands of Scotland, in order to counteract the disaffection of the Acadians. Again in 1755, after the expulsion of the Acadians, many Protestants from Great Britain and older colonies along the Atlantic coast were induced, by the promise of liberty and occupation of some of the vacant lands. Then there was a large influx of immigration from the north of Ireland and from Scotland. Some districts, such as the county of Pictou, were almost exclusively occupied by Scotch Presbyterians. These people naturally clung to the various ecclesiastical bodies into which Scotch Presbyterianism was divided. And accordingly there were Presbyteries constituted with relations to the Kirk of Scotland and the Secession Church in its two subdivisions of Burgher and Anti-Burgher, and also adherents of the Reformed Presbyterians or Covenanters. The great disruption of the Church of Scotland in 1843 extended to the colonies and added to the existing divisions the Free Presbyterian Church. But in 1861 the process of reunion began with the union of the United Secession Church (inclusive of both Burgher and Anti-Burgher) and the Free Church of the Maritime provinces into one synod.

The history of the Presbyterian Church in the Western provinces followed similar lines but with new complications. Soon after the conquest, Presbyterian congregations were organized in the cities of Quebec and Montreal. Among the Loyalists were not a few Presbyterian ministers. But there was scanty provision for their religious needs. Applications for ministers made to the churches in Scotland met with no response for many years. A similar appeal made to the "Associate Reformed Church" in the United States resulted in the incoming of a number of ministers from that country. Other ministers followed from Scotland and Ireland. In 1818 was organized "The Presbytery of the Canadas." In 1831 there was organized a synod in connection with the Church of Scotland. In 1840 the two synods were united into one. But in 1843 the great disruption in Scotland again rent it asunder and two synods resulted, one in connection with the Established Church of Scotland and the other in connection with the Free Church of Scotland. Of these, the one in the British colonies was the United Presbyterian Church and the combined body received the name of the Canada Presbyterian Church. In 1875 the greater union was consummated by which all the Presbyterian bodies throughout Canada from east to west, were united into one great Canadian Presbyterian Church. This was an epoch making, and epoch-marking event in the history of Canadian Presbyterianism. It unified the life of the church, and became the starting point of its missionary energy both in the Canadian and world-wide field.

Until the greater union was consummated little had been attempted by the Presbyterians in the evangelization of the Northwest. In 1812 and 1816 a large body of Highlanders had settled in the Red River district, but the only ministers they had were the Presbyterian Church of England until 1852, when the Rev. John Black, a devoted missionary, organized them into a congregation. Little more was done until after the federation of Canada and the complete union of Canadian Presbyterians. In 1881 the General Assembly appointed the Rev. Dr. James Robertson to be superintendent of Presbyterian missions in the Northwest. This remarkable man laid the foundations of Presbyterian organization throughout those vast territories and covered the whole country with a network of Presbyterian missions, so that now (1916) in place of one there are eight districts superintendents. The Presbyterian Church in Canada is one of the dominating religious forces of the Dominion, and to-day with 1,899 ministers, 3,815 Sabbath schools, 333,457 communicants, eight theological colleges, church property valued at $23,447,000, it stands at the very forefront of the Protestant life of the Dominion. The Presbyterian Church in Canada was the first branch of the church in the world to put social service and evangelism together, having ecclesiastical social settlements and redemption homes from Sydney and Montreal and Toronto to Winnipeg, Calgary and Vancouver.

The Methodist Church in Canada traces its origin to two distinct sources, England and the United States. In 1770 Lieutenant-Governor Franklin sought English settlers for the province of Nova Scotia in the East Riding of Yorkshire. Among them were the earliest Methodists of Canada, one of whom was the noted preacher and evangelist, John Black. In 1784 he went to the United States, and his appeal to the Baltimore conference led to the coming of a number of Methodist ministers to the Maritime provinces. In Quebec the first Methodist preachers were connected with the British regiments. As early as 1778 Methodists from New York State came to the Eastern Townships and to Upper Canada. The Methodists did a noble work in laying the foundations of religious life and worship in many districts in Canada, especially in the province of Ontario, a great impetus being given by the labors of Barbara Heck. Until the War of 1812 Canadian Methodism was closely connected with that of the United States. Negotiations were then entered into with the British Wesleyans. Unhappy dissensions followed. While
one party was anxious to maintain the American
connection, the other insisted that, as loyal
British subjects, they should look to the mother
land. A compromise was arrived at by which the
American connection was to be observed in
Upper Canada, while the British missionaries
were to be free to enter Lower Canada, and the
Maritime provinces. This compromise was of
short duration; for, in 1828, the American
conference relinquished its jurisdiction over
the Canadian conference and the latter was in-
dependently organized under the name of the
Methodist Episcopal Church in Canada, the
British conference decided not to confine its
work to Lower Canada. After much contro-
versy, in 1833 a union between these two
branches of Methodism was consummated under
the name of "The Wesleyan Methodist Church
in North America." But, notwithstanding this
union, the Methodist Episcopal Church sur-
vived in a new form and increased very rapidly.

Methodist missionary work had its origin
among the Indians of Ontario in 1829, and
in the Northwest began about 1840. Its annals
abound with wonderful miracles. There then
existed in Canada five principal Methodist
bodies. In addition to the two main bodies
already mentioned, different branches of British
Methodism had been brought into the country,
namely, the Methodist New Connection, the
Primitive Methodist body, and the Bible Chris-
tians. All these became firmly rooted in Canada
and developed into strong bodies. The need of
unification began to be earnestly discussed as
early as 1866. In 1873 a union was consum-
mated between the Wesleyan, the New Con-
nection, and the Eastern British-American
Conference, but it was not until 1883 that, at
a general conference held in Belleville, the union
was consummated. Then all the Methodist
bodies, hitherto locally or ecclesiastically
separated, were brought together; and, from the
Atlantic to the Pacific, there is now one great
Methodist Church of Canada, with 2,337 or-
dained ministers, 3,821 churches and 1,659 other
preaching places, 376,761 church members, and
3,824 Sunday schools, with 41,929 officers and
teachers and 420,210 scholars. There
was contributed for all missionary work, through
her various boards and funds, $1,170,434; she
has invested $7,200,391 in her educational in-
stitutions, and her activities seek the evangelism
of both the individual and society, and the ap-
plication of the principles of the gospel of Jesus
to all the moral, economic, social and political
relations of life.

The Baptist Churches derived their origin
from the American Baptists. From 1760 on-
ward there are traces of individual Baptists in
different localities in Nova Scotia. In 1820 the
first Baptist association was formed for the
Maritime provinces. The first Baptist Church
in Lower Canada was formed in 1794, and con-
sisted chiefly of Loyalist refugees from Con-
necticut. In 1795 another was organized in
Upper Canada. The first Baptist Church in
Montreal was not organized until 1830. The
Baptists of Canada to-day (1917) occupy a very
strong position in the Dominion. Their lead-
ing educational institutions are the Acadia University
and Seminary in Wolfville, Nova Scotia, the
Woodstock College in Woodstock, Ont., the
Brandon College in Brandon, Manitoba, and
chiefly the McMaster University in Toronto.
In Sunday schools they are in the forefront both at home
and foreign, and in social service, the Canadian
Baptists are always to the fore.

Congregationalism has never found a strong
foothing in Canada. A few scattered adherents
came from New England to Nova Scotia in
1758. In the eastern townships Congregational-
ism was founded in 1811 by settlers from
Massachusetts, and in Ontario some 10 or 12
years later. Nothing was done west of Ontario
until 1879, when work was begun in Winnipeg.
There are in Canada about 13,000 members, and
100 ministers mostly in Ontario, with a few
congregations in Nova Scotia, Quebec and the
Northwest.

The Evangelical Lutheran Church in Canada
dates from the middle of the 18th century. The
first German Lutheran landed at Lunenburg,
Nova Scotia, in 1749. The first Lutheran con-
gregation in Upper Canada was founded in
1775. Others came in with German immigra-
tion. In 1865 the organization of the United
Lutheran Church was founded. The main body of
Lutherans is in the district of Ontario near
the city of Berlin (in 1916 changed to Kitchener)
and in the northwest where large numbers of
Swedes and Norwegians are found. There is an
Icelandic branch of the Lutheran Church in the
Northwest.

There are a number of small religious bodies
in Canada, none of which exercises any appreci-
able influence upon the religious life of the
country; among them are The Disciples and
The Brethren, The Adventists and Mon-
nonites. There are a few Unitarians and
Quakers, and the Russelites, Theosophists and
Christian Scientists have increased not a little,
especially in the cities. The Salvation Army
has acquired a considerable foothold in the
larger cities and towns, and has lately given
much of its strength to the development of
social work in the towns and cities.

There are four paramount considerations
which have profoundly affected the whole
religious history and development of the Do-
minion namely, the relations of the churches
to the state and to education, their beneficent
and missionary activities, and the problem of
church union.

Church and State.—In the 18th century
the authorities believed that an Established
Church was necessary in order to secure the
loyalty of the colonists, and it was, without
doubt, the intention of the British government
to maintain an Anglican establishment in
Upper Canada the counterpart of the Roman
Catholic establishment in Lower Canada. In
1791 the Constitutional Act was passed reaffir-
mimg the provision of previous legislation which
gave the King the right to set apart for the
support of the "Protestant clergy" the seventh
part of all ungranted Crown lands. This was
the origin of the "clergy reserves" (see CAN-
ADA — THE CLERGY RESERVES). The ambiguity
of the term "Protestant clergy" admitted of a
variety of different conceptions. The American
Church maintained that they alone were intended by the
designation. The few clergy connected with
the Established Presbyterian Church of Scot-
land contended that they had an equal right to
it, and their claim was supported by eminent
legal authority in England. The Methodists, in
general, resisted such an appropriation of the
money. The first attempt at a general system of public
schools was made in Upper Canada, by which the lands were handed
over to the municipal corporations of the prov-
ince for secular purposes, provision being made
for the support of the clergy. After years of fruitless ecclesiastical
strife, an act was passed by the legislature of
Upper Canada, which transferred all the money to
the Church of Scotland, to the Wesleyan Methodists,
and to the Roman Catholics in Upper
Canada. The Anglican Church was
thus delivered from what might have been its
ruin in Canada, and the people of the province
released from a grievous injustice and a source
of political discontent and strife. In those days
the representatives of the churches of England and Scotland, especially the former, had a cer-
tain status accorded to them, denied to other
denominations. The Methodists were most un-
justly charged with irreligion, and the dis-
connection, in origin and government, with the
United States gave some color of plausibility.
Until 1830 the Methodists and other dissenters
had no right to hold land for places of worship
or for the burial of their dead, nor was the
Methodists and their ministers the right to
solemnize matrimony, even among their own
people. It was only after long and bitter con-
troversy that laws were passed authorizing the
creation of religious bodies to hold land for
churches, parsonages and burial grounds, and
empowering their ministers to celebrate mar-
rriages. At the present time all the leading
Christian bodies are in a position of practical
equality, and marriages can be performed by
members of every church and religious de-
nomination duly ordained, and also by any
elder, missionary or evangelist of the so-called
Congregation of God and of Christ, the
Disciples of Christ, the Brethren or any duly ap-
pointed commissioner or state officer of the
Salvation Army. Marriages by a magistrate or
justice of the peace are unknown in Canada.
No civil official is qualified by any legislative
act in Canada to celebrate marriage. It is
evident that the formation of Canada as a com-
plete separation of church and state, with
the exception of the peculiar position held by
the Roman Catholic Church in Quebec, secured
by treaty and the terms of British occupancy of
that province. Canadians believe in a church-
supported state, not in a state-supported
denomination, as the religious spirit of the
Dominion is remarkably free and
democratic. The Church and Education.—So long as
Frances Hall Canada, education was entirely
in the hands of the Roman Catholic Church. The
Jesusites, Franciscans and other orders laid the
foundations of the colleges and seminaries which
hold an important place in the education of
Lower Canada. Thus the system of educa-
tion was controlled by the Church. In 1841
rule the attempt was made to establish free
schools common to the whole population and
unsectarian in character. This was found to be
impracticable. With the union of the two
provinces in 1844 separate schools had to be
ceded to the Protestants in Lower Canada
because the public school system was essentially
Roman Catholic; and when, in the same year,
the first attempt at a general system of public
schools was made in Upper Canada, the Roman
Catholics there secured the concession of separate
schools, but in a very limited way. This, for many years, was a subject of con-
troversy, political as well as religious, the
Liberal party demanding the abolition of separate
schools and the Roman Catholic authorities
seeking the complete control of the education of
their children. Finally, on confederation in
1867, the separate school system was bound
upon the province of Ontario; although, as is
noteworthy, there are more Roman Catholic
children in the public schools of Ontario than
in the separate schools. In the Maritime prov-
inces and in northwestern Canada there are no
separate schools.
While public school education has been re-
moved from the control of the churches (ex-
cept in Quebec) the great body of the people
are anxious that it should not be divorced from
the sanctions and influences of religion. In
the province of Ontario, to which reference
is made, with few exceptions, opened daily with prayer
and the reading of the Scriptures. In not a
few, the Bible is carefully taught. But much
depends not only upon the character of the
teachers, but also upon the disposition of the
school trustees, to whom the law gives a large
discretion in this matter. There is a strong
feeling growing in the community at large and
expressed by resolutions of the different church
legislatures that there is urgent need of more
ethical and Biblical teaching in the schools and
that it is possible to secure it upon lines accept-
able to the great majority of the people and
with proper regard for the conscientious con-
vincions of those who may differ from them.
Sectarian jealousies greatly hindered the de-
velopment of higher education in all the older
provinces. The struggle in Ontario occupied a
very large place, both in the politics and the
religious life of the province. The attempt to
create a national university was for a long time
prevented by the exclusive policy of the
Methodist authorities, who used public funds for
the establishment of King's College in 1843 (the
charter was obtained in 1827) upon an exclu-
sively Anglican basis. Bishop Strachan was
the first bishop who desired to have it upon a
broader national line. In 1849 King's College
became the University of Toronto, upon a
broad denominational basis, but not until the
Church of Scotland, shut out from King's Col-
lege, had established Queen's University, and
the Methodists founded Victoria University,
which is now federated with the University of
Toronto. Other denominational colleges sprang
into existence. After the secularization of
King's College, Trinity University was estab-
lished by Bishop Strachan, upon an exclusively
Anglican basis. The leaders of the broader
policy had been broad-minded Anglican laymen,
and it was laymen of the same type who, in
1877, established Wycliffe College, federated
with the University of Toronto, with an exclu-
sively evangelical or Low Church basis, as
opposed to the High Church position of Trinity
University. The latter has not realized the
expectations of its founders, and in 1904,
abandoned its position of isolation and con-
nected itself with the University of Toronto as
a federated college. The result is that, in Ontario to-day, there are Church of England, Presbyterian, Methodist and Roman Catholic colleges federated with the Provincial University; while, apart from it, there still stand the Presbyterian University of Queen's, the Baptist University of McMaster and several Roman Catholic institutions. The Montreal, McGill is virtually a Protestant university, and has affiliated with it Presbyterian, Methodist, Congregational and Anglican schools of theology, which are themselves affiliated in a measure of theological teaching. In Quebec, Laval University is a Roman Catholic institution and the oldest in Canada. In each of the provinces of Nova Scotia and New Brunswick a university was founded under the name of King's College and sustained by means of land and money from the public treasury, but upon an exclusively Anglican basis. The one in Fredericton was remodelled and became the University of New Brunswick, upon a broad, undenominational basis; the other, in Windsor, Nova Scotia, ceased for a time to receive provincial support but remained an Anglican university and theological college. Dalhousie University, in Halifax, while undenominational, has not the status of a provincial university. The Presbyterian theology college, with Dalhousie. The Baptists have a university in Acadia, Nova Scotia; and the Methodists a university and theological college in Sackville, New Brunswick.

The Work of the Churches.—The Roman Catholic Church carries on a great variety of charitable work in asylums, houses of refuge and reformatories. In the province of Quebec all the provincial institutions are under Roman Catholic control. In the cities the Protestants have distinct institutions controlled by boards representative of the chief Protestant churches. In Ontario, the Roman Catholics are upon the same footing with Protestants in the provincial institutions. In many cities and towns the former have their own hospitals, oratories, which receive provincial aid in proportion to the number of patients treated. This plan also prevails in the other provinces to a less extent. In other cases, special provision is made. Among religious Anglicans, various religious services in addition to the Protestant services.

The charitable work of the Roman Catholic Church is carried on by the various religious orders, many of which are specially devoted to the relief of the poor, the sick, and the fallen. The work of home missions within the Dominion is connected with the different churches reaches out to every corner of the land, and to the Indians and Eskimos. Foreign missionary work is prosecuted with great vigor by all denominations. Among other good works of an inter-denominational character may be mentioned the Bible Society, the Religious Tract Society, the Evangelical Alliance, the Young Men's Christian Association, the great Christian movement organized by Mr. Mott among university students, the young people's societies, such as the Christian Endeavor, the Epworth League and the Saint Andrew's Brotherhood, and above all the Laymen's Missionary Movement which has done so much to stimulate the national life of the churches in Canada. The organization of women in the home and foreign missionary work of all the churches, and in various other associations has greatly stimulated religious life and work. The reverent observance of the Lord's Day throughout Canada has been a marked feature in its religious life. Church attendance has, on the whole, been well maintained. The Lord's Day has become a sacred day, and violations and other violations of the Sabbath rest are effectively enforced. The Lord's Day Alliance has the co-operation of the labor unions as well as of the churches in the protection of the Lord's Day. The Protestant churches in Canada exercise a very strong influence upon legislation, education and the press. While not unaffected by modern controversy, their attitude generally has been, on the whole, conservative, while the general tone is more liberal and less acrimonious than in the past.

Old prejudices are passing away. A noteworthy illustration of this is furnished in the public worship of the Presbyterian Church, one section of which refused to use anything except the new version of the Bible. This has led to the placing even the use of the paraphrases as a serious and hurtful innovation. Now all are united in the use of a hymn book which contains hymns of all sections of the Church of Christ. In many college in many sections of the country, the liturgical even in non-liturgical churches. Old controversies have passed into oblivion. Greater liberty both in action and in thought is found in all communions.

It is more possible that with this enlargement and liberty, there has been a corresponding diminution in the intensity of the religious spirit and a growing laxity within the churches which many regard with apprehension. Family worship is not observed as it once was, the children are not as familiar with the Scriptures as were their parents, and many things are tolerated in professedly Christian families which would a generation ago have been rigidly excluded. It is a time of unrest and transition. But in the East and Reformed churches in the main hold firmly to the fundamentals of the Christian faith, and in all are found devoted men and women who earnestly follow after the ideals of truth, purity and righteousness.

Through the Oxford and Tractarian movements have exercised considerable influence, especially among the clergy, it has seldom reached the extremes seen in England. The majority of the laity have only been slightly affected by it, and they have continued decidedly Protestant. The Presbyterians have exercised a strong influence upon the national ideals of righteousness, and they have set a high standard in the education of the ministry. The Methodists have been leaders in Christian liberalism and in benevolent enterprises. The Baptists and Congregationalists have borne consistent testimony to the supremacy of the individual conscience and the independence of the Church from state control. Thus each denomination has contributed essential elements to the general religious well-being of Canada, each has in its own sphere accomplished a good work and manifested distinctive excellence, the value of which is coming, more and more, to be recognized by all.

The Church's Unity.—The general tendency among the Protestant denominations has been toward the unifying of the Christian churches,
and this appears the more remarkable when the present religious condition is compared with that of 100 or even 50 years ago, when
papal influence and antipapalism. There has been a
breaking down of barriers and a marked diminu-
tion of the jealousies and rivalries of the past. The old sectarian spirit has, to a large extent, disappeared and a cordial spirit of good-
will has manifested itself even in those bodies, which special privileges or exclusive theories had tended to separate from others. This is
seen in the increasing co-operation in good
works, in the frequent inter-denominational
comity and in the general attitude of the
churches toward each other. It is remarkably
manifested, as we have seen, in the changed
attitude of most of the churches in regard to
higher education. Federation of denomina-
tional colleges in a common state university has
been accepted by many who were once strenu-
ously opposed to it, as the best solution of
our educational problems. In the three chief
Protestant churches of Canada, the Methodist,
the Presbyterian and the Anglican (they are
together the numerical strength), which are each now a unit throughout the Do-
mination, the tendency is toward a still larger
union. In 1902 a joint committee of the Pres-
byterian and Methodist churches met to con-
sider the problem of co-operation, and com-
mended the principles of comity and non-in-
trusion, until some scheme of organic union
was agreed upon. For some years after this
union movement progressed, the Anglicans and Baptists favoring co-operation and fra-
ternal conversations with the Presbyterians, Methodists and Congregationalists an organic union of
their churches. In 1909-10 the Congregational
and Methodist bodies approved of the union
scheme by large majorities, the Presbyterian
Church referring the basis of union to the
presbyteries, 793 of which approved and
476 opposed. The general assembly of the
Presbyterian Church in Canada, which met in Winnipeg June 1914, definitely
committed their Church to union with the
Methodist and Congregational churches by a
very large majority. The name of the church
formed by the union is to be "The United
Church of Canada," with 20 articles of faith
and doctrine, and an accepted policy of church
government in ecclesiastical and eclesiastical
laws. There is however a small but powerful
minority in the Presbyterian Church opposed to
the unity movement, and it is possible that the
protest of this opposing section and the ex-
istence of various practical difficulties may pre-
vent the consummation of the scheme for some
years to come.

Dyson Hague,
Vicar of the Church of the Epiphany, Toronto; Professor of Liturgics, Wycliffe College, To-
ronto; Sometime Canon of Saint Paul's Ca-

26. ROMAN CATHOLIC CHURCH IN CANADA will be treated in this article under three headings: 1. The Church under the French, from the discovery of Canada until the colonization 1534-1763; 2. The Church under the rule of Great Britain, from 1763 until the present day; 3. Present condi-
tion.

1. Before 1763.—Catholicism was planted in
Canada by France, through whose sailors, Au-
bert de Dieppe (1508), Verazzano (1522), and
especially Jacques Cartier (1534), it was dis-
covered about the year 1534. In the 16th cen-
tury. Cartier penetrated the estuary of the Saint
Lawrence (10 Aug. 1535), and took possession of
the country in the name of King Francis I.
While endowing his fatherland with new coun-
tries, he proposed also to found therein the Catholic faith, as related in the ac-
count of his travels inserted in the 'Histoire
de la Nouvelle France' by Marc Lescarbot
(Paris 1669).

From Cartier to Champlain (1542-1608) a
few attempts at colonial settlement in Acadia
were succeeded by the foundation of Port Royal
(now Annapolis, N. S.). There appeared the first missionaries, Jesuits and secular priesta
Champlain visited Canada in 1603, and in 1608
founded the town of Quebec and settled there.
In 1615 he invited Recollé Fathers from
France, who became the first apostles to the
Indians, and inaugurated those missions in the
interior of Canada so famous during the 17th
century, and in which the Jesuits (1625) and
the Sulpicians (1637) soon took such a glorious
part.

Two distinct and savage races, the Algon-
quins and the Huron-Iroquois, inhabited the
countries just opening up to missionary zeal.
To the Algonquin race belonged the Abenakis,
the Montagnais, the Attikamegs or Poissons-
Blancs, the Ottawas, and several other tribes
scattered from Hudson Bay to the western
prairies. From the Huron-Iroquois source
sprang two great branches: the Yenarts or Hurons established between Lake Huron, Lake Saint Claire and Simcoe, and the Iroquois who
dwelt south of Lake Ontario, and were divided
into five nations: Mohawks, Onondagas, Sen-
ekas, Oneidas and Cayoquos. It would appear
that the total population of these tribes was
not above 100,000 individuals.

The Recollets were the first to devote them-
selves to evangelization among the Indians.
Father d'Olbeau instructed the Montagnais;
Father Le Caron penetrated deeply into the land
of the Hurons to carry them the true faith,
while several fathers remained at Quebec
preaching among the colonists and the sur-
rounding savages. During 10 years they multi-
plied their travels, their preachings, opened
schools for Indian children, called to their as-
sistance new recruits, and among them Father
Viel, who perished in the Ottawa River, victim
of the perjury of a Huron. Consult Sagard, F.,
'Histoire du Canada' (Paris 1668); Beaubien,
Ch., 'Histoire du Sault-au-Récollet' (Montreal
1867). Unable to fill the wants of the missions
alone, the Recollets called upon the Jesuits
(1625), and on their invitation Fathers Brebeuf
and Lalemant with other missionaries came to
Canada. Their efforts for the conversion of
the savages were not attended with the success
hoped for, owing to the opposition of the Com-
pany of Merchants, to whom the French King
had conceded the monopoly of traffic in these
regions, on the condition of founding a colony.
Louis XII and Richelieu replaced them (1627)
by the Company of New France who engaged
to lead "the people inhabiting Canada to the
knowledge of God, and to instruct them in the
Catholic, Apostolic and Roman religion."
There was no time to see the effects of these
good intentions, for less than two years later
(1659), Quebec and the colony fell into the power of David Kerth, who fought on the side of England. The missionaries and their helpers were obliged to return to France.

When Canada was returned to France by the Treaty of Saint German-en-Laye (1632), the Jesuits at the request of Cardinal de Richelieu organized service at Quebec and opened the college of that town (1635), then he plunged into the interior in search of the wandering tribes of Montagnais. Others established a mission at Miscou, and from there branched out to the peninsula of Cape Breton, Acadia and Cape Breton. Trois Rivières and Tadousac on the banks of the Saint Lawrence became centres of evangelization. Consult 'Les Jésuites et La Nouvelle France au XVIIe siècle,' par le Père de la Rochemauch, S. J. (Paris 1895).

Meanwhile hospital religious and Ursulines arrived at Quebec (1639), the first to direct a Hôtel-Dieu endowed by the Duchess of Aiguillon, niece of Richelieu; the second at the head of which was Marie de l'Incarnation, to provide for the education of the girls. These heroic women were rivals in zeal for the conversion of the savages. Consult Abbé Casgrain, 'Histoire de l'Hôtel-Dieu de Quebec' (Quebec 1887); id., 'Histoire de la Vénérable Marie de l'Incarnation' (Quebec 1880); 'Lettres de Mère Marie de l'Incarnation' (Paris 1861).

About this time the Company of Montreal was formed. Its originators were two men of God, M. Olier, founder of the Seminary of Saint Sulpice, and M. de la Dauversière, a nephew of the Marquis de la Condamine, and the establishment of religion in New France without charge to the clergy or to the people. Encouraged by Urban VIII, it was founded in Paul Chomedey de Maisonneuve a faithful executor of its intentions. This illustrious man landed on the island of Montreal which the Society had acquired, 18 May 1642, and laid the foundations of Ville Marie, now Montreal. With him came Mlle. Mance, foundress of the Hôtel-Dieu, and they were soon joined by Marguerite Bourgeoys, an energetic and saintly woman, who organized the religious of the Congregation of Our Lady (1653) for the education of Canadian girls. In 1657, M. Olier, when dying, sent to the colony the first four Sulpicians: de Quelus, Sourat, Gallinier and d'Allot. Consult Doulier de Casson, S. S., 'Histoire du Montréal,' published by the Historical Society of Montreal (1889); Faillon, S. S., 'Histoire de la colonie française en Canada' (Montreal 1865); id., 'Vie de la Vénérable Mère Bourgeoys'; 'Vie de Mlle. Mance' (Paris 1854); id., 'Vie de M. Olier, founder of the Seminary of Saint Sulpice' (3 vols., Paris 1873); P. Rousseau, S. S., 'Vie de Paul Chomedey de Maisonneuve' (Montreal 1886).

The hour of martyrdom sounded for the Jesuits. After escaping twice from the ferocious Mohawks, Father Jogues died beneath their blows (1646). Two missions, flourishing among the Hurons was completely destroyed by the Iroquois, and five Jesuits, Fathers de Brevet, Daniel, Lalemant, Garnier and Chabanel, were overwhelmed in the massacre of their neophytes. Father Buteux also fell a victim to the Iroquois when going to the Attikamékès (1652), and Father Bressani escaped with difficulty from these barbarians. Consult Charlevoix, 'Histoire et Description générale de la Nouvelle France' (Paris 1744); 'Relaion des Jesuites' (Quebec 1858); these two works with the 'Relations inédites de la Nouvelle France' (1672–1779), and other documents have been published with an English translation in the edition of Reuben Thwaites, Cleveland, 1897, under the title: 'Travels and Explorations of the Jesuit missionaries in New France' (1610–1791); Parkman, 'The French pioneers in North America.' The Iroquois became the terror of the colony. Montreal owed its salvation only to the bravery of Maisonneuve and to the heroic devotion of young Dolfard, who at the head of 16 companions for several days faced over 700 Iroquois, and resisted the attacks.

The year 1659 marks the commencement of the ecclesiastical hierarchy in Canada. Monsignor François de Montmorency-Laval was named bishop of Petreia and apostolic vicar of New France by Alexander VII. The prelate had numerous difficulties, and was not averse to putting the Jesuits d'Avangour and de Mésy (1653–65) over the traffic in brandy which was causing ruin among the Indians. He opened a small seminary for the training of future clerics, and 10 years later (1678) laid the foundations of a large seminary for preparation for the priesthood. In 1674 Quebec was created a bishopric by Clement X; the jurisdiction of the new see extended over all North America until 1789, the year in which the bishopric of Baltimore was created. To Monsignor Laval also belonged the title of 'Dr. of charges with resident priests, the incorporation of the Seminary of Quebec and its union with the Seminary of Foreign Missions at Paris, the creation of a chapter of canons; in one word a good diocesan organization. He came in conflict with the Viceroy (1690). Shortly after Messieurs Trouvé and de Salignac-Fénélon, brother of the illustrious archbishop of Cambrai, founded the mission of Kenté (1668), at the point on Lake Ontario where debouches the Saint Lawrence. During 14 years it was a centre whence the true faith radiated throughout all the surrounding region as far as Niagara. The following year (1669) Messieurs Doulier de Casson and Bréhan de Gallinée, Sulpicians, left Ville Marie in the company of Cavalier de La Salle with the resolution of advancing west to the Mississippi. Abandoned by the discoverer they traversed alone the region of the Great Lakes, and returned to Montreal after one year of exploration and research. There M. de Gallinée prepared a relation and made a map of the expedition. The following year also the last foreign missions of the Montagne, Gentilly, I'Ille-aux-Tourtes and Lac-des-Deux-Montagnes, all in the environs of Montreal. The Jesuits on their side prosecutéd arduously their missions. Father Menard evangelized the Outaouais, Father Allouez penetrated as far as Lake Superior (1659) and Fathers d'Ablon

For further information on the history of the Catholic Church in Canada, consult the references and sources listed above.
and Marquette planted the cross at Sault Sainte Marie. Other Jesuits joining the explorers Saint-Loussin and De La Salle, took possession of the banks of Lake Huron; and two years after (1670) Father Albanè penetrated, while traveling by the Saguenay, as far as Hudson Bay. The missions to the Iroquois were resumed, but without great success. In 1699 the sedentary mission of the Prairie de la Madeleine was founded to the south of Montreal. There expanded the Iroquois of Canada, that Catherine Tegakouta, who died in her 23rd year, and for whom the Iro the Council of Baltimore has asked the process of canonization. This mission transferred to Sault-Saint-Louis, now Caughnawaga, is still flourishing (having over 2,000 members), and, after numerous vicissitudes, has again come into the hands of the Jesuits. From Canada also went Joliet and Father Mar- quette on their discovery of the Mississippi (1673). Consult Récit des voyages et découvertes du Père Marquette (New York 1855); Thwaites, Reuben Gold, Father Mar- quette. (New York 1902).

Recall to mind that, the Talon, the Recollet Fathers (1670) established themselves at Que- bec and had four missions: Trois-Rivières, l'île Percée (Gaspé), Saint-John River and Fort Frontenac on Lake Ontario. In 1682, Mr. Dol- lier de Casson called them to Montreal, and in 1692 the return of Cape Breton and of Plaisance in Newfoundland were confided to them.

Meanwhile Monsignor Laval, worn out with his administration, gave in his resignation to Louis XIV (1684). After four years' sojourn in France, he returned to Quebec (1688), where he lived in profound retirement until his death in 1708. The episcopacy of Monsignor Laval marks one of the most prosperous epochs of the Canadian Church and of the colony. Between 1683 and 1709, thanks to the intelligent activity of Colbert and de Talon, more colonists came to Canada than in the preceding half century. A strict supervision was exercised in the choice of the young women sent, as much as regards their physical as their moral qualities. Seven of these whose loose manners might have become a cause of corruption and decadence rather than of growth were rejected. Consult Gaill de Taurines, 'La nation canadienne.' (Paris 1849); Ferland, 'Cours d'histoire du Canada.' Verreau, 'Des Commencements de l'Eglise du Canada—Archives Sociales Royales.' (May 1884); 'Souvenir des fêtes du 2ème cen- tenaire de François de Laval.' (Quebec 1908); Gosselin, 'Évèques de Quebec.'

Monsignor de Saint-Vallier succeeded Mon- signor Laval. The new bishop founded the general hospital of Quebec, endowed it with his own contributions, built the episcopal palace, published a catechism for the diocese, established ecclesiastical conferences and held the first synods. In 1684 the American Indians, having attacked Quebec with 32 vessels the prelate in a pastoral letter exhorted the Cana- dians to bravely do their duty. When after useless efforts the enemy had departed the bishop dedicated to Our Lady of Victory the church in the Lower Town still standing, as a monument to Heaven's protection.

The era of great missions passed; nevertheless Cadillac and a missionary founded the town and colony of Detroit (1701); the priests of the Seminary of Quebec became the apostles of the Tamaroa, between the Illinois and the Ohio rivers; the Jesuits evangelized the Miami, the Sioux, the Otaawas, the Illinois and held their ground amid the Iroquois. With the opening of the 18th century, commenced the furious and repeated assaults of England and its American colonists against the little Catholic colony, in which the French government, careless of the future, became less and less interested. The emigration to New France ceased toward the end of the preceding century. No more were to be seen the great convoys setting sail for America crowded with new populations full of faith and energy. In 1713 the French Canadian population was 18,000, and in 1739 scarcely reached 42,000. It was a small number to re- semble an adversary which counted in 1700 200,000 individuals, and which was increasing each year.

Acadia especially was weak, having but 2,000 inhabitants of French origin. The first attacks were directed against her. After having resisted in 1704 and 1707, and by the Treaty of Utrecht (1713) ceded Acadia, Newfoundland and Hudson Bay to England. From this epoch to that of the violent dispersion by Lawrence (1755), the Catholics found devoted support in the Sulpicians and the priests of the Seminary of Quebec who were their missionaries. The names of Geoffroy, Baudoin, Tronvô, de Bresluy, Metivier, de la Goulaine, de Miniac, Chauveuse and Desenchaves, of Saint-Sulpice; of Petit, Thury, Gaulin, of the Seminary of Quebec, deserve to be remembered by posterity. Mention should also be made of Father Rasles, S. J. missionary to the Alenaks, who was killed by the English. We will not recall here the incredible atrocities which have relegated Lawrence's memory to the execration of humanity, and which Longfellow has immortalized in his touching poem 'Evangeline.' Consult Richard, 'Acadia, Missing Links of a Lost Chapter of American History.' (New York 1895); Abbé Casgrain, 'Les Sulpiciens en Acacie' (Quebec 1897); id., 'Un pèlerinage au pays d'Evangeline' (Quebec 1885).

These painful events only too plainly foreshadowed the fate awaiting the Canadian col- ony. Instead of sending men, France persisted in raising at great expense useless fortifications at Louisbourg and at Quebec. Canada was to fall through lack of foresight.

The episcopacy of Monsignor de Saint-Vallier lasted until 1727. The endowments with which he enriched the various religious establish- ments of the country have been estimated at 600,000. His successor, Monsignor Duplessis-Mornay, never came to Canada. He governed his diocese by an administrator. Resigning in 1724, he was replaced by Monsignor Dosquet who devoted himself to promoting the education of youth and the religious life in the communities. Monsignor de Laubervièrè, who succeeded him, died a month after his arrival in his diocese, victim of his charity in attending soldiers attacked with scurvy (1740). His suc- cessor was Monsignor de Pontbriand (1741-60), the last bishop under the French régime. He built a cathedral, restored the Ursuline
monastery at Trois-Rivières and the Hôtel-Dieu of Quebec, which had been destroyed by fire, established ecclesiastical retreats, and by his science and virtue was the model of his clergy.

Among eminent priests of this epoch should be mentioned M. de Belmont, superior of Saint-Sulpice at Montreal (1701-32), who covered the region with his liberalties and his works; M. Normant du Farandon, his successor (1732-59), who with the Venerable Mother d'Youville, sent the Grey Sisters, and having founded the admirable charitable institution of the Grey Sisters. Consult Faillon, S. S., ‘Vie de la Vénérable Mère d'Youville’ (Montreal 1852).

To Saint-Sulpice belonged also that abbé Picquet to whom the town of Ogdensburg erected (1889) a monument, as well as to its founder. Consult ‘Lettres édifiantes et curieuses’ (Lyon 1819); ‘Mémoire sur la vie de M. Picquet’ by M. de la Lande, of the Academy of Sciences, p. 262; ‘Biographie universelle ancienne et moderne’ (Paris 1823, Vol. XXI, p. 260); ‘Revue canadienne, janvier et février 1870,’ Vol. VII; ‘l'abbé Picquet’, by J. Tasse.

The events which precipitated the fall of Canada are well known. Quebec was taken (1759), but the bishop, Monsignor de Pontbriand, died at Montreal (1760) without seeing that town in the hands of the English. M. Briand undertook the administration of the region of Quebec; M. de Montgolfier, Sulpician, of that of Montreal. The Treaty of Paris which closed Canada to England was signed 10 Feb. 1763. The period of establishment closed for the Canadian Church, and of that of conflicts and of progress opened.

2. After 1763.—All the natural chiefs of the Canadians recrossed the ocean with the French flag. A population of 70,000 souls was abandoned without a guide. The clergy alone remained, invested with the double mission to preserve the ancestral faith and direct the people in the attainment of their civil and political rights. They understood their mission and it can be truthfully said that they did not fail therein.

The Treaty of Paris, it is true, guaranteed the Canadians the free exercise of their religion, but with the addition so much as the laws of Great Britain will permit. This restriction left a great latitude in the interpretation of the treaty. In fact it was a species of persecution. The government of London thought to substitute the Anglican hierarchy and religion for the Catholic hierarchy and religion and flattered itself in easily overcoming the conscience of a handful of colonials. The French laws were abolished and the oath of allegiance exacted from all Canadians. They notified the priests that they would have to subscribe to it or prepare to leave Canada. It was a demand to abjure and rebel against the authority of the Roman See. At the same time they prepared a list of the churches, the priests, their charges, their revenues, their property, also one of the religious communities with their institutions, rights and privileges and properties. In addition George III encouraged the governors to found Protestant schools so that the Church of England could be established in principle and in practice, and the inhabitants gradually be brought to embrace the Protestant religion, and their children educated in the principles of that religion.

The communities of men were also condemned to die out. Recollets, Jesuits and Sulpicians were prohibited from recruiting in the country or from receiving members from abroad. They took possession of the properties of the first, and as to the Sulpicians, they were reduced from 30 which they were in 1760, to two septuagenarians, whose deaths they awaited to take possession of their effects, when the French Revolution broke out. The English government then relaxed its rigorous attitude and offered the victims of the furious revolutionists an hospitality which does them honor. The people though were not better treated. For them there were no public positions, no place in the councils of the colony. A species of ostracism followed them everywhere. In the midst of these painful conjunctions the Catholics did not despair; they sent to London petition upon petition claiming on the face of the Act of 1763 the protection of their religion, their priests, their language and their civil rights. At last in 1766, George III consented to the consecration of Monsignor Briand, as bishop of Quebec, without recognizing any other title, however, than that of superintendent of the Catholic cult.

Meanwhile a storm was arising in the Anglo-American colonies. The metropolis understood that it should conciliate the Canadians. The Act of Quebec (1774) restored the French civil laws, dispensed with the test-oaths and recognized their civil and political rights. During the war which followed and which terminated with the death of Montgomery (1775) under the walls of Quebec, the Canadian people, docile to the voice of their clergy, remained faithful to the sovereign which Providence had given them.

During these years the Catholic population had grown: in 1784, it numbered 130,000 French-Canadians; the Maritime provinces were being peopled by Irish and Scotch Catholics, and the Acadians, dispersed in 1755, were growing silently and multiplying, supported by such apostles as the abbé Desjardins, Sigogne, de Calonne and Cigart, Sulpician. “To these confessors of the faith the Acadian race owed its organization; these were its founders and the keepers of its nationality.” Consult ‘Vie de l'abbé de Calonne’ (Trois-Rivières 1892); Casgrain, ‘Pélerinage au pays d'Évangeline.’

After having courageously combated, Monsignor Briand resigned in 1784. His successor, Monsignor d'Espie, was an old man of 73 years. He speedily took a lead in the person of Monsignor François Hubert, who became titular bishop in 1788. In a remarkable memoir to the Holy See (1794), the prelate states that his diocese contained 100,000 Catholics; that the efforts of the Anglicans to win the Canadians to their religion were in vain; that his diocese is too vast for him to administer conveniently. But, he added, “every plan of division would find insurmountable obstacles on the part of Great Britain and the other side in the means to establish in this country a Protestant clergy.” Consult ‘Mandements des évêques de Québec,’ Vol. XI, p. 474.

Monsignor Denaut (1797-1806) succeeded Monsignor Hubert. Under his episcopacy the
fight against Anglicanism is summed up in the Royal Institution. Thus was named a cleverly composed organization designed to monopolize instruction of every degree by concentrating the power in the hands of the governor. The Anglican Bishop Mountain was chosen as president of the institution. Profiting by a legal resuit, that he obtained for himself official recognition of his title, bishop of Quebec (1818); that he removed the pretensions of the government to nominate rectors; that he ensured the independence of the Church against the State; and that he inspired his adversaries, even with respect and admiration for his great character. Faithful besides to the Crown of England, his was the act of a loyal subject in calling to arms his diocesan, on the occasion of the invasion of the United States in 1812. Well and justly could Lord Bathurst reply to the Anglican bishop of Quebec, J. Mountain, who protested against the favors accorded Monsignor Plessis by the London government. "It is not when Canadians are fighting for England that such actions would be agitated," Consult Pagnuelo, Etudes historiques et légales sur la liberté religieuse en Canada (Montreal 1872).

From 1806 to 1825 the Episcopal See of Quebec was occupied by Monsignor Octave Plessis, a prelate distinguished as much by the breadth of his intelligence and the force of his character, as by his courtesy in all proceedings. He had to hold his own against a powerful oligarchy which would not recoil from extreme measures, and which was resolved to make the Church the vassal of the civil power, the slave of the government; in fact to lead insensibly Canada to Anglicanism by the governmental channel. The soul of this plan was a certain Witzius Ryland, secretary of the governors of Canada, whose schemes could be carried out without entering into the details of this struggle, into which Sir James Craig was weak enough to enter; it suffices to say that Monsignor Plessis by his individuality embodied Canadian resistance without ever wounding English sentiment; that he obtained for himself official recognition of his title, bishop of Quebec (1818); that he removed the pretensions of the government to nominate rectors; that he ensured the independence of the Church against the State; and that he inspired his adversaries, even with respect and admiration for his great character. Faithful besides to the Crown of England, his was the act of a loyal subject in calling to arms his diocesan, on the occasion of the invasion of the United States in 1812. Well and justly could Lord Bathurst reply to the Anglican bishop of Quebec, J. Mountain, who protested against the favors accorded Monsignor Plessis by the London government. "It is not when Canadians are fighting for England that such actions would be agitated," Consult Pagnuelo, Etudes historiques et légales sur la liberté religieuse en Canada, c. IX–XI, p. 86-120; Le Correspondant, April 1877; La France Canadienne, by J. Guérard; Garneau, Histoire du Canada, 2, 114-117, 141-144; Bédard, Histoire de Cinquante ans (1791-1841), (Quebec 1869, c. IV et v).

Monsignor Plessis understood the necessity for dividing his vast diocese so that it might be efficiently administered. Already in 1817 New Scotland was detached from Montreal with Monsignor Burke as apostolic-vicear. This did not suffice. Soon the apostolic vicariates were created of Upper Canada with Monsignor MacDonell as titular; of New Brunswick and Prince Edward's island, with Monsignor MacEachern; and of the district of Montreal with Monsignor Cartigae, Sulpician (1820). These divisions were completed after the death of Monsignor Plessis, by the creation of the sees of Kingston (1826); Charlottetown (1829); and of Montreal (1836).

In the course of years the number of French Canadians kept on increasing. In 1831 it attained 380,000. In less than 50 years, it had increased by nearly 280,000 souls. This progress was not of a peaceful and tolerant order. Protestants, already about 1820, they had tried to abolish the constitution of 1791, which assured an independent existence to the province of Quebec, and wished to unite Upper and Lower Canada, with the scarcely veiled object of outnumbering the French Catholic population. This plan had failed, thanks to the firmness of Bishop Plessis and his clergy, who, rallying the forces of the country, successfully opposed Protestantism. Unfortunately, after the death of the bishop, several influential members of the legislative body deserting the sure ground of legal resistance, slipped upon the slope of revolution, fanned the spirit of revolt by their indignant philippics, and provoked the measure that, when several hundred countrymen, led astray by their representatives, flew to arms. Nevertheless, let us say that the voice of the Catholic clergy was sufficiently powerful to keep the mass of the population in the path of duty. The result of this insurrectional measure was the union of the two Canadas. The Act of Union was passed by the British Parliament 23 July 1840.

Before this act of despotism (consult Turcotte, Le Canada sous l'Union, p. 60), which marks an important date in the history of Canada, several works had been created, several deeds accomplished which interest the Church. The seats of education had multiplied; the College of Montreal (1760) founded by M. Caron, priest of Saint-Sulpice, and then (1806-28) so prosperous under the direction of M. Roques; the colleges of Nicolet (1804), of Saint-Hyacinthe (1811), of Sainte-Thérèse (1825), of l'Assomption (1832), of Sainte-Anne de la Pocatière (1843), mention also, of the formation of the Société d'éducation de Quebec, to promote primary instruction, and the acceptance of Fabriques Schools Law (1824), so favorable toward the same end. To the same period belongs the acknowledgment of the properties of the Seminary of Saint-Sulpice at Montreal by the government of Queen Victoria (1839). This act of justice allowed this venerable institution to follow the course of its charities and to cover the Montreal region with its intelligent liberalities.

To Monsignor Panet, who had replaced Monsignor Plessis (1825-32), succeeded Monsignor Signay. His episcopacy was marked by many misfortunes: cholera (1832), civil war (1837-38), two famines in Quebec (1843), typhus brought by the Irish driven from their country (1847). The 15 years which followed 1840 were more fruitful for the Canadian Church. Five communities of men, and 15 of women dedicated to the ministry, to teaching or to charity, came from France to settle in Canada. The Oblate Fathers of the Immaculate Mary (1811), the Jesuits (1842), the clerks of Saint-Viateur, the Congregation of Sainte-Croix (1847), and the
Brothers of the Christian schools answered to the call of Monsignor Ignace Bourget, bishop of Montreal (1840-79). Then were founded the Sisters of Providence (1843), of the Holy Names of Jesus and Mary (1843), of Mercy (1848), of Saint Anne (1849). At the same time the Episcopal Sees were multiplied: Toronto with Monsignor de Charbonnel, S. S. (1842); Saint John, N. B. (1842). Quebec elevated to the dignity of an archbishopric received as suffragan sees Montreal, Kingston and Toronto. The same year (1844) the bishopric of Arichat, N. S., transferred to Antigonish since 1886, was created: in 1847 the see of Bytown or Ottawa and of Saint John, Newfoundland. United in council at Quebec (1851), the bishops decided on the foundation of Laval University and asked the Holy See to establish the sees of Trois Rivières and Saint Hyacinthe (1852). Let us mention also the foundation of societies for colonization, for temperance, of Saint-Vincent de Paul and of an educational system for separate schools for Catholics.

Meanwhile the Catholic population had increased considerably. In the province of Quebec it more than doubled in 30 years; in 1831 it counted 425,000, in 1861, 942,800 souls; in Ontario it attained 200,000. This development demanded the multiplication of primary schools. This was the work of J. B. Meilleur, of whom it can be said, he undertook the direction of Public Instruction from its cradle; that he had to create everything even to the love of instruction among the people. Consult Meilleur, J. B. 'Mémorial sur l'éducation au Bas-Canada' (Quebec 1876). The Catholic colleges were opened of Joliette (1846), of Rigaud (1850), of Saint-Lawrence (1847), of Saint Mary of Monnoir and Levis (1853). That same year (1853), the Seminary of Quebec undertook the heavy but glorious task to build Laval University which was inaugurated in the presence of Lord Elgin, 14 Sept. 1854, and which since has rendered such immense services to the Catholic cause and to the country. Consult Meilleur, J. B. 'Les fêtes du Cinquantenaire' (Quebec 1903).

While these works were being accomplished in the East, the West was opening to evangelization. With Monsignor Provencher, the first apostolate of these districts had penetrated along the Red River. Wishing to ensure the future of these missions, the bishop of Sainte-Boniface called to his assistance the Oblate Fathers and even chose from them Father Taché as coadjutor. Monsignor Provencher died in 1853 and was succeeded by Monsignor Taché. He had to expend his intelligence and his strength during 40 years (1853-94). It does not enter into the limited scope of this essay to recount the works of the Oblates in the Far West, although they constitute one of the most remarkable chapters of the Church in Canada. The apostolic vicarates and the Episcopal sees embrace in their jurisdiction every point in these distant regions which came under the indefatigable zeal of these missionaries. Consult Dugas, G., 'Monsignore Provencher et les Missions de la Rivière-Rouge' (Montreal 1880); Lebel, S. J., 'Les missions Catholiques françaises' (Paris 1902); Monsignor Taché, 'Vingt années de missions dans le Nord-Ouest de l'Amérique' (Montreal 1869); Don Benoit, 'Vie de Monsieur Taché' (Saint Boniface 1904); Père Jougnet, O. M. I., 'Vie de Monsignore Grandin' (Montreal 1904); Cooke, R. O. M. I., 'Sketches of the Life of Monsignor de Mazenod' (London 1879); 'Dictionnaire des Canadiens de l'Ouest,' par Rev. F. Morice (Quebec 1908); 'Histoire de l'Église Catholique dans l'Ouest Canadien,' 1659-1905 par Rev. F. Morice (Montreal 1912).

The years which followed 1860 were full of solicitude for the Catholic clergy. The councils of Quebec show us the bishops preoccupied with the progress of piety, with evil books, with the weakening of the faith, and painfully affected by the events which led to the invasion of the pontifical domains by the armies of Victor Emmanuel. The Canadians flew to arms and several detachments of zouaves offered their services to Pope Pius IX (1866).

The Catholic hierarchy had developed in the course of years. In 1852, Halifax was created an archbishopric with Charlottetown, Saint John, N. B., Arichat, N. S., and soon after Chatham, N. B. (1860), as the year 1871 marked the creation of the ecclesiastical province of Saint Boniface (Manitoba), with the bishopric of Saint Albert (1871), and the apostolic vicarates of Athabasca-Mackenzie and of Saskatchewann and of Prince-Albert (1871). In the preceding year (1870) Upper Canada was created an ecclesiastical province with Toronto for archbishopric and Kingston and Hamilton for suffragans. Since then Kingston has become an archiepiscopal see (1878) with two suffragans: Peterborough and Hamilton. In the province of Quebec, Sherbrooke (1874), Chicoutimi (1878), Nicolet (1885) became bishoprics. In 1886, Montreal was created an archbishopric under Monsignor Fabre, with Saint Hyacinthe and Sherbrooke as suffragans, to which have since been added Valleyfield (1893), and Joliette (1904). The same year Leo XII created the ecclesiastical province of Ottawa, which received as suffragan the Episcopate of Pembroke (1890). To crown this flourishing period, Leo XIII in 1890 honored with the cardinal purple Monsignor Taschereau, archbishop of Quebec (1886). To conclude the study of the second half of the 19th century, mention must be made of three particular points: (a) The Awakening of the Acadian Race, which had expanded imperceptibly. From the 25,000 that they were in 1815, the Acadians increased to the number of 80,000 (1864), and 125,000 (1899). To Father LeFebvre, a Canadian priest, is due the merit of having amalgamated them and, in founding the college of Memramcook, N. B., having contributed powerfully to render them a force for Catholicism in the Maritime provinces. Today the Catholics of French origin in that region amount to 155,000. Consult P. Poirier, 'Le Père LeFebvre et l'Acradie' (Montreal 1895). (b) The Schools of New Brunswick and of Manitoba.—In 1867 when the Canadian Federation was founded, the educational system of New Brunswick allowed the Catholics of that province to have separate schools. This right was refused them in 1871, the aim being to compel them to send their children to the public schools, that is to say, Protestant schools. An organized resistance spread everywhere and to avoid a sanguinary conflict a compromise was


3 Most Rev. L. N. Begin, D.D., Archbishop of Quebec; Cardinal since 25 May 1914


5 Most Rev. Denis O'Connor, D.D., Late Archbishop of Toronto
effect. The unjust law was not abrogated but the concessions were of such a nature that peace was re-established (1874). In the same year the Manitoba Catholics in 1890. Despite the vigorous fight led by Monsignor Langevin, successor to Monsignor Taché in the see of Saint Boniface, the inequity was not amended, but a compromise was arranged between the Laurier government and the Holy See, which for want of a better softened without destroying the disastrous effects of the law. This question which so impressed the minds in 1896 gave rise to the creation of the Apostolic Delegation to Canada.

(c) The foundation of Laval University at Montreal.—For a long time Montreal was in want of a Catholic university. Monsignor Bourget applied to the Propaganda. Not to injure the rights of Quebec, a branch in Montreal was granted by the pontifical bull Inter urbes solicitudines (1876). The powers and the autonomy of this branch were signalized increased by Leo XIII (1889). In need of the necessary buildings, the liberality of the Seminary of Saint Sulpice, governed then by M. Colin, filled this void. Laval University at Montreal now has spacious premises and numerous professorships.

### 3. Present Condition.

(a) Ecclesiastical provinces.—The total Canadian population in Canada is estimated at 2,230,008 by the census of 1901. Since then it has increased about 100,000 through immigration. With 1,430,000 Catholics, the province of Quebec alone comprises three-fifths of the faithful followers of Rome in Canada. Nearly 900,000 are scattered throughout the other provinces. Everywhere, except in Ontario, in Manitoba and in British Columbia, Catholics exceed the numbers of its adherents any of the separate Protestant sects. It embraces 42 per cent of the total population of the Dominion, which is 5,371,315. From 1850 to 1900 the Catholics increased by over 250,000 souls. This gain was effected despite a very pronounced emigration movement of French Canadians to the Northeast of the United States. The following table gives a glance at the ecclesiastical divisions of the Dominion of Canada:

### Archbishops Succeeding Bishops

<table>
<thead>
<tr>
<th>Archbishops Succeeding Bishops</th>
<th>Titulare in 1916</th>
<th>Catholics</th>
<th>Priests</th>
<th>Church and Chapels</th>
</tr>
</thead>
<tbody>
<tr>
<td>QCULBRE</td>
<td>Card. L. N. Begin auxl. P. E. Roy.</td>
<td>380,000</td>
<td>679</td>
<td>286</td>
</tr>
<tr>
<td>Trois-Rivières</td>
<td>A. A. Blais.</td>
<td>95,884</td>
<td>143</td>
<td>76</td>
</tr>
<tr>
<td>Rimouski</td>
<td>A. D. Brise.</td>
<td>135,628</td>
<td>158</td>
<td>124</td>
</tr>
<tr>
<td>Chambord</td>
<td>P. X. Choutier.</td>
<td>81,246</td>
<td>136</td>
<td>68</td>
</tr>
<tr>
<td>Nicolet</td>
<td>H. Brunswalet.</td>
<td>90,000</td>
<td>163</td>
<td>68</td>
</tr>
<tr>
<td>Bas St. Laurent.</td>
<td>G. Blanche.</td>
<td>9,650</td>
<td>19</td>
<td>39</td>
</tr>
<tr>
<td>MONTREAL</td>
<td>P. Bruchet.</td>
<td>545,400</td>
<td>824</td>
<td>263</td>
</tr>
<tr>
<td>Saint-Hyacinthe</td>
<td>X. Bernard.</td>
<td>116,000</td>
<td>250</td>
<td>120</td>
</tr>
<tr>
<td>Sherbrooke</td>
<td>H. Chalifoux.</td>
<td>95,000</td>
<td>148</td>
<td>86</td>
</tr>
<tr>
<td>Valleyfield</td>
<td>M. Bourard.</td>
<td>56,563</td>
<td>104</td>
<td>44</td>
</tr>
<tr>
<td>Jonquière</td>
<td>F. X. Bourget.</td>
<td>65,000</td>
<td>127</td>
<td>53</td>
</tr>
<tr>
<td>OTTAWA</td>
<td>H. Gauthier.</td>
<td>138,000</td>
<td>310</td>
<td>144</td>
</tr>
<tr>
<td>Pembroke</td>
<td>P. Ryan, administr.</td>
<td>38,500</td>
<td>49</td>
<td>71</td>
</tr>
<tr>
<td>Mont-Laurier</td>
<td>P. X. Brunet.</td>
<td>34,500</td>
<td>58</td>
<td>46</td>
</tr>
<tr>
<td>Gloucester</td>
<td>E. Lalumière.</td>
<td>25,000</td>
<td>51</td>
<td>38</td>
</tr>
</tbody>
</table>

The Catholics number about 2,873,700, for the whole Dominion, the province of Quebec having about 1,766,000. The other eight provinces have about 1,107,700. It is to be remarked also that of the 1,107,700 Catholics disseminated throughout the eight provinces, a little over one-third (400,000) are Catholics of French descent.

On the death of a bishop, the bishops of the province send a list of three names to Rome and the Pope chooses and names a successor. The bishop-designate cannot be consecrated before receiving his bull from the Holy See. He enters immediately on his functions without having to fulfill any civil formality, and the diocesan render their homage and obedience as to his predecessor. The state recognizes in him the rights of a civil corporation. He enjoys besides the greatest liberty while regarding canonical rules, in nominating vicars, creating parishes, erecting churches and parsonages. Each vicar keeps a registry of births, marriages and deaths. In French-Canada the vicar has the right of titles for his maintenance. This title in spite of its name is but a twenty-sixth part; it is raised on grain alone, and the tendency is more and more to pay it in money. No vicar is irremovable.

(b) Religious Communities.—There are today in Canada about 38 communities of men, either priests or brothers; and about 83 communities of women. The priests devote themselves to various forms of charity, of teaching, to parochial ministry or to preaching. They include Sulpicians, Jesuits, the Oblate Fathers of Mary Immaculate, the clerks of Saint Viator, Dominicans, Franciscans, Redemptorists, the Fathers of the Holy Cross, of the Company of Mary, Eudistes, Basilians, of the Holy Sacrament and several others. The
Brothers of the Christian Schools to the number of 700 and 56 establishments, and teaching 25,000 pupils. The Sisters are to be found in every kind of devoted work: hospitals, asylums, industrial schools, almshouses, refuges, orphanages, in one word all the miseries that the crowded cities multiply find succor from their ministrations. The list will be made only of the orders found in Canada:

<table>
<thead>
<tr>
<th>Names</th>
<th>Diocese</th>
<th>Year of foundation</th>
<th>Members</th>
<th>House</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ursulines of Quebec</td>
<td>Quebec</td>
<td>1639</td>
<td>101</td>
<td>5</td>
</tr>
<tr>
<td>Congregation of Our Lady</td>
<td>Montreal</td>
<td>1657</td>
<td>2,000</td>
<td>156</td>
</tr>
<tr>
<td>Grey Nuns, divided since 1854, in 5 independent provinces.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sisters of Mercy of Jesus</td>
<td>Quebec</td>
<td>1869</td>
<td>63</td>
<td>3</td>
</tr>
<tr>
<td>Ursulines</td>
<td>Quebec</td>
<td>1697</td>
<td>179</td>
<td>5</td>
</tr>
<tr>
<td>Sisters of St. Joseph</td>
<td>Montreal</td>
<td>1850</td>
<td>480</td>
<td>30</td>
</tr>
<tr>
<td>Sisters of the Sacred Heart of Mary</td>
<td>Montreal</td>
<td>1853</td>
<td>646</td>
<td>30</td>
</tr>
<tr>
<td>Providence of St. Vincent</td>
<td>Montreal</td>
<td>1850</td>
<td>617</td>
<td>10</td>
</tr>
<tr>
<td>Precious Blood</td>
<td>Montmorency</td>
<td>1869</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>Holy Family</td>
<td>St. John</td>
<td>1874</td>
<td>723</td>
<td>45</td>
</tr>
<tr>
<td>Institut de Saint Joseph</td>
<td>Rimouski</td>
<td>1880</td>
<td>260</td>
<td>20</td>
</tr>
<tr>
<td>Our Lady of Holy Rosary</td>
<td>Rimouski</td>
<td>1879</td>
<td>628</td>
<td>2</td>
</tr>
<tr>
<td>Saint Martha</td>
<td>Montreal</td>
<td>1883</td>
<td>62</td>
<td>2</td>
</tr>
<tr>
<td>Dominican Sisters of the Immaculate</td>
<td>Quebec</td>
<td>1887</td>
<td>172</td>
<td>8</td>
</tr>
<tr>
<td>Providence of Mary</td>
<td>Quebec</td>
<td>1889</td>
<td>253</td>
<td>12</td>
</tr>
<tr>
<td>Our Lady of Perpetual Help</td>
<td>Quebec</td>
<td>1892</td>
<td>196</td>
<td>21</td>
</tr>
<tr>
<td>Servants of Jesus</td>
<td>Ottawa</td>
<td>1895</td>
<td>48</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(c) Universities and Seminaries.—There are three Catholic universities in Canada: Laval in Quebec, Laval in Montreal, and the University of Ottawa, founded by Monsignor Guigues. The first two comprise all faculties except sciences. Medicine, law and letters have well-endowed seats. The University of Ottawa, founded in 1840. The University of Ottawa has only the faculties of theology and arts. Secondary education is disseminated by 17 colleges in the province of Quebec, all affiliated to Laval University, which alone confers university degrees. To these colleges must be added others opened in recent years, namely Loyola College in Montreal, Sudbury in Ontario, Saint Albert in Alberta and Saint Boniface in Manitoba. Saint Augustine's Seminary in Toronto, opened in 1913, is a faculty of theology. Young men destined for the priesthood prepare by two years of philosophy and four of theology. This preparation begins in a great seminary that of Montreal has nearly 300 aspirants for the priesthood, that of Quebec over 100. There is besides, one at Halifax; and each religious community of men is endowed with an academy where dogmatic and moral theology, the Holy Scriptures, patristics, canon law, and the history of the Church are taught. Those young priests who are most distinguished for their intelligence are sent by their bishops to Rome in the Canadian College, founded by the Sulpicians in 1888, where they follow courses given by learned professors of the Roman universities and return with the degrees of doctors in philosophy, in divinity or in canon law. Consult Hopkins, 'Canada: an Encyclopedia of the Country' (Toronto 1898).

Two important events took place in recent years; one in 1910, the Plenary Council of Quebec, at which all the bishops of Canada assisted, under the presidency of the papal delegate, Monsieur Sarebeuti. At this council new laws were enacted and the old laws were confirmed. The other event was the solemn Eucharistic Congress, the XX1st of the series, which proved to be a wonderful success, the whole population of Montreal, Protestants as well as Catholics, joining hands in the celebration of this great event.

French-Canadian Catholics believe that they have been called by Providence to personate on American soil the rôle that France personated in the Old World. They look upon themselves as destined to fill a mission, and to fill that mission the one that France has filled in Europe; to carry high the banner of the Catholic Church, and among races more inclined to positivism, maintain and propagate the instinct of disinterested devotion, and the worship of the ideal. Consult Casgrain, 'Histoire de la Vénérable de l'Incarnation,' t. I. p. 95; Gallay de Taurines, 'La nation Canadienne,' ch. XXV, pp. 289-91; Masson, 'Le Canada francais et la Providence' (Quebec 1875); RajeY, F., 'Une nouvelle France' (Paris 1902).

A. FOURNET, S.S.,
Late Professor in Montreal College.
Revised by J. R. NEVÉN, Professor of Church History, Laval University, Montreal.

27. THE FRENCH CANADIAN. Geographical Distribution.—In 1911, according to the last Dominion census, 2,055,000 inhabitants of Canada were of French origin, forming 26 per cent of the whole population, and showing an increase of 24 per cent since the census of 1901. Of these by far the greatest part, 1,605,000, were settled in the province of Quebec, forming 30 per cent of the total population of that province. But considerable numbers were located in some of the other provinces: 202,000 in Ontario, 98,000 in New Brunswick, 51,000 in Nova Scotia, 13,000 in Prince Edward Island, 31,000 in Manitoba, 23,000 in Saskatchewan, 20,000 in Alberta, and 700 in the Yukon and the Northwest Territories. The French population of Canada has doubled every 27 years for the past 200 years. Then, according to the last United States census, there were, in 1910, throughout the Union over 400,000 people of French origin, and the total number of people of French Canadian extraction in the United States, if local statistics are to be credited, would exceed 1,000,000. From the point of view of physical and social geography, the French Canadian element in North America is made up as follows:

(1) The main body, 1,800,000 strong, extends uninterruptedly over Quebec, eastern and northern Ontario and northern New Brunswick. The nucleus of this main body is a compact community of farmers occupying the banks of the Saint Lawrence and the valleys of its
tributaries. On the outskirts of this central
group, over the wooded and rocky highlands,
north and south of the great river, but more
especially through the plateau of northern
Quebec, northeastern Ontario and northern
New Brunswick, farming is largely supple-
mented by lumbering, and not infrequently by
mining; while along the Gulf and sea-coast of
Labrador, the Grand Manan, Chaleur Bay, and
eastern New Brunswick it is more or less
superseded by fishing.

(2) Then hardly separated from these, and
from one another, we have, off the extreme
eastern limit of this central group, the French-
speaking communities of fishermen of Nova
Scotia and Prince Edward Island; while, as a
projection from the opposite extreme western
border, in Ontario, we find, along the shores of
the Saint Lawrence and the Great Lakes, a
string of small settlements of French Canadian
rivermen, boatmen and woodsmen, forming an
almost continuous chain along that province
and connecting, as it were, the two large French
groups of Detroit River and Georgian Bay with
the garden and forest belt of the Ottawa. Over one-third, namely, about
680,000 of the total French element composing
this main body and its projections are congre-
gated in villages, towns or cities, where they
make a living through physical labor, trading,
the crafts and the liberal professions.

(3) As distinct outliers from the above
main group, we have, in the first place, the
many French-speaking communities of urban
population, which, in very large, though fluctu-
ating numbers, are spread in the centers and
manufacturing towns of the North Atlantic States
of the Union, principally Massachusetts; in the
second place, smaller and sparser groups of
French-speaking farmers (at times woodsmen
and miners as well), to be found in the Western
country, in Manitoba, Alberta and in some
States of the North Central division of the
Union, especially Michigan, Wisconsin, Minne-
sota and Illinois; in the third place, still smaller
and sparser groups of French Canadian pros-
pectors or miners, spread in the camps and
towns of British Columbia, the Yukon and some
of the States of the Western division of the
Union, principally Montana and California.
Lastly, French Canadian families or individuals
are to be found in every part of the Union,
though in the States of the South Atlantic,
South Central and Western divisions they ag-
gregate in most cases a few units or a few
hundred only. About 40 per cent of the total
French Canadian element in the United States
are located in 160 principal cities.

Social Features.—The most widespread,
fundamental and characteristic type of the
French Canadian is the inhabitant, or farmer, of
the province of Quebec (q.v.). From a study of
his conditions there may be gathered the
clearest idea of the capabilities and limitations
of the race as a whole. Three main groupings
are distinctive of social life in the French
Canadian country: the habitant’s household, the
range and the school.

(1) The habitant’s household normally con-
sists of two families, that of the senior house-
holder, and that of an associate son and heir;
it includes generally sisters and younger
brothers of the heir, children of the younger
couple, and, in some cases, sisters of the senior
father of family. We have thus a group of
some 10 or more persons, closely bound to-
gether, not only by ties of kinship and family
love, but by co-operative effort, community of
interest and habits of mutual dependence,
which extend, in a measure, even to those mem-
bers of the group who have settled outside of
the family circle. The habitant’s household is
primarily a labor organism, a workshop. Agricul-
ture is its mainstay; but it is of a type neither
extensive nor intensive, its scope being nar-
rowed down to the task of satisfying directly
the household’s needs, and limited by the house-
hold’s internal supply of labor. The farms
seldom exceed 100 acres in area, and outside
help is resorted to in very exceptional cases
only. To avoid this contingency, women and
children are called upon to work in the fields,
especially in haying and harvesting time. On
the other hand, the object being to provide
directly, as far as circumstances will permit, for
all the requirements of the family, habitant
farming is greatly diversified. On almost every
farm there are to be found, beside the kitchen-
garden and its few fruit trees, small patches of
flax, tobacco, potatoes, Indian corn, wheat
and barley, while larger areas are given to
other cereals, hay and pastureland. Similarly,
all kinds of stock are kept on each farm, though
seldom any in large numbers or of excellent
quality. Various home industries, such as the
spinning and weaving of both flax and wool, the
manufacture of maple syrup and sugar, carp-
entry, joinery, cooperage, brush-making,
leather-working, etc., are an important factor
on many farms. Agriculture is seldom the sole
means of living of the inhabitant, since in the
newer settlements the mere gathering of
natural products, such as fish, game, wild fruits
and wood is largely resorted to, while in the
older and more densely populated sections by
industries are conspicuous. Then again tempo-
rary emigration to and employment in the manu-
facturing, mining and lumbering centers of
Canada and the United States is, in all situa-
tions, an occasional means of securing capital
to start out in life or of bringing over hard
times. The methods of farming of the inhabitant,
his rotation of crops, his processes of retting
and breaking flax, dyeing wool, making candles,
etc., are traditional and have been in use for
centuries in certain provinces of France. How-
ever, in recent years, the wave of modern pro-
gress has been felt, agricultural machinery has
come into fairly general use, co-operative butter
and cheese factories have been established, and,
especially in the vicinity of railways, improved
methods and a more specialized type of farming
have been adopted. Through hard work
and close economy a capable inhabitant will suc-
cceed, with the help of his family, in building up
a homestead of sufficient area to meet the wants
of the household. Should his acquisitions of
land during his lifetime remain within that
limit, then the homestead will be transferred
in its entirety to the associate son or heir, who
in turn will be charged with providing for the
whole family, in the same way that his father
would have done. On the other hand, should
the acquisitions of the father of family exceed
the area required for the support of an ordinary
household, the lots in excess are freely used
in helping out other sons who, after contrib-
uting to the sustenance and welfare of the pater-
nal household in their early life, undertake to make an independent living through agriculture. Girls receive very little aid from the family estate, as it is considered they will be provided for as long as they remain in the paternal household, or through marrying into some neighboring family. Likewise, sons who are sent to college and enter the liberal professions or the priesthood receive very little else from their parents. In the management of the family affairs, the influence of the mother is about on a par with that of the father. As a rule she is better educated than her husband, sees to the correspondence and accounts, is consulted in all matters of importance and leads in the family worship. Through working with their parents on the farm the children acquire a variety of aptitudes, but no particular proficiency in any of the arts, nor any strong desire of attaining eminence in the various walks of life, barring possibly priesthood and politics. Education is reserved for the few who take to the liberal professions and the Church. The style of living is plain, and in many respects old-fashioned. Food is in abundance, though lacking in delicacy. The house, usually of wood and whitewashed, is often rather small for the accommodation of its inmates, but as a rule kept clean and tidy. Homespun, still in use in a few families in isolated sections, is fast being replaced by the cheap cotton and woolen goods supplied by the trade. Births are numerous, but owing to defective hygienic conditions, or to overwork on the part of mothers, this advantage is partially offset by the high proportion of deaths among infants. Amusements are simple, pertaining to the daily work, the family circle, Church festivals. Many of the songs and dances are importations or adaptations from Old France. However, here, as throughout the whole range of social phenomena, outside influences are apparent, and features of recent origin are found grafted on old and quaint usages.

(2) The farms are in the shape of long, narrow rectangles, 20 or 30 arpents in length, by 2 or 3 in breadth. The farm buildings are all built at one end of these rectangles, along the public road, which crosses them at right angles, thus giving a close succession of houses and barns. Not infrequently the buildings of two adjoining farms are situated on opposite sides of the same road, making a double row of almost continuous houses, somewhat like a village street. The ranges, of which there are four or five in parallel line in every parish, connect with one another and with the village by means of "routes" or transverse roads, along which no buildings are erected; so that each range is isolated from the rest and forms a distinct grouping within the parish. This type of settlement, which differs from that of the isolated homestead to be found in some parts of France and throughout the Anglo-Saxon world, and also from the central village type observed in other parts of France and Europe, is a distinctly French Canadian creation, which the habitant takes with him wherever he settles in numbers. It is the result of the desire on the part of the habitant, while residing on his own farm (which the village settlement would not allow him to do), to secure the benefit of his neighbor's assistance and company in a more effective way than the isolated homestead would permit. What the habitant cannot accomplish with the help of his family he endeavors to do through the free help of his neighbors. However, while the nearest neighbor, on either side, may be called upon nearly as members of the family, in the ordinary work of the farm, the summoning in numbers of the near-by farmers is resorted to in exceptional cases only, such as the clearing of land, the "lifting" of a barn or the relief of some domestic emergency. The activities of the farm are organized and directed by its poor, by means of voluntary contributions, principally in kind. Each range has its cheese or butter factory, its schoolhouse, also its large wooden cross along the highway, in commemoration of some religious revival.

(3) The roads leading from the various ranges all centre towards a village, generally small, comprising a few lodgings, workshops and stores, besides the priest's house and the church. A community wherein the highest aim of the farmer, the basal element, is to cater to all the needs of his household directly through the labor of his own family and the occasional assistance of his neighbors does not leave much scope for the development of other social factors. The ambitions and efforts of the most capable being restrained within propriety and similarity of condition is the rule. Commerce, industry, the liberal professions remain embryonic. In the absence of leaders in agriculture, industry and commerce, learning becomes the standard of distinction. A few wise old farmers, the doctor, the notary, the lawyer, are looked up to; but, on account of the exalted nature of his function, the parish priest is decidedly the dominant factor. Like the family and the range, the parish is primarily an organism for mutual support, both in the physical and moral order. It plays, to a certain extent, the part of an insurance company, as barns, for instance, destroyed by fire are restored through contributions from all the parishioners in material or labor. On Sundays and feast days the habitant meets at church, who are all relatives or close acquaintances, the doctor, the notary; he listens to the admonitions of the "curé," to the announcements made by the public crier, and receives the intelligence and impressions which will be his mental food for the remainder of the week. In the parishes, the parish may be considered as an enlargement of the family with the parish priest as its patriarchal head. Then, the parish is the main organ of local government in the French Canadian country, the school commission and the municipal corporation, of British origin and of comparatively recent introduction, remaining mere adjuncts, only partially developed, of the parish proper. The revenues of the latter often exceed those of the school commission and municipal body put together. Many localities have no town-hall other than the vestry. In practice the curé is much more the maintainer of the peace and the arbiter of disputes within the parish than are the mayor, the local magistrates and council. He is no longer the master, even to a close supervision of family affairs. The law of the province allows him the 26th bushel of all cereals grown by his parishioners within his territory, and his influence over the church wardens and flock enables him to obtain from close-fisted farmers the expenditure of comparatively large sums of money on church
buildings. His influence is exerted as well over the school commission and municipal council, whose policy and decisions are usually made to conform to his wishes. On the other hand, principal teachers, such as the parish priest, check on the court, is the far-off bishop, who visits the parish and inspects the books every third year, and may remove him at will. The school commission and municipal corporation are administered in a spirit of parsimony. School buildings are inadequate, and the teachers, generally girls, receive very little pay and give correspondingly poor results. Illiterates are still in large numbers. As each individual farmer is required to look directly after that part of the public highway which faces his property, and to contribute his share of the labor necessary for the maintenance of the cross-road leading to the village, the municipal council has little to do apart from supervising, in a general way, the repairing of roads, bridges or wharves, according to his circumstances. On the other hand, provincial and Federal politics have taken quite a hold on the habitant; but the interest which he takes in them is more the outcome of his inclination for clamorous warfare and oratory, and of his craving for the petty favors of officialism, than the result of a desire on his part to ensure the proper management of public affairs, which he does not always grasp. These are the prey of organized political parties, whose leaders are recruited mainly from the liberal professions and the cities. Church and politics are, in the mind of the habitant, the only avenues open to those desirous of rising in the world. And this accounts for a rather remarkable development of institutions of classical and literary teaching in a community wherein common schools are markedly deficient and technical and business training neglected.

Evolution.—On the basis of the classification proposed by F. LePlay and his followers, H. de Tournelle and the French school of social science, the French Canadian is a semi-patriarchal or semi-communitic type; that is one in which social organization and life, while swayed by tradition and habits of mutant development, is a degree less than the pure patriarchal or communitic types of the Orient; still not permeated and uplifted by that spirit of private independence and enterprise distinctive of the individualistic or "particularistic" types, which are so characteristic of the Anglo-Saxon race. His semi-communitic training the French Canadian holds from France. His social ancestors were mainly the Gaul, on the one hand, the Frank on the other. The former, with its clan organization, village life and neglect of agriculture, was a distinctly communitic type. The particularistic Frank broke up, to some extent, the clamorous and communitic spirit and institutions of the Gaul, and gave a strong impulse to agricultural pursuits; but his influence, for the period which we are considering, was not so lasting nor so far-reaching in France as was that of his duplicate, the Saxon, in England. Thus there sprang up an intermediate type presenting many of the qualities and defects of the Celt, with something of the qualities of the Saxon. A farmer, an artisan, a trader, though generally in a small way and still conserving a feeling for nature and primitive, easy-going occupations; lacking ambition and ability to rise in the ordinary callings of life, having for its sole leaders the clergy and the military or civil officers of the Crown; and these leaders, though in many cases sprung from the people, isolated from them by class interests and training and unfit to lead adequately in practical pursuits. Under the trying conditions of New France—the dense forest to clear, the rigorous climate to provide against, the lurking Iroquois to evade—the peasant from north central France, single-handed, made rather slow progress at colonization. Agriculture was neglected, while the more attractive, more remunerative, though deceptive, fur trade became the means of sustenance of both the initial Church and bridges within the limits of the parish. Similarly, county councils have not acquired in the French country anything like the importance which they have in English sections, and are content with looking after roads, bridges or wharves, according to his circumstances. On the other hand, provincial and Federal politics have taken quite a hold on the habitant; but the interest which he takes in them is more the outcome of his inclination for clamorous warfare and oratory, and of his craving for the petty favors of officialism, than the result of a desire on his part to ensure the proper management of public affairs, which he does not always grasp. These are the prey of organized political parties, whose leaders are recruited mainly from the liberal professions and the cities. Church and politics are, in the mind of the habitant, the only avenues open to those desirous of rising in the world. And this accounts for a rather remarkable development of institutions of classical and literary teaching in a community wherein common schools are markedly deficient and technical and business training neglected.

28. POPULATION; RACIAL DISTRIBUTION AND IMMIGRATION. In a new country, population grows by additions from without rather than by natural increase, and questions relating to immigration and the foreign element become of primary significance. Especially is this the case now and these last half of the 19th century, through the restoration of peace and the advent from Great Britain of a class of business men, the fur trade, carried on by large companies, receded toward Hudson Bay and the Far West, vast lumbering operations were carried on, with a consequent impulse to agriculture, extension of settlements, increase in population; a period of unprecedented prosperity for French Canada. Then, in the latter half of the 19th century, the world-wide evolution of commerce and industry set in, with its marvelous applications of steam and electricity, its powerful machinery and means of transportation, the progress of manufacturing centres; and the French Canadians developed a class of factory operatives, together with a vigorous undergrowth of artisans and traders in the large cities. See also the articles in this series: UNDER FRENCH RULE; POPULATION AND RACIAL DISTRIBUTION; CATHOLIC EDUCATION; RELIGIOUS CONDITIONS.

Léon Gérin, LL.D., F.R.S.C.
Member of la Société Internationale de Science Sociale.

Population According to Origin.—The immigration returns do not offer the final avenue to racial origins, yet, as above hinted, they...
throw so powerful a light on Canada in the making — on the process whose result it is the purpose of the present article to describe — that comparative statistics of 1900, 1911 and 1914–16 may be quoted as having a bearing on the matter to follow. The accompanying tabular statement (Table I) shows also the extraor-

dinary range from which Canada has drawn population since 1900, whether as settlers intending to adopt the country permanently, or as laborers attracted by the great construction booming of 1900–12. The figures of earlier years are not available in similar detail, but doubts differ mainly in degree. It will be seen that roughly 38 per cent of the recent heavy drafts came from the British Isles, 35 per cent from the United States and 27 per cent from the countries of continental Europe.

As has been said, not all of this influx remained. Indeed the census shows an increase in the number of those resident in Canada, but born elsewhere, of only 882,461 during the first decade of the century (see Table II), whereas the immigrants during the same years were at least double that number. The two sets of figures, however, in the absence of statistics of emigration and of reliable vital statistics cannot be collated with the immigration returns, and Table II is to be regarded merely as a further introductory sidelight on the subject in hand.

Latest Census Reports.—For the analysis of the population as it stands to-day from a racial standpoint, recourse must be had to the specific results of the decennial census. The last census for the whole of Canada was taken in June 1911. It contained altogether 41 questions on population, one of which required the racial or tribal origin of each individual. The Canadian census does not take cognizance of "color," as there is only a small admixture of the red, black, and yellow races, which it is thought is sufficiently indicated by the returns of origins. Enumerators in taking the census are instructed to record races or tribes through the father. A person, for example, whose father was English, but whose mother is Scotch, would be ranked as "English." It was pointed out, however, to the enumerators that such terms as "American" or "Canadian" ought not to be applied in a tribal sense. In the case of Indians, the origin is traced through the mother; and the name of their tribe given, as Chipewa, Cree, etc. Persons of mixed white and red blood, usually called "half-breeds," were to be described, in addition to the tribal name, with the name of the white race infused in the blood. Thus "Cree F. B." would denote that the person is a mixture of Cree and French. "Chipewa S. B." that the person was a mixture of Chipewa and Scottish. Children of marriages between white and black, and black and yellow races were to be classed as Negro, Mongolian (Chinese or Japanese) as the case might be. Throughout the census no attempt was made at classification by physical types, such as form of the head, facial features, etc., as this is essentially a matter of expert investigation. A question as to country of birth was added in which distinctive sections are particularized, as for example, between Bohemia and Galicia in Austria-Hungary, England and Scotland in Great Britain, etc., etc. This question was inserted largely as a check on the

### Table I. Immigration to Canada by Nationalities, from 1 July 1900 to 31 Mar. 1916 (Fiscal Year).

<table>
<thead>
<tr>
<th>Year</th>
<th>1900-01</th>
<th>1910-11</th>
<th>1914-15</th>
<th>1915-16</th>
<th>Totals 1900-1916</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total British Isles</td>
<td>11,810</td>
<td>123,013</td>
<td>63,276</td>
<td>8,664</td>
<td>1,168,292</td>
</tr>
<tr>
<td>Total British Colonies</td>
<td>3</td>
<td>2,697</td>
<td>433</td>
<td>316</td>
<td>21,737</td>
</tr>
<tr>
<td>Austrian Hungarian</td>
<td>5,092</td>
<td>16,285</td>
<td>7,150</td>
<td>15</td>
<td>200,015</td>
</tr>
<tr>
<td>Belgian</td>
<td>1,536</td>
<td>1,549</td>
<td>1,549</td>
<td>1,549</td>
<td>15,982</td>
</tr>
<tr>
<td>Bulgarian</td>
<td>1,008</td>
<td>4,048</td>
<td>1,008</td>
<td>1,008</td>
<td>18,171</td>
</tr>
<tr>
<td>Chinese</td>
<td>7</td>
<td>5,278</td>
<td>1,258</td>
<td>88</td>
<td>31,878</td>
</tr>
<tr>
<td>Dutch</td>
<td>25</td>
<td>931</td>
<td>605</td>
<td>186</td>
<td>9,793</td>
</tr>
<tr>
<td>French</td>
<td>360</td>
<td>2,041</td>
<td>1,206</td>
<td>180</td>
<td>25,154</td>
</tr>
<tr>
<td>German</td>
<td>954</td>
<td>2,533</td>
<td>2,472</td>
<td>27</td>
<td>38,708</td>
</tr>
<tr>
<td>Greek</td>
<td>81</td>
<td>777</td>
<td>1,298</td>
<td>149</td>
<td>9,178</td>
</tr>
<tr>
<td>Hebrew</td>
<td>2,765</td>
<td>5,146</td>
<td>3,107</td>
<td>65</td>
<td>75,800</td>
</tr>
<tr>
<td>Hidu</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5,000</td>
</tr>
<tr>
<td>Italian</td>
<td>4,710</td>
<td>8,359</td>
<td>6,228</td>
<td>388</td>
<td>119,346</td>
</tr>
<tr>
<td>Japanese</td>
<td>437</td>
<td>403</td>
<td>437</td>
<td>437</td>
<td>437,437</td>
</tr>
<tr>
<td>Negro</td>
<td>12</td>
<td>202</td>
<td>34</td>
<td>1,234</td>
<td></td>
</tr>
<tr>
<td>Persian</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7,000</td>
</tr>
<tr>
<td>Polish</td>
<td>162</td>
<td>2,177</td>
<td>1,976</td>
<td>8</td>
<td>36,173</td>
</tr>
<tr>
<td>Portuguese</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13,000</td>
</tr>
<tr>
<td>Rumanian</td>
<td>152</td>
<td>513</td>
<td>561</td>
<td>23</td>
<td>8,666</td>
</tr>
<tr>
<td>Russian</td>
<td>1,726</td>
<td>8,794</td>
<td>5,460</td>
<td>170</td>
<td>118,938</td>
</tr>
<tr>
<td>Scandinavian</td>
<td>1,730</td>
<td>6,167</td>
<td>2,173</td>
<td>591</td>
<td>38,497</td>
</tr>
<tr>
<td>Serb</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25,000</td>
</tr>
<tr>
<td>Spanish</td>
<td>14</td>
<td>175</td>
<td>14</td>
<td>14</td>
<td>14,000</td>
</tr>
<tr>
<td>Swiss</td>
<td>270</td>
<td>200</td>
<td>270</td>
<td>270</td>
<td>270,000</td>
</tr>
<tr>
<td>Turkish</td>
<td>661</td>
<td>616</td>
<td>148</td>
<td>3</td>
<td>12,320</td>
</tr>
<tr>
<td>U. S. A., Citizens via ocean ports</td>
<td>68</td>
<td>203</td>
<td>41</td>
<td>15</td>
<td>1,577</td>
</tr>
<tr>
<td>West Indian</td>
<td>455</td>
<td>389</td>
<td>47</td>
<td>3,577</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>10</td>
<td>37</td>
<td>231</td>
<td></td>
</tr>
<tr>
<td>Total Continent</td>
<td>19,352</td>
<td>66,620</td>
<td>41,734</td>
<td>2,936</td>
<td>835,681</td>
</tr>
<tr>
<td>From the U. S. A.</td>
<td>17,987</td>
<td>121,451</td>
<td>59,779</td>
<td>36,937</td>
<td>1,083,375</td>
</tr>
<tr>
<td>Total Immigration</td>
<td>49,149</td>
<td>311,084</td>
<td>144,789</td>
<td>48,537</td>
<td>3,099,348</td>
</tr>
</tbody>
</table>

### Table II. Population of Canada by Birthplace.

<table>
<thead>
<tr>
<th>Birthplace</th>
<th>1901</th>
<th>1911</th>
<th>Increase</th>
<th>1901</th>
<th>1911</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>5,371,315</td>
<td>7,206,643</td>
<td>1,835,328</td>
<td>100.00</td>
<td>100.00</td>
<td>-5.26</td>
</tr>
<tr>
<td>Empire 1</td>
<td>6,453,911</td>
<td>9,592,866</td>
<td>3,138,955</td>
<td>94.42</td>
<td>101.54</td>
<td>7.12</td>
</tr>
<tr>
<td>Canada</td>
<td>4,071,815</td>
<td>5,619,682</td>
<td>947,867</td>
<td>86.98</td>
<td>77.98</td>
<td>-9.00</td>
</tr>
<tr>
<td>British Islands</td>
<td>390,019</td>
<td>784,356</td>
<td>394,337</td>
<td>10.99</td>
<td>10.89</td>
<td>+0.10</td>
</tr>
<tr>
<td>British possessions</td>
<td>15,804</td>
<td>29,188</td>
<td>13,384</td>
<td>13.28</td>
<td>10.11</td>
<td>+3.17</td>
</tr>
<tr>
<td>British unknown at sea</td>
<td>15,168</td>
<td>20,515</td>
<td>5,347</td>
<td>28.28</td>
<td>28.00</td>
<td>+0.28</td>
</tr>
<tr>
<td>Europe</td>
<td>125,549</td>
<td>404,946</td>
<td>279,397</td>
<td>3.34</td>
<td>5.34</td>
<td>+2.00</td>
</tr>
<tr>
<td>Asia 1</td>
<td>23,580</td>
<td>40,946</td>
<td>17,366</td>
<td>44.57</td>
<td>44.57</td>
<td>0.00</td>
</tr>
<tr>
<td>United States</td>
<td>127,899</td>
<td>303,680</td>
<td>175,781</td>
<td>2.38</td>
<td>4.21</td>
<td>+1.83</td>
</tr>
<tr>
<td>All other countries</td>
<td>1,421</td>
<td>3,160</td>
<td>1,739</td>
<td>0.94</td>
<td>0.94</td>
<td>+0.00</td>
</tr>
</tbody>
</table>

1 Includes British of unrecorded birthplace and "born at sea.
2 Exclusive of natives of British India.
population immediately derived from the United States.

The general results of the census are exhibited in Table III, which has been constructed so as to afford comparisons with 1901, the preceding census year, and thereby reveal recent tendencies as well as present facts. Of the total Canadian population (7,206,643), it will be seen that of British race make up well over one-half, whilst the other pioneer race, the French, contribute considerably more than half the remainder. Together, the British and French races represent 82.6 per cent of the population. Those of German extraction follow with 5.5 per cent. Of the 20 other racial strains that are enumerated, only four—the Austrian, the Scandinavian, the Indian and the Jewish—amount to more than 1 per cent, none of them exceeding 2 per cent.

**Table III. Origins in 1911 and 1901. Increase in the 10 Years and Proportion of Population.**

<table>
<thead>
<tr>
<th>Origins</th>
<th>1911</th>
<th>1901</th>
<th>Increase in 10 years</th>
<th>Number per cent of population</th>
<th>1911</th>
<th>1901</th>
</tr>
</thead>
<tbody>
<tr>
<td>British</td>
<td>3,896,985</td>
<td>3,063,195</td>
<td>833,790</td>
<td>27.22</td>
<td>54.08</td>
<td>57.08</td>
</tr>
<tr>
<td>English</td>
<td>1,823,120</td>
<td>1,280,899</td>
<td>542,221</td>
<td>44.59</td>
<td>25.30</td>
<td>23.47</td>
</tr>
<tr>
<td>Irish</td>
<td>1,050,384</td>
<td>988,721</td>
<td>61,663</td>
<td>6.24</td>
<td>14.58</td>
<td>18.41</td>
</tr>
<tr>
<td>Scotch</td>
<td>997,880</td>
<td>800,154</td>
<td>197,726</td>
<td>24.71</td>
<td>13.85</td>
<td>14.90</td>
</tr>
<tr>
<td>Welsh</td>
<td>24,884</td>
<td>13,135</td>
<td>11,749</td>
<td>89.17</td>
<td>84.24</td>
<td>13.85</td>
</tr>
<tr>
<td>Other</td>
<td>723</td>
<td></td>
<td>723</td>
<td>152.80</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>French</td>
<td>2,054,890</td>
<td>1,649,371</td>
<td>405,519</td>
<td>24.59</td>
<td>28.51</td>
<td>30.71</td>
</tr>
<tr>
<td>German</td>
<td>893,320</td>
<td>310,501</td>
<td>582,819</td>
<td>26.67</td>
<td>5.46</td>
<td>5.78</td>
</tr>
<tr>
<td>Austro-Hungarian</td>
<td>129,103</td>
<td>18,178</td>
<td>110,925</td>
<td>610.22</td>
<td>1.79</td>
<td>0.34</td>
</tr>
<tr>
<td>Austrian</td>
<td>42,535</td>
<td>10,947</td>
<td>31,588</td>
<td>288.55</td>
<td>0.80</td>
<td>0.20</td>
</tr>
<tr>
<td>Bulgarian</td>
<td>5,960</td>
<td></td>
<td>5,960</td>
<td>152.80</td>
<td>0.14</td>
<td>0.01</td>
</tr>
<tr>
<td>Galician</td>
<td>3,158</td>
<td>5,682</td>
<td>29,476</td>
<td>518.76</td>
<td>0.49</td>
<td>0.11</td>
</tr>
<tr>
<td>Hungarian</td>
<td>11,650</td>
<td></td>
<td>10,056</td>
<td>649.19</td>
<td>1.60</td>
<td>0.03</td>
</tr>
<tr>
<td>Russian</td>
<td>29,845</td>
<td></td>
<td>29,845</td>
<td>220.41</td>
<td>0.41</td>
<td>0.01</td>
</tr>
<tr>
<td>Belgian</td>
<td>9,593</td>
<td>2,994</td>
<td>6,599</td>
<td>220.41</td>
<td>0.13</td>
<td>0.06</td>
</tr>
<tr>
<td>Bulgarian and Kumanian</td>
<td>5,875</td>
<td>354</td>
<td>5,521</td>
<td>1,559.60</td>
<td>0.08</td>
<td>0.01</td>
</tr>
<tr>
<td>Chinese</td>
<td>27,774</td>
<td>17,312</td>
<td>10,462</td>
<td>60.43</td>
<td>0.39</td>
<td>0.32</td>
</tr>
<tr>
<td>Dutch</td>
<td>546,658</td>
<td>33,845</td>
<td>21,141</td>
<td>59.00</td>
<td>0.20</td>
<td>0.05</td>
</tr>
<tr>
<td>Finnish</td>
<td>15,497</td>
<td>2,502</td>
<td>12,995</td>
<td>519.38</td>
<td>0.20</td>
<td>0.05</td>
</tr>
<tr>
<td>Greek</td>
<td>3,594</td>
<td>291</td>
<td>3,303</td>
<td>1,135.05</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>Hindo</td>
<td>2,342</td>
<td></td>
<td>2,342</td>
<td>0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indian</td>
<td>105,492</td>
<td></td>
<td>127,941</td>
<td>22,449</td>
<td>-17.55</td>
<td>1.46</td>
</tr>
<tr>
<td>Italian</td>
<td>45,411</td>
<td>10,834</td>
<td>34,577</td>
<td>319.15</td>
<td>0.63</td>
<td>0.20</td>
</tr>
<tr>
<td>Japanese</td>
<td>9,021</td>
<td>4,738</td>
<td>4,283</td>
<td>90.39</td>
<td>0.13</td>
<td>0.09</td>
</tr>
<tr>
<td>Jewish</td>
<td>75,681</td>
<td>16,131</td>
<td>59,550</td>
<td>309.16</td>
<td>1.05</td>
<td>0.30</td>
</tr>
<tr>
<td>Negro</td>
<td>11,187</td>
<td>17,437</td>
<td>6,250</td>
<td>-321</td>
<td>0.22</td>
<td>0.32</td>
</tr>
<tr>
<td>Polish</td>
<td>33,365</td>
<td>46,285</td>
<td>27,800</td>
<td>430.87</td>
<td>0.46</td>
<td>0.12</td>
</tr>
<tr>
<td>Russian</td>
<td>309,141</td>
<td>19,825</td>
<td>279,316</td>
<td>1,437.01</td>
<td>0.77</td>
<td>0.01</td>
</tr>
<tr>
<td>Scandinavian</td>
<td>107,335</td>
<td>31,042</td>
<td>76,293</td>
<td>246.42</td>
<td>1.49</td>
<td>0.58</td>
</tr>
<tr>
<td>Swede</td>
<td>6,625</td>
<td>3,865</td>
<td>2,760</td>
<td>71.41</td>
<td>0.09</td>
<td>0.07</td>
</tr>
<tr>
<td>Swedish</td>
<td>1,881</td>
<td>1,083</td>
<td>858</td>
<td>79.41</td>
<td>0.20</td>
<td>0.07</td>
</tr>
<tr>
<td>Various</td>
<td>18,310</td>
<td>1,454</td>
<td>16,856</td>
<td>1,158.45</td>
<td>0.25</td>
<td>0.03</td>
</tr>
<tr>
<td>Unspecified</td>
<td>147,345</td>
<td>31,539</td>
<td>115,806</td>
<td>367.18</td>
<td>2.04</td>
<td>0.59</td>
</tr>
</tbody>
</table>

° Included under the general term "Austrian."

* Included under the general term "Galician."

† Included half-breeds in 1901.

The columns which analyze the trend between 1901 and 1910 are also interesting, especially when read in conjunction with the immigration statistics of Table I. The largest absolute gain during recent years has been in the persons of British origin; it has not suffered, however, to prevent a falling off in the proportion of British to the whole, which dropped from 57 per cent to 54 per cent in the decade, notwithstanding the heavy immigration from the British Isles shown in Table I. The French stock has similarly declined from 30 to 28 per cent of the whole, but its net accretion of 405,519 (less than half that of the British), has been without any such adventitious help as the latter received, being accounted for almost wholly by the large natural increase at their maximum. Many, of course, came as agriculturists, and these will count as permanent. The Greek and Balkan races made practically their first appearance in Canada since 1900.

It is interesting to note that among British stocks, the English alone have increased their proportion, advancing from 23.4 to 25.3 per cent of the whole, and gaining 44.5 per cent in actual numbers. The Scotch have gained 24.7 per cent, but this has not prevented them from shrinking from a proportion of 14.9 per cent in 1901 to one of 13.8 per cent in 1911. The Irish on the other hand have risen only 6.2 per cent in numbers and have rather markedly declined in proportional standing, namely, from 18.4 per cent to 14.5 per cent. The Eng-
lish in Canada numbered 1,823,150, the Irish 1,050,384 and the Scotch 597,800, in 1911. The French totaled 2,054,890.

Distribution of Races by Provinces.—To describe the distribution of the different races by provinces would be to write the history of the settlement of Canada. Table IV will show the general situation as it exists today. The earliest movement to dispossess the native Indian was, of course, that of the French into Acadia and Quebec. It ceased at the Conquest, 1759, when the population of Canada was estimated at 82,000, but the remarkable natural fertility already remarked upon has left the French not only paramount in Quebec, but constituting the second element, and that a considerable one, in New Brunswick, Nova Scotia and Prince Edward Island, the third in Ontario and the fourth in Manitoba. The first marked infusion of British stock, on the other hand, was that of the Loyalists from the thirteen

Table IV. Origins of the Canadian People by Provinces, 1911,

<table>
<thead>
<tr>
<th>ORIGINS</th>
<th>British</th>
<th>New York</th>
<th>New Brunswick</th>
<th>Nova Scotia</th>
<th>Prince Edward Island</th>
<th>Saskatchewan</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>British</td>
<td>192,698</td>
<td>252,683</td>
<td>266,415</td>
<td>229,896</td>
<td>378,700</td>
<td>1,029,077</td>
<td>3,324,103</td>
</tr>
<tr>
<td>English</td>
<td>97,955</td>
<td>133,186</td>
<td>122,798</td>
<td>106,017</td>
<td>177,701</td>
<td>954,423</td>
<td>1,250,091</td>
</tr>
<tr>
<td>Scottish</td>
<td>36,739</td>
<td>60,647</td>
<td>58,463</td>
<td>74,570</td>
<td>52,459</td>
<td>1,031,997</td>
<td>1,233,945</td>
</tr>
<tr>
<td>Irish</td>
<td>54,884</td>
<td>74,493</td>
<td>82,861</td>
<td>47,949</td>
<td>145,335</td>
<td>424,873</td>
<td>637,772</td>
</tr>
<tr>
<td>Welsh</td>
<td>3,186</td>
<td>4,267</td>
<td>2,247</td>
<td>1,348</td>
<td>1,187</td>
<td>770</td>
<td>9,728</td>
</tr>
<tr>
<td>Other</td>
<td>55</td>
<td>176</td>
<td>46</td>
<td>12</td>
<td>36</td>
<td>187</td>
<td>158</td>
</tr>
<tr>
<td>French</td>
<td>19,825</td>
<td>23,907</td>
<td>30,944</td>
<td>98,611</td>
<td>51,746</td>
<td>202,442</td>
<td>231,251</td>
</tr>
<tr>
<td>German</td>
<td>36,813</td>
<td>48,933</td>
<td>34,530</td>
<td>3,144</td>
<td>38,826</td>
<td>192,840</td>
<td>266,828</td>
</tr>
<tr>
<td>Austro-Hungarian</td>
<td>26,427</td>
<td>7,015</td>
<td>39,665</td>
<td>73</td>
<td>1,089</td>
<td>11,771</td>
<td>6,189</td>
</tr>
<tr>
<td>Belgian</td>
<td>1,269</td>
<td>938</td>
<td>2,453</td>
<td>76</td>
<td>59</td>
<td>2,113</td>
<td>2,113</td>
</tr>
<tr>
<td>Bulgarian and Roumanian</td>
<td>956</td>
<td>719</td>
<td>132</td>
<td>101</td>
<td>26</td>
<td>1,483</td>
<td>1,518</td>
</tr>
<tr>
<td>Chinese</td>
<td>1,787</td>
<td>19,568</td>
<td>885</td>
<td>93</td>
<td>134</td>
<td>2,766</td>
<td>6,158</td>
</tr>
<tr>
<td>Dutch</td>
<td>2,279</td>
<td>1,255</td>
<td>2,853</td>
<td>4,320</td>
<td>54,177</td>
<td>350,015</td>
<td>365,264</td>
</tr>
<tr>
<td>Greek</td>
<td>129</td>
<td>810</td>
<td>317</td>
<td>40</td>
<td>114</td>
<td>1,304</td>
<td>678</td>
</tr>
<tr>
<td>Hindi</td>
<td>215</td>
<td>46</td>
<td>292</td>
<td>14</td>
<td>10</td>
<td>118</td>
<td>32</td>
</tr>
<tr>
<td>Indian</td>
<td>11,630</td>
<td>20,114</td>
<td>7,876</td>
<td>1,541</td>
<td>1,913</td>
<td>23,044</td>
<td>35,214</td>
</tr>
<tr>
<td>Italian</td>
<td>2,139</td>
<td>9,721</td>
<td>972</td>
<td>384</td>
<td>960</td>
<td>21,265</td>
<td>23,576</td>
</tr>
<tr>
<td>Japanese</td>
<td>247</td>
<td>8,587</td>
<td>5</td>
<td>4</td>
<td>35</td>
<td>12</td>
<td>57</td>
</tr>
<tr>
<td>Jewish</td>
<td>1,486</td>
<td>1,265</td>
<td>10,741</td>
<td>1,021</td>
<td>1,360</td>
<td>27,015</td>
<td>38,648</td>
</tr>
<tr>
<td>Negro</td>
<td>979</td>
<td>473</td>
<td>209</td>
<td>1,079</td>
<td>5,541</td>
<td>6,747</td>
<td>11,801</td>
</tr>
<tr>
<td>Polish</td>
<td>2,243</td>
<td>561</td>
<td>12,310</td>
<td>67</td>
<td>535</td>
<td>10,002</td>
<td>3,218</td>
</tr>
<tr>
<td>Russian</td>
<td>9,421</td>
<td>6,896</td>
<td>8,841</td>
<td>60</td>
<td>601</td>
<td>12,618</td>
<td>16,041</td>
</tr>
<tr>
<td>Scandinavians</td>
<td>507</td>
<td>15,488</td>
<td>10,419</td>
<td>1,497</td>
<td>8,200</td>
<td>51</td>
<td>17,951</td>
</tr>
<tr>
<td>Swiss</td>
<td>1,200</td>
<td>796</td>
<td>396</td>
<td>53</td>
<td>746</td>
<td>9,130</td>
<td>9,706</td>
</tr>
<tr>
<td>Various</td>
<td>1,598</td>
<td>4,283</td>
<td>4,829</td>
<td>433</td>
<td>1,153</td>
<td>6,186</td>
<td>2,369</td>
</tr>
<tr>
<td>Unspecified</td>
<td>7,766</td>
<td>20,074</td>
<td>14,818</td>
<td>9,406</td>
<td>2,817</td>
<td>1,039</td>
<td>383</td>
</tr>
</tbody>
</table>

Total: 374,663 992,480 455,614 351,889 492,338 2,512,274 93,728 2,002,232 492,432

1 Including Austrians, Buckovinians, Galicians, Hungarians, etc.
2 Not given separately in 1901.
3 Including Finns in 1911.

Dominion also witnessed three special immigrations — the precursors of several of like nature — into the West. These early movements consisted of Munenonites, Icelanders and Russian Jews, the victims, for the most part, of economic or political disadvantage, from which they sought a refuge, and with success, in the New World. A better remembered episode of the kind is the migration of the religious body known as Doukhobors, who came to Canada in the closing years of the 19th century to escape the long and relentless persecution with which they had been followed in Russia. The table will show how all these newer elements have been distributed, and what the racial problem connotes for each of the provinces. How that problem is capable of taking on new and unexpected forms has been demonstrated since the outbreak of the great war, when extensive internments of alien enemies, as well as modifications of the Franchise Act, have been made

colonies, 40,000 of whom crossed into Canada during the years immediately following the Treaty of Versailles, 1918. About one-half of these were divided between New Brunswick and Nova Scotia, and the rest between Quebec and Ontario, where, and especially in Ontario, they became the nucleus of a fast-growing population recruited from the British Isles. In Ontario alone by 1914, the population had risen to 45,000, and to-day, as the accompanying statement shows, the British is the predominant race in all but one of the provinces. The predominance, naturally enough, in view of recent history, is less marked in the West, but even Saskatchewan, which may be said to have crept into a community by the immigration of the past quarter of a century, has more than half of its people of British extraction, whilst the next prevailing strain numbers but 14 per cent. The German movement to Canada began to be noticeable about the time of Confederation (1867). The first 10 years of the new
principal tribes is given in Table V. There has been so much admixture by intermarriage at several of the government’s Indian agencies that it is impossible to classify the present Indian population completely according to tribes, and the table accounts for only 72,509. There are, however, 106,511 Indians on the official rolls which differentiate the Canadian Indians according to linguistic stocks. Of these 59,222 are Algonkins, 13,747 Abasbachan, 956 Haida, 12,142 Iroquois, 515 Kutena, 1,888 Salish, 1,838 Siouan, 2,634 Tsimsian, 3,230 Kwakwutl-Nootka (Wabaskan) and 2,500 nomads of British Columbia unclassified.

TABLE V. CENSUS OF CANADIAN INDIANS, 1916, BY PRINCIPAL TRIBES.

<table>
<thead>
<tr>
<th>Tribe</th>
<th>Location</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abenaki (Algonkin stock)</td>
<td>Quebec</td>
<td>333</td>
</tr>
<tr>
<td>Algonquin (Algonkin stock)</td>
<td>Ontario and Quebec</td>
<td>822</td>
</tr>
<tr>
<td>Assiniboine (Siouan stock)</td>
<td>Saskatchewan and Alberta</td>
<td>207</td>
</tr>
<tr>
<td>Abasbachan tribes (Abasbachan stock)</td>
<td>British Columbia, Manitoba and Saskatchewan</td>
<td>7,976</td>
</tr>
<tr>
<td>Bella Coola (Salish stock)</td>
<td>British Columbia</td>
<td>255</td>
</tr>
<tr>
<td>Bella Bella (Wabaskan stock)</td>
<td>British Columbia</td>
<td>311</td>
</tr>
<tr>
<td>Blackfoot (Algonkin stock)</td>
<td>British Columbia</td>
<td>2,114</td>
</tr>
<tr>
<td>Coast Salish (Salish stock)</td>
<td>British Columbia</td>
<td>1,605</td>
</tr>
<tr>
<td>Delawares (Algonkin stock)</td>
<td>Ontario</td>
<td>127</td>
</tr>
<tr>
<td>Haida (Haida or Skiktagan stock)</td>
<td>British Columbia</td>
<td>595</td>
</tr>
<tr>
<td>Huron (Iroquois stock)</td>
<td>Ontario, Quebec, and Ontario</td>
<td>519</td>
</tr>
<tr>
<td>Interior Salish (Salish stock)</td>
<td>British Columbia</td>
<td>5,480</td>
</tr>
<tr>
<td>Iroquois (Iroquois stock)</td>
<td>Ontario, Quebec, and Ontario</td>
<td>1,123</td>
</tr>
<tr>
<td>Kwakwutl (Wabaskan stock)</td>
<td>British Columbia</td>
<td>1,140</td>
</tr>
<tr>
<td>Malecites (Algonkin stock)</td>
<td>British Columbia, Quebec, and New Brunswick and Nova Scotia</td>
<td>808</td>
</tr>
<tr>
<td>Micmacs (Algonkin stock)</td>
<td>British Columbia</td>
<td>2,071</td>
</tr>
<tr>
<td>Montagnais (Algonkin stock)</td>
<td>Quebec</td>
<td>1,779</td>
</tr>
<tr>
<td>Nootka (Wabaskan stock)</td>
<td>British Columbia</td>
<td>1,716</td>
</tr>
<tr>
<td>Ojibwa or Chipewa (Algonkin stock)</td>
<td>Saskatchewan, Alberta</td>
<td>16,315</td>
</tr>
<tr>
<td>Plain Cree (Algonkin stock)</td>
<td>Saskatchewan and Alberta</td>
<td>6,616</td>
</tr>
<tr>
<td>Pottawatomis (Algonkin stock)</td>
<td>Ontario</td>
<td>354</td>
</tr>
<tr>
<td>Salish (Salish stock)</td>
<td>British Columbia</td>
<td>1,123</td>
</tr>
<tr>
<td>Sioux (Siouan stock)</td>
<td>Minnesota, Saskatchewan and Saskatchewan</td>
<td>877</td>
</tr>
<tr>
<td>Swampy Cree (Algonkin stock)</td>
<td>Saskatchewan and Saskatchewan</td>
<td>2,834</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>72,509</td>
</tr>
</tbody>
</table>

Negro Population.—The Negro is not a problem in Canada. All told, he numbers less than 17,000. More than three-fourths are divided between Nova Scotia and the southern counties of Ontario. The latter are descendants mainly of fugitive American slaves, but the former came originally from Jamaica, a band of negro “maroons” having been brought by the British government to construct the citadel of Halifax, whence they scattered over the neighborhood. Windsor, Ontario, has over a thousand negroes and Halifax 800, and these are the largest colonies.

Dominion Statistician and Controller of Census.

29. IMMIGRATION. Opportunities for.

The Dominion has witnessed within recent years a great increase of immigration, more especially from the British Isles and the United States, but also from the Scandinavian kingdoms, France, Belgium and other countries of Europe. Within the past decade the Dominion has received more than 2,000,000 immigrants, nearly all of a most desirable class, and the large majority devoted to agriculture, ready and able to do their part in developing the practically unlimited wealth of Canada’s vast grain-growing area, estimated at 171,000,000 acres, of which about 35,000,000 acres are now under cultivation. During the year 1915, 12,986,400 acres produced wheat, and the entire wheat crop harvested was estimated at 330,000,000 bushels, almost double the annual importation of wheat for the British Isles.

The cheapness of land, its unparalleled productivity, the certainty of comfort and independence as the reward of industry and thrift, and the security of life and property under a
well-regulated administration, are the chief inducements which have already attracted hundreds of thousands of Britons and Americans to the Canadian West, and which are continuing to bring them.

English-speaking settlers from the British Isles and the United States form the much greater part of the new population. Scandinavians, French, Belgians, Russians, Swiss, Italians and other nationalities are also represented in the arrivals. The Doukhobors, from Russia, have proved industrious and valuable additions to Canada's population. They are almost exclusively engaged in farming.

The lands offered to settlers by the Canadian government are situated west of Lake Superior, and to the north of Minnesota, North Dakota and Montana, and east of the Rocky Mountains, in the provinces of Manitoba, Saskatchewan and Alberta. The land is for the most part prairie, and can be secured absolutely free from timber and stones, if desired, the soil being the very best alluvial black loam, from two to four feet deep, with a clay subsoil. It is just rolling enough to give it good drainage, and in a great many places there is plenty of timber, and in other places it is underlaid with good coal. The land may be secured by the payment of $10. The cost of a homestead of 160 acres is $10, there being no further money consideration. The settler, before receiving his patent, must live upon the land three years, a residence of six months in each year being necessary, and he must also do a small amount of cultivation.

An alien that is a person not a British subject, may make application for a free homestead at once on his arrival in Canada, but he must become naturalized, or give proof of intention to become naturalized, before he can obtain a patent for the land. A residence of five years in British Dominions — the last year Canada — is necessary to acquire naturalization. In the meantime the homesteader may reside on, and exercise every right of, possession, save that he may not mortgage or sell the land until he gets his patent or title.

Though there are tracts of forest in the Canadian Northwest, there are localities where the quantity of building timber and other building material is limited, and the government has made provision for such cases. Should a man settle on a quarter section of land void of timber, he can, by making application to the Dominion lands agent in the locality, obtain a permit to cut on government lands free of charge the following: (1) 3,000 linear feet of building timber, measuring no more than 12 inches at the butt, or 9,250 feet board measure. (2) 400 roofing poles. (3) 2,000 fencing rails and 500 fence posts, seven feet long, and not exceeding five inches in diameter at the small end. (4) 30 cords of firewood. The settler having all these free of charge has only the expense of cutting and hauling them to his homestead, which cannot cost him a great deal. He is also very likely to have the benefit of cheap coal, one of the advantages in western Canada of such an extent as to be practically inexhaustible. The principal districts of western Canada are within easy reach of firewood, while the settlers of Alberta and Saskatchewan are particularly favored, especially along the various streams, at which they may get all the coal they require, very frequently at the cost of handling and hauling it home. If a settler should desire to go into stock raising, and his quarter section of 160 acres should not prove sufficient to furnish pasturage for his stock, he can make application to the land commissioner for a lease of grazing lands at a very reasonable price. The public school system is established all through the country, and there are schools in all the organized school districts. There is a ready market for cereals and other produce; the climate is healthful and agreeable.

The aim of the Dominion government is to attract to Canada industrious, intelligent, energetic settlers with the purpose and ability to do their part in building up a nation imperial in its natural resources and in the extent of its magnificent territory; in the carrying out of this policy the government is meeting with eminent success. See Canada — Population, Racial Distribution and Immigration.

W. D. Scott,
Superintendent of Immigration, Ottawa.

30. MILITARY SYSTEM. Historical.

The Canadian military system has its roots in the principle of universal, compulsory military service. This principle was firmly established in the French colony of Lower Canada; when this colony passed under the British flag and was supplemented by English-speaking colonies to the east and the west the principle was maintained. The general system of defense in use by Great Britain for her North American colonies in the first half of the 19th century provided wholly against attack from the south; at that period there existed an antagonism between the British empire and the United States which a century of peace fortunately has removed. The method adopted was (1) to maintain in the North American colonies (Upper and Lower Canada, New Brunswick, Nova Scotia, etc.) a garrison of the British regular army, which until about 1840 was roughly equal in strength to the regular army of the United States; (2) to provide in addition arms, store, and equipment for these native troops. By the militia until 1862 was meant the peace organization of the male inhabitants of the country suited to this scheme. No attempt was made at peace training; the effort made was to impress upon the people's minds the universal obligation of service and to provide for the rapid and orderly raising of service corps. There was an annual muster parade of all men of military age, and all liable to serve were divided into regiments and companies; local officers were elected, would have been trained for duties of administration rather than of leadership, and if the need of mobilization had occurred their function would have been to select from their formations suitable men to be organized into service corps, which, as already stated, would have been trained and led under the supervision of the regular army. The mainspring of this system was the presence in the country of a comparatively large force of regulars, and when, after the Crimean War, the government of
Great Britain gradually denuded the colonies of regular troops, and at last withdrew these almost entirely in 1870. The organization fell into decay. Early in the second half of the 19th century the second phase set in with the organization of a number of separate volunteer corps; the citizen soldiers comprising these drilled in their spare time after the manner now familiar on the North American continent, and the volunteers gradually supplanted the old militia. The slight Fenian raids of 1866 and 1870 were repelled mainly by the use of these volunteers, and after confederation in 1867 the whole defense of Canada was committed to a new volunteer militia of this type. The principle of universal compulsory service remained on the statute book, but in practice there was no compulsion and the Dominion kept up a voluntarily enlisted citizen force. In corps enlisted in the cities the regiments trained by evening drills; the corps raised in rural districts went to camp for 12 days in the year. The training was imperfect, and higher organization, stores for mobilization, and military services were neglected. In 1873 the British troops were finally withdrawn from the Dominion, with the exception of the naval stations of Halifax and Esquimalt, and from that year to the period of the South African War the military equipment of the country was slight. A revolt by a few half-breeds and Indians in the Northwest territories in 1885 was put down wholly by the forces of the Dominion, about 5,000 being employed. To the struggle in South Africa the Dominion contributed about 8,000 men; of these 7,000 crossed the sea, while the remainder undertook the garrisoning of Halifax, and so released an equivalent number of the British regular army for active service. All the corps so employed were specially raised for the war. The experience of this war, and the gradual deepening of the diplomatic dangers which led to the great European War, caused Canadian statesmen and soldiers to reorganize the defensive forces of the country. The process was a gradual one; it began about 1902 and was still in progress when the explosion of 1914 occurred.

The Militia Act.—The foundation of the new organization is the Militia Act of 1904, and as such it is an integral part of the land forces of Canada exist, it may be noticed at some length. During the Great War it has been modified in some respects, partly by statutes and partly by regulations enacted under the authority of the War Measure Act. The command in chief is vested in His Majesty the King, with the governor-general as his representative. The administration of the force is entrusted to the Minister of Militia and Defense; he is a member of the Dominion Cabinet, he must be a member of Parliament and he can be held to account by that body. In the summer of 1916 a parliamentary under-secretary was appointed to assist the Minister in administering the department, and the business of administering the force is distributed among these branches. The Minister presides over the meetings of the council and acts affecting the administration of the militia technically issue from the Minister in council; in practice the decision lies with the Minister. Outside of the militia council stand two inspectors-general, officers of rank, who report upon the quality of the training, etc., of the troops. The country is divided into 11 military districts, each under a district officer commanding, who is either a colonel or a general officer; in the interests of decentralization considerable powers of administration are entrusted to these officers. All the male inhabitants of Canada from 18 to 60 years of age are liable to military service. To this general rule there are some exceptions, such as judges, clergymen and professors in colleges. In cases of great emergency a "Levee en Masses may be ordered, when all male inhabitants of the eligible age, able and arms can be summoned. Those ordinarily liable to service are divided into four classes: (1) Those 18 years of age to 30, unmarried, or widowers without children; (2) 30 years of age to 45, unmarried, or widowers without children; (3) 18 to 45 who are married, or widowers with children; (4) 45 and upwards, but under 60. The principle of substitution is recognized. It is in this order that the Militia Act of 1904 contemplated the summoning of the male population to the colors. When in the stress of the Great European War resort was had to compulsion for overseas the foregoing classification was rearranged, and the principle of substitution disappeared. The Militia Act limited compulsory service in the field to 18 months at most; this limitation disappeared. The militia may be sent on active service "anywhere in Canada and also beyond Canada for the defense thereof." When in time of war the militia is called out for active service to serve conjointly with His Majesty's regular forces, His Majesty may place in command thereof a senior general officer of his regular army. In the census year of 1911 the number of males in Canada between 18 and 45 was 1,720,000; of these 1,109,000 were by virtue of which the land forces of Canada exist, it may be noticed at some length. During the Great War it has been modified in some respects, partly by statutes and partly by regulations enacted under the authority of the War Measure Act. The command in chief is vested in His Majesty the King, with the governor-general as his representative. The administration of the force is entrusted to the Minister of Militia and Defense; he is a member of the Dominion Cabinet, he must be a member of Parliament and he can be held to account by that body. In the summer of 1916 a parliamentary under-secretary was appointed to assist the Minister in administering the department, and the business of administering the force is distributed among these branches. The Minister presides over the meetings of the council and acts affecting the administration of the militia technically issue from the Minister in council; in practice the decision lies with the Minister. Outside of the militia council stand two inspectors-general, officers of rank, who report upon the quality of the training, etc., of the troops. The country is divided into 11 military districts, each under a district officer commanding, who is either a colonel or a general officer; in the interests of decentralization considerable powers of administration are entrusted to these officers. All the male inhabitants of Canada from 18 to 60 years of age are liable to military service. To this general rule there are some exceptions, such as judges, clergymen and professors in colleges. In cases of great emergency a "Levee en Masses may be ordered, when all male inhabitants of the eligible age, able and arms can be summoned. Those ordinarily liable to service are divided into four classes: (1) Those 18 years of age to 30, unmarried, or widowers without children; (2) 30 years of age to 45, unmarried, or widowers without children; (3) 18 to 45 who are married, or widowers with children; (4) 45 and upwards, but under 60. The principle of substitution is recognized. It is in this order that the Militia Act of 1904 contemplated the summoning of the male population to the colors. When in the stress of the Great European War resort was had to compulsion for overseas the foregoing classification was rearranged, and the principle of substitution disappeared. The Militia Act limited compulsory service in the field to 18 months at most; this limitation disappeared. The militia may be sent on active service "anywhere in Canada and also beyond Canada for the defense thereof." When in time of war the militia is called out for active service to serve conjointly with His Majesty's regular forces, His Majesty may place in command thereof a senior general officer of his regular army. In the census year of 1911 the number of males in Canada between 18 and 45 was 1,720,000; of these 1,109,000 were by virtue of
of battalions, proportion of artillery, details of staff, etc., with the divisions of the British army. (2) A considerable amount of staff work, in the shape of mobilization arrangements, plans of organization, etc. (3) The provision of arms, stores, equipment, etc., for a force of the size which Canada might reasonably be expected to raise and send to Europe; and such plans were prepared and carried out to a certain extent in Canada. The foundations of them are to be found in a series of agreements made at the Imperial Conferences of 1907, 1909 and 1911 and set forth in blue-books published in those years; these agreements were incorporated by the Canadian statesmen of the mother country and the Dominion, assisted by soldiers and sailors representing the several parts of the empire concerned. The details were worked out by a number of staff officers, in part supplied from the British army, in part belonging to the Canadian establishment. The organization of the Canadian forces was stimulated by two visits of inspection paid by distinguished officers, by Sir John French in 1910, and by Sir Edward conference in 1912; their advice proved of great value. The general Canadian organization was based on the theory that the militia was to provide the framework of corps, officers, arms, training establishments, etc., of an army to resist invasion; the first line was to be 125,000 strong; the second line was to be a second line of reinforcing units, also 125,000 strong. The country east of Lake Superior was divided into six areas, each of which was to provide a self-contained division of all arms. In the region west of Lake Superior were a large number of infantry corps, which it was planned ultimately would form a Seventh Division. Provision also was made for a number of mounted brigades. Theoretically this organization faced southward; in point of fact, the real danger apprehended was across the Atlantic.

In this period the organization and numbers of the militia changed rapidly, the general aim being to attain a proper distribution of the forces. The force comprised too large a proportion of infantry, with too small a supply of cavalry and artillery. Several instructional corps, known as the Permanent Force, had existed from about 1880; early in the 20th century this force was considerably increased, partly because the Dominion undertook to garrison the Imperial fortresses of Halifax and Esquimalt, and partly because the militia needed more ample facilities for training. By 1914 the authorized establishment of this Permanent Force was 5,000 and the actual strength was about 3,000. The organization included cavalry, 4 squadrons; horse artillery, 2 batteries; garrison artillery, 5 companies; engineers, 3 companies; infantry, 1 battalion; and also army service corps, army medical corps, army veterinary corps, ordnance corps, army pay corps, etc. The actual militia comprised in 1914: cavalry, 130 squadrons; field artillery, 38 batteries; heavy artillery, 5 batteries; siege artillery, 2 batteries; garrison artillery, 13 companies; engineers, 4 field troops, 9 field companies, 9 telegraph detachments, 1 wireless telegraph detachment; infantry, 104 battalions; signal corps, 4 companies and 3 independent sections; army service corps, 18 companies; army medical corps, 21 field ambulances; and sundry auxiliary services. The war establishments of these units would not be far short of 150,000.

These corps were distributed into higher formations in accordance with the plan already outlined; such plans were not final. In 1914, there still being an excess of infantry and deficiency of some of the other arms, notably of artillery. A feature of this period was the provision of special troops for the auxiliary services — army medical corps, army service corps (for supply and transport), ordnance store corps, a corps of guides (for intelligence work), and similar organizations. Citizen soldiers proved particularly adapted to these auxiliary services, and often attained much proficiency in them.

The number of the active militia trained which before the South African War had been fewer than 20,000, by 1914 had risen to nearly 60,000. With all this improvement in organization the progress in training was slower. Something was done in supply and transport, in the older close-order drill and ceremonial, and rifle-shooting was encouraged, but the bulk of the militia had to content themselves with 12 days' training in the year.

Training establishments had been increased during these years. The oldest of these is the Royal Military College at Kingston; founded in 1876 in professed imitation of West Point, this institution gives an excellent general education, and in addition fits its graduates to be officers in the regular army. A proportion of its graduates have risen to general rank; others are in the Canadian Permanent Force, while the larger number have entered civil life, but have constituted a reserve of military skill. Schools of artillery, cavalry and infantry long have been conducted at certain centres, and these of late have been multiplied, while instruction has been carried to the militia by detachments instructors from the permanent corps to conduct temporary courses at the headquarters of militia units. Rifle-shooting, for many years a popular pastime, has been practised partly by the establishments of Rockcliffe, near Ottawa, of a School of Musketry, modelled upon the British institution at Hythe, partly by the encouragement of rifle clubs, both for military and civilian. Persons enrolling themselves in civilian rifle clubs did so on the condition that "in case of emergency" they should at once become members of the active militia. The government in addition to annual grants supplied a limited number of rifles to each club, with a fair proportion of free ammunition; much energy was shown in providing ranges for these numerous and widely scattered clubs. By 1914 these institutions had increased to 167 military and 433 civilian clubs, and had attained a membership of 52,000. Shooting by members of the militia is actively encouraged. Both the Dominion and provincial governments give monetary grants to the Dominion and provincial rifle associations, the annual meetings of these bodies being well attended, both by militia men, members of the rifle associations and cadets.

To serve as feeders to the militia, and to disseminate military knowledge and aptitude at
an age when lessons are easily learned, the militia department before 1914 had done its utmost to prepare. The training corps in the schools, the provincial governments (in whose hands the control of education is vested under the Canadian constitution) co-operating with the Dominion government. The movement began in 1908; by 1910 there were 492 companies and 19,250 cadets; by 31 March 1916 the numbers had increased to 1,428 companies and 57,000 cadets. Of these units 76 were affiliated or attached to militia organizations; 26,000 cadets were drawn from secondary schools, 25,500 from primary schools and 5,000 were in corps fostered by municipalities or government institutions. In 1912 cadet camps were formed, and in the years before the outbreak of the war these camps were attended by from 12,000 to 20,000 lads; a good deal also was done to teach cadets rifle-shooting.

In regard to the provision of arms the most important step taken was the establishment in 1904 of the Ross rifle factory at Quebec, owned by the men of its shareholders. In 1916 manufactured the Ross rifle, a type of weapon differing in many respects from the Lee Enfield, the military rifle used elsewhere in the British empire, but of the same calibre and taking the same ammunition. The capacity of this factory before the war was 12,000 rifles a year, and in 1914 there were about 70,000 Ross rifles in the country, some of them of an earlier make which was unsuitable for campaigning. In 1916 the Canadian troops in France were rearmed with the Lee Enfield, and the Ross rifle factory, which had been much enlarged, was changed to the manufacture of that weapon. In 1917 this factory was taken over by the government. A small arsenal exists at Quebec, capable in 1914 of turning out several million rounds annually; it also made a limited quantity of 18-pounder shells. A second arsenal has been established at Lindsay, Ontario; it began to manufacture ammunition in 1917. The government by 1914 had provided about 100 guns, mostly 13- and 18-pounder horse and field quick-firing guns; it also had a few medium guns, 4.7-inch and 60-pounders. The supply of machine guns was scanty. Something was done toward providing mobilization stores, clothing and other necessary articles which would be required by the new men who would be brought into the regiments when they were increased to their war strength.

Participation in the Great War.—Canada unhesitatingly took part in the European War. Mention already has been made of the plans framed by the military authorities; these included confidential plans for the dispatching abroad, in the event of a war in Europe, of an expeditionary force comprising a division (i.e., 12 battalions of infantry, with the necessary complement of artillery and other troops, in all about 18,000 men) and a mounted brigade (about 2,000 mounted rifles). Detailed plans for the enlistment and mobilization of these had been matured; the men to be specially enlisted, the militia organization being employed to raise this force. On 1 Aug. 1914 the Canadian government telegraphed to London offering a contingent, and on 6 August the British government replied accepting, and suggesting that the force sent consist of one division and a first reinforcement of 10 per cent; in all, including the reinforcements, some 22,000 of all ranks. Recruiting was so ardent and districts so vied in providing corps, that instead of 12 battalions 17 were raised almost instantaneously; in addition another battalion, the Princess Patricia's Canadian Light Infantry, was raised from former British soldiers residing in Canada. These 18 battalions, with other corps, numbering in all 33,000 all ranks, sailed from Quebec late in September and landed at Plymouth on 13 Oct. 1914. This was a force raised ad hoc, and in a sense was outside the active militia, although it was based upon that force. The liability of the militia to serve abroad has been noted earlier; no attempt was made to apply this liability, the course followed being to organize, under the Militia Act, a new force known as the Canadian Expeditionary Force. The term of service is the duration of the war, with a minimum of one year. The active militia supplied nearly all of the officers and many of the non-commissioned officers; its whole machinery was employed in raising, organizing and outfitting this overseas army. Many, however, of the rank and file had not previously served in the militia, and this fact, coupled with the slight training afforded in any case, made it necessary to give the whole force several months of training before sending it to the Continent. Something was done, especially in the way of musketry, at the great mobilization camp at Valcartier, near Quebec. On landing in England the division was placed under the command of a British general, and it spent the winter upon Salisbury Plain, training amid discouraging conditions of weather—conditions which were shared by scores of divisions of new troops which had been raised in Great Britain. In February 1915 the First Division, as it now was, crossed the Channel, leaving the surplus five battalions in England to serve as feeders. This division was heavily engaged in April at the second battle of Ypres or Saint Julien as it sometimes is termed, sustaining some 6,000 casualties. Before the First Division was well clear of the Saint Lawrence a Second Division was offered; its organization went on through the winter, and the battalions crossing the Atlantic in single ships instead of in one great convoy as with the First Division. The same deliberate training was given to the new troops, and the Second Division was fairly organized by mid-summer of 1915. When it was sent to France the two divisions were united in a Canadian Army Corps. New battalions kept working their way across the Atlantic and through the training camps in England, and by the end of the winter of 1914-15 a Third Division was complete and the Canadian Army Corps had three divisions and upward of 60,000 men. The army corps suffered upward of 10,000 casualties at Hooge in May 1915, the Third Division being the heaviest loser. A Fourth Division was then organized; in the summer of 1916 it joined the Canadian Army Corps in France. The Canadian corps was heavily engaged in the Battle of the Somme in 1916, and at Vimy, Lens and Pashchenka in 1917. Its casualties in 1917 were in excess of 84,000. At
the beginning of the campaign of 1918 the
Canadian Army Corps consisted of four di-
visions, numbering 78,000 all ranks, and about
11,000 “corps troops,” principally artillery;
altogether the Army Corps comprised some
90,000 troops, this being the standard large
formation in the British Army. The general
commanding the Army Corps, Sir Arthur Cur-
rrie, was a Canadian militia officer, who had
raised a battalion of the First Division. In
addition there was a Canadian Cavalry Brigade
serving elsewhere in the British Army, and
there were also a general regiment of forestry,
forestry troops, as well as many line of com-
munication units; all told, the Canadian troops
in France of the various categories mustered
approximately 150,000.

To provide for a steady flow of reinforce-
ments to the troops in France, and for the
care of wounded and sick, an extensive estab-
lishment was maintained in England, over
which after the autumn of 1916 a Minister of
the Canadian Cabinet presided with the title
of the Great War Mission on the Military Forces of
Canada. At one time a fifth division was
formed, but the need for drafts to keep the
other divisions up to establishment was so great
that it was broken up. The establishment in
England comprised numerous training schools,
and the general policy settled upon in 1917 and
1918 was to forward recruits from Canada to the
United Kingdom as soon after their em-
bodyment as convenient, so as to receive their
training close to the fighting. This was part of
a general reorganization, more especially of
the infantry. At first the method of recruit-
ment was to authorize the raising of numerous
single unrelated battalions, and in all more than
250 such battalions were formed. The four
divisions in the field comprised no more than
32 battalions of infantry and pioneers, and these
were reinforced whenever depleted; as a
necessary consequence on arriving in England
four-fifths of the infantry units raised were
either converted into depot or reserve bat-
talions, or were broken up to furnish drafts
for the battalions in the fighting divisions; a
course which entailed considerable hardships
upon the senior officers of corps so treated, as
the majority of them could not obtain employ-
ment in France. In 1917 the raising of new
battalions was discontinued and the whole of
the Canadian infantry were organized in 12
territorial regiments, each of several battalions.
These regiments were: The Western Ontario
Regiment; the 1st Central Ontario Regiment;
the 2d Central Ontario Regiment; the Eastern
Ontario Regiment; the 1st Quebec Regiment;
the 2d Quebec Regiment; the Nova Scotia
Regiment; the New Brunswick Regiment; the
Manitoba Regiment; the British Columbia
Regiment; the Saskatchewan Regiment; the
Alberta Regiment. Each of these regiments
had several fighting battalions in France, one
or more reserve battalions in England, and one
or more depot battalions in Canada. By this
arrangement steadier and more equitable rela-
tions were established between the several
services, the general policy being the mining them and
employing them in battle. Canada maintained
in England and France numerous auxiliary
services, such as hospitals, Y. M. C. A. huts,
etc. In addition to the forces despatched to Europe, the Dominion contributed to the gar-
risons of Bermuda and the West Indian island of
Saint Lucia. Many individual Canadians
obtained commissions in the forces of the
United Kingdom, the air services in particular
attracting several thousand men.

The reorganization just described coincided
with a change in the method of recruitment
from voluntary enlistment to compulsory serv-
ice. At the outset recruiting was voluntary
and in 1914 and 1915 great eagerness was
shown. In all about 375,000 effective recruits
were obtained in this manner, or more than
3 per cent. of the working age population. In 1916 the
stream of enlistment slackened and in 1917 the
government decided to have recourse to com-
pulsion. After some delay due to political
difficulties the Military Service Act was passed,
and its operations began in October 1917. The
general principle was that 100,000 men were to
be drafted from the unmarried men of the
country between the ages of 20 and 34; liberal
provision was made for exemption on grounds
of medical unfitness, the dependence of others
for support, residence in certain occupations,
of food production, war industries etc. A
system of tribunals was set up, the general prin-
ciple of administration being that the draftees
were obtained by the civil power, and by it
turned over to the military authorities, who did
not themselves come into contact with the
civilian population. The military authorities on
receiving the recruits so produced outfitted them in depot battalions, gave them preliminary
training, and sent them to Great Britain in
comparatively small drafts. In 1916, toward
the close of voluntary enlistment, replacement
battalions were sent across the Atlantic at the
rate of about 10,000 a month; in the early
months of 1918, when the new system was
beginning to work well, the rate of reinforce-
ment was about the same. Side by side with
compulsory service volunteering persisted and
was encouraged; those coming forward volun-
tarily going principally into the air forces and
special services.

A feature of Canadian participation in the
war has been the unexpected production of
munitions of war. Soon after the outbreak of
the war the then Minister of Militia, Maj-
Gen., the Hon. Sir Sam Hughes, formed
a shell committee, composed mainly of
manufacturers, and this body, acting for the
British government, placed large orders for
munitions, both in Canada and in the United
States. In the latter part of 1915 it was re-
modelled, the new organization being styled the
Imperial munitions board. The two bodies were
remarkably successful in inducing and en-
couraging Canadian industries originally de-
signed for peaceful purposes to turn to the
making of munitions. Up to the end of
January 1918 the orders given to firms in
Canada and the United States aggregated
rather over a $1,000,000,000. It may be added
that the voluntary giving of the people of
Canada to Red Cross, Belgium Relief, the
Canadian Patriotic Fund [an organization for
caring for soldiers' dependents] so far have
been about $50,000,000.

Naval Defense.—Canada took little inter-
est in the question of helping with the naval
defense of the empire until March 1909. The
excitement which arose in England in that
month over the naval rivalry of Germany
deeply impressed Canadian public opinion, and the Canadian House of Commons by a unanimous resolution approved the principle of participation. In the autumn of 1909 representatives of the Canadian government attended the defense conference of the several parts of the empire held in London, and as a result the government of the day put forward in 1910 a project for the establishment of a separate Canadian navy; two old cruisers, the Niobe of 11,000, and the Rainbow of 3,600 tons, were bought to serve as training ships, and it was proposed to build in Canada four light cruisers of the Bristol class and six destroyers. In time of war this force was to be placed under the British Admiralty. A number of officers were borrowed from the Royal Navy, and a few hundred men enrolled, many of these also coming from the British navy. This proposal encountered political resistance on two grounds, one school of thought regarding it as insufficient, and another school disliking any contribution to naval defense. The administration of the day thought otherwise and in the polls of 1911 and retired without having ordered the ships. The administration which succeeded it consulted the Imperial government afresh, and in 1912 proposed to drop the idea of a separate navy and to present to the British navy a lift of three battleships; the opposition resisted this, putting forward an alternative plan for a Canadian navy of 2 battle cruisers, 6 light cruisers and 12 destroyers. The proposal of the government passed the House of Commons, but was rejected by the Senate, in which the opposition commanded a majority. The great war began before any further steps were taken by the government. On the outbreak of hostilities the Canadian naval forces—the two cruisers already mentioned and two submarines hastily purchased from an American shipyard on the Pacific coast, with some hundred seamen—were placed at the disposal of the Admiralty. The Canadian vessels took part in the patrolling of the Atlantic and Pacific oceans for the protection of commerce. The department of the Naval Service administered the movement of ships from Canada to Great Britain.

C. T. HAMILTON,
Department of Militia and Defense, Ottawa.

31. THE ACADIAN REFUGEES. After the conquest of Acadia in 1710—the first and only fruit of Samuel Vetch's grand design for the conquest of Canada,—the Treaty of Utrecht (see Utrecht, Peace of) provided for the free exercise of the Roman Catholic religion by such of the French inhabitants as were willing to remain there, but also stipulated that any who should choose might remove within a year. Nearly all remained; but, under various excuses, in the hope of a return of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emigrants excited the jealousy of the officials of Canada and a graft of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the found}
two successive deputations came to Halifax, representing together nine-tenths of their entire population. Both absolutely refused to take the simple pledge of fidelity and allegiance to the British sovereign. The governor and council therefore resolved that it was necessary to deport their people, and in order that they should not strengthen the enemy, they were to be distributed among the English colonies. Lawrence now ordered Colonels Montcon and Winslow and Major Hanfield,—at Beauséjour, head of Minas and Acadia,—to seize the inhabitants, and if necessary to burn their houses. The principal scenes of the expulsion took place under Winslow at Grand Pré and Fort Edward, in the Basin of Minas, just after completion of the harvest at those fair and populous settlements. At Grand Pré all the males over 10 were ordered to the parish church, where Winslow read them the order of removal and detained them as prisoners. They were kept several weeks before deportation, and then marched to Halifax. Tragic scenes of lamentation and distress accompanied the leaving, although it was carried out as humanely as possible. The whole number removed from the province is usually stated at little over 6,000, although Richard, and others place the figure much higher. Many in the South eventually reached the French settlements of Louisiana, where their descendants are still found in certain parishes and were estimated at 40,000 a few years ago. The sorrows of the dispersion were great, and the death rate considerable. It is regrettable that those who received Canada and the French West Indies suffered perhaps the most terrible miseries of all from neglect and ill-treatment. Most of the refugees at length found their way back to Nova Scotia, while many of their neophytes of the greater part of the present French population. Their woful story was told in an idealized form in the pages of Haliburton, from whom, passing through a medium of feminity, in the hands of a lady writer, it reached Longfellow and was immortalized in his 'Evangeline.' The unhappy facts were afterward the subject of heated recriminations, especially by French writers such as Abbé Casgrain and Rameau, against the New Englanders, whose leading defenders are Parkman and Hannay. Edouard Richard in his 'Acadia' ascribes all to Lawrence personally. The dispassionate view would seem to lie in fair allowances for the difficult situation and training of the actors on both sides. In this light the Acadian population must be remembered as a densely ignorant people. Without some education, the measure of natural shrewdness they possessed could not be expected to clear up for most of them the moral problems connected with allegiance to the British Crown, and the principle of ownership of Acadia as it was represented to them. Most of them were undoubtedly trying to be loyal to France and ready to return the country into its possession, and duplicity did not seem to them improper. This is not only deducible from all the events but plainly set forth in the petition of 3,500 Miramichi refugees to Governor de Vaudreuil in 1756.

For the Indian atrocities, to which some of them gave support, we cannot hold the people as a whole responsible. In view of these considerations the Acadian people must be regarded as an unfortunate and misled, and their condition as a conquered people, torn from their compatriots and coreligionists by the fortune of war, as they hoped only temporarily, must be considered. As in the case of ignorant populations generally, respectively their leaders and advisers — Le Loutre, Jonquière and the bishop of Quebec — who must be held responsible. Regarding Le Loutre, although his character of the peculiarly savage and relentless fanatic led him into acts which place him among the class of murderous criminals, his guiding motives appear to have been a distorted patriotism and allegiance to his religion. These are in a different class from the mean duplicities and false quibbles of La Jonquière and the French ministry, who were all too gullible to the pretensions concerning the extent of Acadia, and of the dangerous position in which they were placing the Acadian people. When we examine the motives of the British side, we have to deal with two basically different courses of action there, and the actual deportations existed, and in their judgment desperate measures were necessary for the safety of the little British colony. The British settlers were greatly outnumbered and held but a small part of the country. Le Loutre and the French authorities were pursuing a treacherous course of savage murder against them, with Acadian participation. The entire people absolutely refused to take a simple oath of allegiance, although repeatedly and plainly warned of the consequence. In Lawrence's judgment no other course than deportation then seemed safe; and although a harsh measure, like its modern analogue, Reconcentration, it proved effectual in removing all doubt respecting the security of the colony. Le Loutre, with his hardihood, having defied the force of the state, was entitled to be judged, in part at least, as a military man bound to perform a duty; and his freedom of discretion at a difficult juncture must be respected even if it may have been based on a false estimate of the consequences. Two instances of a similar deportation policy are cited in defense — the proposal of Governor de Callières, endorsed by the French King in 1669, to seize the province of New York and deport all the Protestant population (Doc. Hist. N. Y. Vol. I, pp. 285-97); and the actual deportation of the English settlers from the island of Saint Kitts in 1666, to the number of 2,500, an occurrence marked by the striking of a medal by Louis XIV, inscribed 'Ang. Ex Insula St. Christoph. Exturb.'

Bibliography. — Abbé Raynal, 'Histoire des Indes,' 2d ed.; Haliburton, 'History of Nova Scotia' (1829); Rameau, 'La France aux Colonies' (1859); 'Une Colonie Féodale en Amérique' (1889); Murdoch, 'History of Nova Scotia' (1865); Akins in 'N. S. Archives' (1869); Campbell, 'History of Nova Scotia' (1873); Moreau, 'Histoire de l'Acadie' (1873); Hannay, 'History of Acadia' (1879); and 'The Story of Acadia' (1904); Smith, 'Acadia' (1884); Casgrain, 'Les Découvreurs Pays d'Éden ou d'Or.' (1898); Pastore, 'Montcalm and Wolfe' (1894); Hart, 'Fall of New England.'
32. THE QUEBEC ACT. From the capitulation of Montreal in 1760 down to the ratification of the Treaty of Paris in 1763 Canada was without any form of civil government, the affairs of the colony being administered by the officers in command of the British armies of occupation. But with the conclusion of peace and the definite cession of the colony to the British Crown this tentative arrangement came to an end and in the autumn of 1763 a royal proclamation decreed the establishment of a civil government in the newly-acquired colony, promising that as soon as circumstances would permit representative assemblies would be convened. In the meantime the laws of England were to be in force. In virtue of this arrangement Gen. James Murray (q.v.) was appointed to the governorship of the colony and a council of eight members was nominated to assist him in the work of administration. For the time being, justice continued to be administered by the military courts at Quebec, Three Rivers and Montreal, but in September 1764 a proclamation was issued by the governor-in-council establishing a Court of King's Bench for the trial of all causes, both civil and criminal, agreeable to the laws of England which the royal proclamation of the preceding year had declared to be in force. At the same time a Court of Common Pleas was established for the trial of actions which had arisen before the publication of the proclamation of 1763 and in regard to which the old French law had to be applied.

The immediate result of this change was to inaugurate a régime of utter judicial chaos, for the new judges were completely at a loss to apply the principles of English common law to the causes which came before them, especially where questions of real property were concerned. Accordingly, the governor-in-council during the month of November 1764 issued a further proclamation declaring that "in all actions relative to the tenure of land or the right of inheritance, all French laws and usages shall be observed as the rule of decision." But in all other civil cases and in all criminal cases the common law of England was to be applied. This change improved matters but slightly for the new English judges were slow to master the intricacies of French law and applied it very imperfectly where they endeavored to make it apply. To the application of the English criminal law the French inhabitants of the province made no great objection, although for the time being many of them were led to take kindly to the institution of trial by jury; but there was a widespread demand for the extension of French law to all civil causes. Complaints were likewise made that the judicial officers of the colony were for the most part ignorant of the French language; that they were often dishonest and that the legal fees charged the inhabitants were exorbitant. For all of these complaints there seems to have been considerable foundation and in fact the laws of the Crown and the privileges which the old régime carefully re-edited by several colonial jurists of acknowledged ability and the revised text at once became the acknowledged source of law in all cases of land tenure and inheritance. Carleton pressed his proposal on the home authorities and in 1770 went to England to urge its adoption. There he managed to secure the appointment of a commission to examine into the merits of the whole matter and the report of this body, although it was not presented until the closing days of 1772, was on the whole in favor of the governor's recommendation. In the meantime, however, there was a growing demand among the British inhabitants of the colony for the establishment of a representative assembly in accordance with the promise made in the proclamation of 1763 and the meetings of the British inhabitants resolutions calling upon the home authorities to take steps in this direction were passed and forwarded to England. But to the adoption of such a step there was grave difficulty, namely, the decision of the question as to whether Roman Catholics would be permitted to sit in the new assembly. The disabilities of Roman Catholics had not been removed in England at this time and it was hardly to be expected that Parliament would extend to Roman Catholics in a colony privileges which it denied them at home. On the other hand, an assembly from which Roman Catholics were excluded would be very far from representative in a colony where nine-tenths or more of the population professed that religion. This difficulty, together with the fact that the position assumed by the representative assemblies in the British colonies on the Atlantic seaboard at this time was not calculated to inspire the home authorities with a favorable regard for popular colonial assemblies, seems to have determined the ministry in its decision that Canada, for the time being, should not be trusted with an assembly representing the people. On some other points, however, the home authorities evinced a desire to meet the wishes of the colonists.

On 2 May 1774 a bill, popularly known as the Quebec Bill, was introduced into the House of Lords where it passed with little opposition. In the House of Commons the measure was vigorously opposed by a strong minority, but with some amendments was eventually passed, and toward the end of June received the royal assent. By the provisions of the act the boundaries of the province of Quebec were extended to include all ancient Canada, including Labrador, and all the territory lying north of the Ohio and west of the Mississippi. Roman Catholics were released from all penal restrictions; the obligation of the tithe was reimposed in favor of the Church, and all classes, with the exception of the religious orders, were confirmed in all enjoyment of their proprietary rights. French law was hereafter to be applied in all civil cases while the law of Eng-
land was retained for the decision of all criminal causes. Both, however, might be modified by ordinances of the governor and legislative council. Inasmuch as it was "inexpedient to call an Assembly" the act provided for the establishment of a legislative council to consist of not less than more than 23 members nominated by the Crown. To this body in conjunction with the governor was given a limited power of internal administration, including the right to levy internal and local taxes. But Parliament expressly reserved to itself the right of external taxation and every ordinance passed by the council was to be transmitted to England where it might be disallowed if the home authorities deemed advisable.

In the New England colonies the passage of the Quebec Act was bitterly resented, partly because of the privileges which it granted a French and Roman Catholic population but more especially because it placed under the almost complete control of the British authorities the vast expanse of territory west of the Appalachians in the conquest of which the seaboard colonies had borne a heavy share. In Quebec the French inhabitants, while many regretted that provision had not been made for the establishment of a popular assembly open to Roman Catholics, for the most part welcomed the substantial concessions which the act conveyed. There is little doubt that these concessions served in some measure to assure the British authorities of at least their neutrality during the turbulent days of the next few years. The British inhabitants of the province, on the other hand, were naturally disappointed but the course of events during the next half-decade was such as to preclude any important manifestation of their feelings. Under the provisions of the Quebec Act the administration of the province was carried on for the ensuing 17 years.

Bibliography.—Coffin, 'The Province of Quebec and the American Revolution' (1896); Hart, 'The Quebec Act' (1895); Kingsford, 'The Quebec Act' (1895); passim; Marriot, 'Plan of a Code of Laws for the Province of Quebec' (London 1774); Masères, 'Projet des Lois pour la Province de Québec' (Quebec 1770).

WILLIAM BENNETT MUNRO,
Professor of Municipal Government, Harvard University.

33. THE ASHBURTON TREATY.

The Ashburton Treaty (also called Treaty of Washington), a treaty between the United States and Great Britain, signed 9 Aug. 1842, is chiefly important for its settlement of the northeastern boundary question. The boundary between Massachusetts (since 1783 to Maine) and British North America had been in dispute since 1783. The treaty of that year (Art. 2) had made the following provision: "And that all disputes which might arise in future on the subject of the boundaries of the said United States and British North America had been in dispute since 1783. The treaty of that year (Art. 2) had made the following provision: "And that all disputes which might arise in future on the subject of the boundaries of the said United States and Great Britain shall be referred to the arbitration of the King of the Netherlands. His award, however, in 1831 was rejected by the United States.

Meantime the district of Maine had become (1820) a State, and was eager in the defense of its claim to the disputed region. The progress of settlement naturally led to conflict and disturbance on the border line, known as the "Aroostook War." By the year 1840 matters had reached an apparent deadlock in which the adoption of a conventional line seemed the only solution. In addition to the northeastern boundary, various smaller matters of controversy were outstanding between the two nations. The English claim of a "right of search" for the suppression of the slave trade created a standing difficulty. The destruction of the Caroline (q.v.), an American vessel, by a party of Canadians during the war, caused a demand for redress. The British government had met this claim by announcing that the destruction of the vessel was a legitimate act of war, the Caroline having carried supplies for the insurgents. A Captain McLeod, a Canadian, accused of participation in the affair, was brought and brought to trial in New York; in all probability nothing but his acquittal prevented actual
hostilities. A further complication had arisen in the case of the Creoles and the situation in which the negroes had revolted (1841), and which they had carried to a British port in the West Indies, where they were allowed to go unmolested. There was also in question the boundary of Oregon. To settle these various points at one time, Lord Ashburn (ALEXANDER BARING, LORD) was sent to Washington (April 1842) and in conjunction with Daniel Webster, Secretary of State, arranged the treaty commonly known by his name. Ashburton, formerly Mr. Alexander Baring a prominent financier, and for nearly 20 years a member of the House of Commons, had previously resided in America, where he married a daughter of Senator Bingham. His known desire for a good understanding between Britain and America rendered his relations at Washington most cordial. He was widely entertained, and is said to have spread a social charm over Washington, and filled everybody with friendly feelings toward England. With Webster he conducted a most amicable and their negotiations assumed an altogether informal character. (See Schouler, History of the United States, Vol. IV, ch. xvii.)

To this fact has been partly due the impression ever since prevalent in Canada that the interests of that country were sacriﬁced to the expansiveness of Lord Ashburn’s feelings. Under the terms of the treaty, the northeast boundary was settled thus (Art. I): ‘It is hereby agreed and declared that the line of boundary shall be as follows, commencing at the monument at the source of the River Saint Croix, as designated and agreed to by the commissioners under the fifth article of the treaty of 1794 between the governments of Great Britain and the United States; thence north, following the exploring line run and marked by the surveyors of the two governments in the years 1817 and 1818, under the fifth article of the Treaty of Ghent, to its intersection with the River Saint John, and to the middle of the navigation thereof; thence along the middle of the main channel of the said River Saint John into the mouth of the River Saint Francis; thence up the middle of the channel of the said River Saint Francis, and of the lakes through which it passes to the mouth of the Lake Pohemook; thence southwesterly in a straight line to a point on the northwest branch of the River Saint John. This locates the main part of the boundary; for details of the further extension of the line, the text of the treaty may be consulted (‘Treaties and Conventions’, Washington 1889, Annual Register, 1842). The treaty provided further for the survey and permanent marking of the boundary, which was completed in 1847. Of the disputed territory the United States received about seven-twelfths and Canada five-twelfths. Rouse’s Point, on Lake Champlain, was also declared to belong to the United States, the government of that country binding itself to pay to Maine and Massachusetts $300,000 on account of the relinquished territory. The right to carry timber down the Saint John River was granted to the United States. By article 8 of the treaty, it was agreed that each country should maintain on the coast a sufficient naval force, carrying not less than 80 guns, for the purpose of enforcing, separately and respectively, the laws, rights and obligations of each contracting party for the suppression of the slave trade. The treaty passed over the Caroline and Creole cases (see Creole Case), but declared (Art. 10) that each party, on requisition from the other, shall deliver up to justice persons charged with murder, assault with intent to murder, piracy, arson, robbery or forgery, upon sufficient proof of their criminality. The question of the Oregon boundary was also omitted.

The boundary award of the treaty met with great dissatisfaction in Canada. It was currently believed, and the belief largely persists, that the interests of Canada had been unduly sacrificed. The Canadian view of the case is presented in Dent’s ‘Last Forty Years of Canada’ (1881), and in more extreme form in Coﬁn’s ‘Quirks of Diplomacy’ (1874). The supposed sacrifice of Canada by Lord Ashburn has become a commonplace of Canadian political discussion. Later investigation, however, is strongly in favor of the American claim. The whole subject of the boundary has recently been exhaustively treated in an admirable paper by Dr. William Ganong of Smith College (‘Proceedings of the Royal Society of Canada,’ 2d series, Vol. VII, 1901). Dr. Ganong, though a Canadian, decides that Maine was right and New Brunswick wrong in the northwest angle controversy. He bases his decision on the text of the treaty of 1783, on the maps of the time, on the admissions of Governor Carlton and others, and on a petition of the New Brunswick legislature of 1814, virtually admitting the American claim. The West Hill boundary line was not advanced, he says, until 1814. In the controversial discussion of the treaty the episode of the “red line” map has played a considerable part (see North American Review, April 1843, and Winsor’s America, VII, 180). This was a map found in the French archives and supposed to have been given to Vergennes by Franklin in connection with the treaty of 1783. A boundary line favoring the English claim was marked upon it in red ink. A copy of this map was in Webster’s possession during the negotiations but was not shown by him to Lord Ashburn. It was shown by him to the Maine commissioners and played some part in securing their ascent to the Ashburn Treaty. But it is not proved that the marking of the map was by Franklin, and it is also possible that it was wrongly marked with intent to deceive (see Hinks, ‘Boundaries Formerly in Dispute,’ 1885). To offset this map, the original of which has disappeared, there still in the British Museum an English map favoring the American claim.

STEPHEN LEACOCK, Professor of Economics and Political Science, McGill University.

34. CLERGY RESERVES, The. The clergy reserves were lands set apart, by virtue of the Constitutional Act of 1791, for the maintenance of the Protestant clergy in Upper and Lower Canada. The intention of the act was to reproduce in the colony an episcopal establishment similar to that of Great Britain, to whose primacy it was to be subordinate. The provincial governors were directed under the act to reserve such tracts of land as the support of the Protestant clergy. The re-
served blocks of land were to be distributed among those granted to settlers. In Upper Canada a full seventh of all the land was to be granted. In Lower Canada reserves were to be made only in proportion to new settlement and not in respect of lands already occupied. No reservations were made in the latter province before 1796. Reservations were made each year until 1838 (except in 1813). The total reservations made in Lower Canada amounted to over 930,000 acres: in the upper province to about 2,400,000 acres. The Crown was also empowered to authorize the lieutenant-governor of each province from time to time to erect parsonages, to endow them with a portion of the reserve lands and to present incumbrants to them (Constitutional Act, Secs. 38, 39, 40). The operation of the system thus established was not at first felt as a serious grievance. Land being still plentiful, the reservations remained unsold and were leased at extremely low rentals (10 shillings for 200 acres during first seven years). With the progress of settlement however the rentals constantly rose. The question of the clergy reserves became a subject of increasing complaint. The members of the Church of England were in a decided minority, not only in the lower province, but in Upper Canada itself. The question early arose whether the wording of the act—"allotment and appropriation of lands for the support of a Protestant clergy"—could not be construed in favor of the Presbyterian and Dissenting denominations. The matter being referred to the home government, the law officers of the Crown decided (November 1819) that the same principles had a claim for a share of the rentals, but that no other denominations had a claim at all. The irritation thus caused rendered the question one of acute difficulty during the succeeding 30 years, and has been designated by Dr. Bryce the Canadian historian, the "Thirty Years' Religious War in Upper Canada." The distribution of the population of Upper Canada among the different denominations in 1839 was as follows: Church of England, 79,754; Methodists, 61,098; Presbyterians, 73,351; Roman Catholics, 43,029; Baptists, 12,968; others, 57,572. The claims of the Church of England were stoutly upheld by the Rev. John Strachan, subsequently bishop of Toronto (1839). Egerton Ryerson (see Ryerson, A. E.), a young Methodist minister, strove with equal zeal on behalf of the Methodist Church.

In 1827 the assembly of Upper Canada asked the Crown to devote the reserves to the creation of schools and of churches of all denominations. The same request was repeated in each of the three following years with considerable popular agitation. Meantime the endowment of rectories as provided by the act of 1791 was authorized by instructions from the Crown in 1825. The excited state of public feeling delayed for some years the execution of the act, but in 1836-37 rectories were endowed with 400 acres each. The discontent thus caused helped to precipitate the rebellion of 1837. With the suppression of that movement the question of the clergy reserves still earnestly demanded solution. An act of the legislature of Upper Canada in 1839, proposing to reinvest the reserves in the Crown, was disallowed by the home government. In the following year the legislature passed an act for the sale of the reserves, one-half of the proceeds to go to the churches of England and Scotland, and the other to be divided among the other religious denominations. This again was abortive, the British judges, on question by the House of Lords, deciding that the provincial legislature had exceeded its authority. The Imperial Parliament now intervened and passed an act (7 Aug. 1840) for the settlement of the question. Part of the reserves had already been sold by authority of a statute of 1827. The proceeds of these sales were to be divided between the churches of England and Scotland, the former receiving two-thirds; the unappropriated lands (1,600,000 acres) were to be sold, and the amount realized to be invested, one-half of the interest being given to the two above churches, in the proportion already mentioned, the other half to be applied by the governor and executive council for public worship and religious instruction. The income thus accruing was divided in the ensuing years among the churches of England and Scotland, the Wesleyan Methodist, Roman Catholic and Synod Presbyterian churches and the United Synod Presbytery. The question was still far from settled. It was claimed that the lands were sold by the Crown at insufficient prices, and Bishop Strachan led an agitation for the sharing up of the lands themselves. The assembly refused to petition the Crown to this effect, but demanded the repeal of the act of 1840. The Imperial Parliament complied by a statute of 1853, which placed the reserves in the control of the provincial Parliament (the two Canadas being now united). The Canadian Parliament elected in 1854 strongly reflected the general public feeling in favor of secularization. A statute to that effect was passed. A lump sum of £188,342 was paid to the Church of England, representing the guarantee of stipends then charged on the reserve fund, called for by the Imperial act. The reserved lands were sold and the moneys given to the municipal authorities for education and local improvement. Consult Lindsay, 'The Clergy Reserves' (1851); 'Memoir of Bishop Strachan' (1870); Ryerson, 'Story of My Life' (1883).

Stephen Leacock, Professor of Economics and Political Science, McGill University.

35. SEIGNIORIAL TENURE. The system of Seigniorial Tenure was that system of public and private relations based upon the tenure of land which the French government undertook, during the course of the 17th and 18th centuries, to introduce into its North American colonies, and more especially into the colony of New France, now Canada. The system of feudal— or as in its later stages it came to be called— seigniorial tenure, was deeply rooted in France, and it is easy to understand how its introduction into the colonies appealed to Richelieu as a means of providing estates for many of the landless aristocrats of France. Moreover as feudalism was now so far advanced in decay as to be no longer a menace to the central power, it is easy to see how the system appealed to the Bourbon monarch as likely to permit, in the colonies, of that cen-
CANADA—SEIGNIORIAL TENURE (35)

Centralization of authority which characterized France at this time.

As regards Canada, the seigniorial system had originally, in 1627 when the French King granted to the Company of New France, more commonly known as the Company of One Hundred Associates, the whole of the French possessions in North America as one immenseief with full power to sub-grant in seigniorial to settlers. During the whole 35 years of its existence, however, this company devoted almost its entire attention to the development of the lucrative fur trade; very few settlers were sent out to the colony, with the result that while over 60% of seigniorial grants of seigniories were made, almost none at all were ever taken possession of by the grantees. But in 1663 the company was compelled to surrender its charter and extensive territorial rights, the Crown taking into its own hands the supervision of colonial affairs and providing New France with a royal government corresponding roughly to that established in the French provinces at home. From this time on settlers came in increasing numbers; power was given the governor and intendant to make grants of seigniorial subject to royal ratification, and during the last quarter of the 17th century these were made freely. In no case were grants made to absentee; each applicant for a seigniorial grant had to prove himself a bona-fide colonist. Large numbers of the settlers were sent over at the royal expense and once in the colony, every inducement was given them to remain. Even the detestments of fowling were quieted, as far as the colony, the river, and the seignior. But whatever the area of the seignior, it was essentially a baron, and the seignior was under obligation to repair at once to the Château de Saint Louis in Quebec, there to render his fealty and homage to the governor as the representative of the Crown. Within the next 40 days he was required to file with the royal intendant the upper and lower bounds of the seignior, along with the boundaries of the domain, the number of people in the domain, and the location of the seignior's seat.
upon the seignior than upon his censitaires, for except in the more populous seigniories, the amount of toll received rarely sufficed to pay expenses. At the same time, the colonial authorities compelled the seigniors to provide mills in their seigniories on pain of losing the right for all future time. Finally, there was the much-detested corvée, or right of the seignior, to divert from a certain quota of labor on the seigniorial lands without compensation. The amount allowable varied in different seigniories but as a rule the censitaires were permitted to commute it into a fixed money payment. An ordinance of the superior council in 1716 forbade the exaction of corvée during seed time and harvest. In addition to the foregoing main rights the seignior ordinarily reserved for himself the privilege of taking from the lands of the censitaires such wood and stone as might be found necessary in the erection of the seigniorial manor house, mill or church, and in some cases the right of taking wood for fuel. In many cases he likewise reserved the right of claiming a share in all the fish caught in the river by his censitaires in the waters of the seigniorial.

Most of the seigniors possessed certain judicial rights. These, however, were not inherent in the ownership of a seignior, but were specifically granted by the Crown. This grant might convey merely the right of base justice in which case the seignior was empowered to deal with minor causes in which the amount in dispute did not exceed a few sols. The grant of moyenne justice gave him a local jurisdiction, while the grant of haute justice gave full judicial power in all cases except those such as treason and counterfeiting in which the Crown was directly concerned. As a rule all three degrees of judicial power were conferred on the seignior. But in every case an appeal lay to the royal courts of the colony. As the exercise of his judicial powers brought the seignior very little profit the seigniorial courts never became a very important element in the colonial judicial system.

The remaining rights of the seignior were merely honorary and afforded him no financial return. He was entitled to the fealty and homage of his censitaires, to a front pew in the parish church, to certain precedence at the sacraments to the erection of a Maypole at his door each Mayday and, in general, to the respect and deference of his dependents. A number of seigniors who showed zeal in the development of their holdings received patents of nobility but it must be borne in mind that the possession of a seignior in New France did not of itself give noble rank. Herein Canadian feudalism again differed from its prototype in France. The French seignior was always a noble; the Canadian very rarely.

At the close of the French régime nearly 8,000,000 arpents of land had been granted out to be held under the seigniorial tenure. The system had become so deeply rooted in the colony that the English authorities, after the conquest, did not venture to take the drastic step of supplanting it in favor of the English system of tenure in free and common socage. The old system was allowed, therefore, to remain intact, but as the colony became more thickly settled many of the seigniorial exactions became burdensome. The droit de banalité became especially so. Moreover, the new English courts failed utterly to afford the censitaires that protection against the seigniors which the authorities of the old régime had given. From time to time the legislature of Lower Canada sought to deal with the growing complaint that the operation of the system was retarding the development of the province but found it extremely difficult to devise a plan which would be satisfactory to the tenants and at the same time protect the vested interests of the seigniors. In 1825 an act was passed giving to the parties concerned the right to commute all seigniorial dues into a lump sum by mutual agreement but very few took advantage of the legal permission thus accorded. It was not until 1854 that by the Seigniorial Tenures Abolition Act a general scheme for the compulsory commutation of all seigniorial obligations received the assent of the Canadien legislature. This act provided for the establishment of a special court to determine just what seigniorial claims were justifiable and on a basis of its decisions each seignior was awarded a certain loss of his rights. Part of the amount was paid him from the public treasury; the balance became an annual rent charge on the lands of the tenants, which annual charge, again, might be commuted into a lump sum if the tenant so desired. In any case all lands formerly held en seigneurie or en censieu were thereafter to be held in fee simple. Thus by one stroke of legislation the whole system of territorial law in Lower Canada was revolutionized and the last vestige of Canadian feudalism disappeared.

Bibliography.—Parkman, 'The Old Régime in Canada'; Kingsford, 'History of Canada,' Vol. X; Wrong, 'A Canadian Manor and Its Seigniors' (1912); La Fontaine, 'Judgments and Deliberations of the Special Court for the Abolition of the Seigniorial Tenure'; Lareau, 'De la Féodalité et des Littératures' (in his Mélanges historiques et littéraires); Doute et Lareau, 'Histoire du droit Canadien'; Titles and Documents relating to the Seigniorial Tenure (1854); Daniels, 'Histoire des Grandes Familles Canadiens-Français'; Munro, 'The Seigniorial System in Canada' (1907), 'Documents Relating to the Seigniorial Tenure' (1908) and 'The Seigneurs of Old Canada' (1914).

WILLIAM BENNET MUNRO, Professor of Municipal Government, Harvard University.

36. HUDSON'S BAY COMPANY, The.* This great trading company has been in operation under its present charter for two and one-third centuries. Its charter, which is a very generous one, was given by easy-going Charles II. The company owes its origin to the adventures in the New World of two French Huguenots, Pierre Espirit Raleau and Jean Chatouart (afterward Sieur de Grosseiller), or familiarly "Mr. Gooseberry". It is claimed that in 1662 these daring spirits reached James

* The charter of this company is given to the "Governor and Company of Adventurers of England trading into Hudson's Bay." From this it has been unduly employed the title "Hudson's Bay Company," using the possessive form of the name of Hudson, the discoverer. The bay itself, as in the case of Hudson River, has its name spelt by the geographers without the apostrophe and s.
Bay, the southern lobe of Hudson Bay. This is entirely improbable, as in that year they are known to have been in Lac des milles Lacs, now northern Minnesota. (See the discussion on this matter in the author's "Remarkable History of the Hudson's Bay Company"). Persecuted in French Canada, the adventurers fled to New England and thence to England, where they had an audience with King George III. Then the influence of Prince Rupert (see RUPERT, PRINCE), the King's cousin, a strong company was afterward formed, being created by royal charter. The first expedition to Hudson Bay was made for the adventurers in the ship Nonsuch Ketch, Capt. Zachariah Gillam, a New England mariner. Arrived at the destination, a fortress was erected on James Bay (lat. 51° 20' N., long. 78° W.), called Charles Fort. On the return of the vessel to England the charter was granted (1670). Prince Rupert was made the governor of the Bay, and the governorcy conferred by the charter became known as Rupert's Land. He was followed by the King's brother, James, Duke of York, and the third governor was the famous Duke of Marlborough, who has left his name on the various rivers and mountains of the country. The region is the great rival, "La Belle France," immediately began to lay claim to the bay as a part of Canada. Several expeditions were sent out to drive off the English, the most notable being that under Pierre Le Moyne d'Iberville. (See IBERVILLE, PIERRE LE MOYNE D'). He achieved so great a naval victory that the whole bay fell into French hands, comprising at that time seven forts, of which Charles, Nelson, Moose and Allany were the chief. The territory under dispute was restored to England by the famous Treaty of Ryswick, 1697. Up to the time of the French forays rich dividends had been declared by the partners, that of 1690 being 75 per cent of the original stock, and the King's share was rendered in guineas instead of pounds. The company, which included many distinguished men such as the Duke of Albemarle (General Monk), (see MONK, GEORGE), and Sir George Carteret (see CARTERET, SIR GEORGE) was very influential. Prince Rupert presided over the very centre of the Superior and a subsequent committee met regularly to buy and sell, went to Gravesend to see the goods shipped, the men paid, and the like, in the good ships Prince Rupert, Wyvenhoe, or Barb Craven, which sailed around the north of Scotland and thence to London. Every year, about 1 June, for more than 200 years, one ship at least has cleared for its northern port on the bay, latterly generally York Factory. How small the beginnings of trade were may be seen in the inventory of goods sent in 1672: "Two hundred fowling-pieces, and powder and shot; 200 brass kettles, size from 5 to 16 gallons; 12 gross of knives; 900 or 1,000 hatchets." In October the ship returned with its valuable cargo of furs, which was sold in London, often by auction.

The second period of Hudson's Bay Company history is that involving the local opposition in England to the traders. Between the treaties of Ryswick (1697) and Utrecht (1713), the measures of Peste, but after the latter treaty, from which time the bay has remained continuously English, the affairs of the company improved. This roused the envy of a number of merchants, a leader among them being an Irish gentleman named Arthur Dobbs. He advocated an expedition to explore the Northwest Passage, raised by subscription a large sum to equip the ship to rival the company, and though his expedition did not accomplish much, yet the Hudson's Bay Company was disturbed, was put on its mettle, and the struggle as recorded in the government bluebook of 1749 is very interesting. A more serious movement, however, took place in French Canada. The charter of the company gave it the trade of all the lands and streams within "Hudson's Straights," with one most important limitation, namely, except those which are not now actually possessed by any of our subjects, or by the subjects of any other Christian prince or state. Long before the Hudson's Bay Company penetrated Rupert's Land, the French ascended the Great Lakes and 20 or 30 years before the English had reached the Saskatchewan. A treaty was concluded between the French and the Indians, and Frobisher Bay explored the river system of Rupert's Land and came in sight of the Rocky Mountains. This feat was accomplished by Sieur de la Verendrye, who in 1738 caused a fort to be erected on the site of Fortouf on the Saskatchewan, and took possession of the country for the King of France. The conquest of Canada by Wolfe put an end to this French occupation, but as later discussions show left it a part of Canada. Soon after the conquest of Canada, however, a critical movement took place in the effort of the Hudson's Bay Company to penetrate the interior from the bay, on whose shores for nearly a century it had lain in slumber. This advance was under the leadership of one of the captains of exploration, Samuel Hearne, a Hudson's Bay Company officer, sometimes called the "Mungo Park of Canada." Hearne discovered the Coppermine River and followed it to its mouth on the Arctic Sea. He, too, first of white men saw Great Slave Lake. But, also, shortly after the transfer of Canada from France to England, Scottish traders from Montreal began to ascend the waterways of Canada, and to pass from Lake Superior on to Lake Winnipeg and the Saskatchewan River, the latter river being named by a Frenchman, Henry (1760), Thomas Curry, James Finlay and the brothers Frobisher, traders from Montreal, led the way and reached the Saskatchewan. Hearne from Hudson Bay heard of the Canadian traders having built a fort at Sturgeon Lake, and two years later (1774) accepted the gage of battle, and built Fort Cumberland alongside of his rivals on the Saskatchewan. The war of the giants had now begun, and for well-nigh 50 years it raged with increasing rancor in the region of the movement of the Scottish merchants named, from Montreal, grew the union of traders (1783-84) known as the Northwest Company. Its leading traders were Frobisher, Mackenzie, McLeod, McGillivray, Grant, Cameron and greatest of all Simon McTavish—familiarly called "Le premier," and the founder of the Northwest Company. The magnates of this great company Washington Irving has characterized as the "Lords of the Lakes and Forests." Their trade was enormous and extended to the coast of the Pacific Ocean itself. Toward the end of the century (1798-99) one year's production of furs was 106,000 beavers, 32 martens, 11,800 mink, 17,000 musquash—counting alto-
gather 184,000 skins. At this time the Northwest Company employed, besides officers and partners, 21 interpreters and 5 clerks, 1,200 canoe men and 35 guides. But the Hudson's Bay Company was not to be beaten. They were able to carry goods from the sea-coast of Hudson Bay to the inland parts of Rupert's Land earlier in the season, even in the Red River districts, than the Nor'-Westers were able to do by the long river and lake route from Montreal. They duplicated all the forts of the Northwest Company. The confusion became worse confounded when the Northwest Company divided (1796) into two rival factions, the rebels forming themselves into the "New Northwest Company" or "Alexander Mackenzie and Company." more familiarly, however, known as the "X.Y." the name being from the letters of the alphabet following the initials of the old company N.W. The young company was intensely active, and about this time, but only for a short period, the introduction of dangerous amounts of strong drink took place among the Indians. After eight years of detail the two sections were reunited as the "Northwest Company."

Early in the 19th century a new problem arose. A Scottish nobleman, the Earl of Selkirk, obtained control of the stock of the Hudson's Bay Company and proceeded to settle up the fertile lands along the Red River, bringing his colonists chiefly from Scotland by way of Hudson Bay. This invasion of the fur-country (1812-15) by farmers the Nor'-Westers strongly resented. They several times drove out, or invaded away many of the highland settlers who were beginning to till the soil within two or three miles of the site of the present city of Winnipeg. Two forts represented the opposing parties—Fort Gibraltar, the Northwest Company fort—Fort Douglas, the Lord Selkirk stronghold. The descendants of the Nor'-Wester French voyageurs, whose mothers were Indian women, were now becoming numerous and went by the name of Metis (Half-breeds) or Bois-Brulés (Charcoal faces). They were chiefly in the employ of the Nor'-Westers, while the servants of the Hudson's Bay Company, largely Orkneymen, were called by their opponents "Les Orcanais." Attacks on the forts were begun by the hostile factions, and in 1816 Governor Semple and 20 of his officers were killed by the Bois-Brulés, and Fort Douglas was captured. In the next year Lord Selkirk arrived supported by a band of several hundreds of discharged mercenary soldiers who had fought in the War of 1812-15 in eastern Canada. This his lordship had hired and with their aid Fort Douglas was retaken and the colonists re-established in their farms. About the year 1811 John Jacob Astor of New York engaged a number of men who had been in the Northwest Company and with these established Astor House on the Columbia River. This movement took place by way of the Cape Horn route and the rendezvous was in what was known as the Oregon region. The Nor'-Westers taking advantage of the state of war between Great Britain and the United States sold Astoria and employed the greater number of the Astorians in their posts in New Caledonia, as the region of British Columbia was then called. The conflicts of the various companies in different parts of Rupert's Land, the Mackenzie River district and New Caledonia well-nigh destroyed the fur trade. Now arose a man who was to be the company's protector and leader of all the fur-traders. This was a young Scottish clerk in the Hudson's Bay Company—George Simpson (see SIMPSON, Sir GEORGE). On the union of the more-or-less companies in 1821, Simpson was made chief officer and in time he became the Earl of Selkirk than in 40 years he built up the united company, and spent a portion of his time at Fort Garry, the chief point in Rupert's Land, as it was also the capital of Assiniboia, as the Selkirk colony was legally called. In Assiniboia a community of 12,000 grew up, 5,000 Metis, 5,000 English-speaking or locally called Scotch half-breeds, and some 2,000 whites. Not only in this chief settlement, but from Labrador in the Atlantic Ocean to Vancouver Island on the Pacific did the little despot rule. Great forts were scattered over this wide domain, such as Fort Victoria on the Pacific shore, Fort Simpson in the Mackenzie River district, Fort Chipewyan on Lake Athabasca, Fort Edmonton on the Saskatchewan River, Fort Edmonton on the same river, Norway House on Lake Winnepeg, York Factory and Port Churchill on Hudson Bay, Fort William on Lake Superior, Sault Sainte Marie, between Lakes Huron and Superior, the King's post on the lower Saint Lawrence River, and Rigolotte in extreme Labrador. From Lachine, his residence, Sir George Simpson dictated law throughout this vast extent of country, and compelled order and industry. The company quoting its charter rights was at times repressive in dealing in its territory with traders other than its own. The usual metaphor for describing Rupert's Land was that it was "surrounded by a Chinese wall." After a revolt of the Metis in 1849 this largely ceased to be the case. The company always retained the confidence of the Indians, and with practically no police or military maintained a fair state of law and order. The fertile plains of Rupert's Land were visited by several exploratory expeditions shortly after the middle of the 19th century. Some of these were that of Palliser and Hector, 1857, of H. Y. Hind in the same year and of Milton and Cheadle a few years afterward. A famous parliamentary investigation took place in London in the year of Palliser's expedition. Canada was at this time becoming alive to the importance of the Northwest. Negotiations took place between the British and Canadian governments which culminated in 1868-70 in the virtual decision that Rupert's Land, and the Northern and Western territories which were leased to the Hudson's Bay Company, should become Canadian. Unskillful dealing on the part of the Dominion government with the people of Red River Settlement led, however, to the Riel rebellion of 1869-70. A military expedition of British troops and Canadian volunteers was sent by the old fur traders' route to Red River, but the rebels disappeared before the arrival of the troops. In 1870 the sum of $4,500,000 was paid by Canada to the Hudson's Bay Company to satisfy its claim. The province of Manitoba was formed by the Canadian Parliament, and thenceforward the West as far as the Rocky Mountains became a part of Canada. Several years afterward British Columbia came into the Dominion as a province.
The Hudson's Bay Company, though shorn of all political power, still survives, and is vigorous. It still seeks for furs in the far North, and is the largest land company in Canada, owning one-twentieth of every new township, which the government surveys. This serves to give the Hudson's Bay Company a strong interest in building up and developing the newer portions of the country. In addition, the company has been more or less directed itself to conducting large shops in the leading business centres of western Canada. The largest of these is the store in Winnipeg. This with its different departments does an enormous trade not only in Winnipeg, but in supplying the use of the mails the needs of all parts of the country. Important stores are maintained by the company in Portage la Prairie, Rat Portage, Fort William, Calgary, Vancouver, Edmonton and Prince Albert. The governor of the Hudson's Bay Company till 1914 was the predominating figure, Lord Strathcona, the Canadian commissioner in London. As the writer has elsewhere said, for the last 15 years the veteran of kindly manner, warm heart, and genial disposition, Lord Strathcona and Mount Royal (q.v.), has occupied this high place. The clerk, junior officer and chief factor of 30 hard years on the inhospitable shores of Hudson Bay and Labrador; the commissioner who, as Donald A. Smith, soothed the Riel rebellion, and for years directed the reorganization of the company's affairs at Fort Garry and the whole Northwest; the daring sculptor who took hold with his friends, of the Minnesota and Manitoba Railway, and with Midas touch turned the enterprise to gold; a projector and a builder of the Canadian Pacific Railway; the patron of art and education, and the patriot who sent out at a cost of between $1,000,000 and $2,000,000 the Strathcona regiment of horse to the South African War has worthily filled the office of governor of the Hudson's Bay company, and with much success reorganized its administration and directed its affairs. See also the articles The Era of Early Discovery; and Commerce, Tariffs and Transportation.

GEORGE BRYCE, 
Author of 'History of the Hudson's Bay Company.'

37. WASHINGTON TREATY. The Treaty of Washington, between the United States and Great Britain, was signed on 8 May 1871, and had reference to the Alabama claims (q.v.), the fisheries question, the lake, river and canal navigation, the bonding privilege and the Vancouver water boundary question. In the years immediately following the Civil War several causes of acute friction existed between the two countries. Of these the principal was the question of indemnity for the depredations committed by the Alabama and other Southern cruisers, whose construction in England was claimed by the United States to be a violation of neutrality. The second main cause of contention was the fisheries under the reciprocity Treaty of 1854, the fishermen of each nation were admitted to the inshore coast fisheries of the other. With the expiration of the treaty in 1866 the rights of American fishermen on the Atlantic Coast of Canada were limited to the privileges secured under the convention of 1818, with a modification of 1845 admitting them to the Bay of Fundy. By this they were excluded from taking fish within three miles of any coast, bays, creeks or harbors of British North America, except in special parts of the Newfoundland and Labrador coast, and off the Magdalen Islands. The proper interpretation of this three-mile limit had been a standing subject of controversy. It was claimed by Great Britain that the terms of the treaty precluded entrance into the bays by the United States that it merely forbid a nearer approach to the shores of the bay than a distance of three miles. This left in dispute the right to fish in the Bay of Chaleur and other important places. (See Cushing, 'Treaty of Washington,' ch. v.) As a temporary expedient since 1866, the Canadian government had sold licenses to American fishermen for a nominal fee. This scheme had proved abortive, for the raising of the licence fee in 1868 had resulted in an almost complete cessation in their use, only 25 being taken out in 1869. The Dominion government, in consequence, by an order in council (8 Jan. 1870) abandoned the system of licenses and equipped cruisers to protect its claims of the coast fisheries. The claims and the fisheries had been for some time a standing subject for negotiations. A treaty of January 1869 (known as the Johnson-Clarendon Treaty) was rejected by the Senate. Negotiations were renewed under President Grant and, at the suggestion of the British government, it was finally decided to appoint a joint high commission to meet at Washington to settle outstanding matters of dispute. The commissioners for the United States were Hamilton Fish, Secretary of State; Gen. Robert Schenck, Judge Nelson of the Supreme Court, Ebenezer Hoar and George H. Williams. The British commissioners were Lord de Grey, Sir Stafford Northcote, Sir Edward Thornton, Prof. Montague Barnard and Sir John Macdonald, Prime Minister of Canada. The deliberations lasted from 27 Feb. until 6 May 1871. Of the different points in the treaty agreed upon the most important is that in reference to the Alabama claims, on account of its bearing upon international law. The question at issue here was the extent to which Great Britain had been guilty of a breach of neutrality. The Alabama had been built in Birkenhead. The purpose of her construction had been a matter of general notoriety. The British government had refused to listen to any representations that fell short of being technical evidence. Even when the American consul at Liverpool furnished the needed proof, the dilatory action of the government permitted the cruiser to depart un molested. The question was whether, in reference to the Alabama, the Confederate cruisers, the government of Great Britain had shown the diligence demanded of a neutral power (see 42d Congress, 2d Sessn. Senate Exec. Doc. 31 November, pp. 146-51). The commission decided that the claims thus arising shall be referred to an tribunal of arbitration to be composed of five arbiters, one to be named by the President of the United States, one by Her Britannic Majesty, one by the King of Italy, one by the President of the Swiss Confederation and one by the Emperor of Brazil. The questions considered were to be
decided by a majority. Article 6 of the treaty declares: "In deciding the matters submitted to the arbitrators they shall be governed by the following three rules, which are agreed upon by the high contracting parties as rules to be taken as applicable to the case, and by such principles of international law not inconsistent therewith as the arbitrators shall determine to have the force of law applicable to the case: A neutral government is bound: First, to use due diligence to prevent the fitting out, arming or equipping, within its jurisdiction, of any vessel which it has reasonable ground to believe is intended to cruise or to be used in war against a power with which it is at peace; and also to use due diligence to prevent the departure from its jurisdiction of any vessel intended to cruise or carry on war as above, such vessel having been specially adapted, in whole or in part, within such jurisdiction, to warlike use. Secondly, not to permit or suffer either belligerent to make use of its ports or waters as the base of naval operations against the other, or for the purpose of renewal or augmentation of military supplies or arms, or the recruitment of men. Thirdly, to use due diligence in its own ports and waters, and, as to all persons within its jurisdiction, to prevent any violation of the foregoing obligations and duties. The tribunal thus arranged met at Geneva (December 1871) and in September 1872 Sodered its decision that the British government had failed to use due diligence in the performance of its neutral obligations, and awarded an indemnity of $5,500,000 to the United States. In regard to the fisheries, the treaty practically re-established the Reciprocity Treaty of 1854, throwing open the inshore fisheries of the Atlantic Coast north of latitude 39° to the fishermen of both nations (Art. XVIII, XIX). It also established reciprocal free trade in fish and fish oil (Art. XXI) and decided that commissions should be appointed to determine what extra compensation, if any, should be paid by the United States for the privileges thus acquired. A compensation of $5,500,000 was subsequently awarded by the Halifax Fisheries Commission (1894). The location of the northwestern boundary (see NORTHWEST BOUNDARY DISPUTE) which under the treaty of 1846 was declared to follow the 49th parallel to the middle of the channel which separates the continent from Vancouver's Island and thence southwards through the middle of the said channel and Fucua Straits to the Pacific Ocean, was left (Art. XXXIV) to the decision of the German Emperor. It was further agreed (Art. XXVI) that the navigation of the river Saint Lawrence shall forever remain free and open for the purpose of commerce to the citizens of the United States. The United States in return declared the Yukon, Porcupine and Stikine open to British commerce (Art. XXVI), granting also to British subjects the right of navigation on Lake Michigan, the use of the Saint Clair Flats Canal on terms of equality with inhabitants of the United States. The bonding privilege (Art. XXIX) was mutually conceded. The fisheries provisions were not to go into effect until the laws required to carry them into operation should be passed by the British and Canadian Parliaments, the legislature of Prince Edward Island and the Congress of the United States. The entire treaty was to remain in force for 10 years, after which certain provisions (Art. XXIX) of the treaty was to terminate on two years' notice from either party. The fisheries clauses of the treaty were subsequently renounced by the United States and after due notice expired 1 July 1885. For further details regarding the work of Cushings (mentioned above) may be consulted. The text of the treaty is in Treaties and Conventions of the United States (1899). For the part played by Sir John Macdonald (q.v.) in the negotiations and their relation to Canadian politics, see Pope, Memoirs of Sir John A. Macdonald, Vol. II, ch. xix-xxi.

STEPHEN LEACOCK,

Professor of Economics and Political Science,
McGill University.

38. JESUIT ESTATES ACT. This measure, passed by the legislature of Quebec in 1888, gave rise to an agitation which occupied public attention throughout all parts of Canada during the following year and for a time threatened to bring about a reconstruction of political parties. Under the French régime, which ended in 1763, the Jesuits had owned considerable landed estates at various points in the valley of the Saint Lawrence — particularly at Quebec, Montreal and Laperriere. After the conquest of Canada by the English the religious orders were permitted to retain the property which they held under grant from the French Crown or by other legal title, with the exception of the Jesuits. This order had been banished from France, 1767, and was suppressed generally by the papal brief Dominus ac Redemptor (1773). Although General Amherst brought influence to bear upon the government to secure for himself the estates of the Jesuits in Canada, his efforts proved unsuccessful. Despite personal pressure and the papal brief the "black robes" at Montreal and Quebec were not immediately molested by the British authorities who refrained from taking over their property until the death of Father Casot, the last remaining member of the Society. This event occurred in 1886. The once possessed of the Jesuits' estates the Crown had to determine what was to be done with them, and after a certain amount of indecision it was decided that their income should be used for the support of education in the province of Lower Canada. In vain the Roman Catholic bishops maintained the legality of the Church's claim to the property. The government stood its ground and appropriated the revenues.

From having been originally assigned to Lower Canada, the Jesuits' estates passed at Confederation (1867) to the hands of the province of Quebec. It was found, however, by the local government that their actual value was impaired by the ecclesiastical claims which stood against them. The bishops did not cease to protest against their retention by the state and the Jesuit order, revived the papal warrant, defended the justice of its own title. Had these lands been situated in a Protestant community the representations of bishops and Jesuits might have carried little weight, much as they were presented to the courts, but where the mass of the population was Catholic the reiterated claims of
the Church had their effect upon the market. After Confederation the rent of the property decreased until it became almost negligible in comparison with the taxes, and it was allowed to fall until it became a public nuisance. In 1887 the question had been put off by several preceding administrations, Mr. Mercier, a French nationalist of pronounced views, endeavored to effect a final settlement of it. Whatever the motives which actuated him, to criticize them would be to raise a matter of opinion. He introduced a bill which gave $400,000 to the Roman Catholic Church as compensation for the property which the Crown had seized in 1800. This sum was, for the moment, to constitute a special deposit which eventually should be distributed by the Pope in return for a relinquishment of all claims to the Jesuits' estates that had been advanced by the bishops or by the Jesuits themselves. As a matter of fact the Pope divided the money between the Jesuits, the bishops and Laval University, but in the meantime this recognition of his right to allot what were considered public funds among members of his own Church grew from a criticism of remonstrance from a large number of Protestants. A simultaneous grant of $60,000 to Protestant schools in Quebec did not allay the feeling of hostility.

It should be observed that two distinct questions were raised by the agitation which proceeded from the Jesuits' Estates Act. The first had its root in the opposition of religious systems; the second was due to Federal character of the Canadian constitution. In 1888, Colonel O'Brien, a Protestant member of the House of Commons, proposed that the Dominion Parliament should disallow the action of the Quebec legislature in appealing to the Pope and setting aside $400,000 as a subsidy to Roman Catholic institutions. The debate which followed was marked by a series of able and aggressive speeches from all quarters of the House. The chief supporter of Colonel O'Brien's motion was Mr. Dalton McCarthy, while against him were ranged the Premier, Sir John Macdonald, and Mr. Laurier, the leader of the Opposition. On the one side an appeal was made to the alleged political misdeeds of the Jesuits throughout the whole course of their history and to their expulsion from the chief countries of the civilized world. On the other, it was maintained that the Dominion Parliament could not, without extreme danger, disallow provincial legislation and that "the subject-matter of this act was one of provincial concern, only having relation to a fiscal matter entirely within the control of the legislature of Quebec." The vote of 189 to 13 against Colonel O'Brien's motion conveys but a faint idea of the public interest in this debate and in the issues which lay behind it. The fundamental claim of the extreme Protestant party was that recognition of papal authority and the encouragement of the Jesuits were direct breaches of Dominion sovereignty; while the leaders of both parties united to point out the constitutional dangers which would accompany disallowance.

Outside the House of Commons the agitation grew. It led to the formation of an "Equal Rights" party which was recruited from the ranks of the more pronounced Protestants. It proved impossible, however, to break down existing political lines by giving central importance to an anti-Catholic movement. Despite many public meetings and an active campaign in the newspapers, the attacks upon the Jesuits' estates never touched the hallowed walls. Politically the movement died away, but its most lasting trace upon party organization in Canada is the very real and undying hostility of the political leaders to the territorial limits of Rupert's Land, which are also claimed by the United States. In 1884, the province of New Brunswick was divided into four counties, each having one representative in the legislature, and the two counties of York, which were added to the province of Quebec under a treaty of 1841, were transferred to the province of Ontario. The effect was to extend the province of Ontario northward to the 50th parallel of north latitude and the southern shores of Hudson Bay, to the northern limits of Ontario to Hudson Bay and to throw into the province of Quebec the whole of the huge territory of Ungava and Labrador with the exception of that part of the coast line which belongs to Newfoundland. Manitoba thus received about 113,984,000, Ontario 93,696,000 and Quebec 227,175,000 acres of additional territory. The agricultural possibilities of these new areas are at present unknown.

Effects of Climate.—Extending over such a large area and presenting topographical and orographical features of considerable variety, the Dominion of Canada possesses a series of different climates which influence and modify the local agriculture. The Atlantic provinces (Prince Edward Island, Nova Scotia and New Brunswick) have comparatively mild winters with a moist, cool atmosphere. Potatoes and root crops do well, and buckwheat is a special crop. In Quebec and in the eastern and northern parts of Ontario the winters are colder and the summers are warmer than they are at the coast on either seaboard. The ground is usually covered by deep snow during winter, and there are occasionally spells of intense cold. In the spring and of intense heat in summer, the latter usually tempered however by cool nights of great benefit to vegetation. A special characteristic is the rapidity with which the spring advances and merges into summer, and the rapidity of vegetation when once the winter snows have melted. In the southern parts of Ontario, especially that part of it which is known as the Niagara peninsula, the climate is considerably

CHARLES W. COLBY,
Formerly Professor of History, McGill University.

39. AGRICULTURE. At least half of the population of Canada is directly or indirectly dependent upon agriculture, the chief industry of the Dominion. During the present century agricultural development in Canada has been extremely rapid, and although violent dislocations were caused by the European War there are indications that after the conclusion of peace a new period of rapid agricultural expansion will begin.

Political Boundaries.—Extending westward from the Atlantic to the Pacific and northward from the United States boundary into the Arctic circle, Canada, in size, embraces a total area computed at 3,729,665 square miles, of which 128,755 square miles have been ceded to the United States. Politically, Canada is divided into nine provinces, in addition to which there are the Northwest and Yukon territories. Each province has control over its own affairs. Agricultural conditions vary with climate and physical characteristics, density of population, accessibility of markets and special aptitudes of the people. In 1912 took place the latest adjustment of the provincial boundaries when by act of the Dominion Parliament portions of the Northwest territories were added to the province of Alberta, from Ontario and Quebec. The effect was to extend the province of Manitoba northward to the 60th parallel of north latitude and the southern shores of Hudson Bay, to extend the northern limits of Ontario to Hudson Bay and to throw into the province of Quebec the whole of the huge territory of Ungava and Labrador with the exception of that part of the coast line which belongs to Newfoundland. Manitoba thus received about 113,984,000, Ontario 93,696,000 and Quebec 227,175,000 acres of additional territory. The agricultural possibilities of these new areas are at present unknown.
milder. Fruit cultivation is therefore a great feature, and tender fruits such as peaches, peaches, and apricots are grown to perfection. Corn is an important crop grown both for grain and green fodder or silage. The Prairie provinces (Manitoba, Saskatchewan and Alberta) have cold winters, but the air is dry and bracing. Usually, especially in Manitoba and Saskatchewan, the amount of snowfall is not sufficient to prevent the snow from melting and ensuring ample moisture during the early stages of plant growth. In Alberta the winter climate is variable, but milder as a rule than in the other Prairie provinces. Cattle ranching is a feature in certain parts, the animals being able to obtain grazing in the spring and fall and find their own food. The Chinook winds, which blow down from the Rocky Mountains, often cause a rapid increase of temperature to the extent sometimes of 60 degrees. In southern Alberta are large semi-arid areas in which irrigation and methods of dry farming are being successfully practised. Finally in British Columbia the climate varies greatly with altitude, latitude and coast proximity. The valleys are warm and suitable for a great variety of crops and are well suited for mixed farming. The areas near the coast have mild winters and a long spring, conditions resembling those of the south of England. The precipitation varies a good deal. It is as much as 100 inches per annum in some parts; in others it is so scanty that agriculture is dependent upon artificial irrigation. This is being resorted to with marked success for fruits and vegetables.

Economic Factors.—Since the beginning of the present century agriculture in Canada has been profoundly influenced by immigration and railway construction. The total number of immigrant arrivals in Canada during the 16 years ended 31 March 1916, was 3,099,348, of whom 1,168,292 came from the United Kingdom, 1,095,375 from the United States and 835,681 from all other countries. The largest number of immigrants arrived in the single year was 402,432, who arrived in 1913. Partly dependent upon immigration and partly stimulating it there has been during the same period an extraordinary activity in railway construction. Two additional transcontinental lines, the National Transcontinental, constructed by the Dominion government and the Grand Trunk Pacific Railway, and the Canadian Northern, have been added to the previously existing line of the Canadian Pacific Railway opened in 1886. Altogether, during the first 16 years of the present century 19,773 miles have been added to the railway systems of Canada, the total mileage of which on 30 June 1916 stood at 37,430.

With a total land area of 1,401,316,413 acres, only 109,948,988 acres, or less than 8 per cent, were returned as occupied farm lands at the census of 1911, this area representing an increase since 1901 of 46,526,650 acres. Of the occupied area in 1911, 48,733,823 acres were returned as improved and 61,215,165 acres as unimproved land. The unimproved occupied land consists of 17,477,520 acres of natural forest, 47,973,750 acres of pasture and hay lands, and the remainder of 39,563,369 acres of unbroken prairie or other land that is gradually being brought under the plough. Of the improved area of 48,733,823 acres, field crops occupy 35,261,338 acres, orchards and nurseries 403,596 acres, vegetables 206,011 acres, vineyards 9,836 acres and small fruits 17,495 acres. The remainder 12,685,547 acres of improved land consist of pasture, fallow or otherwise uncleared land. In 1911 the total number of occupiers of land was 714,646, an increase of 169,958, or 31 per cent, since the previous census of 1901. About 74 per cent of the holdings in Canada were over 50 acres in extent as compared with 68 per cent in 1901.

Field Crops.—During the decade 1900 to 1910 the area under field crops increased from 19,763,740 acres to 30,556,168 acres, a ratio of 54.6 per cent. In 1911 field crops occupied 35,261,338 acres, this increase in the 11 years representing over 78 per cent. During the past five years the total area under field crops has continued to be about 35,000,000 acres; but in 1915, under the stimulus of war, the acreage rose to its highest point, viz., 39,140,460 acres. The recent expansion of area has been chiefly in wheat, oats and flax, and is due to the opening up and settlement of the Prairie provinces—the great feature of Canadian progress since the beginning of the present century. The area under wheat, which was a little over 7,000,000 acres in 1900 rose to over 10,000,000 acres in 1914. Similarly, the acreage under oats has practically doubled, and flaxseed which only occupied 23,000 acres in 1900 occupied over 1,000,000 acres in 1914. During the past 30 years the distribution of the principal crops in Canada has undergone considerable change. In the 19th century the chief wheat-growing province of Canada was Ontario, and in 1890 the wheat acreage of this province was 1,430,532. But with the completion of the Canadian Pacific Railway, the fertile prairies of the West began to be opened up for wheat growing, and in 1890 the wheat area in Manitoba had grown to 896,622 acres from 5,293 acres in 1880. At the close of the century the wheat area of Manitoba was 1,950,200 acres, as against 1,487,633 acres in Ontario. In the first decade of the 20th century wheat growing in Ontario began to decline, while in the West it progressively increased so that in 1910 wheat in Ontario occupied only 870,354 acres, and in 1914 only 834,852 acres, while in territories to the West of Manitoba also progressed; and since 1905, when the provinces of Saskatchewan and Alberta were formed, the three Prairie provinces have become the great wheat-producing area of the Dominion. The following statement showing the area under the principal grain crops in the Prairie provinces, as compared with the rest of Canada for the year 1915, will make this point clear:

<table>
<thead>
<tr>
<th>Crop</th>
<th>Prairie provinces, acres</th>
<th>Rest of Canada, acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>13,868,000</td>
<td>1,241,400</td>
</tr>
<tr>
<td>Barley</td>
<td>1,171,000</td>
<td>547,000</td>
</tr>
<tr>
<td>Oats</td>
<td>6,481,000</td>
<td>5,107,000</td>
</tr>
<tr>
<td>Flaxseed</td>
<td>458,000</td>
<td>5,000</td>
</tr>
</tbody>
</table>

In the Prairie provinces, therefore, for the year 1915, wheat occupied 92, barley 68, oats 56 and flax 1 per cent of the total area under these crops in the Dominions.

In most parts of Canada wheat is sown in the spring; but in the southern parts of Ontario and in Alberta, wheat, sown in the fall, ripens earlier and gives usually a
higher yield than the spring sown varieties. With fall sown wheat there is usually a proportion, varying from about 5 to 30 per cent according to the mildness or severity of the season, of the area that is winter-killed, but reploughed and resown in the spring in Manitoba, Saskatchewan and British Columbia there are also small areas upon which fall sown wheat is grown. Other crops that have a more or less local importance are buckwheat which is grown in the Atlantic provinces, in Ontario and in Quebec, corn, grown chiefly in Ontario and Quebec, and potatoes, which are an important crop in Nova Scotia and New Brunswick, where they occupy a larger area than does wheat.

The following table gives the area and production of all the principal field crops of Canada for the years 1900, 1914 and 1915, with annual averages for the five years 1910-14.

<table>
<thead>
<tr>
<th>AREA</th>
<th>1914. acres</th>
<th>1915. acres</th>
<th>1910-14. acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crops</td>
<td>1914. acres</td>
<td>1915. acres</td>
<td>1910-14. acres</td>
</tr>
<tr>
<td>Fall wheat</td>
<td>973,000</td>
<td>1,030,600</td>
<td>1,010,000</td>
</tr>
<tr>
<td>Spring wheat</td>
<td>9,321,000</td>
<td>14,078,800</td>
<td>9,444,000</td>
</tr>
<tr>
<td>All wheat</td>
<td>10,494,000</td>
<td>15,109,400</td>
<td>14,454,000</td>
</tr>
<tr>
<td>Rye</td>
<td>111,000</td>
<td>122,000</td>
<td>121,000</td>
</tr>
<tr>
<td>Barley</td>
<td>1,490,000</td>
<td>1,718,000</td>
<td>1,500,000</td>
</tr>
<tr>
<td>Oats</td>
<td>10,682,000</td>
<td>12,749,000</td>
<td>11,914,000</td>
</tr>
<tr>
<td>Peas</td>
<td>206,000</td>
<td>296,000</td>
<td>267,000</td>
</tr>
<tr>
<td>Beans</td>
<td>16,000</td>
<td>48,000</td>
<td>48,000</td>
</tr>
<tr>
<td>Buckwheat</td>
<td>129,000</td>
<td>152,000</td>
<td>137,000</td>
</tr>
<tr>
<td>Mixed grains</td>
<td>118,000</td>
<td>107,000</td>
<td>108,000</td>
</tr>
<tr>
<td>Flaxseed</td>
<td>1,400,000</td>
<td>1,920,000</td>
<td>1,410,000</td>
</tr>
<tr>
<td>Corn (for haying)</td>
<td>236,000</td>
<td>235,000</td>
<td>230,000</td>
</tr>
<tr>
<td>Potatoes</td>
<td>476,000</td>
<td>486,000</td>
<td>476,000</td>
</tr>
</tbody>
</table>

| Turnips, etc. | 175,000 | 157,000 | 189,000 |
| Hay and clover | 71,907   | 7,727    | 8,268   |
| Alfalfa       | 90,000    | 98,000    | 88,000   |
| Fodder corn   | 317,000   | 322,000   | 302,000  |
| Sugar beet    | 12,000    | 16,000    | 17,000   |

<table>
<thead>
<tr>
<th>PRODUCTION</th>
<th>Bushels</th>
<th>Bushels</th>
<th>Bushels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall wheat</td>
<td>26,837,000</td>
<td>29,321,000</td>
<td>22,003,000</td>
</tr>
<tr>
<td>Spring wheat</td>
<td>18,000</td>
<td>30,400</td>
<td>22,000</td>
</tr>
<tr>
<td>All wheat</td>
<td>261,000</td>
<td>280,000</td>
<td>249,000</td>
</tr>
<tr>
<td>Rye</td>
<td>2,017,000</td>
<td>2,486,000</td>
<td>2,155,000</td>
</tr>
<tr>
<td>Barley</td>
<td>36,290,000</td>
<td>54,017,000</td>
<td>41,458,000</td>
</tr>
<tr>
<td>Oats</td>
<td>313,078,000</td>
<td>664,954,000</td>
<td>343,012,000</td>
</tr>
<tr>
<td>Peas</td>
<td>2,900,000</td>
<td>3,464,000</td>
<td>3,140,000</td>
</tr>
<tr>
<td>Beans</td>
<td>797,000</td>
<td>923,000</td>
<td>874,000</td>
</tr>
<tr>
<td>Buckwheat</td>
<td>8,366,000</td>
<td>8,666,000</td>
<td>8,631,000</td>
</tr>
<tr>
<td>Mixed grains</td>
<td>1,020,000</td>
<td>1,152,000</td>
<td>1,028,000</td>
</tr>
<tr>
<td>Flaxseed</td>
<td>7,175,000</td>
<td>6,114,000</td>
<td>7,033,000</td>
</tr>
<tr>
<td>Corn (for haying)</td>
<td>13,924,000</td>
<td>14,368,000</td>
<td>16,231,000</td>
</tr>
<tr>
<td>Potatoes</td>
<td>256,000</td>
<td>305,000</td>
<td>343,000</td>
</tr>
<tr>
<td>Turnips, mangolds, etc.</td>
<td>69,003,000</td>
<td>60,175,000</td>
<td>69,181,000</td>
</tr>
</tbody>
</table>

| Sugar beet    | 10,259,000 | 10,612,000 | 11,706,000 |
| Alfalfa       | 218,000    | 261,000    | 217,000    |
| Fodder corn   | 3,251,000  | 3,383,000  | 2,836,000  |
| Sugar beet    | 100,000    | 141,000    | 164,000    |

It should be observed that in the preceding table the years 1914 and 1915 represent opposite extremes as regards production, the year 1914 being one of the poorest grain seasons on record, while in 1915 circumstances combined to produce the most abundant grain crop that has been recorded in Canada. The particular cases are frequently high, occasionally reaching for wheat 60, for barley 50 and for oats 100 bushels per acre; but the average rate in production for wheat in Canada is about 19½ bushels per acre; in 1914 it was only 15½ bushels; in 1915 the average was 26 bushels. The average yield per acre of oats reached 40½ bushels in 1915; over a series of years the annual average is about 35½ bushels.

Other crop averages in bushels per acre are as follows: Rye 21.3; peas 15.5; beans 18.2; buckwheat 23; flax 10.5; corn 56; potatoes 158; turnips, mangolds, etc. 366; hay and clover average about 142, alfalfa 2½, fodder corn 9½ and sugar beets 9½. Among the numerous varieties of grain grown in Canada those most widely sown comprise for winter wheat Dawson’s Golden Chaff in Ontario and Turkey Red in Alberta, for spring wheat the Marquis, Red Fife and White Fife, for barley Mensury, Mandescouri and O. A. C. 21 and for oats American Banner and Siberian.

The average cost of grain production runs from about $12 to $14 per acre, the profit depending upon the yield and price which vary with the season and the world’s crops. Corn costs more to produce, averaging from $19 to $22 per acre, but the value of the crop and the profit are correspondingly higher. The surplus of grain over home requirements is annually exported, and the trade is highly organized. Exports of wheat and flour, principally to the United Kingdom, have increased with the increasing production. In 1914, after the abundant yield of 1913 they were upwards of 142,000,000 bushels, and in 1916 after the record harvest of 1915 they reached the total of 289,794,162 bushels. There is usually a small surplus of barley, oats and other grains for export, and practically the whole of the flaxseed crop goes across the southern border. Hay, compressed mechanically, is also exported both to the United Kingdom and to the United States. The largest export in recent years was 784,864 tons in 1912; but the annual average is between 200,000 and 250,000 tons. Flour milling is an important Canadian industry and in 1915 the value of flour and girt mill products was $114,483,924 from 1,644 establishments.

Sugar beet for the manufacture of beetroot sugar has been grown in Canada since the beginning of the century. At present the two factories, those of the Dominion Sugar Company at Wallaceburg and Kitchener in Ontario, are in operation for the manufacture of sugar from Canadian beetroot. For the season of 1915 the production of sugar beet was 143,081 tons from 18,000 acres, and the production of refined beetroot sugar was 39,515,802 pounds. Tobacco is grown in parts of Quebec and southern Ontario. In 1910 the production was 17,632,342 pounds from 18,926 acres. In 1915 the estimated production was about 9,000,000 pounds, and in 1916 about 5,943,000 pounds. The production of honey in 1910 was 6,089,784 pounds, the number of hives being returned as 100,372.

FARM LIVE STOCK.—Canada is well suited to the raising of all descriptions of farm live stock, although sheep in the central and colder parts cannot be kept out of doors during winter in the large flocks that are customary in countries with milder climates. As a general rule, Canadian farm animals are remarkably free from disease, and the more virulent contagious maladies are entirely absent. The accompanying table shows the total number of horses, cattle, sheep and hogs in the years 1910 and 1911, and as estimated annually at the end of June by the Census and Statistics Office for the years 1912 to 1916.
Fine horses, both light and heavy, are bred in all the provinces. Horse ranching is practised largely in southern Alberta and in southwest Saskatchewan under the favorable conditions of comparatively mild winters and light snowfall with abundant wild hay and pasture. There is a good demand for heavy horses, both for agricultural purposes and for the drawing of logs from the lumber camps. The favorite draught horse is the Clydesdale, a medium size being usually preferred for farm work. Next in importance comes the Percheron of which by far the larger numbers are in Alberta. The French Canadian is the draught horse of the French farmers in Quebec. The English Shire horse is also raised principally in Ontario, and there are small numbers of the Suffolk Punch and of Belgian breeds. Among the light breeds the Standard Bred trotter, used largely in trotting and pacing races, and the Hackney predominate. Thoroughbreds and coach horses are also raised. In 1911, 1,207 remounts were produced in the province, and have been especially in demand for the war. In 1911 the number of pure-bred horses was 33,149, an increase of 22,393, or 221.4 per cent. Since 1911, 11,917, or 60 per cent were Clydesdales. During the five years ended 31 March 1910-14 the average number of horses annually exported, chiefly across the southern border, was about 2,000; but in 1916 the exports rose to 26,818, of which management of skilled flockmasters. Nearly all the leading British breeds are to be found in Canada, the most numerous being the Shropshire, Oxford Down, Leicester, Cotswold and Southdown breeds. At the census of 1911 there were 53,513 pure sheep in Canada. The industry, in spite of earning 10 cents per pound of wool, encourages it on the part of the government, has steadily declined. In 1881 the total number of sheep in Canada was 3,048,678; in 1911 the number was 2,175,302, a falling off of 873,376, or 28 per cent. Since 1911 the numbers have continued to decline, and the estimated number on 30 June 1916 was 2,022,941, a further decline, since the census of 1911, of 152,361. The average price of wool has increased materially during the war; the prices in 1916 for washed and unwashed wool were respectively 50 and 37 cents per pound, as compared with 26 and 19 cents in 1914. Swine, unlike sheep, have increased steadily in numbers during the last 30 or 40 years. In 1881 they numbered 20,610, and in 1911 36,978. Swine raising, especially in the West, is a fluctuating industry, being largely dependent upon cheap feeding grain. When for instance prices rose suddenly on the outbreak of the war, pig production of large farms became remunerative, and large numbers were immediately thrown on the market at nominal prices. On 30 June 1916, the estimated number of swine in Canada was 3,474,840. The principal breeds are the Yorkshire, Berkshire, Chester White and Tamworth; but the Yorkshire largely predominate. In 1911, 56,457 pure bred swine were returned as on Canadian farms. Poultry raising as an adjunct to ordinary farming has made great strides. In 1911 the numbers of all descriptions of poultry were 31,793,261 of the value of $11,092,320 as compared with 17,922,668 in 1901 of the value of $5,723,890. The production of eggs in 1911 was 123,071,034 dozen, value $23,501,173. Turkeys are easily reared in Canada, and are often a valuable source of additional farm revenue.

Dairying Industry.—Dairying is practised in all the provinces of Canada, but it is carried on chiefly in Ontario and Quebec. The factory system for the manufacture of cheese and creameries for the making of butter have been largely instrumental in the development of the industry. Cheese factories date from the early sixties, the first cheese factory in Canada having been established on the farm of G. V. de Long at Norwich, Oxford County, Ontario, in the spring of 1864. Much has been done by both the Dominion and Provincial governments to improve the methods of cheese making in Canada, as well as to repress fraudulent practices injurious to its reputation. Since 1890 Canadian trade in agricultural products to Great Britain has increased, and there has gradually been built up an increasing export trade in Canadian cheddar cheese which in the British markets now enjoys a high reputation for purity and excellence of quality.

<table>
<thead>
<tr>
<th>Livestock</th>
<th>1910</th>
<th>1911</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horses</td>
<td>1,577,493</td>
<td>1,598,958</td>
</tr>
<tr>
<td>Milk cows</td>
<td>2,408,677</td>
<td>2,392,055</td>
</tr>
<tr>
<td>Other cattle</td>
<td>3,167,774</td>
<td>3,160,828</td>
</tr>
<tr>
<td>All cattle</td>
<td>5,768,451</td>
<td>5,526,083</td>
</tr>
<tr>
<td>Sheep</td>
<td>2,510,250</td>
<td>2,174,300</td>
</tr>
<tr>
<td>Swine</td>
<td>2,353,828</td>
<td>3,654,778</td>
</tr>
</tbody>
</table>

21,833 went to Great Britain, most of them as military remounts. Cattle, principally of British origin, are bred in all the provinces, and, as in the case of horses, there are large ranches in Saskatchewan and Alberta. The beef breeds include Shorthorns, Herefords, Aberdeen Angus and Galloways, comprising the greater majority. In Ontario cattle raising is a very important industry, the animals being fattened on grass lands during summer and in the stable during winter. Of late years, especially in the western counties of Ontario, fine herds of purebred cattle have gradually been established, and their quality has been maintained by large imports from the mother country. As a consequence the trade in pure bred stock with the United States has been considerably developed. Cattle throughout Canada have been reduced in numbers by slaughter for the purpose of meat exports to Great Britain in consequence of the war, but herds are being gradually replenished by the breeding of young stock. Amongst dairy cattle are the Shorthorn, Ayrshire, Jersey, French Canadian and Holstein-Friesian breeds. Many parts of the Dominion are quite favorable for the keeping of sheep and for the production of mutton and wool of the highest quality, but the research work of the live stock industry has not been followed so generally as it might have been. In individual cases, however, sheep raising has proved very profitable under the
Butter made under the creamery system was formerly exported in considerable quantities to Great Britain; but during the past decade,—a period coincident with a marked increase in the population of Canada by immigration—the exportation of butter has been greatly reduced, whilst for the same reason the quantities manufactured and exported of cheese have diminished. The production of milk has increased, but its use has been diverted from the making of cheese to the making of butter, of which comparatively little is available for export after satisfaction of home requirements. Since 3 Aug. 1909, when the Payne-Aldrich tariff took effect, there has been a considerable exportation of fresh cream from Canada into the United States. In the year 1916 the production of cheese in factories amounted to 192,968,597 pounds of the value of $35,512,622 as compared with 220,833,269 pounds of the value of $22,221,430 in 1900. The production of creamery butter in 1916 was 82,564,130 pounds of the value of $20,965,577, as compared with 36,066,739 pounds of the value of $7,240,972 in 1900, the number of factories and creameries being 3,446 as against 3,576 in 1900. The production of homemade butter in 1910 was 137,110,200 pounds, as compared with 105,343,970 pounds in 1900, and in 1910 the production of home-made cheese was 1,371,092 pounds. For 1910 the total production of cheese was 201,275,297 pounds and of butter 201,808,965 pounds. In 1910 condensed milk products were made in 11 factories amounting to 27,831,596 pounds of the value of $1,814,871. During the five fiscal years ended 31 March 1916 the average annual exports of cheese have been 153,941,732 pounds as compared with 215,137,339 pounds for the first five years of the century. Similarly, for the same periods in the case of butter the exports have averaged 3,413,515 pounds as against 26,930,551 pounds. There is on the other hand a comparatively small importation of varieties of cheese not manufactured in Canada, amounting to about 1,500,000 pounds. Dairying in the Prairie provinces has recently made considerable progress, and there is every indication that the dairy products of these provinces will soon be more than sufficient to supply all the western requirements and leave a substantial surplus for export.

Fruit Growing.—This is an increasingly important branch of the agricultural industry in Canada. Apples, plums and small fruits are grown in every province in Canada; but the production of fruits on a large scale is confined practically to three well-defined fruit growing districts, viz., the Annapolis Valley in Nova Scotia, the eastern, southern and western parts of Ontario, and the southern part of the Niagara peninsula, and in the valleys of British Columbia. In Nova Scotia apples for export are the chief fruit; but in the Niagara peninsula pears, peaches, grapes and other tender fruits, as well as apples, grow to perfection. In British Columbia great progress in fruit growing has taken place during the present century, and in certain parts of the province, where the rainfall is scanty, irrigation has been resorted to with marked success for the growth of all kinds of fruit. The census return of 1911 showed an increase in the area devoted to orchards of 47,490 acres, the area having grown from 354,106 acres in 1901 to 403,596 acres in 1911. Grapes are grown for wine making to a small extent in southern Ontario, and the total acreage under vineyards was 9,830 in 1911. The total number of fruit trees in bearing in 1911 was 14,002,145 and of non-bearing fruit trees the number was 8,315,236. The output varies considerably with the season and the prevalence of insect pests, but in the year 1910 the production of the following fruits was, in bushels, as follows: Apples 10,618,666; peaches 646,526; pears 504,171; plums 593,994; cherries 236,947; other fruits 47,789. Apples are exported principally to the United Kingdom, the quantity ranging during the past five years from 523,658 barrels in 1911 to 1,664,165 barrels in 1912. In 1916 the exports were 577,451 barrels. One barrel holds on the average about three bushels. A certain amount of cider is annually made in the apple growing districts, the exports being upward of 150,000 gallons and occasionally exceeding 200,000 gallons. Maple sugar and maple syrup are made on farms where the trees flourish, chiefly in Quebec and Ontario. In 1910 the total production of maple sugar was 10,488,340 pounds and of maple syrup 1,802,581 gallons.

Value of Agricultural Production.—In 1915 the estimated value of the field crops of Canada was $825,370,000, but this was a year of exceptional abundance. For 1916 the total value was $886,494,000, owing to the high prices caused by the war. The average annual value of the total agricultural production of Canada may be placed at about $782,000,000, including field crops $650,000,000, dairy products $70,000,000, wool $2,000,000, poultry and eggs $25,000,000, and fruits and vegetables $35,000,000. The total value of horses, cattle, sheep and swine estimated at $903,686,000 for 1916.

Agricultural Organization.—Associated effort for the improvement of agriculture is largely directed and controlled by the Department of Agriculture of the Dominion government, but each of the nine provincial governments has also a department of agriculture serving local needs. Since 1911 an important advance has been made by the Dominion Parliament in appropriating large sums annually for the encouragement of agriculture under the Agricultural Instruction Act of 1913. The funds thus available are divided amongst the nine provinces and administered in close cooperation with the provincial departments of agriculture. The amount now annually appropriated under this act is about $1,000,000. A great deal of the work of the Dominion department is carried on through the experimental farms and stations which are situated in different parts of Canada. A central farm at Ottawa and four branch farms in Nova Scotia, Manitoba, the Northwest territories and British Columbia were originally established in 1886 under the Experimental Farm Stations Act. These five farms continued in operation for 20 years when their usefulness became so apparent that steps began to be taken for their extension; and two new stations were established in Alberta in 1907. Since then development has been rapid; and in 1917 the experimental stations of the Dominion government originally
five in number with a total acreage of 3,472, number 21 with an acreage of 11,148, not counting seven smaller substations at points in British Columbia, Alberta and the Northwest territories. The more strictly scientific work of the farms is in central farms in Ottawa, in 13 divisions, comprising field husbandry, animal husbandry, horticulture, cereals, chemistry, forage plants, botany, poultry, tobacco, economic fibre, illustration stations, agriculture, extension and publicity. Amongst the results of greatest general influence upon Canadian agriculture, due directly to the experimental work of the farms, may be mentioned the practice of early sowing, the adoption of summer fallowing and the distribution of improved varieties of seeds of cereal and other plants, especially in the West. Phenomenal success has indeed attended one branch of the work of the experimental farms by the introduction of the Marquis variety of hard wheat. This wheat, which possesses all the good qualities of the Red Pife with the added advantages of an earlier ripening and superior yield, leaped into fame by taking the champion prize for the best hard wheat at the first American Land Show, held in New York from 3-12 Nov. 1911. Since then it has taken many similar prizes, and is now in process of rapid distribution throughout the western grain-growing area in replacement of the Red Pife. The work of the Dominion Department of Agriculture extends over many other important fields, including the seed branch for the assaying of seeds in respect of germination and purity; the dairy and cold storage branch; the fruit branch; the health of animals branch under a veterinary director-general; the live stock branch for improvement of farm live stock; and an entomological branch. All these branches not only administer laws affecting the subjects with which they deal, but also carry on scientific investigation at field and other laboratories. Important work in the improvement of farm seeds is being accomplished by the Canadian Seed Growers' Association, who work in close association with the seed branch of the department. The maintenance of pedigree registers of pure-bred live stock is in charge of a National Record Board which receives special grants, facilities and privileges from the Dominion government. Under the Live Stock Pedigree Act, 1900, the pedigree records of live stock were both unified and nationalized. Each of the breed societies in Canada, while remaining responsible for the local management of its own affairs, is represented upon the National Record Board for the issue of pedigree certificates, which before issue are certified by an officer of the live stock branch of the Department of Agriculture; so that every pedigree certificate has behind it a government guarantee of accuracy, a matter of concern in connection with international trade. Only the Holstein-Freisian Society of Canada remains outside this scheme. Much is being done to test experimentally the varieties of tobacco best suited to the Canadian climate and to the methods of cultivation, curing, marketing, etc. Canada is an adhering country of the International Institute of Agriculture, and an officer of the Department of Agriculture acts as Canadian commissioner of the Institute. The publications of the various branches of the department, most of which are issued gratis, are voluminous and diverse; so much so that within recent years a special branch of the department has been organized for their more effective distribution. This branch also issues monthly the Agricultural Gazette of Canada.

Of the provincial departments of agriculture, the oldest and most thoroughly organized are those of Ontario and Quebec. Farmers' institutes and clubs, women's institutes, agricultural and live stock associations and fairs are amongst the agencies employed; but probably the agricultural colleges and experiment stations in each province have the greatest influence. Foremost amongst these institutions are the Ontario Agricultural College at Guelph under the provincial department of agriculture and the Macdonald Agricultural College at Sainte Anne de Bellevue in the province of Quebec. The college at Guelph is remarkable for the comprehensive thoroughness with which it covers the theory and practice of agriculture, while the departments comprise field and animal husbandry, dairying, poultry, apiculture, horticulture, pomology, agricultural chemistry, bacteriology, zoology, entomology, botany and physics. The Ontario Agricultural and Experimental Union, which is organized by officers of the college for the conduct of annual cooperative experiments by farmers throughout the province, has been in existence for 38 years, and the average number of annual experimenters is about 4,500. The Macdonald College at Sainte Anne de Bellevue is a newer institution dating from 1907; but is gradually covering much the same ground for English-speaking students of the province of Quebec. Both colleges provide courses for the graduation of students with the degree of B.S.A. (Bachelor of Science in Agriculture) conferred by the universities to which they are respectively affiliated, viz., Toronto for Guelph and McGill for Macdonald. In the other provinces agricultural colleges and experiment stations exist at Truro (Nova Scotia), Olds and Saint Albert (Alberta), La Pocatiere (Quebec); Winnipeg (Manitoba); Saskatoon (Saskatchewan); Edmonton (Alberta) and Point Grey, Vancouver (British Columbia). Agricultural fairs, shows or exhibitions are held all over Canada, usually by the aid of grants from the provincial governments or municipalities. The largest of these exhibitions is held annually in August and September at Toronto by the Industrial Exhibition Association.

Future Prospects.—At present the great war in which the British empire is strenuously engaged affects Canadian agriculture by the absence at the front of many of its citizens, which renders more acute the scarcity of farm labor, limits production and increases its cost. These conditions are temporary, duration, and will change on the return of the soldiers and resumption of the immigration that was stopped on the outbreak of the war. It is probable that the immigrants who enter Canada after the war will not return to the agricultural lands instead of flocking to the towns for the development of municipal enterprises by means of borrowed capital, as was largely the case before the war. Conditions in Canada will
make it essential that the actual development of agricultural resources shall in future be the first consideration. To what extent homesteads may be prepared in advance for settlement by returned soldiers and immigrants is engaging attention in the various departments of agricultural and irrigation. The policy of ready-made farms on lines already adopted in Alberta by the Canadian Pacific Railway may be more extensively adopted. Future agricultural production in the West is likely to be based on foundations similar to those of the Panama Canal, and already the Canadian government have contracted grain elevators at interior western points in anticipation of new grain movements in this direction.

A railway from Le Pas in Manitoba to the southern shores of the Hudson Bay is under construction by the Dominion government with the object of providing an additional outlet for western grain through the Hudson Strait. A change in the direction of a more general adoption in the Prairie provinces of the practice adequate to the annual crop. New and will probably be hastened by the poor wheat seasons of 1914 and 1916, which have shown farmers the unwisdom of trusting to a single crop. But, probably, this will not entail any reduction in the growing of wheat which will continue to be sown on newly-broken areas. Larger grain production is possible in Canada by an increase in the rates of yield per acre. Improved agricultural methods, including the more general adoption of mixed farming, the use of judicious rotations and more care in the selection of seed, will result in a large average yields per acre in the grain-growing provinces, as has already been the case in the older and more thickly settled parts of Ontario. Here there is evidence to show that during the past 35 years the average yields per acre have been increased by 3½ bushels for fall wheat, 2½ bushels for spring wheat, 4½ bushels for barley and 1½ bushels for oats. Similar future progress in the Prairie provinces will mean a large aggregate addition to the annual crop. New lands in nearly all the provinces are available for settlement, and have been made easily accessible by the construction of railways. It is estimated that there are 56,000,000 acres of land suitable for farm purposes, as well as for agricultural settlement in Canada. Of this area about 31,000,000 acres are Crown lands at the disposal of the provincial governments in New Brunswick, Quebec, Ontario and British Columbia and about 25,000,000 acres are free grant surveyed lands at the disposal of the Dominion government in the Prairie provinces and the Railway Belt of British Columbia. The lands available in northern Ontario, through which run the new National Transcontinental and Canadian Northern railways, including an immense area of excellent agricultural soil, the great clay belt alone consisting of 24,500 square miles, or 15,680,000 acres, specially suitable for the growth of wheat.

Bibliography.—Official Reports of the Government of Canada, Ottawa, including the Report on the Fifth Census of Canada, 1911 (Vol. IV, 'Agriculture,' 1914); Report on the Postal Census of Manufactures (1916); Annual Reports of the Departments of Agriculture (Experiments Farm), of the National Railways and Canals, of Customs and of Trade and Commerce, the Agricultural Gazette of Canada (monthly), 'The Canada Year Book,' the Monthly Bulletin of Agricultural Statistics, formerly the Census and Statistics Monthly; Griffin, Watson, 'Canada, the Country of the Twentieth Century' (Department of Trade and Commerce, Ottawa 1913); von Antes, 'Land and Historical and Descriptive Account of the Dairying Industry of Canada' (Department of Agriculture, Ottawa 1911); Annual Reports of the Ontario Bureau of Industries, the Ontario Agricultural College and Experiment Farm and the Agricultural and Experimental Union, Toronto.

ERNEST H. GODFREY, F.S.S.,
Editor, Census and Statistics Office, Ottawa.

40. FOREST AND LUMBER INDUSTRY. A great forest stretches across the Dominion of Canada from the Atlantic seaboard to Alaska and the Pacific Ocean, and may be roughly divided into a northern forest and a southern forest. The northern forest may be subdivided into a sparsely wooded portion lying north of the Strait of Belle Isle, westward to the southern end of James Bay, and thence northward to Lake Athabasca and the Yukon River. South of this line lies a rather densely wooded portion separated from the southern forest by an irregular line running from James Bay north of Lakes Saint John and Abitibi, south of Lake Nipigon, across the southern end of Lake Winnipeg, and northwestward to the headwaters of the Athabasca and Liard rivers. With the exception of the great plains region of southern Manitoba, southern Saskatchewan and southern Alberta, the southern forest extends as far south as the international boundary. Around the coast of Nova Scotia and New Brunswick, along the Saint Lawrence River and in the southwestern part of Ontario it is largely cleared off for farming; while in Manitoba, Saskatchewan and Alberta there is a fringe of mixed prairie and woodland lying just south of the heavily wooded portion of the northern forest. In British Columbia, the forests are described as the Cordilleran forest. Along the Pacific Coast and on Vancouver and Queen Charlotte islands this forest has heavy stands of timber; in the southern interior part there is what is known as the "wet belt" forest, and between the southern end of Kootenay Lake and Quesnel Lake lies the "wet belt" forest; while all the rest of the province and the southern part of the Yukon territory is occupied by an interior mountain forest with extensive fire-swept and grassland areas.

Total Forest Area.—The total land area of the Dominion is 3,603,910 square miles, or 2,306,502,400 acres, but it is not known with any degree of accuracy how much of this vast territory is covered with forest growth. The most reliable information available places it somewhere in the neighborhood of 700,000,000 acres, which is approximately 30 per cent of the total area. The exact areas of the forest containing timber of commercial sizes cannot be known until the Federal and provincial governments complete the surveys now in progress. For the present we may safely assume that Nova Scotia has 5,000,000 acres; New Brunswick 9,000,000; Quebec 100,000,000; Ontario 70,000,000; Manitoba 3,584,000; Alberta 5,415,000, and British Columbia 30,000,000 acres — making a total of about...
225,000,000 acres or 9 1/4 per cent of the total land area.

Control of Forest Lands.—In the provinces of Nova Scotia, New Brunswick, Quebec, Ontario, and British Columbia, the cutting of timber on specified tracts, known as "Timber Limits," are issued by the provincial governments; while in the provinces of Manitoba, Saskatchewan and Alberta and in the railway belt in British Columbia (a strip of 11,000,000 acres extending 20 miles on each side of the main line of the Canadian Pacific Railway) the Federal government, at Ottawa, controls the lands and issues licenses and permits to cut timber on, "timber berths" and forest reserves. These licenses are obtained by public competition and the sum paid for the right to cut timber for a specified time is known as the "bonus price." In addition to the bonus price there is also paid a specified sum per annum per square mile (or per acre) known as the "rent", and when the timber is cut the "stumpage dues" are paid at the rate of so much per M (log scale), or per cord. These fees are the source of considerable revenue to the respective governments, which impose certain regulations regarding the methods of cutting and removing timber, protection against fire, etc. In no case does the holder of a license or permit acquire a right to the land, which reverts to the Crown as soon as his license expires or is canceled for non-fulfillment of the existing timber regulations.

Forest Reserves.—For many years both the Dominion and provincial governments have followed the policy of setting aside forest reserves and national parks for the purpose of providing a permanent supply of timber, of maintaining conditions favorable to a continuous water supply, and of protecting mammals, fish and birds within the boundaries of the reserves and parks. The Dominion forest reserves in Manitoba have an area of 2,941,600 acres; in Saskatchewan 6,748,954 acres; in Alberta 21,643,814 acres, and in the railway belt in British Columbia 3,485,590 acres—making a total of 34,819,958 acres. In British Columbia there are still 27,931,482 acres under provincial control while the new provincial forest reserves, which have been established since 1909, have an area of 14,340,720 acres in forest reserves, and the huge total of 111,400,320 acres. Neither New Brunswick nor Nova Scotia have, as yet, established forest reserves; while all the land in Prince Edward Island has been alienated for farming purposes.

Federal Forest Service.—In 1899 the forestry branch of the Department of the Interior was established and at once inaugurated a policy of increasing the number and extent of the forest reserves upon Dominion lands. In 1900 arrangements were made to furnish settlers in Manitoba, Saskatchewan and Alberta with young trees and cuttings for the planting of wind-breaks and shelter belts. The settlers entered into an agreement with the forestry branch to set aside a certain portion of his land as a permanent tree plantation, to carefully prepare his ground according to the directions of the tree inspectors, to plant the trees upon their arrival and to cultivate and keep the ground beside the young trees. If the chosen sites are large enough to take care of themselves. The species planted vary according to the climatic and soil conditions, and the great success of this co-operative plan is proved by the fact that approximately 95 per cent of the 20,000,000 trees and cuttings sent out to settlers are growing and are a source of great pleasure and comfort to all who have the license to cut timber on specified tracts, known as "Timber Limits," are issued by the provincial governments; while in the provinces of Manitoba, Saskatchewan and Alberta and in the railway belt in British Columbia, the Federal government, at Ottawa, controls the lands and issues licenses and permits to cut timber on, "timber berths" and forest reserves. These licenses are obtained by public competition and the sum paid for the right to cut timber for a specified time is known as the "bonus price." In addition to the bonus price there is also paid a specified sum per annum per square mile (or per acre) known as the "rent," and when the timber is cut the "stumpage dues" are paid at the rate of so much per M (log scale), or per cord. These fees are the source of considerable revenue to the respective governments, which impose certain regulations regarding the methods of cutting and removing timber, protection against fire, etc. In no case does the holder of a license or permit acquire a right to the land, which reverts to the Crown as soon as his license expires or is canceled for non-fulfillment of the existing timber regulations.

Forest Reserves.—For many years both the Dominion and provincial governments have followed the policy of setting aside forest reserves and national parks for the purpose of providing a permanent supply of timber, of maintaining conditions favorable to a continuous water supply, and of protecting mammals, fish and birds within the boundaries of the reserves and parks. The Dominion forest reserves in Manitoba have an area of 2,941,600 acres; in Saskatchewan 6,748,954 acres; in Alberta 21,643,814 acres, and in the railway belt in British Columbia 3,485,590 acres—making a total of 34,819,958 acres. In British Columbia there are still 27,931,482 acres under provincial control while the new provincial forest reserves, which have been established since 1909, have an area of 14,340,720 acres in forest reserves, and the huge total of 111,400,320 acres. Neither New Brunswick nor Nova Scotia have, as yet, established forest reserves; while all the land in Prince Edward Island has been alienated for farming purposes.

Federal Forest Service.—In 1899 the forestry branch of the Department of the Interior was established and at once inaugurated a policy of increasing the number and extent of the forest reserves upon Dominion lands. In 1900 arrangements were made to furnish settlers in Manitoba, Saskatchewan and Alberta with young trees and cuttings for the planting of wind-breaks and shelter belts. The settler entered into an agreement with the forestry branch to set aside a certain portion of his land as a permanent tree plantation, to carefully prepare his ground according to the directions of the tree inspectors, to plant the trees upon their arrival and to cultivate and keep the ground beside the young trees. If the chosen sites are large enough to take care of themselves. The species planted vary according to the climatic and soil conditions, and the great success of this co-operative plan is proved by the fact that approximately 95 per cent of the 20,000,000 trees and cuttings sent out to settlers are growing and are a source of great pleasure and comfort to all who have the license to cut timber on specified tracts, known as "Timber Limits," are issued by the provincial governments; while in the provinces of Manitoba, Saskatchewan and Alberta and in the railway belt in British Columbia, the Federal government, at Ottawa, controls the lands and issues licenses and permits to cut timber on, "timber berths" and forest reserves. These licenses are obtained by public competition and the sum paid for the right to cut timber for a specified time is known as the "bonus price." In addition to the bonus price there is also paid a specified sum per annum per square mile (or per acre) known as the "rent," and when the timber is cut the "stumpage dues" are paid at the rate of so much per M (log scale), or per cord. These fees are the source of considerable revenue to the respective governments, which impose certain regulations regarding the methods of cutting and removing timber, protection against fire, etc. In no case does the holder of a license or permit acquire a right to the land, which reverts to the Crown as soon as his license expires or is canceled for non-fulfillment of the existing timber regulations.

Other Forest Services.—In 1909 the province of Quebec began the extension of its forest service by employing two technically trained foresters as advisers, and most encouraging progress has been made along the line of developing a progressive forest policy.

In 1911 the British Columbia department of land and forests established a forest branch which has made remarkable progress in the scientific administration of her forest lands and in making known to the world the extent and variety of her forest resources. Just before the outbreak of war the staff consisted of 170 members (including female clerks and stenographers), but the enlistment of 60 of its most efficient members badly crippled the service.

In 1912 the Canadian Pacific Railway Company established a department of natural resources and charged the forestry branch with the responsibility of administering timber lands owned by the company and the investigation of problems of timber and the preservation of timber for railway purposes.

In 1909 the Dominion government established a commission of conservation, which has devoted much time and energy to the protection of timber from fire, the making of forest surveys and the lessening of logging waste.

In 1912 the Dominion Railway Board introduced regulations for the protection of forest properties traversed by the steam roads, and the number of fires has been greatly reduced. In every province of the Dominion fire has done a tremendous amount of damage to standing timber and impoverished the soil for the growth of future wood crops. Now, however, the Federal and provincial authorities have realized the seriousness of the situation and effective steps are being taken to reduce the number of forest fires. Measures are also being taken to reduce the waste incident to logging operations; such as the waste in tree tops, the disposal of logging slash, etc.

Forestry Education.—In 1900 the Canadian Forestry Association was organized for the purpose of getting the public to realize the
necessity of conserving the forest resources of the Dominion. Its membership is now 4,350 and it has been of service in the work of education, advanced legislation in the matter of increasing the forest reserve area, a more careful administration of timber lands and protection from fire.

In 1907 the faculty of forestry was established in the University of Toronto for the purpose of giving young men a thorough technical training along lines required for the scientific management of forest properties, and in 1908 a similar department was established in the University of New Brunswick at Fredericton, N. B. A couple of years later a department of forestry was established in Laval University, Quebec, and plans are now under way for the establishment of a course in forest engineering in the University of British Columbia, Vancouver, B. C. Nearly all the graduates of these schools are employed by the Dominion forestry branch, the British Columbia forestry branch, the Quebec forest service, the New Brunswick forest service, and the forest service of the Yukon Territories. The company.

Estimate of Standing Timber.—During the summer of 1909 and 1910 a reconnaissance survey was made of the forest lands of Nova Scotia. For the mainland the estimate is based on 214,492 acres of virgin and semi-virgin coniferous timber with a stand of 1,133,952,000 board feet; 1,318,964 acres of moderately culled conifers carrying 3,956,892,000 board feet; 3,192,175 acres of severely culled and burned timber estimated at 3,192,175,000 feet, and 1,136,730 acres of forest burns with 341,619,000 board feet. This makes a total of 7,444,365 acres with 8,624,638,000 board feet of coniferous timber. In addition to this there is the island of Cape Breton, which is estimated to have an area of 1,335,000 acres under forest more suitable for pulpwood than for saw timber. For the whole province the coniferous saw timber is approximately 10,000,000,000 feet, and the hardwoods probably amount to 5,000,000,000 feet.

New Brunswick is now engaged in the work of mapping and classifying lands still in possession of the Crown, and in the course of two or three years will have a close estimate of the amount of timber thereon. The present estimate for the whole province (Crown lands and alienated lands) is 12,000,000 acres, carrying 22,000,000,000 feet of saw timber—mostly spruce, pine, tamarack and cedar.

Quebec has at least 265,000,000 acres of nearly pure coniferous forest, 52,000,000 acres of mixed coniferous and hardwoods, and 5,000,000 acres of hardwoods, but no reliable figures are available for the amount of standing timber. Most of it is more suitable for pulpwood than for saw timber, although large quantities of the latter are taken out every spring—especially from the Canadian Shield by the trains flowing into the Saint Lawrence and Ottawa rivers.

Ontario probably has more saw timber than any other province except British Columbia. The northern forests contains something like 180,000,000 acres of coniferous and hardwoods, and 5,000,000 acres of hardwoods, but no reliable figures are available for the amount of standing timber. It is estimated that approximately 200,000,000,000 feet of saw timber. In 1917 the Department of Lands and Forests made extensive preparations for the organization of a thoroughly efficient fire protection service, and introduced stringent regulations regarding the cutting of timber, which in times has been a menace to both lumbermen and settlers.

In the case of the Prairie provinces there are less than 11,000,000 acres of timberland with a total stand of approximately 40,000,000,000 feet of timber distribution being as follows: Manitoba with 1,920,000 acres and 6,850,000,000 board feet; Saskatchewan, 3,584,000 acres and 14,000,000,000 board feet; Alberta, 5,416,000 acres and 21,000,000,000 board feet. In the Yukon and Northwest territories the timber has practically no commercial value, because of its insufficiency, smallness and low stumpage per acre.

In British Columbia the forest branch estimates the total stand of commercial timber at somewhere between 350,000,000,000 and 400,000,000,000 feet. Approximately one-third of it is Douglas fir and one-fifth western cedar; the remainder being almost entirely made up of western hemlock, larch, yellow pine, white pine and jack pine. The company.

Estimate of Standing Timber.—During the summer of 1909 and 1910 a reconnaissance survey was made of the forest lands of Nova Scotia. For the mainland the estimate is based on 214,492 acres of virgin and semi-virgin coniferous timber with a stand of 1,133,952,000 board feet; 1,318,964 acres of moderately culled conifers carrying 3,956,892,000 board feet; 3,192,175 acres of severely culled and burned timber estimated at 3,192,175,000 feet, and 1,136,730 acres of forest burns with 341,619,000 board feet. This makes a total of 7,444,365 acres with 8,624,638,000 board feet of coniferous timber. In addition to this there is the island of Cape Breton, which is estimated to have an area of 1,335,000 acres under forest more suitable for pulpwood than for saw timber. For the whole province the coniferous saw timber is approximately 10,000,000,000 feet, and the hardwoods probably amount to 5,000,000,000 feet.

New Brunswick is now engaged in the work of mapping and classifying lands still in possession of the Crown, and in the course of two or three years will have a close estimate of the amount of timber thereon. The present estimate for the whole province (Crown lands and alienated lands) is 12,000,000 acres, carrying 22,000,000,000 feet of saw timber—mostly spruce, pine, tamarack and cedar.

Quebec has at least 265,000,000 acres of nearly pure coniferous forest, 52,000,000 acres of mixed coniferous and hardwoods, and 5,000,000 acres of hardwoods, but no reliable figures are available for the amount of standing timber. Most of it is more suitable for pulpwood than for saw timber, although large quantities of the latter are taken out every spring—especially from the Canadian Shield by the trains flowing into the Saint Lawrence and Ottawa rivers.

Ontario probably has more saw timber than any other province except British Columbia. The northern forests contains something like 180,000,000 acres of coniferous and hardwoods, and 5,000,000 acres of hardwoods, but no reliable figures are available for the amount of standing timber. It is estimated that approximately 200,000,000,000 feet of saw timber. In 1917 the Department of Lands and Forests made extensive preparations for the organization of a thoroughly efficient fire protection service, and introduced stringent regulations regarding the cutting of timber, which in times has been a menace to both lumbermen and settlers.

In the case of the Prairie provinces there are less than 11,000,000 acres of timberland with a total stand of approximately 40,000,000,000 feet of timber distribution being as follows: Manitoba with 1,920,000 acres and 6,850,000,000 board feet; Saskatchewan, 3,584,000 acres and 14,000,000,000 board feet; Alberta, 5,416,000 acres and 21,000,000,000 board feet. In the Yukon and Northwest territories the timber has practically no commercial value, because of its insufficiency, smallness and low stumpage per acre.

In British Columbia the forest branch estimates the total stand of commercial timber at somewhere between 350,000,000,000 and 400,000,000,000 feet. Approximately one-third of it is Douglas fir and one-fifth western cedar; the remainder being almost entirely made up of western hemlock, larch, yellow pine, white pine and jack pine.

Annual Cut of Timber.—Nearly all the coniferous timber cut in the eastern and central parts of Canada is floated down the creeks, lakes and rivers to convenient milling points, from which it is shipped by rail or water to market. In the case of hardwoods the usual method of removal is by sleigh-haul, as they are generally used for fuel, distillation, cooperage—only a limited amount being used for furniture and interior finishing. In British Columbia the absence of drivable streams renders the use of logging railways, yarding engines and aerial skidders necessary for the removal of Douglas fir and other large timber.

For the year 1915 the production of sawn lumber was as shown below:

<table>
<thead>
<tr>
<th>Province</th>
<th>No. of firms reporting</th>
<th>Cut in board feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quebec</td>
<td>1,578</td>
<td>1,078,787,000</td>
</tr>
<tr>
<td>Ontario</td>
<td>656</td>
<td>841,616,000</td>
</tr>
<tr>
<td>British Columbia</td>
<td>238</td>
<td>665,816,000</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>240</td>
<td>633,518,000</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>366</td>
<td>204,475,000</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>13</td>
<td>62,864,000</td>
</tr>
<tr>
<td>Manitoba</td>
<td>37</td>
<td>32,387,000</td>
</tr>
<tr>
<td>Alberta</td>
<td>13</td>
<td>17,975,000</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>43</td>
<td>7,545,000</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>3,239</strong></td>
<td><strong>3,842,676,000</strong></td>
</tr>
</tbody>
</table>

The value of this cut of lumber was estimated at $61,919,806, which gives an average price of $16.11 per M. Although 25 different kinds of wood were sawn; the five leading species were spruce, which made up 40.7 per cent of the total cut; white pine (eastern and western) 22.1 per cent; Douglas fir 11.8 per cent; hemlock (western and eastern) 6.2 per cent, and balsam fir 6.1 per cent. For the remaining 13.1 per cent of the total cut the next five species were red pine, birch (yellow and white), cedar (western and eastern), maple (sugar and red), and larch (western and eastern)—which made up 10 per cent of the total.
cut. The remaining 3.1 per cent was made up of western yellow pine, jack pine (eastern and western), basswood, elm, ash, poplar, beech, oak, yellow cypress, hickory, chestnut, cherry, butternut and walnut.

The quantity of lath manufactured was:

<table>
<thead>
<tr>
<th>Province</th>
<th>Number of thousand of total</th>
<th>Percentage of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario</td>
<td>309,022</td>
<td>39.0</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>288,951</td>
<td>36.4</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>59,921</td>
<td>7.5</td>
</tr>
<tr>
<td>Quebec</td>
<td>55,204</td>
<td>7.0</td>
</tr>
<tr>
<td>British Columbia</td>
<td>46,345</td>
<td>5.8</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>23,611</td>
<td>3.0</td>
</tr>
<tr>
<td>Manitoba</td>
<td>8,910</td>
<td>1.1</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>1,262</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>793,226</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The total value of the 793,226 0 lath sawn was placed at $2,040,819, which gives an average price of $2.57 per M. The five leading species of wood used were spruce, white pine, cedar. Douglas fir and hemlock.

The cut of shingles was as follows:

<table>
<thead>
<tr>
<th>Province</th>
<th>Number of thousand of total</th>
<th>Percentage of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td>1,894,642</td>
<td>61.3</td>
</tr>
<tr>
<td>Quebec</td>
<td>574,794</td>
<td>18.6</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>458,987</td>
<td>14.9</td>
</tr>
<tr>
<td>Ontario</td>
<td>93,497</td>
<td>3.0</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>30,723</td>
<td>1.0</td>
</tr>
<tr>
<td>Alberta</td>
<td>18,740</td>
<td>0.6</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>17,509</td>
<td>0.6</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>404</td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>3,089,470</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The total production of 3,089,470,000 shingles was valued at $5,734,852, which gives an average value of $1.80 per M. Cedar made up 90.5 per cent of the total cut; with spruce, white pine and jack pine next in order.

Pulpwood, Poles and Ties.—Since 1908 the consumption of wood for the manufacture of pulp has increased almost threefold, and is certain to increase still more. The annexed table shows the consumption and average price per cord for the year 1915:

<table>
<thead>
<tr>
<th>No. of firms reporting</th>
<th>Average value per cord</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cords</td>
</tr>
<tr>
<td>Quebec</td>
<td>14</td>
</tr>
<tr>
<td>Ontario</td>
<td>15</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>4</td>
</tr>
<tr>
<td>British Columbia</td>
<td>2</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>5</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>

These figures show that 49.6 per cent of the pulpwood was used in Quebec, 34.3 per cent in Ontario, 8.2 per cent in New Brunswick, 6.4 per cent in British Columbia and 1.5 per cent in Nova Scotia; while the total consumption of 1,405,856 cords is an increase of 14.8 per cent over that for 1914. Spruce made up 71 per cent of the total, balsam fir 21 per cent, hemlock 4 per cent, jack pine 3 per cent and poplar 1 per cent. Of mechanical pulp the amount produced was 743,770 tons, of sulphite 235,474 tons, of sulphate 92,404 tons and of soda pulp 3,150 tons. This makes a total of 1,074,805 tons, which is an increase of 15 per cent over the production of 1914. The manufacture of pulpwood is one of the few industries, not engaged in the production of munitions, which have not suffered from war conditions. Although labor conditions have been disturbed and the cost of raw materials has increased, the American demand for pulp has increased and the difficulty of obtaining it from Scandinavian sources has increased the over-seas demand.

The total number of telegraph and telephone poles sold in 1915 is reported at 179,248; at an average price of $2.52 each. Exactly 67.4 per cent of them were of eastern cedar, 11.1 per cent of western cedar, 9.3 per cent of tamarack, 5.6 per cent of spruce, and 2.3 per cent of jack pine—the remaining 4.3 per cent being of fir, hemlock, chestnut and oak.

The total number of cross-ties sold in 1915 is given at 7,592,530, and their average price at 44 cents each. Jack pine made up 32.4 per cent of the total, eastern cedar 25.8 per cent, hemlock 11.1 per cent, tamarack 8.3 per cent, eastern spruce 6.7 per cent, Douglas fir 5.3 per cent and oak 4.3 per cent—the remaining 6.1 per cent being made up of yellow birch, chestnut, maple, elm and western cedar. It is worthy of note that the total number of ties sold in 1914 was 19,403,646, or more than two and a half times that for 1915.

The following figures show the values of the exports of forest products for the year ending 31 March 1916:

<table>
<thead>
<tr>
<th>Destination</th>
<th>Unmanufactured</th>
<th>Manufactured</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>$3,173,817</td>
<td>$6,787,756</td>
</tr>
<tr>
<td>Great Britain</td>
<td>14,125,537</td>
<td>1,968,821</td>
</tr>
<tr>
<td>Other countries</td>
<td>2,504,428</td>
<td>934,033</td>
</tr>
</tbody>
</table>

| **Totals** | **$51,292,970** | **$11,497,870** |

The manufactured articles consisted mainly of pulpwood, saw logs, ties, posts, poles, piling, firewood, tanbark, square and wancy timber, planks, boards and scantling, and the manufactured articles of wood pulp, furniture, barrels, etc.; the value of both amounting to $62,790,840.

**Total Value of Forest Products.—** The following table is based partly upon actual statistics and partly upon the estimates of the Dominion forestry branch, and shows the estimated value of different classes of forest products for the calendar years 1913 to 1915, inclusive:

<table>
<thead>
<tr>
<th>Kind of Forest Product</th>
<th>1913</th>
<th>1914</th>
<th>1915</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumber, lath and shingles</td>
<td>$71,000,000</td>
<td>$67,500,000</td>
<td>$69,750,000</td>
</tr>
<tr>
<td>Pulpwood</td>
<td>15,000,000</td>
<td>15,500,000</td>
<td>15,750,000</td>
</tr>
<tr>
<td>Poles</td>
<td>1,800,000</td>
<td>700,000</td>
<td>500,000</td>
</tr>
<tr>
<td>Ties</td>
<td>9,000,000</td>
<td>9,000,000</td>
<td>3,500,000</td>
</tr>
<tr>
<td>Round mining timbers</td>
<td>600,000</td>
<td>500,000</td>
<td>680,000</td>
</tr>
<tr>
<td>Posts and rails</td>
<td>10,000,000</td>
<td>9,500,000</td>
<td>9,000,000</td>
</tr>
<tr>
<td>Firewood</td>
<td>55,000,000</td>
<td>60,500,000</td>
<td>60,650,000</td>
</tr>
<tr>
<td>Cooperage</td>
<td>1,900,000</td>
<td>1,900,000</td>
<td>1,400,000</td>
</tr>
<tr>
<td>Tanbark</td>
<td>20,000</td>
<td>21,000</td>
<td>170,000</td>
</tr>
<tr>
<td>Miscellaneous products</td>
<td>11,000,000</td>
<td>10,000,000</td>
<td>9,500,000</td>
</tr>
<tr>
<td>Logs exported</td>
<td>900,000</td>
<td>850,000</td>
<td>1,325,000</td>
</tr>
<tr>
<td>Square timber exported</td>
<td>500,000</td>
<td>400,000</td>
<td>480,000</td>
</tr>
<tr>
<td>Miscellaneous exports</td>
<td>400,000</td>
<td>300,000</td>
<td>175,000</td>
</tr>
</tbody>
</table>

| **Totals** | **$177,120,000** | **$176,672,000** | **$172,880,000** |

This table gives a fairly accurate idea of the magnitude and stability of the forest industries of Canada.

A. H. D. Ross, Consulting Forest Engineer, Toronto.
41. THE GRAIN TRADE. The Canadian grain trade has been subject to legislative control from an early date; but the first enactment after confederation applicable in all the provinces was the act of 1873. In that year the Dominion Parliament passed the General Inspection Act dealing with a large variety of staple commodities. Under this act the different brands of flour and meal were legally defined, and special provisions were included for the grading of grain. After the establishment of a grain-growing industry in the province of Manitoba, an act of 1885, in further amendment of the General Inspection Act of 1873, was passed to regulate the grades of grain and introduced for the first time grades descriptive of the hard wheats of Manitoba and the Northwest territories. Subsequently the legislation affecting the warehousing and transportation of grain became merged in the Manitoba Grain Act which was passed in 1907. The acts. The Inspection Act covered the inspection, grading and weighing of grain up to 1904, when all matters affecting grain were withdrawn from that act and embodied in the Grain Act of 1904. A revision of the statutes in 1906 became Part II of the Inspection and Sale Act.

The Canada Grain Act.—Four years ago the Dominion legislation affecting the Canadian grain trade was codified by the Canada Grain Act of 1912, which also included numerous additional provisions of important character. The act provides for the appointment by order in council of a board of three commissioners, known as the Board of Grain Commissioners for Canada, who are charged with the management and control of the grain trade for the whole of Canada in accordance with the terms of the act. The offices of the board are at Fort William where, and at the twin city of Port Arthur, are situated the large terminal elevators from which grain is discharged into the lake steamboats plying eastward. For the purposes of grain shipment Canada is divided into two inspection divisions, the Eastern and Western. The former comprises the portion of Ontario lying east of Port Arthur and Queen's Harbour, while the latter comprises the portion of Ontario lying west of and including Port Arthur, the Northwest provinces and territories and British Columbia.

Grain Elevators.—These constitute an integral part of the grain trade as controlled by the act, and the development of grain growing in the Northwest made their introduction into Canada a necessity. The first Canadian grain elevators were constructed in 1877, while the year 1880. Before this date grain grown in Canada was shipped through flat warehouses built by grain dealers at points along the railway line. The grain was bought by the dealers, stored in the warehouse and shipped in car lots for sale in Winnipeg. The warehouse was a simple wooden storehouse, built parallel with the railway track. A passageway across the warehouse allowed the grain to be handled to the railway car. The grain was weighed, piled loose in the bins and drawn in the car to the railway car. This system has become antiquated, and the flat warehouses, of which there are now only about 24 in Canada, tend annually to disappear.

Dissatisfaction on the part of grain growers with the management of the elevators led to the introduction of what are called “loading platforms.” The platform is a wooden structure on a railway siding to which a farmer can drive his team and from which he can shovel the grain into the car. When the grain has been loaded, he can either sell it on the spot as track grain, or consign it to a commission firm in Winnipeg to be sold for his account. By using the platform a farmer can protect himself from the possibility of malpractise on the part of the elevator, and can save the elevator charges amounting to about $17 per car. On the other hand he has to secure the car, make his own arrangements for selling the grain and load the grain into the car with his own labour and this is an advantage as compared with the elevators, the loading platforms are popular, and applications for new and larger ones are constantly being made. There are at present about 1,600 of the platforms, and Mr. Layton, President of the Board of Grain Commissioners, in a report on grain inspection in Canada, estimated that the proportion of grain loaded over platforms was about one-third of the whole.

With regard to the elevators themselves it will be understood that the name refers originally to the mechanical devices employed for hoisting grain in order to store it in bulk. The mechanical device most generally employed is on the endless chain and bucket principle. This is applied for lifting the grain perpendicularly, whilst belts called conveyors are also used to convey it horizontally for the purpose of shooting it into different bins. The elevator, whilst originally employed to designate the machinery for hoisting, has come to signify also the building used for the storage and handling of grain. It is in this sense that the term is employed for the purpose of this article.

There are now in Canada six different kinds of grain elevators. There are first what are called “country elevators.” These, as defined by the Canada Grain Act, include all elevators and warehouses which receive grain for storage before inspection and which are erected at a railway station or on railway lands. As a general rule the country elevators are owned and operated by commercial companies or by farmers’ co-operative companies. When the farmer takes his grain to a country elevator he can either sell the grain to the operator, in which case it is called “street grain,” or he can hire a bin in the elevator to keep his grain distinct from all other grain, in which case it is called “special binned grain,” or he can store the grain either in a special grade or bin, he arranges with the railway company for a car, and the elevator loads the grain into the car to his order. When the grain is loaded he can either sell it on the spot as track grain or send it forward consignment to a commission firm.

In 1916 the total number of country elevators and warehouses was 3,014 with an aggregate storage capacity of 94,322,000 bushels.

Next in order come the large terminal ele-
vators, which are situated at Fort William and Fort Arthur, the twin cities at the head of Lake Superior, to which the country elevators are tributary, and from which the grain is shipped by the lake steamboats to Montreal, or to the lake ports of Canada and the United States. These elevators are called "terminal" not because they are situated at the railway terminals, but because wheat is received at the terminal elevators or at Fort William or Port Arthur there are 13 with a total capacity of 40,435,000 bushels. Other descriptions of elevators include 22 "public elevators" with a capacity of 29,250,000 bushels, 19 "hospital elevators" with a capacity of 2,560,000 bushels for the cleaning or other treatment of rejected or damaged grains and three milling elevators with a capacity of 1,700,000 bushels used in connection with the manufacture of grain products in the western inspection division. Under powers conferred by the Canada Grain Act, and partly for the purpose of meeting a contemplated western expansion of trade through the opening of the Panama Canal, the Dominion government has been erected and is operating four new interior terminal elevators. These are situated at Port Arthur, Saskatoon, Moosejaw and Calgary, and have an aggregate capacity of 9,500,000 bushels. At Vancouver, also, a public or transfer elevator, with a capacity of 1,250,000 bushels, has been erected by the government to facilitate the loading of grain in ocean steamships. Altogether the Dominion government has licensed 3,078 grain elevators and warehouses with an aggregate storage capacity of 180,988,000 bushels. In 1901 the licensed grain elevators in Canada numbered 523 with a total storage capacity of 18,329,352 bushels; so that the difference between these figures and those just quoted for 1916 shows how great has been the development of the trade since the beginning of the century.

Inspection and Grading.—Under the Canada Grain Act all Canadian grain shipped in car load lot: or cargoes from elevators is subject to government inspection and grading, and the grain is sold and bought on the inspection certificate entirely by grade and not by sample. As each car arrives at an inspection point it is sampled and graded by qualified samplers and inspectors appointed under the act. When the grain arrives at the terminal elevator, it is weighed, cleaned and binned according to grade under the direct supervision of the inspectors, and a warehouse receipt is issued by the elevator operator to the owner of the grain. When the grain leaves the terminal elevator in car or cargo lots it is again weighed and inspected, and it must be graded out as graded in; that is, if it was received into the terminal elevator as "No. 1," grade of equal quality must be shipped out. Thus the identity of the grade of exported grain is carefully preserved through every stage of movement. There are a number of inspection points for grain going west and the principal inspection point is Calgary. Duluth is the inspection point for bonded grain going through the United States. Winnipeg is the inspection point for all eastward bound grain and Fort William and Port Arthur are the points of inspection for grain leaving the terminal elevators.

Under the act Canadian grain is divided into five general classes, viz., "Statutory grade," "Commercial grade," "Rejected," "Condemned," and "No grade." The statutory grade means for each grain the highest grades, as defined in the act. There are four of these grades for western wheat, and Nos. 1, 2 and 3 Northern. The act prescribes that the first two of these grades shall be "sound and well cleaned, weighing not less than 60 pounds to the bushel and composed of at least 75 per cent for No. 1 Hard and 60 per cent, No. 1 Northern hard wheat. No. 2 Northern must be "sound and reasonably clean, of good milling qualities and fit for warehousing, weighing not less than 58 pounds to the bushel and composed of at least 45 per cent of hard Red Fife wheat." No. 3 Northern comprises grain not good enough for No. 2 that is graded No. 3 at the discretion of the inspector. A variety of other "statutory grades" are established under the act for spring wheat, goose wheat, winter wheat, Indian corn, oats, rye, barley, and buckwheat. There are also several grades* of oats, 15 of barley and 15 of flax. Of the other three classes, i.e., grain not graded, "rejected grain" means all grain that is unsound, dusty, dirty, smutty or sprouted or that contains a large admixture of other kinds of grain, seeds or wild oats, or any other cause is unfit to be classed under any of the recognized grades. "Condemned grain" means all grain that is in a heating condition or is badly burned, whatever grade it might otherwise be, and "no grade" means all good grain that has an excessive moisture, being tough, damp or wet, or otherwise unfit for warehousing. All grain in Canada is sold, unless otherwise contracted for, by certain legal weights per bushel. These were originally fixed by an act of the Dominion Parliament passed in 1879. At the present time the legal weights per bushel for the principal grains are as follows: Wheat 60 pounds, rye 56 pounds, barley 48 pounds, oats 34 pounds, Indian corn 56 pounds.

Exports of Canadian Grain.—Although the acreage and production of wheat and oats, the two principal grain crops of Canada, are similar in extent and quantity, it is only the wheat that figures very largely in the export returns. Oats are used mainly for the feeding of live stock, and surplus for export is not considerable except after very abundant seasons. The following table shows for each of the five years ended 31 March 1916 the quantity and value of the principal grains exported to the United Kingdom, to the United States and to other remaining countries:
## EXPORTS OF GRAIN FROM CANADA FOR THE FIVE FISCAL YEARS ENDED 31 MARCH 1912-16.

### QUANTITIES.

<table>
<thead>
<tr>
<th>GRAIN AND YEAR</th>
<th>To United States</th>
<th>To United Kingdom</th>
<th>To other countries</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bushels</td>
<td>Bushels</td>
<td>Bushels</td>
<td>Bushels</td>
</tr>
<tr>
<td>Wheat and wheat flour:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1912</td>
<td>11,670</td>
<td>11,670</td>
<td></td>
<td>11,670</td>
</tr>
<tr>
<td>1913</td>
<td>31,521</td>
<td>31,521</td>
<td></td>
<td>31,521</td>
</tr>
<tr>
<td>1914</td>
<td>21,045</td>
<td>21,045</td>
<td></td>
<td>21,045</td>
</tr>
<tr>
<td>1915</td>
<td>16,055</td>
<td>16,055</td>
<td></td>
<td>16,055</td>
</tr>
<tr>
<td>1916</td>
<td>247,636</td>
<td>247,636</td>
<td></td>
<td>247,636</td>
</tr>
<tr>
<td>Barley</td>
<td>426,437</td>
<td>426,437</td>
<td></td>
<td>426,437</td>
</tr>
<tr>
<td>1912</td>
<td>1,919,967</td>
<td>1,919,967</td>
<td></td>
<td>1,919,967</td>
</tr>
<tr>
<td>1913</td>
<td>1,353,281</td>
<td>1,353,281</td>
<td></td>
<td>1,353,281</td>
</tr>
<tr>
<td>1914</td>
<td>1,042,720</td>
<td>1,042,720</td>
<td></td>
<td>1,042,720</td>
</tr>
<tr>
<td>1915</td>
<td>1,209,136</td>
<td>1,209,136</td>
<td></td>
<td>1,209,136</td>
</tr>
<tr>
<td>1916</td>
<td>866,774</td>
<td>866,774</td>
<td></td>
<td>866,774</td>
</tr>
<tr>
<td>Oats</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1912</td>
<td>203,560</td>
<td>203,560</td>
<td></td>
<td>203,560</td>
</tr>
<tr>
<td>1913</td>
<td>1,726,580</td>
<td>1,726,580</td>
<td></td>
<td>1,726,580</td>
</tr>
<tr>
<td>1914</td>
<td>1,828,221</td>
<td>1,828,221</td>
<td></td>
<td>1,828,221</td>
</tr>
<tr>
<td>1915</td>
<td>1,543,484</td>
<td>1,543,484</td>
<td></td>
<td>1,543,484</td>
</tr>
<tr>
<td>1916</td>
<td>1,609,479</td>
<td>1,609,479</td>
<td></td>
<td>1,609,479</td>
</tr>
<tr>
<td>Flaxseed</td>
<td>1,009,802</td>
<td>1,009,802</td>
<td></td>
<td>1,009,802</td>
</tr>
<tr>
<td>1912</td>
<td>75,583</td>
<td>75,583</td>
<td></td>
<td>75,583</td>
</tr>
<tr>
<td>1913</td>
<td>104,943</td>
<td>104,943</td>
<td></td>
<td>104,943</td>
</tr>
<tr>
<td>1914</td>
<td>84,718</td>
<td>84,718</td>
<td></td>
<td>84,718</td>
</tr>
<tr>
<td>1915</td>
<td>77,685</td>
<td>77,685</td>
<td></td>
<td>77,685</td>
</tr>
<tr>
<td>1916</td>
<td>93,592</td>
<td>93,592</td>
<td></td>
<td>93,592</td>
</tr>
</tbody>
</table>

### VALUES.

<table>
<thead>
<tr>
<th>GRAIN AND YEAR</th>
<th>Wheat and wheat flour:</th>
<th>Barley</th>
<th>Oats</th>
<th>Flaxseed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1912</td>
<td>$1,055,437</td>
<td>$89,472</td>
<td>$1,454</td>
<td>$1,038</td>
</tr>
<tr>
<td>1913</td>
<td>867,726</td>
<td>82,430</td>
<td>1,454</td>
<td>1,038</td>
</tr>
<tr>
<td>1914</td>
<td>6,977,369</td>
<td>1,101,074</td>
<td>1,454</td>
<td>1,038</td>
</tr>
<tr>
<td>1915</td>
<td>4,656,450</td>
<td>859,220</td>
<td>1,454</td>
<td>1,038</td>
</tr>
<tr>
<td>1916</td>
<td>10,102,339</td>
<td>15,752,423</td>
<td>1,454</td>
<td>1,038</td>
</tr>
<tr>
<td>Ryegrass</td>
<td>785,765</td>
<td>104,943</td>
<td>1,454</td>
<td>1,038</td>
</tr>
<tr>
<td>1912</td>
<td>7,621</td>
<td>14,304</td>
<td>1,454</td>
<td>1,038</td>
</tr>
<tr>
<td>1913</td>
<td>1,096,721</td>
<td>1,101,074</td>
<td>1,454</td>
<td>1,038</td>
</tr>
<tr>
<td>1914</td>
<td>138,855</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1915</td>
<td>362,654</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1916</td>
<td>780,092</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>Barley</td>
<td>588,075</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1912</td>
<td>607,933</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1913</td>
<td>3,511,712</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1914</td>
<td>709,093</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1915</td>
<td>203,118</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1916</td>
<td>223,118</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>Oats</td>
<td>957,935</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1912</td>
<td>607,933</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1913</td>
<td>607,933</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1914</td>
<td>607,933</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1915</td>
<td>607,933</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1916</td>
<td>607,933</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>Flaxseed</td>
<td>832,765</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1912</td>
<td>1,902,894</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1913</td>
<td>1,902,894</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1914</td>
<td>1,902,894</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1915</td>
<td>1,902,894</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
<tr>
<td>1916</td>
<td>1,902,894</td>
<td>1,454</td>
<td>1,038</td>
<td></td>
</tr>
</tbody>
</table>

It is estimated that of what Canada requires annually for home consumption about 96,000,000 bushels, of which 48,000,000 bushels or one-half represents food for the population of eight millions, and 48,000,000 bushels are either used for seed or are grain of inferior qualities kept on the farms for the feeding of livestock. Following the great increase of settlement during the present century the exports of wheat from Canada, especially to the mother country, have been rapidly expanding; and have reached in recent years a total of about 144,000,000 bushels, or about 67 per cent of the total British imports of wheat and flour. After the season of 1915, when high tide was reached by the most abundant harvest ever reaped in Canada, the Canadian quantities of wheat (including flour) for the crop year ended 31 Aug. 1916 were 289,794,162 bushels.

—Ernest H. Goffrey, P.S.S.,
Editor, Census and Statistics Office, Ottawa.

42. MINERALS.

From a country so vast and of such varied geology as Canada one expects a wide range of mineral deposits, and the expectation is not disappointed, for already most of the minerals known to exist elsewhere have been found in the Dominion, and often in important deposits, though only its southern fringe has been explored. However, up to the present, Canada's mineral production must be looked on as yet at the stage of promise rather than performance, except in a few substances where nature has given her the lead. For example, the world's supply of asbestos comes from the province of Quebec, and more than three-quarters of its supply of nickel is obtained from mines in Ontario, while rich placer mines have produced largely in the Yukon, and Cobalt supplies the needs of the world for that metal and has attained a great place in silver production. Canada is backward in the production of tin and steel, basic factors in the development of a country, and stands relatively low as a producer of coal, though the fact that only a small part of the coal from the provinces of British Columbia and Alberta is as yet exported is an indication of the country's mineral resources has been largely due to foreigners, especially Americans; but Canadian and British capital are now turning in this direction.

In 1913, the year of greatest output, the total value of the mineral products of Canada was $145,634,812, about $18,75 per inhabitant, as compared with $24.50 per capita in the United States, where the total reached $2,445,805,017 in the same year. The area of Canada is about equal to that of the United States and in the parts best explored its mineral resources give promise of equaling in value those of corresponding States of the Union; so that an immense expansion in mining is to be looked for in the next generation.

The mineral production of Canada is very unequally distributed among the provinces, Ontario coming first with nearly 45 per cent of the whole, followed by British Columbia with 21 per cent and Nova Scotia with 13 per cent and the other provinces with smaller percentages. It is interesting to note that Ontario, one
of the oldest and presumably best known of the provinces, has had important mineral discoveries in recent years increasing its output threefold in the last decade. Of the Maritime provinces only Nova Scotia can be described as a mining region, gold and coal having been produced there for nearly half a century. Quebec is not of great importance except for its asbestos mines. Ontario produces a variety of minerals, nickel, silver, and gold being foremost, while British Columbia provides gold, silver, copper, lead, zinc and coal, and the Yukon gold.

Following the usual classification, the minerals of Canada may be taken up under three heads, metals, non-metallic minerals and structural materials.

Metals.

Ores of 15 metals have been mined in Canada—antimony, chromium, cobalt, copper, gold, iron, manganese, mercury, molybdenum, nickel, palladium, platinum, silver, tungsten and zinc, and minerals containing a number of other metals have been found, though they have not yet been mined. Only eight of these metals are of commercial worth, gold, silver, nickel, copper, lead, cobalt, zinc and iron, and attention will be directed mainly to them.

Gold.—The gold areas of Canada are widespread but the production has been very fluctuating, the value in recent years varying from $907,601 (in 1892) to $27,908,153 (in 1900) and standing at $15,983,007 in 1915. In 1900 Canada was third in rank as a producer of gold, being surpassed by the United States and Australia only; but has dropped to the fifth place since then, yielding to South Africa and Russia. Three provinces and one territory are gold producers at present. Nova Scotia has carried on quartz mining, on *saddle reefs* like those of the famous Bendigo region in Australia, for more than 50 years, but has seldom exceeded $500,000 per annum, the value falling to $137,178 in 1915. Ontario also produces gold from quartz mines, but until recently only in small amounts. Since the opening up of the important Porcupine gold region in 1912 the output has steadily increased, reaching $8,380,604 in 1915. The Porcupine district is now the most productive in the Dominion. Before the sudden rise of the Klondike, British Columbia was the greatest gold region of Canada, its history beginning with the times of wild excitement in the sixties, when thousands of miners from California swarmed into the rich placer of the Fraser and Columbia rivers and washed out millions of dollars worth, reaching the climax of $3,913,563 in 1863. The easily available placeres were gradually exhausted, the value falling in 1893 to $379,535, a little less than the output of Nova Scotia in the same year; but the production of lode gold, especially from the melting ores of Rossland on the southern edge of the province, once more placed British Columbia in the first rank. The prairies furnished a small amount of placer gold from bars on the Saskatchewan and other rivers for a number of years, but it was not until the working of the Klondike placers in 1897 that gold mining assumed importance in the north. This region, in lat. 64°, 500 miles below the headwaters of the great Yukon River, was the scene of a placer mining coast resembling one of the famous placers of California and Australia, but surpassing them in difficulty of access and of working conditions, as well as in richness. For its length Eldorado Creek, a tributary of Bonanza Creek, was the most productive ever mined, but its gravels are nearly worked out, and the yield of gold, though still great for so small a region as the Klondike, which is about 40 miles square, has fallen since 1900, when it was estimated at $22,275,000, to $4,755,721 in 1915. The gold-bearing gravels were perpetually frozen and usually buried under several feet of frozen muck, so that the ground had to be thawed before it could be worked. At first this was done by building fires, but later steam delivered from steel pipes driven into the ground was employed, and it was found, also, that when stripped of moss the warm summer's sun thaws layer after layer, which may then be sluiced off in the ordinary way. All the rich placers have now been worked, but hydraulic plants are covering the ground again with good results. In 1915 these methods produced the amount mentioned above, but a gradual falling off may be expected in the future.

Silver.—For many years Ontario was the chief province for silver, the mine at Silver Islet near Thunder Bay on the north shore of Lake Superior being credited with a total output of $3,250,000, while several other mines to the west of Thunder Bay were also worked. For a while British Columbia took the lead in the production of silver, beginning in 1892, and culminating in 1897 with an output of over $3,000,000. In 1897, Ontario produced only 5,000 ounces, worth about $3,000, but from that date onward there was a yearly increase in her output, until in 1911 it was 30,540,754 ounces, valued at $16,279,443. British Columbia's production was only 1,887,147 ounces in the same year. Cobalt has been declining in its silver production since 1911, the amount in 1915 being 23,568,147 ounces, while British Columbia's production rose to 3,628,722 ounces.

Nickel.—This metal has become of practical value only since 1889 and methods of reducing its ores are still somewhat in the experimental stage. The world's supply comes almost entirely from two regions, the Sudbury district in northern Ontario and the French penal colony of New Caledonia. In early years New Caledonia was somewhat in advance, but in 1903 Sudbury passed it in production and seems likely to hold its position for some time. The mines are all situated round the edge of a basin-shaped sheet of eruptive rock 37 miles long and 15 broad, and among them the Creighton is the greatest nickel mine in the world, supplying more than half of the total output. The ores are rich, containing about half as much copper as nickel is produced in these mines and also small amounts of gold, palladium and platinum, the last metal occurring in the rare arsenide sperrylite, first found in the district. In 1915 matte smelted from the roasted ore contained 34,000 tons of nickel, mostly mined and treated by the Canadian Copper Company, though the Mond Com-
pany of England was of some importance, also. The value of the nickel in the matte was placed at $10,532,356, while the refined metal was estimated to be worth $20,423,348. The demand for nickel steel for war purposes has greatly helped the industry.

Copper.—Copper has been mined in Newfoundland, Nova Scotia, New Brunswick, Quebec, Arizona, and British Columbia, but only the last two provinces are important producers. The copper of Quebec is a by-product of the iron pyrites of the Eastern Townships; and most of the copper from Ontario is, as shown above, produced as an accompaniment of Sudbury nickel ores, though mines of copper alone are worked on a small scale at Massey in western Ontario, not far from the once well-known Bruce mines, north of Lake Huron, which were prosperous half a century ago but are no longer in operation. British Columbia supplies more than three-fourths of the copper mined in Canada, chiefly from the gold-copper ores of the Rossland region, the large low grade deposits of the boundary districts and of the Pacific Coast of the province, while a small amount comes from the White Horse district of Yukon territory. The total production of copper in the Dominion in 1915 was 51,306 tons, valued at $17,726,307. The demand for copper for war purposes has greatly increased the production.

Lead.—Almost the whole of the lead mined in Canada comes from the silver-lead ores of southern British Columbia, which began to be opened up extensively in 1893 and furnished 31,500 tons in 1900. Since then there have been great fluctuations in the amount mined, which was 22,184 tons in 1915, the production depending largely on the prosperity of the silver mining industry, since the two metals occur together.

Cobalt.—The whole of the cobalt produced in Canada and practically all that is used in the world, comes from the silver mines of Cobalt in northern Ontario, where the metal occurs in arsenides, especially smaltite. Though the metal is better suited for plating than nickel, very little is employed in this way. Its chief use is in the preparation of cobalt blue and in giving a blue color to glass or porcelain. In 1914 there was a production of 871,891 pounds of cobalt, mostly disposed of as the oxide, and the value is estimated at about $550,000.

Zinc.—Zinc ores, chiefly blende, have been mined in Quebec, Ontario and British Columbia, and have been shipped to the United States or to Belgium for treatment, but the recent high price of zinc, due to the European War, has encouraged two companies, one at Welland, Ontario, the other at Trail, B. C., to produce the metal from its ores. In 1915 15,553 tons of ore were reported, mainly from British Columbia, and the value is given as $636,204.

Iron.—In regard to the most important of all metals, iron, Canada is backward, largely from the fact that the ore deposits and the fuel for treating them are generally widely separated. Nova Scotia, Quebec and Ontario have been producers of iron and steel, the first province having the great advantage of supplies of coking coal on the seaboard, at Sydney in Cape Breton Island and other points, so that two large iron and steel plants are in operation there. Most of the ore smelted is, however, in a sense foreign, coming from Bell Island, off the coast of Newfoundland. The province of Quebec has for generations smelted a small amount of bog iron ore in charcoal furnaces near Three Rivers, the product being of high grade and used for special purposes, but since 1912 these furnaces have been shut down. Charcoal iron furnaces were operated on a small scale in different parts of Ontario, also, from 50 to 100 years ago, but when railways began to bring in British iron the industry ceased. Within the last few years large furnaces using American fuel and in part American ore have sprung up at Hamilton, Midland and the Sault Sainte Marie.

Deposits containing millions of tons of fair grade ore have been found in Hutton township, Michipicoten and other points in northern Ontario in rocks similar to those of the great iron regions of Michigan and Minnesota, so that iron production is likely to increase in the future. British Columbia also possesses large deposits of iron ore and excellent coking coal, so that an iron industry like that of Nova Scotia may be expected to grow up as the province becomes more populous. The amount of pig iron smelted in Canada in 1915 was 913,719 tons, of which Ontario produced more than half, but of this amount only 156,598 tons came from Canadian ore, the rest coming from American or Newfoundland ore. The amount of steel produced was 1,020,335 tons.

Platinum and Palladium.—Among the rarer and more precious metals it is perhaps worth while to mention platinum, which has been obtained from placers in the Similkameen region, B. C., and which occurs also in the form of the arsenide, sperrelylite, in the Sudbury nickel ores. A few hundred ounces of the metal have been obtained annually as residues after the separation of the nickel and copper in the Bessemer matte from Sudbury. The way in which palladium occurs in the nickel ore is unknown, but it is obtained in larger amounts than the platinum.

NON-METALLIC MINERALS.

Twenty-two non-metallic minerals are reported in the statistics for 1915, and several others occur in lists of former years, of which mention may be confined to a few of the more important ones, beginning with the mineral fuels.

Coal.—In 1915 the coal mined in the Dominion amounted to 12,209,371 tons, valued at $31,957,757. Of this Nova Scotia supplied 7,429,888 tons, Alberta 3,320,431, British Columbia 2,089,966, New Brunswick 236,940, Saskatchewan 122,422, and the Yukon territory 9,724. The coal supply of the great manufacturing province of Ontario comes entirely from the United States, and much of that used in Quebec is obtained from the same source; but as a small offset Nova Scotia exports coal to the New England States, and British Columbia to the Western States, the total amount being 263,543 tons. The coal of Nova Scotia is bituminous and of Carboniferous Age; most of the coal mined in Alberta and British Columbia is bituminous, also, but of Cretaceous Age. A small amount of coal approaching anthracite is mined in Bow Pass. A small amount of bituminous coal have been nipped in during moun-
tain building; and a considerable tonnage of lenticular coal and of lignite of poorer quality is mined at numerous points on the prairies. In general the older the deposits and the more they have been disturbed in the rise of the foothills, and especially of the mountains, the better is the quality of the coal.

Excellent coke is made from the coal of Cape Breton Island, Nova Scotia, and of the Crow's Nest region of Alberta and British Columbia, and also of Nanaimo on the Pacific Coast, the amount in 1915 being 884,555 tons.

Though Canada is surpassed in the extent of its coal deposits by only two or three countries in the world, and their distribution, mainly in the foothills and mountains of the West, leaves the populous central provinces and the largest cities mainly without a native coal supply.

**Petroleum and Natural Gas.**—At present Ontario is practically the only producer of petroleum, which comes from a small area in its southwestern peninsula. Crude oil and its products to the extent of 215,404 barrels valued at $300,572 are reported in 1915, but the supply is slowly diminishing and before long will be exhausted unless other pools are struck. Petroleum is known from Gaspe in Quebec and from southern Alberta, and great stretches of tar sands along the Saskatchewan and Athabasca suggest oil deposits, though productive wells have not been sunk in these regions. See Petroleum Industry, this.

Natural gas has been exploited in Essex and Welland counties of southwestern Ontario. In 1915 the wells of Ontario furnished gas to the value of $2,202,523. Natural gas is obtained on a large scale in Alberta, especially near Medicine Hat and Calgary, where the production is valued at $1,037,919; and on a much smaller scale in New Brunswick.

In addition to the mineral fuels just mentioned Canada has large areas of bituminous shale from which oil may be distilled and of peat bog from which fuel may be obtained when the need arises.

**MINERAL ECONOMIC MINERALS.**

After the fuels come several less important minerals, asbestos being the chief one, with an output of 17,115 tons in 1915, valued at $3,491,450. The whole product, which means practically the world's supply, comes from a few mines in serpentinite rocks in the Eastern Townships of Quebec. The value of this beautiful silky-fibred mineral depends on the fact that it is an incombustible material which can be spun or woven or felted together into non-conducting sheets. Next in value is pyrites, of which 206,910 tons were mined in the provinces of Quebec and Ontario, having a value of $1,028,673. Gypsum, the raw material of plaster of Paris, was quarried mainly in New Brunswick and Nova Scotia, to the amount of 470,335 tons, valued at $849,928. Salt prepared from wells in southwestern Ontario reached 119,900 tons in weight and $600,226 in value. In addition, white arsenic, magnesite and graphite reached values of over $100,000, and mica, feldspar, cordurum, talc and ochres were produced in smaller amounts. The cordurum mined in Ontario is used only as an abrasive; the gem varieties, ruby, sapphire, etc., have, so far, not been found.

**STRUCTURAL MATERIALS.**

Building stone, clay for brick making and marl or limestone and clay for the manufacture of cement are, of course, found in all the provinces but the greater part of the clay products and most of the cement are manufactured in Ontario and Quebec where the demand for structural materials is greatest. In 1915 5,681,032 tons of Portland cement were made with a value of $6,977,646; and clay products were valued at $3,918,200. Statistics of other structural materials of importance are given as follows: Lime, $1,015,878; sand and gravel, $2,098,683; sand-lime brick, $182,651; granite, $1,634,084; limestone, $2,942,731; marble and sandstone, $365,784. The total value of structural materials is given as $18,712,074.

**MINERAL PRODUCTION.**

The mineral productions of all kinds sum up to a value of $138,513,750 in 1915, representing an advance of 7.49 per cent over the previous year, but a falling off of $7,121,062 as compared with that of 1913, the year of greatest prosperity. The fall in output in 1915 is due to the general collapse of the world's industries because of the war, and one may confidently expect the usual advance in output when peace is restored and conditions become normal again.

The following table, showing the production at five-year intervals, illustrates the rapidity of the increase since statistics have been kept by the Geological Survey:

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1880</td>
<td>$10,231,255</td>
</tr>
<tr>
<td>1885</td>
<td>$12,318,894</td>
</tr>
<tr>
<td>1890</td>
<td>$12,035,082</td>
</tr>
<tr>
<td>1895</td>
<td>$12,692,021</td>
</tr>
<tr>
<td>1900</td>
<td>$17,024,110</td>
</tr>
<tr>
<td>1905</td>
<td>$8,927,802</td>
</tr>
<tr>
<td>1910</td>
<td>$145,634,812</td>
</tr>
</tbody>
</table>

From this table it will be seen that the mineral industries of Canada increased the value of their output more than eleven-fold in the 25 years between 1888 and 1913, often nearly doubling in the five-year intervals, an almost unexampled advance. That the rate of increase will be as rapid in years to come can scarcely be expected, but so little of the area of Canada has yet been carefully explored that many important discoveries may be looked for as the great northern regions are mapped and opened up.

Sources of Information.—Statistical information as to the mineral production of the country as a whole may be found in the annual reports of the Geological Survey of Canada, Department of Mines, compiled by John McLeish, and in the annual volumes of the Mineral Industry. The mining departments of the provinces of Nova Scotia, Quebec, Ontario and British Columbia also publish annual reports of much value in which information is given as to their special mining industries. The statistical materials for this paper have been largely drawn from these sources.

A. P. Coleman,
Professor of Geology, University of Toronto.

### 43. FISHERIES.

Among the great industries of Canada the fisheries stand fifth in the order of value. The farming industry (mainly grain growing) is estimated to yield $900,000,000 per annum; the lumber industry $100,000,000; stock raising $100,000,000; mining
$105,000,000, while the fishing industries are estimated to produce, on the whole, $39,000,000 to $40,000,000 annually. The latest report of the Marine and Fisheries Department, which gives the value for 1916-17, places it at $39,208,378, but when account is taken of the amount of fish consumed by wandering tribes of Indians and Eskimo, with their hordes of fish-eating dogs, the total amount taken as food by isolated settlers, miners, prospectors, lumberers and sportsmen, and, above all, the employees at the Hudson's Bay Company's posts in the remoter parts of northern Canada, the total amount must be greatly in excess of official statistics.

Completely accurate returns are hardly possible, admiral as the Canadian system of gathering statistics is, so admirable that the late Prof. Brown Goode, head of the United States Fish Commission, declared at a fisheries conference in 1883 that... other countries ought to study it with a great deal of care. The expansion of the Canadian fisheries since 1870 is sufficiently shown by the figures given below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Boats, Fishermen, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1870</td>
<td>$6,577,391</td>
</tr>
<tr>
<td>1876</td>
<td>11,117,000</td>
</tr>
<tr>
<td>1879</td>
<td>9,955,411</td>
</tr>
<tr>
<td>1880</td>
<td>11,714,902</td>
</tr>
<tr>
<td>1883</td>
<td>20,686,641</td>
</tr>
<tr>
<td>1885</td>
<td>21,783,566</td>
</tr>
<tr>
<td>1890</td>
<td>21,557,639</td>
</tr>
</tbody>
</table>

2. The estuarine and inland waters of Quebec and the Maritime provinces, including fisheries for salmon (the spring salmon or quinnat), striped bass, smelt, shad, gaspereau (alewife); and in the lakes, ouananiche or land-locked salmon, lake trout, togue or hunde, etc. Annual value, nearly $2,000,000.

3. Great Lakes division, including Lakes Ontario, Erie, Huron and Superior. In which Canada shares with the United States, the international boundary passing practically through the centre of these vast inland seas, all of which finally empty into the river Saint Lawrence. This complex system of waters, with innumerable subsidiary lakes, intersected everywhere by lake whitefish (Coregonus), great lake trout (Cristovomer namaycush), lesser whitefish (erroneously called lake herring); sturgeon, pike-perch (doré or pickerel), black bass, brook trout, mackinongé, pike and numerous carpopid suckers, and bearded catfish. Annual value, nearly $3,000,000.

4. Manitoba and northwestern division, including Keewatin, etc., whose wide expanses of fresh water, such as Lake Winnipeg, Great Bear Lake and Great Slave Lake, yield enormous quantities of whitefish, sturgeon, pike-perch, tulibee (a peculiar lesser whitefish), pike, gold-eye (a true fresh-water herring), large river trout and catfish. Value, inclusive of an extensive "caviare" or sturgeon-roe industry, over $1,000,000.

5. Pacific Interior division, extending from the Okanagan, Kootenay and Arrow waters, in the south, to the Yukon district, in the north, and covering an area of plain, valley and mountain 1,000 miles north and south, by about 500 miles east and west, intersected everywhere by rivers and lakes, and comprising limited fisheries for lake trout, whitefish, land-locked salmon, river trout, grayling and numerous carps or suckers, not identical, for the most part, with eastern species. Annual value probably not exceeding $500,000.

6. Pacific Coast division, the fisheries of which are little developed, if we except the estuarine and coastal salmon fisheries. The various species of salmon, include the blue-black or sockeye, the spring salmon, the coho, dog-salmon, humpback and a true salmon, namely gairdner's salmon or steel-head. Skill, or black cod, oulachan (candle-fish), anchovy, herring, sardine, smelt and a great variety of other fishes abound which are not utilized to any great extent. Shark, dog-fish, rat-fish and whale fisheries exist; and there are limited oyster fisheries. The halibut fishery is of great importance and yields upward of $2,000,000 annually. With the shipping facilities provided by the extension of the Grand Trunk Pacific to Prince Rupert, in the vicinity of which port are located the best fishing banks, this fishery will develop greatly in the near future.

7. Hudson Bay and Peri-Arctic division, from Ungava Bay, Labrador, to the Mackenzie River, or rather Herschell Island, Yukon District. Whale, walrus, sea trout, Hearn's salmon (a great spotted trout), the inconnu (resembling a river whitefish), pike, suckers, sturgeon and, possibly, salmon and cod occur in these vast northern waters, of which Hudson Bay alone exceeds the Mediterranean in extent and has
an estimated drainage area of 2,700,000 square miles. The richest whaling grounds in the world are in these remote regions of the Dominion, whose tidal channels, as the late Sir John Schultz declared, "are destined to be the last home of the leviathans which within the memory of living man have been driven from Newfoundland latitudes to the places where their survivors have now sought retreat." Hair-seals of various species and white whales (Balaena) abound in these sub-arctic waters, and constitute valuable fisheries; one station, according to Dr. Robert Bell, securing no less than 2,800 of these small whales in one season.

**Marine Fishing Grounds: Area, Kinds of Fish, etc.**—The waters grouped in this sevenfold manner afford a field, hardly to be surpassed, for the development of extensive fisheries. The grounds where fishing can be remuneratively carried on, off the eastern and western sea-board, comprise a total area of no less than 200,000 square miles, the Atlantic shore being over 5,000 miles in length, while the PaSt. Lawrence (British Columbia) exceeds 7,000 miles. On this latter coast, Hecate Straits (20,000 square miles) and the straits between Vancouver Island and the mainland, namely, the straits of Georgia and Fuca (15,000 square miles) afford the most remarkable sheltered fishing grounds in the world, being for the most part shielded from the open ocean, and extending inland as placid bays and deep, salt-water inlets, the total area of these inshore waters being no less than 40,000 square miles in extent. The Canadian fishing banks on the Atlantic Coast are historic. They stretch from Labrador, Anticosti and Gaspé in the north to the West Isles in the southern Passamaquoddy waters, including famous areas like the Bay of Chaleur, off Quebec province, Northumberland Straits, off Prince Edward Island, and New Brunswick, and Chedabucto Bay, off eastern Nova Scotia. Between the outer edge of the inshore areas and the deep-sea waters of the Atlantic, the feeding and breeding grounds occur for cod, haddock, mackerel and other valued edible fishes. "There is probably no part of the world," said Mr. P. L. Simmonds, the well-known fishery authority, "where such extensive fisheries are to be found, as in the Gulf of St. Lawrence." Among the series of banks mainly resorted to by Canadian fishing boats are (passing from north to south) Great Bank, Green Bank, Bank Saint Peter, Misaine, Canso, Quero, Howe, Roseway, La Have and Western Banks, apart from the great fishing areas in the open Atlantic, such as the Grand Banks, which are not really in Canadian limits and are indeed mainly exploited by fishermen from more distant countries.

**Fresh-Water Fisheries.**—If, owing to the superficial extent, and, no less, the coldness and purity of the marine waters of Canada, as well as the abundance of natural food, upon which cod, mackerel, halibut, herring, etc., subsist, the sea fisheries rank amongst the best in the world, it may be said of the fresh-water fisheries that they are hardly inferior in these characteristics. The total area of the fresh waters of the Dominion (lakes and rivers) is estimated at 140,000 square miles. From a fishers' point of view the lake systems of Canada may be arranged under the principal heads, namely:

**Five Lake Systems.**—1. The maritime lakes, embracing the numerous lakes of Labrador, Quebec and the Atlantic provinces. Certain of these, notably Lake Saint John, Quebec (366 square miles), and the Chamcook Lakes, N. B., are famous for land-locked salmon, so prized for their unique game qualities. Black bass, pickerel or doré, lake trout, red and speckled trout abound in these waters, while Clear Lake, Little Seal, Mistassini and most of the northern lakes swarm with whitefish and sub-arctic varieties of trout.

2. The central lake system, including the Great Lakes (76,562 square miles in total area) and innumerable subsidiary lakes, all utilized for commercial purposes and for sport. The areas and maximum depths of the more important of these lakes are as follows: Superior, 31,200 square miles, 160 fathoms deep; Huron, 23,800 square miles, 145 fathoms deep; Erie, 10,030 square miles, 35 fathoms deep; Ontario, 7,330 square miles, 123 fathoms deep; Lake Nepean, 1,450 square miles; Lakes Saint Clair and Simcoe, 300 miles, 100 fathoms deep. 3. The Manitoba and Keewatin system, the principal waters of which are Lake Winnipeg, 9,400 square miles; Lake Winnipegosis, 2,030 square miles; Lake Manitoba, 1,900 square miles; and Lake of the Woods, 1,500 square miles; and in these waters enormous fishing operations are carried on for whitefish, pickerel or doré, sturgeon, pike, etc. 4. The Athabasca and Mackenzie system, extending from Reindeer Lake to Great Bear Lake, the latter lake no less than 11,200 square miles in area, while Great Slave Lake is 10,100 square miles, and others are: Athabasca 4,400 square miles; Reindeer Lake, 4,000 square miles; Woolaston and Doobount lakes, each over 2,000 square miles in extent. These waters have been little fished, excepting by Indians, Hudson's Bay Company employees and the like, but being prolific in whitefish, sturgeon, etc., the development of great commercial fisheries in the near future is assured. 5. The fishing grounds occur from Lakes La Barge and Atlin to Shuswap Lake, and the Kootenay, Arrow and Okanagan lakes near the United States boundary. None of the lakes in this western series are comparable in area to the vast lakes in the east; but such waters as Babine Lake (250 or 300 square miles) at the head of the Skeena River, and Stuart Lake and Quesnel lakes (respectively 100 and 750 square miles in area) at the head of the Fraser River, have an importance wholly disproportionate to their size, owing to the fact that their creeks and tributary streams are the great spawning resorts of various species of Pacific salmon. Whitefish, lake-trout, Pacific trout of various species and grayling occur in these waters.

**Rivers of Canada.**—Fisheries are also conducted upon the rivers, which almost without exception are abundantly supplied with the most esteemed fishes. Apart from a great stream like the river Saint Lawrence, whose drainage area is estimated to be 357,000 square miles, there are rivers, like the Mackenzie (2,400 miles long) and the Great Saskatchewan (1,900 miles); the Churchill and Black rivers (each 1,500 miles); the Fraser (750 miles long and draining 100,000 square miles); the Red River (600 miles), and others like the Peace, Nelson, Athabasca, Grek Whale, Skeena (300 miles); Ottawa (600 miles).
miles): Saint John (500 miles). Restigouche, Saugeenay and Miramichi; all of which are great rivers, presenting for the most part unsurpassed scenic grandeur, and affording notable sport and extensive commercial fishing. It would indeed be difficult to parallel the Fraser River, with its incredible multitudes of salmon, with the Restigouche and other famous angling rivers emptying into the Atlantic Ocean have no peers in the annals of sport. "Canada," as Professor Elwyn said, "is the paradise of the angler."

**Minor Fisheries. Oysters, Smelts, etc.—**

The shores of Prince Edward Island, New Brunswick and parts of Nova Scotia furnish oysters of unequalled flavor and comestible qualities. Owing to over-fishing and inadequate protection the yield has seriously declined from 70,000 or 80,000 barrels per annum to half that quantity, valued at about $180,000 yearly. On the other hand, such an industry as the smelt fishery, mainly carried on through the Ice in December and the early months of the year, was valued in 1881 at over $800,000 in value. These dainty fish, formerly used as fertilizing material on farm lands, are now shipped, four or five thousand tons per season, in a frozen condition, mainly to the United States markets. The estuaries of the Miramichi, Restigouche and other New Brunswick rivers are the centres of this remarkable fishery.

The sturgeon fishery has witnessed a great development recently, and has much greater possibilities before it. This fish became commercially valuable in Canada, first on the Saint John River, N. B., in 1880, when 602,500 pounds were shipped to New York. In four years the catch fell to 126,000 pounds, and in 1895 barely 27,000 pounds were secured; but in Lake of the Woods, and on the Great Lakes, and above all, in the illimitable waters of Manitoba, the Northwest and British Columbia, the sturgeon fishery has received a great impetus during the last five or six years. In 1907, the yield of sturgeon on Fish River was valued at $173,315, as compared with $90,000 20 years ago. Canada, in the opinion of some authorities, is now one of the chief producers of "caviare," which formerly brought 10 cents to 15 cents per pound, but is now quoted, partly prepared condition at 90 cents to $1 per pound. Catfish and similar species, as well as eels and coarse fish generally, formerly little valued, are now in demand, bringing to the fisherman from $750,000 to $1,000,000 per annum.

**Hatching Stations.**—For the encouragement of the Atlantic deep-sea fisheries a bounty system is carried out, the fund for which ($4,490,882) was provided by the Halifax Award, 1877. The bounties paid annually to vessel-owners, vessel-fishermen and boat-fishermen amount to about $160,000.

**Government Hatcheries.**—An important adjunct to the natural reproduction of fish aided by close seasons, size, limits, etc., is the artificial culture of fish. Sixty-four hatcheries are in operation, of which 61 in 1910 amounted to 1,624,924,254 and included Atlantic and Pacific salmon, lake trout, brook trout, whitefish, pickerel, or doré, lobsters, etc. Several of the provincial governments also aid in fish hatches, limited extent.

**Scientific Stations.**—Three scientific biological stations are maintained by the government for the study and solution of fishery problems. One is situated at Saint Andrews, N. B., another at Georgian Bay, Lake Huron, and the other at Departure Bay, B. C. The staff at all three institutions consists of professors and specialists from Canadian universities.

**Bait Freezers and Guano Works, etc.—**

In order to meet the needs of deep-sea fishermen, who suffer much from irregular supplies of bait, the Canadian government assists in the building and maintenance of bait freezers at convenient and suitable ports. The incursions of hordes of destructive dogfish and the injury to the fisheries resulting from the dumping of fish offal in the sea have moved the government to start fish waste reduction works at various localities on the coast. Under government management these works purchase dogfish, cod-heads, etc., and convert them into guano and fish oil.

**Inspection and Branding of Pickled Fish.**—In June 1914, the Dominion government passed an act to provide for the inspection and branding of pickled fish, such as mackerel, herring, alewives and salmon. The object of the act is to bring into use a strong, well-made barrel of a standard size for mackerel and fish in; also to raise the standard of curing and grading the fish, so that the cured article may secure the confidence of dealers and consumers at home and abroad and be traded in with advantage to the producer and dealer alike. A staff of competent inspectors carry out the provisions of the act, and if they find the fish cured and graded in accordance with the act, and packed in barrels that are of the standard size and make, a mark in the form of a crown is branded on the side of each barrel of fish so conforming to the act. The brand shows the grade and kind of fish contained in the barrel. It is expected that the pickled fish trade will be greatly extended and its value enhanced by means of this system of inspection.

**Fisheries Protection Vessels.**—A fleet of 45 vessels of various kinds patrols the Atlantic and Pacific coasts and the inland lakes for the protection and regulation of the fisheries.

**Central Administration.**—For the administration of fishery affairs a special government Department of Marine and Fisheries was created at Confederation (1867) under a minister of the Crown. A deputy minister and a large staff of inside and outside officials carry out the administrative duties which fall to the Federal authorities. Statistics of the quantities and kinds of fish landed in all parts of Canada are carefully collected by officials of the department and published in the monthly bulletin and afterward in the form of an annual detailed report. The Dominion expenditure on fisheries, including fisheries protection, amounts to nearly $1,500,000 annually.

**J. C. COCHRANE,**

Department of Marine and Fisheries, Ottawa.
44. MANUFACTURES. The 1911 census of Canada, which affords the latest comprehensive view of Canadian manufacturing, gave the total value of manufactured products in establishments employing five hands and over as $1,165,975,639, and placed a value on the raw materials consumed in the manufacturing process at about half that amount. A postal census of manufactures for the year 1915 shows an annual production over $240,000,000 in excess of the total above quoted. Compared with the beginning of the century, the latter figures reveal a growth of nearly three times in the value of products. They also effectively reveal the important place which manufacturing has come to occupy within the Canadian economic scheme. Only one other total, that of agriculture, vies with manufactures. From the billion dollars' worth of cereals and animals produced on Canadian farms in 1915 there are, of course, comparatively few deductions to be made an account of raw materials consumed, thereby allowing it to be one of the vexing problems of statistics of manufactures. It would apparently, however, be safe to say that the manufacturing industry of Canada contributes a new value approaching half a billion dollars annually to the production of the country, a total which, along with the secondary agriculture in the Canadian industrial organization.

Anything like a detailed description of manufacturing in Canada exceeds the intention of the present article. It may, however, be practically to run over in a summary way the leading groups into which the industry may be divided. These divisions are necessarily somewhat arbitrary, but perhaps the best initial approach is from the standpoint of the primary extractive industries, whose products it is the function of the manufacturer to turn into the forms required for final use.

Food Production.—First then with regard to manufactures using Canadian farm products as raw materials. The most important industry is the flour and grist milling which had a production valued at $114,483,924 in 1915, the larger mills being located at points strategic to the grain fields of Ontario and the West. Exports of flour in 1915-16 amounted to $35,767,007 and of oatmeal to $471,298. Bread and biscuit-making establishments reported a total product of $40,772,216.

The butter and cheese factories of Canada yielded a product valued at about half that of the flour mills in 1915, a total which does not include farm-made produce. These are chiefly small establishments owned for the most part by associations of farmers. The majority are in Ontario and Quebec, though the Maritime provinces have a well-developed dairying industry, and rapid progress is being made in the West. Moreover the provincial governments have in some cases operated the plants. Condensed milk factories yielded $3,725,668 in 1915. Exports of butter, once a very heavy item, have decreased in recent years with the great increase in home consumption. Cheese exports, however, have steadily increased, reaching a total in 1915-16 of $26,690,500.

Against the live stock branch of farming may be placed a large meat-packing industry, the total product of which reached $96,789,731 in 1915. Meat packing has increased very rapidly in Canada during the past few years and there has also grown up an important wholesale fresh meat trade. The latter was practically non-existent in 1900. Soap making, which is usually subsidiary to meat packing, is not so in Canada; the product reached a value of $6,445,939 in 1915. Leather making is more closely associated with live stock; the total Canadian product was valued at $3,654,491 in 1915, most of it, however, from imported hides. The boot and shoe industry, based on the leather trade, had an output of $34,064,696, the city of Quebec being the main manufacturing point. The harness and saddlery output accounted for $8,739,278 more, and gloves and mitts for an additional $1,899,982.

Fruit and wine, for competition, located chiefly in southern and southwestern Ontario, reported a product of $3,794,922 in 1915. Jams and jellies added over a million to this total, evaporated fruits and wine and pickles another million and a quarter each. Starch production exceeded $2,600,000 second to agriculture in the Canadian industrial organization.

The Canadian fisheries (which it may be remarked in passing are potentially the most important in the world, both from the standpoint of area of fishing grounds and the abundance, variety and quality of the catch), are also the basis of a large manufacturing industry. The salmon canneries of British Columbia and the lobster canneries of the Maritime provinces are world famous. Altogether the value of preserved fish products in 1915 was about $15,000,000. There is a large dried fish industry (domestic) in Nova Scotia, which, for two generations, has found its chief market in the West Indies. Factory production in the same district, however, is growing, and is beginning to enter into competition with Gloucester, Mass., and other centres of the cured fish trade. The future of Canada's status in this industry seems assured. See CANADA—FISHERIES (article 43).

The above includes the more important items of "food production," which is one of the stock groupings of manufactures. The chief omissions are the industries whose raw materials are imported into Canada, e.g., sugar, eight sugar refineries are in operation in Canada, yielding in 1915 a product valued at $37,752,235. Manufactures of cocoa and chocolate, coffee and spices, baking powder, etc., yield a product of $10,278,000.

Wood and Paper.—The lumbering industry of Canada is one of its most historic and picturesque industries, and the unrivalled forest wealth which forms its background vouches for its continuance. It is also one of the most widely diffused of Canadian industries. Southwestern Nova Scotia is important for its saw-milling, though less so than the interior of New Brunswick tapped by the Saint John and Mirimichi rivers. Northern Quebec, the Ottawa Valley, the Georgian Bay district and the territory north and west of Lakes Huron and Superior are the sources of an extensive lumber trade. Northern Saskatchewan and Manitoba have also important timber areas, though
dwarfed by the wealth of British Columbia in this respect. The total product which these various sources yielded in sawn lumber, shingles and laths, reached a value of $68,815,472 in 1915; this, however, was under war conditions, which were perhaps more depressing in the lumber trade than in any other branch of industry. In 1911, the output was almost exactly half again as large. Side by side with this initial working up of the raw material may be placed the manufacture of sashes and doors, blinds, boxes and similar products. The output of which in 1915 was over $18,370,604. Cooperage added $1,989,564. A higher grade of manufactured is represented by furniture, the value of which was well over $9,765,339 in 1915; carriages and wagons with a somewhat higher value; musical instruments and materials with a value of $4,500,000; and brooms and brushes with a value of $1,378,828. Cars, car works and car repair shops reported a product of $39,794,372.

Wood pulp and paper making may be treated in close connection with lumbering. The total output of both in 1915 was $40,348,000. Paper bags and boxes manufactured in 1915 were valued at $5,350,667, and stationery at $3,306,545.

The printing and publishing trade is strictly a part of the paper industry. It may, however, be noted here as well as elsewhere that the output of Canadian printing, bookbinding and lithographing establishments in 1915 was valued at over $3,000,000.

Mineral Products.—The manufactures which have mining for basis are very important in Canada. It is usual to group iron and steel production by itself. There are over 20 blast furnaces in Canada with a total daily capacity of, say, 4,500 tons. The value of the pig iron product in 1913, a high year, was $16,540,000. Steel ingots and castings went over a million in the same year. Total smelter products (in which the above are included) were valued at $102,000,000 in 1915. Some of the most extensive and distinctive Canadian industries are engaged in iron and steel manufacture, such as the Dominion Iron and Steel Company, the Nova Scotia Steel and Coal Company, the Algoma Steel Company, the Steel Company of Canada, the Canada Car and Foundry Company, etc. Based on the raw materials which these supply is a large and varied industry. Foundry products totalled over $36,736,000 in value in 1915; electrical apparatus, $1,085,241; iron and steel bridges, $9,611,000; boilers and engines, $8,546,488; brass castings, $7,787,302; wire, $6,280,000; aluminum, $4,071,000; plumbers' supplies, $2,268,800; coke, $4,416,000. Other great industries that may be regarded as in a way subsidiary to this branch are the automobile industry, the production of which with its accessories totalled over $28,000,000 in 1915; and the agricultural implement industry, with a total product of over $13,370,000. The latter is perhaps the leading example of a Canadian industry having a market in practically every quarter of the globe.

Cement and cement products were valued at $11,676,000 in 1915; brick and tile at $2,931,575; paints and varnishes at $8,373,746. The cut stone industry had a product of $2,568,491. The glass product was valued at $4,718,000, to which mirrors and plate glass added $1,095,000.

Textiles, Rubber, Liquors and Tobacco.—There remain several groups of manufactures whose connection with the primary industries of the country is not so immediate. Among these is the textile industry. Canadian cotton mills had a product of $20,900,000 in 1915; woollens a product of $12,889,708; while silk and silk products aggregated $1,277,044. The clothing industry associated with these raw materials is also very considerable. Men's and women's factory clothing was approximately $41,000,000 in value; hosiery and knit goods over $6,196,800; hats, caps and furs $7,559,000; and carpets $1,500,000. Dyeing and cleaning establishments valued their total contribution at $3,986,670. The rubber industry approximated $14,500,000 in value of product. Liquors and tobacco is a second important group of this kind. Distilled and malted liquors were produced in Canada to the value of $30,756,000 in 1915, while manufactures of tobacco in all forms aggregated $32,997,250. Tobacco growing has made rapid strides in Quebec and southwestern Ontario recently, and British Columbia is beginning to introduce the industry.

Summing up by provinces, approximately half of the Canadian manufacturing industry is in Ontario, and well over half of the remainder in Quebec. British Columbia stands third with about one-fifth the output of Quebec, while Nova Scotia and Manitoba follow close behind. Saskatchewan has a very slight manufacturing industry, though larger than Prince Edward Island, which stands lowest.

The accompanying tables, showing the number of establishments, number of employees and value of products in certain of the more important groups of manufactures and in the several provinces, will be of interest for purposes of more detailed reference.

Manufactures of Canada, 1915, by Provinces.

<table>
<thead>
<tr>
<th>Provinces</th>
<th>Establishments</th>
<th>Capital</th>
<th>Employees on salaries</th>
<th>Employees on wages</th>
<th>Cost of materials</th>
<th>Value of products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>21,906</td>
<td>$1,994,103,272</td>
<td>$52,683</td>
<td>$60,308,293</td>
<td>662,200</td>
<td>229,456,210</td>
</tr>
<tr>
<td>Alberta</td>
<td>584</td>
<td>$42,239,693</td>
<td>1,242</td>
<td>1,456,574</td>
<td>6,325</td>
<td>3,600,549</td>
</tr>
<tr>
<td>British Columbia</td>
<td>1,654</td>
<td>$1,044,683</td>
<td>2,477</td>
<td>2,637,193</td>
<td>21,121,439</td>
<td>30,592,833</td>
</tr>
<tr>
<td>Manitoba</td>
<td>850</td>
<td>$954,845,854</td>
<td>2,427</td>
<td>2,012,197</td>
<td>17,459</td>
<td>10,650,600</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>714</td>
<td>$46,290,014</td>
<td>1,482</td>
<td>1,465,584</td>
<td>16,219</td>
<td>7,391,949</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>6,203</td>
<td>$27,683,327</td>
<td>22,765</td>
<td>23,609,827</td>
<td>21,121,439</td>
<td>30,592,833</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>9,023</td>
<td>$20,033</td>
<td>3,132</td>
<td>3,438,491</td>
<td>2,304,324</td>
<td>2,346,469</td>
</tr>
<tr>
<td>Quebec</td>
<td>7,158</td>
<td>$548,972,375</td>
<td>14,086</td>
<td>16,723,756</td>
<td>163,292</td>
<td>64,931,720</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>457</td>
<td>$16,788,992</td>
<td>735</td>
<td>741,487</td>
<td>2,925</td>
<td>1,690,024</td>
</tr>
</tbody>
</table>
### Canada — Manufactures (44)

Manufactures of Canada, 1915, by Groups of Industries.

<table>
<thead>
<tr>
<th>Groups of Industries</th>
<th>Estab-lish-ments</th>
<th>Capital</th>
<th>Employees on salaries</th>
<th>Employees on wages</th>
<th>Cost of materials</th>
<th>Value of products</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>$</td>
<td>No. Salary</td>
<td>No. Wages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Food products</td>
<td>7,972</td>
<td>199,305.254</td>
<td>7,250</td>
<td>7,233,245</td>
<td>55,085</td>
<td>22,019,411</td>
</tr>
<tr>
<td>2. Textiles</td>
<td>2,671</td>
<td>126,490.509</td>
<td>5,827</td>
<td>6,662,926</td>
<td>68,634</td>
<td>27,044,812</td>
</tr>
<tr>
<td>6. Paper and printing</td>
<td>1,300</td>
<td>138,544.786</td>
<td>6,247</td>
<td>6,875,500</td>
<td>30,817</td>
<td>18,780,569</td>
</tr>
<tr>
<td>7. Liqueurs and beverages</td>
<td>341</td>
<td>52,283.857</td>
<td>1,016</td>
<td>1,712,501</td>
<td>4,376</td>
<td>2,961,993</td>
</tr>
<tr>
<td>8. Chemicals and allied products</td>
<td>255</td>
<td>52,248.588</td>
<td>1,993</td>
<td>2,302,447</td>
<td>10,436</td>
<td>5,413,846</td>
</tr>
<tr>
<td>9. Clay, glass and stone products</td>
<td>772</td>
<td>96,376.573</td>
<td>1,269</td>
<td>1,713,189</td>
<td>14,498</td>
<td>8,249,184</td>
</tr>
<tr>
<td>10. Metals and metal products other than steel</td>
<td>1,173</td>
<td>174,621.994</td>
<td>2,781</td>
<td>3,418,307</td>
<td>27,011</td>
<td>17,557,632</td>
</tr>
<tr>
<td>11. Tobacco and its manufactures</td>
<td>166</td>
<td>23,066.898</td>
<td>1,081</td>
<td>1,445,524</td>
<td>8,532</td>
<td>3,083,000</td>
</tr>
<tr>
<td>12. Vehicles for land transportation</td>
<td>464</td>
<td>125,965.499</td>
<td>2,630</td>
<td>2,652,568</td>
<td>34,195</td>
<td>18,637,539</td>
</tr>
<tr>
<td>13. Vessels for water transportation</td>
<td>103</td>
<td>12,331.341</td>
<td>270</td>
<td>326,954</td>
<td>5,261</td>
<td>2,467,074</td>
</tr>
<tr>
<td>14. Miscellaneous industries</td>
<td>1,147</td>
<td>441,133.728</td>
<td>8,267</td>
<td>9,334,448</td>
<td>47,901</td>
<td>25,554,136</td>
</tr>
<tr>
<td>15. Hand trades</td>
<td>1,584</td>
<td>32,099.855</td>
<td>1,283</td>
<td>1,626,980</td>
<td>17,816</td>
<td>10,761,802</td>
</tr>
<tr>
<td>Total of groups</td>
<td>21,906</td>
<td>1,994,103.272</td>
<td>52,683</td>
<td>60,308,293</td>
<td>662,200</td>
<td>229,456,210</td>
</tr>
</tbody>
</table>

Comparative Statement of the Returns of the Postal Censuses of 1906 and 1916.

<table>
<thead>
<tr>
<th>Items</th>
<th>1905</th>
<th>1915</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishments, No.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital</td>
<td>15,706</td>
<td>21,906</td>
<td>6,200</td>
</tr>
<tr>
<td>Salaries</td>
<td>$846,585,021</td>
<td>$1,994,103,272</td>
<td>$1,147,518,251</td>
</tr>
<tr>
<td>Wages</td>
<td>30,724,086</td>
<td>60,308,293</td>
<td>29,584,207</td>
</tr>
<tr>
<td>Value of products</td>
<td>134,375,925</td>
<td>229,456,210</td>
<td>95,080,285</td>
</tr>
<tr>
<td>Total of groups</td>
<td>573,152,003</td>
<td>1,407,137,140</td>
<td>834,985,137</td>
</tr>
</tbody>
</table>

The preceding brief review will serve to show the substantial status that has been achieved by manufacturing in Canada. Two remaining points may be touched upon. Apart from an abundance of raw material, the first requisite in manufacturing is cheap motive power. Canada is well supplied with bituminous coal. The fields of Nova Scotia are extensive, and are cheaply worked, and the product is accessible to Quebec and Montreal by water transportation. Ontario, however, is largely dependent for its coal on Pennsylvania, and in the west a long and difficult haul separates the exceedingly rich deposits of Vancouver Island and the Crow's Nest Pass from the prairie centres. In the other great power factor, however, that on which the future of manufacturing will more and more depend, viz., the "white coal" of water power — there is probably no other country in the world more fortunately endowed than Canada. Practically every large centre from coast to coast has abundance of water power available not only for present needs, but for all requirements within anticipation. Quebec and Montreal tap the resources of the Shawinigan and the Cedar Rapids of the Saint Lawrence; central and eastern Ontario the Trent Valley and the Ottawa; southwestern Ontario has the three great plants at Niagara Falls; Winnipeg the two large plants of the Winnipeg River; Calgary those of the Bow River; while Vancouver has developed the Coquitlam with its 400 feet of head. Altogether there are in Canada exclusive of the Northwest territories, the Yukon and the northern and eastern portions of Quebec, approximately 17,750,000 horse power available, this amount including in the case of Niagara Falls and other border powers only the development permitted by international treaties, and excluding the possibilities of storage for the enlargement of present capacities. Of this, considerably less than one-tenth has as yet been developed — two-thirds of the development having been carried out only within the past 10 years. The Hydro Electric Power Commission of the Ontario government is perhaps the most extensive experiment in government ownership and operation of an important utility in Canada. In 1915 not less than 73 municipalities and 96,744 consumers were obtaining electric power through this body, whose investments in power development in the six preceding years reached a total of approximately $25,000,000.

The labor factor may be mentioned briefly. A heavy immigration has in recent years maintained the labor supply, and though government encouragement is extended only to agriculturists and domestic servants, the influx has included considerable numbers of skilled artisans. The census of occupations, 1911, credited 491,342 (98,561 female) *workers to manufactures, the largest total outside of agriculture. These were further divided as follows: Mechanical 303,471; textiles 20,642; food 45,916; clothing 80,409; other factories 41,000. From the standpoint of organized labor, several of the most powerful unions are among employees of industrial establishments. In the metal
trades, 186 unions with a membership of 11,813 exist; in the boot and shoe and clothing trades, 59 unions with a membership of 4,906; and in the printing and allied trades, 91 unions with a membership of 6,614. These unions are "national" in the sense that they have their headquarters in the United States, though with a Dominion Congress, which plays much the same rôle in Canada as the American Federation of Labor in the United States. There is a purely Canadian organization, the Brotherhood of Locomotive Engineers, but its following is small. The technical education of labor has made a substantial beginning in Canada and the country is alive to its importance. Its development was the subject of inquiry by a royal commission of seven members, appointed in 1910, who after two years' investigation brought in a comprehensive scheme for Dominion and provincial co-operation.

Historical Sketch.—The Canadian manufacturing industry may be said to have been built up as a definite drift of 1878. There were manufactures, of course, before that date. Iron working had been an industry in Quebec from the days of Frontenac, and the ship-building yards of New Brunswick were famous half a world ago. Nor was there lack of capital. Prior to Confederation, however, the greater opportunities and more imperative tasks of agriculture forced manufacturing into the background, and such industries as arose were small and catered to local markets. Flour mills and saw mills were the most numerous; tanning also was a flourishing industry. The woolen mills of Ontario in these early days were of considerable relative importance. In 1876, however, it was still possible for a captain of industry to declare that "there is no manufacturer of us all who has not come up from five dollars." To this phase the tariff of 1878, which banished the policy of "incidental protection" and aimed to found a well-rounded manufacturing industry, was the end. A notable expansion set in with 1879 and lasted until 1882, after which the general stagnation accompanying the fall of prices told unfavorably. The "national policy" (as the protective scheme of 1878 was styled) may, however, be said to have doubled the export trade within about a decade. It was not until after the end of the century that a like forward movement was repeated. Throughout the nineties, in fact, manufacturing no more than held its own, employing fewer wage-earners and paying out less for labor, though showing a gain in capitalization and income value of products. With the opening of the 20th century, however, this was rapidly overcome. Manufacturing within a decade nearly trebled its capitalization; increased the number of its employees by one-half; considerably more than doubled the amounts paid out in salaries and for raw materials, and increased the value of its product from $481,053,375 to $1,165,975,639. A strong tendency toward specialization and merger made itself felt after 1908, over 40 combinations having been made in the three years 1908, 1909 and 1910; it passed away, however, rather quickly, not having proved the success that was expected. The general expansion continued during 1911 and 1912, but sank back with 1913, being revived, though in a new direction, by the heavy orders for war materials that came from Europe shortly after the declaration of war in August 1914. In the remarkable story of expansion, therefore, which constitutes the history of Canada during the 20th century, and which had its basis in the opening up of the Canadian west to agriculture and the building of railways on an unprecedented scale, the new territory, manufacturing contributes one of the most important chapters. The growth of western agriculture the claim that the Canadian manufacturer to special favors under the tariff has been lent greater importance than hitherto. Independently of fiscal policy, however, which has shown no tendency to fundamental change, it may be predicted with assurance that manufacturing will play an important rôle in Canadian development, and that in many lines of products Canada bids fair to become one of the world's growing sources of supply.

R. H. Coats,
Dominion Statistician and Controller of Census,
Ottawa.

45. WATER POWERS. Some years ago the late T. C. Keefer, C.M.G., a distinguished Canadian engineer, in a presentation before the Royal Society, described the water resources of Canada in the following words:

"An examination of any good map of our broad Dominion, reveals, as its most striking feature, an extraordinarily wealthy and remarkably uninterrupted succession of lakes and rivers, suggestive of ample rainfall, the first great requisite in the occupation of any country. Over a length of several thousand miles, between Labrador and Alaska, and over a width of several hundred miles, there is an almost continuous distribution of lakes, lakes and rivers; the lakes of varied outlines, dimensions and elevations above sea-level, and many possessing facilities for the storage of their flood waters. In many places the outlet from the lake or the connection between a chain of lakes is a narrow cleft in rock where an impassable dam will hold back the water supplied by the winter's accumulation of snow."

These words were written shortly after the first successful transmission of high voltage electricity had opened a new era to water power, and they were designed to emphasize the fundamental advantages that Canada possessed under the new régime. Even in the days of the first Canadian settlers, however, when the harnessing of Niagara would have seemed the wildest of dreams, the earliest manufactories were prescribed by water power, and it is not until the late seventies that the water-driven saw mills and flour mills of Ontario ceased to occupy the premier place in the Canadian industrial scheme.

It would be easy, of course, to exaggerate the importance of water power and of Canada's wealth in that particular. Thus, though the Dominion has a water area of 125,755 square miles, as compared with only 52,630 square miles in the United States, many factors must be considered before such figures are taken at their face significance. The development of power is only one of many uses to which the water resources of the country may be put, and these uses include such important ones as navigation, irrigation and domestic and municipal supply. Moreover, water power as volume of water, and the volume of water is only one factor in water power, the other being hydraulic head, or the vertical distance through which the water falls.

Nevertheless the resources of Canada in

* Up to 1 June 1917, the Imperial Munitions Board alone had forwarded war materials to the government of the United Kingdom from Canada.
this respect are so great as to make moderate statement difficult. Within the nine provinces of the Dominion, excluding the North-west territories and the northern and eastern portions of Quebec, it is estimated that 17,746,000 horse power are available. Of this amount,—including in the case of Niagara Falls and other international streams, only such development as is permitted by treaty, and taking no account of the increases that would be rendered possible by storage,—fully 8,000,000 horse power are readily available to present markets.

Not more than one-fifth of this latter total and less than 10 per cent of the whole has been developed up to the present. By provinces, the record is as follows:

<table>
<thead>
<tr>
<th>Province</th>
<th>Horse Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nova Scotia</td>
<td>21,412</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>3,390</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>500</td>
</tr>
<tr>
<td>Quebec</td>
<td>520,000</td>
</tr>
<tr>
<td>Ontario</td>
<td>789,466</td>
</tr>
<tr>
<td>Manitoba</td>
<td>56,730</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>45</td>
</tr>
<tr>
<td>Alberta</td>
<td>33,985</td>
</tr>
<tr>
<td>British Columbia</td>
<td>265,345</td>
</tr>
<tr>
<td>Yukon</td>
<td>12,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,712,193</strong></td>
</tr>
</tbody>
</table>

Of the above, about 75 per cent goes to the production of electrical energy, and over half the remainder to pulp and paper manufacture.

It is impossible within brief space to describe in any detail the progress that has been made in bringing this great asset into the service of the community. It will be of interest, however, to run over the several districts in which the country may be divided from this standpoint, noting in each the main developments and the promises that the future holds out.

The Maritime Provinces.—Coal, timber and fish rather than secondary production are the industries for which the Atlantic provinces are known. The land area is not extensive and it is so cut up by the sea that with one or two exceptions no large river systems exist, while the smaller streams are tidal or of considerable distances inland. Offsets, however, are found in the heavy rainfall and in the dispersion of water power sites, most of the seaports, where industrial activity may be expected to increase, having water power. Up the rivers, therefore, the power equipment of these provinces is considered satisfactory for present and future needs, though the latter include the heavy demands represented by the smelting of iron ores on a large scale and a considerable steel industry. Existing developments are mainly of two types: Saw, pulp and paper mills, based on the timber resources of the country; and municipal lighting plants. A few woolen and grist mills driven by water are also found. New Brunswick to date has developed about 13,000 horse power, the largest plant being at Aroostook Falls, where 3,800 horse power is manufactured, for sale chiefly in the State of Maine. Nova Scotia has over 21,000 horse power developed, more than half for the manufacture of pulp and paper; gold mining employs 1,150 horse power in this province. The largest water power in the Maritime provinces and one of the largest sites in Canada is at Grand Falls on the Saint John River, where it is now proposed to install 80,000 horse power. The Nepisquit is another New Brunswick stream which offers 10,000 horse power for development. The two largest sources of power in south-western Nova Scotia has a potentiality of 30,000 horse power, of which only 4,250 is now in use.

Quebec and Eastern Ontario.—Coming to Quebec (where 75 per cent of all the power consumed in the Dominion is derived) and eastern Ontario, five groups of water powers—all part of or subsidiary to the Saint Lawrence River—may be distinguished. The first has the city of Quebec for centre. It comprises the Chaudière River to the south, the Montmorency and Saint Anne in the near vicinity (whose combined present development of 19,000 horse power operates the tramways and many of the factories of Quebec) and the Lake Saint John region to the north. On the Saguenay, the outlet of Lake Saint John, it is estimated that a continuous supply of 300,000 horse power can be obtained—a supply that could be doubled by storage—whereas on the rivers flowing into the lake several additional hundreds of thousands of horse power are available. The second group is that of the Saint Maurice, which joins the Saint Lawrence at Three Rivers, and which alone offers a potentiality of 650,000 horse power. Two very large plants are already installed of that of the Shawenegan Water and Power Company at Shawenegan Falls, where 155,000 horse power is produced for local manufactures and for Montreal, Three Rivers and other neighboring cities; and that of the Laurentide Company which controls the fall at Grande Mère, with its 300,000 horse power, 12 miles above Shawenegan, and which manufactures 250 tons of paper daily. At La Tuque, 103 miles from Three Rivers, is a third fall of 70 feet, capable of generating 75,000 horse power, of which only 3,500 is developed. A third group has Montreal, the commercial capital and outlet of Canada, for central market. In it are included the Cedar Rapids of the Saint Lawrence, which have a potentiality of 160,000 horse power, of which 90,000 is developed by one company and 20,000 by a second. Another 13,000 horse power is available for Montreal from the Troulies, Canal still another 13,000 from the Lachine Rapids, whilst Chambly on the Richelieu River contributes 20,000 horse power to this favorably situated metropolis. It is estimated that an additional 240,000 horse power can be developed for Montreal as the demand arises. The fourth group is that of the Ottawa Valley, on the Quebec tributaries of which several hundred thousands of horse power remain to be developed, the Gatineau alone having 225,000 horse power, none of it utilized. Further north and west on the Ontario side the Cobalt mines are supplied by the Northern Light and Power Company, who, in a single year, reduced the consumption of coal in the camp from 63,000 tons to 17,000 tons. On the Ottawa River itself 600,000 horse power would be rendered available by the canalizing of the river. Development, however, is at present confined to the large industries at Ottawa and Hull operating at the Chaudière Falls and consuming about 36,000 horse power. The rapids of the upper Saint Lawrence may be considered a fifth and last group in this area. They have been utilized only to a small extent for local purposes.
Central and Southwestern Ontario.—The Trent River system is the main supply of central, and Niagara Falls that of southwestern, Ontario. No event in the history of the subject has so appealed to the imagination as the harnessing of Niagara Falls and the employment of its gigantic energy to turn the factory wheels and light the streets and houses of the scores of towns and cities dotting the thickly populated area between Lakes Huron, Erie and Ontario. Under franchises granted by the province of Ontario 465,000 horse power is to be developed in the Trent River 100,000 by the Canadian Niagara Power Company, 125,000 by the Electrical Development Company and 180,000 by the Ontario Power Company. Between 1905 and 1914, 309,000 of this was placed on the market, chiefly in the districts between Toronto and London. Linked with Niagara is the plant of the Dominion Power and Transmission Company at Decew Falls, where 57,000 horse power is developed by drawing water from the Welland Canal and carrying it over the Niagara escarpment. In 1905, 45,000 horse power is already in use, the Electrical Power Company having seven plants and supplying a wide territory. The deforestation of southern Ontario and consequent alteration of the regimen of the rivers has greatly reduced the power potentials of the province.

New Ontario.—The northern and western portions of Ontario are rich in water powers. Of developed works, that of the Canadian Copper Company at Spanish River (10,000 horse power) and that of the Kaministiquia Power Company at Thunder Bay (3,000 horse power) are the most important. The Lake Nipigon region and the rivers flowing into James Bay offer perhaps 2,000,000 horse power for future development. The Bow River (Fort William, 15,500 horse power) are the most important. The Lake Nipigon region and the rivers flowing into James Bay offer perhaps 2,000,000 horse power for future development. The Bow River (Fort William, 15,500 horse power) are the most important. The Lake Nipigon region and the rivers flowing into James Bay offer perhaps 2,000,000 horse power for future development. The Bow River (Fort William, 15,500 horse power) are the most important. The Lake Nipigon region and the rivers flowing into James Bay offer perhaps 2,000,000 horse power for future development. The Bow River (Fort William, 15,500 horse power) are the most important. The Lake Nipigon region and the rivers flowing into James Bay offer perhaps 2,000,000 horse power for future development. The Bow River (Fort William, 15,500 horse power) are the most important. The Lake Nipigon region and the rivers flowing into James Bay offer perhaps 2,000,000 horse power for future development. The Bow River (Fort William, 15,500 horse power) are the most important. The Lake Nipigon region and the rivers flowing into James Bay offer perhaps 2,000,000 horse power for future development. The Bow River (Fort William, 15,500 horse power) are the most important. The Lake Nipigon region and the rivers flowing into James Bay offer perhaps 2,000,000 horse power for future development.

The Prairie Provinces.—The two chief developments in the prairie sections of Canada are those on the Winnipeg River, which supply Winnipeg with power, and those on the Bow River, acting as feeders to Calgary. The Winnipeg municipal plant and the Winnipeg Electric Railway Company’s plant on the former aggregate a turbine capacity of 79,700 horse power, but this is only a fraction of the total capacity of the river. On the Bow River, the three plants now installed at Eau Clair, Horsethief and Kansanski Falls, respectively, yield altogether over 32,000 horse power. The above, however, are merely the first beginnings of power development in western Canada. The North and South Saskatchewan have several important developments on them, and it is estimated that with one of the principal drainage areas of the continent, has been estimated to offer no less than 2,500,000 horse power, there being 19 power sites on it, each of which would produce from 75,000 to 235,000 horse power. The Churchill, the Athabaska and the Peace are likewise rivers of great potentialities. For the moment, however, these, like the Nelson, lie beyond reach of a market.

British Columbia.—The “sea of mountains” which constitutes the interior, and the heavy precipitation of a mild and equable climate, makes British Columbia a country of numerous lakes, large and rapid rivers and abundant water powers. The latter early attracted attention. The first development was made 18 years ago at Bonnington Falls on the Kootenay, where 23,000 horse power is now available for the feeders of the smelting industries of Rossland and Trail. About the same time the British Columbia Electric Railway Company developed the Goldstream plant on Vancouver Island; but this has been completely eclipsed by the later plants of the same company at Lake Buntzen on Burrard Inlet (being the largest in the province with 84,500 horse power), and at Jordan River on Vancouver Island (25,000 horse power). Other large British Columbia plants are: Ashcroft on the North Thompson; the Big Hill Company at Stave Lake (26,000 horse power) and of the Powell River Company, Limited, at Powell River, the latter a new plant established generating 24,000 horse power. Altogether over 265,000 horse power has been developed, but it is estimated that there are nearly three times that amount available within market distance of Vancouver and Victoria alone.

The foregoing sketch will serve to show the importance both present and to come of the water power resources of the Dominion. Next to their great extent—Canada in this respect standing second only to the United States, and higher than any other country in the world except Norway on a per capita basis—their proximity to leading centres of population will have been apparent. All across the continent the great cities of Canada have at their disposal an enormous supply of the power which is so essential to their future as industrial centres. Another feature which it has been possible to mention only incidentally is the rapidity of the strides with which Canada is now entering upon her inheritance. Of the total horse power at present in use not less than two-thirds have been developed within the past 10 years, whilst a quarter of a century ago it may be said that the present development had not even been begun.

As an evidence of the awakening of public opinion on the importance of water power, reference may be made to the organization of the Hydro-Electric Power Commission of Ontario, whose operations represent the largest effort in Canada in the way of public administration of a national utility. The Commission was created in 1906, largely upon the report of a previous royal commission of inquiry into the possibilities of Niagara power. Public sentiment had become aroused through fear that the only great source of hydraulic power for southwestern Ontario might be exploited in private interests. The Hydro-Electric Commission began by conducting their own investigations under direct governmental auspices into the power resources of the province. The next step was the vesting of the Commission with powers of administration, under which it at once contracted for supplies of power at Niagara and elsewhere, and consti-
tuted itself a great transmission and supplying
agency. Within four years over 1,000 miles of
transmission lines and over 1,500 miles of tele-
phone lines had been constructed. In 1915, the
Commission was supplying 73 municipalities,
and its distribution of power from Niagara and
the turbine to 65,500 horse power. The number of
consumers reaching nearly to 100,000. The invest-}
ment by the Commission and its customers to date approximates $24,500,000.
The outlook is that within a few years these
totals will be largely exceeded.

Regarding water powers in Canada, application may be made to
the water powers branch of the Department of
the Interior of the Dominion government, which exercises jurisdiction in the provinces of
Manitoba, Saskatchewan, Alberta and in the
unorganized territories of Canada. For the
provinces, the following officers are in control:
Nova Scotia: the secretary of the Nova Scotia
Water Power Commission, Halifax, N. S.;
New Brunswick: The surveyor-general of New
Brunswick, Fredericton, N. B.; Quebec: The
client engineer, hydraulic service, Department of
Lands and Forests, Quebec, Quebec; Ontario:
The Deputy Minister of Lands, Forests and
Mines, Toronto, Ontario; also, the secretary of
the Hydro-Electric Power Commission of
Ontario, Toronto, Ontario; British Columbia:
The comptroller of water rights, Victoria,
B. C.

R. H. Coats,
Dominion Statistician and Controller of Censuses.

Chapter 46

COMMERC contrasts, Tariffs and
Transportation. Early Trade Relations.—In their earlier condition the various
provinces of British North America, now form-
ing the Dominion of Canada, were all alike
subject to those general laws which embodied
the principles, if not always the practice, of the
British colonial system. Owing, however, to
variations in location, natural resources and
the character of the inhabitants, the commerce
and tariffs of the various provinces were more
or less adapted to their special conditions.

Before the conquest of Canada the Marit-
time provinces, under the general name of
Nova Scotia, were worked as a market for
British manufactures and as a field for the
exporting of naval supplies, chiefly sailors, fish and timber.
Nova Scotia's trade was almost entirely deve-
oped in connection with New England and the
West Indies. Trade with French Canada was
illegal, on both sides, and for the most part
unprofitable, except for furs in exchange for
British manufactures. It was but natural,
therefore, that after the conquest of Canada
and the independence of the United States,
Nova Scotia should still continue to trade chiefly
with the New England States and the West
Indies, and only to a limited extent with Canada.

Owing to their extensive coast line and nu-
merous harbors, New Brunswick being also well
supplied with river navigation, the question of
transportation was long a simple one for the
Maritime provinces. For Canada, the Saint
Lawrence and its tributaries had always fur-
nished the great highway of the country. But
above Montreal the river was greatly obstructed
by rapids, hence the trade to the West was first
developed along the easterly Ottawa route, which
passed by way of Lake Nipissing to the
Georgian Bay. There it followed the sheltered
northern channel and the Saint Mary River,
with a portage at Sault Sainte Marie, up to
Lake Superior, and on, by numerous lakes and
streams, to the vast Indian country beyond.

The coming of the Loyalists, the first settlers
in what is now the province of Ontario, render-
decessary a regular traffic up the Saint
Lawrence and along the lower lakes. From
Montreal to Prescott and Kingston this traffic
was carried on by means of various forms of
large flat-bottomed boats, improved bateaux,
which were towed up the rapids, later with
the aid of horses. These bateaux brought up lim-
ited supplies of European imports, chiefly Brit-
ish goods, and took down the furs and, so far
as their space would allow, the potash and flour
of the Western settlements. The Revolutionary
War had led to the building of the first British
vessels on the lakes. After the peace, several
of these became trading vessels and others were
built, the number steadily increasing with the
growth of the Canadian settlements on either side of the lakes. The pre-
ence of lake vessels diverted the greater part of
the Indian trade from the northern to the
southern route.

At first most of the surplus produce of the
Western settlements found a ready local market
in supplying the temporary needs of new
settlers, and in furnishing provisions for the
Indian posts and the British garrisons. With
increasing crops, however, there soon arose a
necessity for export, especially of such articles
as wheat, flour, peas, salt meat and various
minor provisions. About the beginning of the
19th century the amount of provisions produced
in western Canada was nearly equivalent to
the amount purchased by the British govern-
ment for consumption at the garrisons and
posts. In 1801 the total exports of Canada
amounted to $4,800,000. This growing trade
required a more extensive and economical
means of conveyance than that afforded by the
bateaux. A trade in small vessels and various forms
of timber having developed about the same
time, and being sent to market in the shape of
rafts, these were utilized to convey such pro-
visions as might suffer a little exposure. Large
square scows were also built for the purpose
of carrying timber, salt, and other similar
articles.

As regards tariffs and trade regulations in
the earlier Colonial period, nothing was left to
the provincial authorities; all was regulated by
British statutes and administered by Imperial
officials. In the matter of taxation, after the
American Revolution the British North Amer-
ican colonists had little to complain of, for
instead of being taxed to assist Britain the British
people were taxed to assist the colonies. In
return for her freedom to determine the com-
mercial policy of the colonies and to appoint
their officials, Britain had to meet their deficits,
besides furnishing the whole of the naval and
military services.

The first important change in Colonial com-
mercial relations resulted from the recognition
of the independence of the United States in
1783. Pitt and Shelburne had desired to con-
tinue practically the same commercial relations
with the late colonies after the separation as
had existed before it, considering that political
independence did not render such a profita-
able mutual trade. Technically, however, such
a policy would do violence to the whole commercial and colonial system, including the Navigation Acts,—the system of "ships, colonies and commerce," upon which the whole British empire was supposed to rest—and this could not be permitted.

Canadians were for a long time too completely absorbed in questions connected with the control of their internal affairs to be much concerned with the fiscal policy of the country. Indeed they rather looked upon Britain's control of the fiscal policy as a means of obtaining increasing assistance from the mother country. The earlier tariffs were simple affairs, the revenue being derived chiefly from duties on spirituous liquors and the molasses from which rum was distilled. The sweeping prohibitions of the Navigation Acts simplified matters very much. There was no trouble with foreign European goods, because they were forbidden to be admitted to the colonies on board merchant ships, except when they had passed through British ports. It was in Britain, therefore, that the tariff dealt with them and qualified them for entrance to the colonies. In the matter of spirituous liquors, on the other hand, in colonial tariffs, a variety of preferential duties favored the more as against the less direct trade with Britain and the colonies. After the granting of representative legislatures in the colonies (1831) in Canada, they were permitted to impose customs duties on imports for revenue purposes only. The right of disallowance exercised by the Crown prevented any unfavorable treatment of British goods.

By the Act of 1778 the British Parliament maintained and freely exercised the right to regulate, by tariff or other restrictions, the commerce of the colonies, but explicitly stated that all revenue incidentally obtained, after paying the expenses of its collection, should go to the treasury of the colony in which it was collected. There was thus a double jurisdiction in the matter of tariffs, the Imperial and the colonial. But, so far as the colonial and Imperial tariffs covered the same ground, only the colonial tariff was enforced. The Imperial tariff applied only where its rate of duty exceeded that of the colonial. The colonial tariff looked only to revenue; the Imperial tariff to the regulation of commerce in the interests of Imperial trade.

The first legally recognized trade between the United States and Canada was provided for in the Quebec Ordinances of 1787-88, which permitted the free export of all goods except furs and peltries, and the import of all forms of timber and naval stores, all kinds of grain and other natural products and settlers' effects. Rum, spirits and manufactured goods were entirely prohibited, but in 1790 pig iron was added to the list of permissible imports. Pitt's commercial treaty with the United States in 1794 greatly profited the British North American provinces and that country. In this he partly realized his earlier idea of permitting a free mutual trade in all ordinary goods between the United States and the British colonies. But, in deference to the Navigation Acts, so far as the import trade was concerned, it must be in British ships. A direct trade to the East Indies was also permitted to the United States. Later this led to several important relaxations of the British colonial policy.

The trade relations of the Maritime provinces, as we have seen, were well established before the United States secured its independence, but, while the United States enjoyed great freedom of trade with all countries, the Maritime provinces still remained under the close restrictions of the Navigation Acts and the colonial system. Thus general merchandise, even British and East Indian goods, was cheaper in the United States than in the British American ports. As a natural result, there was extensive smuggling along the coasts of Nova Scotia and New Brunswick, and especially among the islands of Passamaquoddy Bay. American vessels supplied the colonists with liquor, tea, tobacco, molasses and other East and West Indian produce, and the chief lines of European and American goods. They received in return furs, fish, lumber, grain, etc., which they carried to their own ports and to the West Indies. Thus the restrictions designed to give Britain a monopoly of the colonial trade and shipping worked to the opposite purpose. Plainly the system had either to be given up or enforced by quite drastic measures. On the death of Pitt the latter policy was adopted, beginning in Canada. This policy in turn induced the non-intercourse policy of the United States, and ultimately the War of 1812-15.

While disastrous to the West Indies and most injurious to Great Britain, these troubles between Britain and the United States were immensely profitable, for the time being, to the British North American colonies. To ensure the carrying of the West Indian supplies in British ships, American produce was collected in ports of the Maritime provinces and in Canada, where it might be taken by sea in either American or British vessels, by overland transport or by inland navigation. This stimulated the trade and shipping of the Canadian and Maritime provinces and enriched the colonial produce dealers. The ultimate benefit, however, of these and later abnormal conditions was more than doubtful. After the Peace of 1815, Canada suffered a severe reaction, emphasized by an unfortunate land and immigration policy.

The enormous preferences in the British market on British North American timber, which had been built up during the Napoleonic wars, was retained and developed because it enriched British shipowners and timber merchants. By the new Corn Law of 1815 a preference was granted to Canadian grain, but it was very uncertain in its operation, since the grain was not admitted at all until the price had risen to quite a high level, in the case of wheat to about $2.10 a bushel.

The international restrictions necessary to preserve a fair equality for British shipping, under the disadvantages of her colonial system, involved further trouble with the United States. Britain admitted a reciprocal trade with the United States and the other British North American provinces; and that country. In this he partly realized his earlier idea of permitting a free mutual trade in all ordinary goods between the United States and the British colonies. But, in deference to the Navigation Acts, so far as the import trade was concerned, it must be in British ships. A direct trade to the East Indies was also permitted to the United States. Later this led to several important relaxations of the British colonial policy.

The trade relations of the Maritime provinces, as we have seen, were well established before the United States secured its independence, but, while the United States enjoyed great freedom of trade with all countries, the Maritime provinces still remained under the close restrictions of the Navigation Acts and the colonial system. Thus general merchandise, even British and East Indian goods, was cheaper in the United States than in the British American ports. As a natural result, there was extensive smuggling along the coasts of Nova Scotia and New Brunswick, and especially among the islands of Passamaquoddy Bay. American vessels supplied the colonists with liquor, tea, tobacco, molasses and other East and West Indian produce, and the chief lines of European and American goods. They received in return furs, fish, lumber, grain, etc., which they carried to their own ports and to the West Indies. Thus the restrictions designed to give Britain a monopoly of the colonial trade and shipping worked to the opposite purpose. Plainly the system had either to be given up or enforced by quite drastic measures. On the death of Pitt the latter policy was adopted, beginning in Canada. This policy in turn induced the non-intercourse policy of the United States, and ultimately the War of 1812-15.

While disastrous to the West Indies and most injurious to Great Britain, these troubles between Britain and the United States were immensely profitable, for the time being, to the British North American colonies. To ensure the carrying of the West Indian supplies in British ships, American produce was collected in ports of the Maritime provinces and in Canada, where it might be taken by sea in either American or British vessels, by overland transport or by inland navigation. This stimulated the trade and shipping of the Canadian and Maritime provinces and enriched the colonial produce dealers. The ultimate benefit, however, of these and later abnormal conditions was more than doubtful. After the Peace of 1815, Canada suffered a severe reaction, emphasized by an unfortunate land and immigration policy.

The enormous preferences in the British market on British North American timber, which had been built up during the Napoleonic wars, was retained and developed because it enriched British shipowners and timber merchants. By the new Corn Law of 1815 a preference was granted to Canadian grain, but it was very uncertain in its operation, since the grain was not admitted at all until the price had risen to quite a high level, in the case of wheat to about $2.10 a bushel.

The international restrictions necessary to preserve a fair equality for British shipping, under the disadvantages of her colonial system, involved further trouble with the United States. Britain admitted a reciprocal trade with the United States and the other British North American provinces; and that country. In this he partly realized his earlier idea of permitting a free mutual trade in all ordinary goods between the United States and the British colonies. But, in deference to the Navigation Acts, so far as the import trade was concerned, it must be in British ships. A direct trade to the East Indies was also permitted to the United States. Later this led to several important relaxations of the British colonial policy.

The trade relations of the Maritime provinces, as we have seen, were well established before the United States secured its independence, but, while the United States enjoyed great freedom of trade with all countries, the Maritime provinces still remained under the close restrictions of the Navigation Acts and the colonial system. Thus general merchandise, even British and East Indian goods, was cheaper in the United States than in the British American ports. As a natural result, there was extensive smuggling along the coasts of Nova Scotia and New Brunswick, and especially among the islands of Passamaquoddy Bay. American vessels supplied the colonists with liquor, tea, tobacco, molasses and other East and West Indian produce, and the chief lines of European and American goods. They received in return furs, fish, lumber, grain, etc., which they carried to their own ports and to the West Indies. Thus the restrictions designed to give Britain a monopoly of the colonial trade and shipping worked to the opposite purpose. Plainly the system had either to be given up or enforced by quite drastic measures. On the death of Pitt the latter policy was adopted, beginning in Canada. This policy in turn induced the non-intercourse policy of the United States, and ultimately the War of 1812-15.

While disastrous to the West Indies and most injurious to Great Britain, these troubles between Britain and the United States were immensely profitable, for the time being, to the British North American colonies. To ensure the carrying of the West Indian supplies in British ships, American produce was collected in ports of the Maritime provinces and in Canada, where it might be taken by sea in either American or British vessels, by overland transport or by inland navigation. This stimulated the trade and shipping of the Canadian and Maritime provinces and enriched the colonial produce dealers. The ultimate benefit, however, of these and later abnormal conditions was more than doubtful. After the Peace of 1815, Canada suffered a severe reaction, emphasized by an unfortunate land and immigration policy.

The enormous preferences in the British market on British North American timber, which had been built up during the Napoleonic wars, was retained and developed because it enriched British shipowners and timber merchants. By the new Corn Law of 1815 a preference was granted to Canadian grain, but it was very uncertain in its operation, since the grain was not admitted at all until the price had risen to quite a high level, in the case of wheat to about $2.10 a bushel.
the supply of the West Indies. In 1823 American vessels were admitted to the colonial trade generally, for all direct dealings between the United States and the colonies. Once more the trade of the Saint Lawrence languished, and complaints poured in upon the home government.

In 1825 Mr. Huskisson, who had revived the policy of Pitt, sought to promote freer trade in America. But he found it impossible as yet to grant perfect reciprocity in shipping. Differential duties were imposed in favor of British shipping in the trade between the United States and the West Indies. The Americans applied the same differentials on their side, and there resulted another period of non-intercourse, from 1826 to 1831, with corresponding activity and prosperity for the Saint Lawrence route and the British North American ports. By admitting to the colonies provisions from the northern nations of Europe in their own ships, Huskisson desired to prevent the Americans from forcing his hand. They came to terms in 1831 and normal trade was once more resumed. But by this time the Colonial System was badly shattered, and almost the only thing left of the New World was the British monopoly of the domestic shipping of the empire. The way was being gradually prepared for the final stroke of colonial economic emancipation.

In 1825 Huskisson weakened the corn laws by greatly increasing the preference on Canadian wheat. Regardless of the local price, Canadian wheat was to be admitted at a uniform duty of five shillings per quarter. For a time the exports of wheat were greatly stimulated, but the benefit was not permanent, and the cry for additional preferences was soon resumed.

The prosperous period of 1826–31, augmented by large expenditures on Canadian public works and an increased emigration, continued for a couple of years after the resumption of normal relations with the United States. But trade depression and political troubles brought Canada to a very low ebb in 1837–38. In 1841 the two Canadian provinces were united, and their political freedom was greatly enhanced and trade extended.

In 1843, after urgent petitions, which more or less coincided with the rising demand in Britain for free food, Canada obtained the ominously liberal concession of access to the British market, at the nominal rate of one shilling per quarter, for all the flour she could grind from her own, or imported American wheat, while the corn laws still stood against the rest of the world. Bad harvests and higher prices in Britain tended to enrich the Canadian merchants of the Saint Lawrence, but precipitated the repeal of the corn laws in 1846, and the adoption of a free trade policy generally.

Free trade carried with it important changes for Canadian commerce, tariffs and transportation. The preference on Canadian grain had gone, and the preference on British North American timber soon followed. In 1847 Britain renounced the right to regulate Canadian trade, and in 1849, by the final repeal of the Navigation Acts, she gave up her monopoly of the carrying trade of the empire.

The general result was that the colonies were left to face the world on much the same terms as other countries. Though lacking in the experience which breeds prudence, those interests which had not been specially pampered entered upon their new career with much zest and enterprise, tending sometimes to rashness.

**Canal Building.** At this stage questions of transportation loomed large. The attention of the imperial government naturally turned to Canada. After the War of 1812 attention had been directed to the necessity for improving the Saint Lawrence route between Montreal and the lakes. A canal to surmount the Lachine Rapids had been projected and abortively attempted. Finally, in 1821, the work was seriously undertaken by the government of Lower Canada, and completed in 1825. This was the year of the opening of the Erie Canal, which, coming at the beginning of a decade of unusual expansion and prosperity for the lake regions, proved a phenomenal success, commercially and financially. This gave an immense impetus to canal building in Canada and the United States. Canals, instead of building pontoon bridges, became the method of support States and provinces without taxation. See CANALS.

In 1824 the Welland Canal was undertaken by a joint stock company with a capital of only $150,000 to connect the Great Lakes with the United States. After many vicissitudes and appeals for both Imperial and provincial assistance, it was opened for traffic in 1832. The locks were of wood, 100 x 22 feet with 7 feet of water. However, neither the Lachine nor the Welland Canal could be of much more than local importance until the remaining Saint Lawrence rapids were surmounted. This task the Imperial government was prevailed upon to undertake. But, in doing so, it disregarded all commercial considerations and followed a shortsighted but very round-about military idea. The Rideau Canal was the result, extending from Kingston to Ottawa, which was afterward connected with Montreal by improvements of the Ottawa River navigation. The locks as constructed were 134 x 33 feet with 9 feet of water. It was opened in 1832 and cost the Imperial government about $4,000,000, or between six and seven times the original estimate. Though of necessity carrying considerable traffic, its cost proved that it was neither a commercial success, since it could not compete with the Erie Canal and did not even supersede the bateaux on the Saint Lawrence. The Upper Canadian legislature determined to complete the Saint Lawrence system and the Cornwall Canal was begun in 1834. But the financial crisis and political troubles of 1837 suspended operations.

The union of the provinces in 1841 brought with it an Imperial guaranteed loan for $7,500,000, with which to complete the public works already planned and partly undertaken. The Welland Canal was taken over by the government and reconstructed. The new locks were 150 x 45 feet, with 9 feet of water, afterward increased to 10½ feet. These were smaller than the locks of the Cornwall Canal, which were 200 x 45 with 9 feet of water. The latter was opened in 1843. The Beauharnois and Williamsburg canals completed the Saint Lawrence system. They were built on the same scale as the Cornwall Canal, and the last lock was opened in 1847. The completing of these canals necessitated the enlargement of the Lachine on the same scale, which was completed in 1848. Thus, in 1849, after the expenditure
of upward of $30,000,000, the new Canadian canal system was planned to accommodate vessels drawing nine feet of water, and Canada expected to realize her eagerly awaited control of the growing traffic of the great basin of the lakes.

But many changes in commerce and transportation had taken place between the opening of the Erie Canal and the opening of the Saint Lawrence system. The British protective and colonial system had been abandoned, and grain from the ports of the United States was admitted to Britain as freely as from those of Canada. Moreover, railways were transforming the carrying trade, making time and continuous service essential features in commerce. While the Canadians were preparing their canals to capture the American carrying trade of the West, the American government was induced, in 1846, to establish the drawback or bonding system. This enabled the American railroads and other transportation companies to make a successful bid for a large share of the western trade and to compete with the Atlantic ports. Finally, though after 1849 western produce could be landed at Canadian seaports much more cheaply than at American ports, yet this advantage was lost through higher ocean freight rates and higher insurance from American ports. The total suspension of shipping for half the year also discounted the natural advantages of the Canadian route, especially in competition with the railroads.

Nothing daunted, the Canadians with their new energy and self-reliant spirit grappled with the changed conditions. On the one hand the government undertook the improvement of the navigation of the Saint Lawrence below Montreal, especially by deepening the channel of the river. The depth of 11 feet at the time was increased to 18½ feet by 1860, and has since been increased to 27½ feet as far as Montreal. The navigation of the gulf was also improved.

About 1850 the ocean steamer was rapidly replacing the sailing vessel. The Cunard line of steamers was subsidized by the British government, doubtless a profitable venture for Britain, but appearing to Canadians as an additional handicap for the Saint Lawrence route. Canada was concerned in this line of its own, the Allan—for weekly service, at an annual cost to the country of $225,000.

The American boom in railroad building, and railroad activity, convinced the Canadians that they must have railroads to supplement their canals. The idea of an independent winter outlet on the Atlantic, and connection with American markets to which the attention of Canada was now turning. While absorbed in their canals the Canadians had give little practical attention to railroads. Hence, before 1840 only 16 miles of railroad had been built, connecting Montreal with Saint John's on the Champlain route to New York. Much discussion took place and many charters were obtained during the forties, but little of a serious nature was done. In 1849 the Canadian government, chiefly under the influence of Mr. (afterward Sir) Francis Hincks, adopted a vigorous railroad policy by undertaking to guarantee 6 per cent interest on a sum not to exceed half the cost of any railroad of not less than 70 miles in length. Among the first lines to be undertaken was the Saint Lawrence and Atlantic, connecting Montreal with Portland, and opened in 1853. In western Canada the Northern Railway, from Toronto to Collingwood, was the first to be built, being begun in 1850 and opened in 1853. The Great Western Railway, between Niagara and Detroit, was the next to be undertaken, and was opened in 1854. Under the fostering direction of Mr. Hincks, the Grand Trunk Railroad was chartered in 1852, as the great central line of Canada. In 1853 it leased the Saint Lawrence and Atlantic, and when, in 1856, the main line was opened from Toronto to Montreal, the chief commercial districts of Canada were connected with the Atlantic by a Canadian line.

The railroad boom lasted from 1849 to 1857, involving an immense outlay of capital, chiefly British. Both the central government and the municipalities were deeply pledged in support of the numerous lines undertaken. The crisis of 1857 brought the movement to a close, and the pecuniary embarrassments of most of the lines effectively discouraged all projects for the next 10 years. In Nova Scotia and New Brunswick large projects were also afoot to connect Halifax and Saint John with the New England States, and also with Canada. But, beyond small sections of these plans, chiefly for local traffic, little was accomplished before Confederation. The general situation is reflected in the following figures. In 1840 there were in the British North American provinces 16 miles of railroad; in 1850, 66 miles; in 1860, 2,065 miles.

Tariffs and Expansion of Trade.—With regard to tariffs, the central feature of the period between 1850 and Confederation, in 1857, was the Reciprocity Treaty with the United States, signed in 1854 and abrogated in 1866. It established reciprocal free trade between the British North American provinces and the United States, in all natural products. This secured free entry to the United States for practically everything which the British provinces had to sell. (See Canada and the United States.) The special attraction for the United States was the freedom of access to the Canadian fisheries (q.v.); though the Americans also enjoyed large local markets for agricultural products in many parts of the eastern provinces. According to the statistics of trade, Canada appeared to have the best of the bargain. But the statistics require interpretation. Much of the Canadian export to the United States was really only a transit trade; either the same goods, or their equivalent, being shipped from Atlantic ports. Again, between 1854 and 1858 the decline in the amount of manufactures imported from the United States was due to the financial crisis of 1857 and the cessation of public works in Canada. Then, during the Civil War the United States was extensively purchasing supplies, and had little to sell. The Canadians themselves have been greatly deceived by the figures of the reciprocity period, and imagined that a like result would be the result of tax-free trade.

The other feature of importance in this period was the increase in the Canadian tariff on manufactured goods, in 1858 and 1859. Owing to the large public debt contracted for the building of the canals, the interest on which was not
offset by tolls as expected, and, more immediately, owing to the great obligations incurred in guaranteeing railroad investments, the Canadian government was in great financial straits after 1856 and was therefore forced to seek a larger revenue. Accordingly, in 1858 the tariff on imports was raised the general rate being increased from about 12½ to 15 per cent, and in 1859 it was still further increased to 20 per cent. The British merchants and manufacturers vigorously protested the most strenuously. An increase of duties on the goods of the mother country, and the manufacturers of the United States considered the increase of duties a breach of faith, inasmuch as they had expected their advantage from reciprocity to come from the sale of manufactured goods. The Canadian government repeatedly that its sole object, was to relieve its financial obligations, not to check imports.

The abrogation of the Reciprocity Treaty in 1866 produced a strong effect upon the British North American provinces, and undoubtedly hastened the process of and undoubted Confederation. The Canadian tariff of 1866 was lowered to a 15 per cent standard, as a concession to the freer trade leanings of the Maritime provinces, and became the first tariff of the Canadian Dominion. Canada retained the general tariff on revenue until, in common with other countries, she suffered from the world-wide depression of 1875-78. An effort was made to secure the renewal of the Reciprocity Treaty. This failed, however, and a change of government took place on a promise of relief by means of a protective tariff. This new tariff of 1879 raised the general standard of duties from 17½ to 20 per cent. Times revived throughout the world and the relief promised actually came. The tariff, however, did not prevent the country from suffering with all others during the next period of depression, from 1884 to 1886, though the tariff had been raised somewhat in the interval. Nor did the country escape during the next depression, from 1894-96, when another change of government took place after a general election. The Liberal party being more or less pledged to a reduction of duties, found this more difficult to accomplish than anticipated. In 1897, however, the tariff was considerably amended in the interest of the consumer, and the happy expedient was devised of offering to the world at large a reduction of 25 cent on the general tariff, wherever Canada was treated with equal favor. As Britain was practically the only important country fulfilling those universal conditions, the policy which was entered upon as a redemption of the party pledge ended in the preferential treatment of British goods only. This limitation was explicitly recognized in 1900, when the preference on British imports was increased to 33½ per cent. Since, for various reasons, Canadian imports from Britain were declining, relatively at least, this concession did not adversely affect important Canadian industries except in the department of textiles. Accordingly, in 1904 this part of the preferential tariff was amended and the duties were raised. At the same time a new principle of maximum and minimum tariffs was outlined for the future.

For a decade and a half after 1897 a steady tide of immigration was in progress and capital was flowing toward Canada. In a new region such as the virgin plains of western Canada, the new and extensive employment of labor and capital resulted in the most obvious prosperity and radical changes on the face of nature. In planting the wilderness with the homes and busy trade centres of men, a lively market was created for all manner of wares for comfort and consumption. Even the wilderness itself soon came to have a highly speculative value, whether in the gross, as prospective farms, or in detail as metropolitan city lots estimated at so much per foot. Thus the annual immigration the dollar in actual capital called into existence several other dollars of prospective value, and the real and imaginary were exchanged indiscriminately.

Again, the building of modern railroads into unexploited territory is like the letting out of water upon the thirsty earth. Even in the process of construction they irrigate the country with millions of wealth, producing large harvests of profit for contractors and the purveyors of and dependents on armies of workmen, and for all manner of machinery, implements and materials of construction and equipment. When completed these agencies of transportation open the wilderness to the home seeker, who, merely as home builder, furnishes principles of a tariff to pay for years, and, as town and city builders, for decades. Soon the speedy returns from agricultural industry furnish the railroads with traffic: alike in the export of bountiful harvests and the import of the implements with which they are to be increased, and the myriad of miscellaneous supplies which the ingenuity of the modern trader brings to the door of the settler with actual or prospective crop returns.

All these features were strikingly realized in Canada between the years 1897 and 1913 and may be illustrated by some typical concrete facts. The immigration from the adjoining agricultural and industrial regions of the United States was very marked during this period, and the annual immigration from the United States was but little over 2,000 in 1897 but it rose to 139,000 in 1913. During the same period, the annual immigration from Britain increased from 11,000 in 1897 to 150,000 in 1913. In 1897, the total immigration into Canada increased from 21,000 in 1897 to 402,000 in 1913. The British immigrants as a rule preferred settlement in the towns, while the American settlers preferred the farms, thus indicating the life to which the respective immigrants had been accustomed before coming to Canada.

The natural effect of the modern tendency toward highly specialized production, as applicable to agriculture as to other industries, has enhanced the activities of urban life and reduced proportionately the occupations of rural life. Agricultural machinery and the supplies for the farmers' homes are now chiefly produced in the cities. The rural population of Canada, which amounted to 63 per cent in 1901, fell to 35 per cent in 1911. This decline was marked in all the older parts of the country and even in southern and central Manitoba where the earliest settlements had been made in the West.

The trade of Canada no less than its population testified, not only to the rapidity of the development of the country between 1897 and 1913, but to the fact that this was largely due
to the influx of immense volumes of foreign capital, which came almost entirely in the shape of goods and not in the form of money. This however, the period of expansion had stagnated from 1875 to 1895, having increased barely 12 per cent in those 20 years, rose from $224,000,000 in 1895 to $350,000,000 in 1906. In another eight years it had increased to $1,129,000,000 in 1914. It then fell off some $900,000 during the first year of the war, but, under the stimulus of war expenditure and munition supplies, rose to $1,447,000,000 in 1916.

Under the influence of the capital investment already referred to, the imports of the country rose much faster during the period of expansion than did the exports. Thus at the beginning of the period of expansion in 1897, the exports of the country exceeded the imports by $18,000,000 on a total trade of $257,000,000. But by 1906 the imports had already exceeded the exports to the extent of $37,000,000, and in 1913 the exports had reached an excess of $286,000,000. These excesses were completely offset by borrowings abroad, much of the greater part being obtained in the London money market. With the rapid fall off in 1913-14 in the supply of borrowed capital, with a corresponding reduction in capital expenditure, there was a severe shrinkage in importation and a corresponding liberation for export of much Canadian produce hitherto purchased for use in the country itself. This transition was greatly emphasized during the first year of the war, when British capital was practically entirely cut off for all but military service.

This sharp reversal of the movement of the previous decade immediately revealed itself in the trade statistics of the country. The surplus of imports of $298,000,000 in 1913 was reduced to $171,000,000 in 1914, was further reduced to $26,000,000 in 1915 and in 1916 was converted into a surplus of exports of $149,000,000. In the trade returns for the last two years, the export and import of bullion has been eliminated as it was abnormally influenced by financial arrangements between Great Britain and the United States with which Canada had no special concern.

Britain and the United States have continued throughout to be the all-important factors in Canadian foreign trade. Thus Britain is the chief market for Canadian exports, while the United States furnishes the chief source of supply for Canadian imports. The Canadian trade with all other countries combined makes but a relatively small showing in comparison with the trade carried on with either of these two countries. In the decade between 1906 and 1914, out of a total of $2,892,000,000 of exports, Great Britain took $1,447,000,000 and the United States $1,157,000,000, leaving only $270,000,000 as taken by all other countries, including the other sections of the British empire. During the same period Canada exported for home consumption a total of $4,160,000,000, of which the United States furnished $2,601,000,000, and Great Britain $952,000,000, leaving only $605,000,000 as supplied by all other countries, whether within or without the British empire. One of the distinctive features of the tariff relations between Canada and her two chief customers, Great Britain and the United States, are of chief interest in this field. Until the outbreak of the European War, however, few changes were made in the tariffs applicable to these two countries. Treaties had been negotiated with several of the British West Indian Islands on the basis of mutual preference. As already indicated, however, for the past century and more, many attempts have been made to break the natural trade relations originally established between the West Indies and the Atlantic States when they were British colonies. The British island colonies on the Atlantic Coast are loath to invite unfavorable tariff treatment from the United States by granting special favors to Canadian trade. Hence, while some of the smaller islands accepted the Canadian offer, the larger colonies of Newfoundland, Bermuda, Jamaica and British Honduras declined to respond to the Canadian preference extended to them for three years from 1912.

On the other hand, as regards Canadian tariff relations with the United States, the situation for Canada has considerably improved since the opening of the century. On the one hand, Canadian products have been coming ever more fully into world markets; while, on the other, the rapid growth of the manufacturing and industries of the United States have rendered the Canadian supplies of raw materials and food products a matter of undoubtedly increasing importance. Further, the Canadian market for American raw material such as coal, cotton, corn, etc., and for many important lines of manufactured goods has been steadily increasing. These changing relations naturally affected the traditional attitudes of the respective countries toward the perennial question of reciprocity. The discussion of this question was renewed in 1910, and, after considerable negotiation, centring around the higher and lower schedules of the Payne-Aldrich tariff, there emerged the reciprocity agreement of 1911, which followed fairly closely the previous treaty of 1854. The new treaty was passed by the United States Congress in July 1911, but was successfully blocked by the opposition in the Canadian House of Commons in the expiring days of the parliamentary term of 1911. The general election which followed largely turned on this issue, and revealed the strength of the growing Canadian sentiment in favor of maintaining not only political but commercial independence. The existing government was defeated in the election of September 1911. In consequence the treaty was not confirmed and the tariff relations between the two countries remained upon the basis of the ordinary tariff legislation of each country.

Such modifications as have been made in the general Canadian tariff since 1911 have been due to special local interests. The changes introduced since the outbreak of the war have been determined almost entirely on revenue grounds and will be dealt with under the section on Public Finance.

Incidentally to the process of granting preferential treatment to Great Britain, Canada has secured complete fiscal independence, being no longer bound by the commercial treaties negotiated between Great Britain and other countries, unless she explicitly agrees to accept the terms of any treaty. Incidentally to the same process of tariff emancipation, Canada found herself involved in a tariff
quarrel with Germany. This lasted for some seven years, from 1903 to 1910, ending in favor of the Canadian contention. During this period most German imports reached Canada as Dutch, Belgian or British goods, and Canadian supplies went to Germany through similar channels.

Of late years Canada has virtually established an independent consular service under the guise of a system of trade commissionerships. This was established first with Great Britain and other portions of the British empire, but now extend to several foreign countries with which it is desired to promote direct trade relations. This system is certain to be more fully developed after the war.

Railways.—As a condition of Confederation, in the East, the Intercolonial Railway, connecting the Maritime provinces with Canada, was constructed by the government at a cost of upward of $20,000,000. A corresponding condition of western federation was the construction of a transcontinental line to British Columbia. This was ultimately realized in the Canadian Pacific Railway, begun in 1881 and completed in 1885 at a cost to the country of $62,000,000 in cash. The line to the Puget Sound was opened in 1889, and the transcontinental system of railways from Quebec to Port Angeles became complete.

The rapid development of Canadian railways since 1890 centres upon the actual and prospective needs of the immense inland areas west of the Great Lakes. The need for additional facilities for main line transportation has been largely incidental to the need for extended systems of branch lines for the settlement and development of so extended an area. A solution of the problem has been largely effected, but unfortunately without any very obvious regard to either economy or efficiency. The combination of transcontinental and local service has been attempted, and, so far as construction is concerned, has been largely realized by three independent and competitive systems, the Canadian Pacific Railway, the Grand Trunk and Great Western railways, and the Canadian Northern Railway. In various portions of the western provinces other more or less independent but chiefly provincial lines have been partially constructed, largely on the basis of financial assistance by the respective provinces in which they are located. Most of the larger railroad extensions in the East, including the government Transcontinental Railway, have been necessitated by the western developments of the three larger companies. Since 1870 the mileage of the railroads has increased as follows: 1870, 2,617 miles; 1880, 7,174 miles; 1890, 13,151 miles; 1900, 17,657 miles; 1910, 24,731 miles; 1915, 35,382 miles.

The total capitalization of the Canadian railways in 1914 was $1,808,820,000, nearly evenly divided between stocks and bonds. In addition the Dominion government has subsidized the railway systems to the extent of $178,834,000 in cash. It also granted to them 31,804,000 acres of land and has guaranteed their bonds to the extent of $127,965,000. The Dominion government has also expended $323,596,000 in building or purchasing certain railroad lines of its own, chief of which are the Intercolonial Railway and the Transcontinental, both owned entirely by the government. The provincial governments have subsidized the railroads to the extent of $37,023,000 in cash, and 23,876,000 acres of land, and have guaranteed their bonds to the extent of $107,500,000. To these subsidies must be added the cash contributions of the municipalities, amounting to $17,914,000.

The outbreak of the European War naturally disturbed the calculations of the railroads as to their normal prospects, affecting them both as to their capital financing and their traffic earnings. The results, however, have not always been adversely. The Grand Trunk and Canadian Pacific have reported their earnings to have been greatly increased, owing to the exceptional Western crop of 1915 and the great transportation needs incident to the war. All of the Canadian railways, and especially the Canadian Pacific Railway, founded in 1856, in 1915-16 an exceptionally profitable one. The net earnings of the Canadian Pacific Railway system for that year amounted to over $49,000,000, being more than $15,000,000 in excess of the net earnings of the previous year. At the same time the Grand Trunk Pacific and the Canadian Northern railroads experienced difficulties in connection with their capital financing, which forced them to come to the government for assistance and which it has not been found possible to avoid.

The present government is investigating the whole railroad problem of the country with a view to some permanent reorganization of the internal transportation system of Canada.

Canals.—Confederation also directed attention to the renewed importance of the Saint Lawrence route and the economy of large vessels for the carrying trade. It was determined to enlarge and deepen the canal system. The new movement was once more begun at Cornwall, in 1876. The dimensions of the new locks were 270 x 45 feet with 14 feet of water. The other canals were enlarged or quite new ones constructed on at least the same scale. The Soulanges Canal, the last to be built, has locks of 280 x 45 feet with 15 feet of water. In 1895 the Canadian Pacific Railway and the Canadian Northern opened with one lock of 900 x 60 feet and with 18 feet of water. There is now, therefore, a continuous waterway with a minimum depth of 14 feet from Lake Superior to the sea.

As usual it was expected that when the new canal system on a 10-foot basis was fully completed, the grain and other traffic from the West would be largely diverted to the Saint Lawrence route. This expectation, however, was but slightly realized, there being many factors to be taken into account, among them the construction of still larger vessels upon the upper lakes and the changed conditions of transatlantic shipping, tending to favor the larger American ports. The forwarding of grain tended to shift from the Saint Lawrence route below Lake Erie to the New York and other transatlantic routes through Buffalo, which, at present, furnishes the chief exit for western Canadian as well as American grain. Still another attempt, therefore, is being made to readjust matters by a further enlargement of the Welland Canal. After elaborate surveys and much discussion, with incidentally a considerable agitation from Montreal and northeastern Ontario for the construction of a new canal route via the Ottawa River and Georgian Bay, it was decided in 1912 to undertake the enlargement of the Welland Canal. This involves widening and deepening the un-
locked section of the canal from Lake Erie to Thorold, and the construction of a new system of seven very large locks from that point to Lake Ontario, serving the purpose of the 25 locks on the existing canal. Ultimately, the lock will be 10 feet in width and 75 feet in depth although in the meantime of 25 feet for the unlocked section of it. This will amply accommodate all present vessels from the head of Lake Superior, the Sault Sainte Marie having a minimum depth of only 18 feet 3 inches. The estimated cost of the new canal is $50,000,000, $20,000,000 have been voted and $10,000,000 expended, but further operations are likely to be suspended until the close of the war.

The full benefit of the new Welland Canal for the Saint Lawrence route cannot be realized until the Saint Lawrence River canals from Prescott to Montreal are also enlarged, the present locks on this section ranging from 14 to 18 feet, the majority with the lesser depth.

Meantime, extensive improvements in the harbor accommodation at Saint John, N. B., and the construction of new terminal facilities at Halifax are expected to have an important influence on the transatlantic facilities from Canada, with which the mere improvement of the canals would not be sufficient to influence the present and possibly future trend of Canada's external trade through American ports. See Canadian Canals.

Adam Shortt, Commissioner of the Dominion Civil Service.

47. BANKING SYSTEM. The first banking establishment in Canada was a private bank founded in Montreal in 1792, under the name of the Canada Banking Company, and evidently intended to be modeled after the English private banks. It opened for business and issued notes, but its life was very short. In 1807-08 an unsuccessful attempt was made to obtain from the legislature of Lower Canada a charter for the Bank of Canada, which would have been a semi-government bank, resembling in many respects the first Bank of the United States, though much on a smaller scale. In 1817 the "Montreal Bank" began business in Montreal as a private partnership, this being the origin of the Bank of Montreal, which was for many years, and still in some respect remains, the most important bank on the continent, while from its "Articles of Association" there has been developed, with steady continuity, the scientific system of banking law which exists in Canada to-day. In the following year two similar associations—the Quebec Bank and the Bank of Canada—were formed, on almost identical lines, and in 1822 all three obtained legislative charters of incorporation, valid for 10 years, which followed the articles of association in almost every important particular. They differed very considerably, however, from the abortive bill of 1808. Framed to give legal recognition to associations of merchants already actively engaged in commercial banking, they were throughout designed to meet ordinary commercial requirements, and although they are perhaps more remarkable for what they omitted than for what they included, most of their provisions were sound. They confined the bank's business to legitimate lines, they prohibited lending upon the pledge of goods or upon mortgage, or dealing in real estate, and they provided that all notes issued were to be redeemable on demand in specie. Power to open branches was not expressly given, but as it was not denied, its existence was assumed, and the banks did, as a matter of fact, open branches or agencies in both Lower and Upper Canada. The English private banks and the Scottish chartered banks were the joint parents of these Lower Canadian charters, and of the Canadian banking system which has sprung from them. Various changes and additions were made to suit Canadian requirements, while in the phraseology used, as well as in some of the internal regulations, the influence of the chartered banks in the United States may be seen, but it may safely be said that practically everything which has proved of permanent value was derived from English, Scotch or native sources.

In Upper Canada the earliest banking legislation was on political, rather than commercial, lines, and the first charter, that of the Bank of Upper Canada, granted in 1821-22, followed the Lower Canadian bill of 1808 rather than the articles of association of the "Montreal Bank." The plan as first made was not sound, and as it had little permanent influence upon later legislation no description of it is necessary. The Imperial authorities, by pressure persistently exerted, succeeded in securing the adoption of two important amendments which are still part of Canadian banking law. In 1832 banks were prohibited from holding, or lending on, their own stock, while in the charter of the Gore Bank, granted in 1835, it was provided that the shareholders should be individually liable for the debts of the bank to an amount equal to their respective holdings of subscribed stock. The 'prohibition of the lending of money on mortgage, which from the first had been embodied in Lower Canadian charters, was never adopted in Upper Canada, although strongly urged by the Colonial Office.

The Union of the two Canadas took place in 1840, and at its first session in 1841 the legislature of the province of Canada adopted the report of a select committee, favoring a uniform system of banking, and a number of important regulations emanating from the Colonial Office, some of which already existed in individual charters. All notes were to be payable on demand in specie, they were not to be issued in an amount exceeding a bank's paid-up capital, and suspension of specie payments for a given number of days (not in any case exceeding 60), either consecutively or at intervals within any one year, was to forfeit the charter. The bank was not to hold its own stock, or to make advances against it, nor was it to lend money on security of lands or houses, or ships, or on pledge of merchandise. These and a few less important regulations were incorporated in every new and renewal bank charter thereafter granted, the double liability clause was made applicable to every bank, and one bank was prohibited from holding stock in another, except such as might be taken for bona fide debts, contracted in the usual course of business. In this last regard Canada did not try to deal with banking in a systematic way and to lay down general rules to which all banks must conform.

Only a passing mention need be made of
the free banking law which, avowedly an imitation of the free banking laws of the State of New York, was introduced in 1835. By 1834 bank failure was evident, the free banks gradually died out or obtained charters, and the act was repealed in 1836. The only vestige of it now to be found is the provision, revived in the Dominion Act of 1880, that notes issued by a bank should be the first charge upon its assets. Up to 1859 banks had been prohibited from lending money upon the pledge of goods, but in that year an act was passed authorizing a bank to take bills of lading, warehouse receipts, etc., as collateral security for the payment of any bill or note discounted by it, providing the security was taken at the time the bill was negotiated.

Little need be said as to the banking history of the other provinces. The charters in the Maritime Provinces were very similar to those of Lower Canada, Manitoba had no existence as a province before it joined the Confederation, while British Columbia had passed no banking legislation before, for its banks had hitherto been incorporated under an Imperial charter, which has now been surrendered.

At Confederation, in 1867, all right to legislate regarding banking was vested in the Federal government, but the initial task of framing a comprehensive banking law which should be uniform for the whole Dominion was by no means an easy one. Banking experiences during the previous two or three years had not been altogether happy, very divergent views were held, and even among bankers there was a wide difference of opinion, a difference which to some extent followed geographical lines, the existing system being generally upheld in Ontario, while in Quebec and the Maritime Provinces there was a widespread desire for a change. A system which in its main features would have followed pretty closely the banking practice of the United States was in 1869 proposed to Parliament by Mr. Rose, then Minister of Finance, and was strongly supported by representatives of the Bank of Montreal and the Bank of British North America. But determined opposition developed, and the proposals were withdrawn. A new Finance Minister, Sir Francis Hincks, having taken office, a new act was passed in 1871, continuing many existing features and introducing some new ones. But the first really important Bank Act passed after Confederation was that of 1871 (34 Vict. Chap. V), which embodied all the provisions of any charter or general act then in force which it seemed desirable to perpetuate, making them applicable immediately to all new banks, and to all the existing banks as soon as their respective charters expired. A few small banks in the Maritime Provinces continued for several years under their old charters, the last one coming under the operation of the act on 1 March 1892. While each bank retained the necessarily individual features of its own charter — those relating to its name, capital, chief place of business etc. — and while it still remained necessary for every new bank to obtain a special act of incorporation (which it could do as a matter of course during any session of Parliament, if it conformed to the prescribed conditions), the new act made all other regulations uniform, with some unimportant exceptions in the case of the Bank of British North America, which was incorporated under an Act of 1860, the Banque du Peuple, which has since passed out of existence. Except for the express right given to a bank to make advances on the stock of other banks (a most objectionable enactment, repealed in 1879), no new features of special consequence were introduced. It provided that no bank should issue notes of less than $4 each, and that every bank should hold as nearly as practicable one-half, and never less than one-third, of its cash reserves in Dominion notes (both provisions designed to increase the issue of Dominion notes): but the importance of the act rests on the fact that it firmly established in Canada a banking system based upon Canadian and British principles, a system which, modified and improved from time to time, exists in Canada to-day. Its chief features are: large banks, the branch system, an elastic assets currency, no fixed reserves and the double liability of shareholders.

In 1879 the act was revised and re-enacted, while an amending act (63, 64 Vict. Chap. 26) was duly passed in 1900, but only two new provisions require mention. Special powers were given in 1900 under which any bank might sell the whole or any portion of its assets to any other bank, and the Canadian Bankers' Association was formally recognized and given certain definite legal powers and duties. For a long time past it had been an established rule to enact the Bank Act for 10 years only, thus ensuring a periodical discussion of the whole theory and practice of banking, while during the 10-year intervals the banks could enjoy comparative peace. A revision of the act was accordingly due in 1910, but at that time the public mind was much disturbed over two or three recent bank failures, and it was therefore deemed best to postpone discussion and revision. But the act of 1900 would expire on 1 July 1911, so in order to keep the bank charters in force the act was extended from year to year until 1913, when it was decided to deal with the matter.

As a result of public feeling, and of a persistent anti-bank agitation which had been going on in some of the newspapers, the whole banking system was subjected to very close and searching criticism. Many new acts were proposed, some of them meeting with strong support both in Parliament and in the country. But while some important alterations were embodied in the new act, there was no real departure from the principles of the established system, which may be said to have encountered successfully the hostile criticism to which it was exposed. The new act (3-4 George V, Chap. 9) came into force on 1 July 1913 and will expire on 1 July 1922. Until that date it is the charter of every Canadian bank (except a couple of savings banks in the province of Quebec), and under it every bank has exactly similar rights, privileges and limitations: the Bank of Montreal, with paid-up capital and reserve fund of $535,320, standing on precisely the same legal footing. The mini-

* An unimportant exception in the case of the Bank of British North America is noted later on.
mum subscribed capital necessary before a new bank can begin business is $500,000, of which at least $250,000 must be actually paid up in cash and deposited with the Minister of Finance. After the bank is in operation the shareholders may, by passing a by-law at a general meeting, and afterward obtaining the approval of the Treasury Board, increase or reduce the capital stock, but it must not be any part of it without being authorized to do so by the Bank Act or by some other act, nor may he use foreign words equivalent to "banker" or "private banker." There are now very few private bankers in Canada, and their operations are on quite a small scale. The following tables give the principal items in the combined balance sheets of the banks at different dates since Confederation.

### LIABILITIES

<table>
<thead>
<tr>
<th>31 Dec.</th>
<th>No. of branches</th>
<th>To shareholders</th>
<th>To public</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Canada</td>
<td>Elsewhere</td>
<td>Paid-up capital</td>
</tr>
<tr>
<td>1870</td>
<td>(a) 20</td>
<td>(e)</td>
<td>$33,449</td>
</tr>
<tr>
<td>1880</td>
<td>(b) 36</td>
<td>(e)</td>
<td>50,819</td>
</tr>
<tr>
<td>1890</td>
<td>(c) 38</td>
<td>(e)</td>
<td>60,057</td>
</tr>
<tr>
<td>1900</td>
<td>(d) 36</td>
<td>(e)</td>
<td>67,087</td>
</tr>
<tr>
<td>1910</td>
<td>(e)</td>
<td>(e)</td>
<td>74,071</td>
</tr>
<tr>
<td>1915</td>
<td>(f) 25</td>
<td>(e)</td>
<td>80,460</td>
</tr>
<tr>
<td>1920</td>
<td>(g) 23</td>
<td>(e)</td>
<td>84,400</td>
</tr>
<tr>
<td>1925</td>
<td>(h) 22</td>
<td>(e)</td>
<td>87,400</td>
</tr>
<tr>
<td>1930</td>
<td>(i) 21</td>
<td>(e)</td>
<td>89,400</td>
</tr>
</tbody>
</table>

### ASSETS

<table>
<thead>
<tr>
<th>31 Dec.</th>
<th>Specie and Dominion notes</th>
<th>Securities</th>
<th>Loans and discounts</th>
<th>Total assets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In banks</td>
<td>Gold reserve</td>
<td>Total</td>
<td>(d)</td>
</tr>
<tr>
<td>1870</td>
<td>14,018</td>
<td>$14,018</td>
<td>16,485</td>
<td>16,485</td>
</tr>
<tr>
<td>1880</td>
<td>16,485</td>
<td>16,485</td>
<td>16,328</td>
<td>16,328</td>
</tr>
<tr>
<td>1890</td>
<td>31,558</td>
<td>31,558</td>
<td>30,248</td>
<td>30,248</td>
</tr>
<tr>
<td>1910</td>
<td>109,418</td>
<td>109,418</td>
<td>97,303</td>
<td>97,303</td>
</tr>
<tr>
<td>1920</td>
<td>128,564</td>
<td>128,564</td>
<td>102,140</td>
<td>102,140</td>
</tr>
<tr>
<td>1925</td>
<td>130,892</td>
<td>130,892</td>
<td>104,397</td>
<td>104,397</td>
</tr>
<tr>
<td>1930</td>
<td>200,610</td>
<td>200,610</td>
<td>105,661</td>
<td>105,661</td>
</tr>
<tr>
<td>1935</td>
<td>213,543</td>
<td>213,543</td>
<td>122,495</td>
<td>122,495</td>
</tr>
<tr>
<td>1940</td>
<td>195,922</td>
<td>195,922</td>
<td>188,978</td>
<td>188,978</td>
</tr>
<tr>
<td>1945</td>
<td>249,542</td>
<td>249,542</td>
<td>1,227,363</td>
<td>1,227,363</td>
</tr>
</tbody>
</table>

(a) Five other small banks not reporting.
(b) Eight other small banks not reporting.
(c) Two other small banks not reporting.
(d) Government securities only.
(e) Exact figures not available.
(f) Since this report was made, the number of banks has been reduced to 19; the Bank of British North America, which operated on an imperial charter, was incorporated by the Bank of Montreal, and the Northern Crown Bank by the Royal Bank of Canada.—both in the early part of 1918.

The dividends paid vary from 5 to 14 per cent, the average rate being 10.

reduced below $250,000. Before a bank may begin business it must obtain from the Treasury Board a certificate that it has complied with all the requirements of the law, this certificate to be obtained within one year of the date of the act of incorporation. The Treasury Board is the financial committee of the Privy Council for Canada, composed of five Cabinet ministers, with the Minister of Finance as chairman. No person or corporation may use the words "bank," "banking company," "banking house," "banking association," or "banking institute," or any word or words of import equivalent thereto in any foreign language, to describe his business or

The chief place of business of most of the banks is at either Montreal or Toronto, only three having their head offices west of Ontario. The right to establish branches is specifically granted, and most of them have numerous branches, several being represented in nearly every Canadian town of any importance. The Bank of Montreal, for instance, has about 174 branches in Canada and 10 elsewhere, the Canadian Bank of Commerce about 374 in Canada and 7 elsewhere, and the Royal Bank of Canada about 366 in Canada and 65 elsewhere. Several have branches or agencies in London and some of the more important cities in the United States, those represented in New York, Chicago, and San Francisco.
York being among the largest dealers in foreign exchange. Newfoundland is entirely dependent for its banking facilities upon the Crown, which holds some 28 branches there, while a large proportion of the whole banking business of the West Indies, including Cuba, Porto Rico, British Guiana, etc., is done by two Canadian banks—the Royal Bank of Canada and the Bank of Nova Scotia—which have between them about 70 branches in the West Indies and adjoining districts. The foregoing tables show that the 21 banks in existence at the end of 1917 had 3,100 branches, an average of 148 branches per bank. Each bank is administered by directors, not less than five in number, who are elected annually by the shareholders, each share carrying one vote. Directors must each hold paid up stock of from three to five thousand dollars, according to the total amount of the capital stock; the majority of them must be British subjects domiciled in Canada. A general meeting of shareholders must be held annually at which directors must submit a clear and full statement of the affairs of the bank. Statements of assets and liabilities (in a prescribed form) must be sent monthly to the Minister of Finance, by whom they are published in the *Canada Gazette*. Two or three other returns are also required, and the Minister of Finance has power to call for special information from any bank. The banks have long made a practice of having all their branches and departments inspected at least once a year by their own inspectors, but until 1913 no system prevailed either of audit by the shareholders or of examination by the government. In that year, in deference to popular sentiment, provision was made for an audit by a person or persons appointed by the shareholders of each bank in general meeting, such persons being selected each year from a list of persons (not less than 40 in number) chosen by ballot by the general managers of all the banks at a meeting called annually for that purpose, and approved by the Minister of Finance. Every such auditor has a right of access to the books and accounts, cash, securities and documents of the bank, and is entitled to require from the directors and officers such information and explanations as may be necessary for the performance of his duties. The auditor must certify to the correctness of the balance sheet or statement presented to the annual general meeting of shareholders, and of any other statement which the shareholders may by law require. Provision is made for special audits at the direction of the Minister of Finance. The practical working out of this audit system is still on trial, but it may be anticipated that at the next revision of the Bank Act the selection of the panel of auditors will be removed from the general managers, the powers against whom the audit is more particularly directed, that more practical opportunity for independent selection will be given to the shareholders, and that a restriction will be placed on the number of banks for which any one person (or members of the same family) may act as auditor.

In the United States the bank's president is generally its chief executive officer, but in Canada this is not the case. British precedent is followed, and the bank is managed by a general manager, who accepts the fullest responsibility for the conduct of its business. The Board of Directors deliberate on all important transactions and all applications for large credits which have been approved by the general manager are submitted to them. The branch managers are responsible for the general business of their respective branches, and, as a rule, are allowed to use their own discretion in making advances up to certain amounts, varying according to the importance of the particular branch. Any loans applied for in excess of the limit fixed must be referred to the general management at the head office. By means of the branch system credit is distributed throughout the whole country; money borrowed from depositors in the rich but less progressive portions of Ontario may be lent out again in the newest parts of the Northwest, and interest tends toward a common level. The average rate obtained in western Canada is only about 1 per cent more than in Ontario. The banks being large, and under no restrictions as to the amount which they may lend to any one customer, are able to supply the total needs of any person with whom they are willing to do business. They grant yearly credits, and practically undertake to supply their customers' wants up to the limit fixed at any time during the continuance of the credit. As a corollary to this they almost invariably require that each customer shall borrow only from one bank.

No special percentage of cash reserves is required to be kept—in fact, the banks are not required by law to keep any cash or other reserves—but of whatever cash reserves are kept in Canada at least 40 per cent must be in Dominion notes. Percentages of cash reserves to total liabilities to the public held by all banks on 31 December in certain years were as follows:

<table>
<thead>
<tr>
<th>31 Dec.</th>
<th>Specie</th>
<th>Dominion notes</th>
<th>Total cash reserves</th>
<th>Total liabilities to public</th>
<th>Percentage cash to liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>$11,773</td>
<td>$19,785</td>
<td>$31,558</td>
<td>$392,150</td>
<td>8.4</td>
</tr>
<tr>
<td>1910</td>
<td>33,411</td>
<td>76,007</td>
<td>109,418</td>
<td>1,147,075</td>
<td>9.5</td>
</tr>
<tr>
<td>1911</td>
<td>37,464</td>
<td>97,657</td>
<td>135,121</td>
<td>1,274,323</td>
<td>11.5</td>
</tr>
<tr>
<td>1912</td>
<td>33,780</td>
<td>94,584</td>
<td>128,364</td>
<td>1,510,084</td>
<td>8.5</td>
</tr>
<tr>
<td>1913</td>
<td>46,620</td>
<td>111,178</td>
<td>157,798</td>
<td>1,306,757</td>
<td>12.0</td>
</tr>
<tr>
<td>1914</td>
<td>67,070</td>
<td>143,240</td>
<td>210,310</td>
<td>1,314,646</td>
<td>15.9</td>
</tr>
<tr>
<td>1915</td>
<td>74,205</td>
<td>156,668</td>
<td>230,873</td>
<td>1,400,903</td>
<td>15.4</td>
</tr>
<tr>
<td>1916</td>
<td>83,132</td>
<td>156,400</td>
<td>239,532</td>
<td>1,706,948</td>
<td>14.0</td>
</tr>
<tr>
<td>1917</td>
<td>101,712</td>
<td>262,099</td>
<td>363,812</td>
<td>2,081,733</td>
<td>16.6</td>
</tr>
</tbody>
</table>

It must not be forgotten that the banks' cash reserves are only their first line of defense. Their real reserves are in the shape of call loans in New York against stocks and bonds, balances in the hands of their correspondents and securities lodged with their agents in London and elsewhere, against which they are entitled to draw at any moment. New York and London are the final settlement points, and it is there that real strength is most necessary and most effective.

On 31 Dec. 1917 there were 25 clearing-houses in Canada, the oldest being that at Halifax, which was established on 1 July 1886. Montreal followed in January 1889 and Toronto in July 1891. The others, listed in order of
The right to issue notes intended for circulation (other than notes issued by the Dominion government, see CURRENCY, COINAGE AND LEGAL TENDER) is confined to the chartered banks. The bank may issue and reissue notes of $5 and multiples thereof, which must circulate at par in any and every part of Canada and must be redeemed on demand in specie or Dominion notes. In order to ensure this the bank must establish agencies for the redemption and payment of its notes at Toronto, Montreal, Halifax, Saint John, Winnipeg, Victoria, Charlottetown, Regina and Calgary, and at such other places, from time to time, designated by the Treasury Board. In addition, the bank must accept its own notes in payment at any of its branches. The notes issued by a bank are a first charge upon all its assets, and they are also especially secured by the Central Gold Reserve and by the "Bank Circulation Redemption Fund," to which all the banks have contributed 5 per cent on their average circulation and which is held by the government for the purpose of redeeming with interest at 3 per cent any notes of a suspended bank which the bank or its liquidator is not ready to redeem within two months after the date of suspension. The result of this is that the other banks readily accept at par the notes of a suspended bank, the notes remaining in their hands earning interest at 5 per cent until they are redeemed. As the banks are obliged to replenish the Redemption Fund gradually if it ever becomes depleted, they are all practically guaranteeing the specie amounts at credit. The fund on 31 Dec. 1917 was $5,769,631, bearing interest at 3 per cent. No call has yet been made on it. Since 1841 the limit of the bank's authorized note issue had been the amount of its deposit plus 10 per cent, but for many years the banks had found no difficulty in keeping well below this limit. So late as 31 Dec. 1890 the total paid-up capital of all the banks was $60,000,000, while their note issue was only $35,000,000. But early in the present century conditions began to change, and by 1907 the increase in capital had so far failed to keep pace with increase in business that on 31 October of that year the total note issue had reached its legal maximum, unless and until some of the banks increased their capital. But as the acute need for the issue of additional notes only existed during four or five months each year, the banks were loath to increase, for this purpose alone, capital which was otherwise sufficient, so that in 1908 each bank was required to issue one share for 10, or to submit to the season for moving the crops, that is, from 1 October to 31 January, "excess circulation" to the extent of 15 per cent of its combined unimpaired paid-up capital and rest. In 1912 this period was extended to run from 1 September to the end of February. On this "crop-moving" issue the bank must pay to the government interest at 5 per cent on the amount paid, not exceeding 5 per cent per annum. In 1913 provision was made for "central gold reserves." Trustees are appointed by the Canadian Bankers' Association and by the Minister of Finance, who receive such amounts in current gold coin and Dominion notes, or either, as any bank may desire from time to time to deposit. Against the gold and notes thus actually held for it, any bank may at any time issue notes of an equal amount, in addition to the amount which it may otherwise issue. The "excess circulation" provision was also continued. Although this arrangement makes it easy for the banks to furnish all the currency needed, it may be doubted whether, from the public standpoint, it is altogether wise. The "gold reserve" feature is illogical, inasmuch as assets which already form part of the general security for the total note issue are placed in the hands of trustees, and there used as special security for an additional issue. All that is gained is the physical safety of their actual and continued existence, and possibly some small increase in total cash reserves. But as the security is ample in any event, this is of little consequence. A serious objection is that the banks are thereby relieved to a considerable extent from the necessity of increasing their capital from time to time as their business increases, and thus the "margin of safety," in the form of capital and double liability, which is the general creditors' insurance against loss, tends constantly to become proportionately less at a more rapid rate than it otherwise would. And in this way, too, any tendency to undue concentration in banking is strengthened.

Very heavy fines are imposed in the case of over-issue, these fines varying from the amount of the excess circulation, if the excess is not over $1,000, up to $100,000, if the excess is over $200,000.

The security behind the total bank issue is shown by the following figures:

Total note issue 31 Dec. 1917 (of this $24,078,009 held by banks) $192,923,824

Specie held:
- By banks (about 90 per cent gold) $82,032,863
- In central gold reserve (gold) 19,680,600
- Dominion notes held by banks 245,099,000
- Gold held against notes by government, 103,000,000

Circulation Redemption Fund 5,769,631

Dominion and provincial government securities 188,703,175

Other assets 541,284,699

Total assets 2,430,388,583

Double liability of shareholders 140,837,070

Unpaid stock 417,690

Total security $2,430,388,583

The bank's unissued notes cost it nothing, except for paper, printing and transmission, and it is thus enabled to keep at each of its branches a sufficient supply of currency for ordinary requirements at a small loss of interest except on a trifling amount of change-making currency. This has an important bearing upon the cost of establishing and conducting small branches. As the note issue is
a source of profit, each bank pays out within its limit only its own notes and sends in for redemption the notes of other banks which it receives. Daily exchanges are made at every point where two or more banks are represented, each bank sending in to the other all the notes issued by the other bank which it received the previous day. The resulting balances are settled at the smaller places by drafts on the Clearing-House centres. In this way an automatically elastic currency is obtained, and the banks are enabled, up to the extreme limit of their issuing power, to meet the annual demand for currency to "move the crops"—a demand which in an agricultural country like Canada is very urgent—while at the same time the daily re- demption provides that the extra supply of notes will be forced out of circulation as soon as the need of them has passed. The elasticity of the note issue is shown by the following table:

**TOTAL NOTE ISSUE OF THE CHARTERED BANKS.**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Lowest point reached</th>
<th>Highest point reached</th>
<th>Percentage of increase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>Date</td>
<td>Amount</td>
</tr>
<tr>
<td>1900</td>
<td>$41,320</td>
<td>January</td>
<td>$53,198</td>
</tr>
<tr>
<td>1901</td>
<td>86,179</td>
<td>&quot;</td>
<td>105,855</td>
</tr>
<tr>
<td>1912</td>
<td>88,065</td>
<td>&quot;</td>
<td>115,473</td>
</tr>
<tr>
<td>1913</td>
<td>90,676</td>
<td>&quot;</td>
<td>119,497</td>
</tr>
<tr>
<td>1914</td>
<td>93,064</td>
<td>April</td>
<td>123,745</td>
</tr>
<tr>
<td>1915</td>
<td>96,388</td>
<td>&quot;</td>
<td>124,154</td>
</tr>
<tr>
<td>1916</td>
<td>111,029</td>
<td>January</td>
<td>148,785</td>
</tr>
<tr>
<td>1917</td>
<td>133,358</td>
<td>&quot;</td>
<td>196,135</td>
</tr>
</tbody>
</table>

In the course of each bank's daily business, it receives notes issued by other banks, which are not sent in for redemption until the following day, at the earliest—sometimes not for two or three days. A certain proportion, therefore, of the total note issue is always in the hands of the banks themselves, and of the total notes in circulation on 31 Dec. 1917, of $192,923,824, the amount thus held was $24,078,909, or about 12.5 per cent of the total outstanding, leaving $168,844,917, or about 87.5 per cent actually in the hands of the public.

The Canadian Bankers' Association is by statute charged with the duty of supervising and controlling all details connected with the issue of notes. The merits of the Canadian bank note may be thus summed up: First, it is safe; nothing but national insolvency could make its ultimate redemption doubtful. Second, it is redeemable on demand in specie or Dominion notes; if suspension of payment occurs, the note bears interest at 5 per cent until it is redeemed, and if not redeemed by the bank within two months, it will be paid out of the Redemption Fund. Third, it passes at par from one end of Canada to the other. Fourth, the amount in circulation always tends to be the exact amount demanded by the industrial activity of the country. The bank is obliged to confine its business within the limits which are almost universally assigned to the banker. Speaking generally, it may not deal in merchandise, or be engaged in any trade; it may not lend money upon the security of goods, or ships, or lands, and other movable property, nor may it advance against its own stock, or the stock of any other bank, but it may lend upon the security of bonds of an incorporated company, even though the bonds are secured by mortgage on real estate. It may, however, under certain conditions, lend money to wholesale manufacturers, and to wholesale purchasers, shippers of or dealers in various products, on the security of the goods they manufacture or deal in, and it may lend to any person on the security of a bill of lading or of a warehouse receipt. It may also lend money on the security of standing timber, and may make advances for shipbuilding, taking security on the ship. As additional collateral to a debt already contracted it may take security of almost any kind, except goods or documents representing goods, and it has a first lien on its own stock for any liability due to it by a stockholder. It cannot recover by process of law any interest in excess of 7 per cent, but no penalties for usury now exist.

In addition to carrying on the ordinary business of a commercial bank, the Canadian banks receive money on deposit at interest, the prevailing rate at present being 3 per cent. Probably about 60 per cent of their total deposits would in the United States be deposits in savings banks. No securities are specially set aside against any deposits. Deposits due to the Dominion government are a second charge on all the assets of the bank (the notes being the first), and those to any provincial government are a third charge. One bank may sell out all its assets to another bank, proper provision being made for the assumption of the liabilities of the selling bank. The purchase price may be in stock of the purchasing bank, or in such other form as may be arranged. No agreement to sell, however, may be made unless and until the Minister of Finance, in writing, gives his consent. In at least one recent instance the Minister has, on grounds of public policy, withheld his consent. In the event of a bank's liquidation, it is taken in charge by a curator appointed by the Canadian Bankers' Association, who controls and supervises it until it either resumes payment or goes into liquidation. Suspension for 30 days, consecutively or at intervals within 12 consecutive months constitutes the bank insolvent. If it becomes insolvent the shareholders are each individually liable for an amount equal to the amount of their respective holdings of subscribed stock in addition to any amount not paid up on such stock. This double liability did not exist in the case of the Bank of British North America (now incorporated in the Bank of Montreal), and its ordinary note issue was therefore confined to 75 per cent of its paid-up capital. Against any portion of the other 25 per cent, which it might desire to issue, it had to make a special deposit with the government.

The giving of a fraudulent preference to any creditor, the corrupt acceptance of a gift, commission or other consideration in excess of dealing with the Bank's affairs, or the making of false returns, etc., on the part of any director or officer of a bank, is punishable by heavy fines or by terms of imprisonment, or
both. Since Confederation 25 banks working under Federal laws have gone into liquidation, their paid-up capital at the time of suspension aggregating some $17,000,000, and their total liabilities about $62,500,000. At least 14 of these banks failed to pay their depositors in full, and all those chartered since Confederation paid their noteholders in full. Three, which failed before notes were made a first charge on assets, paid neither in full, but varying percentages to depositors, while one of these was a fraudulent affair, which was only in operation for a few months.

Savings banks under the management of the government are of two kinds: Government savings banks, under the control of the Finance Department, and post office savings banks, which are part of the post office system. The former were in existence in the Maritime Provinces for several years previous to 1867 and were taken over by the Federal government when the provinces entered into Confederation. In British Columbia savings banks controlled by trustees existed before Confederation, and these banks were wound up and "government savings banks* established in their stead. A government savings bank was opened in Winnipeg in 1871 and another in Toronto in 1872. In 1888 there were 50 offices with 57,567 depositors, having $20,682,025 to their credit, an average of $360 for each depositor. It has now been recognized that these banks are no longer necessary, and whenever the position of superintendent of any office becomes vacant, the deposits in that office are transferred to the post office savings bank.

By 31 Dec. 1917 the number of offices open had decreased to 14, all of them, except those at Winnipeg and Victoria, being in the Maritime Provinces. The total amount on deposit was $13,610,069. In 1888 the system of post office savings banks which had proved so successful in Great Britain was introduced into Canada, 81 offices being opened on 1 April in that year. On 31 Dec. 1916, there were 1,269 savings bank offices in Canada with 134,345 depositors and total balances of $40,478,123. In order to give some support to the theory that these savings banks are intended primarily as safe places of deposit for persons of limited means, the net amount which may be received from any person during one year is $1,000, while the total amount which any depositor may have at his credit is $5,000. The rate of interest paid in both classes of savings banks was formerly 4 per cent but on 1 Oct. 1899 it was reduced to 3½ per cent and on 1 July 1897 to 3 per cent. Until recently there was, however, no justification for even 3 per cent being paid. Canada in normal times was able to negotiate term loans (against which no reserves need be kept) at a net interest rate of about 2.86. By an act passed in 1903 the Department of Finance is obliged to hold as reserves against savings bank deposits an amount in gold, or in gold and Canada securities, guaranteed by the government of the United Kingdom, equal to not less than 10 per cent of the deposits. When the interest paid by the government in certain years was as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Government savings bank</th>
<th>Post office savings bank</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1870 June</td>
<td>$1,822,570</td>
<td>$1,588,849</td>
<td>$3,411,419</td>
</tr>
<tr>
<td>1870</td>
<td>7,107,287</td>
<td>3,945,609</td>
<td>11,052,896</td>
</tr>
<tr>
<td>1870</td>
<td>19,021,612</td>
<td>21,990,653</td>
<td>41,012,465</td>
</tr>
<tr>
<td>1870</td>
<td>15,442,267</td>
<td>37,587,436</td>
<td>53,190,703</td>
</tr>
<tr>
<td>1898</td>
<td>15,016,871</td>
<td>47,564,284</td>
<td>62,581,155</td>
</tr>
<tr>
<td>1898</td>
<td>14,311,342</td>
<td>42,738,941</td>
<td>57,050,283</td>
</tr>
<tr>
<td>1898</td>
<td>13,976,317</td>
<td>41,591,286</td>
<td>55,567,603</td>
</tr>
<tr>
<td>1898</td>
<td>14,006,312</td>
<td>39,995,406</td>
<td>54,001,718</td>
</tr>
<tr>
<td>1898</td>
<td>12,481,148</td>
<td>38,404,494</td>
<td>50,885,642</td>
</tr>
<tr>
<td>1898</td>
<td>13,340,183</td>
<td>41,171,660</td>
<td>54,511,841</td>
</tr>
</tbody>
</table>

Apart from the public savings banks, the only savings banks of any importance are the Montreal City and District Savings Bank, of Montreal, and La Caisse d'Économie de Notre Dame de Quebec. The former has a paid-up capital of $1,000,000, and a reserve fund of $1,350,000; its deposits are about $3,100,000, it holds securities of about $19,000,000, and has loans against securities of over $8,000,000. The latter has a paid-up capital of $250,000, and a reserve fund of about $1,000,000; its deposits are about $10,000,000, it holds securities of about $8,000,000 and has loans of about $3,000,000 against securities. These banks may invest 80 per cent of their deposits in certain approved securities, including the stock of chartered banks, and may make advances against such securities. These are the only classes of investments which they may make. They are specially prohibited from lending on real estate, promissory notes or commercial paper. Unlike the ordinary chartered banks, they have not the right to issue notes for circulation.

At the outbreak of the European War it became necessary to take steps to conserve the financial resources of the country. On 3 Aug. 1914, an Order in Council was passed, giving authority as follows: (1) To the Minister of Finance, to issue Dominion notes to such an amount as might be necessary against such securities as might be deposited by the banks and approved by the Minister; (2) To the banks, to make payment in bank notes, instead of in gold or Dominion notes; (3) To the banks, to issue at any time excess circulation not to exceed 15 per cent of their respective combined unimpaired capitals and rests. This Order in Council (together with one dated 10 Aug. 1914, suspending the redemption in specie of Dominion notes (see CANADA —
CURRENCY, COINAGE AND LEGAL TENDER), was confirmed by an act (5 George V Chap. 3) dated 22 Aug. 1914, which continued it in force until 15 Sept. 1914, and gave the governor-in-council statutory power to make effective proclamation provisions similar to those contained in the Orders in Council of 3d and 10th of August, the only change being that advances to the Quebec savings banks were also authorized. On 3 Sept. 1914, a proclamation was duly issued, revoking the Orders in Council, and putting into force the provisions of the act. These provisions will doubtless be retained for some time after the end of the war. The effect of them is that the banks can at any time obtain from the government advances (unlimited in amount, so far as the law is concerned) of Dominion notes against approved securities deposited (these securities being deemed to be the security required by the Dominion Note Act to be held against Dominion notes: i.e., gold), that they may make all payments in bank notes including the payments necessary to redeem their own notes, which they are thus by law relieved from redeeming, and they may during the whole year issue excess circulation to the extent of 15 per cent of their combined unimpaired capital and rest, instead of only during the period from the beginning of September to the end of February. The practical effect of these provisions is that no gold and only change-making quantities of Dominion notes are paid out over the counter, so that the obtaining of gold by the public for hoarding, export or any other purpose is absolutely prevented. In order, however, to retain the daily redemption of notes not needed by the public, and to prevent large quantities of notes of one bank being held by other banks, the Clearing-House rules provide that the daily settlements at the chief redemption points shall continue to be made in Dominion notes. The whole arrangement has worked remarkably well; even in the disturbed days at the beginning of the war, when all commercial and industrial interests were in a state of absolute uncertainty, and no one knew how things would go from day to day, there was not the slightest tendency toward a run on the banks, which continued to pay their depositors and to all outward appearance to transact internal business as usual.

F. G. JEMMETT,
Colonial Bank, London; Formerly Secretary,
The Canadian Bank of Commerce.

48. PUBLIC FINANCE, 1867-1917. Up to the time that the various provinces, which originally constituted the Dominion of Canada, entered into Confederation, they had depended almost entirely for their provincial revenues upon customs duties upon imports, supplemented by a limited set of excise taxes. Direct taxation upon property and income had been practically entirely reserved for the municipalities, both rural and urban. These municipal revenues, however, had been regularly supplemented from the provincial treasuries by grants in aid of specific requirements, chief of which were education and transportation, or schools and highways and bridges. The larger public works, such as railways and canals, harbors and roads, were for the most part undertaken by the provinces, or by corporations chartered by them and heavily subsidized or aided in other ways, including authorized municipal assistance.

Source of Revenue.—Such being the financial conditions of the provinces at the time of Confederation, one of the main tasks to be faced was that of persuading the individual provinces to resign almost their only methods of taxation, customs and excise, into the hands of the new Federal government, and thus be left to cast about for other and hitherto little developed sources of revenue. After much discussion, but under the somewhat stimulating pressure of necessity, a compromise was arrived at. The new Dominion or Federal government was granted sole control of the customs, excise and all other so-called indirect methods of taxation; while the provinces and their subordinate municipal institutions were confined to direct methods of taxation without, however, excluding the Dominion government from these sources also. On the other hand, the Dominion, in view of these sacrifices on the part of the provinces, not only assumed the future costs, management and maintenance of all the larger and expensive public works and public services, but also assumed the previously accumulated funded debts of the provinces. In addition, the Dominion was required to grant to the respective provinces, on a specified basis, certain annual subsidies in cash. These for some time furnished the most important element in their respective provincial revenues. The amounts of these provincial subsidies have been the occasion of much agitation and not infrequent revision ever since. To the provinces were also assigned the various public lands, including the timber and mines on or within them. At the same time, the North America Act authorized both the provincial and Dominion governments to borrow money on the basis of their respective public credits.

The very strong and long grounded dislike of the Canadian people, both French and English, to direct taxation led not only, as we have seen, to the confinement of this method of taxation to the self-imposed levies on the property owners of the municipalities, but steadily prevented, until quite recently and chiefly under the temporary requirements of the war, the levy of direct property and income taxes for provincial or Dominion purposes. Thus in most cases, up to the outbreak of the present great war, there had remained a sharp distinction between the sources of the revenues of the Dominion, provincial and municipal governments. This separation has been of the greatest value to the people of Canada in simplifying their fiscal problems, and in keeping before them the distinct field of responsibility for the levy and expending of the various contributions which the citizens are called upon to make in support of the different public administrations under which they live.

As already indicated, the revenues of the Dominion are, for the most part, derived from
customs duties on imports and excise duties on certain manufactured articles, chiefly liquors and tobacco. Owing to the customary method of presentation and discussion of the annual budgets and public accounts of the Dominion, the very limited source of the chief revenues of the country is apt to be overlooked. The present situation arises from the changed conditions and the necessity for remedying certain obvious abuses under former methods of dealing with public accounts. Thus, at one time, the officials connected with the collection of the public revenue, whether levied as taxes or obtained in connection with certain public services, were permitted to retain, chiefly in the shape of fees and expenses, the cost of collection, returning to the government only the balance in its favor. When combined with the prevalent system of political patronage, the abuses connected with this method can be readily understood. In order, therefore, to bring as much as possible of the receipts and payments from the various departments to the attention of Parliament and the country, the ordinary revenue from customs and excise duties, and other duties, and from loans and trust funds which are otherwise accounted for, were combined in what is known as the consolidated fund. Out of this is paid both the ordinary and miscellaneous charges and expenses of the government, except what is applicable in the way of capital expenditure or the redemption of debt, or special subsidies and grants. At the same time, in connection with some of the public service, as for instance the postal service, a very considerable element of the expense connected with it is deducted before the remaining funds are handed over to become part of the consolidated revenue. Thus the total gross revenue of the Post-Office Department amounted to upwards of $16,750,000 in 1914-15, but charges to the extent of almost $4,000,000 were deducted therefrom, leaving a remainder of nearly $13,000,000 was handed over as part of the consolidated revenue.

For the fiscal year ending 31 March 1915, the consolidated fund amounted to $133,073,481 and the deficit chargeable to it amounted to $133,073,481, representing a deficit of over two and a half millions, to be met from loans or other available resources not constituting part of the consolidated fund. When, however, we come to analyze the sources of revenue making up the $133,000,000 of the consolidated fund, and the items of expenditure which are charged upon it, we find that a large portion of the fund represents simply the gross income from various government services, such as the postal and government railway services; while the charges upon it include also the working expenses of these same enterprises, so far at least as they have not been already deducted before being brought into the budget, as indicated above in the case of the Post-Office Department. Thus, for example, the revenue from the expenditure of some two millions on mail subsidies and steamship subventions. Further the central or administrative staff of this service at Ottawa costs an additional $800,000, being included in the item of "civil government." If one cares to go further and turn to the detailed expenditures of the Public Works Department, it will be found that of the expenditure for the year of $7,750,000, a large section is represented by either new post-office buildings, separately, or combination public buildings, the chief sections of which are commonly devoted to the postal service. Thus instead of the Post-Office Department furnishing any real revenue to the government, it represents a very extensive additional charge upon the real revenues of the country. The same is true of the large revenue item of $12,000,000 from the government railways,—the Intercolonial, Prince Edward Island, Transcontinental and one or two small lines. We find on referring to the operating expenses of these lines that not only is this revenue entirely absorbed but there is left in its place some $325,000 of a deficit on operating expenses. This does not take into account the share of the Railway Department in the expenditure under civil charges paid for the staff of the Department of Railways and Canals. Neither does it take into account the interest on the enormous capital expenditure on the government lines and which constitutes so large a part of the interest charge on the public debt, amounting to over $15,000,000.

It might appear that the sale of Dominion lands, amounting to over $2,800,000 in 1914, would furnish a very considerable surplus of revenue. But we find that the annual cost of the administration of the Dominion lands amounted to $7,700,000 in the same year. Another important item in the annual receipts included in the consolidated fund is that of $2,900,000 of interest on investments. But this, it is found, represents chiefly the interest on the advances to the Grand Trunk Pacific, amounting to over one and a half millions, on Montreal Harbor debentures, the sinking fund, advances to banks, etc. Altogether the interest on investments represents but a small offset on the interest requiring to be paid by the Dominion on the public debt, which directly or indirectly, was partly incurred for these purposes.

Income from Taxation.—One of the tables in the Annual Report on Public Accounts, prepared by the Finance Department, sets forth separately the income from taxation, which is the real income of the country, and the income derived from other sources, largely, as indicated, the gross receipts from certain government services. Up to the outbreak of the European War, there were, as mentioned, only two real sources of revenue: customs and excise duties. The Chinese immigration tax, though listed separately, is really a customs tax on imports with the usual protective object in view. Since 1914, to these two sources of direct revenue the special war taxes, to be referred to, must be added.

Distinguishing taxes proper from the other sources of income, we find that of the total receipts of $133,073,481, constituting the consolidated fund for the year 1914-15, $97,715,440 were derived from taxes, and the remaining $35,041 were derived from the other sources. Of the charges which are almost entirely paid

CANADA — PUBLIC FINANCE (46) 467
out of the $97,000,000 of taxation, the chief are the following:

Interest and management of the national debt... $16,188,000
Customs and excise collection.................. 4,605,000
Subsidies to the provinces..................... 11,451,000
Sinking funds.................................. 1,645,000
Civil government................................ 6,157,000
Agriculture and forestry......................... 1,669,000
Legislation..................................... 2,376,000
Arms, agriculture and statistics.............. 3,518,000
Immigration..................................... 1,658,000
Military (apart from the war)................... 10,000,000
Public works (not charged to capital)........ 19,343,000
Mail subsidies and steamship subventions.... 2,162,000
Ocean and river service....................... 1,133,000
Lighthouse and coast service................... 2,583,000
Trade and commerce............................ 2,943,000
Indians......................................... 2,400,000

These items account for somewhat over $89,500,000 of the regular revenue, leaving about $8,500,000 to meet other minor items of unremunerative expenditure and cover the deficits on the various remunerative government enterprises whose gross revenue furnishes the other $35,000,000 of income. This $35,000,000 of revenue partly meets what we have called the working expenses of the departments; the chief of these items are:

Post-office................................. $15,961,000
Public works, collection of revenue........... 799,000
Railways and canals.......................... 13,876,000
Dominion lands............................... 795,000
Weights, measures, gas and electric light inspection, etc. 288,000

These items alone amount to $34,500,000, leaving about $750,000 for all the other smaller items of this character. As a matter of fact, as already indicated, most of the deficits, representing the surplus of costs over revenue in these branches of the service, have to be met out of the additional $3,000,000 remaining from the tax revenue as indicated above.

Special Funds.—The Dominion government has the use of several trust funds, such as the post-office and savings bank deposits on which a comparatively low interest is paid. It enjoys also the issue of Dominion notes to a specified amount in excess of the specie reserve. The other funds, beyond the consolidated fund, which are available for expenditure within the year, are: first, surplus of revenue from the consolidated fund; second, loans, whether permanent or temporary, raised during the year. Under normal conditions these extra funds are applied to meet any deficit in the consolidated fund, for the redemption of debt, capital expenditure on public works, or subsidies to railroads, and other special grants.

As to what works may be chargeable to capital expenditure or to annual revenue out of the consolidated fund is largely a matter of expediency. In the history of the Dominion since Confederation, the views and the practices of finance ministers and governments have varied very considerably. Thus, items which at one time are regarded as properly charged to consolidated revenue are, at another, charged to capital account. Apparently the most influential element in determining the variations in practice has been the condition of the public purse, and the very natural disinclination of ministers of finance and their colleagues to present budgets showing deficits on the ordinary annual expenditure. The lack of any definite principle in the division between expenditure from consolidated revenue and expenditure on capital account will be recognized in a survey of the details of the items charged to capital account and annual revenue in the Departments of Public Works and Railways and Canals.

Changes Resulting from the War.—We turn now to take a brief survey of the financial changes which have resulted from the voluntary participation of Canada in the present great war. Canada has undertaken to bear the entire cost of placing half a million troops in the field, fully equipped, transporting them to and from Europe, maintaining them on the front with provisions, munitions, ambulance and hospital equipment and all the other expenses incidental to war. In so doing the country has necessarily to face new and hitherto untried problems of finance. The government has followed the British example of meeting as large a share as possible of the expense from increased taxation, and the remainder from loans. Both old and new forms of taxation have been employed in raising additional revenue. In 1914 additional customs duties were levied on a list of articles mostly of British production, and more or less in the line of what are now considered necessary luxuries, and therefore likely to increase revenue rather than curtail consumption. Excise duties on liquor and tobacco were also increased. The additional revenue expected from these sources was about $1,000,000 per month.

In 1915 the customs duties were still further augmented by a general increase of 5 per cent on the British preferential rates and of 7½ per cent on all other rates. This additional tax was applied, with a few specific exceptions, to goods both free and dutiable in the regular tariff. As a result, although the imports of the previously dutiable goods fell off in 1915-16 while the total imports increased only $32,500,000, yet the customs revenue increased $24,735,000 over the previous year.

The government issue of Dominion notes, supported by a 25 per cent reserve instead of 100 per cent reserves was increased from $30,000,000 to $50,000,000 thereby securing an additional free loan of $15,000,000. So large, however, was the volume of notes fully secured by gold that this change reduced the reserve on the total issue merely from 81 to 71.7 per cent.

New features of Federal taxation were first introduced in 1915, and consisted of special taxes of 1 per cent on bank notes, 1 per cent on the interest income of loan and trust companies and the net premium of insurance companies, except life and marine. Telegraph and cable messages were taxed one cent each, and railway and steamship tickets at graduated rates. Other features were a two-cent stamp on bank cheques, bills of exchange, money and postal orders, travelers' cheques, and notes discounted at banks. There was also a new tax on extra on letters and post cards. Additional excise stamps of varying amounts were levied on proprietary medicines, perfumery and wines. During the first year the revenue from these special taxes amounted to somewhat over $3,000,000.

In 1914 the special appropriation for war purposes was $50,000,000, the following year $100,000,000, and for 1916-17 $250,000,000. In this connection two quite new departures in
Federal finance were made. During the summer of 1915, the first Dominion loans to be negotiated in the United States were arranged. The first was for $25,000,000 and the second for $20,000,000. These were followed in the spring of 1916 by another loan of $75,000,000, floated in New York. The other departure was the raising of a domestic loan for $50,000,000, in the autumn of 1915. They were so successful that over twice that amount was subscribed and $100,000,000 accepted. In the autumn of 1916, the experiment was repeated for another $100,000,000 with perfect success. Exchange conditions, owing to the enormous surplus of British imports from America during the earlier period of the war, rendered it undesirable to borrow in Britain for use in America. A mutual arrangement was therefore effected by which the British treasury advanced funds for Canadian war expenditure in Europe and the Canadian government, partly from its own borrowings and partly by credit arrangements with the banks, financed British purchases in Canada, thus naturally relieving the transatlantic exchange situation.

As the Canadian war expenditure increased, additional taxes were imposed. The new taxes of 1916 took the form of a levy on exceptional profits, most of which were naturally due to the production of armament supplies. The tax consisted of one-fourth of all profits in excess of 7 per cent from incorporated companies, and in excess of 10 per cent in other cases. Naturally in the administration of such a tax a good deal of discretion had to be allowed to the officials of the Department of Finance.

One of the most interesting questions which arises in connection with the new departures now being made, both as to methods of taxation and sources of loans, is as to whether and how far these experimental ventures may permanently affect the future financial practice and policy of Canada.

Provincial Finance.—We may now take a brief survey of the leading features of Canadian provincial finance. As already indicated the provincial subsidies of the Dominion treasury constituted the original basis of provincial revenue. The Dominion having assumed, up to a certain specified amount, the debts of the four original provinces of Ontario, Quebec, Nova Scotia and New Brunswick, found it necessary to make corresponding allowances for the other provinces as they entered Confederation, or were created out of the vast western territories held by the Dominion government, on much the same basis as those territories out of which have been created the Western States of the American Union were held by the Federal government at Washington. In view of the reasons for granting them, these were known as “debt allowances” and interest is paid on them at special rates. The object of the debt allowance was, of course, to enable the new provinces to equip themselves with such provincial public works and buildings as would place them on a fairly equitable footing with the older provinces when they entered Confederation. In the case of the two last provinces to be created, Alberta and Saskatchewan, no definite debt allowances were fixed, but they were granted specific annual subsidies in lieu of the interest upon fixed capital sums.

The details of the frequent agitations for readjustment of the original financial arrangements with the provinces, either at the time of Confederation or on their subsequent entrance or creation, and the actual changes effected from time to time, are quite beyond the scope of this article. Suffice it to say that the grounds on which these relations at present stand, though still subject to demands for revision, are as follows:

1. A fixed grant according to population.
2. A per capita grant of 80 cents per head up to a population of 2,500,000, and at the rate of 60 cents per head above that number.
4. Interest upon debt allowances, or annual grants in lieu thereof.

In raising the remainder of their revenues, the provinces, especially of recent years, have devised many new taxes. As in the case of the Dominion, however, their budgets combine purely revenue taxes and incomes from various forms of provincial service, and these incomes are either wholly or partially offset by the cost of rendering these services. For a considerable time, as already indicated, the real estate and provincial income were exclusively assigned to the municipalities for the support of their local requirements. Up to 1915 only two provinces had departed from this policy, British Columbia and Prince Edward Island. Both levy a tax upon real estate and income, while British Columbia alone has resorted to that old standby of the American States, the personal property tax.

It is impossible to go into details with reference to the very varied financial arrangements, and classifications of revenue and expenditure, of the different provinces. In their provincial accounts, the combinations of items in some provinces and the separation of them in others render it very difficult to make any detailed comparisons of their budgets. Certain broad facts, however, stand out as indicative at once of those features common to the majority of the nine provinces and those which are peculiar to individual provinces owing to their special historic or physical conditions. These last are sometimes due also to special lines of policy. Taking the last available returns for all the provinces up to 1914, we find that beyond the Dominion subsidies, the most common sources of provincial revenue are succession duties, taxes on corporations and various special fees. In these all the provinces share. In some cases the returns from certain fees and licenses are set forth separately. Thus licenses for the sale of liquor, for motor vehicles, moving pictures, hunting and fishing, etc., are listed separately in a number of accounts. Six provinces derive revenues from Crown lands, timber and mines, and from interest on investments. Most of them derive a certain revenue from hospitals and public charities which tends to offset the cost of these institutions. Revenues come also from certain public works, and from activities in aid of agriculture. Certain revenues, as regards their relative importance at least, are peculiar to individual provinces. Among these are the tax on fox farms in Prince Edward Island, royalties on coal mines in Nova Scotia and British Columbia and to a lesser degree in Alberta, also on other mines in Ontario, Que-
be and British Columbia. The income from the Timiskaming and Northern Railway, and the investments of the Hydro-Electric Commission, are characteristic of Ontario. Revenues from provincial telegraph and telephone lines are important in Manitoba, and from Chinese restriction in British Columbia. On the scale of expenditure there is more uniformity. All of the provinces have large outlays for interest and sinking funds, the administration of justice, for legislation, the civil service, education, public charities, agriculture and public works. Five of them expended considerable sums on colonization and immigration, several on mines, lands and forests. Ontario spends much on its Hydro-Electric Commission; Manitoba on telegraphs and telephones and British Columbia on its fisheries.

In six of the provinces the Dominion subsidy constitutes the largest item in revenue. In Nova Scotia the first place is taken by mines; in Ontario, lands, forests and mines; while in British Columbia no less than five sources of revenue are Decedence of the Dominion subsidy, in the following order; timber royalties and licenses, Chinese restriction, land sales, wild land taxes and registration fees. Of those in which the subsidy takes the first place, the land tax comes second in Prince Edward Island, territorial revenue; in Alberta the special tax on railway bonds, exceeded these items in 1914, but these do not represent normal revenues available for general purposes.

In the line of expenditure, education ranks first in five provinces, second in two, third in one and fourth in another. Where education is not first, public works in one form or another take precedence. In Manitoba, however, the gross outlay on the telegraph and telephone service exceeded all other items. In British Columbia public works, divided into two classes, (a) roads, and (b) other public works, occupy the first and second places, with the civil service third and education fourth. The following table gives the total revenue and expenditure and the amounts per capita for the different provinces for the fiscal year ending at various periods in 1914:

<table>
<thead>
<tr>
<th>Province</th>
<th>Total revenue per head</th>
<th>Total expenditure per head</th>
<th>Revenue</th>
<th>Total expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.E.I.</td>
<td>$535.555</td>
<td>$661</td>
<td>$445.396</td>
<td>$475</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>1,885.458</td>
<td>375</td>
<td>2,088.853</td>
<td>418</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>1,893.729</td>
<td>425</td>
<td>1,893.774</td>
<td>425</td>
</tr>
<tr>
<td>Quebec</td>
<td>9,000.377</td>
<td>425</td>
<td>8,624.368</td>
<td>407</td>
</tr>
<tr>
<td>Ontario</td>
<td>11,124.382</td>
<td>223</td>
<td>11,819.311</td>
<td>49</td>
</tr>
<tr>
<td>Manitoba</td>
<td>5,312.163</td>
<td>1038</td>
<td>5,038.158</td>
<td>1038</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>5,806.220</td>
<td>832</td>
<td>5,396.380</td>
<td>747</td>
</tr>
<tr>
<td>Alberta</td>
<td>4,522.513</td>
<td>937</td>
<td>4,409.795</td>
<td>94</td>
</tr>
<tr>
<td>British Columbia</td>
<td>10,479.259</td>
<td>2146</td>
<td>15,766.912</td>
<td>3230</td>
</tr>
</tbody>
</table>

The budgets of the provinces have not been materially affected by the war and yet it has had its influence in various ways. When the war was declared some of the enthusiasm support of the action taken by Great Britain, each of the provinces made typical contributions of supplies for the British army. Ontario and Manitoba contributed flour; Quebec, cheese; New Brunswick, potatoes; Al-berta and Prince Edward Island, oats; Saskatchewan, horses and British Columbia canned salmon. These contributions amounted to nearly $2,250,000. Another large factor has been the provincial contributions toward the patriotic fund, to provide supplementary assistance for the widows, children and other dependents of the Canadá soldiers. To these and other miscellaneous outlays connected with the war has already entailed the levying of additional taxation in most of the provinces.

Adair Shortt, Commissioner of the Dominion Government.

49. CURRENCY, COINAGE AND LEGAL TENDER. Interesting as it would be to trace the history of the currency and coinage of the various British provinces from the time when grain and furs were the actual currency, down through the card money of the Meules, the ordnances of Burgundy and the Army Bills of 1812 to the present satisfactory system, such a task is quite impossible within the limits set for this article. Broadly speaking, the currency history of Canada consists in the French écu to the silver Spanish dollar, and from the Spanish dollar to the gold dollar of the United States. But this transition has reference exclusively to the standard coin; the characteristic feature of Canadian currency, both in the 17th century and at the meet today, is paper. During the French regime a special colonial coinage was struck in France, but until the period when the chartered banks began to provide a stable medium of exchange, we find a large proportion of the gold and silver coins of various countries, passing current and made legal tender at rates which were changed from time to time in the hope of keeping coin within the country. British, French, Spanish, Portuguese, German, Mexican and American coins were all legal tender, while for the first 50 or 60 years after the British conquest the actual currency of old Canada consisted chiefly of Spanish silver and some British gold, together with paper, more or less debased in the eyes of merchants, private bankers and others.

By ordinance of 1777, followed up by acts of the legislatures of Upper and Lower Canada in 1796, the Halifax currency, with the Spanish dollar valued at five shillings, or four to the pound currency, was made the standard of the country, and new rates were established at which different coins should pass current. The British guinea, which appears to have been the gold coin most in use, was worth 1£ 3s 4d currency. The Halifax currency, it will be observed, was to sterling money in the proportion of 10 to 9, £10 currency being the equivalent of £9 sterling. In Lower Canada, however, accounts were for many years afterward kept in livres and sols, six livres being equal to one Spanish dollar, while in Upper Canada the York (or New York) currency was more or less in use, its basis being the Mexican real, known in North America as the York shilling, eight of which went to the dollar. Its use, however, was prohibited after 1 July 1822. With many attempts at change, and with variations in the ratings of different coins from time to time, the Halifax currency, which it must be remembered, was a money of account only, remained as the legal currency system until 1853,
when, after previous consultation with New Brunswick and Nova Scotia, a decimal system having as its unit a dollar equal in value to the old English pound was introduced and placed on an equal footing with the Halifax currency, and the British sovereign was made full legal tender at $4.8667. On 1 Jan. 1858, the decimal system was finally adopted as that in which all public accounts should be kept, and since that date Canadian currency has been on a gold monometallic basis, with a unit of value equal to the gold dollar of the United States.

On 1 July 1867, the Dominion of Canada came into being, uniting in one Confederation the provinces of Ontario, Quebec, Nova Scotia and New Brunswick; currency, coinage and legal tender were thereafter under the sole control of the Dominion Parliament.

The first Federal Act dealing with the standard of value and the metallic currency was passed in 1868. It declared that it was desirable that the currency of Canada should be assimilated to the basis agreed on at the monetary conference held in Paris earlier in the year, and also that it should be of the same value as the metallic currency of the United States. It provided, however, for the continued use of the old

It will be observed that although the Canadian currency has a unit of value equivalent to that of the United States, the standard of value is the British sovereign.

Power was taken to make any foreign gold coins legal tender in Canada, and the American gold eagle of the weight and standard of fineness then existing, together with its multiples and halves, was made legal tender, each coin at its face value.

In 1910 the Act now in force (9-10 Edward VII, Chap. 14) was enacted. Its reads in part as follows:

"The denomination of money in the currency of Canada shall be dollars, cents and mils;—the cents being one-hundredth part of a dollar, and the mil one-thousandth part of a cent.

The standard for gold coins of the currency of Canada shall be such that of one thousand parts by weight, nine hundred shall be of fine gold and one hundred of alloy; and the standard for silver coins of such currency shall be such that of one thousand parts by weight nine hundred and twenty-five shall be of fine silver and seventy-five of alloy.

"Gold, silver and bronze coin, struck by the authority of the Crown for circulation in Canada, of the respective denominations mentioned in the schedule to this act, and of the standard weight and fineness therein set out, shall be equal to and pass current for the respective sums in the currency of Canada following, to wit: for twenty dollars, ten dollars, five dollars, two and one-half dollars, fifty cents, twenty-five cents, ten cents, five cents and one cent.

SCHEDULE

<table>
<thead>
<tr>
<th>DENOMINATION OF COIN</th>
<th>Least current weight</th>
<th>Standard fineness</th>
<th>Remedy allowance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grains</td>
<td></td>
<td>Weight per piece</td>
</tr>
<tr>
<td>Gold</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twenty dollar</td>
<td>516</td>
<td>513.42</td>
<td>(Nine-tenths fine gold,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>one-tenth alloy; or</td>
</tr>
<tr>
<td>Two dollar</td>
<td>258</td>
<td>255.71</td>
<td>milleseimal fineness,</td>
</tr>
<tr>
<td>Five dollar</td>
<td>129</td>
<td>128.355</td>
<td></td>
</tr>
<tr>
<td>Two and one-half</td>
<td>64.5</td>
<td>64.1168</td>
<td></td>
</tr>
<tr>
<td>Silver</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One dollar</td>
<td>300</td>
<td>Thirty-seven-fortieths fine silver</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fortieths alloy or</td>
<td>(4)</td>
</tr>
<tr>
<td>Fifty</td>
<td>90</td>
<td>milleseimal fineness,</td>
<td>.60</td>
</tr>
<tr>
<td>Twenty-five cent</td>
<td>36</td>
<td></td>
<td>(2)</td>
</tr>
<tr>
<td>Ten cent</td>
<td>18</td>
<td></td>
<td>13.00</td>
</tr>
<tr>
<td>Five cent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bronze</td>
<td>87.5</td>
<td>(Mixed metal, copper,</td>
<td>$140.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tin and zinc</td>
<td></td>
</tr>
</tbody>
</table>

* This remedy is on a group of one dollar's worth, ten pieces.
† This remedy is on a group of one dollar's worth, twenty pieces.
‡ This remedy is on a group of eighty pieces weighed against a weight of one pound avoirdupois.

The actual currency of the country consists almost entirely of paper (see Canada—Banking System) and this has been found entirely satisfactory. Until recent years there had been no Canadian gold coinage, while the silver and bronze coinage needed had been obtained from England, through the Royal Mint, an arrangement which had always worked very well. Influenced, however, by the large production of gold in the Yukon territory the government took authority, during the session of 1901, with the concurrence of the Imperial government, to establish at Ottawa a branch of the Royal Mint, which came into operation in 1908. Since that date all Canadian coinage has been minted in Ottawa. In 1912 the Ottawa Mint began the coinage of Canadian five dollar and ten dollar gold pieces, and up to 31 Dec.
1915 $4,868,420 had been coined and issued. Practically none of this is in the hands of the public, which does not want and will not use gold, except very occasionally for some special purposes, and almost the whole of Canada's gold currency is held by the government or the banks, forming a small part of the country's gold reserves. These reserves are drawn upon or added to in the settlement of international balances, and for this purpose British and American gold is better adapted than is Canadian.

The subsidiary or token coins in use are five, ten, twenty-five and fifty cent pieces, all silver, and one cent, bronze. The total amount of silver coined and put into circulation in Canada (including $95,000 old coinage of New Brunswick) up to 31 Dec. 1915 is $19,848,323 and of bronze $1,212,933. Silver of the face value of $1,259,750 has been withdrawn for recasting, and it is estimated that the amount now in circulation is from one-third to one-half of the total coined.

The history of the paper obligations of the Dominion government really begins before Confederation, when in 1866 the legislature of the province of Canada sanctioned an issue of provincial notes to an amount not exceeding $8,000,000. At Confederation this issue, amounting to $3,113,700, together with $605,859.12 issued by Nova Scotia, was assumed by the Dominion, and the "Dominion Notes" system was thus inaugurated. In 1868 provision was made for securing by specie the note issue up to $5,000,000 and 25 per cent of any excess, the balance up to the limit of $8,000,000 to be covered by provincial or Dominion debentures. In 1870 the issue limit was raised to $9,000,000, secured by 20 per cent of specie and 80 per cent of debentures, with authority to increase to any amount, providing the excess above $9,000,000 was covered by specie. In 1872 it was provided that only 35 per cent of this excess need to be so covered, while in 1875 it was enacted that for any issue between $9,000,000 and $12,000,000 specie to the extent of 50 per cent must be held, any excess above $12,000,000 being entirely covered by specie. In 1880 the issue was raised to $20,000,000 to be covered to the extent of at least 15 per cent by gold, an additional 10 per cent by gold or Dominion securities guaranteed by the Imperial government and the remaining 75 per cent by ordinary Dominion securities. The issue might exceed $20,000,000 to any extent provided the whole of any excess was covered by gold. In 1903 an issue of $30,000,000 was authorized, secured as to not less than 15 per cent by gold, and another 10 per cent by gold or guaranteed debentures. Any notes issued in excess of $30,000,000 were to be secured by gold.

Immediately after the outbreak of war in 1914 the Act (5 Geo. V, Chap. 4) now in force was passed, its main provisions being as follows:

"Dominion notes may be issued and outstanding at any time and for any purpose, and such notes shall be a legal tender in every part of Canada except at the offices at which they are redeemable."

"Dominion notes shall be of such denominational values as the Governor in Council determines, and shall be in such form and signed by such persons, two in number, as the Minister directs."

"Dominion notes shall be redeemable in go. on presentation at such offices established, or at banks with which arrangements are made for the redemption thereof as hereinafter provided."

A very large proportion of the large notes in circulation is held by the chartered banks for reserve purposes, and also as a medium in which to make their daily settlements with each other. A special form of note has therefore been issued, negotiable only between banks, and of no value except to a bank. This materially lessens the risk of loss by robbery when large amounts are being carried from one bank to another, or at any other time. Of the notes in circulation as above $148,258,500 were the special notes for the banks, while of the total issue of $183,248,986 the banks held $160,291,577, leaving only $22,957,409 in the hands of the public.

To comply with the provisions of the Act, the Minister of Finance should have held on 31 March 1917, as security for the note issue, gold or securities deposited by the banks under 5 Geo. V, Sec. 4, Subsec. 2 (see Canada—Banking System) as follows:

| Up to and including $50,000,000, 25 per cent. | $12,500,000 |
| $50,000,000 to $183,248,986, dollar for dollar. | 133,248,986 |

Legal requirements: $145,748,986

Of this total $113,110,154 was in gold.

Immediately following the outbreak of the European War, redemption in specie of Dominion notes was suspended, the necessary instructions being given by the Minister of Finance on 4 Aug. 1914. These instructions were approved by an order in council dated 10 August and given full legal confirmation by an Act (5 Geo. V, Chap. 3) passed on 22 August. Under the authority of this Act, the redemption in specie of Dominion notes is still (31 Dec. 1917) suspended, and the suspension will doubtless continue until the end of the war.

In recent years the following amounts of Dominion notes (including a petty amount of old provincial notes) were outstanding:

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>$20,134,348</td>
</tr>
<tr>
<td>1910</td>
<td>$87,131,162</td>
</tr>
<tr>
<td>1911</td>
<td>$90,031,509</td>
</tr>
<tr>
<td>1912</td>
<td>$113,368,838</td>
</tr>
<tr>
<td>1913</td>
<td>$112,141,186</td>
</tr>
<tr>
<td>1914</td>
<td>$117,834,159</td>
</tr>
<tr>
<td>1915</td>
<td>$157,099,459</td>
</tr>
<tr>
<td>1916</td>
<td>$176,929,283</td>
</tr>
<tr>
<td>1917</td>
<td>$183,248,986</td>
</tr>
</tbody>
</table>
Legal tender in Canada is:
(1) Full legal tender. (a) Any Canadian gold coins struck under the authority of the Currency Act of 1910. (b) The British sovereign, and any division or multiples thereof, at $4.85¾ to the £. (c) Gold coins of the United States of five, ten and twenty dollars each, at their face value. (d) Notes of the Dominion government, redeemable in specie on proclamation (redemption suspended since 4 Aug. 1914).
(2) Limited legal tender. (a) Silver coinage of Canada up to $10. (b) Bronze coinage of Canada, up to 25 cents.
(3) Potential legal tender. Any foreign gold coin, at rates to be fixed by proclamation.

F. C. JEMMETT,
Colonial Bank, London; Formerly Secretary
The Canadian Bank of Commerce.

50. THE GRANGER MOVEMENT. The Granger movement in Canada closely resembles in its economic and social features the movement of the same name in the United States from which it was separated as The Grange was first established in the province of Quebec in 1872 by Eben Thompson, a deputy from the United States. Two years later representatives from several Canadian Granges met at London, Ontario, and organized the Dominion Grange of the Patrons of Husbandry. In the declaration of principles then adopted, "Unity, Liberty and Charity," was heartily endorsed. The objects of the organization were declared to be to develop a higher and better organization among the agricultural class; to enhance the comforts and attractions of their homes; to encourage farmers to buy less and produce more; to diversify their crops; to condense the weight of exports, selling more on hoof and in fleece, and less in the bushel. The society expressed itself as opposed to the credit system, and the mortgage system. It declared itself to be independent of political organizations and disassociated from political parties. At the same time it was "reserved for every patron as his right as a freeman to affiliate with any party that will best carry out his principles." The declaration of principles laid stress upon the importance of the abilities and sphere of women, who were admitted both to membership and to office in the order. The growth of the Grange during the next few years was very rapid. With the Dominion grange as its centre, it was organized in provincial granges, division granges and subordinate granges. In 1876 the secretary reported a total membership of 17,500 patrons, with 33 division and 530 subordinate granges. Of the latter 4 were in Nova Scotia, 7 in New Brunswick, 16 in Quebec and 50 in Ontario. There were also six subordinate granges in Quebec, organized under the National Grange of the United States. In the following year the Grange was incorporated by the Dominion Parliament, and in 1879 its membership reached 31,000. The Grange not only sought to exert an educative influence on the farmers, but made a further effort to organize and direct the farmers' supplies, seeds and minor machinery to the patrons at greatly reduced prices. The local distribution was effectuated by the members of the subordinate granges. The company issued for some years a paper devoted to the interests of the patrons under the name of the Grange Bulletin. In this were printed extensive price lists of farmers' supplies offered for sale. A similar undertaking was established in the form of the People's Salt Company of Kincardine. The economic enterprises of the Grange have not, however, met with marked success. The demands made upon the initiative of the co-operative purchasers have proved too exacting. After some 10 years of successful existence the enthusiasm which the institution of the Grange had at first aroused began to cool, and many of the subordinate granges died of inanition. In the year 1876, 271 new granges had been reported in Ontario alone; in 1891 only 13 division granges were organized in Canada, and in 1896 few organizations were reported. Meantime the constant lapse of those in existence, through the apathy of their previous supporters, greatly reduced the numbers of the active patrons. The number of granges in the Dominion in 1876 was stated to have reached about 1,000, but at the 28th annual meeting (2 and 3 Feb. 1904) the secretary's statement shows that only 13 division granges and 30 subordinate granges (with a membership of 411) had reported during the last year. The receipts of the treasury of the Dominion grange, which amounted to $6,900 in 1876, fell to $134 in 1906. In that year the Grange was amalgamated with the Farmers' Association, a society reformed from the Patrons of Industry, but since 1909 no statistics of membership and no annual reports of this body have been issued. During the whole history of the order there were organized at one time or another 57 division granges, 976 subordinate, 2 provincial (Ontario and Maritime provinces), and one Dominion, making a grand total of 1,036 separate Grange organizations in the Dominion. Many persons had been led to join in the movement from the sanguine hopes of profit to be derived from the co-operative side of the enterprise, and fell away when these were not realized. On the whole, the Grange movement must be regarded as a failure in the direction of its economic enterprises, but its influence for the social and educational advancement of the farming class has undoubtedly been great. During the flourishing period of the movement literary exercises alternated with the conduct of business matters at the local meetings. It has especially been instrumental in promoting various legislative measures in the interests of the farming class. Among these may be mentioned the Provincial Drainage Acts (R. S. O. C. 37, 38), the Dominion statute known as the Butter Act, etc. On the tariff question the opinion of the patrons has been divided; it has been difficult for the Grange to take a definite position in the matter without identifying itself with party politics. The Grange was, however, instrumental in securing the repeal of the duty on binder twine. The patrons have constantly sought to foster the

Wholesale Supply Company of Toronto, with a branch establishment at Halifax. This was a joint stock company whose capital was supplied by members of the National Grange, with the object of furnishing the farmers' supplies, seeds and minor machinery to the patrons at greatly reduced prices. The local distribution was effectuated by the members of the subordinate granges. The company issued for some years a paper devoted to the interests of the patrons under the name of the Grange Bulletin. In this were printed extensive price lists of farmers' supplies offered for sale. A similar undertaking was established in the form of the People's Salt Company of Kincardine. The economic enterprises of the Grange have not, however, met with marked success. The demands made upon the initiative of the co-operative purchasers have proved too exacting. After some 10 years of successful existence the enthusiasm which the institution of the Grange had at first aroused began to cool, and many of the subordinate granges died of inanition. In the year 1876, 271 new granges had been reported in Ontario alone; in 1891 only 13 division granges were organized in Canada, and in 1896 few organizations were reported. Meantime the constant lapse of those in existence, through the apathy of their previous supporters, greatly reduced the numbers of the active patrons. The total number of granges instituted had reached about 1,000, but at the 29th annual meeting (2 and 3 Feb. 1904) the secretary's statement shows that only 13 division granges and 30 subordinate granges (with a membership of 411) had reported during the last year. The receipts of the treasury of the Dominion grange, which amounted to $6,900 in 1876, fell to $134 in 1906. In that year the Grange was amalgamated with the Farmers' Association, a society reformed from the Patrons of Industry, but since 1909 no statistics of membership and no annual reports of this body have been issued. During the whole history of the order there were organized at one time or another 57 division granges, 976 subordinate, 2 provincial (Ontario and Maritime provinces), and one Dominion, making a grand total of 1,036 separate Grange organizations in the Dominion. Many persons had been led to join in the movement from the sanguine hopes of profit to be derived from the co-operative side of the enterprise, and fell away when these were not realized. On the whole, the Grange movement must be regarded as a failure in the direction of its economic enterprises, but its influence for the social and educational advancement of the farming class has undoubtedly been great. During the flourishing period of the movement literary exercises alternated with the conduct of business matters at the local meetings. It has especially been instrumental in promoting various legislative measures in the interests of the farming class. Among these may be mentioned the Provincial Drainage Acts (R. S. O. C. 37, 38), the Dominion statute known as the Butter Act, etc. On the tariff question the opinion of the patrons has been divided; it has been difficult for the Grange to take a definite position in the matter without identifying itself with party politics. The Grange was, however, instrumental in securing the repeal of the duty on binder twine. The patrons have constantly sought to foster the
cheese industry and the cattle trade with Great Britain; have succeeded in having agriculture taught in the public schools; and have strongly supported the agricultural college at Guelph. The Grange has also agitated in favor of the inflation of the Dominion paper currency, the reduction of railroad rates and the appointment of a railroad commission. Consult Michell, H., 'The Grange in Canada' (Bulletin, Department of History, Queen's University, Kingston 1914).

Stephen Leacock,
Professor of Economics and Political Science,
McGill University.

51. THE LABOR MOVEMENT IN CANADA. In Canada, as elsewhere, the labor movement has been shaped by political and economic environment. The presence of the French in Quebec has been an important factor. The existence of free land and the large part played by transportation and construction trades in a country of great distances and under rapid development are others.

The history of organized labor in Canada is in the main that of a series of outposts of the larger movements of Great Britain and the United States. The legislative aims of Canadian labor have been derived largely from the United Kingdom, but the working mechanism of trade unionism has come almost entirely, and especially in recent years, from the United States. Few data on the subject prior to Confederation (1867) exist. The newness of the country and the lack of industrial population were against organization. There were "labor circles," so-called, in the province of Quebec as early as 1825. In 1827 a printers' organization in the city of Quebec took cognizance of wages and cared for its sick. A similar union among the printers of York was recorded when that municipality became the city of Toronto in 1834. The larger seaports, being the localities in closest touch with Great Britain, were the first to develop trade unionism. Prior to 1850, however, the movement was negligible. The railway and land "boom" of 1850-54 brought important changes, especially in Ontario, and there were strikes of printers, shoemakers and molders at Toronto in the latter year. The Typographical Union of the United States crossed into Canada in the sixties. But it was not until 1872, and the winning of a celebrated conspiracy trial arising out of a strike of printers at Toronto, and the passing by the Dominion government of "An Act respecting Trade Unions," which repealed the harsh measures previously in effect against associations of employees (an echo of the repeal of the Combination Laws of England), that the labor movement had its real birth in Canada.

In that year, which was the apex of a period of great industrial and commercial prosperity, the first general assembly of Canadian labor met at Toronto. It was attended by the representatives of 31 unions, though there were 70 unions in existence by that time in Ontario alone. The organization with some initial successes to its credit, in securing legislation in the province of Ontario waned with the depression which followed the panic of 1873, and disappeared entirely three years later. In 1883, under more direct encouragement and support from the unions of the United States, the attempt to found a central labor body in Canada was repeated, this time with permanent success, and after 1886 the Trades and Labor Congress of Canada* secured a firmer place among Canadian institutions, holding annual meetings and consistently increasing in strength and influence ever since. Since 1900 alone the increase in the membership of the Congress and its adhering bodies has been tenfold.

The constitution and general position within the Canadian labor movement of the Trades and Labor Congress as it exists to-day is of considerable significance and interest. From the outset, as already remarked, the typical local trade union in Canada has been a branch of a large "craft" organization having its headquarters in the United States. Even where the parent body is British, the immediate affiliation has usually been from a continental head office situated in the United States. Canadian trade unionism, accordingly, has reflected rather accurately the conflicts and general fortunes of the unions of the neighboring republic. The Congress is in effect an organization on the federal principle of the members of the general international labor movement, for the purpose primarily of directing public opinion and influencing legislation in the Parliament of Canada and the legislatures of the several provinces, a function which obviously a foreign organization could not adequately perform. The Congress accordingly has always been closely allied with the federated bodies of the United States, deriving its revenues not only from its own members but by grant from the federal head bodies whose work it carries out in Canadian territory.

This status of the Congress has in large part determined its history. In the great conflict which was waged in the closing decades of the 19th century between the Knights of Labor and the American Federation of Labor for supremacy in the federal field of American trade unionism, the Congress at first held the balance even. Later on, however, with the increasing strength of the Federation, the influence of the Knights of Labor in the Congress declined. Eventually an open rupture occurred, and in 1904 the Canadian Federation of Labor* was organized of unions cast out of the Congress on the ground of adherence to the principles of the defeated movement. The new organization adopted as its leading principle the organizing of a purely Canadian as opposed to an international trade union movement. Outside of the province of Quebec, however, where the Knights of Labor had attained an exceptionally strong position, no numerous following was obtained. The Federation has at the present time a membership of about 50 unions. There have always been, of course, a limited number of purely local organizations of labor in Canada, and even of central craft associations, outside the international movement. The boot and shoe workers and textile workers of the province of Quebec had at one time considerable organizations. The Canadian Brotherhood of Railway Employees has more recently become a body of national importance in the province of at least 10 other Canadian associations of a central character. Of these the best known, both because of its history and its present importance, is the Provincial Workmen's Association of Nova Scotia, a body founded in 1879, origi-
nally of coal miners. After a career of 30 years replete with successes, the Association had established its influence throughout Nova Scotia, where as a union of the Dominion Coal Company’s employees threatened to involve the great majority of its members and accordingly to place an undue strain on its resources. The incident is somewhat typical of organizations having a limited field of operations. It caused a section of the membership in the present case to look for help to the United Mine Workers of America, the international body established throughout the continent, which at once threw its organization into the field. After a bitter struggle of several years duration, a compromise was effected in 1917, by which the two series of local organizations have become merged, but have continued on a Canadian basis. As to the present position of trade unionism in Canada, the following is a brief review:

Local Unions.—Beginning with the unit of trade union organization, namely, the local union,—usually the craft union —there were in 1892 bodies of this character in Canada. Of these, 1,026 were branches of international organizations, 189 were branches of purely Canadian organizations, whilst 27 were entirely independent and local. The total trade union membership was estimated at 150,457 in 1916, of which 129,123 was international. This does not represent the highest point reached by the Canadian labor movement; in 1913, there were 2,017 local unions and the total membership was over 175,000. By provinces, Ontario stands first with 753 unions, and Quebec second with 306. British Columbia follows with 202 and Alberta with 147. Manitoba has 130, Saskatchewan 116, Nova Scotia 100, New Brunswick 80 and Prince Edward Island 8. Trade unionism naturally predominates in the larger industrial centres, and 18 Canadian cities contain 828 of the 1,842 local branches, and over 40 per cent of the entire membership. Montreal with 127 unions, Toronto with 111, Winnipeg with 75, Vancouver with 56, Hamilton with 50, Ottawa with 46, Edmonton with 42 and London with 40 are the leading centres of the labor movement. The most highly unionized group of workers is the railroad employees, who constitute 30.5 per cent of all Canadian unionists. The clothing and boot and shoe trades account for 10.6 per cent of the locals and the metal trades for 9.5 per cent. Building trades and mining and quarrying tie for next place with 9.4 per cent each. The printing trades have 4.5 per cent. These proportions vary from year to year with general economic conditions. In 1914 the building trades made up 18.9 per cent of the total trade union membership, whilst the railway employees were at that time only 24.9 per cent.

With regard to the central international craft organizations, it may be noted that of a total of 143 operating on the North American continent, 91 are represented in Canada. These are the American Federation of Labor. In the past total of 753 unions, and with Canada are in affiliation with the Trades and Labor Congress. Naturally the Canadian representation in the international movement is but a small proportion of the whole. It was estimated in 1916 that the American Federation of Labor embraced a total of 24,580 local branches, with a membership of 2,529,198. The Trades and Labor Congress of Canada could speak at the same time for 1,138 local branches having a membership of 66,573. Of the 91 organizations above mentioned, 41 have 10 or more branches in Canada. Those having 25 or more branches are as follows:

<table>
<thead>
<tr>
<th>Name of Organization</th>
<th>Number of Canadian Local Units</th>
<th>Reported Membership of All Units in Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbers' International Union of America</td>
<td>40</td>
<td>1,193</td>
</tr>
<tr>
<td>Bricklayers, Masons and Plasterers' International Union of America</td>
<td>56</td>
<td>3,755</td>
</tr>
<tr>
<td>Carpenters and Joiners of America, United Brotherhood of</td>
<td>101</td>
<td>5,000</td>
</tr>
<tr>
<td>Electrical Workers, International Brotherhood of</td>
<td>29</td>
<td>1,760</td>
</tr>
<tr>
<td>Locomotive Engineers, Brotherhood of</td>
<td>90</td>
<td>5,013</td>
</tr>
<tr>
<td>Locomotive Firemen and Enginemen, Brotherhood of</td>
<td>92</td>
<td>6,512</td>
</tr>
<tr>
<td>Longshoremen, International Association</td>
<td>26</td>
<td>1,609</td>
</tr>
<tr>
<td>Machinists, International Association of Maintenance-of-Way Employees, International Brotherhood of</td>
<td>157</td>
<td>5,419</td>
</tr>
<tr>
<td>Mine Workers of America, United</td>
<td>25</td>
<td>4,426</td>
</tr>
<tr>
<td>Molders' Union of North America, International</td>
<td>31</td>
<td>2,152</td>
</tr>
<tr>
<td>Musicians, American Federation of</td>
<td>40</td>
<td>4,574</td>
</tr>
<tr>
<td>Painters, Decorators and Paperhangers of America, Brotherhood of</td>
<td>28</td>
<td>1,996</td>
</tr>
<tr>
<td>Plumbers and Steam Fitters of America, United Association of</td>
<td>40</td>
<td>1,827</td>
</tr>
<tr>
<td>Railway Conductors, Order of</td>
<td>61</td>
<td>3,026</td>
</tr>
<tr>
<td>Railway Carmen of America, Brotherhood of</td>
<td>73</td>
<td>4,658</td>
</tr>
<tr>
<td>Railroad Trainmen, Brotherhood of</td>
<td>86</td>
<td>10,684</td>
</tr>
<tr>
<td>Stoneworkers' Association of North America, Journeymen</td>
<td>26</td>
<td>750</td>
</tr>
<tr>
<td>Typographical Union, International</td>
<td>44</td>
<td>4,647</td>
</tr>
</tbody>
</table>

Totals: 1,114 75,300

Trades and Labor Councils.—These are the municipal parliaments of labor, of somewhat loose organization, supported by a small per capita assessment. They are most important bodies under the Canadian system. All matters of general as opposed to craft interests are particularly their concern. In 1916 they numbered 46, of which 42 were chartered by the Trades and Labor Congress and 3 by the Canadian Federation of Labor. Nineteen of the trades councils are in Ontario. Perhaps the most historic labor body in Canada is the Toronto Trades and Labor Council. It was the body chiefly instrumental in calling together the first congress of labor in Canada, and it represents to-day over 10,000 members of the rank and file.

Federal Councils.—Canada has also its quota of trade federations, i.e., local associations of the unions of similar or allied trades. Thus there are nine allied printing trades councils, six building trades councils, six federal councils of railway employees and four federations of theatrical employees. A considerable number of the craft unions have also what is termed "district councils," which usually comprise all the branches of the same craft organization within the given area. Thus the Provincial Conference Board of Ontario of the Bricklayers, Masons and Plasterers' International Union is made up of 30 local unions scattered throughout the province. Similarly the United Mine Workers of Alberta and British Columbia have a district association. There are altogether 38 district councils of labor unions in Canada. It should be noted that in Canada as
in the United States the large international railway organizations have been chary of entering into the more or less restrictive affiliation with the labor movement. They are not represented for example in the Trades and Labor Congress. They maintain instead a series of "protective" and "legislative" committees. Certain of the railway organizations have special officers under salary to watch their interests during the sessions of the Dominion Parliament.

Beneficiary Work.—The beneficiary work of the Canadian unions is inextricably interwoven with that of the continental movement. It may be remarked that the total expenditures on benefits of the international organizations represented in Canada was $125,012 in 1916, of which the Canadian membership doubtless received its proportional share. In addition, the Canadian unions paid out independently and on a purely local basis the following sums:

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death benefits</td>
<td>$56,646</td>
</tr>
<tr>
<td>Unemployed benefits</td>
<td>2,121</td>
</tr>
<tr>
<td>Strike benefits</td>
<td>15,542</td>
</tr>
<tr>
<td>Sick benefits</td>
<td>145,372</td>
</tr>
<tr>
<td>Other benefits</td>
<td>27,279</td>
</tr>
</tbody>
</table>

Labor Legislation.—The main body of labor legislation in Canada is of provincial origin, the exceptions being vested, under the British North America Act, with the protection of civil rights. In the rise and development of the factory system in the older provinces, and of the mining and construction trades there and elsewhere, will be found the conditions which have later been reflected in the Canadian labor laws. Factories and Shops Acts exist in all the provinces, and Mines Acts in those which have an active mining industry. Acts defining the relations of master and servant and protecting the wages of the latter found their way into provincial statutes at an early date. In legislation of this character the model followed has been that of Great Britain. In workmen's compensation legislation, for example, marked diversity has resulted from the different pace with which the provinces have followed British precedent. The Dominion Parliament, however, as responsible for the peace, order and good government of the country, the regulation of trade and immigration and the scope of the criminal law, has also been largely interested in labor problems. A Dominion Department of Labor has existed since 1900, and has been the chief Canadian agency for the settlement of disputes between capital and labor. The evolution of the Dominion policy in intervention in labor disputes, culminating in the Industrial Disputes Investigation Act of 1907—a measure which forbids a strike or lockout in the more important industries prior to investigation by a board of inquiry—constitutes perhaps the most interesting chapter in the subject of Canadian labor legislation. Labor departments in more or less developed form exist in most of the provinces.

R. H. Coats,
Dominion Statistician and Controller of the Census.

CANADA HEMP, INDIAN HEMP, or AMY-ROOT, a perennial herb Apocyon cannabinum of the dogbane family (Apocynaceae), a native of North America (British Columbia, Florida and Lower California) generally found growing along the banks of streams or in moist ground. It has a strong fibre used by the Indians for twine, nets, woven fabrics etc. They root deep, the stem and branches are upright and the leaves oblong, lanceolate-oblong and ovate-oblong, acute or obtuse and mucronate at the apex but narrow and rounded at the base. The seeds are glabrous and sometimes pubescent beneath and range from two to six feet in length and six inches to three feet in width. The cymes are dense; the pedicels short and bracteolate at the base; and the flowers are from two and one-half to three inches broad. The calyx-segments are nearly as long as the tube of the greenish-white corolla. Consult Britton, 'Illustrated Flora of the Northern United States and Canada' (New York 1897); Gray, 'Manual of Botany' (New York 1889), etc.

CANADIAN BOUNDARIES. See BOUNDARIES OF THE UNITED STATES.

CANADIAN CANALS. The outstanding feature of water transportation in Canada is the Saint Lawrence system of rivers and lakes stretching from the Strait of Belle Isle to the head of Lake Superior—a distance of 2,340 miles. The shoals of the Saint Lawrence River in Lake Ontario, and between Quebec and Montreal have been dredged to give a waterway with a minimum of 30 feet in depth. Above Montreal the difficulties to navigation begin, and here begin a series of canals which overcome rapids and other obstacles. This work of canalizing the Saint Lawrence was not effectively begun till about 60 years after the British occupation. The canal system then embarked upon has been subsequently improved and enlarged, and in 1875 it was decided to increase their depths to a minimum of 14 feet. There is a difference in level between Lake Superior and tidewater of 600 feet, the total length of the canalization at different points being 73 miles. The following gives a summary of traffic during the past five years: 1911, 38,630,353 tons, of which 20.5 per cent was freight of Canadian origin, and the balance American; 1912, 47,587,245 tons (19.7 Canadian); 1913, 52,053,913 tons (21.3 Canadian); 1914, 37,023,237 tons (25.3 Canadian); 1915, 15,198,805 tons (44.7 Canadian). It will be seen that 1915 shows the extraordinary decrease of 21,824,434 tons, or 58.9 per cent, over the figures of 1914. Of that decrease 91 per cent occurred at Sault Sainte Marie (see p. 477, Sault Sainte Marie Canal). The canals of Canada, like those of the United States, are free of toll or restrictions of any kind, and there is thus absolute reciprocity in the use made of them by the vessels of each nation. The following is a brief summary of the principal canals of Canada:

Saint Lawrence Canals.—The Saint Lawrence canals, Lachine, Soulanges, Cornwall and Williamsburg, had a total traffic of 3,409,467 tons in 1915, a decrease of 982,026 tons over the figures of 1914.

Lachine Canal.—This canal was built across a portion of the island of Montreal in order to avoid the Lachine Rapids. It was opened in 1824, and has been subsequently enlarged three times. The present canal has five locks 275 feet long, of which two have a depth of 18 feet of water on the sills.
Soulanges Canal.—Between Lake Saint Louis and Lake Saint Francis three rapids are passed—the Cascades, the Cedars and the Coteau. In order to avoid these rapids the Beauharnois Canal was built on the south shore of the river and completed in 1845. It was 11¾ miles in length, with nine locks. The Soulanges Canal, completed in 1899, and built on the north shore, has now superseded the Beauharnois Canal. Its length is 14 miles, and it has a depth of 15 feet of water available on the sills.

Cornwall Canal.—The Cornwall Canal was built to overcome the long Saint Rapids at the head of Lake Saint Francis. It extends from Cornwall to Dickinson’s Landing, and was opened for navigation in 1843.

Williamsburg Canals.—These begin with the Farran’s Point Canal, five miles above the Cornwall Canal, and are continued by the canals at Rapide Plat and the Galops. They were completed and opened for navigation in 1846–47, and have been recently deepened and enlarged.

Chambly Canal.—The Chambly Canal at one time formed an important link in the chain of communication between the Saint Lawrence and the Hudson River via Lake Champlain. A lock at Saint Ours, 14 miles aboveire, was finished in 1822. The Chambly Canal was opened in 1843, but was improved in 1850, giving a navigable depth of about seven feet of water. The canal is 12 miles long, the connection from Lake Champlain being by the Champlain Canal, built in 1822. The Chambly Canal, owing to the building of railways and the increased draught of vessels, is now of little commercial importance, and is chiefly used by barges carrying lumber from the Ottawa River to New York. In 1915 478,707 tons passed through an increase of 41,802 tons over the preceding year.

The Rideau-Ottawa Canal System.—This system was designed to provide safe water communication between Kingston and the lower Saint Lawrence by way of Ottawa (now Bytown) and the Ottawa River. In its conception the requirements of commerce were secondary to military considerations. Water communications with Upper Canada had been seriously interrupted during the latter part of 1812, and it was intended to form, so to speak, a back-door between the two great rivers. At Sainte Anne, where the Ottawa joins the Saint Lawrence, private interests had constructed a lock in 1816. Twenty-seven miles farther up the Ottawa, the Carillon Canal was built to avoid the Carillon Rapids; the Chute à Blondeau Canal four miles above that, and the Grenville Canal a mile and a half above the Chute à Blondeau Canal. The Ottawa River canals handled 272,570 tons of freight in 1915, a decrease of 62,762 tons in comparison with the preceding year.

The Rideau Canal, formed by canalizing the Rideau and Cataraqui rivers, and by making use of the Rideau lakes, was constructed as a military work, and was opened for navigation in 1832. The locks were 134 feet long by 35 feet wide, with five feet depth of water on the sills. In 1915 120,781 tons of freight passed through, a decrease of 30,958 tons from 1914.

Trent Navigation System.—A plan has been projected to connect navigable waterway over 200 miles in length, connecting the rivers and lakes between the Bay of Quinte and the southeastern shore of Georgian Bay. In 1907 it was decided to proceed with the improvement of the Trent River from the Bay of Quinte to Lake Simcoe, with an eight and one-half-foot navigation to Rice Lake, and a six-foot navigation from that point to Lake Simcoe. Contracts were let to a value of over $5,000,000. Two great hydraulic lift locks have been constructed in connection with these works, the one at Peterborough being the largest in the world, and is able to lift vessels of a capacity of 800 tons vertically 65 feet. In 1915 49,904 tons passed through the Trent canals, a decrease of 17,811 tons on the figures of 1914.

Welland Canal.—This is the most extensive of the public works of this character undertaken by the Canadian government, and is designed to overcome the 27 miles that separate Lake Erie from Lake Ontario. The difference in level between the two lakes is 32½ feet.

The first canal was opened in 1829, extended from Port Dalhousie on Lake Ontario to the Welland River, which was utilized as far as its outlet to the Niagara River. Vessels then ascended the Niagara to Lake Erie. In 1833 a diversion was made by extending the canal to Port Colborne, Lake Erie. In 1842 improvements and enlargements were made, and in 1875 a new cutting was begun from Allanburg to Port Dalhousie. In 1912 further enlargements were undertaken, at an estimated cost of $3,000,000. The present channel will be used from Port Colborne to Thorold, and from there a new cutting will be made to Lake Ontario, entering the lake about three miles east of Port Dalhousie. This canal will be 25 miles in length, and in place of 25 locks will have seven locks, all of which are to be between Thorold and Lake Ontario. Each lift lock will be 800 feet by 80 feet in clear with 30 feet of water above the sills, and will have a lift of 46½ feet. Provision is to be made to admit of a future 30-foot navigation. It is believed the opening of the new canal will favorably affect wheat freights and will result in the diversion of much traffic from the Buffalo-New York route to the Saint Lawrence. In 1915 3,063,012 tons passed through the Welland Canals, a decrease of 982,026 tons on the figures for 1914.

Sault Sainte Marie Canal.—Built to overcome the falls and rapids of Saint Mary River connecting Lake Superior with Lake Huron, it was opened for navigation in 1895. This was not the first canal to be constructed, the Northwest Company having built a small canal at the end of the 18th century. The Sault Sainte Marie Canal has a lock 900 feet long with a width of 60 feet and depth of water on the sills of 18 feet 3 inches at the lowest known water level. In 1897, 4,947,065 tons of freight passed through the Canadian Canal, and by 1913 the tonnage had increased to 42,699,324 tons. These figures had declined in 1914 to 27,599,184 tons; and the following year, 1915, an extraordinary reduction in freight passing through being only 7,750,957 tons—a decrease for the 12 months of 19,848,- 227 tons. Of the decline of traffic at that gateway, 1,049,241 tons (or 5.1 per cent) attached to Canadian traffic, and 18,798,986 (or 94.9 per cent) to American traffic. The decrease was
largely in the nature of a diversion to the American Canal at Sault Sainte Marie. The cause of this diversion was the availability of a new lock on the American side, having a much larger capacity than the lock on the Canadian side. The practicability of carrying a heavier load through the new American lock drew away nearly all the iron ore trade and a good deal of wheat from the Canadian canal.

Saint Peter's Canal.—The Saint Peter's Canal connects Saint Peter's Bay on the Atlantic Ocean with Lake of the Woods and the Rainy River estuary in Cape Breton Island. It was completed in 1869, was enlarged between 1875 and 1879, and has a lock 200 feet long, 48 feet wide, with 19 feet depth of water. A new entrance from the Atlantic is being made, with enlargement of the lock.

D. S. DOUGLAS.

CANADIAN COPYRIGHT. See COPYRIGHT, CANADIAN.

CANADIAN EMBROIDERY, a kind of embroidery formed from small pieces of snake skin, fur, etc., intermingled with flexible pieces of thread. The designs are usually in quilts dyed in various colors.

CANADIAN GOVERNMENT RAILWAYS. The following lines were owned and operated by the Dominion government as the government railways in 1917: The Intercolonial Railway (1,562 miles), with which is associated the Prince Edward Island Railway (275 miles); the International Railway of New Brunswick (112 miles), and the Saint John and Quebec Railway (105 miles); and the National Transcontinental Railway, from Moncton, N. B., to Winnipeg (2,009 miles), giving a total of 4,063 miles. In 1917 a measure passed the Dominion Parliament providing for government ownership and operation of the Canadian Northern Railway. The Hudson Bay Railway, now (1918) in course of construction from The Pas, on the Saskatchewan River, to Port Nelson, on Hudson Bay, a distance of 410 miles, is to be operated as a government line. After the Canadian Northern Railway passes into government hands, there will remain only three lines of any importance under private ownership—the Grand Trunk Pacific, and Grand Trunk Pacific railways. See separate articles on before-mentioned railways—Canadian Northern; Canadian Pacific; Grand Trunk; Grand Trunk Pacific; Intercolonial; and National Transcontinental.

CANADIAN NORTHERN RAILWAY. The Canadian Northern Railway system may be said to have had its origin in the construction in 1896 by Mackenzie and Mann, contractors, of a line of railway between Gladstone and Dauphin, in Manitoba, under the charter of the Lake Manitoba Railway and Canal Company. During the next few years construction was carried on under a variety of company names, but by virtue of an order in council passed 13 Jan. 1899, the Canadian Northern Railway Company was brought into existence. In that year there were 252.6 miles in operation. In 1901 the Canadian Northern carrying 77,062 tons, a Manitoba Railway Company in the province of Manitoba were leased for a very long term of years, and on 1 Jan. 1902, the last spike was driven upon a line connecting Winnipeg and Port Arthur, on Lake Superior, giving the Canadian Northern its own independent outlet from the wheat fields of the prairies to the cargo carriers of the Great Lakes. Since then the lines have been extended over the Prairie provinces of Manitoba, Saskatchewan and Alberta, to the Pacific at Vancouver and Victoria, and to the Atlantic Port of Quebec, while in Nova Scotia, Canadian Northern lines serve the Atlantic shore from Halifax to Yarmouth, and cut across the province to the Bay of Fundy side. To-day the system comprises more than 9,000 miles of line. It connects Atlantic, Great Lakes, St. Lawrence and Pacific ports and serves centres containing 60 per cent of the population and producing 70 per cent of the manufactured products of the provinces of Ontario and Quebec; 77 per cent of the urban population of Manitoba; 77 per cent of that in Saskatchewan; and 90 per cent in Alberta; in British Columbia it opens up the North Thompson Valley to settlement, and serves anew the old places such as Kamloops, Ashcroft, Yale, Hope, New Westminster, Vancouver and Victoria—in all 78 per cent of the urban population. It has contributed measurably to the prosperity of the Dominion through opening up vast areas to settlement, by encouraging immigrants to make the new country their home and by opening up timber and mineral-bearing lands to development. The possibilities for economical operation in the future are exemplified by the fact that this transcontinental line possesses the easiest gradient of any of the great systems on the continent of North America.

Collecting elevators for grain having 26 per cent of the total capacity of western Canada are served by the Canadian Northern Railway; licensed terminal elevators having 47 per cent of the total capacity in Canada are on the Canadian Northern Railway. The flour mills having 51 per cent of the total daily capacity of Canada are on the lines of the Canadian Northern Railway. In British Columbia the Canadian Northern Railway proportion is 90 per cent; in Alberta 44 per cent; in Saskatchewan 74 per cent; in Manitoba 81 per cent; in Ontario 34 per cent; in Quebec 90 per cent; in Nova Scotia 15 per cent. Lumber mills producing 30 per cent of the total output in Canada are served by the Canadian Northern Railway, while 32 per cent of the total is marketed by water. In British Columbia the Canadian Northern proportion is 34 per cent; in Alberta, Saskatchewan and Manitoba 70 per cent; in Ontario 33 per cent; in Quebec 28 per cent; in Nova Scotia 28 per cent. Pulp and paper plants having 53 per cent of the capacity of Canada are served by the Canadian Northern Railway lines. In Ontario the Canadian Northern proportion is 60 per cent, in Quebec 64 per cent and in Nova Scotia 50 per cent. The company owns 3,245,987 acres of land, 843,127 of which are prairie land.

Its grain elevator at Port Arthur is the largest consolidated grain elevator plant in the world—capacity 10,000,000 bushels. Its coal docks at Port Arthur, Ontario, have a storage capacity of 660,000 tons and an unloading capacity of 700 tons per hour and an annual capacity of over 1,000,000 tons. The shipping capacity of the Canadian Northern Railway ore docks at Key Harbor, on Georgian Bay, is 8,000 tons of ore daily.

The lines of the system are located as fol-
ship lines on the lakes and on the Pacific and Atlantic oceans, the Canadian Pacific adopted special methods of management which have worked out to the material advantage of the company.

According to its statement of 30 June 1911, the cost of the railway and equipment was $503,384,724 and of its various steamship lines $24,208,595. It then held in Manitoba, Western provinces and in British Columbia 8,214,186 acres of land. Its capital stock was $200,000,000, receiving dividends at the rate of 10 per cent per annum; its 4 per cent preference stock, $80,681,921; its 4 per cent consolidated debenture stock, $176,284,882; its bonded debt, $6,399,180; 6 per cent note certificates, $52,000,000.

The company issued $25,000,000 5 per cent land grant bonds in 1881, which have been paid off. In 1888 a further issue of $15,000,000 3½ per cent land bonds was made, and of these $3,500,000 had been provided for at 30 June 1904 by payment of that amount to the government out of the proceeds of land sales in terms of the mortgage, leaving $11,500,000 outstanding. These were afterward paid off.

The following table illustrates the diversified nature of its traffic during the three years, each ending June 30:

<table>
<thead>
<tr>
<th>DESCRIPTION OF FREIGHT CARRIED</th>
<th>1910</th>
<th>1911</th>
<th>1915</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flour, barrels</td>
<td>4,921,903</td>
<td>8,460,744</td>
<td>8,538,600</td>
</tr>
<tr>
<td>Grain, bushels</td>
<td>52,719,706</td>
<td>111,100,982</td>
<td>126,909,828</td>
</tr>
<tr>
<td>Live stock, head</td>
<td>963,742</td>
<td>1,567,665</td>
<td>2,833,726</td>
</tr>
<tr>
<td>Lumber, feet</td>
<td>1,033,569,377</td>
<td>2,441,007,107</td>
<td>2,180,735,600</td>
</tr>
<tr>
<td>Firewood, cords</td>
<td>204,963</td>
<td>298,345</td>
<td>254,428</td>
</tr>
<tr>
<td>Manufactured articles, tons</td>
<td>2,288,234</td>
<td>5,759,344</td>
<td>6,024,590</td>
</tr>
<tr>
<td>All other articles, tons</td>
<td>2,571,130</td>
<td>8,971,037</td>
<td>7,423,163</td>
</tr>
</tbody>
</table>

Freight traffic
- Number of tons carried | 8,769,934 | 22,536,214 | 21,490,596 |
- Of tons carried 1 mile | 3,247,922,167 | 8,062,102,013 | 7,940,151,242 |
- Earnings per ton mile | $0.75 | $0.81 | $0.76 |

Passenger traffic
- Number of passengers carried | 12,080,150 | 13,202,603 |
- Number of passengers carried 1 mile | 1,457,332,932 | 1,164,488,630 |
- Earnings per passenger mile | $1.05 | $2.06 |

The gross earnings of the system for the year ending 30 June 1915 were $98,865,209, and the working expenses $65,290,585, with net earnings of $33,574,627.

Lord Mount Stephen, the first president of the company, resigned from that office in 1888 and was succeeded by Sir William C. Van Horne, who retired in 1899, when Lord Shaughnessy, K.C.V.O., the present president and chairman of the company, became his successor. The general offices of the company are at Montreal, Canada.

CANAIDA RIVER, a river that rises in the northeast part of New Mexico, and runs generally eastward through Texas and Oklahoma to the Arkansas. Its length is about 200 miles, but it is rather shallow and not important for navigation. Its largest tributary is the
Rio Nutria, or North Fork of the Canadian, which runs parallel to the main stream for about 600 miles.

**CANADIAN SERIES**, the lower of the three series into which the rocks of the Ordovician system are divided by American geologists, comprises the Chazy and Calciferous stages, principally limestones. See ORDOVICIAN.

**CAÑAIGRE, kā-nē'grā**, a species of dock (*Rumex hymenophalus*) indigenous to the arid region of southern California, Arizona, New Mexico, northern Mexico and western Texas. It is a perennial herb with tuberous roots from which a reddish or green stem rises to a height of about two feet and bears rather large leaves resembling those of other docks. The tubers, which resemble those of the dahia, have long been used locally as a source of tannin, and attempts have been made to grow them upon a commercial scale for this purpose.

**CANAJOHARIE, kān-'jō-hār'e, N. Y., an Indian word, meaning, The pot that washes itself.** A village on the south bank of the Mohawk River in Montgomery County, 55 miles west of Albany, in the most picturesque part of the Mohawk Valley. Canajoharie was first settled about 1740 by the Dutch and Germans. It was the home of Brant, chief of the Six Nations, and place of departure from the Mohawk to the southern interior. The Erie Canal, the New York Central and West Shore railroads pass through the village. The village has two banks, a library, six churches and a school of high standing; two weekly local newspapers and one hay-trade publication; flour mills, limestone quarries, paper and cloth bag manufactory and meat and fruit packing-houses. It is equipped with electric light and power, sewers and an abundant water supply. It is governed by a board of trustees and a council of five members, elected annually. Pop. (1916) 2,500.

**CANAL DOVER, Ohio, city of Tuscarawas County, 70 miles south of Cleveland, situated on the Tuscarawas River and the Ohio Canal, and on the Pennsylvania and Baltimore and Ohio railroads. There are deposits of coal, iron and building stone in the vicinity. The city owns and operates its waterworks and electric lighting plant. The chief industries are in iron and steel, and the manufacture of racing-sulkies, baby-carriages, roofing, etc. Pop. (1910) 6,621.**

**CANAL DU MIDI, or CANAL DU LANGUEDOC, a canal in the south of France, connecting the Mediterranean Sea and the Atlantic Ocean. See CANALS — HISTORICAL.**

**CANAL RING.** See TILDEN, SAMUEL J.

**CANAL ZONE BOUNDARY.** See BOUNDARIES OF THE UNITED STATES.

**CANALE, kā-nā'ltê, Nicolo, Venetian admiral, who flourished in the second half of 15th century. In 1469 he was commander of the Venetian fleet at Negropont (the ancient Chalceis), and succeeded in seizing the Turkish fort. The cruelties perpetrated upon the inoffensive inhabitants created great indignation at Constantinople, and Mohammed II, with a view of resenting the outrages, besieged Negropont with a force of 120,000 men, and after a violent contest expelled the Venetians. Canale, to whom this defeat was attributed, was sentenced to death by the Council of Ten, but at the instance of Pope Paul II and of other influential persons, his punishment was commuted to exile for life.**

**CANALEJAS, kä-na-lā'hās, Don José, Spanish statesman: b. 1854; d. 12 Nov. 1912. The son of humble parents, he was originally trained for the law, but took to politics at an early age. Working his way up the political ladder he held several portfolios, including those of Finance and Justice, and was for a time President of the Chamber. In February 1910 he was called by King Alfonso to succeed Señor Moret, the Premier, whose administration had lasted only four months. Moret had bitterly attacked the Maura ministry on the campaign in Morocco and their strong action in suppressing the Barcelona riots. Maura was compelled to resign and Moret, a Liberal, assumed office, but was soon forced to resign owing to dissensions in his party. Canalejas was called to the helm and divided his government in one day, distributing the portfolios among the Democrats, of which party he was the leader. On 15 June 1910 he disclosed his policy in the King's speech, which, whilst containing expressions of importance, was not unexpected. In the House of Commons, Pope, clearly indicated that the government intended to take action against unauthorized religious orders and congregations. Canalejas speedily found himself in conflict with the Vatican when he canceled the prohibition, which was then in force, of the use of any emblem, attribute, or lettering on the exterior walls of Protestant places of worship. A number of prominent Carlists seized the occasion to send a testimony of their regard to Don Jaime of Bourbon, son of the late pretender, Don Carlos. Don Jaime, however, wisely repudiated any intention of disturbing the peace of Spain. The financial policy of Canalejas also ran counter to vested interests. Among his proposals was a tax on sums bequeathed for masses for the souls of the dead. A grave political crisis shook his administration early in 1911, when the question of the execution of Ferrer was revived. The responsibility for that sentence, however, did not rest upon Canalejas, for he was not in office when Ferrer was shot. In a speech he stated that he would have been in favor of a reprieve—as a matter of policy—which offended the military authorities. The War Minister sided with the army, but the King and the Cortes supported the Premier. Barcelona was said to be the home of 10,000 anarchists. In September 1911 these malcontents broke out in fierce riots, which spread with alarming rapidity. Canalejas was equal to the occasion. He proclaimed martial law throughout the country, seized the ring-leaders and broke up the movement in two days. A democrat in sentiment, his sense of justice was strong, if severe. He resigned twice because the king had reproved criminals condemned to death for atrocious murders. The king wished to bestow a title upon him, but the honor was refused by Canalejas, who said he preferred to remain associated with the proletariat from whom he was sprung. While looking in the window of a bookstore he was shot and killed by an anarchist.
CANALETTO—CANALS

CANALETTO, or CANALES, name applied to two Venetian painters: (1) ANTONIO, b. 18 Oct. 1697; d. 20 Aug. 1768, first followed his father's profession as scene-painter, but having studied in Rome, where he employed his time in depicting ancient ruins in studied light and shade effects. He was the first to employ the camera obscura practically. He returned home and devoted his work to views of the palaces and scenes of Venice, which he painted with fine perspective, a clear and unpretentious, and an excellent mastery of color. He has been given both favorable and unfavorable criticism, the latter for the mechanical nature of his art. The National Gallery, London, has five pictures by him, among them 'View on the Grand Canal, Venice' and the 'Regatta on the Grand Canal.' (2) BERNARDO BELLOTTO (q.v.) nephew of the former, also a landscape painter, who imitated his uncle and master. He lived in Dresden where he was a member of the Academy of Painters.

CANALS. Canals are waterways, wholly or partially artificial, used for conveying water or for waterborne navigation. Those used for irrigation, drainage and water-power development are of the first class and, being closely related to the subjects of their purpose, are not considered here.

Navigation canals have been designated according to the size or kind of boats that can navigate them, as boat, barge or ship canals; according to the nature of the channel, whether purely artificial or in natural streams, they have been known as artificial canals or canalized rivers; and according to geographical location they have been called isthmian canals, peninsular canals, canals around falls or rapids, artificial seaport canals or canals connecting waterway systems. Also there are sea-level canals—built at sea level—and tidal canals, which are sea-level canals subject to tidal flow.

The term ship canal is commonly applied to those canals intended for ocean-going vessels, but the other terms—boat and barge—are not so generally used, probably because they fail to convey any definite idea as to size. Each element of a large canal, which was used to designate one particular canal, gives a fairly clear idea of the boats that can be accommodated. As no standard of size has ever been or is likely to be established, the size of a canal is truly defined only by stating the maximum dimensions of the boats that can be accommodated. These are usually given in terms of draft, beam and length, but sometimes the form of bow and stern must also be considered.

Until a few years ago the great majority of canals were of small size, and before the advent of the lock, unless a canal could be built at one level, the boats used were limited to a size which could be transferred from one level to another by some mechanical device. After lock canals came into use, France in the 17th century, undertook considerable canal construction. England followed next, but did little until the latter half of the 18th century. Early in the 19th century the beginning of canal construction was witnessed in America. This was followed by the decline of railroads and at a time when canals furnished the only cheap means of transportation. The sizes of the canals up to this time seem, in the light of present dimensions, but very small. During the latter part of the 19th century several of the European countries began enlarging and improving their more important canals, making some radical changes in size and in the construction and operation. These changes were worked out by careful study, made in accordance with modern scientific methods rather than by the rule-of-thumb procedure of former years. American waterway improvement along modern lines did not become very active until the beginning of the present—20th—century, but now various Federal projects, also the Panama Canal and New York State Barge Canal have caused a reawakening of canal construction in America.

The artificial channel, which among engineers is now known as a land-line, was the prevailing type of construction for many years, even where the route was parallel and in close proximity to a natural stream, as in the case. To control a river sufficiently for navigation by small boats was often considered impracticable and the cost, prohibitive. The liability of damage to canal structures by floods and the damage to adjacent territory resulting from backwater caused by canal structures at all times argued against the use of the natural channels. Later, when larger canals were built and methods for the control of rivers were improved, it became more economical to utilize the natural channels, where available.

Isthmian and peninsular canals, so called from the neck of land crossed, provide shorter and safer routes between certain ports. Canals around falls or rapids connect navigable portions of a river above and below the fall. There are several of these on the Saint Lawrence River. Artificial seaport canals extend from the coast inland and are designed to permit sea-going vessels to reach inland ports. Canals connecting waterway systems enable boats to pass from one system to another, thereby increasing the utility of both systems, and often also they possess other features of much importance.

Of canal structures, the most important probably is the lock, designed to raise or lower boats from one level to another. A lock, placed at the meeting of two canal levels, is simply a chamber or basin which has a gate or set of gates at each end and side walls extending from a little above the water-surface of the higher level to the bottom of the lower level. When a boat enters a lock the closed gates at the other end maintain the difference in elevation between the two levels. After the gates are closed behind the boat, water is admitted to or drawn from the lock chamber, so as to raise the boat to the upper level or lower it to the lower level. Then the gates ahead of the boat are opened and it passes to the new level, the point of difference in elevation between the two levels having been transferred to the gates through which the boat entered the lock.

Various kinds of lock-gates have been employed, the most common being the mitre-gate. This consists of two leaves swinging on vertical axes from the side walls and meeting at an angle in the centre with the cut toward the upper level. The material formerly used for mitre-gate construction, but now steel...
is generally used. Improvement in gate design has made possible locks of more than 40 feet lift, whereas 10 or 12 feet was the usual maximum. The tumbler-gate, sometimes used at the upper end of the chamber, is mounted on a horizontal axis at the bottom and is raised or lowered mechanically. Lift-gates, which can be raised high enough to clear the boats, and rolling-gates, which roll back into a recess formed outside the lock at right angles to the sides wall, have also been used.

On the smaller locks, when mitre-gates were used, the water in the lock chamber was controlled by means of wickets or valves in the gates, but where the other kinds of gates are used and in all large locks, culverts are employed. These are built in the side walls or under the floor of the lock chamber, and in the larger locks usually extend just beyond the gates at both ends of the lock, connecting with the pools above and below the lock. They have several openings to the lock chamber, in order that the lock may be filled or emptied in a reasonable time with the least disturbance to the craft in the lock. The flow in these culverts is usually controlled by means of lift-gates or vanes, placed near each end. One type of gate, which operates on a nest of rollers, is being used largely on the New York State Barge Canal. There are a few instances of locks in which the culvert has been formed near each end into a siphon that has its neck above the highest water in the upper pool. A closed tank built in the masonry, which is filled from the upper pool and has an outlet to the lower pool and air pipe connection with the neck, primes the siphon, the water flowing from the tank tending to create a vacuum, which is filled by air from the neck.

The quantity of water required for one complete lockage is equal to the volume of the lock chamber between the elevations of the two pools. However, when the lockages alternate up and down, this quantity of water will serve to lock a boat each way. Where conditions permit, a saving of water is sometimes effected by the construction of a side pool. When the lock is to be emptied, some of the water is drawn to the side pool and returned above the level of the lower pool, thereby being available for filling the lower portion of the lock chamber at the next lockage. Evidently the quantity of water thus saved must be somewhat less than half the quantity required for one lockage.

There are a few examples of another type of lock—a structure consisting of a tank into which the boats pass and which is raised or lowered by power. Gates are provided at each end of the tank and also in the canal adjacent to the tank. Sometimes two tanks are operated side by side on a kind of balance. Since the weight of a tank and its contents is nearly constant, very little power is required and that mostly to overcome friction. With this type no water is consumed for lockage and but a small amount for power. On account of certain structural difficulties, however, very few locks of this variety have been built.

Inclined planes have been used occasionally in all canals. In one kind of plan the boats being hauled out of the water and up or down the incline in a saddle. Obviously these are not suited to large boats on account of the difficulty of safely supporting the boat and also because of the great amount of power required.

Of the other structures used in canals the movable dams deserve special mention, because of their use on the power of natural streams for canal purposes. These structures are designed to fulfill all the functions of a fixed dam, when it is desired to maintain the pools for navigation, and at other times, when a fixed dam would cause excessive floods, to be capable of being removed from the channel area either by being lowered to the river bed or by being raised above the flood level. Many kinds of automatic cresst and also of controlled flashboards have been devised for special cases, to serve partially the same purpose as the movable dam, but their use is less general.

In the operation of the larger canal structures mentioned here the lock is the principal one which has almost entirely superseded hand-operation. The great advances made in the development of electrical equipment render electric power particularly suitable for canal service. Also by its use the best means of lighting for night operation can be obtained. Where water power is available at a lock, a hydro-electric plant may be installed. In such cases, where power may be needed at times when water power is not available, as at movable dams, the electric generators are driven by gasoline engines. Electric power has the advantage of ease in distribution to points where it is needed and also flexibility in the amount employed. In addition, the modern equipment for lock operation is damaged very little by flood water. The equipment is often quite extensive, as on the Panama locks at Gatun, where all the operations are indicated on a chart or diagram, which automatically shows the position of all the moving parts of the locks at all times.

Any project for canal construction must necessarily be considered from three standpoints—the commercial, the engineering and the financial. From these standpoints there must be considered not only the subjects that have already been discussed, such matters as terminals, power-supply and types of locks, dams and a host of lesser structures, but also the more general problems that arise in canal-building, and which remain for discussion.

These problems are so many and so interdependent that they do not readily lend themselves to brief classification. However, under three main heads—(1) dimensions, (2) route and (3) water-supply—the most important can be considered.

1. Several elements enter into a determination of the dimensions for a canal. In general a large boat can carry freight cheaper than a small boat, but unless the traffic is sufficient and of the proper kind to keep the large boat working to capacity, a canal of large size is not economically feasible. A canal often tends to be a large lake or river at the ocean. The question then arises as to whether it is advisable to make the waterway to fit the boats which
navigate these adjacent channels or to use smaller boats and transfer the cargoes. The nature of the territory traversed is also a determining factor. If natural waterways are available, then a larger channel may be desirable, since it can be made without excessive cost and will emit greater speed. The necessity of bridges has a bearing on the subject. If they must be fixed bridges, the minimum clearance tends to limit the boat dimensions and through them the channel dimensions. In recent times the question of speed has not had much bearing on canal dimensions. On the old and small canals the permissible speed did not exceed three and a half or four miles an hour, this limit being necessary because of injury to the banks by wave action. Since larger channels and canalized rivers have come into use, higher speeds are obtainable. Just how high speeds will eventually be attained is hard to say. The economical speed probably has not yet been worked out; at least it is not self-propelled or move in fleets of one power. An attempt is a propulsion than are warranted economically. In a restricted channel, such as most canals must necessarily have, the power required for a speed in excess of about five miles per hour includes much more than is that speed has resulting speed attained. The necessity for a considerable amount of water under the keel has not been appreciated by canal boatmen of the old order. They have usually crowded the channel dimensions beyond a reasonable limit by the boating; they have used, not realizing that they were defeating their own ends by increased cost for traction. On some of the recently improved canals the allowable speeds change with the locality. For example, on the New York Barge Canal they range from 4 to 10 miles. From this discussion it appears that, if a given speed must be attained on a canal, then the channel dimensions must be planned accordingly.

Closely allied to the question of speed is that of power. In the primitive canals man furnished the motor power, pushing the boats by poles, rowing them or drawing them by ropes from the banks. Then came the use of animals on a towpath. This was the common mode of propulsion until ... locomotives have replaced the animals. Steam propulsion has been in use to a limited extent on various canals for many years. Experiments in electric propulsion have been numerous, but no very successful system has yet been developed. A cable or a chain along the bottom of the canal has been used in some places, especially in Europe. These are either gripped or wound over a drum on the boat. According to modern methods canal boats are self-propelled or move in fleets of one power boat and one or more consorts. The newer canals are not provided with towpaths.

2. The early canals followed the natural contours of the ground much closer than do modern canals. Because of difficulties connected with stream canalization, preference was usually given to the building of independent channels, which often were close to but slightly above the streams. As previously stated, modern practice favors river canalization. After certain general natures of location have been determined by commercial and broad topographical considerations, the detailed location of a canal is distinctively a technical problem, in which questions of engineering expediency and relative costs play the chief part. The desiderata sought in canal location are shortness of route, minimum of curvature, least number of locks, all possible elimination of intermediate summit levels, minimum of excavation and embankment, avoidance of a channel above surrounding country, greatest ease of excavation consistent with stability, suitable foundations for structures, accessibility to water-supply, least interference with adjoining private, municipal and industrial interests, utilization of natural water courses, etc. This subject of location, like that of dimensions, is complicated. Only by careful surveys and comparative plans and estimates can the questions be solved.

3. The supplying of water is one of the most important problems connected with canals. In the old canals, which were generally small and ran beside natural streams, the water requirements could be readily met by damming the streams at various points. Under more difficult conditions, lakes or artificial reservoirs and sometimes long feeders have to be resorted to. It is almost essential that the supply be such that it can reach the canal by gravity flows, since in a canal of any magnitude the question of pumping is seldom to be considered.

Water has to be supplied to canals for three main purposes, namely, to fill the canal prism and to replenish loss in the levels between locks; to furnish water sufficient for lockages and for unavoidable leakage at locks; and to furnish power for operating the machinery at locks and other structures, and for electric lighting along certain portions of the canal, particularly at the locks.

An independent water-supply for filling the canal prism is required only in land-lines and then only at the opening of navigation or after water has been drawn out of the levels for repairs or other purposes. In river-lines the natural flow of the stream will of course fill the canal prism. The losses in land-lines include seepage through embankments, waste over spillways, evaporation from water-surfaces and transpiration through aquatic plants. For river-lines there is little or none over spillways.

The amount of water required for a lock varies not only with the height of the lift, but also with the volume of traffic. The same quantity of water is used in lockage, whether the boats are large or small and whether the lockage is up or down. Therefore the efficiency, or economy, of the lifting operation is increased with the larger boats. For a given amount of traffic the water-supply varies according to the means by which it is handled. The lock — whether singly or in groups and whether lockages in the same direction are made in sequence or alternate with lockages in the opposite direction. A canal is essentially an inland transportation route in which gradients are overcome by water-power. That the power is applied directly from water to boat does not alter the case. All things considered, the canal lock is a fairly efficient water-driven machine. In addition, the advantage of simplicity, quick operation, and avoidance of strain on the boat.
The critical points of supplying water to canals are usually the summit levels. Although lower levels may require more water, it is generally more readily obtainable for such portions, as the fall occurs naturally under the modern method of stream utilization. Proceeding downward in either direction from a summit, the water-supply required at any lock is equal to the sum of the losses from the source of supply down to the lock, plus the water required at the lock, minus the fall under the water-supply and the lock. From this it appears that the water-supply required may vary greatly from point to point. In providing water for a summit level of a canal it is necessary, therefore, to obtain a supply adequate for the points of greatest demand on both sides of the summit.

Thus it will be seen that the problem of estimating the water-supply required by a canal, like the problems already discussed, is also complicated; and this complexity can only be approximated. It is necessary to allow a liberal excess, or reserve supply, as a factor of safety.

Historical.—The earliest artificial water channels were for irrigation and drainage; not to reclaim (swamp land, other soil being too plentiful, but to regulate the overflow of rivers. These date from an immemorial past, certainly 3500 B.C. in Babylonia and Egypt, more probably 7000 B.C. at least. Very early also the larger ones must have been used for boat navigation, to transport agricultural and building materials; these combined drains and canals still exist in Egypt, called “navigations,” and the workers on them “navigators,” and have given to the language the word “navvy” for construction laborers. At what period the first ones were dug primarily for navigation, and incidentally for irrigation, cannot be told. There is a tradition that the Suez Canal was dug under the old kingdom of Egypt before 2000 B.C.; it was certainly opened or re-opened for small boats by Necho, about 600 B.C. About this time also Nebuchadrezzar of Babylon opened the Royal Canal between the Tigris and Euphrates, and Mesopotamia had been well canalized before. In these two countries, indeed, the natural canals, with their flat surface and long levels, and easy digging in sand or clay. It is probable that China also had canals before the Christian era, but evidence is wanting. The first canals were of course on one level; but with the light boats and great engineering skill of the ancients the step was not long to damming the water at different levels and hauling the boat over. The first system, not yet disputed, was to pull the boat up an inclined plane and let it down by gravity; and this remained the only method till modern times. Under Alexander his successors in Egypt and the Seleucid empire canals were much used: an important one was from Alexandria to the Nile, whose mouths were shut off by sandbars. Marius had one constructed 102 miles from the lower Rhone to the Mediterranean. Under Claudius there was one from the Tiber to the sea; and in Great Britain there are two which date from the Roman time, the Foss Dyke and the Caer Dyke, in Lincolnshire, of 40 and 11 miles respectively. In the 4th century Lombardy was canalized,—a very favorable spot from its great plain and many rivers; and near the end of the 5th century Odacer carried one from the Adriatic to Mentone above Ravenna. The downfall of Roman civilization stopped their development for a while; but under Charlemagne a fresh impulse was given them, and a great canal was constructed to connect the Danube both with the Rhine and the Black Sea. In the Netherlands the system is that of nature itself, and began very early; here the canal is not so much an artificial channel as a remnant of the original sea, around which it has been developed as early as 1121 Henry I deepened and made navigable the old Foss Dyke. The Grand Canal of China, about 1,000 miles long, a large part of it made up of canalized rivers, was completed in 1289. That country has many other great systems connecting its internal waterways.

But obviously the boats transferable by such machinery must be small and lightly loaded; and the modern canal system, with long, heavy boats and large cargoes, was first made possible by the invention of the lock. The development of locks is the story of the universal genius; and again for Holland a century earlier. The one certain fact is, that in the latter part of the 15th century they were in use in both countries, and spread rapidly through Europe. The first country to undertake on a large and systematic scale the connection of its leading systems by canals was France, in the 17th century. The Briare Canal, connecting the Seine and Loire, was begun in 1605 under Henry IV, and completed 1642 under Louis XIII. The Orleans Canal, unifying the same basins by the Loing, was completed 1675, under Louis XIV. The greatest of all, the Languedoc Canal, to connect the Bay of Biscay with the Mediterranean, was finished 1681. It is 148 miles long, 6½ feet deep, with a summit level of 600 feet; has about 119 locks and 50 aqueducts, and floats barges of 100 tons. France in 1879 passed a law making all its canals uniform at 6½ feet deep, with locks 126½ feet long by 17 wide. England was much later in taking up the system of a large scale, but when it did so, carried out a remarkable one, with great feats of engineering. The fathers of it were Francis, Duke of Bridgewater and his famous engineer, James Brindley; and the beginning was the charter for the Bridgewater Canal in 1759. The names of Watts, Telford, Nimmo, Rennie and other noted engineers are associated with it. The last inland canal in Great Britain was built in 1834. Among the leading ones are the Grand Junction, 128 miles; Leeds & Liverpool, 128; Trent & Mersey, 93; Kennet & Avon, 57. The great Irish canals are the Grand Canal, from Dublin to Ballinasloe, 164 miles, uniting the Irish Sea to the Shannon; and the Royal Canal nearly parallel to it for the same traffic, from Dublin to Torinammsburg, west of Longford. The great canals of Scotland are the Caledonian and the Forth & Clyde, described under SHIP CANALS. Early in the 18th century Peter the Great constructed a great system of canals and canalized rivers, 1,434 miles long to connect Saint Petersburg with the Caspian. The Danish Canal, 100 miles long, from the North Sea to the Baltic, was finished in 1785. The Gotha Canal, 280
miles long, connecting Stockholm with Gothenburg across Sweden, was planned 1716, but opened the first part 1810, the whole 1832. In 1836-46 Louis of Bavaria revived Charlemagne's old plan, connecting the Main (and so the Rhine) with the Danube, by a canal 186 miles long, 650 feet above the Main, and 270 feet above the Danube.

United States Boat Canals.—The first canal in this country was built in 1793, around the falls of the Connecticut River at South Hadley Falls, Mass.; the engineer was Benjamin Pickering of Northampton, afterward superintendent of the Springfield armory. The lift was not by locks, but by inclined planes, the boats being run into a movable caisson, filled with water and hauled up by cables operated by water power; locks were introduced later. In 1796 a canal was completed around Turner's Falls farther north in the same river, at Montague. *The Proprietors of the Locks and Canals on Merrimack River* were incorporated 1792, and opened the first canal in New England. The mouth of the Concord, one and a half miles long and with four locks, in 1797; it was for the lumbering business, rafts, masts, etc. But the first general canal for passengers and merchandise was built on a branch of the Connecticut River, the Middlesex Canal, in 1812, a rival to the last, incorporated 1793, and completed 1804 at a cost of $700,000; it ran to Charlestown, 31 miles, was 24 feet wide and 4 feet deep, and fed by the Concord. A packet boat, the Governor Sullivan, plied regularly between Boston and Lowell, taking nearly a day. The first boat voyage to Concord, N. H., was made in 1814, and a steamer began passages in 1819. The canal was disused 1851. But much larger projects had been set on foot about the time of these local ventures; and several of the greatest afterward carried out, as well as some which have been chimeras rather from political developments than from any inherent impracticability, were broached even before the Revolution. Washington was deeply interested in canal schemes all through his life, and favored canals to connect all the great American water systems. The Potomac and Ohio, the James and Ohio, and the Mohawk Valley and Great Lakes connections, were all examined by him. The act of Congress authorizing the improved canal and locks was approved by the city of New York 1785, and the work was begun a year later. It was completed in 1794, at a cost of $1,000,000, and the first trip was made in 1795. The total cost of the whole work had been about $2,000,000, and it was considered prohibitory then; and in 1829 the "eastern division" to Cumberland was authorized, by national, State, municipal and private stock subscriptions. But the work had not been inaugurated on 4 July 1828 by President J. Q. Adams, who struck the first spade; and it was fully opened in 1850. It is 184 miles long and 6 feet deep, 60 feet wide from Georgetown to Harper's Ferry, and 70 on an average from thence to Cumberland. It is fed from the Potomac by seven dams. The aqueduct at Georgetown over the Potomac was a very considerable engineering feat for its time; it rests on 12 masonry piers constructed by coffer-dams on rock 26 to 40 feet below the surface. The canal was 10 feet wide and 27 miles east of Cumberland, the canal saves six miles by a 'cut-off' and tunnel through the mountain, 3,118 feet long. The summit level is 619.4 feet above tidewater; the rise is accomplished by 74 locks and 140 sets of gates. The whole work had cost over $9,500,000 when opened, and its total capitalized outlay had been over $15,000,000 when the bondholders foreclosed in 1890.

Erie Canal.—The best known of the New York State canals is the Erie Canal, which joins the Hudson River and Lake Erie. The original Erie Canal was the great pioneer work of engineering in America, standing as the model for canal-building for a half century. The work of opening navigation to the interior which was undertaken by the Western Inland Lock Navigation Company in 1792 did not accomplish all that was needed and early in the 19th century agitation began for something more adequate. In 1808 the legislature ordered a survey of the route between the Hudson and the Lakes for the purpose of securing information to set before President Jefferson, who a short time before had recommended that Congress appropriate surplus moneys for building canals and highways giving the result that on 10 April 1817 he appointed a commission, Gouverneur Morris and De Witt Clinton being two of the members. In 1811 Robert Fulton and Robert R. Livingston were added. This commission made reports from year to year and in 1816 was ordered to make complete surveys and estimates. On 15 April 1817 construction of the Erie and Champlain canals was authorized and on 4 July 1817 the first ground was broken at Rome. On 26 Oct. 1825 the canal was formally opened from Albany to Buffalo, 363 miles. Its success was so marked that it gave rise to a veritable mania for canal-building throughout the country. There can be no doubt that it was the greatest single factor in bringing to the State and the city of New York their remarkable development and prosperity in the first half of the 19th century, giving the latter the initial impetus which has made it the chief metropolis of the Western world. The channel was 28 feet wide at bottom, 40 feet of water-surface and 4 feet deep. It had 84 locks, 90 feet long between gates and 15 feet wide, with a total lift of 689 feet. It cost $7,143,790.
The first enlargement, begun in 1836, was not finished till 1852. It shortened the canal to 35½ miles; gave a channel of 70 feet wide at the least 52½, or 50 feet at bottom, according to side slopes, and 7 feet deep; made 72 locks, each 110 feet long between gates and 18 feet wide, having a total lift of 654.8 feet; and cost $31,834,041. At the close of 1852, when all tolls were abolished, gross revenues to the amount of $121,461,871 had been collected on the Erie Canal; the cost of construction, improvements and maintenance had been $78,862,154, leaving a balance of $42,599,717 to its credit. The preceding decade was a period of adverse public sentiment toward the State canals and several of the lateral branches were abandoned. In 1884 there began a series of lock-lengthenings which continued for about 10 years and marked the beginning of renewed interest in canals which has endured until the present time, finding expression in two enlargements. The first of these, 1896 to 1898, which was the second enlargement of the canal, attempted a deepening to nine feet, but because of exhaustion of funds it was never completed. The third enlargement, 1905 to 1910, was an improvement in more things than size; it is a rebuilding along modern lines. It was originally planned for barges of 1,000 tons, but before work was begun the size was increased to accommodate boats of two or three times that capacity. The Erie Canal has had a remarkable history. It occupies a strategic position; it connects the Lakes and the Atlantic along the only feasible canal route in the United States. It has played an important part in industrial development and regulation of commerce between the great interior and the coast, and it promises to continue exercising a mighty influence. See BARGE CANAL.

Hennepin Canal.—This is one of the few boat canals which have been dug in the United States since 1830. It was begun June 1802 and completed in 1808, at a cost of $75,000,000. It affords a short route from the upper Mississippi to Lake Michigan, extending from the Illinois River at Great Bend, about two miles from Chicago, to Lake Michigan. Its entire length is 77 miles, but of this distance 27 miles are along the slack waters of the Rock River. The canal proper and its summit level feeders are 7 feet in depth and 80 feet wide. There are 37 locks, each 35 by 70 feet in size and with lifts ranging from 3 to 10 feet in height.

Illinois & Michigan Canal.—This route connects the Mississippi system with the Great Lakes, and, by the Welland Canal, with the Saint Lawrence. Its inevitability was plain by reason of the extensive use of two Chicago portages (from the Chicago River to the headwaters of the Kankakee, an affluent of the Illinois) by the Indians and trappers, it being only half a mile for boats, the shortest important portage on the continent. Chicago was one of the first cities in America before white men came here. As early as 1822 Congress granted a right of way for such a canal, and in 1827 and 1854 made further grants. For some reason it hung fire for many years, though a bill was passed in 1836 and estimates were made by the State and the nation. Work was prosecuted on it 1836-41, then suspended till 1845, and the canal was finally opened in April 1848. It had then cost $6,170,226. The western terminus is La Salle, at the head of steamer navigation on the Illinois River; its eastern is on the south branch of the Chicago, about five miles below the mouth of the Kankakee. Its entire length is 96 miles, and the rise from La Salle to Lake Michigan is 145 feet, surmounted by 17 locks, 110 by 18; the capacity of boats is 150 tons. The original intention was to make a straight cut from Lake Michigan to the Des Plaines River, the chief branch which with the Kankakee forms the Illinois; but to save expense it was decided to use the Chicago River instead. Thence it runs to Summit on the Des Plaines 8 miles; then 42 miles to the junction with the Kankakee; thence through the Illinois Valley to La Salle. It has five navigable feeders, the Calumet, Des Plaines, Du Page, Kankakee and Fox; and five large storage basins. The summit level at Bridgeport required pumping for supply; and two steam engines, delivering 15,000 cubic feet of water per minute, were used till 1870. These were also used for many years to help draw off the sewage of Chicago, which empties for miles into the river. By supplying the canal from the river, the engineers in 1903 filled a permanent vacancy, and so kept the river comparatively sweet. But the system was expensive, and the canal was deepened for some years, ending 1870, to carry the sewage by its own flow to the Des Plaines, reversing the current of the river. It proved insufficient, and in 1892 the Chicago Drainage Canal (q.v.) was begun, which was finished in 1900. It is 40 miles long to Joliet, 22 feet minimum depth, and 162 to 290 feet wide at top. A scheme has been mooted for years to convert this into a huge ship canal to enable ocean-going steamers to ascend from New Orleans to Chicago, and so through the Great Lakes and to the Saint Lawrence; but it depends on the co-operation of the national government. Consult Putnam, J. W., 'The Illinois and Michigan Canal' (Chicago 1918).

James River & Kanawha Canal.—This is a line partly existent and partly on paper, but interesting as probably the oldest North American canal in the United States. Under Governor Spotswood in 1716, when he explored the Blue Ridge; but the first active part was taken, as in all these early ventures, by Washington, who saw from his backwoods days the necessity of joining the eastern settlements with the trans-Alleghanian territory by lines of communication. He personally explored the James River route in 1784, and induced the Virginia legislature on 5 Jan. 1785 to pass an act for improving the navigation of the James. Under this the James River Company was organized, 25 Jan. 1785, with Washington as president. No work was done, and in 1835 another company of the same name took up its task, beginning the construction of the section from Richmond to Lynchburg in 1836, and completing it near the end of 1841. The second division, from Lynchburg to Buchanan on the upper James, was begun before this was opened, and completed in 1851. In 1853 an extension of 47 miles to Covington on Jackson River was begun, but the war interrupted it, and it has never been resumed. In 1874 the cost of completing it to the Kanawha, including an improvement of the navigation of that river, was estimated at $60,000,000.
The Ohio Falls Canal.—This is a short canal, but from its location a very important one; it makes continuous navigation in one of the chief waterways of the continent. The first project for it was in 1824–25, but it was not until 1837–39 that it was completed between Louisville & Portland. It was 1 7–10 miles long, 64 feet wide, had 8½ feet lift, and three locks, one at the head and two at the foot. An enlargement was begun in 1861, but interrupted by the war; in 1868 the national government undertook it in its river and harbor appropriation, and it was opened February 1873, having cost about $4,000,000. It runs west from in front of Louisville, Ky., to Portland; is a little over 11,000 feet long and 86½ feet wide, with a minimum depth of 6 feet assured by a dam at the falls. The water in the river varies from 6 to nearly 43 feet, and earthen parapets on the sides of the canal rise to 4 feet, based on stone walls, themselves built on the limestone rock through which the canal is cut. The upper lock has been raised, the lower two left as they were, but a branch with two locks has been added. At the head are flood-gates 46 feet 11 in. high. The upper entrance is 400 feet wide.

Among others existent or of past importance are a canal between the Chesapeake and Delaware bays, across the Delaware isthmus, built 1824–29, 13½ miles long, and supplied by pumps for 10 miles of it. An enlargement has been projected. This system has recently been acquired by the Federal government. (See Ship Canal.) The Morris Canal, 101 miles long, built in 1830, connects the Hudson at Jersey City with the Delaware at Phillipsburg, N. J.; it is owned by the Lehigh Valley Railroad. The Delaware & Raritan, 43 miles long, built 1831–34, connects those rivers, and therefore New York and Philadelphia. The Delaware & Hudson, completed 1820, was once the great coal freight route between New York and the Pennsylvania mines; its company transformed itself into the railroad company of the same name, and has abandoned the canal. The Schuykill Coal & Navigation Company’s canal is 108 miles long. The Ohio & Erie Canal from Portsmouth, Ohio, to Cleveland, and the Wabash to Evansville, Ind., were once of importance in building up these sections.

The initiative taken by New York in the construction of the great barge canal seems to have had the effect of causing a new era of canal building. Several projects have been begun and several of these have almost been completed, among these latter being the Lake Washington Canal, which connects Lake Washington, near Seattle, Wash., with Puget Sound by means of a canal nearly two miles in length, a 17-foot lock being required to lift the vessels from the waters of the Sound to the lake. The Dalles-Celilo Canal is another enterprise practically completed, which opens up the Columbia River to light draught vessels as far up stream as Priest Rapids, on the main river above Pasco, and to Lewiston, on Snake River, in Idaho. It is 8½ miles in length and climbs to a height of 82 feet above the water, the cost of building having been $5,000,000, but the appropriation was $5,000,000 for a 65-mile canal, 8 feet in depth, from Joliet to Utica, the canal to start from the end of the Chicago Sanitary District Canal. The Pennsylvania legislature, too, has authorized an issue of bonds for the construction of a canal from Pittsburgh to Lake Erie. According to the plans already roughly drafted this canal will put Pittsburgh into water communication with Louisville & Portland. It was 1 7–10 miles long, 64 feet wide, had 8½ feet lift, and three locks, one at the head and two at the foot. An enlargement was begun in 1861, but interrupted by the war; in 1868 the national government undertook it in its river and harbor appropriation, and it was opened February 1873, having cost about $4,000,000. It runs west from in front of Louisville, Ky., to Portland; is a little over 11,000 feet long and 86½ feet wide, with a minimum depth of 6 feet assured by a dam at the falls. The water in the river varies from 6 to nearly 43 feet, and earthen parapets on the sides of the canal rise to 4 feet, based on stone walls, themselves built on the limestone rock through which the canal is cut. The upper lock has been raised, the lower two left as they were, but a branch with two locks has been added. At the head are flood-gates 46 feet 11 in. high. The upper entrance is 400 feet wide.

Among others existent or of past importance are a canal between the Chesapeake and Delaware bays, across the Delaware isthmus, built 1824–29, 13½ miles long, and supplied by pumps for 10 miles of it. An enlargement has been projected. This system has recently been acquired by the Federal government. (See Ship Canal.) The Morris Canal, 101 miles long, built in 1830, connects the Hudson at Jersey City with the Delaware at Phillipsburg, N. J.; it is owned by the Lehigh Valley Railroad. The Delaware & Raritan, 43 miles long, built 1831–34, connects those rivers, and therefore New York and Philadelphia. The Delaware & Hudson, completed 1820, was once the great coal freight route between New York and the Pennsylvania mines; its company transformed itself into the railroad company of the same name, and has abandoned the canal. The Schuykill Coal & Navigation Company’s canal is 108 miles long. The Ohio & Erie Canal from Portsmouth, Ohio, to Cleveland, and the Wabash to Evansville, Ind., were once of importance in building up these sections.

The initiative taken by New York in the construction of the great barge canal seems to have had the effect of causing a new era of canal building. Several projects have been begun and several of these have almost been completed, among these latter being the Lake Washington Canal, which connects Lake Washington, near Seattle, Wash., with Puget Sound by means of a canal nearly two miles in length, a 17-foot lock being required to lift the vessels from the waters of the Sound to the lake. The Dalles-Celilo Canal is another enterprise practically completed, which opens up the Columbia River to light draught vessels as far up stream as Priest Rapids, on the main river above Pasco, and to Lewiston, on Snake River, in Idaho. It is 8½ miles in length and climbs to a height of 82 feet above the water, the cost of building having been $5,000,000, but the appropriation was $5,000,000 for a 65-mile canal, 8 feet in depth, from Joliet to Utica, the canal to start from the end of the Chicago Sanitary District Canal. The Pennsylvania legislature,

Bibliography.—Hepburn, ‘Artificial Waterways and Commercial Development’ (1909); Moulton, ‘Waterways vs. Railways’ (1912); Bellasis, ‘River and Canal Engineering’ (1913); ‘The International Northwest’ (1932).

Revised by NOBLE E. WHITFORD, Senior Assistant Engineer, Department of State Engineers, New York.

CANANDAIGUA, N. Y., city and the county-seat of Ontario County, 29 miles southwest of Rochester, at the northern end of Canandaigua Lake, and on the New York C. and H. R. and Northern C. railroads. It is situated, on high ground, with a commanding view of the lake amid attractive scenery. Canandaigua is a popular holiday resort. The fishing and boating accommodations are excellent. The chief manufactures are those of brick and anti-rust tin and enameled ware. The power-house and shops of the Rochester and Eastern Interurban Electric Railway are located here. The public institutions include the Thompson Memorial Hospital, the Ontario Orphan Asylum (private), a private sanatorium, an association library, two banks and churches of six denominations. It is also the seat of Canandaigua Academy, a public high school, and of the Granger Place School for Girls, a private secondary school. The government is administered by a mayor and a board of aldermen. Municipal waterworks, a sewage system, public playground and swimming schools are modern developments. Canandaigua was settled by New Englanders in 1789, became a village in 1815 and received a city charter in 1913. The name was originally Cananadaga, an Indian word thought by some to signify "the chosen spot," by others "the site of a former settlement." Pop. 7,217.

CANANDAIGUA LAKE, N. Y., a body of water lying chiefly within the limits of Ontario County. It is 668 feet above the sea and 437 feet above Lake Ontario, and has an extreme length of 15 miles and an average width of one mile. Its outlet is the Clyde, a tributary of Seneca River.

CANANI, kā-nā’nē, Giovanni Battista, Italian anatomist; b. 1515; d. 1579. He discovered certain of the hand muscles, and was the first to observe the use of the valves in the veins.

CANAR, kā-nār’, Ecuador, a small province situated among the Andes, between the provinces of Chimborazo and Azuay; capital, Azogues. It has the eastern Cordillera of the Andes on the eastern border, and is watered by the tributaries of Paute River. Numerous Inca remains are found there. Pop. 64,000.

CANARD, kā-nārd’, or kā-nār’, a false report; a silly rumor. The origin of this use of the term is not known. It is the French word meaning "duck," and is thought by some to be derived from the old French verdet, and à moitié, one who half-sells a duck or cheats in such a transaction; hence a liar, a guller, etc. According to an account of wide currency in different versions, the usage arose from a story
of cannibalism among a flock of ducks that ate one of their number each day until they were reduced to a single survivor, who, it was argued, had eaten all his companions. The story is common in Peru, and afterwards, when any marvelous recital was heard, the listener would shrug his shoulders and exclaim, C'est un canard! ("That's a canard, or duck!")

**CANARIES.** See CANARY ISLANDS.

**CANARIUM,** a genus of plants of the order Burseraceae. There are about 90 species, inhabiting tropical Asia and Africa. The gum of *C. commune,* known as Elemi, has the same properties as balsam of copaiba. The nuts are eaten in the Moluccas and Java, but are apt to bring on diarrhoea. An oil is expressed from them, used at table when fresh and burned in lamps when stale.

**CANARY,** a small domesticated finch (*Carduelis cannabina*), closely allied to the goldfinch (*C. carduelis*), and found throughout the Canary Islands, Cape Verde and Madeira. Domestication, besides having modified the size and colors of this bird, has developed its power of song. It was introduced into Europe as a cage-bird early in the 19th century, and is now familiar in all parts of the world. Canary in their wild state are about five inches long, and, like other finches, live mainly upon seeds, seldom eating insects. They build nests of moss and feathers in bushes and trees, often near dwellings; and their pale-blue eggs number four or five. Canaries are bought, bred and sold in large numbers in England, Scotland, Belgium and in the Hartz Mountains, where their breeding forms an important household industry. The varieties are named, to a great extent, from the localities in which they are bred. Among birds valued for their beauty rather than for their power of song are: the British crested Norwich canary, the Manchester canary, which is noted for its abnormal size, it sometimes reaching a length of eight inches. The Scotch Fancy is a slender bird with long neck, its body, trunk and tail, when in certain positions, curving into almost a half circle. The gold- and silver-spangled canaries are considered the handsomest. Their general color is dull, spattered with gold or silver markings. The Belgian or humpback canaries are also bred for their beauty of plumage, and are remarkable by reason of the peculiar appearance they present by their broad shoulders, short neck and small head. Canaries bred for their power of song, and selling for from $1 to $75, are those of the Hartz Mountains, which vary in color from a clear yellow to a bright green. The most valuable of all varieties is the South Andresberg bird, bred solely for their power of song. Single birds are frequently utilized for the instruction of young birds, and are known as "campaninis." Other varieties are the cinnamon canaries and the cayennes, the brilliant red and scarlet of the latter being due to judicious feeding with red pepper. Canaries are also crossed by fanciers, with other finches; the resulting hybrids are called "mules," and are usually from the mating of hen canaries with other cock birds, great difficulty being experienced in keeping female goldfinches, linnets, etc., on the eggs in captivity.

Canaries are easily cared for, the only essentials being cleanliness, food and water. The principal danger to the bird is a cold draught. The best food consists of canary-grass seed, hemp-seed and a certain amount of greens. Acids are to be avoided, but sugar is beneficial in small quantities. Lime is essential to its welfare and is most easily obtained in cuttle-fish bone. If their nails grow so long as to be troublesome to the bird, they should be occasionally cut with a very sharp scissors, thus running no chance of injuring the foot. Attention must also be given to the perches. These should be no thicker than a thin lead pencil, so that the birds' toes may meet around them. Consult Wallace, *The Canary Book* (London 1893); Belts, *The Pleasurable Art of Preventing and Caring* (London 1897); Blakeston, Swaysland and Miener, *The Book of Canaries and Cage Birds* (London); Holden, *Canaries and Cage-Birds* (New York 1883); Robson, *Canaries, Hybrids and British Birds in Cage and Aviary* (London 1897). Consult also the weekly, *Cage-Birds* (London).

**CANARY-CREEPER, or CANARY-BIRD FLOWER,** an annual climbing plant (*Tropaeolum peregrinum*), of the nasturtium family, a native of Colombia, cultivated for its showy yellow flowers.

**CANARY-GRASS.** See CANARY-SEED.

**CANARY ISLANDS, or CANARIES,** a cluster of islands in the Atlantic, politically forming a province and military district of Spain, but geographically considered as belonging to Africa, the most easterly being about 150 miles from Cape Nut. They are 13 in number, 7 of which are of considerable size, namely, Palma, Hierro, Gomera, Teneriffe, Grand Canary, (Gran Canaria), Fuerteventura and Lanzarote. The other six are little more than mere rocks. The population numbers about 526,400, the area being about 3,216 square miles. Lanzarote and Fuerteventura lie in the north-east of the group. Hierro is the farthest south-west. Through Hierro the first meridian used to be drawn. All are rugged and mountainous, frequently presenting deep ravines and precipitous cliffs to the sea, though having also fertile valleys and verdant slopes. The principal peaks are those of Teneriffe, 12,700 feet; Teide, 14,700 feet; El Pico de la Cruz, in Palma, 7,730 feet. Fuerteventura and Lanzarote, which are nearest the African coast, are less elevated than the others, and have more strongly marked African characteristics. Evidence of volcanic action is almost everywhere present, and volcanic disturbances have taken place on some of the islands in quite modern times. The flora of the central and western islands generally resembles that of the Mediterranean region, the trees and shrubs including the oak, chestnut, pine, cedar, laurel, heather, etc.; but there are (particularly on the eastern islands) plants that belong to the African region, such as the dragon-tree and euphorbias. Among the fauna may be mentioned the canary, the red partridge, and several kinds of lizards; there are no snakes. Goats and camels are the chief domestic animals. The islands are deficient in moisture and severe droughts sometimes occur; tornadoes also are not infrequent. The climate is hot on the low grounds, temperate higher up, and generally healthy. The soil, which is suited for cultivation readily produces all kinds of grain, fruits and vegetables in abundance, three and even four crops being raised yearly; some
of the islands furnish good wine, especially Teneriffe and Palma. The Canaries constitute a valuable possession of Spain and they serve as a winter resort for Invalids from colder regions. This has led to the erection of hotels especially intended for visitors, to the making of improvements of roads and to the providing of attractions of various kinds, including golf-courses, lawn-tennis grounds, etc. There are several places of worship for English-speaking visitors. The export trade is chiefly of bananas, tomatoes, onions, and potatoes, shipped in great quantities to London and Liverpool, cochineal, sugar, wine, etc. The imports chiefly consist of textiles and other manufactured goods, cereals, coals, etc. Peaches, oranges, lemons, figs and other fruits are cultivated. Teneriffe and Grand Canary are the two chief islands. Santa Cruz, the capital of the islands, is a port on the northeast coast of the former, and on the western coast of the same island is Or Hava, a favorite resort of foreign visitors. Las Palmas, on the northeast coast of Grand Canary, is a more important place, with its new harbor, Puerto de la Luz between three and four miles distant, protected by a breakwater. The city is rapidly extending, its streets have been improved and lighted by electricity. In 1917 it had about 43,000 inhabitants. Numerous steamers engaged in the trade between Europe and Africa call here, and also at Santa Cruz. Wireless telegraphic stations, one of 800 miles range, carry out the service with Spain and another of 250 miles range the service with ship and shore traffic.

Historical Outlines.—The half-fabulous "Fortunate Isles," as the Canary Islands were called in the classical ages, were undoubtedly known to the Semitic merchant-adventurers from the south-southwest Mediterranean coasts (including the Carthaginians) long before the Roman conquests extended to Spain. But it is possible that, as Mr. Royale Tyler suggests, the Carthaginians may have kept the secret of their wealth for a year that others might share with them, with such advantages as the astute traders of those days were anxious to keep to themselves. Contact with the outside world appears to have been interrupted for centuries. Finally, the Bastions secured the Canaries in the 15th century; the Portuguese and Majorcans visited them in the 14th; and in the early years of the 15th a Norman adventurer, Jean de Bethencourt, established himself at Fuerteventura and founded his capital in a village that still exists under the name of Betancuria (more correctly, Bethencuria), on the western side of that island. The King of Castile was his protector, and toward the end of the 15th century Ferdinand and Isabella took possession of the islands. At that time the Canaries were inhabited by people of different races, some of whom were Semites, as we have said; but the bulk of the population was formed by a people called the Guanches who had been in possession of the islands for ages. The blood of the Guanches is still visible in the veins of many of the inhabitants; and even to-day, in Gomera and Teneriffe especially, the old race appears to have maintained itself almost without admixture.

CANARY-SEED, the seed of a plant (Phalaris canariensis), belonging to the order of Gramineae, cultivated for its seed, which is used principally as food for birds. In its early growth it is scarcely distinguishable from oats or wheat. With good cultivation it attains a height of three or four feet, and terminates in egg-shaped heads or ears, each containing upward of 100 seeds. The straw is of little value, either as fodder or litter, but the ears, especially when mixed with other kinds of chaff, are good food for horses. It requires a deep soil not adhesive, and it produces just the same in quantity as wheat. It is a native of the Canary Islands, but is successfully cultivated elsewhere.

CANARY WINE, a wine that comes from the Canary Islands, chiefly from the island of Teneriffe. It is not unlike Madeira, but the name is properly applied only to the Bidogne wine.

CANARY-WOOD, the light orange-colored wood of Phabe indica and P. canariensis, trees of the laurel family of the Azores and Madeira, so called because it was brought originally from the Canaries. It is also called Madeira mahogany.

CANASTER, or KANASTER, originally the rush-basket in which South American tobacco was packed and exported, and hence applied to a kind of tobacco consisting of the leaves coarsely broken for smoking.

CANASTOTA, N. Y., village in Madison County, on the Erie Canal, and on the New York Central, the West Shore and the Lehigh Valley railroads, 21 miles east of Syracuse. It is the centre of an agricultural district and manufactures agricultural implements, gasoline engines, boats, canned goods, cut glass, etc. It has two banks, public library, churches, high school, hospital and two grammar schools. Canastota was settled about 1806 and was first incorporated in 1835. The government is administered by a president, elected annually, and a board of trustees. Seneca turnpike, built in 1790 and now a State road, runs along the southern boundary of Canastota. Pop. (1910) 3,247.

CANBERRA, the new Federal capital of the Commonwealth of Australia, situated in lat. 35° 15' S. and long. 149° 15' E. on a plateau about 2,000 feet above sea-level in the Yass Canberra district, New South Wales, 70 miles distant from the eastern coast line of Australia. The constitution of 1900 provided for a new capital, and after nearly 10 years' search and deliberation the present site was chosen. The territory is 500 square miles in area, and includes a spot of two square miles at Jervis Bay for the construction of a port and a naval college. In 1911 the Australian government offered $15,000 in three prizes, for the best plans submitted, the competition being open to all architects of the world. A serious difference of opinion between the Minister for Home Affairs and British architects caused all the best of the latter to withdraw from the competition. On 23 May 1912 it was announced that the first prize, $8,750, had been awarded to an American architect, Mr. Walter Burley Griffin of Chicago. The second prize ($6,500) went to M. Elie Saarinen, of Helsingfors, Finland, and the third to Alfred Agache, of Paris. From these three plans the work of designing the
future city was begun. The population contemplated for the capital was fixed at 25,000, and a period of eight years in four stages was estimated for the completion of the preliminary works, at a cost of $10,000,000. According to Mr. Griffin's plan the city will be divided by three large sheets of water, with parks and boulevards; a capitol of 600 feet frontage and 200 feet depth; accommodation for all the great departments of state; courts of justice, mint, art gallery, museum, churches, a university, post-office, hospital, stadium, gas-works, etc. A large reproduction of the winning design appeared in the London Times of 24 May 1913.

CANBY, Edward Richard Sprigg, American army officer. b. Kentucky, 1817; d. 11 April 1873. He was graduated at West Point in 1839; served in the Mexican War, 1846-48; commanded the United States troops in New York during the draft riots of 1863; succeeded General Banks in the command of the army in Louisiana, 1864; became brigadier-general, United States army, and major-general of volunteers, 1866. After the war special duties were assigned to him, and in 1869 he took command of the department of the Columbia. He was killed in battle by an Indian chief, while negotiating for the removal of the Modocs from northern California, in the *Lava Beds.*

CANBY, William Marriott, American botanist: b. Philadelphia, Pa., 1831; d. 1904. He was educated privately, and though a business man, devoted much time to the study of botany. He gathered a fine herbarium of over 30,000 species of plants, which is now owned by the New York College of Pharmacy. A smaller collection was brought together for the Delaware Society of Natural History. He was one of the first botanists attached to the Northern Pacific Transcontinental Survey.

CANCELE, kân'sal', France, fishing port of Ille-et-Vilaine department, on the Bay of Mont Saint-Michel, 10 miles east of Saint-Malo. Oyster culture and shipbuilding are busy industries, and it is a popular seaside resort. Pop. 8,000.

CANCAN, a dance, something of the nature of a quadrille, but accompanied by violent leaps and indecorous contortions of the body originated by the demimonde of Paris, and resembling the old Bacchic dances. The earlier and usual meaning of the word in French is noise, racket, scandal, and is derived, oddly enough, from the Latin conjunction quadrans, although—a great squab having arisen in the French medieval law schools as to the pronunciation of this word.

CANCELLARIA, a genus of Gastropods belonging to the family cancellariidae, in which the shell is tuberose, turbinate and generally reticulated, the spine and aperture nearly equal and the body ventricose. Tate in 1875 estimated the known recent species at 71, and the fossil ones, at 60, the latter from the Upper Chalk till now.

CANCELLATION, a method of abbreviating certain arithmetical and algebraic operations. When the product of several numbers is to be divided by another such product, any factors common to both products may be left out, or canceled. If divisor and dividend do not appear in extension as products, the process of cancellation may yet be applied if common factors exist and can be detected. The work is substantially the same as that of reducing fractions to their lowest terms.

CANCER, Luis, early Spanish-American missionary: b. Barbastro, near Saragossa; d. Florida 1549. After missionary labors in Dominica and Haiti, he was very successful with the antagonized Indians of the mainland and supported their cause in an ecclesiastical assembly at Mexico in 1546. He was killed by Florida Indians 26 June 1549.

CANCER. Nature of Cancer.—A tumor is a growth of abnormal size and situation, composed of cells of the body. Some tumors are not dangerous to life, because they do not increase after they attain a certain size; others, and these are cancers, have no limit to their growth, and destroy life by extending into healthy tissue or by interfering with digestion or some other important vital function. While a cancer is a particular sort of tumor, there are also many varieties of cancer; and these varieties are classified according to the tissue from which the growth originates. If the cancer begins in the skin or epidermis, it is called an *epitheloma;* if it begin in a gland, it is called a *carcinoma;* if it begin in muscle, fibrous tissue, tendon or bone, it is called a sarcoma. These kinds of cancer grow progressively and are fatal if not promptly removed.

Sarcoma of arm

In the beginning a cancer is composed of a few microscopic cells, much smaller than the point of a pin. Depending upon the type, it may grow in a few months to the size of a grapefruit, or may require years to reach the size of a pea. When it first begins to grow there are no symptoms—no pain and no bleeding; but later, when the cancer presses on the nerves, pain results. Bleeding begins only when the cancer ulcerates. Any other symptoms to which a cancer may give rise are due solely to its interference with some normal function of the body. A cancer looks like a lump of tissue. It has no roots, as is popularly believed, but it may grow out through the vessels of the body to distant parts.

Cancer is not a new disease but one which has been recognized since earliest times. It is mentioned by the Egyptians in the Papyrus Ebers, and by the Hindus in their medical writings, both of which probably date back to about 2000 B.C.

Occurrence of Cancer.—While cancer occurs not only in man but in all warm-blooded animals, it is not equally frequent at all ages.
Certain types of cancer may be found in a newborn infant, in other words, are congenital; but these are very rare. The usual rule is that cancer begins to appear at the age of 35, and increases rapidly in frequency until the age of 65—a little earlier in women, a little later in men. After 75, the rate of occurrence of cancer decreases very rapidly, until it practically disappears at 90. The same frequency distribution according to age is seen also in mice, rats, dogs, cats, etc.; that is, the disease appears only in older animals, but is less often seen in the very old.

Sex Variations.—Sex has some influence on the rate of occurrence of cancer; for example, between the ages of 35 and 45, men show the disease less often, practically only one-third as often as women; between the ages of 55 and 65 the frequency in men is about 65 per cent of that in women of corresponding age; while in old age, men have more cancer than women. This is due to the fact that in women a great many cancers occur in the breast and in the womb at about the beginning of the change of life, that is, from 45 to 50 years of age. On the other hand, cancers of the lip and tongue attack men only, practically; and these, with cancer of the skin, appear late in life. Similar variations in the occurrence of cancer are noted also in the different organs of the body; for example, the more frequent site for cancer is either the stomach or the liver. Thus, while in 1913, in the United States, 30,205 people died of cancer of the stomach or of the liver, only 2,633 died of cancer of the skin, and 3,007 of cancer of the tongue and mouth.

Race Variations.—The differences noted in the occurrence of cancer in organs are also noted in the occurrence of cancer in different races; for example, the negro race is attacked by cancer much less frequently than the white race, and cancer seems to be more frequent in people of the northern European states than it does in those living in the tropics or in South America, although the population of South America is much the same as that of Spain. There is, also, a difference in the organ distribution in different countries. In England and Wales, out of 100,000 women, 18.6 individuals will have cancer of the breast, while in the death rate per 100,000 from cancer was 67 in clergymen and 265 in chimney sweeps. The irritation resulting from the soot may explain this difference.

Increase of Cancer.—There is a widespread opinion that cancer is increasing rapidly in frequency of occurrence. This question has been subjected to elaborate statistical analysis by Hoffman in a volume on "The Mortality of Cancer Throughout the World." Hoffman comes to the conclusion that there is a gradual increase in the number of cases of cancer occurring in most of the countries of the world, but that this increase tends to reach a certain maximum and not to pass that point. This maximum has already been reached in Switzerland, where the cancer death rate is now 124 per 100,000, while in the United States it is only 74 per 100,000. There are, however, many authorities who consider that this increase in cancer is due not to an absolute increase in the number of persons with cancer, but to an increase in reported cases; in other words, that improvements in diagnosis and in our understanding of the nature of the disease and the increased accuracy of statistics have led to an increase in the number of cases of cancer which are reported. The matter cannot be considered as finally settled, however; and only greatly improved statistical reports from different countries can throw any light upon the problem.

Heredity.—The question of heredity in cancer has long occupied the attention both of statisticians and of workers with experimental cancers in animals. While there is no doubt that an individual family may show a large number of cases of cancer for one or two generations, this is by no means a proof that the disease itself is hereditary. It is not even a proof that a liability to the disease is hereditary. If we realize that out of every 100,000 people living in the United States, 80 will die from cancer, it is easy to see that, as age increases and the frequency of cancer becomes greater (so that between the ages of 45 and 65 one woman in 6 and one man in 12 will die from the disease) there are no more cases in a family, especially if it be long lived, is not astonishing. It is evident that if cancer occur so frequently, some families are bound to have a larger number of cases than others, merely by chance. This point is illustrated in the "cancer villages" which will be discussed in the next paragraph. The problem of heredity in cancer has interested the life insurance companies, also, because if cancer be hereditary, it is very important that no one in whose family cancer has occurred shall be insured. But a careful analysis of a large number of persons insured shows that the liability of death from cancer is no greater because that disease has occurred in one's family than it is if no cancer death has been recorded; so that the insurance companies do not regard a history of cancer in the ancestry as any evidence that cancer will occur in the descendants.

It has been shown, however, by breeding mice of cancerous ancestry, that is, by selecting both father and mother from a highly cancerous strain, that the amount of cancer occurring in the descendants after many generations of such selected breeding, is apt to be about twice as much as occurs in the stock in which
no special selection was made. Such a concentration of cancer heredity in man is quite impossible, as the stock would die out long before the 8 or 10 cancerous generations could be reached. 

Contagion in Cancer.—It is a popular superstition that cancer is contagious, and that it is very dangerous to nurse a person with an ulcerating cancer; but there is not the slightest foundation for this belief. There is no recorded evidence of a case in which cancer has been transferred from one person to another or in which a surgeon has contracted the disease during an operation on a cancerous patient. If cancer were a germ disease, it would probably be very easily transmitted in this way; but there is no evidence that a germ has anything to do with the development of the tumor; and the only way in which the disease can be transferred is by direct grafting of a piece of the growth into the body of a healthy person. It is very difficult even to graft a cancer from one mouse to another. Often hundreds of animals are inoculated in order that one or two cancers may be grown. Animals thus cured of cancer have been kept together in large numbers for long periods, and not the slightest evidence of any transfer has been shown.

It has been popularly supposed that cancer is very abundant in certain districts or villages or houses, and that this fact pointed to the contagiousness of the disease; but when the population of these districts is studied, it is usually found that all the young people have gone to the neighboring large towns or cities, leaving only those whose age is such that they are especially liable to cancer. Consequently, the number of cases seems very large and the percentage is increased for that particular locality; but if the cancer incidence is considered in conjunction with the age of the population, it will be found that no greater number of cases has occurred, for example, between the ages of 45 and 50, than has occurred in the general population elsewhere in the country within the same age limits. It follows that "cancer villages" do not exist as such.

Human cancer is not derived from animal cancer, for it has been shown that it is impossible to transplant, even with the greatest care, a tumor from a mouse to a rat or a tumor from a rat to a mouse; in other words, cancer of one animal will not grow in any other animal except it be one of the same species; that is, no animal cancer can be transplanted to a human being and remain alive and grow.

The theory of the origin of cancer from the so-called cancers of cancer patients, which are really not cancers but only inflammations, seems too foolish to have any wide credence; but occasionally the newspapers take up some such wild story and people are led to believe that there may be something in it. It is, however, not true.

Cause of Cancer.—The cause of cancer is not known, though there are two popular superstitions regarding it. One is, that cancer may be produced by a blow; and the other, that it is due to the moon. To uphold either of these there is not the slightest evidence. A large number of cases in which it was claimed that a blow had caused the growth of the cancer have been investigated, and it has been found that the disease existed before the blow was received. And when we compare the large numbers of people who in their lifetime have received blows in various portions of their bodies, with the small number of relatively few people who have developed cancers, it is evident that there can be no relationship between the blow and the beginning of the tumor. It is true that a blow may stimulate a cancer which is already existing, but usually on investigation of such cases it will be found that the growth had reached a considerable size before the injury occurred. The same thing is true of the growth of cancer in a broken bone; the presence of the tumor in the bone makes it liable to break, and often the fracture is the first evidence of the tumor. But the fracture did not cause the tumor, even though it may appear to have grown after the break occurred or was not discovered until after the injury.

The reasons for believing that bacteria have nothing to do with cancer are based upon experimental work on animals. If a cancer is transplanted from one animal to another of the same species, it will grow and ultimately kill the second animal; some cancers are so very virulent that they will not even transplanted, grow in every mouse in which they are implanted and cause the ultimate death of the host. But if some of this cancer tissue is crushed or frozen so that all the cells present are broken up, it will not produce a tumor when grafted on to another animal. Now we know that bacteria will live in liquid air which is about 400° F, below freezing, and that they are not killed merely by being crushed; and for these very good reasons we believe that cancer is not produced by bacteria.

While we do not know the cause of cancer, we do know the conditions under which it is liable to arise, and these are any chronic inflammation or ulceration of the skin or of any organ of the body. If, for instance, the skin is burned and the burn remains for a long time, there is always risk that a cancer may develop in the site. The burns due to X-rays are very chronic; and cancers frequently develop in these exposed sites. Cancers from irritation of the lip, tongue or cheek, by smoking or by a rough tooth or an ill-fitting plate.

This relationship between chronic irritation and cancer is well shown by the fact that women of the white race very rarely suffer from cancer of the cheek, while in Ceylon and the Philippine Islands where women chew a highly irritating substance known as the betel-nut, and keep the chewed mass in the cheek over night, they very frequently have cancer arising on the inside of the mouth. Chronic ulcer of the stomach in persons over 40 is another condition which has the same relationship to cancer, for it has been shown that most of the cases of cancer of the stomach arise in one of these ulcers. Chronic ulceration or irritation of the intestine, also, is a cause of the beginning of cancer; and cancers of the womb often result from tears or injuries following childbirth.

Cancer of the breast occasionally begins in lumps which are the result of chronic inflammation, so that it is well in case a woman has a lump in the breast to have it carefully examined by a physician every six months or so in order to be sure that a cancer is not beginning.
Chronic irritation, therefore, is the only cause for cancer which we know of, and yet it is curious that not everyone who has chronic irritation develops cancer. There is some peculiar personal quality in the tissue which is necessary other than the irritant to develop. An example of this is the fact that leg ulcers which are so very common among old people almost never give rise to cancer, although ulcer of the stomach so frequently does. There is, therefore, something besides the ulceration and the chronic irritation of such makes the cancer start.

Cure of Cancer.—The only generally successful cure for cancer is its removal as early as possible by surgical means. The use of the knife is preferred to cauteries or cautery because it permits of a cleaner cut and more rapid healing. Of course, the knife is the only possibility for deep internal cancers involving the stomach or intestines; but occasionally cancers of the skin are treated by cautery with fair results. It is, however, better to have the cancer cut out clean, as the scar is then much less marked and the healing is more rapid. It is, also, a satisfaction for the patient to know that all the cancer is out of the body, instead of having it burned out by some slow cautery. A certain number of cancers of the face, and especially small early cancers in other sites, can occasionally be cured by either radium or X-ray, but as yet we have no published statistics to show what proportion of cases can be permanently cured by either of these agents; the number of cures reported after some 10 years of use of both these is exceedingly small, and the results are not nearly so good as those which follow surgical removal of the entire tumor. For it must be remembered that cancer is not a blood disease and that when it begins it is no longer than a pin-point, so that if we could make a diagnosis and cut it out in time, every cancer would be curable. The difficulty is to make a diagnosis and as the symptoms of cancer are obscure and often are entirely absent, it is impossible for a physician to learn of the beginning of the disease in time to cut it out all. With every improvement in diagnosis of cancer, the possibility of curing the disease is increased.


Francis Carter Wood, M.D.,
Director of Cancer Research, Columbia University.

CANCER, in astronomy, fourth sign in the zodiac (q.v.) marked thus ♂. The sun enters this sign on about 21st of June. He is at his greatest northern declination on entering the sign, and the point which he reaches is called the summer solstice, because he appears for the moment to stop in his progress northward and then to turn south again. The sun is then at the middle of the line of the sphere parallel to the equator at 23½° distant from it and called the Tropic of Cancer. The sun leaves this sign about the 22nd of July. The constellation Cancer is no longer in the sign of Cancer. At present it occupies the place of the sign Leo. The constellation Cancer contains within it the cluster of Praesepe or the Manger. This lies between two stars of the fourth magnitude, the Aselli or Asseus, whose disappearance, according to some writers, presaged rain. The arrangement of the stars is in the triple or quadruple system 33 Cancer. Two close stars of the fifth and sixth magnitudes which revolve about each other during 60 years, and a third part which has a retrograde motion of lesser range. This is still unknown and variable, form the constellation. It is probable that the third component is a satellite of a larger body, and that the other two stars also revolve about this larger unknown.

CANCER-ROOT, or BEECH-DROPS, a branched parasitic plant (Leptosiphum virginianum), of the family Orobanche, with brownish scaly leaves, indigenous in eastern North America, growing almost exclusively on the roots of the beech tree. The whole plant is powerfully astrigent, and the root of a brownish color, spongy and of a very agreeable taste. It was once popularly believed to be a cure for cancer. Other plants of the same family are also called cancer-root.

CANCRIUS, kann-kren', Georg, Count, Russian general, statesman and financier: b. Hanau, Prussia, 8 Dec. 1774; d. Saint Petersburg, 22 Sept. 1845. He studied at Gießen and Marburg. In 1812 he was commissary-general of the Russian forces, and in 1814 accompanied Tzar Alexander I to Paris; was Minister of Finance from 1823 to 1844; and wrote on military and economic subjects; his most noted works being ‘Military Economy in Peace and War’; ‘The Economy of Human Societies’ (1845).

CANCRO ORIS, or NOMA, gangrene of the cheek, due to bacterial infection and mostly occurring in sickly children, especially those with scarlet fever or measles. The immediate cause is infection from a fusiform bacillus and the spirillum of yincent, associated with other pus-producing microorganisms. It begins as a red spot on the cheek or at the angle of the mouth, spreads rapidly, and soon cuts away the whole cheek, even to the eye. There is fever, and death usually results in 75 to 80 per cent of the cases. As soon as the disease is recognized it should be freely cauterized and the parts kept bathed in antiseptic solutions.

CANDACE, kann-da-se, a name apparently common to the warrior queens of Ethiopia (Upper Nubia), between the Nile and the Atbara, in the later period of the kingdom of Meröe. The most distinguished of them invaded Egypt 22 B.C., was defeated by the Romans and obliged to sue for peace, which she obtained with a remission of the tribute imposed on her by Petronius. One of her successors is mentioned in Acts viii, 27; her high treasurer was baptized by Philip the Deacon on the road to Gaza.

CANDAHAR. See KANDAHAR.

CANDAULES, kann-doolz, king of Lydia, who lost his throne and life through his bejotted admiration of the beauty of the person of his Queen in 718 B.C. See GYGES.

CANDER, Helen Churchill, American writer: b. New York 1868. She was educated at various private schools in New Haven and
Norwalk, Conn. Has published 'An Oklahoma Romance' (1902); 'Styles and Periods in Furniture and Decoration' (1908); 'The Tapestry Book' (1912); 'Jacobean Furniture' (1915). He is a specialist and lecturer on fine antiques, tapestries and decorations.

Candeille, kän'ðïl, Amélie Julie, French actress, singer and composer: b. Paris, 31 July 1767; d. there, 4 Feb. 1834. At a very early age she began to take leading parts in classical opera. Later she abandoned opera and made her appearance at the Comédie Française in 1785, in 'Andromaque,' 'Bajazet' and 'Tancrède.' In 1790, she composed both libretto and music of 'Catherine ou la belle fermière,' a very popular operetta in three acts, in which she took the leading part and accompanied herself on the harp and on the piano. She also made several tours through the Continent, wrote novels and several other operettas.

Candeish. See Khandeshe.

Candelabrum, a word originally signifying candlestick, but usually denoting a support for a lamp or lamps among the Romans. The candelabra were of considerable size and often intended to stand upon the ground. They were made of wood, bronze, silver or marble, and were often elaborately and beautifully adorned. Sometimes they had shafts in the shape of columns, which could be shortened or drawn out; sometimes the luxuriant acanthus formed a part of them; sometimes they represented trunks of trees entwined with ivy and flowers, and terminated by vases or bell-flowers, at the top, for the reception of the lamps; and not infrequently the lamps were supported by figures. In ancient times Tarentum and Ægina were famous for their elegant candelabra, and Corinth also manufactured them. The Etruscan candelabra of bronze were celebrated. Examples may be found in the plates of the 'Museo Gregoriano' or in the works of Overbeck, 'Pompei,' in seinen Gebäuden, Alterthümern und Kunswerken' (4th ed., Leipzig 1884), and Mankelsy, 'Pompeii: Its Life and Art' (New York 1902).

Candia. See Crete.

Candia, or Megalokastron, Crete, a fortified seaport and capital of the island, situated on the north coast, 65 miles east of Canea; lat. 35° 20' N. and long. 25° 9' E. Its harbor admits only vessels of small draught. The governor and the Greek archbishop reside here.Soap is manufactured and exported. The fortifications of the city date from the time of the Venetian occupation, and in 1669, after a prolonged siege, it submitted to the Turks. These fortifications have been much demolished by frequent earthquakes. Pop. estimated at 20,000.

Candida. George Bernard Shaw's play 'Candida' belongs to that early group of the author's plays that followed hard upon the close of his novel-writing period. Written in 1894 for Richard Mansfield, who had that year produced 'Arms and the Man,' it had its first production in any form in 1897 when the Independent Theatre Company offered it in Aberdeen and on tour, with Janet Achurch in the title rôle and Charles Charrington in the part of the Rev. James Mavor Morell. It was printed the following year as the second play in the volume of "pleasant" plays in the 'Plays Pleasant and Unpleasant' series. The theme of love, marriage and the artist had been treated by Shaw, Mavor Morell and others, but 'Candida' set it in a situation that would not be out of place in the work of any of the great artists. It is returned to as a minor theme in 'The Doctor's Dilemma.' In 'Candida' it is handled in a spirit of combined disillusion and reverence that raises the play to first rank as a work of art and as a psychological document. The action, which is set within the contents of a house of the name of 'Arms and the Man,' in which James Mavor Morell and his wife, Candida, comes the poet, Eugene Marchbanks. The action that follows is not so much a development of the triangle theme, as the testing of the marriage compact of Morell and Candida before the acute perceptions of the poet. Marchbanks' temporary error in thinking he is in love with Candida but raises her to a greater clarity of insight; happily too it gives the masterful Morell a quarter of an hour of keen self-distrust. But there is no real struggle between Morell and Marchbanks. Each man has what he most desires and most needs. In Marchbanks, who all through is too much aware to be really in love, the author is revealing the lonely soul of the poet, as in Candida and in the uncovering the secret places in the marriage bond. 'One of the noblest, if not the noblest, of modern plays,' Chesterton calls 'Candida.' This nobility appertains not only to the theme, but as well to the manner in which the play is written. In its freedom from gallant, wicked and poetic attitudes, in its lofty idealism as well as in its searching of human weaknesses it is a work of genius. Unlike the greater number of Shaw's plays 'Candida' is a true theatre-piece. Against all the dramatic anarchy of his discursive plays it is Shaw's indubitable warrant as a great dramatist. The stage history of the play has been distinguished. Finally produced by Mansfield in 1903, it was the same year given notable productions in Dresden and by Arnold Daly in New York. The following year it was a part of the Court Theatre repertoire of the Vedrenne Barker management in London. It was given in French in Brussels in 1907 and in Paris in 1908. In recent years it has occupied a leading place in the repertoire of "new" theatres. Consult Henderson, Archibald, 'George Bernard Shaw: his Life and Works' (London 1911); Chesterton, G. K., 'George Bernard Shaw' (1st ed. 1909); Burton Richard, 'George Bernard Shaw: the Man and the Mask' (New York 1916); Hamon, Augustin, 'Le Moïsture du XX siècle: Bernard Shaw' (Paris 1913); 'The Technique of Bernard Shaw's Plays,' translated by F. Maurice (London 1912).

Thomas H. Dickinson.

Candidate, an applicant for an office, from the Latin candidatus, "white-robed," because, among the Romans, a man who solicited a public office appeared in a white garment — toga candida — and wore this during his candidacy, which lasted for two years. In the first year the candidates delivered speeches to the people, or had them delivered by others. After this year they were required to enter their names on the list of candidates for the office sought for. Before this was done the previous life of the candidate was subjected to a scrutiny in the Senate, after the praetor or
CANDIDE — CANDLE 405

consul had received his name. If the Senate accepted him he was permitted to offer himself on the day of election as a candidate. The formula by which permission was granted was "Rationem habebo, renuntiabo"; if he was not accepted he received the answer, "Rationem non habebo; non renuntiabo." The tribunes often opposed a candidate who had been accepted by the Senate. The morals of the aspirants, in the purer ages of the republic, were always severely examined. In the later period of the republic, nobody could obtain an office if he was not present and if he had not offered himself on three market days. On these days the candidates tried to insinuate themselves into the favor of the people. They went from house to house (ambito, whence the word ambition), shook hands with everybody whom they met (prec annotate), addressed each one by his name, for which purpose they generally had a nomenclator with them, who whispered the names of those whom they met into their ear. Cicero, therefore, ca repleti s et su nsima. They placed themselves on market days in elevated places in order to be seen. On the day of election they did the same. Favorites of the people accompanied them (deductor e); some were distributed money among the people, which, though prohibited, was done publicly. Interpret es were employed to bargain with the people, and the money was deposited in the hands of sequentes. Sometimes a number of candidates united into parties (citiones), in order to defeat the endeavors of the others. At last the grounds on which each candidate rested his claims to the office were read, and the "tribes" delivered their votes. The successful candidate then sacrificed to the gods in the Capitol. To oppose a candidate was called ei refugari; to support him, suffragari, or suffragatores esse. In the early Church newly-baptized Christians were called candidates, on account of the white robes worn by them for a certain period after celebrating the rite. The word "candidate" is also used by Protestants to designate a theologian who, having finished his studies at a university, is waiting for an appointment in the Church. At present it means, in English-speaking countries, an official or any office whatever. (See CONVENTION, POLITICAL; CORRUPT PRACTICES ACT.) Consult the treatise known as 'Quinti Ciceronis de Petitione Consulatus ad Marcum Tullium Fratrem' (printed with Cicero's letters); Greenidge, 'Roman Public Life' (London 1901).

CANDIDE, OR OPTIMISM ("Candide, ou l'Optimisme"), kând'dé, oo lopt'zm'z'm', is one of the most characteristic works of Voltaire. It is the longest and the best known of the 'Philosophic Tales' ("Contes Philoso phiques"), in which he let his incomparably nimble pen, day after day, over all questions of human interest,—politics, religion, morals. The story of the remarkable adventures of Candide and his tutor, Pangloss, in search of his beloved cousin, Cunegondi, is merely the thread on which are strung the flashing gems of his wit, his satire, his unshaken faith in the easy optimism of "Whatever is, is right." Earlier Voltaire had shown decided leanings toward such a view. He had translated Pope's 'Essay on Man,' and in another philosophic tale, 'Zadig,' in 1747, he had, though with some mental reservations, apparently "justified the ways of Providence to man." But his optimism, such as it was, was shattered by the Lisbon earthquake, and in Candide, in 1752, he disposed the wanderings of his personages so that they were not only of its horrors but of a thousand others. The endless panorama of human sufferings and meanness is unrolled before us,—plague, pesti lence and famine, war, lust, greed, injustice, cruelty, disease. Pains of academical pedantry, the doctrine of optimism, long maintains in the face of each new disaster, that, after all, this is the best of all possible worlds. But even he is finally reduced to silence. Cunegondi, when found, is a mere wreck, diseased in body and soured in temper. Candide buys a little plot of ground and installs himself and his companions in a modest cottage. Life is a sorry snail. Philosophy is powerless to untangle it. To work without philosophizing is the only way of making life tolerable. It is Candide's conclusion, and to every attempt of the incorrigible Pangloss to discuss "cause and effect" and other high problems he opposes the famous final word of experience and common sense; "Il faut cultiver notre jardin." "We must attend to our own business."—ARTHUR G. CANFIELD.

CANDLE, a solid cylindrical rod composed of beeswax, tallow, paraffine or some other fatty substance, with a wick running longitudinally through its centre, designed for slow combustion with illumination. The wick is generally composed of a few threads of cotton yarn lightly twisted or plaited; but formerly, in home-made candles, dried rushes ('Juncus effusus') were employed for this purpose. The process of making rushlights is described at length by the Rev. Gilbert White in his well-known 'History of Selborne.' Candles are mentioned in several places in the Bible, but no direct evidence is given as to their form or of what they were made. There seems to be a distinction, however, between candles and lamps,—the latter specifically calling for oil, while the candle is spoken of as being lighted and placed on a candlestick.

Considerable modern improvements have been made in the manufacture of candles. One of the most important of these consists in not employing the whole of the fatty or oily substances, but in decomposing them, and then using only the stearin or stearic acid of the former, and the palmitine of the latter class of substances. The animal fats are combinations of glycerine and fatty acids, principally stearic and palmitic, both solids, and oleic acid, which is liquid. If the latter be in excess, the fat will be a liquid and constitute an oil; if, on the contrary, the solid acids predominate, we shall have a more or less concrete fat, such as the tallow of the ruminants and lard of the hog. Stearic acid now constitutes the principal new material for the manufacture of candles. The chief chemical agents employed to obtain the stearin are caustic lime, which, setting free the glycerine, produces stearate, margarate and oleate of lime, in the first, in a spiritless attack on the easy optimism of 'Whatever is, is right.' Earlier Voltaire had shown decided leanings toward such a view. He had translated Pope's 'Essay on Man,' and in
CANDLE

color, free from impurities, and fit for the manufacture of candles, are obtained.

Candles are commonly made by dipping, molding or rolling. The former is the older method, and consists in arranging in a frame a number of wicks of the proper length and thickness, and dipping them a number of times successively in a tank of melted tallow or other fatty composition, with intervals for the incipi- ent solidification to cool and harden. These dippings are repeated until the candles have assumed the requisite thickness and weight.

Molded candles, as their name implies, are formed in molds. These are generally made of pewter, or an alloy of 20 parts of tin and 10 of lead, though glass has also been introduced. They are hollow cylinders of the length of the candle, and open at both ends, but provided at the upper end with a conical cap, in which there is a hole for the wick. A number of these molds are inserted in a wooden frame or trough, with their heads downward; the wick is then drawn in through the top hole by means of a wire, and kept stretched and in the centre by a peculiar arrangement. The molds thus prepared are now filled by pouring melted tallow of the proper temperature from a boiler into the trough. The candles remain in the molds for about 24 hours, but, as they improve by keeping, generally remain in the storehouse for a few months before they are exposed for sale.

The rolling of candles is confined principally to those made of wax. Although the bleaching of wax was described by Pliny, the use of this material for the manufacture of candles dates back only to the beginning of the 4th century. From its tenacity, and the contraction which it undergoes in cooling, wax cannot be formed into candles by melting it and then running it into molds. Instead, wicks, properly cut and twisted, are suspended by a ring over a basin of liquid wax, which is poured on the tops of the wicks, and, gradually adhering, covers them. Or the wicks may be immersed, as in the case of tallow “dips.” When a sufficient thickness is obtained, the candles, while hot, are placed on a smooth table kept constantly wet, and rolled upon it to the shape of a flat piece of wood. In this way they assume a perfectly cylindrical form. Machines have been constructed, however, for the manufacture of such products. The large wax candles used in Roman Catholic churches are merely plates of wax bent round a wick and then rolled.

For preparing wax tapers, the wick is wound around a drum and is then made to pass into the melted wax under a hook placed at the bottom of the kettle. The wick, coated with wax, traverses a draw-plate which gives it the desired diameter, and then winds around a second drum. A little tallow, resin and turpen- tine is often added to the wax in order to give it greater ductility. Wax matches, also, which are generally of paraffine, are made with the draw-plate. They are afterward cut to the proper length and tipped with a paste of inflammable material.

The use of wax for candles, by reason of their color was preferable, and in order to avoid the dross and of course at the present day is likely to diminish greatly. See Wax.

Hollow candles are provided with three apertures extending throughout their entire length. They offer the advantage of not guttering when burning. They are manufactured by means of a special machine, the molds of which contain three solid rods, which are withdrawn before the solidification of the mass.

At the beginning of the 18th century, spermaceti, a product of the cachalot, or sperm whale, came largely into use for the manufacture of candles. The competition of other ma- terials and the decline of the whale fisheries limit its use. In the present day, cetin, a form of spermaceti, is too brittle and lamellar in texture to use alone in candle-making. These defects are corrected by the addition of about 3 per cent of wax.

Paraffine candles came into general use about 1850. When crude petroleum is distilled the products obtained consist of light oils employed for illuminating purposes, and heavy oils used as lubricants. These latter, upon cool- ing, yield a solid substance of waxy consistence and deep color, called paraffine. This material, when purified, gives a white, odorless combus- tible substance, which is made into candles which give a brilliant but slightly smoky flame. Objections to their use are that at the moment of extinction of the flame they are disagreeable odor, and that they are too fusible and apt to become de- torted in a warm atmosphere. For these rea- sons paraffine is generally mixed with stearic acid. The use of paraffine candles is most com- mon in Great Britain. See PARAFFINE. Ozokerit, or cérésine, which is also used in the manufacture of candles, resembles paraffine in appearance. It is obtained by purifying a sort of natural mineral wax, the principal de- posit of which is found in Galicia. It is not much used except in Germany and Austria. Since cérésine candles melt at a higher tem- perature than paraffine, they undergo no de- formation when used.

Palm-oil is obtained from the west coast of Africa, especially the neighborhood of Lagos. The palm which yields it is the Elia guineensis, which produces a golden-yellow fruit of the size and shape of a pigeon’s egg. By detaching its pulp from the kernel, bruising it into a paste, and then agitating it in boiling water, the oil is separated and solidifies as the water cools. About two-thirds of it in weight consists of a peculiar, white, solid fat, called palmitine; the remainder is chiefly olein.

The manufacture of candle-wicks is fully as important as the treatment of the combustible fats, and candle-makers have studied the princi- ples of combustion with a view to discovering methods of producing the clearest light with the minimum of smoke, odor and trouble in snuffing.

A flame is the result of the combustion of a gas. In a burning candle the fatty or other substances are melted and carried by the wick into the interior of the flame, where they are continuously converted into gas. We may com- pare the combustion of a candle to a micro- scopical gasworks, and, just as the gas-burner gives more or less light according as the pres- sure is varied, or the tip is more or less foul, or the fly diffused, so of course at the present day is likely to diminish greatly. See Wax.

Hollow candles are provided with three apertures extending throughout their entire length. They offer the advantage of not guttering when burning. They are manufactured by means of a special machine, the molds of which contain three solid rods, which are withdrawn before the solidification of the mass.

At the beginning of the 18th century, sper- maceti, a product of the cachalot, or sperm whale, came largely into use for the manufac- ture of candles. The competition of other ma- terials and the decline of the whale fisheries limit its use. In the present day, cetin, a form of spermaceti, is too brittle and lamellar in texture to use alone in candle-making. These defects are corrected by the addition of about 3 per cent of wax.

Paraffine candles came into general use about 1850. When crude petroleum is distilled the products obtained consist of light oils employed for illuminating purposes, and heavy oils used as lubricants. These latter, upon cool- ing, yield a solid substance of waxy consistence and deep color, called paraffine. This material, when purified, gives a white, odorless combus- tible substance, which is made into candles which give a brilliant but slightly smoky flame. Objections to their use are that at the moment of extinction of the flame they are disagreeable odor, and that they are too fusible and apt to become de- torted in a warm atmosphere. For these rea- sons paraffine is generally mixed with stearic acid. The use of paraffine candles is most com- mon in Great Britain. See PARAFFINE. Ozokerit, or cérésine, which is also used in the manufacture of candles, resembles paraffine in appearance. It is obtained by purifying a sort of natural mineral wax, the principal de- posit of which is found in Galicia. It is not much used except in Germany and Austria. Since cérésine candles melt at a higher tem- perature than paraffine, they undergo no de- formation when used.

Palm-oil is obtained from the west coast of Africa, especially the neighborhood of Lagos. The palm which yields it is the Elia guineensis, which produces a golden-yellow fruit of the size and shape of a pigeon’s egg. By detaching its pulp from the kernel, bruising it into a paste, and then agitating it in boiling water, the oil is separated and solidifies as the water cools. About two-thirds of it in weight consists of a peculiar, white, solid fat, called palmitine; the remainder is chiefly olein.

The manufacture of candle-wicks is fully as important as the treatment of the combustible fats, and candle-makers have studied the princi- ples of combustion with a view to discovering methods of producing the clearest light with the minimum of smoke, odor and trouble in snuffing.

A flame is the result of the combustion of a gas. In a burning candle the fatty or other substances are melted and carried by the wick into the interior of the flame, where they are continuously converted into gas. We may com- pare the combustion of a candle to a micro- scopical gasworks, and, just as the gas-burner gives more or less light according as the pres- sure is varied, or the tip is more or less foul, or the fly diffused, so of course at the present day is likely to diminish greatly. See Wax.
and the feeding of it would be effected under unfavorable conditions. Too small a wick would produce the opposite effect; around the periphery of the candle there would form a rim, which, no longer receiving a sufficient quantity of heat, would remain in a solid state; the cavity that serves as a reservoir for the liquefied material would become too full; and the candle would gutter. So the section of the candle, the size of the wick and the draft of air in the flame must be apportioned in such a way that there shall always be an equilibrium between the quantity of wax melted and that decomposed by the flame. The purity of the air, too, must be taken into account, for just as a man needs pure air in order to live in health, so a candle has need of the same in order to burn well. During an evening party it may be observed that the brilliancy of the candles diminishes in measure as the air becomes impoverished in oxygen and enriched with carbonic acid.

The wick must be placed in the centre of the candle, or else it will remain too long, produce smoke, and darken the flame. If the end remains exactly in the centre the air will not reach it, and the wick will carbonize and form a thiel or waster, which, falling into the cavity at the top of the candle, will make the latter gutter, and end by obliterating the wick. It then becomes necessary to snuff it. In order to do away with this inconvenience, Gay-Lussac and Chevreul, in 1823, recommended the use of flat or cylindrical wicks of an uneven texture, having the property of curling over. In the same year Cambacéres proposed the use of hollow plaited wicks, which, in measure as the candle burned, had the property of curling toward the white part of the flame. But ashes nevertheless formed, and, obstructing the wick, affected the light. In the month of June 1826 De Milly finally succeeded in solving the problem by impregnating the wick with boric acid. This latter, uniting with the ashes of the wick, gives rise to a fusible body, which is rejected in the form of a drop or bead toward the extremity of the wick. In Austria, wicks are impregnated with phosphate of ammonia, which gives analogous results. Bailey has proposed a solution of ammoniac of 2º or 3º Baumé. Consult Calderwood, 'Manufacture of Candles' (London 1891); Lamborn, 'Modern Soaps, Candles and Glycerine' (ib. 1906); Lewkowitsch, 'Chemical Technology and Analyses of Oils, Fats and Waxes' (Vol. II, London and New York 1909).

**CANDLE, Electric.** See **Electric Lighting.**

**CANDLE-FISH, OOLAKAN, oo'la-kän,** **OULACHON, -kön,** or **EULACHON, a'kön,** a sea-fish ('*Thaleichthys pacificus,*' of the salmon family, frequenting the northwestern shores of America, of about the size of the smelt, to which it is allied. It is a greenish olive on the back, with a white belly, spotted with yellow. It is converted by the Indians into a candle simply by passing the pith of a rush or a strip of the bark of the cypress-tree through it as a wick, when its extreme oiliness keeps the wick blazing. Oulachon oil, a substitute for cod-liver oil, is obtained from it. This fish is a favorite article of food in British Columbia. The name is also applied to a fish in San Francisco (*anoploma fimbria*), or Pacific coalfish. Consult Swan, in *Proceedings of the United States National Museum* (Vol. III, Washington 1881).

**CANDLE-FLY, or LANTERN-FLY, a hemipterous insect of the group Homoptera, family Fulgoridae.* The large Chinese candle-fly (*Fulgora candelaria*) is remarkable for its greatly prolonged head, which was formerly believed to be luminous. Compare LANTERN-FLY.

**CANDLE-NUT, the nut of *Aleurites moluccana,* the candleberry-tree, a native of Malaysia, belonging to the family Euphorbiaceae. It is about the size of a walnut, and yields an oil used for food for lamps, and in the manufacture of varnish, while the oily kernels are also strung together and lighted as torches.

**CANDLEBERRY, BAYBERRY, CANDLEBERRY MYRTLE, TALLOW-TREE, or WAX MYRTLE, a shrub (*Certhamnus cerifera*) common in eastern North America, where candles are made from the waxy substance collected from a decaying part of the plant. It grows abundantly in sandy soil, and seems to thrive particularly well in the neighborhood of the sea, nor does it ever seem to be found far inland. The berries intended for making candles are gathered late in autumn, and are thrown into a pot of boiling water, where the fatty or waxy substance floats on the top and is skimmed off. When congealed this substance is of a dirty-green color, somewhat intermediate in its nature between wax and tallow. After being again melted and refined it assumes a transparent green hue. Mixed with a proportion of tallow it forms candles, which burn better and slower than common tallow ones, and do not run so much in hot weather. They have also very little smoke and emit a rather agreeable odor. Soap and sealing-wax are also made of this substance. The plant has been cultivated in France and Germany, where it grows in the open air. Another plant belonging to the same family is the *Myrtus Galea* (*Myrtus Galea*), which grows abundantly in boggy and marshes in Europe. It is a small shrub with leaves somewhat like the myrtle or willow, of a fragrant odor and bitter taste, and yielding an essential oil by distillation. It was formerly used in the north of Europe instead of hops, and in some places it is still so used. The catkins or cones boiled in water throw up a scum resembling beeswax, which, collected in sufficient quantities, would make candles. The plant is used to tan calf-skins. Gathered in the autumn, it dyes wool yellow, and is thus used both in Sweden and in Wales. The dried leaves are used to scent linen.

**CANDLEMAS, an ecclesiastical festival instituted by Pope Gelasius I in 492, in commemoration of the presentation of Christ in the temple, and of the purification of the Virgin Mary. It is celebrated on 2 February, and has its name from the fact that in the Roman Catholic Church candles are blessed and carried in procession, in allusion to the words of Simeon, spoken of the infant Christ. *A light to lighten the Gentiles.* See **Purification.**

**CANDLER, Warren Akin, American clergyman:** b. Carroll County, Ga., 22 Aug. 1857. He was graduated from Emory College, Ox-

---

**CANDLER—CANDLER 497**

---

**CANDLES—CANDLES**
ford, Ga., in 1873, being licensed to preach and entering the North Georgia Conference of the Methodist Episcopal Church in that year. He was in the pastorate until July 1880, when he became editor of the Nashville Christian Advocate (the organ of the M. E. Church South), serving in that capacity until 1888. In the latter year he became president of Emory College, but resigned in 1898 when he became a bishop of the M. E. Church South. He has written 'History of Sunday Schools' (1880); 'Georgia's Educational Work' (1893); 'Christ's Auctor' (1899); 'High Living and High Lives' (1901); 'Great Revivals and the Great Republic' (1904); 'Dangerous Donations and Degrading Doles' (1906); 'Wesley and His Work' (1912); 'Practical Studies in the Fourth Gospel' (1913).

CANDISH, Robert Smith, Scottish clergyman: b. Edinburgh, 23 March 1806; d. Edinburgh, 19 Oct. 1873. He was educated at Glasgow University; in 1828 was licensed as a preacher, and in 1834 was transferred from Bowmont to Saint George's, Edinburgh. In 1839 he threw himself into the conflict with the civil courts in the matter of the congregational right of election and independent church jurisdiction in matters spiritual, and soon became, next to Chalmers, the most prominent leader of the non-intrusionist party and of the movement that culminated in the Disruption of 1843, and the formation of the Free Church of Scotland. From the death of Chalmers till his own death, Candish was the ruling spirit in the Free Church. In 1862 he was made principal of the New College (the theological college of the Free Church), Edinburgh, and was one of the founders of the Evangelical Alliance. He was the author of 'Contributions Toward the Exposition of the Book of Genesis' (1842); 'Reason and Revelation' (1859); 'The Fatherhood of God'; 'The Two Great Commandments' (1860), etc. Consult 'Life,' by Wilson and Rainy (1888).

CANDOLLE, Kän-döl', Alphonse Louis Pierre Pyramus de, Swiss botanist: b. Paris, 28 Oct. 1806; d. 4 April 1893. He was son of Augustin de Candolle (q.v.). He was professor of botany and director of the Botanical Garden at Geneva, published numerous works on botanical subjects, and continued his father's 'Introduction to a Natural System of the Vegetable Kingdom.' In 1714, he succeeded Agassiz in the Academy of Sciences at Paris.

CANDOLLE, Augustin Pyramus de, Swiss botanist: b. Geneva, 4 Feb. 1778; d. there, 9 Sept. 1841. He studied at Paris, where he made his reputation by his 'History of Succulent Plants,' and 'Essai sur le Medicinal Proprietes of Plants.' In 1808 he took the chair of botany at Montpellier, where he replaced the artificial method of Linnaeus by the natural method of Justus and published the remarkable 'Elementary Theory of Botany.' After the Restoration of 1815, he returned to Geneva, where he devoted the rest of his life to his great work, 'Introduction to a Natural System of the Vegetable Kingdom,' the continuation of which he entrusted to his son, together with an herbarium of 70,000 species of plants.

CANDON, kän-dön', Philippines, a town of the province of Ilocos Sur, situated in the northwestern part of the island of Luzon, very near the coast. It manufactures cotton. Pop. about 15,797.

CANDY. See Confectionery.

CANDY, or KANDY, a measure of weight in the East Indies. In Madras the candy is equal to 493.7 pounds, in Bombay it is 560 pounds and in Ceylon it is equal to 500 pounds. It is divided into from 20 to 22 maunds. In Bombay there is a unit of capacity called the candy, equal to 8.2 Imperial bushels, and elsewhere a dry-measure candy is found varying from 15 to 30 bushels.

CANDY CEYLON. See KANDY.

CANDYLARTHRA, a group of primitive animals, ancestral to the ungulate type and especially the perissodactyls, remains of which are found fossil in Cretaceous rocks, and on into the Eocene, where they appear. They were animals of moderate size, imperfectly plantigrade, with five toes on all feet, teeth adapted to both animal and vegetable diet, and small, smooth brains. The best-known example is Phenacodus, found in the lower Eocene formation of the Rocky Mountain region in Wyoming. It had the form of a small tapir, but had a long tail. Their nearest modern representatives are the condylarths, structurally, are the African conies ('Hyrax').

CANDYTUFT, a genus of plants ('Iberis'), of the natural order Cruciferae, flowering in dense corymbs, and distinguished by an emarginate pouch with keeled and winged valves. Some species are shrubs; some, herbaceous perennials and some, annuals. It is indigenous to the countries bordering on the Mediterranean, and several species, as 'Iberis umbellata,' 'Iberis adorata' and others, are cultivated in gardens.

CAINE, kän, or KEN, a river in Bundelcund (q.v.), British India, a tributary of the Jamna River. It follows a northeast course and is about 250 miles long.

CAINE-BRAKE, a term applied to the extensive growths of Arundo macrophilla, the most gigantic of United States grasses, which occur in the southern portions of the United States, often covering vast extents of country. The plant's stalks are much used for fishing-rods. Cane-brakes are indicative of rich land, as they are only to be found in perfection in the most inexhaustible soils, where, having obtained a foothold, by their more rapid growth they usurp the place of the timber. In the southern portions of the United States the plant often reaches the height of 15 to 25 feet, with a base one to one and a half inches diameter. It grows as straight as an arrow from the root, tapering off finally in a beautiful, thread-like, feathery top. The leaves commence at about two-thirds of the height of the plant, and seem to be attached directly to the stalk, as the branches on which they grow, save the very top ones, are not perceptible to ordinary observation. To the hunter, progress through a cane-brake is one of the most tiresome journeys that can be undertaken. Each step is disputed by the dense vegetation, which rises before the intruder like a wall. In places the cane is sometimes pressed down and inter-
laced, and then it becomes quite impenetrable. Under the most favorable circumstances the knife has to be freely used. Cane-brakes are often many miles in extent, always lessening in density as they reach high ground. They are favorite haunts for all kinds of game, which seek their solitudes either for protection or for the leaves for food. The deer are particularly fond of the young green leaves, and upon them often become exceedingly fat. Cane-stalks being hollow, having no pith, and being divided inside every few inches into sections, are very combustible when dried in the sun; and the air confined within the hollow sections, warming by the external heat, explodes with very considerable force, so that a cane-brake on fire gives the idea of a continued roar of distant musketry.

CANE SUGAR. See SUGAR AND SUGAR-MAKING.

CANEA, ká-ne’a (Greek Khania), Crete, the chief commercial town of the island, situated on the northwest coast, with a good harbor. It occupies the site of the ancient Cydonia, but the present town is due to the Venetians, to whom it was wrested by the Turks, and given a two years’ siege in 1669. Canea is the principal mart for exporting the productions of the island. Pop. about 20,000. See CRETE.

CANELLA, a genus of plants belonging to the family Cannelaceae. They are ornamental shrubs or trees. C. alba, the wild cinnamon, is a common West Indian aromatic evergreen tree, growing to a height of from 10 to 50 feet, with a straight stem branched only at the top. It is covered with a whitish bark, by which it is easily distinguished at a distance from other trees; the leaves are placed upon short leaf-stalks and are alternate. They are oblong, obtuse, entire, of a dark, shining green hue, and thick like those of the laurel. The flowers are small, of a violet color, and grow in clusters at the tops of the branches on branched stalks. The fruit is an oblong berry containing from three to six kidney-shaped seeds of equal size. The tree is very aromatic, and when in blossom perfumes the whole neighborhood. The berries, when ripe, are greedily eaten by the wild pigeons of Jamaica, and impart a peculiar flavor to their flight. Of commerce is the bark of the tree freed from its outward covering and dried in the shade. It is brought to Europe in long quills, which are about three-fourths of an inch in diameter, somewhat thicker than cinnamon, and both externally and internally of a whitish or light-brown hue, with a tinge of yellow. This bark is moderately warm to the taste, and aromatic and bitterish. Its smell is agreeable, and resembles that of cloves. In distillation with water it yields an essential oil of a dark-yellowish color, and of a thick tenacious consistence, with difficulty separable from the aqueous fluid. The remaining decoc- tion, when evaporated, leaves a very bitter extract composed of resinous and gummy matter imperfectly mixed. It has been supposed to possess a considerable share of active medicinal powers, and was formerly employed as a cure in scurvy. Now it is merely esteemed as a pleasing and aromatic bitter, and as a useful adjunct in correcting more active, though nauseous medicines. The powder is often taken along with aloeas as a stimulating purgative.

CANEPHORUS, a term applied to one of the bearers of the baskets containing the implements of sacrifice in the processions of the Dionysia, Panathenaeæ and other ancient Greek festivals. It was an office of honor, much coveted by the virgins of antiquity. The term is often applied to architectural figures bearing baskets on their heads, and is sometimes improperly confined with caryatides.

CANES VENATICI, ká-nez vê-nât’chë ("the hunting dogs"), one of the northern constellations added by Hevelius in 1690, between Boötes and Ursæ Major. Coming in after the time of Bayer, it has none of his assigned letters; but Baily, in the "B. A. C." in 1845, assigned the letters α and β to the two brightest stars, and they will probably stand, though they have not been universally accepted by astronomers. The former of the two stars is a well-known double. On the maps, the two dogs, Asterion and Chara, are represented as held in leash by Boötes, and pursuing Ursæ Major and the celestial pole, but this change in the figure of Boötes has of course been made since the introduction of Canes Venatici into the celestial train. The constellation is surrounded by Ursæ Major, Boötes and Coma Berenices. The great whirlpool nebula of this train was discovered by Lord Rosse in 1845, and a fine globular cluster of stars of the 11th magnitude is on the border of the latter. It is notable for the large (nearly one-seventh) proportion of variables among them. Its principal star, to which Halley gave the name Cor Caroli, is a double star with components of the third and sixth magnitudes.

CAÑETE, kán-yá’tā, Manuel, Spanish author: b. Seville, 6 Aug. 1822; d. 4 Nov. 1891. He was educated in Cadiz. For a long time he was an official in the ministry of the interior, and was later chamberlain to King Alfonso XII. His literary poems, published under the title, "Poesías," are highly esteemed, and his dramatic also successful, include "Un Rebato en Granada;" "El Duque de Alba;" "La Flor de Besalu;" and "La Esperanza de la Patria" (with Tamayo). He is best known, however, as a dramatic critic and a writer of plays for the Spanish stage. His writings in the field of criticism had much influence in the reform of the stage and were not connected with his advancement to important posts in the commissions of Historic and Artistic Monuments and the Inspection of Museums. Among his other works are "Parsas y Elógios de Lucas Fernandez" (1867); "La Tragedia Llamada Josefa" (1870); "Escritores Españoles e Hispano-Americanos" (1884); and "Teatro Español del Siglo XVI" (1885).

CANEEY, ká-ne’é, Kan., city, Montgomery County, on the Missouri Pacific and on the Atchison, Topeka and Santa Fe railroads, 144 miles southwest of Topeka. It has smelting plants, municipal operated waterworks, and manufactures of glass, oil, flour and bricks. Pop. (1910) 3,597.

CANFIELD, James Humle, American educator: b. Delaware, Ohio, 18 March 1847; d. New York city, 29 March 1909. He was graduated from Williams College in 1868; admitted to the Michigan bar, 1872, and practised law at Saint Joseph, Michigan, 1872-77. He was professor of history in the State University of Kansas, 1877-91; chancellor of the University
of Nebraska, 1891–95; president of the Ohio State University, 1893–99, when he was appointed librarian of Columbia University, New York. He was secretary of the National Education Association for five years, and its president for one. Oxford conferred on him the degree of Litt.D. in 1902. He published ‘Taxation: Plain Talk for Plain People’ (1883); ‘The College Student and His Problems’ (1902); ‘A Short History of Kansas’ (1885); ‘Local Government in Kansas’ (1887).

CANG, CANGUE, or KIA, the wooden collar or portable pillow, weighing from 50 to 60 pounds, and fitting closely round the neck, imposed upon criminals in China, who are then paraded through the streets and exposed in the public thoroughfare. It renders the wearer unable to eat or drink, or to look after himself. On the cang is inscribed the nature of the crime and duration of punishment.

CANGA ARQUELLES, kâŋɡ’a ār-gwél’-yěs, José, Spanish statesman: b. Asturias 1770; d. 1843. In 1812 he was a member of the Cortes from Valencia, and rapidly rose to the leadership of the Constitutional party; hence on the accession of Ferdinand VII he was banished. Recalled in 1816, he became Minister of Finance in 1820, when the constitution was restored. Through the abolition of certain direct taxes, he caused financial disorder, and was forced to resign in 1821. He was a member of the Cortes in 1822, but fled to England at the time of the revolution of 1823. Returning in 1829, he again was elected to the Cortes, where he remained true to his liberal principles. He wrote ‘Memoria del Crédito Público’ (1820); ‘Elementos de la Ciencia de Hacienda’ (1825); ‘Dicionario de Hacienda’ (1827, and 2d ed., 1833–34); ‘Observaciones sobre la Guerra de la Peninsula’ (1833–36); and poems, translations in verse, from the Greek.

CANGAS DE ONIS, Spain, town, Oviedo province, on the Sella River, 35 miles east of Oviedo. It has busy stock raising and coal mining industries, and is noted for historic incidents. Here the first Spanish Kings resided after the Moorish invasion and here in the 8th century the King Pelayo started the Spanish Conquest. The famous cave of Covadonga where he hid is eight miles distant. There are Roman ruins of bridges, etc., and the 19th century church of the Assumption is a replica of the mediaeval church which it replaced. Pop. 9,100.

CANGAS DE TINEO, Spain, town of Oviedo province. 37 miles southwest of Oviedo, on the Rio Narcea, here spanned by an historic bridge. Situated in a well-watered mountainous and wild region, stock raising, farming and coal mining are active industries and cloth, leather, pottery, liquors, flour and linen are manufactured. Pop. 24,000.

CANIAPUSCAW, kâ-nî-op’us-kâ, a river in Labrador, outlet of a lake of the same name, flowing northwest into Ungava Bay, Hudson Strait; length, 400 miles.

CANICATTI, kâ-nî-kâ’të, Sicily, a city in the province of Girgenti on the Naro, situated in a grain and fruit region. Here are also salt mines. The inhabitants are mostly engaged in agriculture. Pop. (1911) 31,204.

CANIDAE, the dog tribe, comprising wolves, foxes, jackals, dogs and the like, a family of carnivores, intermediate in structure and phylogeny between bears, hyenas and weasels. Their legs are long; the claws non-retractile, and in all except the lycaon there are five toes in front and four behind. The dentitions usually consist of three incisors, a great canine (a tooth which takes its name from its prominence in the dog, and is the seizing and tearing instrument); four small premolars, and two molars on each side of each jaw; but in the lower jaw there are three molars. All these teeth have the carnivorous characteristic of sharp-cutting crowns rather than broad, grinding surfaces, such as characterize the molar teeth of vegetable-eaters. Dogs are mainly diurnal and live in open uplands rather than in forests, where they obtain their prey by chasing it down; they occupy dens and burrows, and possess keen senses and great intelligence. See Dogs. For the fossil history of the family, see Carnivora.

CANDIDIA, a Neapolitan woman (real name probably Gratidia), whom Horace loved, and who deserted him. Horace reproaches his friend Livius and the Satires, gives her name to a sorceress.

CANGOU, kâ-nō-gōo, one of the peaks of the Pyrenees in France. It is in the department Pyrénées-Orientales, 24 miles from Perpignan; height, 9,137 feet.

CANINA, kâ-nî-nâ, Luigi, Italian archaeologist and archaeologist: Carlino, Lombardy, 23 Oct. 1795; d. Florence, 17 Oct. 1856. He was for some time professor of architecture at Turin, and afterward lived in Rome, where he published works of great value on the antiquities of Rome, Veii, Etruria and Tusculum, among them ‘L’Architettura antica descritta e dimostrata coi monumenti’ (1839–46).

CANINDE, kâ-nî-nûdâ, a river of Brazil, flowing into the Paranaiba; length, 200 miles.

CANIS MAJOR ("the greater dog"), a constellation of the southern hemisphere, remarkable as containing Sirius, the brightest star in the heavens, by means of which the constellation may be located for continuation of the line through the belt of Orion.

CANIS MINOR ("the lesser dog"), a constellation in the northern hemisphere, immediately above Canis Major, the chief star in which is Procyon, lying between Sirius and Pollux. Procyon has a satellite of a star of the 13th magnitude, and the pair revolve about each other about every 40 years.

CANISIUS, kâ-nîsh’i-ŭs, Petrus (Lat. trans. of Dutch name, De Hond), Dutch theologian: b. Nimeguen, 8 May 1524; d. Freiburg, Switzerland, 21 Dec. 1597. He was the first man in Germany who entered the order of the Jesuits, of which he became a very active member. In 1549 he was made professor of theology, rector and vice-chancellor of the university at Ingolstadt, and in 1551 court preacher at Vienna. He afterward reformed the University of Vienna, according to the views of the order. His catechism, which has passed through more than 400 editions, is yet in use. He persuaded Ferdinand I to adopt stringent measures against the Protestants, and founded the colleges at Prague, Augsburg, Dillingen, and Freiburg in Switzerland. He was beatified 20 Nov. 1864. For his life, consult Reiss (Freiburg 1865); Drews, P. (Hale 1892); Mehler, J. B.
CANISIUS COLLEGE—CANNES

BLE (Berlin 1897); Michel, L. (Lille 1898); Kross, A., 'Canisius in Oesterreich' (Vienna 1898); Braunsberger, O. (editor), 'Epistolae et Acta' (8 vols., Freiburg 1896 et seq.).

CANISIUS COLLEGE, an educational institution in Buffalo, N. Y.; organized in 1827 under the auspices of the Roman Catholic Church; reported in 1917: Professors and instructors, 25; students, 530; volumes in the library, 45,000; value of property (including endowment) about $385,000.

CANITIES. Graying of the hair. See HAIR.

CANTITZ, ca'-nits, Friedrich Rudolf Ludwig, German poet and diplomat: b. Berlin, 27 Nov. 1654; d. there, 16 Aug. 1699. He studied law at Leyden and Leipzig, and was made state counsellor in 1697 under Frederick I of Prussia; in 1698 he was given the rank of baron. His poems were first published anonymously under his death (1700) under the title 'Nebenstunde unterschieden Gedichte'; the second edition with the name of the author appeared in 1719. They had influence on style in opposition to the mannerisms of Lohenstein and other writers of the time. Their most popular with his contemporaries are the satires, elegies and odes, imitating Boileau; and also an elegy on the death of his first wife, Dorothea von Arnim. Consult König, 'Des Freiherrn von Canitz Gedichte' (Leipzig 1727); Varnhagen von Ense, 'Biographische Denkmale' (Vol. IV, Berlin 1824-45); and Lutz, 'Canitz und sein Verhältnis zu dem fränkischen Klassicismus' (Munich 1887).

CANKER, a disease of plants. See APPLE.

CANKERWORM, a caterpillar of a geometroid moth of the genus Anisotrypes, destructive to fruit-trees, especially apples. See APPLE.

CANNASSI, kán-lás'sé, Guido, Italian painter: b. Sant' Angeloan 1601; d. Vienna 1681. He studied under Guido Reni at Bologna, and lived at Venice as court painter under the Emperor Leopold I, and later at Vienna. He is to some extent an imitator of Guido Reni, but is especially distinguished for his use of color. His chief works, mostly biblical or mythological subjects, are in Vienna, Munich and Dresden.

CANN, one of the Hebrides, 12 miles southwest of Skye, and 3 miles northwest of Rum. It is 4½ miles long, 1 mile broad and 4½ square miles in area. The surface, nowhere higher than 800 feet, consists of trap. A hill here of basalt, called Compass Hill, reverses the magnetic needle.

CANN, a genus of plants, some species of which have fine flowers, and some, from their black, hard, heavy seeds, are called Indian shot. There are about 50 species in tropical America and Asia, with ornamental leaves, creeping rootstock, and panicles of red or yellow flowers. C. indica is the best-known species, and the roots of C. edulis yield starch. The plants are very popular in cultivation, especially the hybrids between various species and the improved varieties obtained by selective breeding. A very large number of named horticultural varieties has been produced in recent years.

CANNABIS INDICA. See HEMP, INDIAN.

CANNES, kán, Italy, an ancient town in Apulia, on the river Aufidus. Its site was between the modern Canosa and Bartletta, and was famous for the battle in which the Romans were defeated by Hannibal (210 B.C.). The Roman army under the consuls Émilius Paulus and Terentius Varro consisted of 87,000 men, while that of the enemy amounted only to 50,000, among whom were 10,000 horse. The battle was brought on by Varro against the better judgment of his colleague. The Romans left their strong position at Canusium on the banks of the Aufidus, and the whole army crossed the river. Varro drew up his troops on the plain, with his right wing protected by the river. At the same time, Hannibal ordered Aufidus and led his small army to the attack. The battle was long, and the Romans fell in great numbers, among them the consuls, Émilius Paulus, and both the proconsuls Servilius and Attilus. Hannibal's Numidian horse destroyed those who fled from the field. The victor made 13,000 prisoners. The Romans lost, according to their own lowest statements, 45,000 men; according to the highest, 70,000. Hannibal collected the gold rings of the knights who had fallen and sent some of these to Carthage.

CANNA, Edwin, English economist: b. 1861. A student at Balliol, Oxford, he was engaged as lecturer at the London School of Economics (1897) and became professor of political economy in the University of London (1907). He is widely known in advanced circles as author of 'Elementary Political Econny' (1888, 3d ed., 1903); 'History of the Theories of Production and Distribution' (1893, 2d ed., 1903); 'History of Social Rates in England' (1896, 2d ed., 1912); 'The Economic Outlook' (1912); 'Wealth' (1914). He also edited Adam Smith's 'Lectures on Justice, Police, Revenue and Arms' (1896), and the same author's 'Inquiry into the Nature and Causes of the Wealth of Nations' (2 vols., 1904).

CANNEL COAL. See COAL.

CANNELTON, Ind., city and county-seat of Perry County, 130 miles south of Indianapolis, on the Southern Railroad, and on the Ohio River. It has cotton mills, flour mills, foundry and machine shops, potteries, brick yards and sewer-pipe manufactory. Coal and sandstone are mined in the neighborhood and gas and oil are also found. The city owns the electric lighting plant and the waterworks. Pop. 2,136.

CANNES, kán, France, a seaport and health resort on the shore of the Mediterranean at the west end of the Riviera, 22 miles southwest of Nice, in the department of Alpes-Maritimes. It is beautifully situated in a rich fruit district. It is famed for its mild and equable climate, with an average winter temperature of 50°, and an average of about 70 days on which rain falls in the year. Since its discovery as a health resort by Lord Brougham in 1831 it has become celebrated as a wintering station. There are many hotels and fine villas, charming public walks, etc. Perfumes and soap are made here and anchovies, oils and fruit are among the articles exported. It is a place of great antiquity, and twice suffered destruction at the hands of the Moors. On the island of Sainte Marguerite opposite, the Man with the Iron Mask was imprisoned from 1686-98. Near
CANNIBALISM

CANNIBALISM, the act or practice of eating human flesh by mankind. In his accidental discovery of the West Indies Columbus heard of, if he did not himself see, the Carib Islands, the inhabitants of which were spoken of as Caribales, or, owing to the customary dialectical interchange of i, a and r, Canibales. These Canibales or Caribales were reported to be man-eaters. This terrible association of Canibales with the practice of eating human flesh naturally enough led straightway to the transfer of the name of the people to their horrid custom. The Greek word, anthropophagy (ἀνθρωποφαγία), coming down from pre-Christian times, indicates, that the practice, though unknown to Columbus, was ancient and well enough known to be in the literature of the older peoples. The story of Polyphemus devouring human flesh as told in the 'Odyssey' and other legends of semi-divine man-eaters is evidence enough that the ancient authors knew, and held dear, of this practice. It is a well-established fact that all races of men have at some time, in a greater or less degree, been guilty of the practice of eating human flesh for one purpose or another. It is very generally believed, and with a good show of reason, that there never has been a time, since man first appeared, down to and including our own, when the world has been free from cannibalism. It is nearer being free from it now than it has been perhaps in all past time. To-day it exists among isolated South American tribes in the Malay Archipelago, some of the South Sea Islands (mainly in Melanesia) and in parts of Australia. Excluding Australia cannibalism may be said to be confined to a belt of land extending to a little more than 10 degrees north and south of the equator.

How far back the practice goes it is not possible to tell. So far as is known there is nothing to warrant the belief that the ancestors of the human species was the first of the human species to practice it. There is Likewise no evidence to indicate that down to as late a period as the close of the Old Stone Age the several races of men which had successively inhabited Euro-Asia and northern Africa practiced cannibalism. Cannibalism is not universally characteristic of the savage state. A few charred and broken and scraped human bones from the cave-dwelling period are substantially all that has been found which can by any stretch of the imagination be supposed to hint at this practice. Taylor goes as far as the facts seem to warrant when he says that this evidence may "perhaps be taken to show that prehistoric savages were in this respect like those of modern times neither free from cannibalism nor universally practising it."

Cannibalism is a practice derived from widely different motives, ranging all the way from eating human flesh as a regular part of daily subsistence to the eating of it for purely magical or ritualistic reasons. It is not possible to draw a dividing line between the species of motive because all or nearly all forms are more or less interrelated. This may arise from the fact that usually the practice does not begin in a single motive.

As a Means of Subsistence.—The most repulsive and degrading form of cannibalism is that of eating human flesh as a part, the main part, of the regular diet. The custom is to be found along the Guinea Coast southwards into the Kongo and for some distance eastward eat human flesh as food. It is treated just as other races treat animal flesh. Raids are made to capture prisoners and they are herded and kept till wanted. Sometimes they are fattened just as other races fatten animals for the slaughter. Under great stress of hunger occasioned by shipwrecks, sieges and famines civilized persons have been driven to the eating of human flesh. The siege of Samaria about the middle of the 8th century B.C. (II Kings vi, 24ff.); the siege of Paris in 1590; and the famine in Algiers in 1868 furnish instances of this. What civilized people are driven to do by the pressure of hunger it is not surprising that the savage should do with even greater similiar circumstances. Many savage races have resorted to cannibalism only in times of famine. The Mungera tribe in Queensland in times of severe famine "kill and eat some of their female children." The name of Pueblo, when starving in winter, "throttle and devour the oldest woman of the party. When asked why they did not kill and eat the dogs, they reply 'Dogs catch otters.'"

As a Manifestation of Affection.—Incredible as it may seem cannibalism in some instances seems to be prompted by affection. The Binderwurs of Central India killed and ate the sick and aged, "thinking this an act of kindness and acceptable to the goddess Kall." The aborigines of southwest Victoria practise eating human flesh in a solemn service of mourning for the dead, particularly for those killed by accident. "The Tangara carry their dead about with them, and whenever they feel sorry for their death, they eat some of the flesh till nothing remains but the bones." Among still other peoples parents partake of the flesh of their dead children as "a token of grief and affection for the deceased." The practice of eating flesh for the purpose of honoring dead kinship, is a characteristic. Herodotus, writing of the Massagetae, a Scythian people living in the northeast of the Caspian, relates that when a man has attained a great age among these people it is the custom for his kinmen to sacrifice him, boil his flesh with the flesh of cattle and eat it. This is accounted an exceedingly happy ending. Lyden describes a canniblistic custom which has the appearance of a very pious ceremony. The aged and infirm invite their descendants to eat them. The victim is eaten at a round table, at the others assemble singing a funeral dirge: "The season is come, the fruit is ripe, and it must descend." He then descends, and is put to death and eaten in a solemn banquet.

As a Ritualistic Practice.—Cannibalism as a religious duty is one of the most widespread and persistent forms of the practice and it ranges all the way from almost a passable refinement to the most revolting orgies. The religious purpose is not always the same. In some instances it is due to a desire, as among some Australian tribes, who make a practice of eating their totems, to become identified with the totem or god. In other cases the desire is simply to establish a close bond of friendship.
between the flesh-eating god and themselves. The peoples who offer human sacrifices to the god eat of these sacrifices, believing that by so doing they directly and surely become possessed of the divine virtues or qualities of those eaten from such sacrifices. With the Khonds it was the custom for a girl representing the goddess Tari to be sacrificed and torn limb from limb by the worshippers eager to obtain a piece of the deceased victim. Cannibalism was a purely religious exercise among people possessing a high degree of culture, and most notably illustrated by the Mexican custom of offering human sacrifices to the god Huitziopochtli.

"The victims were enemies or slaves and were offered before the images of the gods. The priest cut open the breast with an obsidian knife, tore out the heart and offered it to the gods; then he sprinkled his assistant and the offerers with the blood. After this a cannibal feast on the body took place, priest and offerers partaking. Early writers say these cannibalistic sacrifices reached yearly into the thousands. To obtain rain from the rain-god Quiaotec, children and adults were sacrificed to him and his images were sprinkled with their blood.

As Magic and Medicine.—One of the most common of the functions of cannibalism that originating in the belief that by eating human flesh or certain parts of the body very important advantages would be gained. Dead relatives in some instances are eaten in the belief that the soul of the deceased will thus pass into the eaters and thereby be possessed of all the desirable qualities of the dead man. In other instances the body of an enemy was eaten because that was the way to destroy the soul and thus put an end to further menace. Landor reports that in the dead is eaten partly by the Lamas and in part by the relatives, it being believed that the spirit whose flesh has been eaten will always remain friendly. The Boto-cudos ate an enemy to render themselves invulnerable against the arrows of the hostile tribe. And at the founding of a new town a human victim was slain and the heart and liver eaten by all present so that they might not die within the year. In I Kings xvi, 34, is reflected a survival of a similar custom. The idea that the eating of human flesh endows the eater with distinctly magical or supernatural powers is frequently met with in the savage world. In East Central Africa it is quite generally believed that the uncanny powers supposed to be possessed by witches and wizards are obtained by the feeding of the latter upon human corpses. From this comes, naturally enough, the belief that whoever feeds on human flesh will have the power of witches and wizards.

Not infrequently cannibalism has arisen from an almost uncontrollable passion for revenge, and a savage belief that an enemy is the surest way of bringing about his lasting disgrace. The ferocious natives of New Caledonia do not consider that revenge is complete until they have devoured the slain. The cannibal practices in Samoa seem to have had their root in the belief that the body of the one killed was the greatest insult that could be offered a Samoan. For a long time after the practice was abandoned, captives, in token of submission, would offer burning wood and say "Kill and cook us when it seems good to thee." The Tupis of South America ate their dead enemies, and the children were brought home captive and cared for till the age of 14 when they were slain and eaten. Instances have been met with where the criminal enemies within the tribe are slain and eaten. Where this is the custom it is usually the chief alone who has the privilege of eating the offending tribesmen. In some cases it is easy to distinguish between this custom and that of mere glutinous cannibalism. The chief goes so far as to cause a tumult to be raised. As a punishment the offender is slain and the chief invites guests to share in the meal of human flesh. So powerful an incitement to cannibalism is this passion for revenge that quite civilized peoples have been guilty of it.

Other Motives.—There are several other motives leading to cannibalism more or less distinct from those mentioned. Among some peoples the flesh of a fallen enemy was eaten after the fight by both contending parties as a token of entering into a binding covenant of peace. At the coronation of a king in the Sandwich Islands it was the custom for the new king to swallow the left eye of a human victim that he might thereby receive an accession of strength. Among the Indian tribes of the Northwest of America cannibalism took the form of initiation into certain secret societies—a sort of ritualism. At the beginning of the initiation into the cannibal society the person thereby becomes possessed of the cannibal spirit, and so of a violent desire to eat human flesh. In olden times, when the cannibal was in a state of ecstasy, slaves were killed for him and he devoured them raw. Cannibal practices are of almost infinite variety, and perhaps all, except where human flesh is eaten simply as food, have their root in a superstitious view of life and the world. Naturally the practice has been disappearing before the progressive enlightenment of the world, and even the tribes who are guilty of eating human flesh as food are increasingly ashamed of it, very often carrying on the practice in closely guarded secrecy.

The bibliography of the subject covers a multitude of publications. Articles on anthropology and ethnology, the majority of which will come to such subjects will yield much information; also the narratives of travel and adventure by well-known explorers of early and later times. A few might be mentioned simply as suggestions: 'Weeks, 'Among Congo Cannibals'; Frazer, J. G., 'Totemism and Exogamy'; Stanley, H. M., 'In Darkest Africa'; Landor, W. S., 'In the Forbidden Land'; Rannie, 'My Adventures Among South Sea Cannibals'; Dennys, 'Folklore of China.'

CANNIFF, William, Canadian physician; b. Thurlow, near Belleville, Ontario, 1830; d. 1910. He was educated at Victoria College, Cobourg, and studied medicine in Toronto, New York and London, England, where he took the degree of M.R.C.S. He served in the Crimean War, 1856; returned to Canada, became professor of pathology in Victoria College; visited the Washington hospital during the Civil War, and finally settled in the practice of his profession at Toronto. He was one of the originators of the "Canada First" movement. He was the author of 'The Medical Profession in Upper
Canada, 1783-1850" (1894); 'The Settlement of Upper Canada' (1872).

CANNING, Charles John (Earl), English statesman, son of George Canning (q.v.): b. near London, 14 Dec. 1812; d. London, 17 June 1862. He was educated at Eton and Oxford. He entered Parliament in 1836 as member for Warwick, and in the following year succeeded to the peerage, on his mother's death, as Viscount Canning. In 1841 he was appointed under-secretary for foreign affairs in Peel's government, and in 1846 commissioner of woods and forests. In the Aberdeen ministry of 1853, and under Palmerston in 1855, he held the Postmaster-Generalship, and in 1856 went out to India as governor-general. Throughout the mutiny he showed a fine coolness and clear-headedness, and though his carefully pondered decisions were sometimes lacking in promptness, yet his admirable moderation and the implicit trust he imposed in able military subordinates did much to re-establish the British empire in India. In 1858, when the government of India was transferred from the East India Company to the Crown, Canning became the first viceroy; and in the succeeding year he was raised in the peerage to the earldom of Dalhousie. From that time till his retirement in March 1862, the arduous task of undoing the mischief wrought by the mutiny devolved upon him, and his great success was a witness to his ability. Consult Cunninghame, 'Earl Canning' (1891); Hare, A. J. C., 'The Story of Two Noble Lives' (1892).

CANNING, George, English orator and statesman: b. London, 11 April 1770; d. Chiswick, 8 Aug. 1827. His father offended his family by marrying a lady of beauty and accomplishments, but without fortune, and died in 1771, leaving her destitute. She however lived to see the success of her son, from whom she ever received the tenderest marks of filial love. Canning, who had inherited a small estate in Ireland, was educated at Eton. In 1787 he was entered at Oxford. His vacations were passed with Sheridan, by whom he was introduced to Burke, Fox and other distinguished Whigs. But although Sheridan had already announced him in Parliament as the future ornament of his party, Canning entered into terms with Pitt, by whom he was brought into Parliament in 1793. During the first session he remained silent. In 1796 he was under-secretary for foreign affairs. In 1797 he projected, with some friends, the Anti-Jacobin, of which Gifford was appointed editor. Canning contributed many poetical and other articles to this periodical, the happiest of his efforts in this direction being the 'Needy Knife-grinder.' In 1798 he supported Wilberforce's motion for the abolition of the slave-trade. In 1800 Canning increased his fortune and influence by a marriage with Joanna, daughter of General Scott, a story of his fortune and administration being dissolved in 1801, Canning became a member of the opposition until the restoration of Pitt in 1804. In 1807 he was appointed Secretary of State for Foreign Affairs, in the Portland administration, a political misfortune standing which Lord Castlereagh led to a duel between that minister and Canning, in which the latter was slightly wounded. This dispute occasioned the dissolution of the ministry. In 1810 he opposed the reference of the Roman Catholic claims to the committee of the whole House, on the ground that no security or engagement had been suffered by the Roman Catholics, and many of his most brilliant speeches were on this subject. The adoption of the measure being a matter of policy, the state of opinion, the condition of affairs, and the securities with which it should be accompanied, were with him elements of the question. He proposed securities in 1813, which, with the bill, were rejected. He supported in 1812 and 1813 the same motion which he had opposed in 1810. To Canning was principally owing the first blow which shook the throne of Napoleon: the British policy in Spain was directed and animated by him. In 1812 he was elected member for Liverpool, from which he was also returned in 1814, 1818, 1820. In 1814 he was appointed Ambassador Extraordinary to Portugal, and remained abroad about two years. In 1819 he declared his decided hostility to parliamentary reform in whatever shape. On the occasion of the proceedings relative to Queen Caroline, the discarded wife of George IV, he declared that 'toward the object of that investigation he felt an unwholesome affection'; and soon after resigned the presidency of the board of control and went abroad. Having been nominated governor-general of India, he was on the point of embarking when the death of the Marquis of Londonderry called him to the Cabinet as Secretary for Foreign Affairs, 16 Sept. 1822. One of his earliest acts in this situation was to check the French influence in Spain, the French having sent an army into that country to put down the revolutionary party. By way of withdrawing the Spanish-American colonies from French influence he decided to recognize their independence; thus, as he afterward phrased it, 'calling the New World into existence to redress the balance of the Old.' He continued to support the propositions in favor of the Roman Catholics, and in 1825 communicated to foreign ministers the determination of the government to appoint chargés d'affaires to Colombia, Mexico and Buenos Aires. In consequence of the attempts made by Spain to assist the insurrections of Portugal, it was immediately determined by the ministry to support the regency in that country, and troops were sent to Lisbon in January 1827. On 12 April 1827 his appointment as Prime Minister was announced. His administration was terminated by his death, but not until it had been crowned by the Treaty of London (6 July), for the settlement of the affairs of Greece. As an orator Canning was showy and graceful, with a brilliant wit and caustic satire, though neither formed on a very masculine taste. During his career the leading domestic subjects on which the British Parliament was called upon to legislate were the following: the liberty of the press, the emancipation of the Roman Catholics, the test and corporation acts, the corn-laws and reform in Parliament. Those of a foreign nature were, among others, the various overtures of peace between Britain and France, the settlement of Europe on the overthrow of Napoleon, the treatment of Italy by the Papists, the Spanish revolution and recognition of the South American republics. On all these questions, with one or two exceptions, he supported the high Tory side. The chief exceptions were
the emancipation of the Roman Catholics and the recognition of the South American republics. He was also desirous of reforming the corn-laws. His speeches, edited by Talfrey, were published in six volumes in 1830. Consult Stapleton, 'Political Life of Canning' (1831); Stapleton, 'Canning and His Times' (1835); Temperley's 'Life of Canning' (1905); Bisset, 'George Canning and His Friends' (1910); Marriott, 'George Canning and His Times' (1903); Lord Dalling, 'Historical Characters' (1867).

CANNING, Sir Samuel, English civil engineer: b. Wiltshire 1823; d. 24 Sept. 1908. He is best known in connection with the laying of the Atlantic cables, and those in the Mediterranean and North seas. He was knighted in 1866.

CANNING, Stratford (1st Viscount Stratford de Redcliffe), English diplomatist, cousin of George Canning (q.v.): b. London, 4 Nov. 1780; d. 14 Aug. 1880. His father, Stratford Canning, had been disinherited owing to an imprudent marriage, and had gone into business as a merchant, died a few months after his son's birth, and in consequence young Stratford and his mother removed to Wanstead. He went to Eton, and in 1805 he was elected to a scholarship at King's College, Cambridge. Before graduating he was in 1807 appointed by his cousin, George Canning, then Foreign Secretary, to be his private writer, and in the latter part of that year was sent as second secretary with a mission to Denmark. In the following year he accompanied as first secretary an important mission to Constantinople, which resulted in the conclusion of a treaty of peace with the Porte on 5 Jan. 1809. In the summer of 1810 his chief, Sir Robert Adair, was transferred to Vienna, and Canning temporarily succeeded him as Ambassador at Constantinople. Before the arrival of Adair's successor, Canning made his reputation as a diplomatist by the masterly way in which he conducted the difficult negotiations which led to the signing of the Treaty of Bucharest on 28 May 1812. This treaty put an end for the time to the war between Russia and Turkey, and thus left Russia free to resist the advance of Napoleon. Moreover, it secured English predominance at Constantinople, and was in this respect the first notable triumph in the traditional British policy on the Eastern Question. In 1812 Canning returned to London, and after declining in 1813 the offer of the chief secretariat to Lord Aberdeen's Vienna mission, accepted in the following year the post of Envoy Extraordinary and Minister Plenipotentiary in Switzerland. He held this post till 1818, and was completely successful in his endeavours to free Switzerland from French domination and to erect it into a neutral federal republic. Shortly after his return he was appointed Ambassador to the United States and he arrived at Washington in the autumn of 1820. He was again in London in 1823. The diplomatic agreement arrived at in 1818 was, however, then rejected by the United States Senate. After a brief but important mission to the Russian capital he was again sent to Constantinople in October 1825 as Ambassador. In the following year he succeeded in again patching up a peace between Russia and Turkey, and thus prepared the way for a joint representation by England, France and Russia on behalf of insurgent Greece. Negotiations were, however, abruptly broken off by the Sultan's insurrection on learning of the battle of Navarino, and Canning was later in the same year engaged, along with the representatives of France and Russia, in drawing up proposals for establishing a Greek kingdom. He was ultimately forced on the acceptance of Turkey in a more stringent form as part of the peace treaty which ended the Russo-Turkish War of 1828–29. In 1829 he resigned his position and returned to England, where he was created G.C.B. He entered Parliament as member for Old Sarum, but he ultimately secured election for King's Lynn. In 1830 he drew up the British case in the Saint Croix-Saint Lawrence boundary dispute with the United States for submission to the King of the Netherlands. After acting as special envoy to the Porte in 1831–32, and to Portugal in 1832–33, he was in 1841 appointed for the third time Ambassador at Constantinople. For a considerable period he was mainly engaged in assisting and encouraging the Sultan, Abd-el-Mejid, in his policy of reform, but after a visit to England in 1852, during which he was raised to the peerage, his efforts had to be directed to thwarting Russian designs. His diplomatic triumph over Prince Menschikoff caused the Tsar in a moment of irritation to precipitate the Crimean War. He resigned in 1858, and the remainder of his career was passed mainly in retirement. In addition to a few volumes of poetry, he published works entitled 'Why am I a Christian?' (1873), and 'The Greatest of Miracles' (1876). A selection of his articles on Eastern affairs was published in 1881 under the title of 'The Eastern Question.' See 'Life' by Stanley Lane-Poole (1886).

CANNING AND PRESERVING INDUSTRY. The hermetical sealing of food, generally termed 'canning,' was long since passed the experimental stage and is now one of the leading industries of the country. The inventive genius of man has from the earliest times turned toward some method of preventing articles of food from deteriorating, and toward some way of preserving food which will be palatable at some future time. 'Desiccation' or drying was probably the first method used, but the food thus preserved lost its natural flavor and became tough in texture. Prior to 1750 this method of drying, and that of using salt and sugar, were the only methods in use for preserving food. From 1809–10 a Frenchman, Nicholas Appert (b. 1750; d. 1841), evolved a plan for hermetically sealing foods for use at sea, and his process was purchased by the French government, which now one of the principles involved in the art of canning, and since his time there have been several new principles discovered equally as important as his sterilizing process, which did not take in the prevention of souring prior to sterilization. There have also been other im-
provements in machinery especially adapted to the principles involved, whereby cost has been enormously reduced and the tin is within reach of all classes of consumers. He was later awarded a prize of 12,000 francs by Napoleon, but spent most of this money for further experiment and died when over 90 years of age, after having seen his process thoroughly established and put into operation.

In 1810 the English government granted a patent to Peter Durand for the preservation of fruits, vegetables and fish in hermetically sealed cans, made of tin, glass or other fit material. He made no claims to the discovery of the process, and it was stated at the time that he received his information in regard to it from a "foreigner residing abroad." The methods, despite the secrecy in their use, gradually became known, and in the course of time came to America. It is believed that a man by the name of Ezra Daggett was the first to put the practice of canning goods into actual use in this country, in the years from 1815 to 1818. He and his son-in-law, Thomas Kensett, began to make fruit in tin boxes, and in 1819, the principal foods thus packed were salmon, lobsters and oysters. A patent was granted them in 1825 on the use of the tin can, or "case" as it was then called, and they immediately started the use of this process in their factory. Glass jars were then very little in use, because of their costliness, bulk and inability to withstand the extremes of temperature.

In 1820 William Underwood and Charles Mitchell combined, in Boston, for the purpose of manufacturing foods in hermetically sealed cans. The principal business engaged in during the early days of the combination was the preparation of pickles, jams, jellies, sauces and mustard; but they also put up quinces, cranberries, currants, etc. About the same time, Allen Taylor and M. Fallagher, who had learned their trade in Ireland, came to this country and were for some time employed in New York. They with Kensett did much to put the industry on a permanent basis. In 1839 William Underwood began to substitute tin for glass, though it was a number of years before the jar and bottle gave way entirely to the tin can. The methods of can-making were for many years very slow and laborious. When the factory could turn out 60 cans a day was a master workman, for every can was made by hand. The body for each had to be measured, marked and cut out from the plate by hand shears, and, to make the seam or lap secure and air-tight, it was necessary to pile on the solder until a ridge an eighth of an inch thick was built up from end to end. It was also a slow and difficult operation to make the covers and bottoms. Each one had first to be drawn on the tin with compasses and then cut out with the shears, and, finally, with a mallet, the edges stuck up or bent, over an upright piece of iron called a heading stake. The tops and bottoms, like the seams, were soldered on with a heavy heading of metal, and enough solder was used on one can to make a dozen of to-day's manufacture.

So was born the tin can that now is scattered in every direction, along the paths of travel and progress; but, strange enough, this growing infant had, in its younger days, another name, one which more became its infantile and clumsy form. "The Tin Canister." In all food preserved in tins, practically all canned goods, 10 or 15 years, cans or canned goods never seem to be mentioned. They were always spoken of as hermetically sealed goods in canisters or tin cases. In the salesbook or "Waste," as it was then called, canisters were abbreviated thus, "Cans," and probably by such abbreviation, packages for food came ultimately to be known as cans.

The stamp-can was invented in 1847 by Allen Taylor and was a decided improvement over any previously made. Two years later, 1849, Henry Evans, Jr., of New Jersey, brought forth the "pendulum" press for making can tops, and so the improvement in the manufacture of cans has gone on till now we have the key-opened can, the invention of a Mr. Zimmerman. While the manufacture of cans has become a distinct industry and not now generally connected with the canning industry, nearly 10 per cent of those now in use are made by the canning establishments. These cans are made from sheets of tin weighing about one pound. The objection to tin cans as containing poisonous acid or injurious substances has caused the methods of manufacture to be carefully scrutinized, so that now all cans are subjected to an acid preparation for removing dirt, grease, etc., and then coated with pure tin by the acid process or palm-oil process, the latter of which is considered the safer.

In the methods of cooking there have been many improvements, the slowness and low temperature of 212° F. allowable in the Appert process being gradually raised by the use of chloride of calcium, till now a temperature of 250° F. is possible, although this process is more expensive, as the cans become discolored and have to be cleansed before they can be put on the market. The "closed-kettle" process of cooking goods by means of super-heating water with steam was invented by A. K. Shriver of Baltimore, and about the same time, the invention of the patent-process kettle, securing similar results by the use of dry steam, was brought out by John Fisher of the same city. One of the modern systems for sterilization is the Continuous Calcium Process System, patented by the Ceramic Company of Chicago. Another is the Continuous Process System in oil, used by the packers of canned meats. Another is the Polk Agitating System, patented by Ralph Polk, of Greenwood, Ind. By this system the time of sterilization is materially shortened.

The canning industry, although established in the United States as early as 1825, did not become of much importance until the middle of the century, but from 1850 came to the front by leaps and bounds. In 1889 the products of the industry were valued at $46,600,000; in 1899 at $99,335,000; in 1904 at $130,466,000; in 1909 at $162,000,000; and in 1914 at $235,000,000. This last tremendous increase appears to be partly fictitious, owing to the fact that more foods are now reported by the census under the heading of "canning." For instance, condensed evaporated milk totaled $58,747,000 in 1914, or nearly one-sixth the entire production.

Many unaccountable losses were met with when in certain years the canned goods would
not all keep. Numerous theories were experimented with, in vain efforts to learn the cause of these mysterious deteriorations.

In some cases it was thought that spoiling was caused by freezing. Some salmon had been stored in a warehouse, which, during the winter, had not been constantly heated. Many cans of this lot spoiled; so the freezing theory was accepted and held good, until some other cans, which had not been exposed, which could not possibly have frozen. To explain this new phase of the situation, another theory had to be concocted.

In searching for the probable origin of these mysterious losses, the real cause was not suspected. The exclusion of air was thought to be one of the most important factors in keeping the goods, and, until recently, this opinion has prevailed.

The researches in bacteriology in 1895-99 at the Massachusetts Institute of Technology brought out the fact that in some cases the spoilage of canned goods was due to imperfect sterilization through lack of sufficient heat to destroy all bacteria. This, however, accounted for only a part of the cases of spoilage.

There are several other causes which have been brought out by the research work of Edward W. Duckwall, M.S., in the Sprague Canners’ Laboratory, an institution which was founded in August 1903 by Mr. Daniel G. Trench of Chicago. (The name of this laboratory has since been changed to the National Canners’ Laboratory). It was discovered that a large per cent of what is known as “sour” corn and peas was due, not to insufficient sterilization, but to souring which had been accomplished by bacteria in the raw product prior to the sterilizing process. It was also discovered that some of the spoilage was due to the evolution of carbonic acid gas from the seeds of certain fruits and vegetables. The germ life of the seeds was not destroyed by the heat, and carbonic acid was liberated when the seeds sprouted in the cans. Gradually all obstacles are being overcome; new processes have been invented, the purity of the canned article has been improved, and the manufacture has become general in every part of the United States where fruits or vegetables are grown or where the supply of fish and oysters is nearby.

The installation of labor-saving machinery, the remarkable growth in the number of firms, the decline in the market value of the goods, made necessary uniform grades and rates of sale throughout the country. In October 1872 the first organization of canned goods packers met in Philadelphia, but this was only short-lived, and it was not until February 1883 that a permanent exchange was established. The “Canned Goods Exchange” of Baltimore was at that time organized, with the intention of having sales on the floor daily, but after a thorough trial they abandoned that plan and adopted grades for goods, and rules and terms governing transactions. These exchanges began rapidly to come into existence. In 1885, the “Western Canned Goods Packers’ Association” was formed at St. Paul, and those dealing in the Mississippi Valley. In the same year the New York State packers organized, and two years later those of New Jersey and Virginia. In May 1889 the National Association was formed at Indianapolis, followed by the “Peninsula Packers’ Association” of Delaware, formed in 1894, and the “Atlantic States Canned Goods Packers’ Association” of Baltimore, organized in the fall of the same year.

The localization in the canning industry is principally due to climatic conditions. California has forged ahead and monopolized one-fourth of the industry, New York producing over 10 per cent and Maryland 7½ per cent. in 1914. Thus we have Illinois, Iowa, Ohio, and Maryland as the principal corn-packing States; Maryland, New Jersey, Delaware, Indiana, Virginia and California as the tomato-canning States; while Wisconsin, New York, Illinois and Ohio produce the largest amount of canned milk; Maine is the principal packer of sardines, while Washington and Oregon monopolize the salmon canneries. Peaches are principally canned in California, Maryland, Michigan and Georgia; New York, Michigan, Maryland, California and Maine put up the major portion of the apples packed, though the industry is carried on to some extent in Washington and Oregon. Pears are packed mainly in California and New England, while pineapples are almost wholly packed in Baltimore, Md. Beans are canned mainly in Indiana, New York, Maryland and Illinois; peas in Wisconsin and New York; prunes and raisins are dried almost wholly in California; nearly all the salt fish is packed in Massachusetts.

For general purposes of comparison, the canning and preserving industry may be divided on the lines of the United States census statistics into four distinct classes: Fruits and vegetables; fish, both canned smoked and dried; oysters and clams; and pickles, preserves, jellies and sauces; and under these headings the industry may be more comprehensively discussed. The canning and preserving of fruits and vegetables gives employment to over 50,000 persons; that of fish to 9,000; and that of oysters, etc., to over 2,000.

Fruits and Vegetables.—Fruits were the first foods to be successfully canned, as the low temperature used by the early methods was more easily applied to this class of goods because less heat is required to preserve them than all others. Glass bottles were filled up to the neck, loosely corked, and then placed in tepid water, the temperature of which was gradually raised from 170° to 190° F., remaining there for a period varying from 30 to 60 minutes according to the article being preserved. In 1823 Pierre Antoine Angilbert made an improvement on this method by placing the fruit in a tin can containing water, then placing on the cover in which there was an aperture to allow for gas escape. It was then placed in water and heat applied; after boiling a sufficient length of time, the aperture was closed by a drop of solder.

Not much is known of this branch of the canning industry between the years 1830-45, and it probably was not very extensive, and it is certain that tomatoes and corn were not put up to any great extent during those years. It appears from a narrative presented by William Lyman Underwood that his grandfather, William, began to use the Appert process about 1820, and exported preserved goods to Manila in 1821. In 1830 he packed pie fruit in bottles,
and in 1830 imported tomato seed. His son, William J., has a label used in 1845 on "hermetically sealed tomatoes," and which contains the words: "This bottle is divided into the skins and seeds from the tomatoes, evaporating the particles by slow heat. The bottles contain the substance of about two dozen tomatoes, and it will keep good any length of time." The style of the label is in marked contrast to those now in use. In 1847 Harrison W. Crosby, when he was steward of Lafayette College, at Easton, Pa., first used tin cans to seal tomatoes hermetically, and in 1893 the canning of corn was begun by two firms, one in Baltimore, Md., and one in Portland, Me. The establishment in Portland gained little headway until 1852, in which year Isaac Winslow, who was in charge, applied for a patent on his process, but which was not granted him until 8 April 1862. His method was substantially the same as the Appert process, with the exception that the first cooking was done away with by the introduction of "cookers," which are steam retorts used to cook the corn before placing it in jars. Numerous canneries were in operation in New York, Boston, Baltimore, Portland and Eastport, Me., and in Newark, N. J., and it was in the latter place that the fruits and vegetables were prepared for Kane's Arctic Expedition.

In 1860 factories began to spring up in all the great fruit and vegetable raising sections of the country. The Middle West loomed up as a manufacturing centre. Thomas Duckwall erected the first canning factory in Claremont County near Cincinnati, Ohio, and followed at Cincinnati. A few years later a canning was started at Circleville, Ohio, and at Indianapolis, Ind. From that time up until 1880 factories sprang up all over the Middle States like mushrooms.

California then began to be heard of, and rapidly came to the front as a producer of canned fruits, now being in the lead in the preserving and canning of small fruits, such as the plum, pear, peach and cherry, and such vegetables as asparagus, tomatoes and peas. The dried fruit industry, in which prunes and raisins lead, and which has reached its fullest development in California now exceeds in volume the production of canned fruit.

The canning of fruits and vegetables has grown more rapidly in the last 30 years than any other branch of the industry, due to the greater territory in which it may be carried on and to the unlimited cultivation of these articles. The canned vegetable branch of the industry yields products of $25,000,000 in 1899, $53,000,000 in 1909, and $84,000,000 in 1914. The dried fruit production of 1909 was $22,000,000, and about $35,000,000 in 1914.

The tomato has proved the most popular of canned vegetables, and the manufacture in 1909 valued at $47,747,000, rising to $25,532,000 in 1914. Corn and peas represented a value of about $15,000,000 each, and beans $16,500,000. Of fruits, peaches now lead, apples having fallen into fifth place. Of dried fruits, raisins and prunes are far in the lead. In 1915 leading canneries contracted for the largest acreage recorded to that date — 190,105 for sweet corn, 140,000 for tomatoes and 102,000 for peas, this last figure being a reduction from the 1914 acreage, contracted for, of 126,000.

Fish.—All the known processes are used in the preservation of fish, which of all foods is the most rapid to putrefy. Smoking and drying were the older methods, and in some places are still in use. The Hollanders put up fish in cans long before the Soddington and Appert methods were known. About 1845, sardine canning was successfully established on the coast of France, and prior to 1843 the canning of fish in the United States was little known, but in that year lobster and mackerel canneries were successfully established at Eastport, Me., and the business grew rapidly till 1860, when the supply of lobsters decreased and the prejudice against the canneries resulted in the enactment of strict laws restricting the time of operation of canneries and the canning of short lobsters, so that in 1855 the last factory so engaged suspended, and in 1900 there were no lobsters canned. Mr. Underwood established the first lobster-packing factory in this country at Harpswell, Me., in 1848, and in 1853 started a factory for packing salmon at Bathurst, N. B., at one time the only source of supply. Quantities of Prior to were canned prior to salmon being taken from the Columbia River. He died in 1864, and was succeeded by the firm of William Underwood Company, of which his grandson, H. O. Underwood, is president. Prior to 1864 salmon-canning was carried on to a small extent, but after that year the industry grew rapidly; factories were established on the Pacific Coast at Washington, Calif., on the Sacramento River, and in 1886 on the Columbia River. Perhaps the most striking illustration of the growth of the business is in that almost universally used article, canned salmon. In 1846 the firm of H. C. Good, Hume & Company, consisting of William Hume, G. W. Hume and A. S. Hagedorn, canned a few cases of salmon on the Sacramento River, where William Hume had been a hunter and fisherman for several years. William Hume carried the samples around to introduce them, using a basket for that purpose, from which the salmon were sold. In 1866 the business was transferred to Eagle Cliff, Wash., on the Columbia River, where William Hume had been prospecting the year before, and there (in 1866) the first Columbia River Royal Chinook salmon were packed, thus introducing to the trade what is unquestionably the finest food-fish article of the time, and a small amount was shipped to New York, around Cape Horn, bringing $5 per dozen there at wholesale. In 1883 there were in Alaska 5 canneries, which in six years increased to 37 with an output of 714,196 cases. Next in importance comes the sardine canning of Maine, which did not come to a point of success until 1875, and this branch of the business outranked all others. The process of putting up fish is extensive and complicated, and since the beginning of the industry many changes have been made, more especially in the tincture for the larger bones of the fish, and in filling, capping, labeling and boxing the same. Up to 1880 the business done in this line was very small, but gradually grew after that, and the establish-
mements at Eastport, Robinson, Lubec, Jonesport, East Lamoine and Camden, all in Maine, are now thriving.

Besides the fishes named, smelt, sturgeon, menhaden, halibut, Spanish mackerel, eels and herring were put up in large quantities. The canning of fish is generally divided into five classes: (1) Those plain boiled or steamed, which include salmon, mackerel, halibut, lobsters, etc.; (2) those preserved in oil, of which sole and mackerel constitute the major portion; (3) those preserved with vinegar, sauces, spices, etc., among which are herring, eels and sturgeon; (4) those cooked with vegetables, namely, fish chowder, clam chowder and codfish balls; (5) those preserved by any other process, such as smoking and salting, and which are put into cans for convenience. Smoking and salting of fish is principally confined to the Eastern States lying along the Atlantic Coast, although the industry is carried on to some extent in the Pacific States.

In 1855 one-pound lobsters sold at $2.75 and salmon at $4 a dozen. No one believed him when William J. Underwood made a prediction that the prices of salmon and lobsters would be reduced to the point where the size of the lobsters tapering upward and the salmon dropping down, a situation which has come about even earlier than he anticipated.

The canned fish production of 1909 was $14,000,000 and salt fish $7,000,000. In 1914 the total canned fish production rose to $19,000,000; smoked fish fell off to $2,700,000 and salt fish increased to over $8,000,000.

Oysters and Clams.—The oyster is a lamellibranch or bivalve mollusk of the genus Ostrea, the most important in commercial value to be found in American waters being Ostrea virginiana, which are generally found attached to some solid substance in the brackish waters at the mouth of rivers or in the shallow waters along the seacoast, the depths of the water in which they lie varying from 15 to 180 feet, according to temperature. The principal and most productive beds in which they are found are off cape Henlopen, which were in the industry in Chesapeake Bay, Cape Cod and Long Island Sound, but the constant fishing up to 1860 soon depleted these, and the supply in the public beds along the coast of Connecticut, New York, New Jersey and Delaware would have been exhausted long ago but for the systematic breeding and cultivation of this succulent bivalve. Maryland, Louisiana, California, Mississippi and South Carolina are now the chief sources of supply.

The canning of oysters has grown simultaneously with the canning of fish, and the two were generally carried on, in the early days of the industry, under the same roof. Thomas Kensett was probably the pioneer of oyster canning, and conducted operations in Baltimore as early as 1820, later being followed by others, but it was not until 1850 that the industry was put on a permanent basis. Originally, the oysters were opened by hand, but Louis McMurray, of Baltimore, introduced, in 1857, a device for removing the shells in quantity, and this method made the removal of the oyster from the shell much easier. Two years later steaming took the place of McMurray's method, and this process consisted of placing the oysters in baskets having a capacity of three pecks or more, and then putting these baskets into a box through which steam was passed. In 1862 Henry Evans introduced the method of "shucking," his process consisting of placing the oysters in cans of iron framework, six to eight feet long, which held about 20 bushels of unshucked oysters; the cars were then run on a track from the wharf to an air-tight and steam-tight box; after having been run for about 15 minutes, the cars were run into the shucking shed and opened; after shucking they were washed in cold water, packed in air-tight cans, hermetically sealed and weighed; the cars were then run on a track to a steamer and treated to a sufficient degree to kill all germs of fermentation, and then cooled off in a vat of cold water. The total cost of handling a bushel of oysters by this method was estimated at 29 cents. In canning the variety of oysters found in the Gulf of Mexico, the following process was introduced in 1880 by William T. J. Mayburg: To 10 gallons of pure water add one-half gallon of good commercial vinegar and one-tenth of a saturated aqueous solution of saltpeter to which mixture sufficient common salt is added to impart the requisite salty flavor to the oyster. The mixture is boiled a few minutes and poured over the oysters in the cans, which are at once sealed and placed in hot water, the temperature of which is 202° F. This temperature is gradually raised to 240°, and maintained at that degree for about 40 minutes. The cans are then vented, resealed and steamed as before for about 30 minutes, after which they are ready to be labeled and packed.

It seems rather extraordinary, but in 1850 oysters were packed in Boston, which found a ready sale in direct competition with Baltimore goods, and for a number of years there was considerable rivalry between the two markets. The oysters were brought from the coasts of New Brunswick and Prince Edward Island, and were said to have a finer flavor and to keep much better than those from the warmer waters of the South, but these could not compete with one- and two-pound canisters, and large sales were made in Saint Louis at $4 and $7.50 per dozen. The canned oyster production of 1909 was valued at $2,443,000, and clams at $402,000. In 1914 the figures increased to $2,677,000, and $670,000.

Pickles, Preserves, Jellies and Sauces.—This important branch of the industry is of more recent development. It can hardly be called canning because most of it is put up in glass. The methods of cooking and preserving are very similar. The trade consists mainly of branded goods whose sale is created and maintained largely by advertising. The brands are put up attractively, trade marks are used to protect them from the constant criticisms of pure food agitators, they have moved steadily forward in popular favor. The goods packed in glass are more liable to contact with the air, and therefore the manufacturers have depended more on artificial preservatives, of which benzoic acid is the most common. The difficulties of making the goods keep and of avoiding harmful preservatives seems to have been met successfully, as shown by the vast sale. In 1909 the total for
pickles, preserves, jellies and sauces was $48,500,000, and in 1914 the estimated figure was $65,000,000 worth.

Canning Tools and Processes.—In 1876, at the Centennial Exposition in Philadelphia, the Ferracure Machine Company, of Bridge-
ton, N. J., displayed a collection of tools for making cans and canners' goods, and imme-
mediately thereafter secured large sales. To Oberlin Smith, president of the concern, and also for a time president of the American Society of Mechanical Engineers, must be given a great deal of the credit for supplying cannery with simple and inexpensive machinery. A line of presses was marketed for stamping out the tops and parts of cans of all sizes; gasoline firepots were made for heating the capping steels and tinning-coppers, or tools for closing the cans. These fire-pots were provided with air-pumps for driving air into the gasoline tanks and thus forcing out the oil, which was vaporized by the heated and burned as a gas under the pot. These pots for heating the soldering tools are designed to stand on the capping-tables where the tops of the cans are soldered. Among special machines made for the canner are hulling machines with a capacity of 1,000 bushels of peas in 10 hours, and rotary separators that grade the peas into sizes at about two-thirds this speed. There are also pea-sieves for sorting peas in small quantities, and pea-blanchers for scalding and blanching peas. There are corn-cutters on the market with a capacity of 4,000 ears an hour, and corn-silking machines for removing the silk and refuse from the corn. Many automatic can-filling machines will handle 1,200 cans an hour. There is a great variety of machines for handling the different fruits and vegetables, as well as numerous parers, graters, corers and seeders.

In canning fruit, steam-boilers are necessary to supply the various tanks and kettles, which are used in washing and scalding. Baskets of heavy galvanized wire are used for handling tomatoes and various fruits when dipping into the scalding kettles. For steam-cooking a common method is to fill a large wire tray with filled cans which have been capped but not wholly closed, a vent being left for the escape of air and steam. Immediately after cooking, when the boy, this vent is sealed with a drop of solder, so that the destructive germ has no chance to enter. Salmon is cooked and sealed afterward in the same manner.

Statistics.—California is now the leading State in the canning and preserving industry. Her production increased 200 per cent in the decade ending in 1909, in which latter year over $33,000,000 worth of goods, mostly canned fruits, were placed to her credit, this being 20 per cent of the country's total. New York was the second State, with $19,000,000 production, and Maryland has fallen to third place with $14,700,000. Washington advanced from 13th to fourth rank with a production of $9,600,000, a gain of 85 per cent; Pennsylvania, with an output of $9,500,000; Indiana developed wonderfully, showing $8,758,000, a gain of 158 per cent. The other States of large production are Maine, Illinois, Massachusetts, Michigan, Wisconsin, Ohio and New Jersey. Of these, Wisconsin is making the most rapid progress, showing an advance of 253 per cent in the census period. There is really only one State that shows a considerable falling off in canning, Mississippi, where the fish and oyster industry has decayed.

The average number of employees employed in canning and preserving in the United States is 72,000, but this is a very variable figure, because canning is largely a seasonal business. Only 20,000 people find employment in January, while the demand for products runs from 100,000 to 155,000, September being the busiest month. Nearly one-half of the employees are women and children, but the proportion of men increases, and the disposition to employ children for tasks.

A total of $119,000,000 capital is invested in the industry, the earnings are nominally $235,-000,000, but subtracting the cost of the materials, the real income being the value added by manufacture, gives about $85,000,000 as the real measure of the industry annually.

CHARLES H. COCHRANE,
Author 'Modern Industrial Progress.'

CANNIZZARO, kăn-nĕ-tsă-rō Stanislao, Italian chemist: b. Palermo, 16 July 1826; d. 1910. He studied medicine at Palermo, and chemistry at Pisa. In 1848 he was elected a member of the Sicilian Parliament and had part in the revolution in Sicily. In 1852 he became pro-
cfessor of chemistry in Alessandria; in 1857 in Genoa; in 1860 in Palermo; and in 1870 in Rome. He emphasized by clear definition the difference between atomic and molecular weights, and was one of the most influential in establishing Avogadro's law as a maxim of chemical science. He also discovered benzyl-
 alcohol and cyanamide. He wrote 'Sunto di un Corso di Filosofia Chimica; Nota Sulle Condensazioni di Vapore' (1880); 'Relazione Sulle Analisi di alcune Acque potabili' (1882); and 'Abriss eines Lehrganges der theoretischen Chemie,' which appeared in Ostwald's 'Klassiker der exakten Wissenschaften.'

CANNOCK, England, an urban district and parish in West Staffordshire, eight miles north-northwest of Walsall, in the district known as Cannock Chase, which is rich in coal and ironstone. Manufactures of boilers, edge-
tools, bricks and tiles are carried on, and there are numerous collieries. Pop. (1911) 28,586.

CANNON, Annie Jump, American astronomer: b. Dover, Del., 11 Dec. 1863. A student at Wellesley College, she was engaged in 1897 as staff assistant in Harvard College observa-
tory and in 1911 became curator of astronomical photographs. During her photographic work she discovered three new stars, one spectroscope binary and 150 variable stars, and completed a voluminous bibliography of variable stars with 45,000 references. She also wrote 'Second Catalogue of Variable Stars' (1907); 'Maxima and Minima of Variable Stars of Long Period' (1909); and 'With William Paton Fleming' (1911).

CANNON, Frank Jenne, American politi-
cian, son of George Q. Cannon (q.v.): b. Salt Lake City, Utah, 25 Jan. 1884. He was gradu-
ated from the University of Utah in 1878, and in the same year engaged in the printing busi-
ness, acquiring interests also in western mining enterprises. He was a delegate to the Republi-
can National Convention in 1892 and 1896, and a delegate to Congress from the Territory of
Utah in 1895. In 1896, against the wishes of the Mormon leaders, he became candidate for and was elected to the United States Senate, serving until 1899. As a result of political differences, he separated himself from the Mormon Church and, joining the Democratic party in 1900, was State chairman from 1902 to 1904. He became managing editor of the Rocky Mountain News and contributed articles on political subjects to magazines. He has published "The People of Utah" (1876), "Harvey J. O'Higgins (1911), and 'Brigham Young and the Mormon Empire' (1913). Both works are exposés of conditions in Utah under the Mormon domination.

CANNON, George Quale, American politician: b. Liverpool, England, 11 Jan. 1827; d. Monterey, Cal., 12 April 1901. He went with his parents to Nauvoo, Ill., in 1844, and was one of the earliest settlers in Salt Lake City. He was a member of the legislative council of Utah in 1855-65 and 1869-72, and was a delegate to Congress from 1872 to 1881, where he was seated only after a long fight against him on the ground that he was a polygamist. At a Constitutional Convention at Salt Lake City in 1872 he was chosen to present the constitution and memorial to Congress for the admission of the Territory into the Union as a State. He translated the 'Book of Mormon' into the Hawaiian language. He held various positions of importance in the Church, including that of first councilor after 1880, and wrote a number of pamphlets in support of Mormonism, and a biography of Joseph Smith (1888). His son, Frank J. Cannon, was elected one of the first two United States senators from Utah in 1896.

CANNON, Henry White, American bank president: b. Delhi, N. Y., 27 Sept. 1850. He was educated at Delaware Academy in his native town and engaged in banking. He was comptroller of the currency, 1884-85, and was a member of the International Monetary Conference at Basel in 1888. He is director of several important railroads and of the Manhattan Trust Company, and was president of the Chase National Bank in New York, 1886-1904. He is vice-president and director of the United States Guarantee Company, and of the Brooklyn Union Gas Company.

CANNON, James Graham, American financier: b. Delhi, N. Y., 1858. A brother of Henry White Cannon (q.v.), besides being director in several banks and industrial corporations, he was for some time president and director of the Fourth National Bank of New York. He is author of the standard work 'Clearing Houses; Their History, Methods and Administration' (New York 1908), and of an address 'Clearing Houses and Currency' (18)."

CANNON, Joseph Gurney, American politician: b. Guilford, N. C., 7 May 1836. Admitted to the Illinois bar, he was State's attorney of Vermillion County, 1861-68. He was a member of Congress from 1873 to 1891, and again, 1893-1903. He was 20 years on the Committee on Appropriations, and its chairman in the 55th and 56th Congresses. He was speaker of the House of Representatives in the 59th and many succeeding Congresses. His autocratic power was greatly limited by the House resolution of 19 March 1910, enlarging the Committee on Rules and taking its appointment from the speaker and giving it to the House. In 1911 Champ Clark, Democrat, succeeded him as speaker, and in 1912 he failed of re-election as representative but was elected from the 18th Illinois District to the 64th Congress (1915-17). He was a leader on the reactionary branch of the Republican party, to whose methods the downfall of the party in 1912 was generally attributed.

CANNON, William Austin, American botanist: b. Washington, Mich., 23 Sept. 1870. He studied at the University of Michigan and at Columbia University and from 1903-05 was resident investigator at the Desert Laboratory. He became staff member in 1905, and 1911-12, was acting director of the department of botanical research of the Carnegie Institution. He is author of 'Studies in Plant Hybrids' (1903); 'Studies in Heredity as Illustrated by the Trichomes of Species and Hybrids of Jug- lans,' (1907); 'Root Habits of Desert Plants' (1911); 'Botanical Features of the Algerian Sahara' (1913).

CANNON. See Ordnance.

CANNON-BALL TREE, a large tree (Couroupita guianensis) of the family Lecy-thidaceae, a native of Guiana, with a hard, woody, globular fruit six or eight inches in diameter—whence the name. It bears white or rose-colored flowers growing in clusters on the stem and branches. The pulp of the fruit is pleasant to eat when fresh.

CANNSTADT, kahn'stahrt, CANNSTATT, or KANSTATT, Germany, town in Württemberg, in a beautiful and fertile district on the Neckar, two miles northeast of Stuttgart with which it was incorporated in 1905. Its antiquity is proved by the Roman remains found. It has celebrated and much-frequented mineral springs. The Neckar is here crossed by three bridges. The newer portion of the town is well built, with handsome streets and pleasant recreation grounds. Overlooking the Neckar, near by, is the castle of Wilhelma. Of late years Cannstadt has entered to a considerable extent into industrial pursuits, and has railway shops, and flourishing manufactures of machinery, cooking utensils, woolen goods, furniture, electrical supplies, etc. It suffered much during the Thirty Years' War and through the repeated invasions of the French. It was the scene of the victory of the French under Moreau over the Austrians under Arch- duke Charles, 21 July 1796. Pop. 26,497. Con- sult Beck, 'Cannstatt and the New Neckar Bridge' (Cannstatt 1893).

CANO, kahn-no, Alonzo, Spanish painter, sculptor and architect: b. Granada, 19 March 1601; d. 5 Oct. 1667. When quite young he went to Seville, where he studied both painting and architecture, and at Madrid in 1637 he became intimate with Velasquez who helped him in many ways, among others by introducing him at court where he became a court painter in 1639. He was forced to leave Madrid in 1644 because he was suspected of having murdered his wife; and he went to Valencia. He returned to Madrid and was there subjected
to the rack. But his innocence being proved he was sent to Granada where he spent the rest of his life and where he was made a canon, and chief architect of the cathedral, to which he devoted much of his attention, carving statues and painting pictures for it. He became so distinguished in each of these arts that his countrymen called him the Michelangelo of Spain, although the title is due more to his versatility than to any resemblance in points of genius to the great Florentine. His 'Conception of the Virgin,' in the church of San Ildefonso, at Toledo, is considered his masterpiece. His works in sculpture and architecture are numerous. Among the best of these works are his series of pictures 'The Seven Joys of the Virgin,' his busts of Adam and Eve and his various statuettes of the Virgin. In carefulness of design and in the execution of his work Cano ranks high; but in the mastery of coloring he is inferior to the really great artists of his day. His contemporaries ranked him with Velasquez, but time has not so exalted him.

CANO, Juan Sebastian del, Spanish navigator: b. Guetaria, about 1460; d. on the Pacific, 4 Aug. 1526. He was one of the first to circumnavigate the globe (1522), as captain of one of Magellan's fleet, which he afterward commanded. In 1525 he was placed second in command of a similar expedition, and became its commander by the death of Loaisa.

CANO, Melchior, Spanish theologian: b. Tarancón 1523; d. Toledo, 30 Sept. 1560. He was a member of the Dominican order and an opponent of the Jesuits. He was professor of theology at the universities of Alcantara and Salamanca, and was made bishop of the Canaries, but did not live in his see. He wrote 'De Locis Theologici' ('On the Source of Theological Knowledge') 1563) and many other theological works. He was sent as the representative of the Crown to the Council of Trent in 1551 to maintain the court theological traditions. His complete works were published at Padua in 1720.

CANOE, ka-noo', a light boat designed for propulsion with a paddle or paddles. The term is very commonly used to designate the small vessels used by uncivilized people living near the water. The name is of West Indian origin, the Carib word being canoo. Canoes are built in divers forms and of various materials. The primitive canoes were light frames of wood over which skins or bark of trees were stretched. The most common form was the hollowed tree-trunk; the excavation, before the advent of adequate cutting-tools, being accomplished by means of fire. This form is of wide distribution, being found in Africa, South and Central America, China and the islands of the south Pacific and Indian oceans. In the form known as a "dugout" it is common in the United States. Among the island races of the Pacific the stability of the canoe is largely increased by the adoption of an oceftiier, which, of varying forms, prevents capsizing on one side by its weight and leverage, and on the other by its buoyancy. Many of these islanders sew planks together to form their canoes, making the joints watertight by means of gums, etc. Others use double canoes united by a strong platform. Such a vessel is capable of carrying a number of persons and a considerable lading. In South America, where large trees are abundant, very large canoes are constructed. The same is true of Africa, where the war-canoes of the native kings carry very large crews. They are often fantastically carved and ornamented.

As stated above, the propelling force of the canoe is usually the paddle, but sails are often used, particularly on sea-going craft.

The Esquimaux canoe is known as a kayak. This consists of a light wooden or balsa frame covered with seal-skins sewed together with sinews. The skin covering extends across the top, forming a water-tight deck with but one opening amidships to admit the boatman. A loop is fitted to this opening, and after the boatman has entered he fastens himself in by means of an apron so that the whole boat is water-tight, and he becomes, as it were, part of the craft. So intimate is this union, and so skilful are the Esquimaux in the management of their kayaks, that with a twist of his paddle capsizes the craft and turn completely around under water, coming up again on the opposite side to that he went over. The paddle is about 10 feet long and double-bladed. The oomiak, or women's boat, is also made of seal-skins sewed over a framework; but it is of large, even clumsy build, and but for its propulsion by paddles might be classed as a boat rather than as a canoe. It is designed as a transport for women, children and household goods rather than for the chase, for which the kayak is principally used.

The Aleuts build large skin boats, somewhat resembling the Esquimaux oomiak, which are propelled by paddles. Such a boat is known as a bidarka. Other tribes of the west coast build large canoes of wood, the war-vessels being, like those of Africa, curiously decorated. A peculiar form of canoe is found in the Kootenai district and on the Columbia River. While most canoes are constructed with the bow and stern either perpendicular or with a flaring overhang, these are shaped, both at bow and stern, like the ram of a warship. In other words, the greatest length is along the bottom. These canoes are generally about 15 feet long and are constructed with a light framework of cedar covered with spruce or white-pine bark. This bark is cut off in one piece in the spring, when the sap is running, and is turned inside out, bringing the smooth side in contact with the water. The canoes are sewed with rawhide or tendons, and cracks and knot-holes are stopped with resin. Two squaws will make a canoe in four or five days; the chief difficulty being to get the bark off whole and to turn it wrong side out successfully.

The North American Indians have brought the canoe to its highest state of perfection. With the most frail material, birch bark, they construct a craft so light that it may be carried by one man, and yet so strong and buoyant that it will carry a very considerable load. A framework of light but tough wood is covered with sheets of birch bark, which are sewed together, the seams being waterproofed with resinous gums. They are propelled by means of a single-bladed paddle, which is dipped on one side only (a slight twist correcting the
tendency to swerve from a straight line), or alternately on either side. The use of the birch-bark canoe by the Indians of the United States is rapidly becoming a thing of the past; but the art of building them has been preserved by their construction as pleasure craft and fishing boats.

A form of canoe of recent invention is used solely for pleasure. About 1865 John MacGregor, inspired by a love of adventure, sought recreation on the rivers and fjords of Europe and Asia, as well as on the coasts of Egypt and Palestine. He developed his model from the Esquimaux kayak, and evolved a clinker-built craft of cedar, about 14 feet long and 2 feet in beam, with a depth of 10 inches to 16 inches, entirely decked over with the exception of a "well" in which the canoeist sits. This is propelled by means of a double-bladed paddle, but a short mast enables the carrying of a sail. In a canoe of this type, which he named the Rob Roy, MacGregor cruised on the Danube, the Jordan, the Nile, the Seine and on Norwegian fjords. From this early model other forms have been evolved, notably the Nautilus and Shadow types. Water-tight compartments ensure permanent buoyancy. Centre-boards control the way when under sail on a wind. The interior space is so arranged as to provide a sleeping-place for the cruiser.

There are many canoe clubs in the United States, England and Canada, and the canoe may be seen on all the coasts of the Great Lakes and inland waters of those countries, as well as on the continent of Europe. Consult MacGregor, 'A Thousand Miles in the Rob Roy Canoe' (1866); 'The Rob Roy on the Baltic'; Powell, W. B., 'Canoe Traveling' (1871); Alden, W. L., 'Canoe and the Flying Frog' (New York 1878); Hayward, T. D., 'Camping out with the British Canoe Association'; Vaux, C. B., 'Canoe Handling' (New York 1888); Stephens, 'Canoe and Boat Building' (New York 1881); 'Canoes and Canoeing,' 'Spalding's Athletic Library' (New York, annually).

CANON, kâ'nôn, Johann, Austrian painter: b. Vienna, 13 March 1829; d. there, 12 Sept. 1885. He studied with Rahl, but imitated the old masters more closely. He entered the Austrian army and in 1848-55 was lieutenant of cuirassiers, but even while in the army had given more attention to painting and finally devoted his whole time to it. His name first became known through his picture 'The Fishermaiden,' exhibited in 1858. His work includes genre pictures, historical paintings, and portraits; the latter are thought to resemble Rubens or Van Dyck in style. Among his other paintings are 'Cromwell Beside the Corpse of Charles I'; 'The African Lion Hunt'; 'Flamingo Hunt'; and the 'Fish Market.' Works of art belonging to this artist are in Vienna, Karlsruhe and New York. There is a monument dedicated to him at Vienna. Consult his obituary in 'Zeitschrift für bildende Kunst' (1886).

CANON. See CANYON; GRAND CANYON.

CANON (Greek, a rule, measure or standard). 1. In the arts.—When art has succeeded in producing beautiful forms the question arises, with what proportions beauty of form is united. At present we find various opinions, and consequently imitators, inferior to them in talents, scrupulously follow their results, and naturally ex-

alted some existing work into a model for every performance. Among the Greeks the celebrated statuary Polykleitos (452-412 B.C.) first instituted such inquiries; and as he generally represented youthful, pleasing figures, it is probable that he fixed the standard of beauty in the youthful form. The canon (the model statue) of Polykleitos was accordingly a statue which was made principally for the purpose of showing the beautiful proportions of the human form in a youth just ripening into manhood. No copy of it is known to exist, but the pupils gave his model of proportion a quiet, simple attitude, without any strong distinguishing marks. His successors imitated it without deviation. Polykleitos was not the only Greek artist who pursued such investigations respecting the proportions of form. Among the moderns, Dürer and Leonardo da Vinci have devoted themselves to similar inquiries.

2. In Scriptural literature, a term employed to designate the collection of books containing the rule or statute of Christianity; that is, the canonical books of the Holy Scriptures. The canon of the books of the Old Testament, as contained in the Hebrew Bible, receives in this form equal respect among all Christians, because Christ and the apostles have expressly appealed to them, and in this way pronounced them writings inspired by God. There are certain books, however, belonging in subject to the Old Testament, but whose canonical character the Jews did not acknowledge, and which the apostles class together under the head of Apocrypha, and reject from the canon. For these there is only a Greek, and not a Hebrew, text. The Western Church accepted them as canonical in the African council, about the end of the 4th century; but the opinions of the clergy respecting them remained for a long time divided. Saint Jerome denied their canonicity, and many theologians coincided with him. The Roman Catholic Church finally declared them canonical in the Council of Trent. (See APOCRYPHA.) Respecting the number belonging to the canon of the New Testament, the opinions of Christians were much divided till the 6th century. As early as the 2d century the separation was made into the Evangelion (the four Evangelists) and the Acts and Epistles of the Apostles). The five historical books, the Epistles of Paul, the First Epistle of Peter, and the First Epistle of John were universally acknowledged to be genuine in the 3d century; hence Eusebius, in his 'Ecclesiastical History,' written about 325 A.D, calls them Homologomena (universally received). The other five Catholic epistles (Second of Peter, Second and Third of John, Jude and James) he calls Antilegomena (doubtful, not universally received). At that time, the Epistle to the Hebrews was considered genuine by most persons, and the Apocalypse by many. These books were received in the second half of the 4th century in the Egyptian Church (where Athanasius first used the term canonical), and in the Western Church. In the Eastern Church, properly so called (the dioceses of the patriarchs of Constantinople, Antioch and Jerusalem), only the Catholic epistles were of canonical authority at that time; the Apocalypse and the New Testament have since remained unaltered, and the Protestant churches hold it common with
the Greek and Catholic churches. The results of critical examinations of the genuineness and canonical character of the single books of the Bible, even when they were unfavorable to the books, have produced no alteration in the established canon. The reasons of the ancient fathers of the Church for or against the canonical character of the biblical books were merely historical and traditional, and built on philosophical grounds are more subject to be affected by extraneous influences. For bibliography see Bible.

3. In ecclesiastical use, a rule or law of doctrine or discipline as established by ecclesiastical authority. The term is further applied to various matters of church organization and ceremony; also to books containing the rules of religious orders, etc., and to a list or catalogue of acknowledged and canonized saints in the Roman Catholic Church.

Another distinctive ecclesiastical use of the term is that which designates a dignitary possessing a prebend, or revenue allotted for the performance of divine service in a cathedral or collegiate church. Canons were originally priests who lived in community, appointed to assist the bishop in his duties, and supported by the revenues of the bishopric. Secular canons are those who, in progress of time, have left off the custom prevalent in monasteries of living a community life, and have the privilege of enjoying the returns of their respective benefices. The obligations of the canons are contained under three heads: (1) The duty of residing in the place where the church they belong to is situated; (2) assisting at the canonical offices which are celebrated in the church; and (3) attending the meeting of the chapter at the appointed times. They cannot be absent from their benefices for a longer period than three months, and are obliged to sing or recite their office in choir. In their collective capacity they are called a chapter, and form the council of the bishop. In each chapter there are dignitaries. The name was originally applied to all the clergy, but was afterward confined to those who were connected with the cathedral church, or to specially privileged churches.

4. In music, with the ancient Greeks, the term canon signified what now is called monochord. At present it signifies a composition in which the several voices begin at fixed intervals, one after the other, and in which each successive voice sings the strain of the preceding one. In Italian, therefore, it is called fuga di conseguenza; in Latin, canon perpetuus, or continuous fugue; in German, Kreisfuge (circular fugue). Sometimes each voice begins with the same, sometimes with different notes. The phrase or passage for imitation is called the theme or subject, the imitation, the reply. Canons may be finite or infinite. The former end, like any other compositions, with a cadence, with a conformity to the theme. It is observed that the theme is begun again before the parts which follow are concluded. A canon may consist of two, three, four or more voices. Canons differ from ordinary fugues; for, in the latter, it is sufficient that the subject be strictly repeated and imitated according to the laws of counterpoint; but, in the former, it is essential that the subject be strictly repeated by all the succeeding parts; which repetition may be made in the unison or octave, the fourth, or the fifth, or any other interval of the scale. There are several other canons, as canon polymorphus, canon per dimensionem and canon per augmentationem, and also a canon of a composition in which one voice repeats for a short time another is called, improperly, a canon. Consult Ouseley's 'Treatise on Counterpoint, Canon, and Fugue' (1869).

5. In poetry put into the name given to a large type which is so called from the early use of it for printing the canon of the mass and the Church service-books.

CAÑON CITY, Colo., a city and county-seat of Fremont County, situated on the Arkansas River, near the mouth of the Grand Cañon, and on the Denver and Rio Grande, and the Atchison, Topeka and Santa Fe railroads. It is a well-known health resort, over 5,000 feet above the sea-level, with an excellent climate and hot and cold mineral springs. It is the seat of the State penitentiary and Odd Fellows' sanatorium and home, an academy for young women, and has a Carnegie library, two hospitals, seven public parks and a hot-water natatorium. The city has abundant water power, with an excellent gravity system; the soil is fertile, and in the vicinity are rich deposits of iron, coal, silver, copper, marble, limestone and petroleum. Fruit growing is an important industry, and there are canning and brick and tile factories, a large smelter and a reduction mill. Pop. (1910) 5,162.

CANON FINCH, TowHeE, WREN. See Finch, Towhee, Wren.

CANON LAW. Canon law is so named because it consists of rules or canons, which are established to guide the faithful to eternal happiness. In a strict sense, canon law comprises only those laws which emanate from an ecclesiastical authority that has supreme and universal jurisdiction. In a wide sense, it takes in also those laws enacted for the good of the faithful by anyone having ecclesiastical authority. The sources or fountains from which canon law has originated are sacred Scripture; divine tradition; laws made by the Apostles and Church Fathers; decrees of the sovereign pontiffs; ecumenical councils; certain congregations of cardinals under orders of the Pope; custom, which, however, could in no case be contrary to divine law, common sense, good manners, public order or the spirit and the rights of the Church. The Old Testament contains three sorts of precepts, moral, ceremonial, judicial. The moral code remains in full force under canon law the ceremonial and judicial laws have lapsed. The New Testament is the chief source of ecclesiastical law. It contains also dogmas of faith, but with these canon law does not deal except indirectly. By tradition is meant a doctrine not written by its first author, but conveyed by word of mouth. Usually it is subsequently written into writing. Traditions, considered in their source, are divine or human. Divine are those which have God for their author, and which the Apostles received either directly from Christ or by the suggestion of the Holy Ghost, are transmitted to the Church as apostolic if they originate with the Apostles, or ecclesiastical if they come from the successors of the Apostles, called bishops of the Church. Divine traditions bind all the faithful; human
only those of the localities and times to which they are applicable. Some of the enactments attributed to the Apostles are the Apostles' Creed; abstinence from things sacrificed to idols and from blood and from things strangled, part of which prohibition has lapsed; the substitution of Sunday for the Sabbath of the Jews; the institution of certain feast days; the fast of Lent. The sentences of the Fathers, approved by the Church and made into universal laws by councils or the Roman pontiffs, are part of canon law. These sayings were not inserted into the canonization of the Church, but in the office of the Church, especially in Spain. After the emperors assumed the Christian religion, ecclesiastical legislation became important, and the laws of the Church were therefore in the year 438 inserted in his collection by the Emperor Theodosius II. Valentinian III afterward adopted this collection for the West. About this time—the latter half of the 5th century—a compilation was made of the so-called apostolic canons and constitutions together with decrees of some of the councils. Originating in the 6th century, John Scholasticus being the first to do this in the East in that century, and Regino first in the West in the beginning of the 10th century. To the student it is evident that the constitutions or decrees of the Roman pontiffs constitute the chief source of canon law; in fact, the entire canon law in the strict sense of the term is based upon the legislative authority of the Pope. To understand this it is necessary to recall that in the Catholic doctrine all authority in the Church is only by the grace of Christ in the office of priesthood, but also in the matter of jurisdiction or power of ruling. Catholic writers hold that the primacy or headship in the Church was established by Christ in Peter before the priesthood was entrysted to him and the other Apostles, the purpose of the Saviour being to effect unity in his organization. The Church thus organized is a spiritual monarchy; elective it is true, but not an aristocracy or democracy. Other religious organizations hold quite the opposite doctrine and would make their unity a coalition of equal parts. This point of primacy of the Roman pontiff is also the line of separation between the canon law of the West and that of the separated Greek and the Russian churches, the review of which is given later in this article. Ecumenical councils, whose decrees are a source of canon law, are those meetings of the bishops of the Church throughout the world, which are held under the presidency of the Pope or his legates, and whose acts are by him confirmed. There were 20 councils recognized as ecumenic; the first being that of Nicaea in 325; the latest that of the Vatican in 1870.

During the first three centuries, the Church was virtually a continuation of the Scriptures, and the rules laid down by the Apostles and bishops, as occasion required. Thus Clement, the disciple and successor of Peter, mentions the rule given by the Apostles concerning the succession of bishops, and Ignatius the Martyr, in his epistles, exhorts his fellow bishops diligently and tenaciously to observe the traditions of the Apostles. Thus, too, in the controversy concerning the celebration of Easter, the contests on each side alleged the apostolic tradition. But councils were held at Ancyra and Neo-Cesarea in 314, at Nicaea in 325, at Antioch in 322, at Sardica in 347, at Gangra from 362 to 370, at Laodicea between 337 and 381, at Constantinople in 381, at Ephesus in 431, and in the council of Chalcedon in 451 a collection of canons of council was read and partly authorized for the entire Church. With the exception of those of Sar- dica, which are in Latin, the canons of all these early councils were formulated in Greek. The name of the compiler of this first collection is unknown and few of these early canons have reached our times, only their tenor being known through subsequent use in the Western Church, especially in Spain. After the emperors assumed the Christian religion, ecclesiastical legislation became important, and the laws of the Church were therefore in the year 438 inserted in his collection by the Emperor Theodosius II. Valentinian III afterward adopted this collection for the West. About this time—the latter half of the 5th century—a compilation was made of the so-called apostolic canons and constitutions together with decrees of some of the councils. Originating in the 6th century, John Scholasticus being the first to do this in the East in that century, and Regino first in the West in the beginning of the 10th century.

To the student it is evident that the constitutions or decrees of the Roman pontiffs constitute the chief source of canon law; in fact, the entire canon law in the strict sense of the term is based upon the legislative authority of the Pope. To understand this it is necessary to recall that in the Catholic doctrine all authority in the Church is only by the grace of Christ in the office of priesthood, but also in the matter of jurisdiction or power of ruling. Catholic writers hold that the primacy or headship in the Church was established by Christ in Peter before the priesthood was entrysted to him and the other Apostles, the purpose of the Saviour being to effect unity in his organization. The Church thus organized is a spiritual monarchy; elective it is true, but not an aristocracy or democracy. Other religious organizations hold quite the opposite doctrine and would make their unity a coalition of equal parts. This point of primacy of the Roman pontiff is also the line of separation between the canon law of the West and that of the separated Greek and the Russian churches, the review of which is given later in this article. Ecumenical councils, whose decrees are a source of canon law, are those meetings of the bishops of the Church throughout the world, which are held under the presidency of the Pope or his legates, and whose acts are by him approved. There were 20 councils recognized as ecumenic; the first being that of Nicaea in 325; the latest that of the Vatican in 1870.

During the first three centuries, the Church was virtually a continuation of the Scriptures, and the rules laid down by the Apostles and bishops, as occasion required. Thus Clement, the disciple and successor of Peter, mentions the rule given by the Apostles concerning the succession of bishops, and Ignatius the Martyr, in his epistles, exhorts his fellow bishops diligently and tenaciously to observe the traditions of the Apostles. Thus, too, in the controversy concerning the celebration of Easter, the contests on each side alleged the apostolic tradition. But councils were held at Ancyra and Neo-Cesarea in 314, at Nicaea in 325, at Antioch in 322, at Sardica in 347, at Gangra from 362 to 370, at Laodicea between 337 and 381, at Constantinople in 381, at Ephesus in 431, and in the council of Chalcedon in 451 a collection of canons of council was read and partly authorized for the entire Church. With the exception of those of Sardica, which are in Latin, the canons of all these early councils were formulated in Greek. The name of the compiler of this first collection is unknown and few of these early canons have
ecclesiastical constitutions issued from the emperors, as from Leo Philosophus in 911, from Constantine Porphyrogenitus in 961, from Alexius Comnenus in 1118, from Isaac Alexius in 1185–90. The resolutions of synods summoned by the patriarchs of Constantinople, epitapes of renowned bishops and their decisions, formed another addition to the canon law of the Eastern Church. The first commentary on the Greek codex was undertaken by Theodore Prodromos in the 8th century. The second, following the enumeration of a commentary on the Nomo-canon of Doropater, the monk John Zonas composed a comprehensive verbal interpretation in 1120, using the collection of Photius as a basis. Fifty years later, Theodore Balsamon made a commentary with a view to practical questions, comparing the canons with the civil law and insisting that Justinian's maxims only applied when conformable to the Basilica. He added many matters not found in the collection of Photius. Epitomes of canon law were composed at a comparatively early period, and the author of the first of which appears to have been Stephen of Ephesus in the 5th century. There is a synopsis by Aristenus augmented by Alexius Aristenus in 1160, and another by Arsenius, a monk of Mount Athos, in 1223. Constantine Harmenopoulos in 1390 composed an epitome of the spiritual law in six parts, using, with some omissions, the collection of Photius as altered by Zonas. In order to reduce canon law to a more practical form than it appeared in the collection of Photius and at the same time produce a more comprehensive work than these epitomes, Matthew Blastares drew up his syntagma in 1335, divided into chapters of different lengths and arranged according to the principal word of these rubrics, the numbers of the chapters commencing anew under each letter. Each chapter begins with the ecclesiastical law, followed by the civil law applicable to it, without, however, mentioning the source of the latter. This work came into very general use among the clergy. The collection of Photius and the syntagmata of Blastares continued in use under the Turkish rule and were alike termed Nomo-canon and, metaphorically, the 'Rudder.' The collection and interpretation of Zonas also obtained considerable attention. Many of the manuscripts of the Nomo-canon many extracts were translated into modern Greek up to the 18th century, and several textbooks composed for the use of the clergy, some of which were printed in Venice. Lastly, a comprehensive collection was published in 1800 at the instance of the patriarch and synod. It contains the old Greek text of all the authentic canons of councils since Photius and Zonas, to which are added interpretations of the authentic commentators in modern Greek, especially those of Zonas and Balsamon. In the interpretation, the canons of those fathers are taken into account which had not been confirmed by any general synod, but had obtained a canonical authority. Nothing was inserted from the municipal law works which did not agree with the canons. Several appendices were added, including formulas for ecclesiastical business, and upon these and similar collections is founded the present law of the Greek separate Church. The Russian followed the Greek Church in adopting compilations of Church law up to the end of the 15th century.

In 1550 certain regulations respecting the jurisdiction of bishops were introduced. Some canonical epistles and rules drawn up at councils are used in addition to the Greek codex, and manuals adapted to the country have been compiled therefrom. Peter the Great in 1721 changed the chief see of the Russian Church from a patriarch into the Holy Synod, by decrees of which the Church to-day is ruled. By an arrangement lately made with the Roman pontiff the bishops and priests under Roman jurisdiction are subject to the civil laws of the Russian empire, and to prevent complications, Russia, besides a resident minister and two secretaries, has at the Vatican a representative agent for ecclesiastical affairs.

In the Western or Latin Church the canons of Nicaea and Sardica were the only code publicly received up to the end of the 5th century. About this time the Spanish translation of the Greek code was turned into barbarous Latin, and became known as the Priscans. The decrees of the 5th and 6th centuries were added to the canons of the Greek code, as found in the Priscans, but it seems that Dionysius the Little, about the year 500, was the first to formulate a collection of the canons and the decreals. He had previously made a collection of the concilia for Stephen, the bishop of Dalmatia. The deacon Theodosius later made a new collection founded on the old Spanish and the Dionysian. A third collection termed the Avellanian, valuable for the historical documents it contains, appeared in the latter half of the 6th century. These, however, were superseded by a second edition of Dionysius, made probably in 731 under Pope Gregory II. In this edition some decrees overlooked previously were added, together with an appendix consisting of the statutes of the Roman pontiffs from Linus downwards, those up to Sercius, however, being given only in an historical form as no longer actually in existence. The German conquerors of Italy in 476 did not, although Arian, interfere with the laws by which the Church was governed, but when Justinian reconquered Italy he introduced his Novelle in the Julian translation in place of the codex of Theodosius II, and this order of things was later upheld by the Lombards. From the materials of the codex the deacon Fulgentius Farrandus made the first collection in 547, termed Brevisato. This was an excerpt in 232 numbers of nearly all the Greek canons, including the Nicaeans, to which was added the African concilia under Gratian in 348-49, under Genethlius in 390, and that of Carthage in 419 with its 33 canons, together with 304 taken from synods as well as an extract from the canons framed at Hippo in 393. The second African work was the Concordia of Bishop Cresconius in 690, founded upon the Dionysian, but arranged in 300 titles instead of in chronological order. This work was incorporated with the Dionysian and appeared under the name Breviarum. But the Arabs now put a sudden stop to all further development of canon law in this quarter. As early as the 5th century, as noted above, there was in Spain a translation of the Greek canons; in the 6th century Martin of Braga made a collection of canons, but in the 7th century Isadore of Seville held two councils, half church, half civil, the canons of which may be said almost
to have formed the basis of the constitutional law of Spain in both Church and State down to the 15th century. The collection of canons known as Collectio Isidoriana or Hispana was divided into two parts; the first containing the classified series of Greek, African, Frankish and Spanish canons, and the second the decrets from Pope Damasus in 366 to Gregory the Great in 604. In the 5th century an extensive but confused collection of councils and decrets was compiled in Gaul under Gelasius. It was founded upon the older Spanish version and some peculiar version of the canons of Nicea and the Prisca. Out of it sprang several other collections; the first in the middle of the 6th century, containing the councils of Nicea, and of Sardica, some Frankist concilia and papal decrets; the second of the same date containing Greek, African and Gallican canons, and papal decrets in a confused order; the third in the 7th century, containing 103 numbers, many decrets, Frankist, German and Italic. A fourth and a fifth collection of the same century contained chiefly Frankish and Spanish conciliar decrees. After Charlemagne in 774 on his first visit to Rome he had received from Pope Hadrian a copy of the Digest which was necessary for him, he had it sanctioned in a synod at Aix-la-Chapelle as the codex canonum for the Frankish empire. In addition to these principal works many of the bishops compiled capitularies for their own dioceses, as Boniface of Mayence, Theodulf of Orleans, Hinmar of Rheims. The 'Hispana' circulated among the Franks in a more or less corrupt form. One edition, which appeared between the years of 829 and 857, has caused great controversy and is known as 'Collectio Pseudo-Isidoriana', or False Decretals. The author called himself Isadore Mercator, and the name led many to believe the work that of Isidore of Seville. The best evidence that Levites Benedict of Mainz was the compiler, but no purpose for the foregoers in the 6th century his work has been conclusively shown. After the preface and some minor apocryphal documents, the first part contains 50 of the apostolic canons taken from 'Hispana' and 60 supposed decrets of the Popes from Clement in 92 to Melchisedec in 1047. The second part consists of chiefly canons taken from the 'Hispana.' In the third part, founded also on the 'Hispana,' the compiler has interpolated 35 decrets. A supplement contain many brief regulations regarding processe against bishops, said to be by Capitula Angilramni, a bishop of Metz. The collection was regarded as genuine by all canonists and theologians for 700 years from the 9th to the 15th century. Cardinal Nicholas of Cusa in the 15th century expressed doubts of the genuineness of some of its contents. In the following century religious bitterness overshadowed scholarly inquiry, but it is now admitted by Protestant writers that the compilation was produced, not in the interest of the Pope but of the barbarous bishops in order to protect themselves against oppression by temporal rulers on the one hand and Church councils on the other. For this reason such insistence is found in the collection on the right of appeal to the Pope in every minor cause of a bishop and also that the Pope's permission is necessary to the holding of a provincial synod. The sources from which the compiler chiefly borrowed his materials were the Bible, the Fathers, genuine canons and decrets, Roman law, the works of Rufinus and Cassiodorus on Church history and the lives of the Popes in 'Liber Pontificalis.' Of the supposed decrets a large number are authentic, although antedated and ascribed to earlier Popes to give them the value of antiquity, while others embody the traditional contents of actual but lost decrets. The influence of the pseudo-Isidorian collection has been much exaggerated, for it should not be supposed either in the faith or the discipline of the Church, since it merely put into enactments the prevailing ideas and doctrines of that period on Church government. Had it introduced a violent change the innovation would have caused a speedy inquiry into the genuineness of the work. However, it cannot be doubted that a written text often in controversy is a more forcible argument than traditional law, and hence the false decrets naturally exerted some influence.

To meet the necessity of rendering canon law more accessible from the 10th to the 12th century at least 36 compilations were made, only the authors, titles and dates of which seem necessary for us, he had lit sanctioned in a synod at Aix-la-Chapelle as the codex canonum for the Frankish empire. In addition to these principal works many of the bishops compiled capitularies for their own dioceses, as Boniface of Mayence, Theodulf of Orleans, Hinmar of Rheims. The 'Hispana' circulated among the Franks in a more or less corrupt form. One edition, which appeared between the years of 829 and 857, has caused great controversy and is known as 'Collectio Pseudo-Isidoriana', or False Decretals. The author called himself Isadore Mercator, and the name led many to believe the work that of Isidore of Seville. The best evidence that Levites Benedict of Mainz was the compiler, but no purpose for the foregoers in the 6th century his work has been conclusively shown. After the preface and some minor apocryphal documents, the first part contains 50 of the apostolic canons taken from 'Hispana' and 60 supposed decrets of the Popes from Clement in 92 to Melchisedec in 1047. The second part consists of chiefly canons taken from the 'Hispana.' In the third part, founded also on the 'Hispana,' the compiler has interpolated 35 decrets. A supplement contain many brief regulations regarding processe against bishops, said to be by Capitula Angilramni, a bishop of Metz. The collection was regarded as genuine by all canonists and theologians for 700 years from the 9th to the 15th century. Cardinal Nicholas of Cusa in the 15th century expressed doubts of the genuineness of some of its contents. In the following century religious bitterness overshadowed scholarly inquiry, but it is now admitted by Protestant writers that the compilation was produced, not in the interest of the Pope but of the barbarous bishops in order to protect themselves against oppression by temporal rulers on the one hand and Church councils on the other. For this reason such insistence is found in the collection on the right of appeal to the Pope in every minor cause of a bishop and also that the Pope's permission is necessary to the holding of a provincial synod. The sources from which
old Italian and Spanish-Saxon and Roman records. The 24th is by Bourgo, bishop of Satrim in 1089, and is in 10 books. The 25th is in two books and belongs to the 12th century. The first chapter is inscribed from the Primate of the Roman Church and is published with the Dionysian collection. The 26th is the decree attributed to Ivo, bishop of Chartres, and the 27th in Quinpanoria in eight parts, also the same author, 1090. The 28th is a large manuscript collection; first of decreals; second of councils, third of fathers, then Roman and Frankish legal collections. The 29th was made under Pascal II in 1102-18 in seven books. The 30th is attributed to Hildebert, bishop of Tours, in 1134, and may be the same as the 10 books attributed to Ivo. The 31st is a manuscript in 15 books called the collection of Saragossa. The 32d is wholly extracted from the above. The 33d is taken from Burchard and Ivo. The 34th is a penitential book in nine titles belonging to the 12th century. The 35th belongs to the middle of the 12th century and is taken chiefly from Anselm of Lucca and the collection dedicated to Anselm and Simeon of Volterra. Lastly, Algemius of Liège in the beginning of the 12th century compiled a work on 'Justice and Mercy,' which contains a treatise on Church discipline in three parts, taken from Anselm and Burchard for the most part. Gratian, a Benedictine monk, composed at Bologna in the middle of the 12th century a scientific and practical work on the canon law with references and proofs. The first part treated of ecclesiastical administration, the second contained 20 legal positions, with their answers, the third part concerned the liturgy of the Church. The whole work is founded on previous collections and contains many mistakes. It was never approved by the Church though it obtained great authority and superseded all other collections. Other collections are by Cardinal Laborans in 1182, that of Bernard of Pavia in 1190, that by Gilbert, an Englishman, in 1203. The universities of Bologna and Paris at an early period began to study the rules of canon law and their opinion in controverted questions was considered decisive, and was termed the authority of the schools. Gratian's collection was made the basis of lectures in Bologna and teachers of the canons were called magistri and doctores decretorum. Their teachings were soon gathered together in books of commentaries. Soon after the collection by Gratian, the Extravagantes, or decrees not yet collected, were gathered together, there being between the years 1179 and 1217 14 different compilations, only five of which received the stamp of authority. Pope Gregory IX ordered a code to be published in which the entire body of law was to be properly arranged. What was useless was to be cut out, what was ambiguous was to change, and Pennafort was entrusted with this task, which he finished in the year 1233, and the collection was sent to the universities of Bologna and Paris with instructions that it was to be the sole authority. The whole work is divided into five books. The first treats of ecclesiastical judicature and of prelates; the second of civil suits; the third of civil causes before the episcopal forum; the fourth of betrothals and marriage; the fifth of judicial proceedings in criminal matters and of punishments. To these five books was added by Pope Boniface VIII, in 1257, the Decretals. This was followed in 1334 by the Clementine or collection of decreals by Pope Clement V. The Extravagantes of John XXII in 1334 and the Extravagantes Communes (73 decreals from Boniface VIII to Sixtus V) were gathered by authority and divided into parts of the code or Corpus Juris Canonici. Commentaries on the 'Corpus' were made by the doctors, and systematic works for the use of courts were published. In the 15th and 16th centuries legal literature seems confined to these efforts. But in the 16th century Pope Paul IV confined to a congregation of cardinals, with canonists as consultors, the work of revising and correcting the 'Corpus Juris.' Gregory XIII approved the work of the committee and an authentic edition was published in 1589, in which the glosses are retained, and on which all subsequent editions have been based. The corrections made by the commission are marked 'cor. Rom.' in the text. Two appendices were added, 1604 and 1614, the former of the other Septimus Decretalium, which contained the Extravagantes of Sixtus V in 1590. Neither is of public authority, but both are very useful and recognized by scholastic approval. Since then the Decretum Benedicti XIV, which contains the constitutions of that Pope, has been made of public authority. There is also a collection of papal bulls, called Bullarium Magnus Romanum, made up in 14 volumes, which was published in 1744 and continued in 1840; but it is very imperfect and only a private collection. Anyone who desires to know canon law must learn the 'Corpus Juris,' even though to-day many parts have been changed by the councils of Trent and the Vatican and new papal decrees. In the 'Corpus' itself the different portions stand as lex prior and lex posterior, so that in cases of contradiction the latest is preferred. With certain modifications the 'Corpus' still has the force of law in matters relating to ecclesiastical Latin law and their opinion in controverted questions is considered decisive, and was termed the authority of the councils. Extravagantes of Trent and the Vatican except the Bullarium of Benedict XIV, mentioned above, no authentic collection has been made of the various constitutions and laws made by the Roman pontiffs since the close of the 'Corpus.' Still every genuine decreal is part of the canon law. The same may be said of the decisions of the Raymundi confessor and of the Roman pontiffs which have the force of law, especially that of the council which authoritatively interprets the decrees of the Council of Trent. So evident was the need of a revision of canon law that ecumenist Vatican Council, held in 1870, proposals were made that a number of bishops to have a committee appointed, consisting of the most eminent canonists, to revise the 'Corpus Juris' or rather
prepare a new one, omitting whatever owing to changed times was no longer applicable. Nothing was done before the adjournment of that council, but Pope Pius X by a motu proprio provided more clearly indicated a special committee of cardinals, with a number of consultors, and a canonist from each nation, to revise thoroughly not only the 'Corpus Juris' but all the canon law of the Church, that general for the world and that special to the various nations. He himself was the president of the committee to which he assigned the following cardinals: Seraphin Vanutelli, Agliardi, Vincent Vanutelli, Satolli, Rampolla, Gotti, Ferrara, Cassetta, Mathieu Gennari, Cavicchioni, Merry del Val, Stuhrleher, Segus, Vives y Tuto and Cavagnis. Archbishop (later Cardinal) Gasparri was appointed secretary. The plans of the various titles have been confided to canonists in every country. The general plan of the Code includes (after the preliminary second) four main divisions: persons, things (with subdivisions for the sacraments, sacred places and objects, etc.), trials, crimes and penalties. The articles are numbered consecutively. The work is now completed and embodies several modifications and reforms in the ancient law. This code is now the only authorized canon law of the Latin Church.

It will have been noticed that canon law is not traceable to any original code, but is a development founded on the general moral rules laid down in the Scriptures and especially in the New Testament. Neither is the Roman civil law traceable to any code, but is a gathering of principles suggested by good reasoning for promoting the civil interests of its subjects. Compared to the Jewish law, the principle upon which Roman jurisprudence was founded was very different—the former treats principally of criminal matters and is most severe in its penalties; the latter on the contrary treats all questions as civil, and prefers restitution to punishment. When the Roman emperors had been converted to Christianity, in promoting its progress by special constitutions which then became part of the canon law, they necessarily gave to canon law much of the spirit of the Gospels. So much so, that in the canon, as in the Roman civil law, there was little severity in criminal matters, and many cases which other peoples than the Romans treated as criminal were cognizable by a civil tribunal and an indemnification was effected by damages. Generally no crime was punished capitally, especially where no force or violence was employed. This spirit of leniency is manifest throughout canon law to the present day. In the 4th century wherever Roman power conquered the nations and wherever Christian missionaries converted the pagans canon law was introduced through the influence of the Pope and the Emperor. It permeated and modified the laws of the peoples of northern Europe, as well as those of England to a certain extent. With it necessarily came the principles of Roman civil law. The rules for the application of canon law were as follows: (1) In cases not contained in the canon law, at least the rule for the civil law was to be preferred. (2) In cases of conflict, the civil law formed the rule for courts of civil, and the canon in those of ecclesiastical, jurisdiction. Thus, when a matter of canon law cognizance arose in the civil court, the decision was made by the civil court according to the rules of the canon law; and vice-versa, when a question of civil cognizance occurred before an ecclesiastical tribunal. (3) Within the Imperial states the civil law formed the basis, and the canon law in the papal states. (4) In matters of a feudal nature the civil was preferred to the canon law. (5) In forensic causes the canon is not presumed to differ from the civil law. When the Western empire passed under the rule of a barbarian race the Roman and the canon law, as far as preserved, but to a great extent they influenced the legislation of the conquerors. Alaric, Attila, Ricimir did not disturb the outward form of Roman government. In the collection of West Gothic laws, gathered in 672 a.d., there are evident traces of the part which the Roman clergy took in the compilation. The Burgundian laws also show literal excerpts from the Roman law. Roman law is found also in the Bavarian code composed in the 7th century, as well as in the capitularies of the Franks, which commence in the year 560 and are introduced by a literal transcript of a novel of Valentinian. It is noteworthy that the German tribes did not force their laws upon their subjects in those portions of their conquests where the Roman law was acknowledged. It was natural, too, that the Churches, as juridical persons, should follow the Roman law, not only on account of its connection with religion and the great degree of favor it manifested toward the Church, but also on account of the accuracy of its provisions in this respect. Like the law of the Teutonic tribes, that of England is an accumulation of individual laws. While Britain was conquered by Julius Caesar in 54 B.C., still it was only at the end of the 1st century of the Christian era that the English manners, arts, architecture, language and laws were introduced. The Roman law superseded the customary laws of the island and remained in force until the year 455, when Britain became derrict because of the removal of the seat of empire to Constantinople and the impossibility of the emperors defending it against the Picts and Scots. Christianity was introduced into Britain under the Roman dominion and was preached to the Scots and Ireland before the year 430. Roman literature, arts and law, however, received a sudden check by the Saxons, who, when they invaded Britain, imposed their law upon the conquered people. The Danes subsequently did the same. Still we are informed by the Venerable Bede that Ethelbert, king of Kent, in 613, with the assistance of his wise men, made certain decrees and gave judgments between his subjects in conformity with the principles of Roman and canon law, whatever happened to the bishops, and the like. Indeed, it is not surprising that the Saxons and Danes, whose codes contained a great admixture of Roman
law, should have carried the same principles with them into their new settlement in England. Traces of a Roman original may be seen in the laws of Ina, king of the West Saxons, Offa, king of the East Angles, and in the laws published by Canute which were translated into Latin. Thus it happened that, when Edward the Confessor compiled a code out of the materials then at hand, much of the Roman and canon law was inserted and thus became the basis of much of the common law of England and the United States. During the dominion of the Saxons and Danes, those Britons who had fled to Wales were governed by their own princes. Howel Dha, in 940, is said to have assembled his bishops and the more literate among the laity for the purpose of revising the law which was translated into Latin at his command. In the 8th article he approves the Roman rule of two witnesses being sufficient in cases where no specific number is stated, and for noting or one to be insufficient, except of a woman in cases of rape, of a lord between two tenants, an abbot between two monks, a father between two of his children, a priest in a matter attesting his procession. His proof turns on the king’s evidence, in the place of execution. Most of the Roman laws of this age seem to have been taken from the Theodosian code. Although the foot of the Roman soldier never trod on the bosom of Ireland, nor did a Roman general have a chance to introduce the Roman law, still the principles of canon law were enforced throughout Ireland and Scotland by Saint Patrick in his canons. One of them, translated by the Anglican Bishop Usher, reads: "Wherever any cause that is very difficult and unknown to all the judges of the Scottish nation shall arise, it is rightly to be referred to the see of the archbishop of the Irish (that is, of Saint Patrick) and to the examination of the prelate thereof. But if the same, by him and his wise men, a cause of this nature cannot easily be made up, we have decreed it shall be sent to the see apostolic, that is, to the chair of the Apostle Peter, which hath authority of the city of Rome." The canons of Ethelred, Egfrid, king of Northumberland, Aldwulf, king of the East Angles, and Theowulf, king of Kent, Theodore, at that time archbishop of Canterbury, summoned a synod at Hatfield, in which the canons of the five general councils of Nicaea, Constantinople, Ephesus, Chalcedon, the second of Constantinople, were enforced, together with the concilia drawn up under Pope Martin at Rome in 648. He also collected in his capitularies the most important points of Church discipline. In the latter half of the 8th century, Egbert of York made an extensive collection of canon law from the sources then existing. He also wrote the book 'De Remediis Peccatorum.' In the 8th century a collection was made in Ireland in which the Roman, Gallic and Irish councils are used. King Henry I, in 1100, endeavored to repudiate a number of Church laws and ordered that Peter’s Pence was to be paid to the King instead of the Pope. Henry II entered into a controversy over the enforcement of canon law with Thomas à Becket. In 1215, by the Magna Charta, King John confirmed to the prelates and barons of his kingdom the freedom of election of the clergy, and this acted as a general acknowledgment of ecclesiastical rights and liberties. In 1220, Othon, the legate of Pope Gregory IX, held a national synod, and in 1266 Othobon, the legate of Pope Clement IV, held a second, both of which, as Blackstone says, had a great effect on the ecclesiastical jurisprudence of England. Under King Henry III, Boniface, archbishop of Canterbury, enacted several canons which seemed against the existing laws of the realm, and under Stephen an ecclesiastical and a secular party were formed, the latter adhering to the common law as tenaciously as the clergy and nobility did to the canon and civil law. In the Parliament of Merton, however, the adherents of the canon and civil law were defeated on the proposition to make "legitimation per subsequens matrimonium" legal also in England as it was under canon and civil law. Under Richard II, more than 500 years later, some 400 still exist. By act 26 Hen. VII, 1; 35 Hen. VIII, 3; 1 Elizabeth 1) the king was declared the supreme head of the Church, and it became treason (1 Ed. VI, 22; 5 Eliz., 1) to doubt it or to defend the supremacy of the Pope as head of the Church. These acts and subsequent ones revealed a new canon law in England, Ireland and Scotland. Speaking of the courts of the archbishops and bishops of the English Church to-day, Blackstone says: "An appeal lies from all these courts to the foreign in the last resort, which proves that the jurisdiction exercised in them is derived from the crown of England. . . . It appears beyond a doubt that the civil and canon laws, though admitted in some cases by custom in some courts, are not official. The law of England is not a mixture of canon and civil law. The canons of provincial councils, held yearly, and at whose meetings representatives of the king were
present, constituted a national canon law which was recognized by the Pope and by Parliament and enforced in the courts of law. Even to this day, though the ecclesiastical system of the country is Protestant, the Church of England, like its ecclesiastical law, still prevails to a certain extent. "So deep hath this canon law been rooted," says Lord Stair in his "Institutes of the Law of Scotland," that even where the Pope's authority is rejected yet consideration must be had to the decay, now so great, of the Church. In most cases the Church benefits have been erected and ordered, but as likewise containing many equitable and profitable laws which, because of their weighty matter and their once being received may more fitly be retained than rejected. In two old acts of the Scotch Parliament, made in 1540 and 1551, the canon and Roman law are mentioned as the common law of the country, the clause used being "the common law, haith canon, civil, and statutes of the realm." Since the restoration of the Catholic hierarchy in England in 1550, and in Scotland in 1578, the churches under Roman jurisdiction have held various councils and enacted laws to fit the changed conditions. These laws, having been examined, are in the present day confined to the Roman pontiff appointed for such purpose, have become, as it were, a national canon law for the Catholics of those countries. In a similar way the Catholics of newly established nations, owing to various reasons, are ruled by a modified canon law which gives the bishops and superiors a very extensive authority. Such is the case at present in Canada, Australia and the United States. These modifications pertain chiefly to the election of bishops, the appointment and removal of parish clergy, the tenure and administration of Church property. The second and third plenary councils of Baltimore contain special modifications for the United States. For Mexico, West Indies and South America a council was held in Rome of the bishops of those countries, and its decrees were published in 1901. Other national modifications of canon law in the course of time have been introduced by concordats made by the Pope with the rulers of Christian nations, after which he grants them the right of exercising their own jurisdiction. As the Pope enjoys the greatest concessions. The councils held in Gaul in the 4th and following centuries show the beginning of a national canon law for France. The fourth canon of the Council of Aix, convoked by King Clovis in 511, prohibited certain laymen and teachers from receiving holy orders without the king's consent. The Council of Orleans, in 549, shows that at that time the king's consent was necessary for the election of bishops. Many points regarding a special liturgy, the administration of the sacraments, the matter and forms of ecclesiastical trials are to be found in these same early councils. The laws of Dagobert, in 628, show special protection given the Church but also lay the foundation for future subjection; for councils could not be held without consent of the king, and bishops were elected not infrequently at the dictation of royalty. But the capularies of Charlemagne and his successors promulgated in 825 by the abbot Ansegiso, were very favorable to the Church. Under the third dynasty, especially because of the feudal law, bishops, abbots and chapters exercised almost complete civil authority over the people in their charge; but the oath of fealty was imposed on the prelates as vassals of the king. On the other hand, the kings took upon themselves the defense and guardianship of the Church and law; after the death of the prelate they were the guardians of the vacant see, they performed many acts of ecclesiastical jurisdiction, among which was the administration of the temporalities of the vacant church. This was not done, however, without the consent of the bishop of the diocese. Herein is found the origin of ius Regalis which later caused such trouble. In the year 1268 a pragmatic sanction was issued by Saint Louis which gave liberty of election of bishops and ordered that the general canon law should be observed throughout France. However, the genuineness of this law has been seriously questioned. Under Philip the Fair the seeds of absolute independence of the secular from the spiritual authority were sown; and about the same time serfs and other classes were set free. Clerical and lay judges concerning their jurisdiction. On appeal to the king the clergy won; but the jurisdiction of the Church was gradually lessened, and at this time the appeal from abuse in ecclesiastical law was transferred to a layman might appeal to the king from an abuse of the power exercised by a bishop. This was diametrically opposed to general canon law. The great schism of the West brought out the question whether the Pope or an ecumenical council were superior, and the controversy became especially bitter in France. Charles VII selected certain passages from the Concilabul of Basel, and in 1438 issued a pragmatic sanction in which the superiority of the council over the Pope was declared, and elections both to episcopal sees and in monasteries were to be held after the ancient law of France. Louis XI suppressed this decree, but it was revived after his death until finally condemned by the Fifth Lateran Council, and changed by the concordat made between Leo X and Francis I. In this concordat many of the dispositions of the pragmatic were preserved; but the concordat differed from the pragmatic in this: that in place of the election of bishops and prelates in case of vacancy on the death of the pope, it was to present to the sovereign pontiff, within six months, a doctor or licentiate in theology who should be at least 27 years of age and otherwise competent. The pontiff would grant institution. The Parliament, after a long contest, agreed to the execution of this concordat. Herein is seen the beginning of the system of government nomination of bishops, concerning which, in 1903-04, the Pope and the French government were at variance. In the 16th century the government long opposed the publication of the decrees of the council of Trent, but finally, without mentioning the source, the chief decrees, word for word, were published in 1579 by royal order. In 1681 the Gallican clergy, at the instance of the government, met in extraordinary convention and adopted a declaration favoring the extension of the Regalia to all France. This was repudiated by Pope Innocent XI. The next year the Gallican clergy adopted four in which they attacked the Holy See in administrative matters, and declared that the judgment of the Pope on a matter of faith was not irrefutable except when the consent of the Church had been added.
The king ordered the observance of this declaration, but it was condemned by Alexander VIII. Later, King Louis XIV wrote the Pope, affirming that the order should not be observed. Nevertheless, the Regalia was observed up to 1789 throughout all France, and the government continued taking the revenues of all vacant bishoprics and appointing to benefices during the interregnum. In the event of 1685 a code of ecclesiastical law as observed in France was enacted, and in it was the appeal "as from an abuse," that is, from the ecclesiastical to the civil authorities. The national convention in 1790 passed a civil constitution for the clergy by which dioceses and parishes were suppressed and the Church made subject to the state. In 1801 Napoleon, as First Consul, and Pope Pius VII made a concordat in which the Catholic Church was acknowledged as the state Church, and by which new bishops were appointed, and the French government took upon itself the support of the bishops and parish priests in place of restoring the immense Church properties which had been confiscated. During the year 1904 a great agitation occurred for the suppression of this concordat because of controversies over some bishops held delinquent and suspended by the Pope. The concordat was suppressed in 1906. With the abrogation of the concordat the state no longer supports the clergy, nor can it nominate bishops. There is complete separation of Church and State in France since the passage of the law abrogating the concordat of 1801. During the 19th century the liturgical worship of the Church in France was made conformable to that of Rome, and other matters of discipline were brought under general canon law.

Undoubtedly canon law has exerted a wide and lasting influence on the nations of Europe and America. It made them Christian states and directly or indirectly modified their constitutions. State legislatures based their proceedings on the methods of Church councils. The law of nations is simply the application to nations of the principles of Christian law taught to individuals. The ancient Romans as well as barbarous tribes considered all foreigners enemies; the Church taught the brotherhood of all men. The Pope, as the common father of all Christians, acted as arbitrator in the disputes between nations, and so noteworthy became the Roman Rota, to which the Pope referred innumerable disputes, that at times much of its work was deciding important questions for rulers of nations. The system of Church administration served as a model for that of states, and the clergy, especially in the earlier and Middle Ages, being the educated class and following canon law, naturally introduced many of its rules into everyday life. The elevated condition of woman is due to the canon law prescriptions regarding marriage, which the Church enforced on all nations converted to Christianity. Questions relating to widows and orphans were within the jurisdiction of canon law and Church courts. The incorporation of Church bodies, from which other corporations took their origin, had its foundation in the law of Justinian and was imported into England with the civil and canon law. As in the Roman law, the charter of the sovereign is always expressed, but he decreed that the decree should not be observed. Nevertheless, the interdictum de liberro nomine exhibendo held its origin in the Roman law. Inheritance by will and the rule for the descent of real property came from Roman law, while trial by jury, with challenges of the jurors, was determined in the Roman Lex Servilia and Lex Cornelia. While in England Christianity is part of the law of the land, in the United States this is true only in a qualified sense (33 Barb. 548), and owing only to the fact that it is a Christian country and that its constitution and laws are made by a Christian people (23 Ohio St. 211). Nevertheless the decision of ecclesiastical courts or officers having, by the rules or laws of the body for whom they act, the power to decide such questions, or the right to decide them, will be held conclusive in all courts of civil administration, and no question involved in such decisions will be revised or reviewed in the civil courts. The function of the Church in the determination of such courts or officers to determine such questions according to the laws or usage of the body which they represent (Quoted with approval in 98 Penn. 213). Civil courts will not review the action of ecclesiastical tribunals except where rights of property are involved (62 Iowa 567; 23 Ill. 450). Justice Strong, in "Relations of Civil Law to Church Policy," concludes: "I think it may be safely asserted, as a general proposition, that whenever questions of discipline, of faith, of church rule, of membership, or of office have been decided by the Church in its own modes of decision, civil law tribunals accept the decisions as final and apply them as made." See also Law; Catholic Church, Roman.


CANON OF THE MASS, that part of the mass following the sanctus. This use of the Roman Catholic Church for celebrating the Eucharist is contained in this canon.

CANON OF SCRIPTURE. See Bible.

CANONESS. At the close of the 8th century the title of canoness was given to a class of women who took the vows of chastity and obedience, but not that of poverty, and were not cloistered, though they had a common table and dormitory, and were bound to the recitation of the breviary, as were nuns. They derived their name from their being enrolled in the canon or official list of the Church. Their occupations were chiefly education of girls, transcription and embellishment of Church office-books and embroidery of vestments. The advantages of such institutions as asylums in a rough age were soon visible, and they multiplied in consequence, but as in many houses the religious motive had little to do with entrance, a distinction was drawn between long-time canonesses regular and secular. The secular canonesses were for the most part members of princely or noble families, practised much state and luxury and retained none of the rule save
the common dormitory and the recitation of the Hours in choir. In Germany, several abbesses of canonesses were princesses of the empire, kept up feudal state and furnished contingents to the Imperial army from their vassals; and at the Reformation some chapters adopted the new opinions, and subsist to the present day as Protestant foundations, enjoying the revenues and admitting to membership only ladies of noble birth or daughters of distinguished members of the military and civil service, whose sole obligation is celibacy during membership. The institute never spread beyond the limits of the empire, and the non-German houses were chiefly in Hainault, Flanders and Lorraine.

**CANONGATE** The, the principal street in the Old Town of Edinburgh. It is upward of one mile in length, rising gradually with a regular and steep incline from a small plain at the east end of the town, on which stands the palace of Holyrood, and terminating at the castle. The appearance of this street, the scene of many interesting historical incidents, is rendered remarkable by the labyrinths and antiquity of the naves with which it is lined, most of them ranging from five to seven stories in front, and often more behind. At different points it is known by other names, High street, Lawnmarket, etc.

**CANONICAL BOOKS**, the books of Scripture belonging to the canon. See *Bible*, *Canon*.

**CANONICAL HOURS**, certain times of the day set apart by ecclesiastical law in the Roman Catholic Church to the offices of prayer and devotion, namely, matins with lauds, prime, tierce, sext, none, even-song or vespers and compline. These hours of prayer originated early in the Church's history, being mentioned by Clement of Alexandria, Tertullian, Jerome and others. The day was divided into seven parts and the observance of the canonical hours was as follows: prime, tierce, sext and none at the first, third, sixth and ninth hours of the day, counting from six in the morning; vespers at the eleventh hour, compline at midnight and matins shortly after midnight. These times are no longer strictly adhered to. In England the canonical hours are from eight to twelve in the forenoon, before or after which the marriage service cannot be legally performed in any parish church. See *Breviary* and consult *Bingham*, *Origines Ecclesiastici*; *Proctor*, *On Common Prayer*.

**CANONICALS**, the prescribed dress or vestments worn by the clergy of the Roman Catholic, Protestant Episcopal and other churches when officiating at religious services. The wearing of vestments is of ancient origin. In all the pagan religions the priests wear sacerdotal garments, and in the Jewish system the priestly robes were very elaborate and significant. The modern Jewish system retains these ecclesiastical vestments and the ministers of many denominations wear such attire. See *Chasuble*, *Costume*, *Ecclesiastical Stole*, *Vestments*.

**CANONICUS**, Indian chief; b. about 1565; d. 4 June 1647. When the Pilgrims landed, he and his nephew Miantonomo (q.v.) were associate sachems of the fierce Narragansetts, mustering some 3,000 warriors. In the winter of 1621–22 he sent to the little colony, with about 50 fighting men, a bundle of arrows bound with a snakeskin, either as a preliminary of war or a demand of gifts to avert it. They returned the skin stuffed with powder and ball, and the frightened savages did not dare keep it. A lasting treaty was negotiated, and it was owing to the influence of Canonicus that the tribe never made war against the English, even many years after his death, till "King Philip's War" of 1675. In 1636, Roger Williams and his company sought refuge from the Massachusetts authorities among the Narragansetts. They were kindly received, and to them was granted the peninsula where Providence stands. In 1637 the Pequots of Connecticut were attempting to form a general Indian league to exterminate the English settlements, and the Massachusetts government sent an embassy to prevent the Narragansetts from joining it. Canonicus received them with great Indian pomp in his wigwam of poles and mats, surrounded by his *mugwumps* and leading warriors, gave them a feast with boiled chestnuts and huckleberry Indian pudding for dessert; and probably more from kind regard for Williams than through the embassy's persuasions, kept the peace, and even furnished a couple of hundred warriors to help the English. These allies, however, played the usual ambiguous Indian part, ready to massacre the beaten side. In 1644 the Gorton (q.v.) party succeeded in persuading the chiefs that it was under the protection of irresistible powers in England; and on 9 April Canonicus, his son Mixan and his nephew Pessacus, brother and successor of Miantonomo, signed two astonishing documents, of whose purport it is very unlikely that they had been correctly informed. One of them ceded the land and people of the Narragansetts to his Majesty of Great Britain, placing the Indians themselves under his protection, and appointing Gorton and three others their attorneys to carry the instrument to him. The other, addressed to the Massachusetts authorities, was the refusal of their invitation to visit Boston. It also menaced the authorities on account of Miantonomo's death and threatened to revenge it on Uncas. Finally, however, a truce was signed, and three years later Canonicus died.

**CANONIZATION**, a rite in the Roman Catholic Church by which a deceased person is inscribed in the catalogue of the saints and by which it is publicly, solemnly and canonically declared that such person is to be honored as a saint by all the faithful.

The desire to honor the dead is an instinct of human nature. The state picks out its great ones for civil honors; the Church holds up to the veneration of its members those who by the sanctity of their lives and their love of God and their fellow-men merit imitation.

The state honors its heroes on account of intellectual ability, oratorical gifts, courage or patriotism; the Church demands purity of life and eminent virtue in her spiritual heroes. As a proof of that virtue she requires miracles wrought by or through their intercession. The virtues, which must be heroic, and the miracles, are proved by a process most minute and searching.
During the early centuries the deeds of the martyrs were recorded by Christian notaries. For this purpose Pope Clement divided the city of Rome into seven quarters with a special notary for each quarter. The letters of Saints Cyprian, Jerome, Augustine and Epiphanius tell us of the efforts of the bishops to collect the deeds of the martyrs and to have them venerated.

In the early times individual bishops sifted the testimony regarding those brought to their notice as worthy of veneration and declared for or against it. But this gave rise to inconveniences and the necessity of a central authority for judging in such cases was made manifest.

As early as the 4th century the case of Saint Vigilius, bishop of Trent, who was martyred A.D. 399, was brought to Rome to secure the consent of the Pope for his veneration as a saint.

Gradually the procedure in these matters was elaborated and in 1587 the Congregation of Rites was charged with the duty of investigating the causes of Beatification and Canonization.

Beatification precedes Canonization, and is a decree which permits the honoring of a servant of God by public worship in a certain place. It differs therefore from Canonization in that the latter not only concedes but declares that veneration be paid by the universal Church to the canonized one whilst Beatification permits only in a certain place the honoring of the beatified.

The process by which Beatification is reached is a lengthy one. "The fierce light which beats upon a throne is nothing to the minute and protracted inquiry which turns upon the everyday life of the person submitted to it."

Thirteen or fourteen steps may be distinguished in the process of Beatification. The bishop of the diocese first inquires at the reputation of the person proposed for virtue and miraculous powers. Then the question of "non-oppositio" is examined; namely whether any veneration was paid to the servant of God or whether anything was done contrary to the decrees of Urban VIII which prescribes the form of Beatification and Canonization.

As a third step the minutes of these two inquiries are sent to Rome. The process is then opened before the Congregation of Rites. See Congregations, Roman.

The Promoter Fidei (called in popular language the "devil's advocate") is appointed. His duty is to raise objections against the process and person. All the works printed or in manuscript, if the person were an author, are then examined. If a favorable report is made, then begins what is called the Apostolic Process. A commission is given to the Congregation of Rites to investigate the notoriety, reality and nature of the virtues and miracles ascribed to the one to be beatified.

Three bishops are appointed to deal with the case systematically. Their findings are sent to the Congregation of Rites and examined and arguments are heard pro and contra.

A new delegation makes another and more searching inquiry, if the result of the last examination is favorable. The process is again returned to the Congregation of Rites to be again examined. In three successive meetings, at the last of which the Pope is present, the virtues and miracles of the subject for beatification are again discussed.

Having sought to know the will of God by prayer the Pope confides his judgment to the secretary of the Congregation.

In a new general assembly the question is considered whether the Beatification may proceed without further delay. In the event of an affirmative decision the Pope appoints a day for the ceremony, and orders a brief to be prepared setting forth the Apostolic sentence.

The Beatification takes place in Saint Peter's with ceremonies appropriate to the occasion. Proof of at least two miracles is necessary in the case of Beatification, and before proceeding to Canonization it must be proved that at least two more miracles were wrought through the intercession of the "Blessed" person.

So strict is the examination of these miracles, that according to an Italian proverb, "It is next to a miracle to get a miracle proved in Rome." To prove the truth of miracles worked after Beatification, the same formality and rigorous conditions are required as are necessary in the case of miracles before Beatification.

The three congregations or assemblies which were required before Beatification are again convoked and after mature deliberation, a portion of everything is favorable to the Cause, declare for it. A decree is drawn up by the direction of the Pope expressing that decision. Canonization then takes place in Saint Peter's.

Most solemn ceremonies mark the event and never does the venerable Basilica with thousands of worshippers look so grand and inspiring as when the Pope declares and ordains that the servant of God in question shall be inscribed in the register of the Saints ("Canon Sanctorum") and that his (or her) memory shall be celebrated on a given day in every church.

Consult the celebrated treatise of Pope Benedict XIV, 'De Servorum Dei Beatificatione et Beatorum Canonizatione' (1734-38), the standard work on the subject. A portion of it has been translated under the title "Heroic Virtue" (3 vols., 1856); also Addis and Arnold, 'The Catholic Dictionary' (1893); Aichner, 'Compendium Juris Ecclesiastici' (1900); Baert, 'The Roman Court'; Bargiliat, 'Prolectiones Juris Canonici'; Veit, 'Apologia Legis Canonici', 344-45 (1903); Bouix, 'Tractatus de curia Romana,' 180 p. 183 (1880); Ferraris, 'Bibliotheca Canonica'; Furnari, 'Codex pro Postulatoribus'; Gardellini, 'Decreta authentica S. C. Congregationis Rituum'; Reifenstul, 'Jus Canonicum Universum'; Schmalzgruber, 'Jus Ecclesiasticum Universum'; 'Catholic Encyclopedia' (New York 1912). Consult also 'Catalogus ac Status Causarum Beatificationis' (Rome 1901).

CANONS, Book of, a system of canons or rules prepared for the Church of Scotland by its bishops, in accordance with the direction of Charles I. It was published in 1636, having undergone revision at the hands of Archbishop Laud. It limited greatly the power of the Church courts insomuch as their findings were now subject to ratification by the bishops, and also asserted the king's supremacy in spiritual matters. Its promulgation was felt to be arbitrary, and the strongest objections were made against it.
CANONS OF THE CHURCH OF ENGLAND — CANOSA

CANONS OF THE CHURCH OF ENGLAND. the "constitutions and canons ecclesiastical" drawn up in convocation in 1604 by the synod in London. These canons, still in force as revised, number 141, and were designed to confirm the established system of the Church of England, particularly through the test oath, aimed at the Puritan party, in which the clergy were sworn to subscribe willingly to the supremacy of the sovereign, to the Articles and to the Prayere-book. Consult Walcott, 'The Constitutions and Canons Ecclesiastical of the Church of England' (Oxford and London 1874).

CANONS OF HIPPOLYTUS, The, a book divided into 38 canons, believed to have been written by Hippolytus, archbishop of Rome, about the middle of the 3d century. It contains instructions in regard to the selection and ordination of Christian ministers, conversion and baptism of the heathen, rules for the celebration of the Eucharist, for fasting, etc. The book originally was made from a Coptic version of the Greek but has been handed down only in Arabic. It first attracted attention in the 17th century, was published in 1820 by Haneberg, who added a Latin translation, and was revised by Achelis in 1891. A German translation was made by Reidel in 1900 from a new manuscript, which showed that the book had been previously thrown into disorder by the displacement of two pages, and which also removed other difficulties upon which the theory of interpolation was based. There has been much controversy about the authorship of the book and as to whether the canons were the original form from which the Egyptian Church Order was derived, but all documents, as well as the general style of writing, point to Hippolytus as the author.

CANONSBURG, Pa., borough of Washington County, on the Pittsburgh, Cincinnati, Chicago and Saint Louis Railroad, 18 miles southwest of Pittsburgh. Named after Col. John Cano, who platted the town in 1789. It was the active centre in 1794 of the Whisky Insurrection. In 1802 it received a borough charter. It is situated in a rich coal region and has manufactures of sheet iron, structural steel, tin plate, stove pipe, pottery, etc. The original building of Rev. Dr. John McMillan's Latin School, founded in 1790, the Pennsylvania Training School, the buildings of Jeffer son College founded in 1802, now part of Washington and Jefferson College (p.v.), are situated here. Pop. with South Canonsburg annexed 5,588.

CANOPIC VASES, or CANOPI, certain large-bellied vessels found in tombs of Egypt, containing the embalmed viscera of bodies that had been converted into mummies. Four of these were placed in a tomb, each appropriated to a particular deity, and surmounted by the effigy of the head of such deity, as of a man, and the eyelids, or a hawk. It is to those with the human head that the term canopi has been more particularly applied. They were frequently made of basalt, and decorated with figures in relief or paintings; or of costly white alabaster, with spiral fluting; or they were turned from black burnished clay. The name is derived from the town Canopus.

CANOPPI, ká-nó̄̀ppi. Antonio, Italian scene-painter: b. 1773; d. Saint Petersburg 1832. He received his first education from his father, who was employed as civil engineer by the Duke of Modena, and after occupying himself for some time with oil painting, was subsequently employed as scene-painter in Venice and Mantua. Compelled to resort to flight at the time of the French invasion, he first took himself to Vienna and afterward to Moscow, where he was engaged in the decoration of many places, which he 즉ed in the great fire of 1812. From that time until his death he was engaged as scene-painter of the Imperial theatre of Saint Petersburg. His most admired efforts in that branch of art were his architectural scenes for Mozart's 'Magic Flute,' and for 'Semiramide.'

CANOPUS. (1) In Egyptian mythology, a water-god, represented on vessels of a spherical shape. These vessels were used by the ancient Egyptians to keep the water of the Nile in good drinking condition. The worship of Canopus was superseded under the Pharaohs of the 3d dynasty. (2) A star in the constellation of Carina. (3) A town in Lower Egypt, near the most western mouth of the Nile, about 14 miles east of Alexandria. The name of the town is variously ascribed to the divinity of the same name and to Canopus, or Canobus, the helmsman of Menelaus, who died in Egypt of the bite of a serpent, after his return from Troy, and who was buried on the site of the town. It became important after the foundation of Alexandria, as a summer resort of doubtful reputation. It was an important port, and although the channel is now filled up, there are still ruins of the old city on the shore at Aboukir. It was the seat of a temple at Serapis (successfully excavated in 1893), whose oracle was celebrated, especially among the sick seeking for restoration to health.

CANOPUS, or CANOBUS, the brightest star except Sirius of the first magnitude, belonging to the southern constellation Argo, and invisible in the north or middle parts of the United States, on account of its nearness to the South Pole. It is one of the few brilliant stars for which no sensible parallax has been found. The name, according to Plutarch, was derived from Canopus, the pilot of Menelaus.

CANOPY, in general, any suspended covering that serves as a protection or shelter, as an awning, the tester of a bed, or the like; especially, an ornamental covering of cloth suspended on posts over a throne or the seat of a high dignitary, or any covering of cloth so disposed. In architecture, it is the decorative hood or cover supported or suspended over the altar, throne, chair of state, pulpit and the like; also the ornamented projecting head of a niche or tabernacle. Early English canopies are generally simple with a trefoiled or cinquefoiled head. The triangular arrangement of an early English and decorated doorway is often called a canopy.

CANOSA, ká nó̄̄sà. DI PUGLIA, Italy, city in the province of Bari delle Puglie, 14 miles to the southwest of Barletta on the Adriatic.
The cathedral of San Sabino, with pavement several feet below the surface of the street, was built about 1101. In an adjacent court is the tomb of Bohemond I; it has bronze doors by Ruggieri of Amalfi. There is a ruined castle, which by Charles V. of Naples. It was the ancient Canusium, and various relics of Roman times, including an amphitheatre, have been found. Between Barletta and Canosa was the ancient Canusae (q.v.), where in 216 B.C. Hannibal defeated the Romans. In 1813 a beautiful burial-chamber was opened, which contained the corpse of a warrior in armor. A copper lamp and a number of beautiful vases were also found here. The paintings upon the vases were the most important part of this discovery. They refer to the Greek-Italian mysteries. The town was founded by the Greeks, and till the Second Punic War was an important commercial centre. Pop. about 26,000.

CANOSA, small village in northern Italy, 12 miles southwest of Reggio. On a rock near by are the ruins of Canosa castle, which was destroyed by the inhabitants of Reggio in 1255. In the 17th century the castle belonged to Countess Matilda of Tuscany, with whom Pope Gregory was staying in 1077 when the German Emperor Henry IV came to render submission after his excommunication by the Pope. The monarch was compelled to stand barefooted in the courtyard for three days and nights before the pontiff would receive him. Bismarck in 1871 used the historic phrase, "We are not going to Canossa," in a speech directed against the clerical party. Hence, "going to Canossa" signifies submitting to humiliation.

CANOT, kə-nō', Theodore, Italian adventurer and slave trader: b. Florence 1807; d. 1850. His father was a French officer. He visited Boston, sailed to various parts of the world, was shipwrecked near Ostend, and again on the coast of Cuba, where he fell into the hands of a gang of pirates, one of whom claimed to be his uncle, befriended him for some time, and finally sent him to an Italian grocer at Regla, near Havana, who was secretly concerned in the African slave trade. Canot made his first voyage to Africa in 1826, landing at the slave station of Bangalang, on the Rio Pongo, Senegambia. After quilting a mutiny on board and helping to stow away 108 slaves under 15 years of age, the young adventurer entered the service of the owner of the station. He visited various parts of the neighboring country, collecting by aid of the African princes a flock of slaves for his newly established depot at Kambia near Bangalang, which in May 1828 was destroyed by fire. He afterward purchased a vessel at Sierra Leone, in which with a cargo of slaves wrested from a trader in the Rio Nunez, he sailed to Cuba. Three more expeditions he followed; in the first he lost 300 slaves by smallpox; in the last he was taken by the French and condemned to 10 years' confinement in the prison of Brest, in France, but after a year's duration was pardoned by Louis Philippe. He returned to Africa, and in 1833 was the pioneer of the slave traffic at New Stetos. After a pleasure trip to England he returned to New Stetos and in 1840 shipped to Cuba 749 slaves. He now resolved to abandon his illicit course, and obtaining from an African chief a valuable grant of land at Cape Mount, established there in 1841 a trading and farming settlement under the name of New Florence, which in March 1847 was destroyed by the British, and in which Canot subsequently removed to South America, then to Baltimore, Md., and finally received from Napoleon III an office in one of the French colonies in Oceania. Consult Mayer, "Captain Tombs and the Twenty Years of an African Slaver" (1854).

CANOVA, ka-nō'vā, Antonio, Italian sculptor: b. Possagno, Treviso, 1 Nov. 1757; d. Venice, 13 Oct. 1822. He was the founder of a new school of Italian sculpture in which softness and delicacy of expression predominate. Canova came of a family of stone-cutters and makers of small statuary. At a very early age he was taught by his grandfather to draw, design and copy the statuary in his workshop. He very early showed talent and great interest in the traditional trade of his family; and in this he was encouraged by the tutor, who acted as his guardian, for his parents had died while he was still an infant. Before his tenth year Canova had begun to imitate the work of his elders; and two small shrines executed by him at this period are still in existence. From this time on he was busily engaged in the shop of his grandfather, who had some knowledge of painting, drawing and architecture, a strong love for his profession and a desire to see his grandson distinguish himself in it. At the age of 13 the boy had already acquired a local reputation which attracted the attention of Giovanni Falleri, senator and member of an old patrician family, and a man of great influence in the community, who introduced him to Torretti, a local sculptor. Canova worked with and studied under the latter for two years and went with him to Venice, where Torretti died a few months later. The boy continued with Ferrari, a nephew of Torretti, who made marble house decorations. While there Canova made for his patron Falleri two statues "Orpheus" and "Eurydice," in which the latter saw evidence of great talent, and gave him an order for more. The next three years were, for Canova, a period of study, attendance at the art and other classes in the school and of investigation in anatomy and working from natural objects; at the end of which time he presented to his patron work much superior to anything he had previously done, among them "Dedalus and Icarus, the best known of his works of this period. As his reputation grew he turned his eyes toward Rome, then the centre of Italian art, as it is to-day. Falleri came to his aid and secured for him a pension of 300 ducats ($290) a year for three years from the Venetian Senate to enable him to continue his studies. In 1779, at the age of 22, he went to Rome with a letter of introduction to the Venetian ambassador, who became his friend and patron. There Canova applied himself to study and work with enthusiasm; and under the influence of the city, its ancient monuments and the enthusiasm inspired by Winkelmann and other students and reformers of art, the young Venetian developed rapidly and soon acquired, in the Imperial city, a reputation superior even
to that he had left behind him in Venice. 'Theseus Sitting upon the Slay Minotaur' was the first large work by Canova in Rome (1783). In 1783 he undertook the execution of the tomb of Pope Clement XIII in the church of the Chiesa di Natale Apostoli. He retained the usual style of composition, and only improved on the depraved taste of the school of Bernini. He next executed the group of 'Cupid and Psyche,' in which he first dispensed with his peculiar style, of which loneliness is a striking characteristic. The figures are exceedingly delicate and graceful. He was employed on a second public monument, the tomb of Pope Clement X11, in Saint Peter's, which was finished in 1792. It is distinguished for its colossal size and simple style. Meanwhile the fame of the artist continually increased. He established himself in the palace of the Venetian Ambassador a school for the benefit of young Venetians. His next works were a winged Cupid, standing; another group of 'Cupid and Psyche'; a group of 'Venus and Adonis' for the Marchese Verio, in Naples; the tomb of the Venetian Admiral Emo, for the republic of Venice. This latter is a combination of bas-reliefs with figures in full relief. In 1791 he executed a standing, Aeneas dressed, with a butterfly in her left hand, which she holds by the wings with her right, and contemplates with a calm, smiling mien and a 'Repentant Magdalene,' natural size, he has carried the expression of blending and softness to the highest degree. His 'Hebe' is a delightful figure. In an easy and animated attitude the smiling goddess of youth hovers over a cloud, pouring nectar with her right hand into a bowl which she holds in her left. Both vessels, as well as the coronet of Hebe and the edges of her garment, are gilt. Canova is fond of a variety of material, and often endeavors to give to his statues the effect of pictures. He displayed his talent for the tragic in the tossing 'Hercules hurling Lichas into the Sea.' The group is colossal, and Hercules is somewhat larger than the Farnesian; but it makes a disagreeable impression, for the genius of Canova was not adapted to such subjects. His reputation, together with the two pugilists, 'Kreus' and Demoxenos,' is much more successful. A standing group of 'Cupid and Psyche' was the triumph of his art. 'Psyche here appears again holding the butterfly. In 1796 and 1797 Canova finished the model of the celebrated tomb of the Archduchess Christina of Austria, wife of Duke Albert of Saxe-Teschen, which in 1805 was placed in the church of the Augustinians at Vienna. In 1803 he made the colossal statue of the King of Naples, one of his finest works, which was executed in marble. During the revolution of 1798 and 1799 Canova accompanied Prince Rezzonico on a journey through Germany. On his return he remained for some time in the Venetian territory, and painted for the church of his native village an altar-piece in which are represented the dead Christ, the Marys, Nicodemus and Joseph, and, on high, God the Father. He afterward executed, in Rome, his 'Perseus with the Head of Medusa,' which, when the Apollo of Belvedere was restored, was placed on a pedestal. This statue increased the fame of Canova more than any of his preceding works. But Perseus is only an imitation of the Apollo. The separate parts are of exquisite beauty in form as well as in masterly, delicate finishing. In 1802 he was invited by Bonaparte to Paris to make the model of his colossal statue. In the beginning of 1803 the model of the Emperor's bust, and afterward that of his statue, was to be seen in the workshop of the artist. There is not a more successful work of the kind than this bust: the figure of the statue is not so good. Among the later works of the artist are a Washington, of colossal size, in a sitting attitude; the tomb of the Cardinal of York and of Pius VII; an imitation of the Medicean Venus; a 'Venus Rising from the Bath'; the colossal group of 'Theseus killing the Minotaur,' far surpassing his earlier works in the heroic style; the tomb of Alfieri, for the Countess of Stolberg, in Florence, and erected in that place (the 'Weeping Italia,' a colossal statue in marble, is particularly admired); the 'Graces Rising from the Bath'; the monument of the Marchioness of Saint Croce; a 'Venus'; a 'Dancing Girl,' with almost transparent garments; a colossal 'Hector'; a 'Paris'; a 'Muse,' larger than natural size; a model of a colossal 'Ajax'; and the model of a sitting statue, in rich robes, of the Archduchess Maria Theresia of Austria. A portrait of Napoleon, in 1815, Canova was commissioned by the Pope to demand the restoration of the works of art carried from Rome. He went from Paris to London, and returned to Rome in 1816, where Pius VII inscribed his name in the golden book of the capital, declared him "to have deserved well of the city of Rome," and made him Marquis of Ischia, with a pension of 3,000 scudi.

As a man Canova was active, open, mild, obliging and kind toward everybody. His opinion of himself was very modest, notwithstanding his fame. He assisted promising young artists, and established prizes for the encouragement of the arts. When the Pope conferred upon him the title of Marquis of Ischia, with a pension, he dedicated the latter to the support and encouragement of poor and deserving artists. Canova was also an agreeable painter, but, strangely enough, more of a colorist than a correct designer. Engraved copies of all his works have appeared in Italia; in France, 'Consult Missirini, Melchior, 'Vita di Canova' (1824); Cigognara, 'History of Modern Sculpture' (Venice 1825); 'Quatremère de Quincy, 'Canova et ses ouvrages' (Paris 1834); Tri- paldo, 'Biografia degli Italiani Illustri'; Anzelmi, 'Opere Scelte di Antonio Canova' (Naples 1842); 'Meyer, A. G. 'Canova' (1898); Borzelli, Angelo, 'La Relazione del Canova con Napoli' (1901); Malamani, 'Canova' (Milan 1911).

Canova, Kā-nō-vā, Stanislao, Italian ecclesiastic and historian: b. Florence, 27 March 1740; d. Parma, 17 Nov. 1811. Having taken holy orders, he officiated afterward as professor of mathematics at Parma. In 1788, as a member of the academy of antiquities, he contended for the prize which was offered for an essay on Amerigo Vespucci. He opposed the common opinion that Columbus was the first discoverer of the New World, and Vespucci one year before him had landed upon the northern part of the continent and had landed in Brazil. His paper gained the prize, but produced much discussion. He was
also the author of several books on mathematics and history.

CANOVAS DEL CASTILLO, kə-nō-vās dél kás-tēl-yō, Antonio, Spanish statesman and man of letters: b. Malaga, 8 Feb. 1828; d. Santa Aqueda, 8 Aug. 1897. He was editor of the Central Europe Journal, Patria, and in 1854 entered the public service as member of the Cortes; thereafter he held various posts in the government. At his death he had been for two years Prime Minister, and had held the same position three times previously. He is author of 'Literary Studies' (1868); 'History of the Austrian Dominion in Spain' (1869); 'Problems of the Time' (2 vols., 1884); 'Studies on the Reign of Philip IV' (3 vols., 1888–90). He was editor-in-chief of a 'General History of Spain,' consisting of monographs by sundry writers (1890–97). He was assassinated at the baths of Santa Aqueda. Consult Pons y Humbert, 'Canovas del Castillo' (1901).

CANTABILE, kăn-tə-bē-lā, in music, a term applied to movements intended to be performed in a graceful, elegant and melodic style.

CANTABRI, the rudest and most savage of all the Iberian tribes who inhabited the greater part of what is now La Montana and the northwestern part of the province Burgos. They defied Roman arms for a long time, and though the campaign against them began in about 150 B.C., they were not subdued until Augustus and Agrippa had carried out a series of campaigns against them. They were included in a part of the province of Hispania Tarraconensis, with some measure of self-governing. But some time elapsed before they became romanized. In ancient history Cantabri is used to denote all of the inhabitants of the northern mountains of Spain.

CANTABRIA, the name applied to a district of Spain on the south coast of the Bay of Biscay, the home of the Cantabri (q.v.).

CANTABRIAN MOUNTAINS, the general name of the various mountain ranges extending for a distance of over 300 miles from the western Pyrenees along the north coast of Spain to Cape Finisterre. They attain in some parts a height of about 9,000 feet, and are rich in minerals, especially copper, lead, iron and gold. Large forests of oak, chestnuts and other trees are also found on their slopes. On the western coast they are very steep and form a bold seacoast, but on the southern and eastern slopes, they are less rugged and descend gradually to the Castilian plateau. Local names are given to different portions of the ridge.

CANTACUZENUS, kăn-tä-koo-zā-noos, John, Byzantine emperor and historian: b. about 1292; d. about 1380. While minister of Andronicus II he negotiated a peace with the Genoese in 1336, and repelled the encroachments of the Turks in 1337. On the death of Andronicus in 1341 Cantacuzenus became regent during the minority of the young emperor, John Palaeologus. He defeated the

Oder, traveled much in Europe, went in 1688 to Berlin, where he was appointed page of the Elector of Brandenburg, and served as a volunteer in the Netherlands. A dangerous sickness obliged him to leave the military service. He went to Halle, where he became familiarly acquainted with Spener and Francke, and became eager to spread a knowledge of religion among the common people. He was especially anxious that the poor should be taught the Bible at as low a rate as possible, and thus originated the famous institution called the Canstein Bible Institution, which after the death of Canstein in 1719 became associated with the institutions founded by Francke, and still continues its benevolent operations. He wrote a 'Harmony of the Four Evangelists' and a 'Life of Spener.' Consult Francke, 'Memoria Cansteiniana' (Halle 1722) and Bertram, 'Ge- schichte der cansteinischen Bibelanstalt' (Halle 1863).

CANTABILIS, in ship-building, those timbers which are situated at the ends of a ship. They derive their name from being canted, or raised obliquely from the keel, in contra-distinction from those the planes of which are perpendicular to it.

CANTABILIS, in the Catholic Church, a term applied to Masses intended to be performed in a graceful, elegant and melodious style.
Bulgarians and Turks, assumed the diadem and entered Constantinople, victorious over his rivals, in 1346. In 1347 he became joint emperor with John Palaeologus, but really usurped the royal authority. He used his power with moderation, and endeavored to heal the wounds which civil war had inflicted on his state; but religious disputes, civil dissensions and foreign enemies soon disturbed his government; and the jealousy of Palaeologus, the rebellion of his own son, war, plague, the frightful disorders which prevailed in the empire and his loss of popular favor, induced him to renounce the crown. He retired to a monastery (1355), where he employed himself in literary labors. He is considered one of the greatest among the successors of Constantine. His "Four Books of Byzantine History" were printed in 1645, and belong to the collection of the Byzantine historians. His other works, principally theological, are partly printed in the collections of Byzantine historians and partly lost. Consult Pears, "Destruction of the Greek Empire" (London 1903); Val-Paricot, "Cantacuzène, homme d'état et historien" (1845).

**CANTAGALLO, kán-tä-gäł'lô, Brazil, town, Rio de Janeiro state, 100 miles by rail northeast of Rio de Janeiro. The chief industry is coffee growing; sugar cane and fruits are also cultivated and cattle and swine raised. The former gold placer mines have been exhausted. Pop. 26,000.**

**CANTAL, kán' tål', France, a central department; area, 2,215 square miles; capital, Aurillac. It is named from its highest mountain, the Plomb du Cantal, Mons Celorum of the ancients, which rises to the height of 6,094 feet. The department is one of the poorest and least productive districts of France. The climate is rather severe near the mountains, and agriculture is in a backward state. The principal crops are rye, buckwheat, potatoes and chestnuts and some hemp and flax. Of wheat and oats the product is insufficient for the consumption. In the declivities of the mountains there is excellent pasturage; cattle, sheep, horses and mules are raised in large numbers; and on the refuse of the daiers numerous pigs are fed. The fat cattle from this department are much esteemed, and are sent to all parts of the country. Large quantities of cheese are made, and sold principally in the south of France under the name of Auvergne cheeses. There are deposits of coal and marble. Hot mineral springs are abundant, those of Chaudes-Aigues being the most frequented. Cantal is divided into four arrondissements, containing 23 cantons and 267 communes. Pop. 223,361.**

**CANTALOupe, a small round variety of muskmelon, globular, ribbed, of pale-green or yellow color and of delicate flavor; first grown in Europe at Cantalupo, in Italy. See Musk-melon.**

**CANTANI, kán-tä'nē, Arnaldo, Italian physician: b. Hainsbach, Bohemia, 15 Feb. 1837; d. Naples, 30 April 1893. He was educated at Prague, and was physician in the general hospital there. In 1864 he became professor of pharmacology and toxicology at Pavia; in 1867 he was director of the clinical institute at Milan, and in 1868 at Naples. In 1879 he became a senator of Italy. He investigated chiefly malaria, typhus and tuberculosis; and was influential in introducing the teachings of German medicine into Italy. He wrote "Manuale di materia medica e terapeutica" (1865); "Manuale di farmacologia clinica" (1885-90).**

**CANTARINI, kán-tä-rë'nē, Simone, also known as Il Pesaresi, Italian painter: b. Pesaro 1612; d. Verona 1648. He studied under Guido Reni at Bologna. He afterward painted a large number of pictures, all much in the style, but without the grace and delicacy, of his master's work. His 37 etchings more closely resemble those of Guido. Throughout his life Cantarini's intolerable arrogance made him numerous enemies; and after a quarrel with his chief patron, the Duke of Mantua, he died in Verona. Among his best-known paintings are an "Assumption"; "A Holy Family"; and "Joseph and Potiphar's Wife."**

**CANTATA, kán-tä'.ta, literally, "sung music" to distinguish it from "sonata" or "sounded music." A musical term applied to an elaborate vocal composition, with different movements, arias, recitatives, with piano accompaniment. Orchestral accompaniment are also found, and in character the cantata may be anything from a short oratorio to a slight opera not intended for dramatic representation. In early times the cantata was sung by a single vocalist to the accompaniment of one instrument, in which form it was called cantata da camera to distinguish it from the church cantata which had a religious text.**

**CANTEN, in the United States, a soldier's metallic water flask, containing two to three pints, and covered with a woven fabric. In England the canteen is combination pan, dish and plate, for use at mess by the army.**

(2) The departments of the British garrison store, usually divided into a dry canteen and wet canteen, the former being for general groceries and provisions, and the latter for liquid refreshment, excluding spirited liquors.

Previous to 1901, beer and wine were sold at canteens in the United States army, though spirits were prohibited. In that year an anti-canteen law went into effect, as the result of temperance agitation. Strong amendments were made in 1910 and 1911 to repeal the anti-canteen law, but they were unsuccessful. The canteen was succeeded by the "post exchange" (q.v.). The name, "canteen," is sometimes given at present (1918) to the stores and restaurants for soldiers established at the front by such institutions as the Y. M. C. A. (q.v.).

**CANTERBURY, England, cathedral city, a parliamentary and a municipal borough, and a county borough under the Local Government Act of 1888. It is situated in the eastern division of the county of Kent, 55 miles distant by road from London and 62 by rail. It stands on the banks of the river Stour, is 14 miles from Margate and 16 from Dover. It is connected with Whitstable by means of a branch line of railway about seven miles in length. The town is on the lower levels.**

**Industries.—The district is chiefly agricultural. Canterbury was formerly noted for its silks, velvet and brocade manufacturer. Breweries, linens and worsteds, leather, bricks and lime are the main industries. It is the centre of important corn and hop markets.**

Vol. 5—34
cepting the supply of electric light, there are no
great municipal undertakings, not only the gas
and waterworks but also the swimming baths
being managed privately.

Churches, Buildings, Educational Institu-
tions, etc.—There are 14 parish churches and
various chapels. In addition to the churches,
of which the most historic is Saint Martin's,
built originally by the Romans, Canterbury con-
tains a number of interesting buildings, the
principal of which are "The Guildhall" (built
1439, rebuilt 1697), Market House, Saint Augus-
tine's College, Chaucer's Inn, the 'Chequers
of the Hope' (1477), and the Crown Inn, erected
by Prior Chillenden in the 15th century. The
only remaining city gate is the West Gate, re-
built by Archbishop Sudbury, 1360, and now
used as a Museum of Arms and Armory,
Saint John's Hospital, East-bridge Hospital
and Saint Nicholas Hospital at Harbledown
are picturesque survivals of ancient charitable
foundations.

The public library was established in 1858.
The museum, which has been in existence since
1825, now houses the public library, housed
in the Beaney Institute. This institute
was partially paid for out of a legacy of £10,000,
left to the city by the late Dr. Beaney, a native
of the city, who amassed a large fortune in
Australia. The Cathedral library, which was
founded in 1660, contains about 13,000 volumes,
and the library at Saint Augustine's College has
about 18,000 volumes. An art gallery was pre-
sented to the town in 1882 by Mr. T. Sidney
Cooper, the famous artist, who was born in the
city. Attached to the cathedral is a school
founded by Henry VIII, and until recently a
bluecoat school founded by Queen Elizabeth,
now merged into a scheme called the Simon
Langton schools. Saint Augustine's Monastery
has been restored and enlarged and is now used
as a Church Missionary College.

Canterbury Castle, one of the largest in
England, was of Norman construction, but all
that now remains of it is the keep.

The Cathedral.—The most remarkable ob-
ject in the city is the cathedral, which is one of
the finest ecclesiastical structures in England.
Nothing of the original building remains. The
cathedral is built on the site of a Roman
church, which was renamed Christ Church by
Saint Augustine when he was elected arch-
bishop of Canterbury. The church was de-
stroyed by fire the year after the Norman Con-
quest, 1067, but rebuilding was commenced
three years afterward and was completed in
1130. This was again destroyed by fire four
years afterward. It contains the tomb of
Edward the Black Prince, 1376, also that of
Henry IV and his Queen in the Trinity Chapel;
the stone chair in which the archbishops are
enthroned; and some beautiful 13th-century
stained glass. The principal historical event
connected with the cathedral is the murder of
Thomas à Becket, which took place in 1170.
The Archbishop of Canterbury is Primate of all
England and metropolitan for all the dioceses
south of the Trent. See CATHEDRAL and
CHURCH.

Government.—Canterbury sends a member
to the House of Commons and is governed by
a mayor, aldermen and councillors. Many
charter rights have been granted to the city from
time to time, the first by Henry II and the last
by Charles II, who granted a charter of incor-
poration in 1686. The first mayor was elected
in the year 1448.

History.—Canterbury is supposed to have
been a place of importance before the Roman
invasion, and was Durovernum, meaning appar-
ently the British prefix Duor, water, although
antiquaries differ in the interpretation of
the remainder of the compound. Druidical
remains have been found here, together with
the British weapons termed celts. Its impor-
tance during the Roman occupation is proved
by the discovery of a great variety of remains
and it is interesting to note that bricks of
Roman manufacture have been found in cer-
tain portions of the remaining walls. It derives
its present name from the Saxons, Can-tun-
berie, the Kentishmen's city. During the resi-
dence of Ethelbert, king of Kent, the memora-
able arrival of Saint Augustine took place in
597—an event rapidly followed by the conver-
sion of this King and his people to Christianity
and the foundation of the archbishopric of
Canterbury. In the 8th and the three following
centuries, the city was from time to time dread-
fully ravaged by the Danes, and on one oc-
casion, in 1011, nearly the whole of the inhabit-
ants, including women, children and the arch-
bishop himself, were barbarously massacred,
and the cathedral burned to its bare walls. It
was gradually reconstructed and at the Con-
quest its buildings exceeded in extent those of
London. The ecclesiastical importance of the
place, in particular, advanced with great rapid-
ity, and was consummated by the murder of
Thomas à Becket, whose canonization by the
Pope rendered Canterbury the resort of pil-
grims from every part of Europe. Not only
were the priory and see enriched by the offer-
ing of the wealthy devotees, but the prosperity
of the town itself was greatly advanced by the
money spent in it by so many strangers.
Erasmus describes the church, and especially the
chapel in which Becket was interred, as glitter-
ing with the gold and jewels of kings and
princes, nobles and wealthy pilgrims to his
shrine. Henry VIII appropriated all its
revenues on the dissolution of the priory in
1539, when he ordered the bones of Becket to
be burned to ashes. Several of the English
monarchs have made a temporary residence at
Canterbury, which was also occupied by Oliver
Cromwell in the civil war, whose troopers
made a stable of the cathedral. Pop. (1911)
24,628.

Bibliography.—Willis, 'Architectural His-

tory of Canterbury Cathedral' (1845-69); Stan-
ley, 'Historical Memorials of Canterbury' (1883);
Hook, 'Lives of the Archbishops of
Canterbury'; Jenkins, R., 'Diocesan History
of Canterbury' (1880); Cox, 'Canterbury: A His-
torical and Topographical Account of the City'
(1905); Taylor, 'Canterbury' in the Medieval
Towns Series (1912).

H. T. MEAD.
Librarian of the Public Library.

CANTERBURY, New Zealand, a provin-
cial district occupying the centre of South
Island; capital, Christchurch. Its area is
14,040 square miles. The interior is mountainous,
and covered with dense forests. The famous
Canterbury Plain, of 2,500,000 acres, slopes
CANTERBURY BELLS (CAMPAHULA)
CANTERBURY-BELL—CANTERBURY TALES

531

gradually down over a descent of 40 miles to-ward the sea. A rich loamy tract, admirably adapted for agriculture and cattle grazing, extends along the east coast, while the interior is a true pastoral country, well watered by numerous streams, and covered with a perpetual herbage of various grasses. A vast coal-field seems to underlie the whole country, and coal is worked in the districts of Timaru and Malvern. Good fire-clays, quartz, sand for glassmaking, marble, limestone, etc., are also found. The productions include wool, grain, frozen meat, skins and hides, butter, cheese and some silk. Pop. including Maoris, 173,185.

CANTERBURY-BELL, a name given to species of Campanula (q.v.), especially C. medium.

CANTERBURY TALES, The. 'The Book of the Tales of Canterbury' has a permanent claim on the attention of reading men. It represents the most mature and the most variously brilliant achievement of the man whom the world will always regard, and in many respects rightly, as the father of English poetry. In its structure it is, though uncompleted, the happiest scheme of the many that have been devised for presenting a series of stories in a manner at once natural, dramatic and the reverse of monotonous. In its setting it introduces us to an acquaintance on terms of intimacy with the society, high and low, of merry England's 14th century, an age of color, of contrasts and of essential liveliness. In its contents it offers an inviting approach, for most men probably the readiest, to the literature of the late Middle Ages, a realm of gold for all its dress, whose literary coin still bore, after its own peculiar fashion, some stamp of the antique Roman world and is still current in the world of beauty to-day. 'The Canterbury Tales,' as we know it, is a collection of 24 stories, two of them unfinished and two, for dramatic reasons, interrupted and not continued. These stories are bound together in a scheme, only partly realized, by means of the words of the host, Harry Bailey, toast-master of the occasion; by the talk of the pilgrims the tellers of the tales—among themselves, and by the narrator in his descriptive touches on the part of Chaucer, himself a pilgrim and reporter of the whole. Though some of the stories were composed earlier, the writing of many of them and the work of weaving them all into a garland seem to have been the chief literary activity of the last 15 years of the poet's life. For death found him with the work still unfinished.

The plan which the poet proposes at the beginning is characteristically ambitious; characteristically, also, the modification and adjustments as the work proceeded; this fact, together with the further rearrangements introduced by different copyists, makes it impossible always to speak with certainty of Chaucer's final intention. But enough of the steadfast pleasure in tracing the evolution of a whole vastly more significance than any one story, or all of them arranged in a manner not so original, could possibly possess. It is perfectly possible for a continental critic, steeped in the literatures of the Romance tongues, to assert that he finds little in the 'Tales' that is new to him. He might be understood, if he preferred, as most English readers would not, Boccaccio's version of the story of Palamon and Arcite to that which Chaucer puts in the mouth of the Knight. He might assure us with some truth that the story of the patient Giselda is a translation and nothing more of Petrarch's Latin version of the 'De Democritae' story. And so he might go through the list, conceding, however, perhaps more readily than the English reader, the originality of Chaucer's adaptation of the fabliaux type in the 'Miller's Tale,' 'The Reeve's Tale' like being more capable of appreciating these things in the Chaucerian spirit than the English reader, who is troubled, as Chaucer's audience plainly was not, by the indecorous character of the material upon which such splendid narrative artistry is lavished.

But to proceed thus is to refuse the poet credit for much that he has tried to do. He has not assembled his company of nine and twenty—perhaps there were a couple of priests besides—merely to treat us to a gallery. High and low, every one, be it noted, succeeded in the life he had chosen, Knight, Squire, Monk, Prioress, on the one hand, Yeoman, Cook and Plowman on the other; knights like the Friar, the Pardoner, the Summoner; professional men and tradesmen, and the never-forgotten Wife of Bath, all step before us, it is true, in the general prologue. Under the clear, encouraging eye of Chaucer they declare themselves for the folk they are, so that Dryden could see 'their humors, their features and their very dress, as distinctly as if [he] had supp'd with them at the Tabard at Southwark.' If Chaucer had stopped here, if he had given us nothing beyond his prologue, he would still have written something more brilliant, more sympathetic than anything that can be found in medieval literature before him, but nothing essentially different from, let us say, the 'États du monde' of many a French satirist. But Chaucer, fortunately, does not stop there. Having got his characters, he set out to order his material in terms of drama. Tale was to be adjusted nicely to teller; character was to play upon character; little personal hostilities, class prejudices, different individual reactions were called upon to bring the discussion of marriage and the art of love, to bring the successions stories naturally and dramatically into being, as the pilgrims took their leisurely way along the well-known road to the shrine of the martyred saint. There was to be a constant flow of narrative, washing pleasantly upon the alternate shores of fiction, grave or gay, and of the real life of his own time. This plan, as has been said, is imperfectly carried through. To have conceived it at all, however, and even in part to have given to it poetic expression is to have made a distinct and permanent contribution to the literature of the world.

The reader to-day, making his way through this 'God's plenty' of stories, serious and trivial, dignified and the reverse, will find his pleasure in tracing some of the evolution of Chaucer's interests, which make up a strand capable of giving, in spite of imperfections, unity and significance to the whole. He will start easily with the 'Knight's Tale,' noting its nice adaptation to its grave, gentle, its thoroughly chivalrous teller, and he may, if he like, pass
from this sort of serious, quasi-historical romance to romance of Oriental character in the multiplied wonders of the 'Squire's Tale,' to Arthurian matter in the 'Wife of Bath's Tale,' and to Chaucer's gentle and searching ridicule of degenerate romance in his own 'Tale of Sir Thopas.' But if he is wiser he will read the tales in their setting, interrupting with the drunken Miller the Host's well-laid plans and sharing with the Reeve his resulting indignation, noting in the stories of both the robustness of the characters and the richness of the social background. A like situation he will observe in the tales of the Friar and Summoner. With the 'Physician's Tale' and the experience will doubtless be repeated in the case of the tales of the Man of Law, the Shipman and the Manciple—he will miss the sense of delicate and inevitable adjustment; temporary assignments, stop-gaps, perhaps some of them were. But the 'Pardoner's Tale' is one of the most effectively told of all, and his prologue an amazing and successful piece of fairy composition. With it he would be interested to compare; that other essay in the "literature of exposure," the tale of the Canon's Yeoman, 'The Monk's Tale' and the 'Parson's Tale' do not spring of sheer necessity from the situation, but they are excellent in character, and because they are fairy-telling, more delightful to contemporary readers than can nowadays be easily appreciated. And to the 'Monk's Tale' the humor of the Nun's Priest, set off with all the arts of a skilful preacher on a holiday, affords a perfect foil, just as Chaucer's ponderous 'Melioces' contrasts with the gaiety, imperfectly grasped by the host, of his own 'Sir Thopas.' No more delicate adjustment is to be found between tale and teller than in the 'Prioress's Tale,' a story current all over Europe; but here enhanced in value by the artistic uses to which it is put.

Very much on Chaucer's mind, apparently, was the problem of what to do with a certain coarse, forth-putting type of woman whose determination in her own behalf has been handed way was sure to make trouble for whatever member of the inferior sex she chanced to mate with. Harry Bailey has such a wife, and he has already confided some of his woes on this score to the pilgrims, when the presiding arch-wives, the very embodiment of all their awful power, steps forward in the person of the Wife of Bath, and in good scholastic style, with full illustration from her own experiences, states her case. Such a subject will not do; and it is the clerk who makes the story of Griselda serve the end of a savage, though delicately administered, satire upon the extravagant positions advanced by the Wife of Bath. At once the Merchant cuts in with a hint of his miseries in marriage and a story which makes clear his own theory of the bitter disillusion in store for those who trust their wives. It is possible that the 'Squire's Tale,' which treats of love, something quite apart from marriage, according to the medieval view, might when finished have been brought into closer relation with what goes before. It is certain that it prompts the Franklin to tell his story presenting a husband, a wife, a clerk and a squire in such an amiable light, developing at the same time a theory of marriage and distrust in marriage which is the finest flower of gentleness. One can, if one wishes, push on further and tag the 'Second Nun's Tale' as presenting the ecclesiastical view of marriage as something inferior to celibacy.

But it would probably be wrong to do so or to insist that Chaucer, throughout the tales discussed, felt himself constrained to a rigid, doctrinaire discussion of marriage as a problem. He is concerned with the expression of human character in conduct, with the relations of man to his fellow men and women, and to God. Being of the Middle Ages, he exhibits some of the conventions of the Middle Ages; the talk of his pilgrims unashamedly informs, it frankly edifies, it indulges in class satire and sex satire, it inevitably finds itself revolving around traditional questions—how do rogues thrive in the world? how shall we make terms with fortune? how is man to succeed in civilizing woman? what is the nature of true gentility? It is impossible for Chaucer to look thoughtfully on human conduct without proceeding in this manner. With him, conduct, again, for him, as for his time, falls naturally into the elastic and all-embracing category of the seven deadly sins. But this does not mean that Chaucer is writing a tract on marriage or a book of exemplary anecdotes, toasting strait the double standard. It is unlike him to attempt anything so rigidly schematic; certainly whatever his intention he achieved nothing of the sort; it was not for nothing that Dryden called him "a perpetual fountain of good sense." It is this good sense of his which has led him to pierce through the conventions in which he inevitably worked to the plane of our common humanity on which all who love good literature can affectionately meet with him.


HARRY MORGAN AYRES, Assistant Professor of English, Columbia University.

CANTARELLUS. See FUNGI, EDIBLE.

CANTHARELLUS, or SPANISH FLIES, the blister-beetle (q.v.), when prepared for medical use. Their value is due to the presence of a chemical principle, called cantharidin, which constitutes from 0.5 to 1 per cent of earthy bodies, with the formula C₉H₇O₅. On hydrolysis, this is converted into cantharidic acid, C₉H₇O₄. Cantharidin is obtained by treating the pulverized insects with a solvent, such as alcohol, ether or chloroform (not water), the last being preferable. The solution is evaporated, and the residue is purified from a green oil which adheres to it obstinately, by digesting with bisulphide of carbon or by redissolving in alcohol. Purification is further affected by animal charcoal and the cantharidin crystallized from hot alcohol or chloroform.

Cantharides is used externally for its
counter-irritant action. It must be used with
discretion especially in cases of older persons,
children or paralysis. It must not be used in
renal disease, owing to the risks attendant on ab-
use of the diuretic effect of the plant in cases of
impotence. Its criminal employment is
usually intended to heighten sexual desire, and
has frequently led to death. It produces severe
gastro-intestinal irritation, and has toxic qualities,
the patient usually dying from an arrest of
the respiration. To maintain the appetite,
sterilizing of bland fluids, such as milk, soda-
water and plain water, to dilute the poison in
the blood.

A number of insects other than cantharides
possess the vesicant property, such as the
Chinese beetle (Mylabris cichorii) which is
especially rich in cantharadin, yielding about
twice as much as the cantharides. Our native
blister-beetles, when powdered, nearly resemble
Mylabris in color, and are used as adulterants to
insecticides.

CANTHOPLASTY (Gr. kanthos, "the
angle of the eye" and plastikos, "formative"),
the operation of slitting up the outer canthus
or corner of the eye, so as to enlarge the
opening between the lids, an operation proposed
by Ammon when the eyelids are not sufficiently
cleft, or when the eyelids produce tension on
the eyeball, as in inflammatory processes.

CANTICLE OF THE SUN, The (II
Cantico del Sole), known also as the Praises
of the Creatures, is the only work in Italian
that we possess of Saint Francis of Assisi.
Guiliano del Domenico calls it "the
darkest jewel in the Italian religious poetry of the 13th
century." Renan goes even so far as to term it
"the finest piece of religious poetry since the
Gospels." Written in the Umbrian dialect of
the Saint's native region, its assonanced prose
and occasional rhymes constitute in its primitive
form one of the oldest monuments of mediaeval
Italian. It was improvised at San Damiano in
the fall of 1225 at a moment of great spiritual
exaltation during a reaction from a period of
severe illness and mental stress. Tradition
clearly assigns to it, as subsequent additions,
the final one having been composed by
Saint Francis just prior to his death, 3 Oct.
Cl, CXIX, CXX, CXXII.

In this canticle Saint Francis lays bare his
own simple, naive soul, his wonderful love of
intimate nature, his artless faith and innate
mystic love. He raises to the Creator a pean
of praise for the light of the sun, the moon and
stars, the air and clouds, rain and fire, for
mother earth, for those who forgive and endure
during worldly death from which no living man can flee. In the loveliness of its inspiration the "Canticle of the Sun" must be compared to Psalm 148 of David. Like the famous "Cantico di Sant'Antonio," a work of
later date, the "Canticle of the Sun" has touched
the souls of men and has preserved in Italian
hearts the popular tradition of their great Saint.
It became in his last days the favorite song of
Saint Francis and must be regarded as the mes-
sage of the Saint himself. All his joyousness, his
hopefulness, his broad sympathy toward all
things, his feeling for universal brotherhood.
We must not look for great literary merit in this
canticle. Francis was not a man of learning,
nor in those primitive times was the art of
verse in the vernacular sufficiently developed to
be compared with the perfected compositions of
the following century. Yet in his religious
poetry Saint Francis found in the Canto di
Pone da Todici, his Franciscan successor, who in
turn is the precursor of Dante (consult "Par-
adiso," canto XI). For a critical study of the
writings of Saint Francis consult Robinson
Pascal, "The Writings of Saint Francis of
Assisi" (Philadelphia 1907). For the original
text consult Sabatier, Paul, "Speculum
perfectionis" (Paris 1898). For an English
translation consult Cuthbert, "Life of Saint
Francis of Assisi" (1914).

ALFRED G. PANARONI.

CANTICLES. One of the canonical books
of the Old Testament. The name is derived
from the Latin cantica, plural of cancra, a
little song. In the Vulgate it is called
cantica canticorum, "song of songs." This is
a literal translation of the Hebrew title which is
generally understood to mean "the best song." It
may, however, signify "the best song" in the
sense that the first word is taken in a collective sense, as it
probably should be in the superscription "Songs of the Ascents" in the Pilgrim Psalter (Pss.
CXX-CXXXII). The Alexandrian MS of the Greek version has apparently rendered the title cantica cantic-
orum; and the Targum paraphrases it "songs
and hymns which Solomon uttered." This is
likely to be the original meaning. When the
name of Solomon was added, it may have been
the intention to characterize the collection as the
choicest of the 1,005 songs ascribed to this
monarch in 1 Kings v, 12. The conception of
the work as a unit naturally led to understanding
the title in the former sense. At the time
when the canon was reduced as a result of the
critical inquiry caused by the idea that holy
books possessed a sanctity rendering it improper
to touch profane things without a ceremonial
washing after they had been handled, the ques-
tion of canonicity arose; but it was settled at
the Council of Jamnia (c. 90 A.D.) in favor of
the book, probably through the influence of
traditional authorship and the allegorical
interpretation R. Akiba seems to have adopted.
Whenever in earlier times the allegorical
exegesis was rejected, there was a tendency
to question again the canonicity. To-day the
literal sense is generally accepted, and most
modern interpreters either look upon the love
expressed in the poems as typical of spiritual
devotion or seek for no ulterior significance,
feeling with the historian Niebuhr that something
would be missing in the Bible, if there were
not in it some expression of the profoundest and strongest of human emotions.

There is no intimation of anything but the
obvious meaning in the oldest Greek version,
the Song of Songs in the Septuagint, and the
New Testament. But R. Akiba affirmed that
the whole world was not worth the day when
it was given to Israel, since all Scriptures
were holy but this the holiest of all ("Yadaim"
III, 5), and declared that whoever sings
from the Song of Songs in the wine-houses and
makes it a (profane) song shall have no share
in the world to come ("Tosephta Sanhedrin"
xii). He no doubt saw in the book a descrip-
tion of the love of God and Israel, and this
continued to be the interpretation in the synagogue. Hippolytus (c. 200 A.D.) applied it to the union of Christ and the Church. In spite of his suggestion that the literary form is that of an epitaphialum, Origen rejected the literal sense as inadmissible, and explained that according to the moral or topological sense the love of the soul for the heavenly bridegroom was represented, and according to the mystic sense the union of Christ and the Church. The mediæval church also saw the love of Christ and the Virgin Mary depicted in the book. Bernard of Clairvaux wrote 86 sermons on it. A new type of mystical interpretation is found in Teresa de Cepeda's commentary on the first chapter. Nicolaus de Lyra saw in the poem a prophetic adumbration of the course of ecclesiastical history, and Cocceius discovered in it the history of the Church down to the synod of Dort in 1618 A.D., just as the author of the Aramaic Targum had found in it the history of Israel down to 586 B.C. In the same way ingenious exegetes have discerned veiled descriptions of the political courting of the 10 tribes by Hezekiah, or of Solomon. A different method was suggested by Honorius of Autun (died 1140), who held that the literal sense might be accepted, if a typical significance were attached to it, and this view has been adopted by Vataillé, Bosset, Lowth and many Catholic and Protestant scholars in recent times. The type may then be thought of either as having already been in the mind of the author or only subsequently recognized. From the former standpoint a comparison has been made, e.g. by Harper with the poems of Hâlec, Jami and Jeyadeva, where a double meaning seems to be intended, while the recognition of an original literal sense, having no mystical meaning, afterward legitimately receiving an additional typical significance, is characteristic, e.g., of Gigot's interpretation.

Theodore of Mopsuestia (d. 429) refused to recognize any other than the literal sense. For this he was condemned by the council of Constantinople in 553. Some of the Anabaptists seem to have taken the same view. Sébastien Chateillon recognized the secular character of the poem, and for this offense he was driven out of Geneva through the influence of Calvin. Luis de Leon (d. 1591) made a Latin translation of it, but it is not translated into English. Mme. d'Albrie, in a letter to the Duke of Beaufort, gives an account of an only the name by which the poem is known in the Syriac or in the Syriac language, which is written in Syrian, and which is divided into the same number of stanzas as the Greek original. The translation of the poem is given in the Syriac version, and the poem is divided into three sections: the first section is devoted to the description of the wedding, the second to the description of the marriage, and the third to the description of the marriage feast. The poem is divided into five acts: Laurentius Petreius, a Danish pastor, arranged it in dramatic form, translated it into Danish, and it was published in 1640; Huet, in 1670, declared it to be a drama; Hermann von der Hardt (before 1706), an anonymous Breslau pastor in 1720, G. Wachter in 1722, and Nicholas Nonnen in 1725 presented various attempts to indicate a plot. A shepherd lover as a rival of Solomon was introduced by J. F. Jacobi in 1771. While Franz Delitzsch gave the most perfect expression to the type of dramatic construction which made Solomon and Sulamith the real lovers, it was largely through Ewald that the idea of a heroine, faithful to her absent shepherd in the face of the blandishment of the infatuated despot, became widely popular. It furnished an ethical motive, presented a moral struggle and suggested the ultimate triumph of virtue. Duhm in 1902 and Driver in 1910 still adhere to this view. The chief difficulties that have been raised against it are that the ancient Hebrews possessed no theatre; Canticles has no plot, on which two interpreters can agree; Solomon's character and conduct are anaria by Tributsch, and Martigny; ostensibly answering his, in reality addressed to her absent friend, place her in an absurd situation and a morally dubious light; the tone of the King's words, those assigned to the shepherd, and those placed on her own lips is very much the same; and the necessity for putting her to sleep on the stage, to dream through entire scenes, is not less embarrassing because these scenes are so short that they can scarcely have occupied more than a minute or two.

Already Bossuet and Lowth suggested that Canticles may have been written for a royal wedding, and divided it in sections for the seven days of the festival. Renan (1860) threw out the idea that it may be the libretto of a simple play performed at some rural wedding, where the singers took the parts of Solomon's guards, ladies of Jerusalem and others. He was influenced by Charles Schefer who had seen such performances in Egypt and in Syria. In 1873 J. G. Westermünster described, in an article on the "Syrian Thresholding Table," a wedding ceremony at Del Hamma, near Damascus. On the morning after the wedding night the husband and wife played king and queen, sitting upon the threshold table as a throne, dancing and listening to songs in the convent while the bride was incarcered by the Inquisition for five years as a punishment. Jean le Clerc maintained that only earthy love was depicted in the songs; and J. D. Michaelis, regarding the work as in part obscene, was unwilling to give it a place in his translation of the Bible. The growing conviction that the poet, or poets, had no other purpose than to depict the love of man and woman has not strengthened this feeling as regards the book; on the contrary there has been during the last century a decidedly higher estimate of its moral worth as well as a greater admiration of its literary charm.

On two important points there is as yet no consensus of opinion. Is Canticles a drama or a mere collection of lyrics? And is the love described that of husband and wife, a bridegroom and a bride, a betrothed couple, or only that of man and woman. Caspar Sanctius, in 1616, affirmed that Canticles was a sacred drama; Cornelius a Lapide (d. in 1637)

According to Luis de Leon (1569), René Lapin (1569), Charles Cotin (1652), Richard Simon (1679), Jean le Clerc (1685), Claude
Genest (1707), J. T. Lessing (1777), J. G. Herder (1778), E. Reuss (1879), W. W. Baudissin (1901), L. Gauthier (1906), Paul Haupt (1907), N. Schmidt (1911) and H. Grundmann (1919). CANTON: The collection of love-songs, idyls, elegies or madrigals. Reuss has especially called attention to the poem's peculiar manner of making the woman with whom he is in love the speaker by preference. There is an unmistakable similarity of this diwan to the "Anthologia Palatina." Greek influence seems certain; it is not impossible that the poet had heard some idyl of Theocritus; and his sense of beauty in nature reminds of Meleager. Nevertheless, it may not be safe to go as far as to the reign of Aretas IV (c. 85-63 B.C.), while it would seem necessary to assume a date later than the 3d century B.C. The language, with its Aramaisms, neo-Hebraic turns, and Persian and Greek loanwords appears to be as late as the 2d century B.C. But if the author lived in the East-Jordan country this appearance may to some extent be due to dialectical differences. There is no hint that he was a married man, or a wedding poet. He does not appear to have been an institution, but to voice, in the most delicate and beautiful terms he could master, the joy with which the glories of spring and the impulses of love filled his heart. The mention of Solomon by way of comparison naturally led to the idea of an author, who had so much experience with love, was the author, and Solomon's reputation for wisdom led to the search for a hidden meaning. This meaning made it appropriate to read the book at the Passover when the intimate relation between Yahwe and a hidden meaning was celebrated. There does not seem, therefore, to be any occasion on this account to suspect, as Erbt and Sellin do, that originally these songs were composed in honor of a sun-god and a moon-goddess whose nuptials were celebrated at the feast of the vernal equinox.


NATHANIEL SCHMIDT,
Professor of Semitic Languages and Literatures,
Cornell University.

CANTTUM, cän't-tüm, England, an ancient territory in South Britain, whence the English Kent is derived, supposed to have been the first district which received a colony from the Continent. See Kent.

CANTO FIGURATO, fé-gū'-rätō, a term applied by the old Christian ecclesiastics to the chant in its more florid forms, or in which more than one note was sung to a syllable.

CANTON, John, English electrician: b. Stroud, 31 July 1718; d. 22 March 1772. He was settled as a schoolmaster in London, and was elected a fellow of the Royal Society in 1749. He invented an electroscope and an electrometer; originated experiments in induction; was the first to make powerful artificial magnets; and in 1752 demonstrated the compressibility of water. He and Franklin discovered almost simultaneously that some clouds were charged with positive and others with negative electricity.

CANTON, William, English writer: b. Isle of Chusan, China, 27 Oct. 1845. He was educated in France for the Roman Catholic priesthood, but decided upon a secular career and was for many years on the staff of the Glasgow Herald. He is author of 'A Lost Epic and Other Poems' (1887); 'The Invisible Playmate,' a strikingly original piece of work (1894); 'V. V., Her Book and Various Verses' (1896); 'The Invisible Playmate, and V. V., Her Book' (with final chapter) (1897); 'A Child's Book of Saints,' republished in the United States as 'V. V.'s Golden Legend' (1898); 'Children's Sayings' (1900); 'A Child's Book of Warriors' (1912); 'Saint Elizabeth of Hungary' (1912); 'The Bible and the Anglo-Saxon People' (1914).

CANTON, China (more correctly Quang-chow-foo), a large and important city on the Pearl River, at a distance of 80 miles from the sea. It is situated in the province of Quangtung (of which name Canton is a corruption), and consists of the city proper and of many suburbs, and its total population is estimated at from 1,250,000 to 1,800,000 with 500 foreign residents. The city proper is enclosed by walls, forming a circuit of six miles, and is divided into two parts by a partition wall running east and west; the portion north of this wall, which is much the larger, being called the old, that on the south of it the new city. The walls mainly of brick, rise to the height of 25 feet, with a thickness of about 20 feet. There are 12 gates, all of which are shut at night. The streets are long and straight and in general paved with flat stones, but they are very narrow, the average breadth not exceeding eight feet. The
houses of the poorer classes are mere mud hovels; those of the shopkeeping class are common houses of two stories, the lower of which serves as the shop. The streets are to a great extent lined with these shops, in which are to be found the productions of all parts of the globe. Neal and gaudily painted signs and names give a gay appearance to the narrow streets; in most cases these two stories are walled in, but the whole is thrown open by day and closed at night. Temples and other religious edifices are very numerous, but few of them are in any way remarkable. There are two lofty pagodas, forming a notable feature in any general view of the city. One of these, 170 feet high, is about 1,300 years old, the other, 160 feet high, about 1,000. Among the chief temples, which are far from attractive buildings, may be mentioned those of the Ocean Banner, of the Five Hundred Gods, of Longevity and of the Five Genii. Among other buildings may be mentioned the residences of the governor-general, the commander-in-chief, the treasurer, the prefect, etc. There are four large prisons, one of them holding 1,000 prisoners. In the European quarter are churches, schools and other buildings in the European style. Wheeled carriages are not in use in Canton; goods are transported on bamboo poles laid across the shoulders of men, while people who can afford it have themselves carried about in sedan-chairs. The river opposite the city for the space of four or five miles presents a most interesting scene. The prodigious number of boats with which it is crowded is the first thing that strikes the eye. A large number of these — as many as 40,000, containing a population of 200,000 — are fixed residences, and most of them moored stern and stem in rows. The inhabitants are called tankia or boat-people, and form a class with many customs peculiar to themselves. Millions are born and live and die in these floating dwellings without ever having put foot on dry land; while their ancestors for generations were all amphibious like themselves. The family boats are of various sizes, the better sort being from 50 to 80 feet long, and about 15 feet wide. A superstructure of considerable height, and covered with an arched roof, occupies nearly the whole of the interior of the boat. This structure is divided within into several apartments, devoted to different domestic purposes, all of them being kept very clean. The smaller boats of this description are not above 25 feet long, and contain only one room. By far the handsomest are the hwa-ting or flower-boats, which are graceful in form and have their raised cabins and awnings fancifully carved and painted. These are let to pleasure-parties for excursions on the river. The foreign mercantile houses and the American, British and French consulates have as their special quarter an area in the suburbs in the southwest of the city, with water on two sides of it. The river banks are faced with a granite wall; handsome hongs or factories have been built, and much money has been spent on improvements. The manufactures and other industries of Canton are varied and important, embracing silk, cotton, porcelain, glass, paper, sugar, lacquered ware, ivory carving, metal goods, etc. Its foreign trade has been known for three centuries throughout the world, and it was the chief foreign emporium in China until 1850, when Shanghai began to surpass it. Since then the opening of other ports and various other causes have checked its prosperity, yet it still carries on a large traffic, its exports and imports together amounting in 1912 to about $50,000,000, and its total trade to upwards of $70,000,000. Business transactions between natives and foreigners are transacted in a jargon known as cantonese. Since the establishment of the colony of Hongkong there has sprung up quite a flotilla of river steamers, which ply daily between Canton, Hongkong and Macao, and convey the greater part of the produce and manufactured goods of Hongkong for consumption. These steamers equal the best river boats of Europe, and carry large numbers of passengers. The climate of Canton is healthy; in July and August the thermometer may rise to 109° F. in the shade, and during winter it is at times below freezing-point. Canton was first visited by English vessels in 1634. From 1689 to 1834 the East India Company had a monopoly of the English trade. In 1839 war was declared by Great Britain against China, and Canton was occupied by 1,600 prisoners. In 1856 the foreign quarter were pillaged and destroyed, and about a year after this Canton was taken by an English force. From this time to 1856 it was jointly occupied by an English and French garrison. Since then it has been open to foreign trade. Of revolutionary movements that have affected the political life of China Canton has been the centre.

CANTON, Conn., town, Hartford County, on Farmington River and on the Central New England Railroad, 15 miles from Hartford. The manufacture of edged tools and the bottling of plain and carbonated waters are thriving industries. The town includes the village districts of Canton, Canton Centre, North Canton and Collinsville. Pop. 2,732.

CANTON, Ill., city, of Fulton County, situated on the Chicago, B. & Q. and the Toledo, P. & W. railroads, 28 miles west of Peoria. It is the trade centre of the fertile agricultural and coal-mining region; and has numerous industrial interests, including a large manufactory of agricultural implements, factories for factories and several lesser plants. The United States census of manufactures for 1914 reported 34 industrial establishments of factory grade, employing 1,113 persons, of whom 920 were wage earners, receiving $829,000 annually in wages. The capital invested aggregated $9,733,000, and the year's production was valued at $2,577,000: of this, $1,451,000 was added by manufacture. It has a public library, a high school and municipal waterworks. Canton was settled in 1813, first incorporated in 1849 and is governed under a charter of 1892, providing for a mayor, elected every two years, and a city council. Pop. 12,000.

CANTON, Mass., town in Norfolk County, about 15 miles southwest of Boston, on the New York, New Haven and Hartford Railroad. It includes several villages. There is a public library, the Massachusetts Hospital School and has manufactories of felt goods, cotton padded goods, blacking, woolens, rubber goods, patent and camoule leathers, electrical supplies, fire hose, etc. Canton was settled about 1690 and was separated from Stoughton
in 1797 and incorporated. The waterworks are the property of the town, the government of which is carried on by town meetings. Pop. 4,797. Consult Huntoon, 'History of the Town of Canton' (Cambridge 1898).

CANTON, N. Y., village and county-seat of Saint Lawrence County, on Grass River, and the Rome, W. & O. Railroad, 59 miles northeast of Watertown. It is the seat of Saint Lawrence University, a State school of agriculture, a government weather bureau, and has a large lumber interests, boat building industries, a national bank, a public library, county almshouse, several churches and an assessed property valuation of over $3,000,000. Canton was settled in 1803 and incorporated in 1846. Pop. 3,000.

CANTON, Ohio, city, county-seat of Stark County, on the Nimishillen Creek, and on the Pennsylvania, Wheeling & Lake Erie, Baltimore and Ohio railroads, 60 miles southeast of Cleveland. Interurban electric railroads connect all cities and towns within a radius of 50 miles. The commercial centre of the second richest agricultural county of Ohio, also ranking among the six richest of the nation, Canton has an extensive grain trade, and manufactures of brick, sheet steel and iron, watches, enamel ware, roller bearings, safes, bridges, toys, knives, etc. The total manufacturing output is valued at $22,000,000 annually. Neighboring deposits of coal, limestone and pottery clay are also extensively worked. An immense plant supplies electric light and power, natural gas is piped at a domestic rate of 30 cents; an artesian well water supply is maintained and operated by the municipality, and a fire department with a modern motor-equipped apparatus. Bank clearings in 1915 amounted to $95,873,208; an increase of $4,600,000 over 1914; bank deposits totaled $27,000,000, resources over $30,000,000. Canton was the home of President McKinley and one of the city's features is the stately National memorial erected in 1907 on Monument Hill in West Lawn Cemetery, where the President and his wife are buried. Of granite, with a bronze statue of the President and with two sarcophagi containing the bodies, the monument stands in beautiful grounds covering 26 acres; from the lowest step it reaches a height of 163 feet 6 inches and 28 feet 9 inches in diameter. The memorial to the American soldiers of the Spanish-American War is also noteworthy. The city's principal buildings include the Federal building, city hall, city auditorium, county administration building, public library, high and other schools, several theatres, numerous handsome churches which cost $250,000, membership 1,500. Nimisilla park and Meyer's Lake park are attractive outing resorts. Canton was settled about 1805, was incorporated as a village in 1822 and received a city charter in 1854. It is administered by a mayor and nine aldermen, elected under a law of 1902.

CANTON, S. D., capital of Lincoln County, on the Chicago, M. & Saint P. Railroad, and on the Sioux River, 20 miles from Sioux Falls, is the seat of Augustana College and the State Agricultural College. The city owns its waterworks and has a Carnegie library, a handsome courthouse, churches, public schools and important manufacutes of concrete, engines and agricultural implements. The commission form of government exists since 1909. Pop. (1910) 2,103.

CANTON, a small division of territory, constituting a distinct state or government, as in Switzerland, where each of the 22 states is so designated. In France judicial districts comprising a number of communes, but constituting in the case of very large cities only a part of such commune, are called cantons.

CANTONI, kán-to-

Carlo, Italian philosopher: b. Gropello 1840; d. 1906. He studied law and philosophy at Turin, and philosophy at Berlin and Göttingen (under Lotze). He was professor at the lyceum at Turin, and in Milan; since 1878 he has been professor of philosophy at the University of Pavia. In his philosophical theory he agrees in general with Kant, except his theory of phenomenon and noumenon. He wrote 'G. Battista Visco, studii virtù e comparazione' (1867); 'Corso elementare di filosofia' (1870); 'Giuseppe Ferrari' (1878); 'Emanuele Kant' (1879-84).

CANTONMENT, the district in which troops are quartered when they are not collected into a camp, but detached and spread over the neighboring towns and villages. The object of sending troops into cantonments is to be able to concentrate them as quickly as possible on one spot, when circumstances do not admit of a camp being formed, or do not render it advisable to form one. In India the permanent military stations erected in the neighborhood of the principal cities are so called. The larger types contain barracks for European cavalry, infantry and artillery, houses for officers, huts for native troops, gymnasia, storehouses, parade grounds and administrative buildings.

CANTOR, Georg, Russo-German mathematician: b. Saint Petersburg 1845. After 1879 when he became professor of mathematics at the University of Halle, he originated the theory of assemblages or systems of numbers which may contain—as does the universe—a finite or an infinite number of numbers, or an infinity of such infinities; this last class he termed transfinite numbers and made a classification of the systems, refining the potency or degree of infinity of each. His learned contributions appear chiefly in the Mathematische Annalen.

CANTOR, Moritz, German mathematician: b. Mannheim 1849. From 1853 he was professor of mathematics and privat-dozent in the University of Heidelberg and became widely known by the standard 'Geschichte der Mathematik'—History of Mathematics, which brings the subject down to the year 1799 (4 vols., Leipzig 1880-1909).

CANTU, kán-too, Cesare, Italian historian, poet and philosopher: b. Brivio, 7 Dec. 1804; d. 11 March 1885. He was educated at Sondrio in the Valtellina, where he taught belles-lettres, at a youthful age, resided afterward in Como, and next at Milan until 1848. One of his earliest works, entitled 'Ragionamenti sulla Storia Lombarda nel Secolo XVII' ("Lec- tures on the History of Lombardy in the 17th Century") appeared in a second edition in 1842-44, and contained liberal ideas that brought upon the author the animadversion of the Aus-
CANTUS FIRMUS—CANUTE

CANTUS FIRMUS, an ancient chant of the Roman Catholic Church. These chants were adopted as standing melodies, and until counterpoint was discovered, were unaccompanied, or only harmonized with octaves.

CANUCK, a term sometimes used in the United States to denote a Canadian.

CANUTE IV, Saint, King of Denmark 1086-88. He suppressed the ancient heathen customs of his people, which aroused opposition; in 1085 he started on an expedition against William the Conqueror, but was murdered by rebels in his own army in 1086. He was canonized in 1100 and in the Middle Ages was considered the patron saint of Denmark.

CANUTE, ká-noot', THE GREAT, Knud, or Knut, the second king of Denmark of that name, and first Danish king of England: b. in the former country, about 995; d. Shaftesbury, England, 1035. He was the son of Sweyn, King of Denmark, and accompanied his father in his victorious campaigns in England. Sweyn, having proclaimed himself king of England, died in 1014, before his power was established, and appointed Canute his successor there. The latter was immediately driven out by Ethelred, the representative of the Saxon line, and fled with 60 ships to the court of his brother, Harold, king of Denmark. Harold enabled him to collect a large fleet in the north to prosecute his cause in England. He invaded that country again in 1015. He fought many battles with Edmund Ironside, who had succeeded his father, Ethelred, in 1016, and was finally victorious at the battle of Ashington. After this battle, Edmund and Canute agreed upon a division of the kingdom. To Canute were assigned Mercia and Northumbria, while the Saxon Prince reserved West and East Anglia. By the death of his brother Harold, he obtained the crown of Denmark (1016). In the same year, and but one month after the ratification of the treaty of partition, Edmund died, and Canute became sole king of England without further resistance. He refrained from murdering the children of his late rival, and sent them to his half-brother, Olave, king of Sweden. He put away his wife, Alligie, the daughter of Ethelred, and espoused Emma, the widow of Ethelred, the Saxon monarch (1017), on the condition that their children should succeed to the throne of England. He made the greatest exertions to gain the affections of his English subjects, to whom his Danish origin had no recommendation. He accordingly disbanded his Danish army, retaining only a body-guard. He adopted a law blend the romance as far as possible and to induce them to live in harmony with each other. He erected churches, and made donations to abbeys and monasteries on the scenes of former conflicts and massacres. In a witenage at Winchester, he established a code of laws which is still extant. In this code he denounced those who kept up the practice of pagan rites and superstitions, and forbade the sending of Christian slaves out of the country for sale. Although Canute generally resided in England, he made frequent visits to Denmark. He carried with him on these occasions an English fleet, English missionaries and English artisans. He promoted three Englishmen to the newly-erected bishoprics of Scania, Zealand and Ponia. In 1025 he was attacked by the King of Sweden and defeated; but in the night, Earl Godwin, at the head of the English contingent, surprised the Swedish camp and dispersed the enemy. His absence from Denmark, and the bestowal of so many dignities on his English subjects, made him unpopular in that kingdom. To appease this discontent, he left behind in Denmark his son, Hardicanute, then aged 10 years, under the guardianship of his brother, Ulf (1016). In that year he made a pilgrimage to Rome. He was well received there by the Pope, John, and by the Emperor, Conrad II, who gave up to the Danish King all the country north of the river Eider. From the Pope he obtained privileges for the English school established in Rome, and an abatement of the sums demanded from his archbishops for the pallium; and from the various princes, relief for all English and Danish pilgrims and merchants from all illegal tolls and detentions which they had endured on their route to Rome. He returned from Rome to Denmark. In 1028 he made an expedition into Norway, expelled Olave and restored Haco who swore allegiance to him. In 1029 he returned to England, and his Danish subjects proclaimed Hardicanute king of Denmark. Canute immediately returned to Denmark, put down the revolt and executed the traitor, Ulf. In 1030 Canute was acknowledged king of Norway, and laid claims to the crown of Sweden. On returning again to England, his son Hardicanute to share with him the Danish crown. His reign is very important in the constitutional history of Denmark. Canute issued the first national coinage of Denmark, and published the first written code of Danish law wherein the custom of private vengeance was prohibited. He raised the clergy in their corporate capacity to a separate estate of the realm, and instituted the Thingthl or royal guard of 3,000 men. The members of this body were all men of good family and rich enough to equip themselves at their own expense. From them sprang the Danish order of nobility; they were tried only by their peers and formed with the king the highest court of justice. Canute's last campaign was against Duncan, King of Scotland, in Northumberland, and espoused Emma, the widow of Ethelred, the Saxon monarch (1017), on the condition that their children should succeed to the throne of England. He made the greatest exertions to gain the affections of his English subjects, to whom his Danish origin had no recommendation. He
a daughter, Gunhilda, married to Henry, the son of Conrad II, of Germany, Emperor. By Allgeive he left two sons, Sween and Harold. To the former was given the crown of Norway; Hardicanute retained that of Denmark, and Harold, surnamed Harfoot, took possession of that of England. Canute is most popularly known, not by his extended rule and legislative enactments, but by the familiar story of his friendship with the courtiers and the disobedient sea. Consult Larson, ‘Canute the Great’ (New York and London 1912); Freeman, ‘The Norman Conquest’ (Vol. I, Oxford 1870); Green, ‘The Conquest of England’ (London 1883).

CANVAS, a textile fabric made of the fibres of hemp; or any strong, firms cloth, whether of hemp or flax. It is chiefly used for tents, and for the sails of sailing vessels, for which its strength makes it well adapted. Canvas for sails is made from 18 to 24 inches wide, and numbered 0 to 8. No. 0 being the thickest bolt is 39 to 40 yards long, and weighs 25 to 48 pounds. Various of it are also used as the ground of tapestry work and of oil paintings. A finer description is used for many common domestic purposes, as for towels, table-cloths, etc. The canvas used by artists is commonly of linen, varying in size and thickness, stretched on a frame or “stretcher,” and made tight by “keys” or wedges inserted in the four inside corners. There are several sizes of canvas which are generally used and are kept stretched.

CANAAN-BAK, a widely distributed fresh-water duck (Aythya valisineria), much sought as a table luxury, as its flesh is considered superior to that of all other ducks. It is about 22 inches in length and its reddish-chestnut head and neck are much shaded with drab, or the lower neck, breast, and lower part of the back, with the rump and tail-coverts, are black; and the back and sides gray, covered with fine lines and dots, so that the plumage resembles canvas. By reason of its similarity, this duck is frequently confounded with the red-head (G.v.). The canvas-back is larger, its head darker, and its bill a deep black, while that of the red-head is deep blue, or a slatish color. The shape of the bill of the canvas-back is wedged and long; of the red-head more pointed and concave. They are very tenacious of life, their bump of stubbornness being fully developed, and they will dive long distances, and prefer death by any other means than human agency. When one is crippled it will usually look around for an instant, to see where the danger lies, then down it goes, and if rushes or cover are near, it is good-bye to that duck,—it will not be seen again. When one is crippled it should be shot again, and at once. The food of the canvas-back consists chiefly of the roots of wild celery (Zoster a valisineria), which resembles the cultivated celery in appearance. It grows densely in the shallow parts of the Chesapeake Bay and Susquehanna River about the Great Lakes and in the Mississippi Valley. Few canvas-backs are found east of the Hudson and Delaware rivers. It is almost safe to say that where the plant grows in abundance, the canvas-back is almost sure likewise to be found; consequently the peculiarly delicate flavor of its flesh, and the texture and weight of the duck, increase with the amount of celery it consumes, as otherwise it is hardly distinguishable from the red-head in flavor. The canvas-back breeds north of Dakota, building its nest on the ground near the swamp, and laying from 6 to 10 greenish-buff eggs. Consult Elliot, ‘Wild Fowl of North America’; Job, ‘Among the Wild Fowl.’

CANYON, kán’-yón, a valley that is notably deep in proportion to its width. The average idea as to the depth of canyons is much exaggerated, however. Most canyons are much wider than they are deep. The Grand Canyon of the Colorado is as much as 16 miles wide at many points, and averages only about a mile deep, and yet it is one of the most stupendous chasms in the world. In rare cases gorges are deeper than they are wide, but this is the exception. Since the work of a river is not only to cut a valley but to carve away the entire surrounding region, it is evident that canyons represent a youthful stage in river erosion, before there has been time to widen the valley. See GRAND CANYON OF COLORADO.

CANYON DE CHELLY (Shay), Arix., a canyon in the Navajo Indian Reservation in the northeastern corner of the State, famous for its picturesque walls and monuments of red sandstone. Two branch canyons, del Muerto and Monument, are similar. The walls are from 900 to 1,200 feet high and while mostly vertical, present many erosion forms. The canyons have been cut by creeks rising in Chuska Mountains on or near the Arizona-New Mexico State line. The rock is a light red massive, crossbedded sandstone locally developed between Shinarump conglomerate above and Moenkopi formation below, possibly of Permian age. Some notable cliff dwellings remain in the canyon walls. These wonderful canyons can be easily visited by leaving the Santa Fé Railroad at Gallup, taking automobile 70 miles to Chinlee and there obtaining horses for a 35-mile round trip. The canyon was discovered by Doniphan’s expedition in 1847 and Simpson who visited the place in 1850 obtained the name from San Ysidro, secretary of the province of New Spain. It is believed to be a Spanish version of the Navajo term, Tse-yi, meaning “in the canyon.”

CANYON DIABLO, a noted canyon crossed by Santa Fé Railroad in eastern Arizona. It is 225 feet deep, with steep, step-like walls of the limestone which constitutes the adjoining platform. It is cut by a small stream, tributary to the Little Colorado River, which is not far north.

CANZONE, kán-tsou’ná, a particular variety of lyric poetry of Provencal origin. It is found in the Italian poetry of the 13th century. At first it was quite irregular, but was confined by Petrarch to more fixed and regular forms. Hence it is called canzone Petrarchesca; it is also called canzone Toscana, because it originated in Tuscan. It is divided into several stanzas, in which the nature and disposition of the verses, which are of 11 and 7 syllables, and the place of the rhymes, are uniform. The canzone-strophe consists of two parts, the opening one being distinguished by Dante as the fronte, the closing one as the sirmo, and these parts are connected by rhyme, it being usual to make the rhyme of the last line of the fronte identical with that of the first line of the sirmo.
other respects, the canzone has great liberty. The canzone usually concludes with a stanza which is shorter than the others, and is called ripresa, congodo, comiat, signifying dismissal or taking leave. There are different kinds of canzoni, and different names are given to the different parts. The canzone Anacreontica is divided into small stanzas, consisting of short verses with a regular disposition of the rhymes through all the stanzas. Not only light, pleasing songs of love, gaiety and mirth, but poems on solemn and lofty subjects, and of an elevated dithyrambic strain, are included under this name. The latter subjects, however, are better adapted to the canzone Pindarica, which was first introduced in the 16th century by Luigi Alamanni, and owes its perfection chiefly to Chiabrera. It is distinguished from that of Petrarch by a bolder flight, loftier ideas, greater freedom in the choice and disposition of the verses, and by the form of the stanzas, which is borrowed from the Greek chorus. The Pindaric canzoni are divided into strophe, antistrophe and epode, and are called canzoni alla Greca. Those divisions are sometimes called ballata, cantata and sonata, or volta, rivolta and standza; the Greek names are the most common. There is also the canzone a ballo, an old Italian poem, originally intended to be sung at a dance (ballo). It is called also ballata. It is not employed by the Italian poets later than the 16th century. In England, the canzone was introduced at the end of the 16th century by William Drummond of Hawthornden, who has left some fine examples. In Germany, the poets of the Romantic period imitated it, especially A. W. von Schlegel.

CANZONET, kán-tsó-net', CANZONETTA, in Italian poetry a canzone (q.v.) consisting of short verses, much in use with the poets of the 15th century. Rinuccini, and after him Chiabrera, have used it in modern times, and given it more grace. Canzonets are generally expressive of tender feelings. In music canzoni signifies a song, shorter and less elaborate than the aria of the oratorio or opera.

CAONABO, ká-o-nábó', Indian chief of Hispaniola (Haiti) at the time of its discovery by Columbus: d. 1496. The latter built a fort which he called La Navidad, and in which he left, when sailing for Spain early in 1493, a garrison of 40 men. Returning before the end of the year, he found that Caonabo had burned the fort and killed the garrison. According to the account of a friendly native, the Spaniards had drawn this fate upon themselves by their evil conduct. In 1494 the Indians in great numbers attacked the Spaniards, having been provoked by the misconduct of one of the lieutenants of Columbus, Pedro Margarite. Columbus overthrew them, first at Magdalena, and later (1495) on the plains of the Vega Real—where, tradition has it, 100,000 hostiles were destroyed. Caonabo meanwhile threatened the garrison of Saint Thomas. Alonzo de Ojeda was sent by Columbus to cajole Caonabo into coming to a conference. Ojeda went alone among the hostiles. As presents he took gyes and a large quantity of tobacco, and persuaded the Prince to show himself to his subjects wearing these novel ornaments, and even, while thus adorned, to ride Ojeda's horse; then, mounting also, he dashed through the crowd of savages, and carried his victim into the presence of Columbus. He was sent to Spain for trial and died en route.

CAOUTHOUCH, koo-chóok, an elastic, gum-like substance, obtained from the juice of certain tropical trees and shrubs, and commonly known as India-rubber or rubber. The best caouthouc comes from the Pará region, in Brazil; but supplies are also obtained from Central America and the West Indies, from Africa and from tropical Asia, especially from Ceylon and Malaya. The details of collecting the juice and preparing it for market vary somewhat according to the locality, and with the nature of the trees or shrubs from which the juice is obtained. In the Amazon region, when the source is a tree, incisions are made in the bark each morning, and the milky sap that exudes is collected in little tin or clay cups that are secured to the trees by a stake. At the end of about 9 hours these are emptied into larger collecting vessels, and on the morning of the following day new incisions are made in each tree, some eight inches below the first ones. This process is continued until incisions have been made in the bark from a height of about six feet down to the ground. The poorest quality of sap is obtained from the highest wounds, and the best from the lowest. To evaporate the juice, fire is first built of materials that yield dense volumes of smoke. A workman then dips a wooden paddle into the collected sap, after which he holds it in the smoke until the sap solidifies and acquires a slight tinge of yellow. He then dips the paddle into the sap supply again, repeats the smoking process, and so proceeds until the paddle is covered with a layer of the dried gum that is perhaps an inch and a half thick. He then slits this layer, removes it from the paddle, hangs it up to dry, and starts a fresh evaporation.

Pure caouthouc from Pará is light-colored below the surface, but superficially it is dark-brown from oxidation. It has a specific gravity of about 0.92, and consists chiefly of carbon and hydrogen in the proportion of one of carbon to 13 of hydrogen. Small quantities of oxygen are always present, however, as the best of the Pará product contains as much as one-half of 1 per cent of a sort of resin that contains oxygen, and is undoubtedly produced by the oxidation of the gum. In fact, it is known that caouthouc will oxidize slowly in damp air, even after it is vulgarized, and particularly when exposed to the action of light. Caouthouc consists, apparently, of two different kinds of gum, one of which is fibrous, while the other is viscous, though the two are chemically identical. It is slightly soluble in ether, turpentine, chloroform, petroleum, naphtha, benzine, and carbon disulphide, the viscous portion being more soluble than the fibrous part. At 250° F. caouthouc begins to melt, and becomes permanently transformed into a sticky substance which retains its peculiar consistency almost indefinitely. At 400° F. the transformation is more complete, and the black, adhesive mass that is treacherously known as "sealing glass bottles and jars if it is thoroughly incorporated with 50 per cent of its own weight.
of dry slaked lime. By careful destructive distillation of the caoutchouc is resolved into a number of hydrocarbon oils that are of interest to the chemist.

As early as 1615 the Spaniards used the crude gum for waxing their cloaks, which were made of canvas, so as to make them resist water. But it was not until about 200 years later that caoutchouc began to attract general attention in such ways. At first it was applied to cloth by the aid of heat; but improved methods followed the discovery of solvents for the gum. The first man who made a name for himself was an Englishman named Thomas Hancock (about 1820), of the "masticator," a machine by which the caoutchouc is thoroughly worked over and brought to a uniform consistency. But the greatest step in the development of the rubber industry was the discovery of the process of vulcanization—a discovery that appears to have been made independently and at about the same time (1843) by Charles Goodyear, of New Haven, Conn., and Thomas Hancock, to whom reference has previously been made. The credit of priority belongs to Goodyear, but Hancock did a great deal to make the discovery a commercial success. Unvulcanized caoutchouc is softened by heat, and is made hard and inelastic by cold; but upon being vulcanized the gum becomes comparatively insensible to ordinary extremes of temperature, and also has its elasticity materially increased. The process of vulcanization depends upon the fact that the crude rubber will absorb sulphur, and combine with it at a temperature that is easily attainable without injury to the product. The details of the vulcanization differ somewhat, according to the nature of the article that is being manufactured. If sheet rubber is submerged for a few moments in melted sulphur at a temperature of 250° F., it absorbs about one-tenth of its weight of that element; but although its color changes somewhat, it is otherwise apparently unaltered.

Upon exposure for a somewhat longer time to a temperature of 285° F., however, true combination of the sulphur and caoutchouc ensues, and the gum is said to become "vulcanized." It is not necessary that the sulphur should be actually melted in order that the sheet rubber may absorb it, for sheets that are laid in powdered sulphur that is heated nearly to its melting-point will absorb the proper amount for good vulcanization in the course of a few hours. Vulcanization of rubber sheets can even be brought about without the action of heat, by dipping the sheets for a few seconds in a solution of chloride of sulphur in carbon disulphide. It is more common, however, to knead the requisite amount of sulphur directly into the caoutchouc by mechanical means. The article to be manufactured is then brought into shape by the action of pressure and moderate heat (or in any other manner), and the final operation consists in heating it to the vulcanizing temperature by the aid of a steam bath. Chemically considered, the process of vulcanization appears to consist in the substitution of one or more sulphur atoms for a portion of the hydrogen of the hydrocarbons of which the caoutchouc is composed. For many years chemists have been interested in synthetic rubber to take the place of natural caoutchouc, but the artificial product has not yet come into extensive use. See INDIA RUBBER; RUBBER MANUFACTURE.

CAP, the cover of the end or head of anything. Caps were not worn by the Romans for many ages. When either the rain or sun was troublesome the lappet of the gown was thrown over the head; and hence all the ancient statues appear bareheaded, excepting sometimes for a wreath or the like. The same usage prevailed among the Greeks, to whom, at least during the Heroic Age, caps were unknown. The sort of caps or covers of the head in use among the Romans on divers occasions were the pītra, pīleus, cucullus, galerus and pālītūm, which are often confirmed by ancient and modern writers. The general use of caps and hats is referred to in the year 1449. The first seen in Europe were used at the entry of Charles VII into Rouen. From that time they began to take the place of chaperons or hoods. When the cap was of velvet they called it mortier; when of wool simply bonnet. None but kings, princes and knights were allowed to use the mortier. The cap was the head-dress of the clergy and graduates. Pasquin says that it was anciently a part of the hood worn by the people of the rope: the point whereof being cut off, as an encumbrance, left the round cap an easy, commodious cover for the head; which cap, being afterward assumed by the people, those of the gown changed it for a square one, first invented by the Venetians, called Patrouillet. He adds, that the giving of the cap to the students in the university was to denote that they had acquired full liberty, and were no longer subject to the rod of their superiors, in imitation of the ancient Romans, who gave a pīleus to their slaves in the same manner of making them free: whence the proverb vocare servos ad pīleum: hence, also, on medals, the cap is the symbol of Liberty, who is represented holding a cap in the right hand by the point.

Cap of Maintenance, one of the ornaments of state carried before the sovereigns of England on the occasion of their coronation. It is also applied to an ornament borne before the mayors of certain cities on state occasions, and to a device in heraldry.

In ship-building a cap is a square piece of timber having two holes cut through it,—one square, to fit on the squared or tenon head of the lower mast; the other round, to take the heel of the upper mast. Also a similar contrivance affixed to the end of the bowprit, through a round hole in which the jib-boom is rigged; and a covering of metal or tanned canvas to protect the end of a rope from fraying.

In mining a mass of unproductive rock overlying valuable ore. In coal mining, the bluish halo of ignited gas which appears above and around the flame of a safety-lamp when a dangerous amount of fire-damp is present. In physical geography a similar mass, as of ice overlying the surface of a country; as, the ice-cap of Greenland. The word is also used in carpentry, in book-binding, in machinery and in ornithology to denote coverings for protection. The term as used in military parlance is percussion cap, a small copper cup containing fulminating powder, used in a percussion lock to explode gunpowder.

CAPANEUS, one of seven legendary heroes who warred against Thebes, killed by Jupiter.
CAP-À-PIE, kěp'-a-pě' (O. Fr. de cap à pie; Mod. Fr. de pied en cap), a term signifying from head to foot, and used with reference to a complete suit of armor covering the body of a knight at all points; as, "He was armed cap-à-pie for the encounter."* 

CAPE ANN, Mass., the southeast point of the town of Gloucester, Mass., 31 miles from Boston, at the northwestern limit of Massachusetts Bay; in lat. 42° 38' N., and long. 70° 34' W. The whole of the rocky peninsula forming this part of Gloucester is also called Cape Ann, including the village of Squam in its north-eastern part. This peninsula is a headland of syenite, which forms low hills, over the surface of which the rock is very generally exposed to view. It projects about 10 miles into the Atlantic Ocean. Valuable quarries of syenite for building purposes are worked most conveniently for shipment. The place is much exposed to the prevalent quarter-east storms; but it offers a small, well-sheltered harbor among the rocks, where coasting vessels often take refuge. There are on the shores of this harbor two fixed lights about 165 feet above mean high water, and visible for 19 nautical miles; there is also a 10-inch steam fog whistle. The south and east shores have many attractive summer resorts.

CAPE ANN SETTLEMENT, the first within the limits of the Massachusetts Bay territory. In 1622, the New England Company, to push the settlement of its grant and give it some value, divided the land in severity among its members. The region about Cape Ann fell to Edmund, Lord Sheffield, who sold a patent for it in 1624 to Robert Cushman and Edward Winslow of the Plymouth colony. They found some English hunters and fishermen who had been there since the year before; these acknowledged the rights of the Plymouth people, and the two parties planted and fished amicably; but shortly after a London vessel which had taken up the firebrand, Rev. John Lyford, seized the Plymouth men's fishing stage. Miles Standish came up from Plymouth to settle the trouble by force, but against his wish the settlement compromised the matter by the crew agreeing to build them another stage. In 1624 Winslow's company sold the site of Gloucester to the "Dorchester Adventurers," an unincorporated English joint-stock company recently formed. These had anticipated the bargain by sending out a band of settlers the fall before, with live stock, implements, etc., and they made Thomas Gardiner overseer. The attempt was unsuccessful, and in 1625 the Dorchester company engaged Roger Conant, then at Nantasket with Lyford, to be governor, Lyford to be minister. But the next year the "Adventurers" dissolved, and most of the settlers went home; the few remaining ones, however, removed to "Nahumkeke" (Naumkeag), where they founded Salem.

CAPE ARAGO, or GREGORY, a cape on the western coast of Oregon, on the south of Coos Bay in Coos County. Its lighthouse, which is on a small island, is at lat. 43° 20' 30" N., and long. 124° 4' 40" W., and shows a white, flashing light 84 feet above sea-level.

CAPE OR POINT BARROW. See Barrow, Cape or Point.

CAPE BLANCO, Africa. See BLANCO, Cape.

CAPE BLANCO, Ore., a cape forming the most western point of the State, situated in lat. 42° 50' N., and long. 124° 37' W. It has a lighthouse with a white fixed light 256 feet above sea-level.

CAPE BOZO, bō'-zō, or LILIBEO, the ancient Libyolum Promontorum, a cape, on the western coast of Sicily, one mile from Marsala. It is the point of Sicily nearest to ancient Carthage, and at an early period became an important naval station. The naval victory of the Romans over the Carthaginians, which put an end to the first Punic War, was gained near this point.

CAPE BOJADOR, bōj-a-dōr'. See BOJA-

CADEN, Cape.

CAPE BON, or RAS ADDER, a headland of Tunis, on the Mediterranean, forming the northemmost point of Africa, in lat. 37° 6' N. and long. 11° 3' E., and a few miles north of the town of Kalibia.

CAPE BRETON, brēt'ən, Canada, an island of the Dominion of Canada, separated from Nova Scotia, to which province it belongs, by the narrow gut or strait of Canso; area 3,120 square miles; length about 110 miles. It is of very irregular shape, the Bras d'Or, an almost landlocked arm of the sea (with most picturesque scenery), penetrating its interior in various directions, and dividing it into two peninsulas connected by an isthmus, across which a canal has been cut. The surface is rather rugged, and only small portions are suited for agriculture; but it possesses much timber. The chief towns are Sydney and Arichat.

The mineral deposits are very rich: iron and copper ore is abundant, and over 400 square miles is underlaid with seam upon seam of valuable bituminous coal. The Dominion Steel Corporation had in 1912 over 10,000 men on its pay roll in and about the mines in Cape Breton discovered by John Cabot in 1497, and originally part of the French possession of Acadia; it was captured by the New Englanders in 1745, retroceded under the Treaty of Aix-la-Chapelle in 1748 and became a British possession under the Treaty of Paris in 1763. It was governed as a separate province from 1784 to 1820. It is divided into four counties, Richmond, Inverness, Victoria and Cape Breton.

CAPE CANAVERAL, a cape on the eastern coast of Florida, in lat. 28° 27' N. and long. 80° 33' W. There are dangerous shoals at this point, and navigation is protected by a revolving light 137 feet above sea-level and a coastal signal station.

CAPE CANSO, the eastern extremity of Nova Scotia, at the southern entrance of Ched-uh-bucto Bay, in lat. 45° 19.5' N. and long. 60° 55' W.

CAPE CARTHAGE, a headland on the northeast coast of Tunis, jutting out into the Mediterranean. Traces of the ancient city of Carthage are found on it to the north of the Tunis lighthouse, lat. 37° 23' N., long. 9° 57' W.

CAPE CATOCHE, kä-tō-chē, a headland at the northeastern extremity of the peninsula of Yucatan, Central America, in lat. 21° 34' N.
CAPE CHARLES—CAPE FAREWELL

and long 86° 57' W. It is the northeast extreme of the Mexican state of Yucatan. It was here that the Spaniards first landed on the Mexican coast in 1517.

CAPE CHARLES, a cape at the northern entrance of Chesapeake Bay, forming the southern extremity of Northampton County, Va., at lat. 38° 16' N. and long. 75° 53' W. Northeast of it, on Smith's Island, is a firstorder lighthouse with a revolving white light, signaling 45" every minute and is 180 feet above mean high water.

CAPE CITY. See CAPE MAY, N. J.

CAPE CLEAR, a headland forming the southernmost extremity of Ireland, in lat. 51° 26' N. and long. 9° 29' W. It is on an island of 1,506 acres, with a lighthouse on an abrupt cliff 455 feet high. Fastnet Rock, with a light 148 feet above high water, is distant three and one-half miles to the southwest. These are generally the first points of land seen by transatlantic voyagers eastward from Cape Comorin.

CAPE COAST CASTLE, a town and fort of western Africa on the Gulf of Guinea, in the British colony of the Gold Coast, in lat. 5° 5' N. and long. 1° 13' W. The place lies in a chasm, and is defended by the great castle walls of sandstone, and by three small forts on the hills behind, one of which serves as a lighthouse and signal station. With the exception of a few houses for Europeans, the town consists of straggling lines of mud huts, with clusters of palm trees and an occasional tamarind attached. It is a principal mart for native trade. It is connected by telegraph with Accra (the capital) and by road with Prahsue. The climate is unhealthy; mean temperature, 78°. The principal exports are gold-dust, ivory and palm-kerne. Cape Coast Castle was ceded by the Dutch to the English in 1665, and from 1672 was possessed by several British African companies till 1843, when it was taken over by the British government. Pop., mainly Fantis (1911) 11,304.

CAPE COD, a cape and peninsula on the coast of Massachusetts, on the south side of Massachusetts Bay, forming the county of Barnstable; lat. of the cape, 42° 3' N., long. 70° 15' W. The peninsula is 65 miles in length and from 1 to 20 in breadth, and is in the form of a man's wrist, bent inward both at the elbow and the wrist. Though mostly sandy and barren, it is nevertheless populous; and the inhabitants derive their subsistence chiefly from the sea. The best harbor on the peninsula is at Provincetown. There is a lighthouse known as the Highland Light, on the northeast shore, and one at Race Point almost directly west of the former. The navigation around the cape is peculiarly baffling and hazardous, and the saving to commerce and human life resulting from the well-cutwaterway will undoubtedly be very great. A proposition to cut a canal from Buzzard's Bay to Barnstable Bay dates from the early part of the 17th century, but nothing was actually done until 1878, when a charter was granted by the legislature of Massachusetts, a company was formed and work begun. A new charter was granted in 1906, the canal was begun in 1909 and completed in 1914. The Old Colony division of the New York, New Haven & Hartford Railroad extends through the peninsula. The cape was discovered 15 May 1602 by Bartholomew Gosnold, who gave it its name from having taken a great quantity of codfish near it. In 1620 the Pilgrims of the Mayflower made a temporary landing at the site now occupied by Provincetown.

CAPE COLONNA. See SUNNAM.

CAPE COMORIN, kōm'ōrīn, the most southern extremity of the peninsula of Deccan, British India, in lat. 8° 5' N. and long. 77° 37' E., forming a circular, low, sandy point, which is not discernibly above the distance of 12 to 16 miles from the deck of a large ship. Eighteen miles north from the cape is a bold summit called Comorin Peak, the southern termination of the western Ghauts, which has, from a distance, been often taken for the cape itself. Within a short distance of the cape lies a rocky islet, high above water; and about three miles from this islet are a fort and a village, a few fishermen's houses, a church and some ancient temples, being the remains of the once famous town of Comorin.

CAPE DIAMOND, Canada, the extremity of an abrupt promontory in the province of Quebec at the junction of the Saint Charles and Saint Lawrence rivers. On the promontory stands the citadel of Quebec, and on the west and nearly on a level with the ramparts lie the Plains of Abraham. It rises precipitously over 300 feet from the river level. Here was gained in 1755 the memorable victory by the English under Wolfe, over the French under Montcalm.

CAPE DISAPPOINTMENT, or CAPE HANCOCK, Wash., a cape at the north side of the mouth of the Columbia River, forming the southwest point of the State of Washington, in lat. 46° 16' N. and long. 124° 3' W. There is a lighthouse at this point with a flashing light 233 feet above sea-level.

CAPE DUCATO, doo-kā'tō, the southern extremity of Santa Maura, one of the Ionian islands. It is identical with the ancient promontory of Leucadia, commonly called the Lover's Leap, or Sappho's Leap. The famous Greek poetess, according to an ancient tradition, threw herself from the top of this promontory. It lies in lat. 34° 10' N. and long. 20° 32' E. The strong currents which sweep around the cape and the frequent fierce gales render it a dread to mariners.

CAPE ELIZABETH, Me., a headland projecting into Casco Bay, between Portland harbor and the Atlantic Ocean, in lat. 43° 33' N. and long. 70° 11' W. The coast is rocky, made up of ledges of talcose slate, traversed by dikes of trap. There are two lighthouses on the outer point, which stand 300 yards apart, the lights being 140 feet above the sea.

CAPE DE ESPICHEL (probably the ancient Barbarium Promontorum), a cape on the western coast of Portugal, 121 miles southwest of Lisbon. It rises abruptly from the sea, and is crowned by a small chapel and a lighthouse.

CAPE FAREWELL, the southern extremity of Greenland, at the eastern entrance to Davis Strait. A strong current sets around this cape, and continues north along the eastern coast of the strait. On account of the ice and the current the cape is seldom visited.
CAPE FARO, fā′rō, the northeast extremity of the island of Sicily, known to the ancients as Pelorus. It is at the narrowest part of the strait of Messina, opposite the rock of Scylla on the coast of Italy.

CAPE FEAR, the south point of Smith's Island, near the mouth of Cape Fear River, N. C., in lat. 33° 35′ N. and long. 77° 57′ W. About one mile from the shore stands Bald Head lighthouse. Navigation of the surrounding waters is attended by many dangers.

CAPE FEAR RIVER, a river of North Carolina; navigable for steamboats for 150 miles from its mouth to Fayetteville. Its length, including one of the head branches, is about 300 miles. Formed by the junction of the Deep South and Cape Fear rivers, its course is generally southeast till it reaches the Atlantic Ocean. This is the largest and most important river which lies wholly within the State. Rice growing is an important industry along its lower region.

CAPE FINISTERRE, fin-is-tār′ (Lat. finis terra, land's end), the westernmost point of Spain, in the province of Corunna, extending southwest into the Atlantic, in lat. 42° 54′ N. and long. 8° 0′ W. The Spaniards and Portuguese fought off this cape, of which the most important were the victories of the English over the French, 3 May 1747 and 22 July 1805.

CAPE FLATTERY, the most westerly point of the State of Washington and of the United States, is beyond Alaska, as the entrance to the Strait of Juan de Fuca, in lat. 48° 23′ N. and long. 124° 44′ W. On the island of Tatoosh, opposite the cape, there is a lighthouse 155 feet above sea-level.

CAPE FLORIDA, the southern extremity of Biscayne Key off the southeast coast of Florida, in Dade County, at the north entrance to Biscayne Bay, in lat. 25° 39′ N. and long. 80° 9′ W. There is a lighthouse on the shoals opposite this point. It has a fixed red beacon light.

CAPE FOULWEATHER, a cape projecting into the Pacific Ocean from the coast of Oregon, in lat. 44° 50′ N. and long. 124° 5′ W.

CAPE FOX, or LALANDE'S DOG, a peculiar canine animal (Otocyon lalandii), differing from other dogs principally in the possession of an additional molar in each jaw. Other characters in the structure of the jaw and dentition suggest that Otocyon is a persistent creodont-like form which has developed from a primitive arctoid stock in a direction curiously parallel to that of the true dogs. No other mammal outside the marsupial order ever has four molar teeth in both jaws, and this may indicate a still more remote marsupial ancestry. This wild dog is generally found in open country, dwelling among small bushes in pairs, exceedingly shy, and not gathering into packs. It is rather smaller than a fox and resembles a fennec in having enormous ears and a thick bushy tail. In general color it is brownish or iron gray, mottled with yellow and with the limbs nearly black.

CAPE FRIO, fri′ō (Port. Cabo Frio, "cold cape"), a promontory on the coast of Brazil, in the state of Rio de Janeiro. It forms the terminus of a range of mountains running parallel to the coast, and consists of a huge oval mass of granite. There is a lighthouse at this point.

CAPE FROWARD, the southern extremity of the continent of South America, lying northwest of Cape Horn in lat. 53° 53′ S. and long. 71° 18′ W. It is a bold promontory of dark slaty rocks.

CAPE GASPE. See Gaspe.

CAPE DE GATA, gā′ta, a promontory of Spain, on the coast of Granada, 150 miles east of Gibraltar, 24 miles in circuit and 13 miles broad. It was formerly a resort of Moorish pirates.

CAPE GIRAURDEAU, fē-rār′dō, Mo., a city of Cape Girardeau County, on the Mississippi River and on the Cape Girardeau and Northern Railroad and the Frisco Lines, 150 miles southeast of Saint Louis. It is a well-cultivated region and has a large commerce, by river and railroad, in lumber, flour, limestone and mineral paints. There are also manufactories of Portland cement, shoes, bentwood, bricks, tobacco, washtubs, veneer, threshing machines, beer, etc. The United States census of manufactures for 1914 recorded 42 industrial establishments of factory grade, employing 1,397 persons, of whom 1,269 were wage earners, receiving annually $607,000 in wages. The capital invested aggregated $3,074,000, and the year's production was valued at $3,888,000; of this $1,532,000 was the value added by manufacture.

The notable institutions include Saint Vincent's College and Academy, the Southeast Missouri State Normal School, Saint Francis Hospital and the Loretto Convent. The government is administered by a mayor, elected biennially, and a city council. Pop. 10,033.

CAPE OF GOOD HOPE, a province in the Union of South Africa, formerly Cape Colony, is situated at the southern extremity of Africa, washed on the west, south and east by the ocean, and having on the north and northeast the German territory of Great Namaqua land, the British territory of Orange Free State province, Basutoland and the province of Natal. A considerable portion of the boundary on the north is formed by the Orange River. The colony extends about 450 miles from north to south, and 600 from east to west; the coast line is about 1,300 miles. The area is 276,000 square miles. The principal indentations of the coast are Saint Helena, Saldanha, Table, False, Walker, Mossel, Plettenberg, Saint Francis and Algoa bays.

In the interior almost every variety of soil and surface is found, but a great part of the colony is arid and uninpiring in appearance. Several ranges of mountains, running nearly parallel to the southern coast, divide the country into successive terraces, rising as they recede into the interior, between which lie belts of fertile land, or vast treeless and barren-looking plains. One of these, called the Great Karoo, is 300 miles long and 100 broad, and presents a desolate appearance, having a dry and often baked soil, with small shrubby plants scattered over it. Yet these plains make valuable sheep-walks, the flocks grazing well upon the scanty vegetation; and the soil, where water can be obtained by collecting the rain, is generally very fertile. Large reser-
voirs have been constructed in many places, and permanent homesteads established where formerly flocks could only be maintained for a month or so. The culminates run to the Compasa and farthest inland mountain terrace averages 6,000 or 7,000 feet in height, and, commencing in Namaqualand, runs eastward under the names of Roggeveld, Nieuwveld, Sneeuwbergen, Stormbergen, etc., to the northeast frontier. The culminates mark the Compasa Berg, over 8,000 feet high. The Table Mountain at Cape Town is a stupendous mass of naked rock, rising almost perpendicularly, about 3,585 feet in height. The colony is deficient in rivers, though in this respect the eastern half is more favored than the western. The Orange River is the largest in this part of Africa, but is of little or no use for navigation. Others are the Elephants or Olifants River, flowing into the Atlantic; the Gauritz, Gamtoos, Great Fish, and Sundays, all running into the sea on the south and southeast.

The most valuable mineral product is diamonds; copper ore is largely exported, coal is mined, and iron ore, gold, amethysts, agates, etc., are manufactured. A large part of the iron ore imported into the markets of the world in the rough state are now obtained from Cape Colony. The great mining centre is Kimberley, in the far north of the colony, about 10 miles from the Vaal River, and near the frontier of the Orange River Colony. So far as is known, the first of the South African diamonds was casually picked up in 1867, and soon after several others were found, including a fine large stone known as the Star of South Africa. By the early part of 1870 so many diamonds had been found that a rush of people to the diamond district began to take place, and the banks of the Vaal were soon covered with thousands of diggers. At first the precious stones were found on or near the surface, but subsequently it was discovered that they were to be found deeper down, and later they have been obtained many hundreds of feet below the surface, great open excavations having been made at the localities where they are plentiful.

The colony has a temperate climate, situated in the centre of the town of the same name, which sprang up around it. For the first hundred feet in depth the diamonds were found embedded in a soft, friable, yellowish earth, but when the soil changed to a slaty-blue color, and was of a firmer consistency, and the diggers then thought that the bottom of the mine had been reached. It was soon discovered, however, that the blue ground yielded as many diamonds as the yellow, if not more, and this productive stratum continued. Another famous mine is the De Beers mine. Both these mines have yielded a remarkable number of large stones, but a great many of the diamonds have been "off-color," that is, yellow, spotted or otherwise defective in water or lustre. One of the finest yet found in South Africa is the Porter Rhodes, a beautiful stone weighing 150 carats, and valued at $300,000. One much larger, a yellow stone, weighing 302 carats, was found in 1884, and a still larger, weighing 428 carats, was found in the De Beers mine in 1888. The largest in the world, weighing 971 carats, but with a large flaw, was found in the Orange Free State in 1893. Although mining operations have been carried on at great expense, owing to the depth of the workings have been sunk (some 600 feet or more), the profits of the companies which latterly have been principal are enormous. The rough work has been done almost entirely by the native Africans, of whom 10,000 or 11,000 have been in employment in the mines at one time. Very stringent regulations have had to be enforced to prevent theft of the precious stones, and also illicit dealing in stones unlawfully acquired.

The climate is very healthy and generally pleasant, though in summer the heat is great in some parts. The mean temperature for the year at Cape Town is about 62°. The climate of the dry and elevated inland districts is considered remarkably suitable for persons of consumptive tendency, and many have been attracted to the colony on this account. Except along the coast line, especially the southeast coast districts, the vegetation is extensive forests, timber is scarce. There are upland of a hundred different kinds of woods, however; of them are extensively employed for such purposes as house-building, wagon-making, and furnishing the same. With irrigation, trees can be grown anywhere. The aloe and the myrtle attain a great size.

The quadrupeds of the province comprise the African elephant, still found in the forests of the south coast region; the buffalo, equally restricted in locality; the leopard, jackal, hyena, numerous antelopes, baboon, aardvark, etc. Lions, at one time numerous, are not now to be met with in the colony, nor is the giraffe. The birds include vultures, eagles and other Raptores (the most remarkable of which is the serpent-eater), pelicans, flamingoes, and most important of all, the ostrich, now bred as a domestic animal for the sake of its feathers, those plucked from an adult bird in a season being sometimes worth from $50 to $90. Other native animals are large snakes, the venomous cobra di capello and scorpion. Along the coast whales and seals abound, and salt- and fresh-water fish are plentiful.

The province is better adapted for pasture than for agriculture, but wheat, maize and other cereals can be grown almost everywhere, the only drawback to their cultivation being the want of moisture in certain localities and in certain seasons. In some years a surplus of grain is left for exportation; in others grain has to be imported. All kinds of European vegetables and pot-herbs, and all the fruits of temperate climates, such as apples, pears, plums, peaches, melons, apricots, walnuts, almonds, oranges, limes, etc., thrive excellently, and fruits, dried and preserved, are exported. Grapes on vine is cultivated and some excellent wines (notably those of Constantia) are made. The colony is said to be particularly well suited for grape-culture, and the vines produce heavier crops than are known almost anywhere else. Viticulture, it is believed, is yet only in its infancy, though there are 67,000,000 vine-stocks. The colonial government had up to the end of 1911 alienated 140,000,000 acres.

Sheep-raising is the most important industry, and wool the chief export (although surpassed in value by diamonds). The amount of this article exported to the United Kingdom in 1913 was 92,813,330 pounds. Most attention is now devoted to the breeding of pure merinows,
the consequence being a great improvement in the wool. Goats are also bred, both the native and the Angora, and the export of goats' wool or hair to Great Britain was valued at $4,600,000 (1913). Cattle-breeding is carried on to some extent, especially along the coasts and in the eastern and northern districts.

There are no manufactures of any importance, and consequently the imports consist largely of manufactured goods, chiefly from Great Britain. The exports to the United Kingdom (1913) totaled $47,000,000, and the imports (British and foreign) to nearly $60,000,000. The export of diamonds in the same year was over $60,000,000. This industry suffered great disorganization during the European War. The other exports of importance besides wool, are ostrich feathers, copper ore, skins and hides. There are 3,813 miles of railway in operation. Lighthouses have been built round the coast and harbor works constructed.

The coinage is that of Great Britain, as are also the weights and measures, except that for large measures—2.1216 acres is employed.

On 31 May 1910 the colony, under the name of the province of the Cape of Good Hope, was merged in the Union of South Africa (q.v.).

The European population consists in part of English, Scottish and Irish settlers and their descendants, but the majority is of Dutch origin (see Boer), with a considerable number of German origin. The colored people are chiefly Hottentots, Kaffirs, Bechuana, Basutos, Griquas, Malays and a mixed race, the offspring of black women and white fathers. The laborers are chiefly Hottentots and Kaffirs. The prejudices and ill feeling once subsisting between the different nationalities of which the population is made up are now fast disappearing. Education is advancing, though it is not compulsory. The returns show a steady increase in the numbers of children of all classes receiving instruction. For the higher education there are seven colleges, besides a university (at Cape Town) incorporated in 1873. The colleges have each a staff of instructors in classics, mathematics, science, etc., but the university is merely an examining and degree conferring institution. The religious bodies in the colony with the greatest number of adherents are the Dutch Reformed Church, the Church of England, the Methodist Independents and Presbyterians, in the order here given. There is no Established Church.

The chief towns of the colony ranking after Cape Town are Port Elizabeth and Kimberley (q.v.).

The Cape of Good Hope was discovered by Bartholomew Diaz in 1486, and rounded by Vasco da Gama in 1497, but was first colonized by the Dutch under Van Riebeeck in 1652. Reducing the Hottentot inhabitants to slavery, or driving them beyond the mountains, they extended the Cape settlement over a pretty large area. But the colony was under the rule of the Dutch East India Company, and owing to these restrictions it made no great progress. It was captured by the British in 1795, restored at the Peace of Amiens (1802), and again taken in 1806. Sir David Baird being sent at the head of an expedition to take possession of it, and to prevent it from falling into the hands of the French. From this time it has remained in the possession of the British, to whom it was formally assigned in 1815, along with Dutch Guiana, Holland receiving in return $6,000,000. It now began to advance in prosperity, but the progress of the colony was greatly retarded by the Kaffir wars of 1834, 1846 and 1851-53. Subsequently the area of the colony was greatly enlarged by successive annexations. The most important of these annexations were: British Kaffraria (1866); Griqualand West (1876); Kaffraria proper, or the Transkeian districts (Transkei proper, Griqualand East and Tembuland), including nearly the whole of the region between the Kei and the Natal border (1875-80); Pondoland (1894), and part of Bechuanaaland (1915). Pop. (1911) 2,564,965, of which 582,377 were Europeans. See South Africa, Union of.

CAPE DE GRISNEZ, greg-nà', a headland of France, in the department of Pas-de-Calais, the nearest point of the French coast to Great Britain. It has a revolving light 195 feet high.

CAPE GUARDAFUI, gwär-dâ-foot-'ë, or GARDAFUI, a cape on the east coast of Africa in Italian Somaliland, situated in lat. 11° 50' N. and long. 51° 16' E. at the entrance to the Gulf of Aden.

CAPE DE LA HAGUE, hâg (written also, but less correctly, La Hague), a headland of Normandy, France opposite the island of Alderney, 20 miles northwest of Cherbourg, and forming the northwestern extremity of the peninsula of Cotentin, in the English Channel. It is often confused with Fort La Hague or La Hougue, on the opposite side of Cotentin. Near this latter promontory the united English and Dutch fleets defeated the French, 19-24 May 1692.

CAPE HAITIEN, á-tet'ân, or CAPE HAYTIEN, Haiti, a town on the north coast of the island. It was formerly known as Cap Français, Le Cap or Guaraico, the latter being the native name. It has an excellent harbor. The town is well laid out and has the appearance of the older European towns.

Before the earthquake in 1842 it was known as "Little Paris," but as most of the white settlers did not rebuild, the town has not recovered since. During the French occupation, Cape Haitien was the capital of the island. It was bombarded by the English in 1865. The commerce is very important, and the chief exports are coffee, logwood, cacao, hides and honey. In 1913 the exports from Cape Haitien amounted to $1,254,407; in 1915 they amounted to only $352,418, the shrinkage being due to the hampering of commercial activity by the war in Europe: the imports in the same years amounted to $1,194,453 and $560,881 respectively. Pop. about 30,000.

CAPE HATTERAS, the easternmost point of North Carolina, a sandy insular spit, or narrow beach, separated from the mainland by the broad bay called Pamlico Sound. South of the capes of the Delaware, no land stretches so far out into the Atlantic as Cape Hatteras. The Gulf Stream, in its eastern and western vibrations, often flows within 20 miles of the cape, crowding toward the shore coasting vessels bound south. The difference of temperature between the honest and the ocean near the capes along shore and from the land engender
frequent commotions in the atmosphere at this place; and no point on the coast is more noted for its frequent and dangerous storms. A lighthouse is kept a little over a mile north of the outermost point. Also about three-quarters of a mile south a fixed white beacon light is placed about 35 feet above sea-level.

CAPE HENLOPEN, a cape on the eastern coast of Delaware at the southern side of the entrance of Delaware Bay, in lat. 38° 47' N. and long. 75° 5' W. It is 13 miles south of Cape May, on the opposing New Jersey shore. The Cape Henlopen light, 125 feet above sea-level, is a fixed white light.

CAPE HENRY, a cape on the coast of Virginia at the southern entrance of Chesapeake Bay in lat. 36° 56' N. and long. 76° 1' W., opposite Cape Charles. It has a fixed white light with fixed red sector between south-southwest and southwest by west 157 feet above the level of the sea. Cape Henry has also a lifesaving station.

CAPE HORN, the southern extremity of an island of the same name, forming the most southerly point of South America. It is a precipitous headland 500 to 900 feet high, and running far into the sea. Sailing vessels often encounter dangerous tempests in passing round the Horn; steamers generally pass through the Straits of Magellan. The cape was first doubled in 1616 by the navigator Schouten, a native of Hoorn, Holland, whence its name. It is situated in lat. 55° 59' S. and long. 67° 16' W. The climate is perennially Antarctic.

CAPE HUNTING-DOG, a wild dog of Africa (Lycaon pictus), which is placed in a separate genus because it differs from all other dogs in having only four toes on each limb, in lacking one pair of molars in the upper jaw and in certain other features. It resembles a hyæna in form, and is yellowish-gray, with irregular, black markings. It hunts in packs and is one of the enemies most feared by all the African antelopes. Since the decrease of this, its natural game, it has played havoc with domestic cattle and sheep, and is killed off by the settlers wherever found. It is fast becoming rare. Consult Ingersoll, 'The Mammals' (New York 1906).

CAPE ISLAND CITY. See CAPE MAY, N. J.

CAPE JUBY, Africa, a barren, sandy projection into the Atlantic Ocean, 67 miles due east from the island of Fuerteventura of the Canary group. It is part of the section of the western Sahara which extends along the Atlantic Coast between the Mogador district and Rio de Oro. Water is very scarce on the cape, but is obtained in the ravines by sinking wells. The interior supports great numbers of sheep, which graze large crops of wheat, barley and corn. The ocean fisheries at this point are abundant, and most of the catch is marketed in the Canary Islands. There is a monthly steamship service between Cape Juby and Santa Cruz de Tenerife. A wireless station was erected on the cape in 1916, thus establishing communication with the large station on Tenerife, and through this, with the Spanish mainland.

CAPE LINGUETTA, lin-gwē'ta, a headland of Janina, Greece, 2,290 feet high. It forms the termination of the Chimara, or Acrocoriannian Mountains and bounds the east entrance into the Adriatic at the Strait of Otranto.

CAPE LOOKOUT, a cape situated on an island off the southeast coast of North Carolina, in lat. 34° 37' N. and long. 76° 31' W. There is a lighthouse with fixed white light at a height of 156 feet above the sea. It is 63 miles southwest of Cape Hatteras and 12 miles southeast of Beaufort.

CAPE LOPATKA, the southern extremity of Kamchatka. At the northern part of the headland is a mountain, bearing the same name, whence the land gradually slopes until it terminates in a low and barren tongue.

CAPE LOPEZ, lō'pāth, the southern extremity of the Bight of Biafra, on the west coast of Africa. It is situated in lat. 0° 36' S. and long. 8° 44' E.

CAPE MATAPAN, mā-tā-pān', a promontory of Greece, forming the southern extremity of the Peloponnesus, in lat. 36° 23' N. and long. 22° 29' E. The name Tενεωριον, or Promontorium Tenerum, was applied by the Greeks to the headland, and to the small peninsula north of it, connected with the great Taygetic Peninsula by a narrow isthmus. It was sacred to Neptune, whose temple stood nearby.

CAPE MAY, N. J., a city and watering place in the southern part of Cape May County, having good railroad and water communication. It has a fine beach and is very popular as a seaside resort, providing accommodations in hotels and boarding-houses for guests 10 times exceeding in number the permanent inhabitants. The industries include fishing, canning, oyster raising, gold beating and sand washing. Its harbor has an area of 500 acres and an average depth of 35 feet. It is the only port of refuge south of Sandy Hook on the New Jersey coast and is the scene of many important yachting events. The government is administered by a mayor, elected for three years, and a city council. The place is sometimes called Cape City or Cape Island City. Pop. 3,000.

CAPE MAY COURT HOUSE, N. J., town and county-seat of Cape May County, 70 miles south of Philadelphia, and 11 miles north of Cape City, or Cape May, on the Atlantic City, and Pennsylvania railroads. Glass blowing, fishing and agriculture are among its chief industries. It contains two churches and a penitentiary. Pop. 1,300.

CAPE MAY POINT, the southern extremity of New Jersey, at the northern entrance to Delaware Bay, situated in Cape May County, in lat. 38° 56' N. and long. 74° 57' W. It has a revolving light about 160 feet above sea-level.

CAPE MENDOCINO, měn-dō-sē'no, the westemmost point of the coast of California, projecting into the Pacific Ocean in lat. 40° 26' N. and long. 124° 25' W. It has a very high lighthouse, 422 feet above sea-level, with a flashing light.

CAPE NEDDOCK, Me., a promontory 35 miles southwest of Portland, with a lighthouse on Goat Island near it, containing a fixed light, 33 feet above the sea.
CAPE NOME, nóm, a cape on the south coast of the peninsular projection of Alaska which separates Kotzebue Sound on the north from Bering Sea on the south. In the vicinity of the cape is a remarkably rich gold mining region. The Nome district as settled centres about the lower course of the Snake River, an exceedingly tortuous stream in its tundra course, which emerges from a badly degraded line of limestone, slaty and schistose mountain spurs, generally not over 700 to 1,200 feet elevation, but backed by loftier granitic heights, and discharges into the sea at a position 13 miles west of Cape Nome proper.

The first discovery of gold was made in September 1898, but it was not until July 1899 that the beach gold was discovered. In the middle of October following, Nome City had 5,000 inhabitants all living in tents on the hitherto barren shore. For a time it appeared as if this region would rival in richness the famous Klondike district, but this anticipation has not been realized.

CAPE NORTH, the northeastern point of Cape Breton, east of Saint Lawrence Bay, projects into the Gulf of Saint Lawrence.

CAPE NORTH, northernmost promontory of Europe. See North Cape.

CAPE NUN, noon, a headland on the west coast of Morocco, extending into the sea at the southwestern extremity of the Atlas range, in lat. 28° 45' N. and long. 11° 5' W.

CAPE ORTEGA, ór-tä-gäl', a rugged promontory forming the northern extremity of Spain, extending into the Bay of Biscay, in lat. 43° 45' N. and long. 7° 56' W. The coast at this point is barren and rugged.

CAPE PALMAS, a cape on the western coast of Africa, situated in the southern part of Liberia, in lat. 4° 22' N. and long. 7° 44' W. In 1834 the Maryland colony of free colored emigrants settled on this point.

CAPE PETREL, or CAPE PIGEON, a large petrel (Daption capensis), about the size of a pigeon, exceedingly numerous about the Cape of Good Hope, and widely distributed throughout the Southern Ocean. Consult Milne-Edwards, A., in 'Annales des sciences naturelles' for 1882.

CAPE PILLAR, a high mass of rocks terminating in two tower-shaped cliffs on the northwest coast of Desolation Island, at the southwestern entrance from the Pacific Ocean into the Straits of Magellan.

CAPE POGE, a cape on the coast of Massachusetts, in lat. 41° 25' N. and long. 70° 26' W. It is the extreme northeast point of the Martha's Vineyard Island group. It has a lighthouse with a flashing white and red, every third flash red, light, with five seconds interval.

CAPE PRINCE OF WALES, a promontory on Bering Sea, the most northwest point of North America, terminating in a peaked mountain, presenting a bold face to the sea, and is a dangerous point on account of a shoal which stretches to the northeast. It lies opposite East Cape on the coast of Siberia. Bering Strait between the two is the narrowest water between Europe and Asia.

CAPE RACE, a promontory at the southwestern extremity of Newfoundland, in lat. 46° 39' N. and 53° 4' W. The fogs of this part of the coast make navigation hazardous. The British guard a passage north, 16 miles, through the Cataracks, opposite the mouth of the Crow's Nest Point, which is marked by a lighthouse.

CAPE RIVER, or RIO DE SEGOVIA, known also as Coco or Wanks, a river of Nicaragua, Central America, which after a generally northeast course of nearly 300 miles enters the Caribbean Sea at Cape Gracias a Dios. It is navigable for a considerable distance from the sea, but the upper part of its course is obstructed by cataracts and shallows. It forms part of the boundary between Honduras and Nicaragua.

CAPE ROMAIN, a low and barren point of land, with a lighthouse, 37 miles northeast of Charleston, S. C.

CAFE SABLE, the name of two capes in North America: (1) The southernmost point of the mainland of the United States at the extreme of Florida, in lat. 25° 8' N. and long. 81° 9' W. (2) A point at the southwest extremity of Nova Scotia, in lat. 43° 23' N., and long. 65° 37' W.

CAPE SAINT ROQUE, rō-kā, SAN ROQUE, or SÃO ROQUE, a cape on the east coast of Brazil, in lat. 5° 29' S. and long. 35° 14' W.

CAPE SAINT VINCENT, a headland at the southwestern extremity of Portugal, in lat. 37° 3' N. and long. 8° 58' W. Off this cape, 14 Feb. 1797, an English naval force, consisting of 15 ships of the line, under Admiral Jervis, defeated a superior Spanish fleet. This point was known to the ancients as Promontorium Saurum.

CAPE SAN ANTONIO, sän an-tōn-ē-o, the name of two capes: (1) A high, barren and precipitous headland, on the coast of Valencia, Spain, opposite the island of Iviza. On its summit are a convent, a watch tower and several windmills. (2) A lofty and nearly perpendicular promontory, at the mouth of the Rio de la Plata, in the province of Buenos Aires, Argentina.

CAPE SAN BLAS, sän blä, a low point of land, about two miles long, on the south coast of western Florida, in Calhoun County, 123 miles east-southeast of Pensacola. It lies between San Blas Bay and Saint Joseph's Bay. It has a revolving light 98 feet above sea-level.

CAPE SAN LUCAS, loo'käs, the southern extremity of the peninsula of Lower California, Mexico, in lat. 25° 44' N. and long. 109° 54' W.

CAPE SPARTIVENTO, the ancient Hercules Promontorium, a promontory of southeasterly Italy, forming the southeastern extremity of Calabria, in lat. 37° 57' N. and long. 16° 5' E.

CAPE OF STORMS. See CAPE OF GOOD HOPE.

CAPE TINDARO, tîn-da'-ró, a headland of Sicily, near Falcone, extending into the Gulf of Patti. The remains of the ancient Tyndaris are in its neighborhood.

CAPE TOWN, Africa, capital of the province of the Cape of Good Hope in the Union of South Africa and the seat of the legislature under the Union, is situated in the midst of striking scenery, rather more than 30 miles from the Cape of Good Hope, at the head of
CAPE TrafALGAR — CAPEL

Table Bay, which opens into the Atlantic on the northwest, and at the foot of Table Mountain, a range of mountains containing tramways. It was opened in 1652, on behalf of the Dutch East India Company. It is regularly laid out and has some good streets, with well-built business premises and other buildings, and is furnished with most of the institutions and conveniences of a town. The tramways are the means of conveyance above the level of the sea. Some of the islands are very bare; in others the lower hills are covered with a beautiful verdure, as well as the valleys between; but there is little water, except what is found in ponds and wells. Long droughts have occurred, sometimes causing great loss of life. The climate is hot and unhealthy in most of the islands. The soil is, for the most part, not very fertile; nevertheless some parts produce sugar, coffee, rice, tobacco, maize, etc., with bananas, lemons, oranges, citrons, grapes and other fruits. European domestic animals abound and thrive well. Marine turtles are plentiful. The ports of the archipelago were visited in 1913 by 1,696 merchant vessels of 6,136,784 tons, besides a large number of tramps. In 1914 the imports were valued at $2,306,610; the exports in the same year were valued at $832,739. The total population amounted to 143,029 in 1912, of whom 4,799 were white, the rest being chiefly negroes. The chief town is Praia on São Thiago (Santiago), and Porto Grande on São Vicente is a coal station for steamers. Salt is an export of importance. Coffee, hides and physic-nuts are also exported. There is a resident governor at Praia. Consult Ellis, 'West African Islands' (London 1885); Fæa, 'Delle Isole del Capo Verde' (Rome 1899); Lima, 'Rapport sur les îles du Cap Vert' (in 'Receuil consulaire,' Vol. CX, Brussels 1900).

CAPE WRAITH, a pyramidal promontory of unrivalled wildness and grandeur, forming the northwest extremity of Scotland and running out into the Atlantic; in lat. 58° 38' N. and long. 4° 58' 5" W. It presents deep fissures and tall pinnacles. From it a reef of rocks, perforated with arches and caverns, juts out into the sea. Off the cape is Scafell, a peak of 3,200 feet high. Cape Wrath is 525 feet high, and there is a lighthouse near it, 400 feet above the sea, visible 25 miles off.

CAPEFICUE, käp-fék, Baptiste Honoré Raymond, French historian and journalist: b. Marseilles 1802; d. Paris, 23 Dec. 1872. He entered the field of journalism and contributed to various publications under the signature 'Un homme d'état.' He was appointed to a post in the Foreign Office, holding it until 1848. He thus had access to various documents unknown or closed to others. He was a prolific writer, producing about 100 volumes of history, many being biographies of famous women. They were hastily written, are uncritical and tinged with the Bourbon sympathies of the author. His most important contributions to historical science are the 'History of Philip Augustus' (4 vols., 1829); 'History of the Restoration and of the Causes that Led to the Fall of the Elder Branch of the House of Bourbon' (1831–33); 'Histoire de la réforme, de la ligue, et du règne de Henri IV' (8 vols., 1833–34).

CAPEL, Arthur, Lord, English soldier: b. about 1010; d. 9 March 1649. He was son of
Sir Henry Capel was raised to the peerage as Lord Capel, of Hadham, by Charles I in 1641. He sat for Hertford in both the Short Parliament and the Long Parliament, and took sides with the popular party under Pym in demanding redress of various grievances. He strongly opposed revolution, however, and during the revolutionary war he fought bravely as one of the royalist generals in the west in the engagements at Bristol, Exeter and Taunton. Having been at length forced to surrender at Colchester to General Fairfax, he was imprisoned and, after some vicissitudes, executed. His 'Daily Observations or Meditations' was published posthumously with a memoir.

**CAPEL, Arthur, Viscount Malden and Earl of Essex**, English statesman, son of the preceding: b. January 1631; d. July 1683. He fought for the King in the civil war and on the accession of Charles II was appointed lord-lieutenant of Hertfordshire. In 1661 he was created Viscount Malden and Earl of Essex and appointed Ambassador to Denmark in 1670. He succeeded as lord-lieutenant of Ireland in 1672-77, and was for a few months in 1679 head of the treasury commission. He opposed the court party and supported the Exclusion Bill. Arrested for his connection with the Monmouth conspiracy (1682) he was sent to the Tower, and is supposed to have committed suicide there.

**CAPEL, Thomas John, Monsignor**, English Roman Catholic ecclesiastic: b. London, 28 Oct. 1836; d. Sacramento, Cal., 24 Oct. 1911. He was ordained to the priesthood in 1860. He conducted a mission for English-speaking Catholics at Pau 1868-73, and was given the title of Monsignor by Pope Pius IX. He afterward devoted himself to education, establishing a Roman Catholic public school at Kensington in 1873 and achieved celebrity as a preacher and devotional writer. He came to the United States in 1883, and after a lecture tour settled to private life in California. He is the author of 'The Holy Catholic Church'; 'Confession'; 'The Name Catholic'; 'The Pope and the Church.' He is the original Monsignor Catesby in Disraeli's 'Lothair.'

**CAPEL, or CAPELE, a term used by miners to indicate the wall of a lode, especially in a tin or copper mine. It is generally of quartz, black tourmaline and hornblende. The capels sometimes contain sufficient metallic particles to make it worth while to work them. In these cases they may be considered as forming part of the lode. The word cæb is an equivalent used by Cornish miners. In the United States, casing is nearly synonymous.**

**CAPELINE, or CAPELLINE, a small piece of armor, consisting of a skull cap of iron, worn in the Middle Ages by light armed men such as archers.**

**CAPELL, Edward**, English Shakespearean scholar: b. Throston, Suffolk, 1713; d. London, 24 Feb. 1781. He was educated at Cambridge; he was deputy inspector of plays after 1737 and devoted his life to the study of Shakespeare. He transcribed this author's plays 10 times, he collated the quartos of the first two folios with greater care than any previous editor. He published 'Prologues or Select Pieces of Ancient Poetry' (1760); 'Mr. Wil- liam Shakespeare, His Comedies, Histories, and Tragedies' (10 vols. 1768); 'Notes and Various Readings of Shakespeare' (1783); and 'The School of Shakespeare.'

**CAPELLA, Martianus Mineus Felix**, Latin writer probably of the 5th century: b. probably in Carthage, Africa. His extant work, 'Satiricon,' consists of nine books, the first two under the title, 'De Nuptiis Philologorum et Mercurii,' being an introductory allegory, while the others treat of grammar, logic, metaphysics, geometry, arithmetic, astronomy and music. It is a sort of encyclopaedia and was much esteemed in the Middle Ages. His statement of the heliocentric system of astronomy in the eighth book may possibly have given hints to Copernicus, who quotes him occasionally. The best edition is that of Eysenhardt (Leipzig 1886). Consult Teuffel, 'Geschichte der römischen Litteratur' (6th ed., Leipzig 1911).

**CAPELLA, a star situated in the constellation Auriga, on the 'Charioteers' left shoulder. It is of remarkable brilliancy, only four stars exceeding it in that respect. Its color is nearly that of solar light. It is one of Secchi's solar stars, whose spectra closely resemble that of the sun, being ruled with dark lines due to metallic vapors. Its parallax, determined by Elkin, is 0'.08, corresponding to a distance nearly 25,000,000 times the distance from the earth to the sun. Its light takes about 40 years to reach us. It is often called Capra. In mythology Capella was Amalthea's goat, which suckled Jupiter.**

**CAPELLINI, kă-pĕl'e-nĕ, Giovanni**, Italian geologist and paleontologist: b. Spain, 13 Aug. 1833. He studied at Pisa and traveled widely. In 1860 he became professor at Genoa, and later at Bologna. He has emphasized the importance of prehistoric discoveries which related archaeology to paleontology and defended the Darwinian theory. He was influential in calling the International Congress of Anthropology and Prehistoric Archaeology in 1865. He founded in Bologna a geological museum. His publications include 'Delfini fossili del Bolognese' (1864); 'Relazione d'un viaggio scientifico nell'America settentrionale' (1867); and 'Armi e utensili di pietra del Bolognese' (1870).

**CAPELLO, kă-pĕl'o, Bianca**, Italian adventureress: b. Venice 1542; d. in the Castle Paggio di Capano, 11 Oct. 1587. In 1563 she eloped with a banker's clerk named Pietro Buonaventuri, who put himself under the protection of Francesco de Medici at Florence. The latter made Bianca his mistress and her husband his steward, but had him put to death in 1570, and after the death of his wife, Joanna of Austria, married Bianca in 1578. She and Francesco are supposed to have lived by her brother and successor, Cardinal Fernando.

**CAPEN, Elmer Hewitt**, American clergyman educator: b. Stoughton, Mass., 5 April 1838; d. Medford, Mass., 22 March 1905. He was graduated at Tufts College in 1860, and was elected to the Phi Beta Kappa, while still an undergraduate, 1859. After studying at the Harvard Law School, he was admitted to the bar in 1863 and practised at
Stoughton for a short time; began the study of theology, was ordained pastor of the Independent Christian Church of Gloucester in 1865, held pastorates at Saint Paul, Munn, and Providence, R. I., 1865–75; when he was elected president of Tufts College, a position he held till his death. His administration was marked by success in every way, and under him the institution grew to be one of the most progressive of American colleges. His collected addresses appeared, entitled "Occasional Addresses," 7th ed. and in Memoriam E. H. Capen. (New York 1905).

CAPEN, Nahum, American historical writer: b. Canton, Mass., 1 April 1804; d. 4 Jan. 1886. In 1825 he began business in Boston as a publisher, with the firm of Marsh, Capen and Lyon. He was among the first to agitate the matter of an international copyright, his memorial to Congress on the subject being one of the first presented to that body; a letter of his, printed by the Senate, led to the organization of the census bureau at Washington and as postmaster of Boston in 1857–61, he established the custom of collecting letters from street boxes. He contributed to the press many articles on history and political economy. He edited a translation of the "Works of Dr. Gall" (6 vols.); the "Annals of Phrenology" (2 vols.); "The History of Woodbury, LL.D." and "The Massachusetts State Records" from 1847 to 1851 (5 vols.). He published "The Republic of the United States" (1848); "A Reminiscence of John G. Spurzheim and Henry Clay" (1856); and a "Reverie on the Science of Phrenology" (1881). He left an unfinished "History of Democracy" (Vol. I, 1874).

CAPENA PORTA. See CAMPUS SCCELERATUS.

CAPER-BUSH, a shrub of the genus Caparisi of the family Caparraceae. The genus includes about 150 species of trees and shrubs, distributed throughout the warmer regions of the earth. Capers are pickles made by preserving the flower buds of C. spinosa, a straggling, spiny shrub of the Mediterranean region.

CAPERCAILZIE, käp-ér-käl', CAPER-CAILLIE, or CAILLIE, kállé, a readily domesticated, polygamous grouse (Tetrao wrogallus), about the size of a turkey, widely distributed throughout the pine-covered mountains of Europe. Formerly it inhabited Ireland and Scotland, where it was known as "blackcock," but it was entirely exterminated toward the end of the 18th century. It has since, however, in small numbers, been restored to Scotland by stock imported from Scandinavia. The ground color of the cock is muddily black, spotted with gray and brown; quill feathers dark brown; tail feathers nearly black; a glossy dark green chest; whitish bill and a small patch of naked skin above the eye, which is scarlet. The feet are feathered to the toes. The hen and young are like the male, but a lighter shade on the neck and chest yellowish chestnut, and the feathers of the under part usually edged with white. It feeds chiefly upon berries, seeds, insects and the young shoots of the pine and other trees, which give its flesh a delicate turpentine flavor. They are hunted with the aid of dogs, which "tree" them, when they are easily shot. In the early spring, at the approach of the breeding season, the cocks meet at an accustomed place to give the hens the benefit of their annual "dances," at which assemblies the hens seem to choose their mates by the amount of plumage, color, daring and extraordinary gestures which each displays. On some occasions the cock is oblivious to all else save the winning of his mate, and may easily be approached and killed. The female bird builds her nest on the ground among the pines, generally laying from 10 to 12 eggs, few of which reach maturity, owing to the carelessness of the mother. They are spotted red or yellowish brown, and are over two inches long. The bird is readily domesticated if it has the range of a space containing a few pine trees. Consult Lloyd, "Game Birds of Sweden and Norway" (London 1867); Morris, "British Game Birds" (ib. 1891); Darwin, "Descent of Man" (2d ed., ib. 1874); Millails, "The Natural History of British Game Birds" (London 1889).

CAPERN, Edward, English minor poet: b. Tiverton, Devonshire, 21 Jan. 1819; d. 1894. He was long in the mail service in his native county, and was often styled "The Postman Poet." The poet Landor, attracted by the verse of Capern, procured him a pension from the civil list. His published works include "Poems by the Biddeford Rural Postman" (1856); "Ballads and Songs"; "Wayside Warbles"; "Sun-gleams and Shadow Pearls." His verse is mainly descriptive of Devon life and character and a number of his lyrics were set to music by the poet himself.

CAPERNAUM, a city of ancient Palestine, on the west or northwest side of the Sea of Tiberias. This place is famous in Christian history, because Jesus often visited it during the time of his ministry, and in its vicinity he delivered the Sermon on the Mount. Nothing of the city now remains.

CAPERS, Ellison, American Protestant Episcopal bishop: b. Charleston, S. C., 14 Oct. 1837; d. Columbia, S. C., 22 April 1908. He was graduated at the South Carolina Military Academy 1857, and was ordained in 1858–60. He entered the Confederate army, was successively major, lieutenant-colonel and brigadier-general, and received several severe wounds. He was secretary of State of South Carolina in 1867–68, then entered the Protestant Episcopal ministry, and was rector of Christ Church, Greenville, S. C., for 20 years, and at Columbia, S. C., for six years where he remained until his elevation to the episcopate. He was secretary and treasurer of the diocesan board of missions 1879–93 and deputy to the general conventions of 1880, 1883, 1886. In 1893 he was consecrated seventh bishop of South Carolina, succeeding Bishop Howe.

CAPERS, William, American Methodist Episcopal bishop: b. South Carolina 1790; d. 1853. He was educated at South Carolina College, became an itinerant preacher and ministered to the Indians in Georgia, 1821 to 1824. He was presiding elder in Charleston for four years and for a short time was editor of the Wesleyan Journal, later merged in the New York Christian Advocate. In 1837 he founded and edited the Southern Christian Advocate. He also did missionary work among
the negroes. In 1846 at the first general conference of the Methodist Episcopal Church he was chosen bishop. Consult his autobiography, with memoir by Wightman (Nashville 1858).

CAPERS, the unopened flower-buds of a low shrub (Capparis spinosa), which grows from the crevices of rocks and walls and among ruins in the southern parts of France, in Egypt and the Levant. The stems of the Caper-bush are trailing and two or three feet long. In the south of France the caper-bush is very common. It grows wild upon the walls of Rome, Siena and Florence, and, when trained against a wall, flourishes even in the neighborhood of Paris. It was introduced into Great Britain as an exotic as early as 1596. Modern horticulturists are of opinion that with care it might be raised in the open air in England, but this has never been accomplished to any practical extent. It is cultivated on a large scale between Marseilles and Toulon and in many parts of Italy. In northern United States it is propagated by cuttings in greenhouses, but is grown from seed in the Southern States. In the early part of summer it begins to flower, and the flowers continue successively to appear until the commencement of winter. The buds are picked every morning before the petals are expanded; and as they are gathered they are put into vinegar and salt. When a sufficient quantity is collected they are distributed, according to their size, into different vessels, again put into vinegar, and then packed up for sale and exportation. The smallest capers are the dearest, simply from the reason that they are more troublesome to gather. This pickle is much used in sauce for boiled mutton. To persons unaccustomed to it the taste of capers is unpleasantly sharp and bitter, but after a little while the palate becomes reconciled to it. The flower-buds of the marsh-marigold (Caltha palustris) and the seeds of nasturtiums are frequently pickled and eaten as a substitute for capers. The bark of the root of the caper cut into slices and dried in small rolls or quills is sometimes used in medicine as a diuretic and in cases of obstruction of the bladder. The caper-tree (Capparis Jamaicensis) is found in tropical America.

CAPERTON, Allen Taylor, American Confederate statesman: b. near Union, Monroe County, Va. (now West Virginia), 21 Nov. 1810; d. Washington, D. C., 26 July 1876. After attending school in Huntsville, Ala., and entering the University of Virginia, he went to Yale, where he was graduated in 1832, and studied law at Staunton, Va. He was a director of the James River and Kanawha Canal, and served in both houses of the Virginia legislature, his last term in the senate being in 1859-60. He was a member of the Constitutional Convention of 1861, and opposed secession until the beginning of hostilities. He was elected to the Confederate States Senate in 1863, and served till the fall of the Confederacy in the spring of 1865. He was chosen to represent West Virginia in the United States Senate in the term beginning 4 March 1875, and was a member of the committees on claims, railroads and the revision of the laws. After the close of the war Caperton took an active part in bringing the coal, timber and grazing lands of West Virginia to the notice of distant capitalists.

CAPERTON, William Banks, American naval officer: b. Spring Hill, Tenn., 30 June 1855. He was graduated at the United States Naval Academy in 1875. Through the various grades of the service he rose to the rank of lieutenant in 1889. He has had 23 years of sea service and about 19 years of shore and other duty. He has seen service in every sea, and has shown that he is one of the great men of the United States navy. He was an officer on board the Mareota when she accompanied the Oregon in her famous race from the Pacific to the Atlantic to take part in the fight with Admiral Cervera’s fleet in the Spanish War. Previous to that he was one of the young American naval officers who were sent to Paris to the Exposition there in 1878. He was at one time assigned to duty with the coast and geometric survey and served as an officer aboard the Venetia. He was in command of the naval station at Newport, R. I., and supervisor of the second naval district 1913-14. He was named rear-admiral in 1913 and was assigned to the command of the cruiser squadron of the Atlantic fleet in 1915. In 1914-15 he was in the Caribbean trying to bring peace to the west Indian republics of Hayti and San Domingo. When it was time to fight he proved that he was a fighter, and he has been equally proficient in diplomacy. He brought the most turbulent of the revolutionary leaders at least to make believe they liked peace. In July 1916 he was promoted to admiral for valuable and satisfactory service in Hayti and San Domingo and his efficient record as a high executive officer. On 29 July 1916 he took command of the Pacific fleet, succeeding Admiral Winslow.

CAPES, Bernard, English novelist. His works include ‘The Lake of Wine’ (1898); ‘The Adventures of the Comte de la Muette’ (1898); ‘Our Lady of Darkness’; ‘At a Winter’s Fire’ (1899); ‘From Door to Door’ (1900); ‘Joan Brotherhood’ (1900); ‘Love Like a Gipsy’ (1901); ‘A Castle in Spain’ (1903); ‘A Jay of Italy’ (1905); ‘A Rogue’s Tragedy’ (1906); ‘The House of Many Voices’ (1911); ‘The Story of Fifi’ (1914); ‘The Fabulists’ (1915). The French race of kings, which has given 118 sovereigns to Europe, namely, 36 kings of France, 22 kings of Portugal, 11 of Naples and Sicily, 5 of Spain, 3 of Hungary, 3 emperors of Constantinople, 3 kings of Navarre, 17 dukes of Burgundy, 12 dukes of Brittany, 2 dukes of Lorraine and 4 dukes of Parma. The history of this royal race is, at the same time, the history of the rise and progress of the French monarchy. The fate of one of the most interesting countries and nations in Europe is connected with the name of Capet. After having been deprived of four thrones, and again restored to them, this family stood forth as the first and most ancient support of the European principle of political legitimacy, that divine right, which in this house commenced with the beginning of 1859-60. He was a member of the Constitutional Convention of 1861, and opposed secession until the beginning of hostilities. He was elected to the Confederate States Senate in 1863, and served till the fall of the Confederacy in the spring of 1865. He was chosen to represent West Virginia in the United States Senate in the term beginning 4 March 1875, and was a member of the committees on claims, railroads and the revision of the laws. After the close of the war Caperton took an active part in bringing the coal, timber and grazing lands of West Virginia to the notice of distant capitalists.
ilar fate. Under the last Carolingians, destin-
itute alike of energy and wisdom, Hugh the
Great, Duke of France (by which was then
understood the Isle of France), Orleans and
Burgundy, exercised a power as unlimited as
that of the mayor of the palace under the
Merovingians. On the death of Louis V, with-
out issue, in 708, his cousin, Lower Lorraine, laid claim to the throne, which the
Franks had sworn to preserve to the family
of Charlemagne. The French nobility, dis-
gusted at the German leanings of the Carolin-
gians, whose domains and influence lay in
the eastern provinces, preferred that a member of
their own class, whose possessions were situ-
ated in the centre of the country, and whose
power was so great as to outlive that of the
old dynasty, should rule over them, and ac-
cordingly chose as their king Hugh, son of
Hugh the Great, Duke of France and Count
of Paris, and had the support of the Church
in their favor. The valiant Charles of Lor-
raine was surprised in Laon by the treachery
of a bishop and made prisoner. He died soon
afterwards in prison, and his son, Obo, Duke of
Lower Lorraine, died in 1006. Both his
younger brothers died childless in Germany.
The race of the Capet was left in possession
of the throne of France. According to some
historians, Hugh Capet was descended from a
Saxon family. He married a German princess,
Adelaide, daughter of King Henry I of Ger-
many (Duke of Saxony). Hugh was crowned
at Rheims, and swore to preserve to the nation,
and particularly to the powerful feudal nobility
and clergy, all their existing privileges. Hugh
and the succeeding monarchs, till Louis VII,
took the precaution to have their successors
invested with the royal title during their own
lifetime. Thus Hugh had his son, Robert,
crowned and anointed as his colleague as early
as 1 Jan. 988. He abolished by law the partition
of the hereditary estates among the sons of the
kings and forbade the alienation of the family
domains. The daughters of the kings were
endowed from that time with money, and the
appurtenances which were given to the princes of
the blood returned to the Crown in default of male
heirs. Both these principles were more fully
confirmed by later laws. Thus Hugh Capet,
by uniting his hereditary duchy, consisting of
Paris, Isle of France and Burgundy, inalien-
ably with the Crown, may be regarded as the
founder of the French monarchy. What he
had begun was completed by his successors,
particularly in the times of the Crusades, and
by the establishment of standing armies. On
the failure of the direct line at the death of
Charles IV (1328) the French throne was kept
in the family by the accession of the indirect
line of Valois, and in 1589 by that of Bourbon.
Capet being thus regarded as the family name
of the kings of France, Louis XVI was ar-
raigned before the National Convention under
the name of Louis Capet.

CAPGRAVE John, English historian: b.
Lynn, Norfolk, 1393; d. there 1464. The most
of his life was passed in the Augustinian friary
of his native place. He was provincial of the
order of the Austin Friars in England, and was
once of the leading men of his day. He
wrote in Latin numerous commentaries, ser-
mons and lives of the saints. His most im-
portant work was his "Chronicle of England," in
English, extending from the creation to the
year 1417. Other works were a 'Liber de
Illustribus Henricis' and a 'Life of Saint
Katherine.' Many of his works are lost, others
have never yet been printed. His 'Chronicle'
and his 'Liber de Illustribus Henricis' have
been edited by F. C. Hingeston and printed in
the Rolls series (Lond. 1887). In Ypres,
Lower Lorraine, laid claim to the throne, which the
Franks had sworn to preserve to the family
of Charlemagne. The French nobility, dis-
gusted at the German leanings of the Carolin-
gians, whose domains and influence lay in
the eastern provinces, preferred that a member of
their own class, whose possessions were situ-
ated in the centre of the country, and whose
power was so great as to outlive that of the
old dynasty, should rule over them, and ac-
cordingly chose as their king Hugh, son of
Hugh the Great, Duke of France and Count
of Paris, and had the support of the Church
in their favor. The valiant Charles of Lor-
raine was surprised in Laon by the treachery
of a bishop and made prisoner. He died soon
afterwards in prison, and his son, Obo, Duke of
Lower Lorraine, died in 1006. Both his
younger brothers died childless in Germany.
The race of the Capet was left in possession
of the throne of France. According to some
historians, Hugh Capet was descended from a
Saxon family. He married a German princess,
Adelaide, daughter of King Henry I of Ger-
many (Duke of Saxony). Hugh was crowned
at Rheims, and swore to preserve to the nation,
and particularly to the powerful feudal nobility
and clergy, all their existing privileges. Hugh
and the succeeding monarchs, till Louis VII,
took the precaution to have their successors
invested with the royal title during their own
lifetime. Thus Hugh had his son, Robert,
crowned and anointed as his colleague as early
as 1 Jan. 988. He abolished by law the partition
of the hereditary estates among the sons of the
kings and forbade the alienation of the family
domains. The daughters of the kings were
endowed from that time with money, and the
appurtenances which were given to the princes of
the blood returned to the Crown in default of male
heirs. Both these principles were more fully
confirmed by later laws. Thus Hugh Capet,
by uniting his hereditary duchy, consisting of
Paris, Isle of France and Burgundy, inalien-
ably with the Crown, may be regarded as the
founder of the French monarchy. What he
had begun was completed by his successors,
particularly in the times of the Crusades, and
by the establishment of standing armies. On
the failure of the direct line at the death of
Charles IV (1328) the French throne was kept
in the family by the accession of the indirect
line of Valois, and in 1589 by that of Bourbon.
Capet being thus regarded as the family name
of the kings of France, Louis XVI was ar-
raigned before the National Convention under
the name of Louis Capet.

CAPGRAVE John, English historian: b.
Lynn, Norfolk, 1393; d. there 1464. The most
of his life was passed in the Augustinian friary
of his native place. He was provincial of the
order of the Austin Friars in England, and was
once of the leading men of his day. He
wrote in Latin numerous commentaries, ser-
mons and lives of the saints. His most im-
portant work was his 'Chronicle of England,' in


reference to an arrest to answer. Formerly, a writ upon which a suit was commenced was either a capias, distress or summons; either the person of the defendant was seized, and (unless he was bailed) imprisoned until the trial, or his goods and lands were seized as a guarantee of his appearance to answer; and more often, in modern times, to obtain a lien to secure satisfaction of the judgment; or he was only summoned, that is, merely had notice that a suit was to be tried before such a court by such a plaintiff, and was to be heard at such a time. The commencement of an action by summons is now the usual course of procedure; recent legislation, and especially the practical abolition of imprisonment for debt, having greatly restricted the use of writs of capias of any kind. By the Debtors' Act, 1869 (32 and 33 Vict. c. 62), the writ of capias ad satisfaciendum is abolished, except in cases in which the defendant can pay, but will not. The same act provides that when a plaintiff has good cause of action against a defendant to the amount of £50 or upward, and the defendant is about to quit England, and the absence of the defendant from England will materially prejudice the plaintiff in the prosecution of his action, a judge may order the defendant to be arrested unless or until security be found. A supplementary or second writ, issued when an ordinary capias has been placed in the hands of the sheriff and has been returned with the endorsement that the defendant could not be found, is called a testatum capias. See ARREST; ATTACHMENT; EXECUTION.

CAPILLARIES, the extremely minute blood vessels that make the connection between the arteries and the veins. They are extremely abundant, being present in practically all parts of the body and in enormous numbers. It is by means of the capillaries that most of the interchange of nutrition takes place in the various tissues of the body. The arteries bring the fresh oxygenated blood to the parts, to which it is distributed by the rich network of capillaries, through the walls of which the waste products pass and are carried on by the blood pressure into the veins, to be eliminated by some one of the large excretory organs, the liver, etc., or carried to the lungs to be thus modified or cast off. The arrangement, width and capacity of the capillaries varies in every tissue of the human body. In general they are arranged as a close network about the parts to which they are distributed, and in width they vary from one two-thousandths to one two-hundredths of an inch in diameter. They are largest in the marrow of bone and smallest in the brain. In muscular tissue they are generally parallel one to another, but in numerous cases, as around fat cells, they are arranged spherically and in the intestines they form loops. See ANATOMY; BLOOD, CIRCULATION OF.

CAPILLARITY. The subject of capillarity takes its name from the circumstance that it was first studied in connection with the rise of liquids in tubes having a bore so fine as to be comparable in diameter with a hair (capillus). When one end of such a tube is immersed in water, the water rises in the general level of the surface outside it, in a way which is not in accord with the general law of hydrostatics, that a liquid will stand at the same level in two communicating vessels. Many other instances can be found in which liquid surfaces, especially in the neighborhood of solid bodies, assume shapes and positions which are equally at variance with the laws of hydrostatics, such as the curvature of leaves and veins, belonging to the general subject of capillarity. Examples of capillary actions are the soaking up of water by a sponge; the penetration of varnish into wood; the rising of oil in a lamp wick; the clinging of clothes to a properly nibbed pen; the running off of the ink from pen to paper; the soaking up of the superfluous ink in blotting paper; the falling of drops of uniform size from the lip of a bottle or from a medicine dropper; the rounding of drops of melted lead into pellets of shot as they fall in a shot-tower.

When we consider such examples as these, it becomes clear that they are to be explained as the result of forces acting between the parts of the liquid, or between the liquid and the solid with which they are in contact. These forces are often called the forces of cohesion and adhesion. Very little is known about them. The one thing definitely known is that they are very great when the parts of the body or bodies between which they are exerted are so near together that they are said to be in contact, and fall off rapidly in magnitude as the parts are separated, so as to become inappreciable when the distance between the parts becomes discernible. It is customary to think of these forces as exerted between the molecules of matter, and so to call them molecular forces. The very small distance within which the action of a molecule on its neighbors is appreciable is called the range of molecular action.

By reflection upon the effects of such molecular forces acting in a liquid, Young (1804) was led to assume that a tension exists in a thin layer of molecules at the surface of a liquid, comparable in general to the tension in a stretched membrane. The magnitude of this surface tension depends upon the nature of the liquid, or, more exactly, upon the nature of the two media, of whatever sort they may be, separated by the surface. It is independent of the shape of the surface, provided that its radii of curvature are always great in comparison with the range of molecular action or the thickness of the surface layer. Young added to this hypothesis the observation that the angle of contact between a liquid surface and a solid is always the same for the same pair of substances. The angle of contact is generally measured at the line of contact, between the external normals to the solid and the liquid surfaces. In the case of mercury and glass, which Young particularly observed, this angle is obtuse, and seemed to him to be about 135°. Young assumed that the like is true for all contacts of liquids with solids which are wetted by them.

Young's two principles are closely related and proved to be consequences of the more fundamental hypothesis of molecular force; but, accepted as generalizations from observation, they may be used to explain all the forms of liquid surfaces. For example, let us consider the rise of water in a glass tube. The water, rising in the tube, displaces the air in the tube, and so meets it everywhere in the circle of contact at an angle equal to zero. Owing to this, the surface of the water in the tube will
be concave upward. In a tube of very small bore, it will be approximately hemispherical. The tension strives to straighten out the surface, and since the contact condition prevents its doing this, it lifts a column of water up the tube, to a point such that the weight of the uplifted column is sustained by the upward force due to the tension, while at the same time the curvature of the surface is consistent with the contact condition.

When the column is stationary, the tension in the surface can be considered as acting vertically upward at all points in the circle of contact of the surface with the wall of the tube. Representing by $T$ the tension in the surface, or the force acting in the surface across a line of unit length, and by $r$ the radius of the tube, we have the expression $2\pi r T$ for the upward force acting on the column. Representing by $\rho$ the density of water, by $g$ the acceleration of gravity, and by $h$ the height of the column above the general level of the water surface outside the tube, we have the expression $\rho g r h$ for the weight of the column. Setting the two forces equal, we obtain $2T = \rho g r h$, and conclude that the height of the column is inversely as the radius of the tube. This law was made known by the experiments of Jurin (1718), and is generally known as Jurin’s law.

By a slight extension of Young’s conception of surface tension, we may deduce from it the constancy of the contact angle. We need only to suppose that a tension exists, in any surface separating two substances, which has a particular value for each pair of substances. Consider then three fluids in contact along a line. It is evident that the line of contact will be at rest when the angles made with each other, at that line, by the three surfaces in which the fluids meet in pairs, are such that the tensions in the three surfaces are in equilibrium. These angles are therefore obtained by constructing the triangle of forces, with the three tensions as sides, and they are constant, for the three substances.

We may consider more particularly the special case in which one of the three substances is a solid. Suppose, for convenience in statement, that the three substances are a liquid, air, and a solid. Represent by $T_u$, $T_m$, and $T_s$ the tensions corresponding to the tension in the solid, in the liquid-air, and in the solid, respectively. Denote the angle of contact of the liquid-air surface with the solid by $\phi$. The line of contact will be at rest when the sum of all the tensions or components of tension in the plane of the solid is equal to zero, or when

$$T_u \cos \phi + T_m - T_s = 0.$$ 

The angle of contact is therefore given by

$$\cos \phi = \frac{T_m - T_s}{T_u},$$

and is constant. It is acute or obtuse, according as $T_m$ is greater or less than $T_s$. In the case of mercury and glass, $T_u$ is the greater, and $\phi$ is obtuse. In the case of most liquids and glass, the tension corresponding to $T_u$ is the greater, and $\phi$ is acute. When $T_u$ equals or exceeds $T_m + T_s$, the angle $\phi$ becomes evanescent.

Almost contemporaneously with Young, Laplace (1805) formally applied the hypothesis of molecular forces to the explanation of the forms of the various surfaces of liquids. He considered the pressure at the end of a liquid filament, beginning in the surface and drawn normal to it, and terminating in the interior of the liquid. He proved that it may be expressed by the sum of two pressures. One of these, called the molecular pressure, is very great, and is constant at all points of the liquid that are not in the surface layer. This pressure is eliminated from all equations of equilibrium of liquids, and plays no part in determining the forms of liquid surfaces. The other pressure depends upon the shape of the liquid surface, and is given by the formula

$$\frac{H}{\left(\frac{1}{R} + \frac{1}{R'}\right)}$$

in which $H$ is a constant, and $R$ and $R'$ are the two principal radii of curvature of the surface. This pressure, at any point under the surface layer, is in equilibrium with the hydrostatic pressure at that point. Under a flat surface, and therefore under the level surface of a large expanse of liquid, the radii of curvature are infinite and this pressure vanishes. If $A$ is the height of a point in the curved surface above the general level, we then have for equilibrium the condition

$$\frac{H}{\left(\frac{1}{R} + \frac{1}{R'}\right)} = \rho g h.$$  

This relation may be deduced from Young’s hypothesis of surface tension, and it is found that Laplace’s constant $H$ is equal to $2T$. As an example of the use of this equation, consider again the rise of water in a tube. The surface in the tube, if its bore is small enough, may be considered a hemisphere, and therefore $R = R' = r$, the radius of the tube. Accordingly we have $H = \rho g r h$, as we obtained before by Young’s method.

Laplace’s theory did not suffice to demonstrate the constancy of the contact-angle, and Laplace was forced to assume it as a fact of observation. A more profound and successful application of the hypothesis of molecular forces to the problem of capillarity was made by Gauss (1829). He showed, by the use of virtual work, that a system of substances in contact possesses a certain amount of potential energy, arising from the molecular forces. For each pair of substances the energy is proportional to the extent the products of the tension in the solid, in the solid-air, and in the solid, respectively. Denote the angle of contact of the liquid-air surface with the solid by $\phi$. The line of contact will be at rest when the sum of all the tensions or components of tension in the plane of the solid is equal to zero, or when

$$T_u \cos \phi + T_m - T_s = 0.$$  

The angle of contact is therefore given by

$$\cos \phi = \frac{T_m - T_s}{T_u},$$

and is constant. It is acute or obtuse, according as $T_m$ is greater or less than $T_s$. In the case of mercury and glass, $T_u$ is the greater, and $\phi$ is obtuse. In the case of most liquids and glass, the tension corresponding to $T_u$ is the greater, and $\phi$ is acute. When $T_u$ equals or exceeds $T_m + T_s$, the angle $\phi$ becomes evanescent.
portions of the surface, which will make the surface energy a minimum, are such that the sum of the reciprocals of the principal radii of curvature is the same for all parts of all the surfaces. We are thus led to the same rule for the form of a liquid surface as that reached by Laplace.

It may be shown that the constants denoting the surface energy and the surface tension are the same. To do this, consider a film of liquid bounded by the sides of a rectangle, one of which can be moved so as to increase or diminish the area of the film. Since both faces of the film act alike, we need consider only one of them. The force applied by the tension $T$ in the film to the movable side, the length of which is represented by $s$, is $Ts$, and if the movable side moves in toward the opposite side through the distance $r$, the work done by the surface tension is $Tsr$. This is, therefore, the measure of the change in the energy of the film, and since $sr$ is the change of area, $T$ equals the energy per unit of area, or the surface energy.

The method of Gauss furnishes a proof that the contact-angle should be constant. If we consider that the potential energy of the system is a minimum, when the surface tensions which arise from the surface energies of the gas, liquid, and solid, are equal, and that the system is in a state of equilibrium, this may be proved in the way already indicated, or a direct proof may be given.

The argument by which these conclusions have been reached fails if we take into consideration the heat that must be introduced into the surface film to keep it at constant temperature during its enlargement. When this heat is taken into account it appears that the surface energy differs from the surface tension by a quantity equal to the product of the absolute temperature, and the rate at which the surface tension changes with the temperature. In all known cases the surface tension decreases as the temperature rises and the surface energy is greater than the surface tension. The surface tension, while not equal exactly to the total surface energy, is equal to the so-called free energy of the surface. Since equilibrium depends on the free energy having a minimum value, the test of equilibrium based on the condition that the area of the liquid surface shall be a minimum is consistent with the boundary conditions, is not impaired by this modified statement.

A very interesting set of verifications of the theories of capillarity was devised by Plateau. In order to be able to examine a liquid taking shape under its surface tension only, he prepared a mixture of alcohol and water having the same density as olive oil, in which the oil could be suspended. A mass of oil, freely floating in this mixture, assumed a spherical form. This form is manifestly that which would be produced by a tension acting uniformly in all parts of the surface; it is also that for which the internal pressure represented by $P = \frac{1}{R} + \frac{1}{R'}$ is the same everywhere; and also that for which the surface, and consequently the potential energy, is a minimum. When the oil was suspended in a wire frame, it assumed various forms, depending on the shape of the frame and the quantity of oil, which were always such that the internal pressure, determined by Laplace's equation, was the same everywhere.

A similar set of verifications was afforded by the use of films of soapy water. Such films are so thin and light that their weight hardly distorts them at all, and the positions they assume are due almost solely to the surface tension. Such a film, blown into a bubble, is spherical. When formed on a wire frame, or in a plane, the film is a plane. When the frame is twisted out of the plane, the surface of the film is the least that can be constructed with the edges of the frame as a boundary. It is one of the so-called minimal or ruled surfaces. Various films of this sort were examined by Plateau, and found to fulfil the geometrical conditions of the minimal surface.

Observers have ordinarily tested the theory by determination, from Laplace's equation, the various forms and dimensions of liquid surfaces, subject to various boundary conditions, and comparing the actual forms obtained by experiment with those deduced from the theory. For example, rough observations show that for any one liquid that wets glass, the heights to which it rises in various capillary tubes are inversely as the radii of the tubes, as the elementary theory declares they should be. More refined observations show that this statement is not strictly accurate, and a more complete theory leads to certain corrections of the statement, to which the better observations conform. In a similar way, the rise of a liquid between parallel plates, the forms of large drops of mercury on a horizontal plate, or of large bubbles of air in a liquid under a horizontal plate, the force needed to lift a horizontal plate from the surface of a liquid which wets it, the maximum pressure exerted in a small bubble as it is enlarging in a liquid at the end of a tube, have all been used as means of testing the theory. Generally the observations are used in the appropriate formula to obtain a value for the surface tension $T$, or for the constant $\alpha = \frac{2T}{\rho g}$ (called Poisson's constant) and the verification of the theory is found in the fact that the values of these quantities obtained by different methods are in good agreement with one another.

The determination of the surface tension is complicated by the fact that many of the formulæ containing it involve the condition that the liquid surface shall be a minimum, consistent with the boundary conditions, is not impaired by this modified statement.

In such cases the contact-angle may be determined by an independent observation, as was done by Young in the case of mercury in contact with glass; but in most cases the liquids examined wets, or seem to wet, the solid walls, and it is then assumed that the contact-angle is evanescent or zero. The results obtained on this assumption may be compared with those obtained by methods in which the contact-angle is not involved, to test the validity of the assumption, and if it is found in the former to determine the magnitude of the contact-angle.

It is of interest to consider some examples of the constants of capillarity. The units commonly employed are not those of the absolute c. g. s. system. It has been found more convenient to use the millimetre as the unit of length, and the weight of a milligram as the unit of force. Poisson's constant $\alpha$, being always determined, as in the example given of the rise of a liquid in a tube, by the product of two lengths, is a number of the unit of angle.

The surface tension $T$, or the force which acts
CAPILLARITY

across a unit of length in the surface, is expressed in milligram weights per millimetre. In these units Poisson's constant for mercury is about 6.75, and for the surface tension 45.7. For water at 20° C., we may take $a = 15.0$ and $T = 7.5$; for chloroform at 23° C., $a = 3.7$, $T = 273$; for refined petroleum at 22° C., $a = 6.75$, $T = 294$. These numbers are simply cited as examples of the magnitude of the two constants in the best estimates of the exact determination is beset with such difficulties that it is doubtful whether any results have been obtained which can be accepted as definitive.

The constant contact-angle of mercury with glass is about 135°, or a little larger. Most liquids wet glass, and their contact-angles are assumed to be 0°. Evidence has been adduced to show that in some cases, with water or petroleum, for example, the contact-angle with glass is not 0°, but has a finite, though not a large, value. This question is not yet definitely settled.

The principal difficulty in determining the constants of capillarity with accuracy lies in the effect of impurities on the surface tension. The water does not wet itself; it has high surface tension, like mercury or water. The least trace of oil or grease will spread out over a water surface in a thin film, and alter its surface tension very considerably. It is very difficult to get the vessels clean, which are used in the experiments, and much more difficult to keep them clean, so that the constants obtained for any liquid are always open to a certain degree of suspicion. Impurities dissolved in the liquid affect the surface tension also, though not to so great a degree as those which spread over its surface.

The surface tensions of all liquids which have been tested, become less as the temperature rises. It has been shown to be a consequence of the principles of thermo-dynamics that, provided the specific heat of the liquid is independent of the extent of its surface, the amount by which the surface tension changes is proportional to the change in the absolute temperature. Most of the older measurements of the temperature coefficients do not rest on this conclusion, but the observations of Knipp on water and of Feustel on various organic liquids are in agreement with it.

The magnitudes of the constants of capillarity manifestly depend on the magnitudes of the forces between molecules and on the range of molecular action. The theory of van der Waals leads to an estimate of the molecular pressure within a liquid, the values obtained for it ranging from 1,430 atmospheres in the case of ether to 10,000 atmospheres in the case of water. The same theory indicates that the range of molecular action is proportional to the linear dimensions of the molecule, and is of about the same magnitude as the radius of the molecule. By the help of a modified form of this theory, Eötvös came to the conclusion that the rate of variation with the temperature of the product of the surface tension and the two-thirds power of the molecular volume should be constant, and the same for all liquids, within a certain temperature range, if the molecules are single, and not double or compound. Observation shows that this law holds true for many liquids, and in cases in which it fails, there are often other reasons to support the conclusion that the molecules of the liquid are compound.

Before closing, we may consider a few examples of the effects produced by surface tension.

When waves are set up on the surface of water, they are transmitted across the surface at a rate which depends on the hydrostatic pressure and on the surface tension. The surface tension is practically the only agent in transmitting the waves when they are very short. Such waves may be set up by the use of a vibrating tuning fork, and the measurement of their lengths furnishes a means for the determination of the value of the surface tension. The ripples set up on the smooth surface of a pond by a breath of air, or which proceed in front of a slowly moving boat, are largely due to surface tension.

When a glass tumbler is partly filled with water the surface tension draws the water up the sides. As more water is carefully poured in, the line of contact rises until it reaches the edge of the glass. It often happens that the line of contact is checked at the edge, so that the water does not wet the glass. In this case the glass can be filled above the level of its edge, and the water will stand in it under a surface that is convex upward, the surface tension in which keeps the water from running out.

The surface tension in the convex surface of the mercury in the tube of a barometer produces a pressure downward, which has to be estimated and allowed for when accurate observations are to be made.

A fine needle that has been slightly oiled or greased if laid gently down on the surface of water will float there. It lies in a concave trough formed in the water surface. The water cannot wet the needle, because of its coating of oil, and so the needle is supported by the uplift due to the surface tension acting in the concave surface in which the needle rests. In a way generally similar, the insects which run over the surface of water are supported in little hollows in the water surface. Their feet are not wetted by the water.

When two light bodies, floating on the surface of a liquid, are moved toward each other until the curved parts of the liquid surface near them intersect, they seem to exert forces on each other. If they are both wetted by the liquid, or are both not wetted by it, they move together and adhere to each other. If one of them is wetted by the liquid and the other not, they move apart. If water is run in between two parallel sheets of plate glass, they are drawn closely together and adhere very strongly to each other. These actions are ascribed to differences in the pressures on opposite sides of the bodies. In case the bodies are wetted by the liquid, the pressure in the region between them, in the elevated portion of the liquid under its concave surface, is less than the pressure on their outer sides and they are pushed together. This action takes place even in a vacuum, in which case the pressure under the concave surface is a negative pressure or tension. In case the bodies are not wetted by the liquid the liquid is depressed between them, and the pressure inward on their outer sides is greater than that acting outward, and they are pushed together. A curious effect, pre-
CAPILLARY ATTRACTION—CAPITAL
dicted by Laplace from the theory of capillarity, and verified by experiment, is exhibited by two bodies in close contact which are wetted by the liquid and the other not. These bodies, as the distance between them is diminished, at first appear to repel each other, but as the distance is reduced the repulsion changes to an attraction and the bodies come together.

If a small lump of camphor is dropped on clean water, it begins to move about over the surface in an irregular way, and continues to do so, generally for some time. These motions are explained by noticing that one part of the lump of camphor dissolves more freely than the rest, and so, near it, the surface tension of the water surface is lowered below that near the other parts of the lump. The camphor is accordingly drawn toward that part of the surface in which the tension is greatest.

If a thread of water is at rest in a horizontal capillary tube, and one of its two end surfaces is touched by a wire that has been dipped in turpentine or benzine, the tension at that end will be diminished, and the greater tension of the liquid will pull the water along the tube. This effect is taken advantage of in cleaning off grease spots from cloth. The surface tension of benzine is very low, and when benzine is applied in a gradually narrowing ring around the spot of grease, the grease is drawn in toward the centre of the ring, and if the cloth is laid on a piece of blotting paper, the grease will be taken up by it. This action is promoted if a hot iron is applied to the other side of the cloth, for the heat lessens the tension in the ends of the pores nearest the iron, and the greater tension at the other ends draws the grease into the blotting paper. Consult Boys, 'Soap Bubbles, and How to Blow Them' (New York 1900; new ed., London 1912); Lord Rayleigh, 'Collected Scientific Papers' (1901).

WILLIAM FRANCIS MAGIE,
Professor of Physics, Princeton University.
CAPILLARY ATTRACTION. See CAPILLARITY.
CAPILUPI, ká'-plóo-pé, Camillo, Italian poet: b. Mantua 1504; d. 1548. He was the author of a work issued in 1572 entitled 'The Stories of Charles IX, Marquis of Montpensier, Italian general: b. Rouen, about the middle of the 16th century; d. Florence 1613. He was in the service of Spain in the Low Countries, under the Duke of Parma, in 1584, afterward becoming lieutenant-general and commander of the army of Ferdinand I de' Medici, Duke of Tuscany. He fought the French Protestants in the reign of Charles IX, and distinguished himself at Clain, near Poitiers, in 1569.
CAPISUCCHI, ká-pe-sook'ké, or CAPI-
ZUCCA, Biagio, or Biasio, MARQUIS OF MON-
tanto, Italian general: b. Rome 1479. Having become bishop of Neoscastro he was summoned to Rome by Clement VII, who referred to him the question of against the Westerners of the Marche of Ancona, land and Queen Catherine. In this matter Capisucchi made a report against Henry in 1534.
CAPITAL. Capital as a factor in the modern economic system is wealth, other than land, which is used by its owner to secure an income rather than for direct enjoyment. Land as a natural agent is usually treated in a class by itself, and is distinguished from products of human industry and enterprise. These products are subdivided, according to the uses to which they are put, into producers' goods and consumers' goods. Producers' goods include all tools, machines, buildings and appliances which are used in production, while consumers' goods include only such goods as are used for direct enjoyment. Capital includes all producers' goods, and some consumers' goods. It includes all producer goods since it is used for direct consumption or enjoyment, but rather for the purpose of securing other goods. The term capital, however, is usually made to include, in addition to producers' goods, such consumers' goods also as are used by their
owners for the purpose of securing an income. A pleasure automobile which is let for hire is a consumer's goods from the standpoint of society, but since he has no consumer's enjoyment from it, he keeps it for the income which it brings him. A dwelling-house is likewise a consumer's goods, but if it is rented, it is capital to its owner. Some writers have accordingly spoken of two kinds of capital, that is, social or productive capital, and second, private or acquisitive capital. Social or productive capital is synonymous with producers' goods, while private or acquisitive capital includes such consumers' goods as are lent, rented or hired by their owners to other people.

Capital is sometimes thought of not as a class of goods but as a fund of value. There are two reasons which lead to this way of thinking. In the first place, however capital may be used as a tool or a means of accomplishing more than could be accomplished without it. After one comes into the possession of money, he then has the power of exchanging it for consumers' goods or for sources of income as he may choose. If he decides to purchase sources of income, he is said to invest his capital. As a matter of fact, he is merely exchanging one form of capital for another. This habit of speaking as though one had invested capital when one had merely invested money, has led naturally to the idea that capital is money.

Another reason is found in the fact that capital, like all wealth, is measured in terms of money, and its quantity so expressed. There is no such thing as capitaI, but each person possesses except by stating it in terms of money. If any business man were to state how much capital he used in his business, he would be reduced to the necessity of saying so many dollars or so many dollars' worth. However, he is not likely to labor under the delusion that capital is money. If he were to state in what his capital consists, he would not, unless he were a money lender pure and simple, say that it consisted of money. He would give an inventory of his particular property, of the property which he used in his business.

Others who reject the idea that capital is money still hold to the idea that it is a fund of value. The distinction is made between capital and capital goods, capital being the fund of value and capital goods being the goods in which that fund is embodied. No great harm can come from this use of words so long as they are properly understood, but they are not strictly accurate and may lead to confusion. The value of the goods is not capital, the goods are capital. Value is the important quantity which they all possess in common, and, therefore, it is the only quality in terms of which their quantity can be stated. Money is the commodity used in measuring that quantity. See Value.

The function of productive capital is to aid in production. Each any piece of land resembles the value of a piece of capital. It is not its value which makes the land productive; it is its productivity or its usefulness in production which gives it its value. Similarly it is the productivity of any piece of capital, or its usefulness in production, which gives it its value. In the case of that special kind of capital known as money, and in this case alone, its productivity, or its ability to aid in production, depends upon its value or its purchasing power. In all the other cases, it is the various tools, machines, buildings and other bits of equipment which perform the characteristic function of capital, and the money which is money, and of the waiting which is necessary to the performance of work long in advance of the maturing of a consumable product. The labor and the waiting may both be performed by the same person, or by different persons. They are performed by the same person when a man, say a farmer, makes his own plow, and then waits during the lifetime of the plow for the benefits in the form of income or the products of the plow. They are performed by different men when the farmer buys the plow from a blacksmith, paying him cash. The blacksmith performed the labor of making it, but does not have to wait for its benefits, since he is already paid for his work. The farmer does the waiting, having surrendered present cash long before he receives the benefits in the form of larger crops year after year, from its possession. At the present time, in our highly complicated industrial system, with its increase of specialization, the working and the waiting are generally performed by different persons. Even the case of the plow made by a blacksmith and sold to a farmer, while a real case, is exceedingly simple as compared with the average process of capitalistic accumulation. A modern plow factory is using machinery and equipment, that is, capital, which was made in other factories, and these, in turn, are using other capital made in still other factories, and so on back to the mines, and there machinery is used which also can be traced back to other factories and so on. In all this complex system, those who labor will generally be paid wages as they go along, while others will do the investing, which means that they must spend considerable money in advance and get it back with an increase over a period of years. The two functions of the laborer and the capitalist, or of labor and capital as they are sometimes called, are pretty sharply separated.

Capital has existed, of course, as long as tools and equipment have existed, but this separation of the two functions has become general only since the rise of machine production. Before that time, the function of the capitalist was not important enough to create
CAPITAL — CAPITAL PUNISHMENT

an opportunity for many men. Not enough capital was needed in the more primitive forms of industry which preceded the present to enable any large number of men to live on its earnings. It is this fact which is probably meant when it is erroneously stated that capital in the modern sense came into existence with the rise of the factory system. Capital in the modern sense was used by the Roman men, while a still simpler order was made from it and called the Tuscan. The capitals of these two orders are very thin and low in vertical measurement, and consist of moldings running round the continuation of the shaft, and either plain or carved, except in its greater quantity and in the greater opportunity it gives to the capitalist, from capital in any other sense. See INCOME; NATIONAL WEALTH.

THOMAS N. CARVER,
Professor of Political Economy, Harvard University.

CAPITAL, in architecture, the uppermost member of a column, that is to say, a separate piece of stone set upon the shaft and supporting an epistyle or the abutment of an arch— in short the mass of the building which is imposed upon the column.

A column must always have a shaft and a capital; without these features it would be a post, perhaps a pillar or a pier, but would have no architectural character. The capital, moreover, has generally received the most elaborate decorative treatment of the whole composition. Thus in Egypt while the shaft might be cylindrical or conical, the capital would spread out immediately in curves either concave or convex, and would be carved and painted. It is even possible to divide Egyptian columns into four orders by their capitals, which spread in different ways, and are ornamented by different sculpture more or less imitative of nature. The idea of the spread given to the capital is, of course, that in this way the superstructure is taken more easily, as it is always and of necessity much larger horizontally than the column itself.

The stone uprights left in rock-cut temples in India and called ordinarily pillars, because of their varied forms—octagonal, square and the like—are still divided into shaft and capital, though the forms of these are entirely remote from Egyptian or later European examples. Thus, some capitals consist of a mere enrichment of the uppermost band of the shaft and a support, a splendid block very elaborately carved. In some cases this upper block gives off corbels and consoles which help to carry the roof by their greater spread.

The capitals which have excited the most interest among European students of art are those of the three Greek orders and of the five Renaissance orders which were deduced from the first three. The capital of the Grecian Doric is a reversal cone rounded off at top and carrying a square plinth or die; this plain echinus was richly painted in bright colors. The capital of the Ionic order is a curious device consisting of scrolls or volutes, two on each of the two opposite sides, so that this capital, almost alone, has not the same appearance from every point of view. The capital of the Corinthian order is a circular bell, surmounted by a leaf and having at each corner a couple of projecting scrolls not unlike those of the Ionic order but small. This Corinthian order received many modifications in ancient Roman practice, and one of these was erected by the Renaissance men into a separate order, the so-called Composite. From the Grecian Doric the Roman Doric took shape, and the Composite was used by the Romanesque men, while a still simpler order was made from it and called the Tuscan. The capitals of these two orders are very thin and low in vertical measurement, and consist of moldings running round the continuation of the shaft, and either plain or carved, except in its greater quantity and in the greater opportunity it gives to the capitalist, from capital in any other sense. See INCOME; NATIONAL WEALTH.

RUSSELL STURGIS.

CAPITAL (Das Kapital), a noted work by Karl Marx, published in 1867; English translation edited by Fred Engels, 1887; a book of the first importance, by the founder of international socialism. The conservative aspect of Marx's teaching is in the fact that he honestly seeks to understand what, apart from any man's opinion or theory, the historical development actually is; and that he does not think out and urge his own ideal program of social reform, but strives to understand and to make understood what must inevitably take place.

CAPITAL PUNISHMENT (Latin caput, "the head"; hence capita, "pertaining to or affecting the head"; hence "affecting the life"), the punishment of death. The questions most commonly discussed by philosophers and jurists under this head are: (1) As to the right of governments to inflict the punishment of death; (2) as to the expediency of such punishment; (3) as to the crimes to which, if any, it may be most properly confined and limited; (4) as to the manner in which it should be inflicted.

1. As to the right of inflicting the punishment of death. This has been doubted by some distinguished persons and the doubt is often the accompaniment of a borough or city, inclined to the indulgence of a romantic sensibility, and believing in human perfectibility. One of the first men of prominence to advocate the abolition of capital punishment was Robespierre, the French revolutionist, who not only wrote many pamphlets against it, but resigned his position as criminal judge of Arras, to avoid pronouncing a death sentence. The right of society to punish offenses against its safety and good order will scarcely be doubted by any considerate person. Individuals have a right to guard themselves from injury, and to repel all aggressions by a force or precaution adequate to the object. This results from the right of self-preservation. If a person attempts to take away my life, I have, by the inalienable right to protect myself against the attempt by all reasonable means. If I cannot secure myself but by taking the life of the assailant, I have a right to take it; it would otherwise follow that I must submit to a wrong, and lose my life rather than
preserve it by the means adequate to maintain it. It cannot, then, be denied, that in a state of mœurs repel force, and may even justly take away life, if necessary, to preserve their own. When men enter society, the right to protect themselves from injury and to redress wrongs is transferred generally from the individuals to the community. We say that it is generally so, because it must be obvious that in many cases the natural right of self-defense must remain. If a robber attacks one on the highway, or attempts to murder him, it is clear that he has a right to repel the assault, and to take the life of the assailant if necessary for his safety, since society in such a case could not afford him any adequate and prompt protection. The necessity of instant relief, and of instant application of force, justifies the act, and is recognized in all civilized communities. When the right of society is once admitted to punish for offenses, it seems difficult to assign any limits to the exercise of that right, short of what the exigencies of society require. If a state has a right to protect itself, its citizens in the enjoyment of its privileges and immunities, it has a right to apply means adequate to this object. The object of human punishments is, or may be, threefold: (1) To reform the offender (2) to deter others from offending; and (3) to secure the safety of the community, by depriving the offender of the power of doing mischief. The first consideration has only lately entered into human legislation, because of the inadequacy of our means to produce great moral results by the infliction of punishment; but two latter considerations enter largely into the theory and practice of legislation. Who is to be the judge in such cases? what is the adequate punishment for any offense? Certainly punishments ought not to be inflicted which are utterly disproportional to the offense, and beyond the exigencies of society. No government has a right to punish cruelly and wantonly and from mere revenge; but still, the discretion must be vested somewhere, to say what shall be the degree of punishment to be assigned to a particular offense. That discretion must flow from nature, justly a part of the legislative power, and to be exercised according to the actual state of society. It may, — may it must, be differently exercised in different ages and in different countries; for the same punishment which in one age or country may be sufficient to suppress an offense, or render it comparatively harmless, may, in another age or country, wholly fail of the effect. If mild punishments fail of effect, more severe ones must be resorted to, if the offense be of a nature which affects society in its vital principles, or safety, or interests. The frequency of a crime must often furnish a very strong ground for severe punishment, not only as it furnishes proof that the present punishment is insufficient to deter men from committing it, but from the increased necessity of protecting society against dangerous crimes. But it is often said that life is the gift of God, and therefore it cannot justly be taken away, either by the party himself or another. If he cannot take it without a coerced power, and thereby confer that power on others. But the fallacy of this argument is obvious. Life is no more the gift of God than other personal endowments or rights. A man has, by the gift of God, a right to personal liberty and locomotion, as well as to life; to eat and drink and breathe at large, as well as to take away the life of another. God has not, in any doubts that, by way of punishment, he may be confined in a solitary cell; that he may be perpetually imprisoned or deprived of free air, or compelled to live on bread and water. In short, no one doubts that he may be restrained in the exercise of any privileges or natural rights short of taking his life. Yet the reasoning, if worth anything, extends to all these cases in an equal degree. If, by his crimes, a man may justly forfeit his personal rights, why not his life? But we have seen that it is not true, even in a state of nature, that a man’s life may not be taken away by another if the necessity of the case requires it. Why, then, may not society do the same if its own safety requires it? Is the safety of one person more important than the safety of the whole community? Then, again as to a man’s inability to confer on others a right which he does not himself possess. Suppose it is so; the consequence which is deduced from this does not, in fact, arise. Blackstone, indeed, does not deduce the right of society to reduce the right of capital offenses from cases of mala prohibita and not mala in se) from the consent of the of the offenders. The Marquis Bec- caria, on the other hand, denies that any such consent can confer a right to criminals to commit offenses against society and objects to its existence. But the notion of consent is, in nearly all cases, a mere theory, having no foundation in fact. If a foreigner comes into a country and commits a crime at his first entrance, how can it be contended that he is not subject to the laws of the country? If a pirate commits piracy, it is absurd to say that he consents to the right of all nations to punish him for it. The true and rational ground on which the right rests is not the consent of the offender, but the right of every society to protect its own peace, interests, property and institutions, and the utter want of any right in other persons to disturb or destroy or subtract them. The right flows, not from consent, but from the legitimate institution of society. If men have from nature, for mutual benefit and security, they have a right to punish other persons who would overthrow it. There are many cases where a state authorizes life to be taken away, the lawfulness of which is not doubted. No reasonable man doubts the right of a nation, in a just war, especially of self-defense, to repel force by force and to take away the lives of its enemies. And the right is not confined to repelling present force, but it extends to precautionary measures which are necessary for the ultimate safety of the nation. In such a war a nation may justly insist upon the sacrifice of the lives of its own citizens, however innocent, for the purpose of ensuring its own safety. Accordingly we find that all nations enroll militia and employ troops for war, and require them to be armed, and permitted to make use of arms for the preservation of the state. In these cases life is freely sacrificed by the nation; and the laws enacted for such purposes are deemed just exercises of power. If so, why may not life be taken away by any law that self-preservation requires it? If a nation may authorize, in war, the destruction of thousands, why may it not authorize the destruction of a single life, if self-preservation requires it?
The mistake, however, is in supposing that life cannot be taken away without the consent of the party. If the foregoing reasoning be correct, such consent is neither supposed nor necessary. In truth, the supposition of an original compact between all the persons who are subject to the regulations of a society, by their own free consent, as the necessary and proper basis on which all the rights of such society depend, is at best a gratuitous supposition, and it sometimes leads to very incorrect results. It may be added that the Scriptures most clearly recognize and justify the infliction of capital punishments in certain cases. 2. As to the expediency of capital punishment. This opens a wide field for discussion. Some able men who do not doubt the right do still deny the expediency of inflicting it. It may be admitted that a wise legislature ought to be slow in affixing such a punishment to any but very enormous and dangerous crimes. The frequency of a crime is not of itself a sufficient reason for inflicting such a punishment. It should be a crime of great atrocity and danger to society, and one which cannot otherwise be effectually guarded against. In affixing punishments to any offense, we should consider what are the objects and ends of punishment. It is clear that capital punishment can have no effect in reforming the offender himself. It may have, and ordinarily does have, the effect of deterring others from committing a like offense; but still, human experience shows that even this effect is but small, when inflicted for small offenses, which are easily perpetrated, and to which there is great temptation, does not always operate as an effectual terror. Men are sometimes hardened by the frequent spectacles of capital punishments and grow indifferent to them. Familiarity deprivés them of their horror. The bloodiest codes are not those which have most effectually suppressed offenses. Besides, public opinion has great weight in producing the acquittal or condemnation of offenders. If a punishment be grossly disproportionate to the offense, if it shock human feelings, there arises, insensibly, a sympathy for the victim and a desire to screen him from punishment; so that, as far as certainty of punishment operates to deter from crimes, the objection may be very strong. The contrary may be said of capital punishment. It may be added that a reasonable doubt may fairly be entertained whether any society can lawfully exercise the power of punishing beyond what the just exigencies of that society require. On the other hand, a total abolition of capital punishments would, in some cases at least, expose society to the risk of deep and vital injuries. A man who has committed murder deliberately has proved himself unfit for society and regardless of all the duties which belong to it. The safety of society is most effectually guarded by cutting him off from the power of doing further mischief. If his life be not taken away, the only other means left are confinement for life or transportation and exile for life. Neither of these is so effectual as capital punishment. It is not only punishment for other crimes, and may not always be within the power of a nation without great inconvenience and great expense to itself. It is true that the latter punishments leave open the chance of reform to the offender, which is indeed not too often a mere delusion; but, on the other hand; they greatly diminish the influence of another salutary principle, the deterring of others from committing like crimes. It seems to us therefore that it is difficult to maintain the proposition that capital punishments are at all times and under all considerations inexpedient. It may rather be admitted that in certain cases they are absolutely indispensable to the safety and good order of society. Some states have, however, entirely abolished capital punishment, as is the case in Holland, Rumania, and Portugal. In certain parts of the Swiss cantons, and some States of the American Union, including Michigan, Wisconsin, Maine, Rhode Island and Kansas. It was entirely abolished in Switzerland in 1874, but a few years after, owing to the increase of murders, it was again made permissible. It was also for a time done away with in Austria and in one or two of the States of this country, while in Russia it was abolished in 1750, only to be revived for political offenses when the Revolutionary agitators became known. Blackstone, in his 'Commentaries,' published in 1767, says: 'The law of 1768, which was passed by the Revolutionary government to suppress all political associations and societies against the king, is declared to be tyrannical, illegal, and inhuman; and the act which has lately obtained the name of the 'punishment of death,' is abolished by the constitution established in 1791.' 3. As to the crimes to which capital punishments may most properly be limited. From what has been already said it is plain that this must depend upon the particular circumstances of every age and nation; and much must be left to the exercise of a sound discretion on the part of the legislature. As a general rule humanity forbids such punishments to be applied to any but crimes of very great enormity and danger to individuals or the state. If any crimes can be effectually suppressed by moderate means, these ought certainly to be first resorted to. The experience, however, of most nations, if we may judge from the nature and extent of their criminal legislation, seems to disprove the opinion so often indulged by philanthropists that capital punishments are wholly unnecessary. The codes of most civilized nations used to abound with capital punishments. That of Great Britain long continued to be very sanguinary. Blackstone, in his 'Commentaries,' admits that in his time not less than 160 crimes were, by the English law, punishable with death. Forgery was one of these up to the reign of William IV. The only crimes for which capital punishment may now be inflicted, according to the law of England, are murder, treason, and dueller. The law in Scotland is substantially the same, a sentence of capital punishment now being competent only in cases of treason, murder and attempts to murder in certain cases. By United States statutes nineteen offenses are so punishable, including treason, murder, arson, rape, piracy and robbery of the mail. In several States of the Union still fewer crimes are generally punishable with death. Beyond treason, murder, arson, piracy, highway robbery, burglary, rape and some other offenses of great enormity and of a kindred character, it is extremely questionable whether there can be necessity or expediency in applying so great a severity. Beccaria, with his characteristic humanity and sagacity, has strongly urged that the certainty of punishment is more important to debar from crimes than the severity of it. 4. As to the manner of inflicting the punishment of death. This has been different in different countries, and in different stages of civilization in the same countries. Barbarous nations are generally inclined to severe; and
vindictive punishments; and, where they punish with death, to aggravate it by prolonging the sufferings of the victim with ingenious devices in cases of a political nature or of very great atrocity, the punishment has been sometimes inflicted with many horrible accompaniments. Tearing the criminal to pieces, piercing his breast with a pointed pole; pinching to death with red-hot pincers; strangling to death by tying his limbs upon the wheel; pressing to death in a slow and lingering manner; burning at the stake; crucifixion; sawing to pieces; quartering alive; exposure to wild beasts; and other savage punishments, have been sometimes resorted to for the purposes of vengeance, public example or public terror. Compared with these the infliction of death by drowning, strangling, poisoning, bleeding, beheading, shooting or hanging is a moderate punishment. In modern times public opinion is strongly disposed to discountenance the punishment of death by any but simple means; and the infliction of torture is almost universally repudiated. Even in governments where it is still countenanced by the law, it is, in some measure, commuted by the policy of the government, beyond the simple infliction of death. In Prussia, where atrocious criminals were required by the penal code to be broken upon the wheel, the King latterly used always to issue an order to the executioner to strangle the criminal (which was done by a small cord not easily seen) before his limbs were broken. So in the same country, where robbery attended with destruction of life was punished by burning alive, the faggots were so arranged as to form a kind of cell in which the criminal was suffocated by the fumes of sulphur, or other means, before the flame could reach him. Not only is torture now abolished by civilized nations, but even the infliction of capital punishment in public has been given up by most of them. In England, in high treason, the criminal is sentenced to be drawn to the gallows, to be hanged by the neck until he be dead, to have his head cut off, and his body divided into four parts, and these to be at the discretion of the sovereign, and all this punishment is remitted by the Crown, except the hanging and beheading, and these too may be altogether remitted according to circumstances. In other cases the punishment is now simply by hanging, or, in the military and naval service, by shooting. In France formerly the punishment of death was often inflicted by breaking the criminal on the wheel. The usual punishment now is beheading by the guillotine. In 1853 a kind of guillotine (Fallschwert) was introduced into the kingdom of Saxony, and it has since been adopted as the means of execution in several other German states. In Austria the general mode of punishment is by hanging. In Prussia hanging is rarely inflicted; but the usual punishment is beheading with a heavy axe as the criminal’s head being first tied to a block. In other two German states continuation by the sword still exists. It should be remarked, however, that in Germany hanging has always been deemed the most infamous sort of punishment; and the sentence has often been commuted for beheading by the sword as a milder or less dishonorable mode of punishment. In the United States of America hanging is the almost universal mode of capital punish-
sentence is by the Royal Prerogative, exercised on the advice of the Home Secretary. In the United States, there is considerable latitude on appeal. In France there may be a review in the Court of Cassation. In Germany there is, in criminal as in civil cases, a right of appeal; hence, in that country, few innocent persons have suffered capital since the 16th century. Capital punishment is considered a stigma in all civilised states, and the general humanity of the laws of modern nations, upon persons who are insane or who are pregnant, until the latter are delivered and the former become sane. It is said that Frederick the Great required all judgments of his courts condemning persons to death to be written on blue paper; thus he was constantly reminded of them as they lay on his table among other papers, from which they were readily distinguished. He usually took a long time to consider such cases, and thus set an excellent example to sovereigns of their duty. Consult Curtis, N. M., 'Capital Crimes' (New York 1894); Actes du 8ème Congrès pénitentiaire international (1910).

CAPITALS (maiuscula), the large letters used in writing and printing, most commonly as the initial letters of words in a title, of proper names, and of the names of the Deity, and in the next century the same usage was followed in ordinary manuscripts. The practice with regard to the use of capitals varies in different countries. Sentences and proper names begin almost universally with capitals, but there are several other cases in which the usage is not so general. In English there cannot be said to be any invariable rule regulating their use. The first personal pronoun is always written and printed with a capital letter, and it is common also to begin titles and the names of well-known public bodies, societies, institutions, etc., with capitals. Formerly, it was a frequent practice to begin all substantives in English with a capital, which is still the rule in German. The Germans also begin all titles and pronouns of address with capitals, but not the first personal pronoun. One point in which the English practice differs from that of Germany, France, Italy and other continental countries, is in beginning adjectives derived from proper names, such as Spanish, Italian, etc., like proper names themselves, with capitals, such adjectives being printed in other countries entirely with small letters. See Alphabet; Writing, and consult Pron. 'Manuel de paléographie latine' (3d ed., Paris 1910); Thompson, E. M. 'Greek and Latin Palæography' (Oxford 1912).

CAPITANIS, käp-tä-nës. See Armatoles.

CAPITATION is applied to anything that concerns a number of persons individually. Thus a capitation tax is a tax imposed upon all the members of a state, each of whom has to pay his quota of contributions from taxes upon merchandise, etc. A capitulation is a grant given to a number of persons, a certain amount being allowed for every individual among the number. Class capitation taxes, when differentiated according to fortune, become income taxes. In France, of pre-revolutionary days graduated capitation taxes were levied and were intended to reach all classes. The privileged classes, however, succeeded by various means in evading either wholly or in part these taxes and the unequal burden thus thrown on the great unprivileged class was one of the fundamental causes of the Revolution.

CAPITO, käpë-tô, or KOPFEL, Wolfgang Fabricius, Alsatan reformer: b. Hagenau 1478; d. Strassburg, November 1541. Entering the Benedictine order, he became professor of theology at Basel, where he showed in his lectures a tendency to shake off the trammels of the scholastic writers. In 1523 he was made provost of Saint Thomas, Strassburg. He approved of Luther's action, but nevertheless in 1519 entered the service of Albert of Mainz; and it was only some years later that he finally declared for the Reformation. He then entered zealously into its work, shared with Bucer the composition of the Confessio Tetrapolitana, and took part in the Synod of Bern in 1532. His earnest work for Christian unity caused him to be viewed with suspicion by the narrower-minded among the Reformers. Consult Baum, 'Capito und Bucer' (Elberfeld 1860).

CAPITOL, now Campidoglio, the citadel of ancient Rome, standing on the Capitoline Hill, the smallest of the seven hills of Rome, ancienly called the Saturnine and the Tarpeian Rock. It was planned and said to have been begun by Tarquinius Priscus, but not completed till after the expulsion of the kings. At the time of the civil commotions under Sulla it was burned down, and rebuilt by the Senate. It again suffered the same fate when it was restored by Vespasian and Domitian. The latter caused it to be built with great splendor, and instituted there the Capitoline games. Dionysius says the temple, with the exterior pillars, was 200 feet long and 185 feet wide, and the whole building consisted of three temples, which were dedicated to Jupiter, Juno and Minerva, and separated from one another by walls. In the wide portico triumpal banquets were given to the people. The statue of Jupiter, in the capitol, represented him sitting on a throne of ivory and gold, and consisted in the earliest times of clay painted red. Under Trajan, it was formed of gold. The roof of the temple was made of bronze; it was gilded by Quintus Catulus. The doors were of the same metal. Splendor and expense were lavished upon the whole edifice. On the pediment stood a chariot, drawn by four horses, at first of clay, and afterward of gilded brass. The temple itself contained an immense quantity of the most magnificent presents. The most important jewels were preserved in it. The Capitoline Hill consists of three parts, namely, the northern summit, now occupied by the church of Santa Maria in Araceli; the southern summit, crowned by the Palazzo Caffarelli, usually oc-
CAPITOL AT WASHINGTON

The national capital had been located on the Potomac in 1789, Washington and Maj. P. C. L'Enfant selected sites for the public buildings. On the first map (1791), the “Congress House” is situated as now, on a low hill commanding the best view in Washington where Congress assemble, the state-houses in States of the Union are officially called capitol. Of these the most noteworthy are those at Albany, Hartford, Providence, Austin, Jackson City and Saint Paul.

The President’s house James Hoban’s plans were accepted at once, and he was made superintendent of its erection. For the capital none were furnished. But the competitors were given another trial, and one, Stephen Hallet, a French artist living in Philadelphia, was employed at a salary and indemnity to revise his plans under the commissioners’ criticisms. But in the year Dr. William Thornton of Tortola Island, W. I. submitted plans whose “grandeur, simplicity, beauty and convenience” forced the committee to accept them. They were too grand for the commissioners’ ideas of national needs or resources at the time, however, and specified too costly materials. Thornton wished marble and mahogany and the best of construction, and under a bitter assault from several of his rejected competitors, headed by Hallet, whom the commissioners had joined with Thornton in a revising board, he was forced to reduce its scale and material greatly. Their suggested modifications of his general plan were, however, disapproved. These plans were for what is now the central portion of the capitol.

Work was begun about 1 August. The cornerstone was laid 18 September in the southeast corner of the old north wing, now the Supreme Court section, with imposing ceremonies, Masonic rites and procession, and a barbecue. Hoban was made superintendent, and Hallet his assistant; but Hoban gave his whole time to the White House, where the President’s house came to be called, and Hallet was the real manager. He proceeded to change Thornton’s plans and specifications at will, was repeatedly censured for it and at last ordered to stop it. He resigned, but refused to give up the drawings; the commissioners at last secured them and discharged him, 15 Nov. 1794. Thornton, now one of the commissioners of the District of Columbia, was asked by Washington to obliterarke Hallet’s changes as injurious, and did so. Hoban now acted as superintendent until George Hadfield, an English architect, was engaged to succeed Hallet, on Jonathan Trumbull’s recommendation of him as a modest man and good artist. He outdid Hallet; spent his whole energy in fighting Thornton and Hoban (who always worked in harmony), and after repeated resignations and reconsiderations, was discharged for practical incompetence 10 May 1798. Hoban again took charge. On 17 Nov. 1800 the second session of the sixth Congress met in the north wing of the building. Much of this early construction was of too costly or ornamental material. This was on account of haste, the local interests being very urgent for the coming of the government to that seat. A few years later more durable material was substituted. The commissionship was abolished May 1802, and Thornton and Hoban ceased direct superintendence, though often called in consultation. At this time the north wing was complete, the foundation of the central rotunda and dome in place and the basement story of the south wing partly done. These are still as Thornton planned them.

On 6 March 1803 Jefferson appointed Benjamin H. Latrobe (q.v.) “surveyor of public buildings.” He at once began, like the others, to besiege the President with the bitterest assaults on Thornton’s designs, and when the former declined to interfere, appealed to Congress. Thornton, however, now in charge of the patent office, though he defended himself with energy, made no further attempt to prevent the alteration of his plans. Last of all came serious changes, some of them since judged harmful to beauty and utility. Thus, the Representatives’ hall was changed from a graceful ellipse to a square with semi-circular ends; a bad echo gave trouble; the gallery was altered; the changes. The number and size of entrances to the rotunda were curtailed, the splendid open staircases, cut down and placed in obscurity, were difficult for strangers to find; and the grand semi-circular western portico was abolished. The principal entrance was also changed from the west front, facing the White House, to the eastern side. Latrobe was constantly in hot water with both Jefferson and Congress, and published a pamphlet against them in 1806; but till 1811 had pretty much his own way. When the War of 1812 broke out, the capitol consisted of the north and south wings, connected by a corridor of rough boards over the central foundations. On 24 Aug. 1814 the British burnt it as far as possible, piling the furniture and platforms in the rooms with rocket stuff and igniting them; the interior was destroyed, but the outside walls remained, also the inside brickwork and some stone. A strong movement arose for removing the capital elsewhere; but the same considerations prevailed against it as
CAPITOLINE GAMES — CAPITULARY

later. In fear of such a result, however, the local interests formed the "Capitol Hotel Company," and erected a building for government occupancy till the repairs on the capitol were finished. It was occupied, 1815-19, and was afterward known as the "Old Capitol," and used in the Civil War as a military prison. In the reconstruction the House wing was entirely altered.

Near the end of 1817 Latrobe became embroiled with a new commissioner of the Federal building, Samuel Lane, and resigned. In his place was appointed Charles Bulfinch (q.v.), from 1 Jan. 1818; he remained supervising architect for the next decade. In the winter of 1819-20 Congress took its seat in the new hall. The centre was pushed forward to completion, and on 10 Dec. 1824, the entire interior was finished. In 1825 a public competition was held for the figures on the pediment of the eastern portico. From 1826 on, Bulfinch was employed on special detail, and the landscape gardener, and work on the grounds, which were of his designing. The capitol was set in a park of 22½ acres, encircled by an iron railing somewhat taller than a man, affixed in the sandstone coping of a low wall. There were four carriageways and five pedestrian entrances. On 2 March 1828 the position of architect of the capitol was abolished; but Bulfinch remained in employment till the end of June 1829, when Jackson dismissed him. He designed and planned the modern form of the then west extremity of the building, the Senate galleries and the terraces on the east; and made the dome higher than in Thornton's plan. Among others who should have great credit for the beauty of the capitol are Peter Lenox, clerk of works under Latrobe; George Blagden, superintendent of stonecutters; and Giovanni Andrei, an Italian, superintendent of carvers. That so beautiful and harmonious a structure should have emerged from the contents of so many different minds is due partly to the really great ability of the three chief architects, Thornton, Latrobe and Bulfinch, and partly to the determination of successive Presidents that the changes should harmonize with the original design. Latrobe's material external alterations of Thornton's plan have been changed by Bulfinch designed the western central portico as it now stands.

From 1829 to 1836 there was no architect of the capitol. On 6 June 1836, Jackson appointed as Federal architect Robert Mills (q.v.), who had succeeded under Latrobe and he held the place till 1851. Thomas U. Walter (q.v.) then took the post, having drawn the plans for the two modern wings that extended the original capitol, which the government needs had outgrown, into the modern one. The corner-stone of the new capitol was laid by President Fillmore, 4 July 1851; the new Representatives' hall was occupied in 1857; the Senate hall in 1859. The great lengthening of the dimensions required a correspondent heightening of the dome; and Mr. Walter designed a new one, which was contrived. It was occupied, and completed at the close of 1863, the statue of Freedom being then lifted into place. Mr. Walter, however, had foreseen a future need of still further extension, and had drawn plans for it while the other work was going on. Congress in the spring of 1853 authorized their execution, at an expenditure of $2,500,000 and three years' time, under the supervision of the Federal architect, Mr. Woods. As now completed the capitol cost over $16,000,000. It covers an area of about four acres standing amid beautiful park grounds of nearly 50 acres, adorned with fountains and classic statuary. The building is 750 feet long, from 121 to 140 feet deep and rises to a total height of 285½ feet from the base of the capitol to the top of the final figure of Freedom, 19½ feet high, on the dome. Massive and cast by the most famous in the nation's history, grace the three main entrances on the east front—to the Rotunda, the Senate and the House. In the Rotunda under the dome are many priceless historical paintings, and in Statuary Hall is an assemblage of portrait statues, gifts from various states. The Supreme Court occupies a room in the Central building; the Senate chamber is in the north wing, the House of Representatives in the south.

CAPITOLINE GAMES, games held in ancient Rome in celebration of the deliverance of the city from the Gauls, in honor of Jupiter Capitolinus, to whom the Romans ascribe the salvation of the capitol in the hour of danger. They were instituted 387 B.C., on motion of Camillus, after the departure of the Gauls. They were in charge of the priests of Capitolini, whose members were chosen from those who lived on the capitol. In later times they appear to have been discontinued. In 86 A.D., Domitian instituted Capitoline games, which were held every four years down to a late period of the empire.

CAPITOLINUS, Julius, Roman historian, who lived at the beginning of the 3d century, and wrote the lives of the emperors—Antoninus Pius, M. Aurelius, L. Verus, Pertinax, Albinus, Macinus, the Maximii, the Gordiani, Balbinus and Pupienus. He is one of the writers of the 'Historia Augusta,' 5 in the editions of which his works are to be found.

CAPITULARY, (Lat. capitula, "chapters"), a writing divided into heads or chapters, especially a law or regal enactment so divided into heads. Laws known by this designation were promulgated by Childebert, Clothaire, Car- loman and Pepin, kings of France; but no sovereign seems to have put himself out of them as the Emperor Charlemagne, who appears to have wished to effect, in a certain degree, a uniformity of law throughout his extensive dominions. With this view it is supposed he added to the existing codes of feudal laws many other laws, divided or arranged under small chapters or heads, sometimes to explain, sometimes to amend, and sometimes to reconcile or remove the differences between them. These were generally promulgated in public assemblies composed of the sovereign and the chief men of the nation, both ecclesiastical and secular. They regulated equally the spiritual and temporal administration of the kingdom; and the execution of them was entrusted to the bishops, the courts and the missi regi, officers so called because they were sent by the French kings of the first and second race to dispense law and justice in the provinces. Many copies of these capitularies were made, one of which was generally preserved in the royal archives. The authority of the capitularies was very extensive. It prevailed in every kingdom under the do-
minion of the Franks, and was submitted to in many parts of Italy and Germany. The earliest collection of the capitularies is that of Ansegis, abbot of Fontenelle. It was edited by Louis the Debonnaire and Charles the Bald, and was publicly approved of in many councils of France and Germany. But as Ansegis had omitted many capitularies in his collection, Benedict, the abbot of the Monastery of Molsheim, added three books to them (before 858). Each of the collections was considered to be authentic, and of course was appealed to as law. Subsequent additions have been made to them. The best editions of them are those of Baluze, ‘Capitularia Regum Francorum’ (2 vols., Paris 1677), Walter, ‘Corpus Juris Germanicæ Antiqui’ (3 vols., Berlin 1824), and of Pertz in the ‘Monumenta Germaniae Historica’ (2d div., Vols. I and II, Hanover 1835–37). The best of all is Boretius, ‘Mon. Germ. Hist. Lexegm. Sectio II’ (Vols. I and II, Hanover 1883–97). The capitularies remained in force in Italy longer than in Germany, and in France longer than in Italy. The incursions of the Normans, the intestine confusion and weakness of the government under the Carlo Magne, and above all the publication of the epitome of canon law termed the Decretum of Gratian, about the year 1150, which totally superseded them in all religious concerns, put an end to their authority in France.

CAPITULATION (‘a writing drawn up in heads’), in military language, the act of surrendering to an enemy upon stipulated terms, in opposition to a surrender at discretion. The word is also used to designate the instrument containing the terms. The proposition to enter into such a compact may originate either with the commander of the successful or of the defeated party. Based on the terms proposed by either, the conditions are agreed upon, being modified by the relative strength of the belligerents. Consult Article XXXV of the Second Peace Conference at The Hague (1907).

In the 15th century capitulations, as they were called, were presented by the ecclesiastical establishments in Germany to their newly-chosen abbots and bishops, who were obliged to swear to observe them as laws and conditions for their future lives. The ecclesiastical electors obtained, after the fall of the Hohenstaufen family, certain advantageous promises from the new emperors, which were called capitulations. When Charles V was proposed as emperor, and it was apprehended, on account of his foreign education, that he would disregard the German constitution, he was obliged to make oath that he would not reside without the German empire, nor appoint foreigners to office in the empire, etc. This was called his election capitulation. Such a Wahlkapitulation was afterward presented to every new emperor as a fundamental law of the empire. In this way the authority of the German emperors was constantly more and more diminished, so that at last it became merely nominal, since the electors, at the choice of every new emperor, made some new infringement on the imperial privileges. The Wahlkapitulationen were acknowledged bargains, certainly unique in history.

CAPITULATIONS, Turkish, the decrees governing the privileges and powers of Europeans resident on Turkish soil, so called apparently for the reason that they were divided into articles or chapters. After 1453 such privileges were frequently granted by the sultans; they were peculiar grants based on concessions and valid only for the life of the grantor. Hence they were renewed, often with modifications, by each new sultan. So we find many capitulations made with France, England and other states. The earliest of the capitulations to which reference is often made for precedent, dates from 1535 and was granted to Francis I of France. It was more specific and formal than any preceding grant of the kind and remained in force for over 350 years. By it the French were permitted to travel and to trade according to their own customs and usages; it granted them freedom from all imposts except customs duties, also liberty in matters of religion, inviolability of domicile and the extra-territorial jurisdiction of consuls. Even if they committed a crime, they were to be arrested by an Ottoman official only in the presence of a consular or diplomatic officer of their own country. Ottoman officers, if asked by a consular or diplomatic officer to aid in the arrest of a French subject, were to perform such service. The French had the full right of making wills. If they died intestate in Turkey, their own consul must take possession of their estate and liquidate or administer it for their heirs. Soon after this grant to France other nations of the Occident sought similar privileges. In 1583 Queen Elizabeth after four years of effort succeeded in establishing relations of this nature with the Sultan. This capitulation was afterward many times renewed. The Netherlands received a capitulation in 1609, and Austria in 1615.

In 1673 a new power was granted to France, namely, the exclusive right of protecting under her flag the subjects of sovereigns who had received no capitulations. This gave France prestige in Europe by placing several powers under obligation to her. But in 1675 England succeeded in gaining a right to the protection of other nations jointly with France, so that some states had the option of English or French protection. Austria in 1718 gave the commission for Genoa and Leghorn to use her flag.

No concession made in the capitulations to foreign powers led to greater abuses than this grant of the right to protect the citizens of sovereigns or states without capitulations. The French and English sold to native Greeks and Armenians the privilege of protection by a document which exempted them from paying duties on goods imported. Many of these became rich through this advantage, and were permitted to make a transfer of their privileges for a consideration. Ambassadors became rich through the traffic; one of the French ministers, it is stated in an official report, received more than 400,000 francs from this source, and the English ambassador is said to have received from £2,000 to £3,000 as his share. Russia and Austria abused this right of protection for political ends. Rivals in seeking influence in Moldavia and Wallachia in 1780–82, their consuls competed with each other in granting patents of protection to the citizens of the one country. Austria had by this process more than 200,000 subjects in Moldavia and 60,000 in Wallachia. These latter were later given to Russia. In 1806 in order to embarrass Russia Napoleon
put an end to the abuse and Turkey succeeded in persuading most of the foreign powers to follow his example. Yet the Ottoman empire did not possess many of the great Powers, through their consuls, taking large numbers of Turkish rajahs under their protection under one pretext or another. Many of these formed lawless crowds claiming exemption from police supervision. Many of them were men of wealth whose acts led to frequent diplomatic difficulties. We need not wonder, then, that in 1869 the Sultan issued an irate forbidding the naturalization of his subjects under a foreign government unless they had previously obtained his consent. All treaties since 1803 between Turkey and European powers are based on the capitulations, notably that of 1740. Down to the 19th century foreigners could not hold real property except under borrowed names. Since 1867 they have been allowed to hold it. After 1868 the inviolability of the domicile of a foreigner was limited to residences within nine hours' journey of a consular post. Questions of real property were determined by an Ottoman court. Religious freedom was confirmed in all treaties.

Turkey made repeated efforts to annul the capitulations, without success. It attempted to do so at the Paris Congress of 1856, and again in 1862. But the Powers were unwilling to accede to her request. Germany renounced the capitulations in 1891, but under the most favored nation clause in her treaties she still enjoys the same privileges as formerly. All the Powers except the United States had been gradually yielding on the point of extraterritorial jurisdiction, though the consul of one accused of crime attended the trial, and if there was a denial of justice the case was made one for diplomatic intervention. America's insistence often led to a miscarriage of justice because the Ottoman government refused to furnish witnesses, and permitted the culprit to escape. Another fruitful source of trouble was in respect to Armenians, who take out naturalization papers in America and return home as American citizens. The Sultan has not recognized such naturalization since 1869, unless it has been made with his consent. England has side-stepped this difficulty by stating that the passports of Turkish subjects naturalized in Great Britain that such passports are not valid on the return of the bearer to Turkey.

The Young Turks after their advent to power repeatedly denounced the capitulations and on 11 Nov. 1914 the Ottoman government announced their abolishment. However, until the Western Powers are satisfied that the judicial system in Turkey has undergone reform sufficient to ensure an impartial administration of justice, it is not likely that the Porte will be permitted to ignore these agreements altogether. See Extraterritoriality and consult Moore, John Bassett, 'Digest of International Law' (1906); Angell, J. B., 'Turkish Capitulations' (in American Historical Review, Vol. VI, 1901); McLoughlin, A. C., and Hart, A. B., 'Cyclopedia of American Government' (Vol. I, New York 1914).

CAPIZ, kâ pêth', Philippines, capital of the province of Capiz, situated in the northern part of the island of Panay, four miles from the mouth of the Panay or Capiz River. The river is navigable to the city, and there is also an excellent roadstead at its mouth. There is a large local trade, particularly in rice, and connection by steamer with Manila. Capiz is also a telegraph and military station. Highroads connect the town with Iloilo and Miagao. Pop. 18,525.

CAPLIN, or CAPELIN, a small savory smelt (Mallotus villosus), found in large numbers on the Arctic Coast as far south as Cape Cod. The inhabitants of Labrador catch it in large quantities at certain seasons, and many are dried and exported to Great Britain. The eggs are deposited in very great numbers in the sand along the Arctic slopes, and these, being washed by the wind where they hatch, the fry being washed back into the sea. Adults are also washed ashore in great numbers and perish. In Greenland fossil caplin have been uncovered, enclosed in clay nodules of recent shales.

CAPMANY Y DE MONTALAU, kä-pmän-sē-' mōn-tā-lō, Antonio de, Spanish critic and historian: b. Barcelona, 24 Nov. 1742; d. Cadiz, 14 Nov. 1813. He served in the wars with Portugal in 1762, left the army in 1770 and joined Olavide in his scheme for colonizing and cultivating the Sierra Morena, an enterprise terminated disastrously, and Capmany removed to Madrid, where he was chosen secretary of the Royal Historical Academy of Spain in 1790, and filled several offices in the gift of the government. He traveled in Italy, Germany, France and England. When the French entered Madrid in 1808 he fled to Seville, arriving there destitute and in rags. He was chosen a member of the Cortes of Cadiz, in which capacity he made himself conspicuous by his patriotism and exalted opposition to the new rulers. His works, which enjoy a high reputation in Spain, are numerous; among them are 'Memorias históricas sobre la marina, comercio y artes de la antigua ciudad de Barcelona' (4 vols., 1779-92); 'Cuestiones criticas sobre varios puntos de historia, economica, politica y militar' (1807); 'Teatro historico-critico de la elouencia espanola' (5 vols., 1786-94); 'Diccionario Frances-Español' (1805); 'Código de las costumbres maritimas de Barcelona' (2 vols., 1791). Stating on the communications and negotiations and the 'Código' contain valuable details on the commerce, industry and maritime laws of the Middle Ages. He is equally famed for his philological works, the chief of which are 'Discursos analiticos sobre la formacion y perfeccion de las lenguas, y sobre la castellana en particular' (1776) and 'Filosofia de la eloencia' (1776; London 1812; Gerona 1820). The purity of his language led the Real Academia Española to include his name in the 'Catalogo de Autores ilustres del Idioma,' Consult Sempre y Guarinos, 'Ensayo de una biblioteca espanola' (6 vols., Madrid 1785-89).

CAPNONOMANCY, divination by smoke, one of the modes of divination resorted to by the ancients. They used to burn vervain or some other sacred plant, and observe the form and direction which the smoke took in escaping, and from these circumstances they drew their auguries. Sometimes the smoke of sacrifices was observed instead of that of vervain. When this smoke was thin and transparent and ascended in a straight column, it was considered a good omen; if, on the contrary, it was thick
and opaque, the omen was bad. Another method of acquiring a knowledge of the future by capνonières was to throw the seeds of jasmine or poppy on burning coals, and to observe the smoke which rose from them.

CAPO D’ISTRIA, Austria (the ancient ΕΞΙΔΙΑ, later JUSTINOPOLIS), seaport on the Gulf of Trieste, nine miles south of Trieste, in the crownland of Istria. It is connected with the mainland by a causeway rather more than half a mile long. It is defended by an old fort now going to decay. It contains a cathedral, a lofty edifice, faced in the Venetian style with marble, and containing some fine paintings, sculptures and arabeques. It is the seat of a bishop, and has six monasteries and two nunneries, a gymnasium, several hospitals and a penitentiary. There are manufactories of soap, candles, leather and sea-salt; and there is also a considerable trade in wines, oil and fish. After the 10th century Capo d’Istria belonged, alternately, to the Venetians and Genoese, till finally, in 1478, it succeeded in making itself independent of the latter with the aid of the former. Capo d’Istria now became the capital of Istria, and along with it came into the possession of Austria in 1815. Pop. 11,765 (largely Italian).

CAPO D’ISTRIAS, κα-πό-δες'-τρε-ας, or CAPO D’ISTRIA, Ioannes Antonius, COUNT, Greek statesman: b. Corfu, 11 Feb. 1770; d. Nauplia, 9 Oct. 1831. His family had been settled in Corfu since 1373, but originally came from the Illyrian town of Capo d’Istria. He devoted himself to political life, and in 1809, after holding a high place in the Ionian Islands, entered the diplomatic service of Russia. Here his policy tended to the separation of Greece from Turkey. In 1822 he emerged from a seven years’ presidency of Greece; but whether from his attachment to Russian interests, or from the jealousy and impatience of restraint of the chiefs, he speedily became extremely unpopular. Several of these unruly chiefs belonging to the island of Euboea, in the province of the Euboea, made at last, in the spring of 1831, rose in open rebellion against him, demanding a convocation of the National Assembly, the establishment of the liberty of the press, and the release of certain state prisoners, especially of Petros Maurumichalis, one of their own number whom D’Istrias had arrested and imprisoned. The President obtained the aid of Russia, but before the insurrection could be quelled he was assassinated in a church at Nauplia, by Constantine and George Maurumichalis, the brother and nephew of Petros Maurumichalis. Consult Phillips, ‘The War of Greek Independence’ (1897).

CAPONIERE, κα-πό-νυ-αρ, or CAPONIERE, in fortification, a place covered against the fire of the enemy on the sides, sometimes also above, and serving for the connection of two works or for maintaining an important point. In particular: (1) A passage secured by two parapets, in the form of glacis, which leads through the dry ditch from one work to another; for instance, from the chief wall to the ranges. If danger is apprehended only from one side, and consequently only one parapet is made, it is called a demi-caponière; if it is covered above with hurdles or with wood, it is called a coffer: but this word is often used indifferently for caponière. (2) Small block-houses so located as to fire along a dead angle. Coehorn laid out similar but less useful works below the glacis, and Scharnhorst proposed the use of the name of field-caponières, for the salient angles of field fortification. Caponières are also known as tambours in many recent works on field fortifications. See FORTIFICATION; TAMBOUR.

CAPOTE, κα-πο-τι, Domingo Mendez, Cuban statesman: b. Cárdenas 1863. He was graduated at the University of Havana and became one of the best-known lawyers in Cuba. Subsequently he was a professor in the University of Havana for many years. In December 1895 he joined the insurgents under Gen. Maximo Gomez; became a brigadier-general, and was appointed civil governor of Matanzas and of Las Villas. In November 1897 he was elected Vice-President of the Cuban republic. When the Cuban Constitutional Convention appointed a commission of five members to confer with President McKinley and Secretary Root concerning the future relations of the United States and Cuba, he became its leader. The conference was held in Washington, D. C., in April 1901.

CAPOUL, κα-πουλ, Joseph Amédée Victor, French tenor singer: b. Toulouse, 27 Feb. 1839. He was educated at Paris, and sang there in the Opéra Comique, 1851-72, where he was very popular, especially in his rôle as Gaston de Meillagre in Aubé’s ‘Premier jour de bonheur.’ He has also sung in New York, London, Vienna, Saint Petersburg and other cities, being everywhere very successful. In 1892 he accepted the position of professor of operatic singing at the National Conservatory in New York. In 1898 he took up his residence in Paris, being in great demand as a singing teacher. In 1900 he became stage director at the Grand Opéra.

CAPPADOCIA, κα-πα-δο-σι-α, in antiquity, one of the most important provinces in Asia, once a famous kingdom; in its widest extent bounded west by Lydia, south by Lycaonia and Cilicia and Syria, east by Armenia and north by the Pontus Euxinus. In the period of the Persian government Cappadocia comprehended all the country between the Halys and Euphrates. By the former river it was separated from Phrygia and Paphlagonia; by the latter, from Armenia; therefore the region afterward called Pontus was comprehended in this territory. The Persians divided it, according to Strabo, into two satrapies, which bore the name of Cappadocia Magna, afterward Cappadocia Proper, and Cappadocia Minor, afterward Pontus. This division, however, was not always strictly observed. The Persian satraps governed, at a later time, under the title of kings, and sometimes made themselves independent. At the time of the famous retreat of the 10,000 Greeks, both the Cappadocians seem to have been under the rule of Mithridates I, who had participated in the conspiracy of Cyrus the Younger, but retained his government and became, after the defeat of Cyrus, again dependent upon the kings of Persia. Alexander the Great received tribute from Ariarathes, but the latter’s son did not recognize Alexander’s successors. It changed sides frequently during the civil struggles of Caesar and Pompey, Octavian and Antony and became a Roman prov-
ince in 17 A.D. Cappadocia Magna was a good grazing country, and also well adapted for the cultivation of grain, especially wheat; but wood was scarce. Mazaca, afterward Cæsarea, now Kaisariyyeh, was the residence of the kings of Cappadocia. The war of the Turks with the Franks (White Syræans) is said by Strabo to have been applied to the Cappodocians, as if to distinguish them from the dark Syræans who dwelt on the east of Mount Amanus. The ancient population is at present represented by a few mountains inhabited by the Cappadoci. Some modern geologists connect them with the Hittites. However, there is considerable difference of opinion in regard to their ethnic origin. Consult Chante, Recherches anthropologiques dans l'Asie occidentale (Lyons 1895); Grothe, Meine Vorderasiexpeditionen (Leipzig 1911); Von Luschans and Petersen's Reisen in Lykien (Vienna 1889); Von Luschans, Tachtschdy (in Archiv für Anthropologie 1901).

CAPONI, käp-pō'ni, Gino, Marchese, Italian scholar and historian: b. Florence, 14 Sept. 1792; d. there, 3 Feb. 1876. He traveled widely and devoted much of his life to his studies in spite of the fact that he became blind early in life. Returning to Italy he founded at Florence the Antologia Italiana, which was suppressed in 1832, when he at once founded the Archivio Istorico Italiano. For a short time in 1846 he was at the head of the Tuscan government, attacks by the Radicals causing his temporary retirement to private life. In 1859 he was a member of the Constitutional Convention of Tuscany; he was also a senator of Italy; and in 1862 was at the head of the Historical Commission for Tuscany, Umbria and the Marches. He wrote Storia della repubblica di Firenze (1875), a standard work; and had a part in the preparation of a lexicon by the Accademia della Crusca, and in the editing of texts of Dante's Divine Comedy (Florence 1837). Consult Tabarini, Gino Capponi (Florence 1879), and Von Reumont, Gino Capponi ein Zeit-und Lebensbild (Gotha 1880).

CAPPS, Edward, American philologist: b. 21 Dec. 1866. He was graduated from Illinois College, 1887; took his doctor's degree at Yale, 1890, in Latin; and at the latter place, 1890-92. He was successively associate professor and professor of Greek in the University of Chicago from 1892 to 1907. In the latter year he became professor of classics at Princeton University. Besides a number of philological papers, he has written From Homer to Theocritus (1902); Four Plays of Menander (1910); and sundry other articles in classical philology.

CAPPS, Washington Lee, American naval constructor: b. Portsmouth, Va., 31 Jan. 1864. A graduate of the United States Naval Academy in 1884 he rose by grades to the position of chief constructor of the navy in 1895. After service at the Union Iron Works 1896-98, and at Washington 1899-1901, in 1903 he was appointed chief constructor of the navy with the rank of rear-admiral. Reappointed four years later, he retired in 1910. President Wilson appointed him to represent the United States at the International Maritime Conference in 1913.

CAPRARA, ka-prärà, Giambattista, Cardinal, Italian ecclesiastic: b. Bologna, Italy, 29 May 1733; d. Paris, 21 June 1810. He studied theology, became vice-legate of Ravenna in 1758 under Benedict XIV, and in 1785 was sent by Pius VI to negotiate with the Emperor Joseph on his conduct in relation to Church matters. His remonstrance proved ineffectual, but in 1792 he was appointed a cardinal, shortly afterward a member of the state council, and in 1800 bishop of Jesi. In 1801 he went to Paris as legate of Pius VII, and conducted the negotiations with Napoleon with so much success that the first concordat was speedily concluded. Shortly after he was appointed archbishop of Milan, and in 1805 he crowned Napoleon king of Italy, placing on his head the iron crown of Lombardy. The cardinal left his fortune to the hospital in Milan.

CAPRERA, kä-prärà, a small island to the northeast of Sardinia, and separated from it by a narrow strait. It is six miles long from north to south, and two miles broad. It is fertile, and almost entirely covered with cultivation and is connected with the island of Maddalena by a causeway and drawbridge. It is well known as the ordinary residence of Garibaldi, who after 1854 possessed a dwelling-house on the island, along with a piece of ground which he farmed until his death there 2 June 1882.

CAPRI, kä-pré, Italy, an island in the beautiful Gulf of Naples, which contributes not a little to the charm of this favorite scene of nature. Capri, five miles long and three broad, lies at the entrance of the gulf, and consists of two mountains of limestone, remarkable for their picturesque shape, and a well-cultivated valley. The inhabitants amounting to about 5,000, are occupied in the production of oil and wine, in fishing and in catching quails, which come in immense numbers from Africa to the shores of Italy. Every spot on the island which can be made productive is cultivated. In fact, agriculture all around Naples is in the highest state of perfection. The town of Capri is the seat of a bishop. A high rock separates Capri from the mainland, and the narrow passage, which is reached by 522 steps cut in the rock in 1876. The highest point on the island is Mount Solaro, which rises 1,920 feet above the sea. Capri has a delightful climate and pure air, and is visited annually by over 30,000 tourists. It is a favorite summer resort for the Neapolitans, being distant but 20 miles southwest of their city. The supply of drinking water is far from satisfactory. With the Romans Capri was called Caprea. Augustus obtained it from the Neapolitans in exchange for Ischia, and made it a place of agreeable retreat, but never made use of it. Tibereius spent here the last seven years of his life in degrading voluptuousness and infamous cruelty. The ruins of his palaces are still extant, and other ruins are scattered over the island. The island of Capri is notable for several remarkable caverns or grottoes in its steep, rocky coast. By far the most remarkable of these is unquestionably the celebrated Grotta Azzurra (Blue Grotto), which was discovered by a singular accident in the summer of 1832, an Englishman while bathing having observed
the opening in the rocks which forms the entrance to the grotto, and swam into it. It gets its name from the fact that, while the sun is shining outside, all the objects within the cavern—rocks, water and sand—are tinged with a beautiful blue color, very soft and agreeable to the eye. The cavern is elliptical in form, measuring about 1,200 or 1,300 feet in circumference; its height is about 41 feet with water 48 feet deep, and its roof and sides bristle with stalactites. The blue color with which the grotto is tinged, is produced by the refraction of the rays of light in passing through the water before entering the cave. The blue rays, with those next to them, the violet and the indigo, being the most refrangible, are the only rays that are admitted, the others—red, orange, etc., being dispersed in the water. In another part of the coast there is another grotto which exhibits phenomena precisely similar, except that the objects in this one are clothed with a green instead of a blue color. It is hence called the Grotta Verde (Green Grotto). The English captured the island in 1806 and fortified it, but lost it to the French two years later. They recovered it in 1813 and restored it to King Ferdinand IV of Sicily. Consult Allers, 'Capri' (Münich 1894); Frohlich, 'Commentation the fig swells into a bell and Capri' (Naples 1899); Gregorovius, 'Die Insel Capri' (Leipzig 1897); Weichardt, 'Das Schloss des Tiberius und andere Römerbauten auf Capri' (Leipzig 1900).

CAPRIC ACID. See DEOC ACID.

CAPRICCIO, kǎ-pré’chō (Caprice), is the name applied to a musical composition, in which the composer follows the bent of his humor, the aim being to produce piquant and striking effects. The capriccio may be used with propriety in pieces for exercise, in which the strangest and most difficult figures may be introduced, if they are not at variance with the nature of the instrument or of the voice. A shorter piece of the same nature is often called capriccietto.

CAPRIFICORDUS (Lat. caper, a goat; and cornu, a horn), "the goat" one (the 10th) of the 12 signs of the Zodiac; between Sagittarius and Aquarius; also the corresponding zodiacal constellation, one of Ptolemy's original 48 and designated by the sign ♓, representing the horns of a goat. One of its brightest stars, Alpha, is a wide double, easily separated by the naked eye by anyone with good eyesight. Capricornus is surrounded by Aquila, Aquarius, Piscis Austrinus, Microscopium and Sagittarius. The star was celebrated among the ancients, who regarded it as of good omen, and as marking the southern tropic or winter solstice, whence it was known as "the Southern Gate of the Sun."

CAPRIFICATION, the fertilization of the flowers of the Smyrna fig with pollen derived from the wild fig, or caprifig. From time immemorial it has been the custom of Orientals to break off the fruits of the caprifig, bring them to the edible-fig trees and tie them to the limbs. From the caprifigs thus brought in there issues a minute insect, which, covered with pollen, crawls into the flower receptacles of the edible fig, fertilizes them, and thus produces a crop of seeds and brings them, sub-

sequent ripening of the fruit. It has been shown that the varieties of the wild fig or caprifig are the only ones which contain male organs, while the varieties of the Smyrna fig are exclusively female. In the caprifig there are said to exist in Mediterranean regions three crops of fruit—the spring crop, a summer crop and a third, which remains upon the trees through the winter. The fig-insect (Blatophaga grossorum) over-winters in the third crop, oviposits in the spring crop, develops a generation within it, and is carried to the swelling of a gall-flower (a modified and unfertile female flower), and, issuing from it covered with pollen, enters the young flower receptacles of the young Smyrna fig, which are at that time of the proper size, and makes an attempt to oviposit in the true female flowers, fertilizing them at the same time by means of the pollen adhering to their bodies. The life history of the insect from that time on is not well understood, but the Blatophaga has been known to occur immediately seeking fertilizing crop of figs. The effect of caprification on the young Smyrna figs becomes readily visible within a few days; before the Blatophaga enters the fig the latter is transverse and strongly ribbed, while a few days after fertilization it becomes round and sleek. The male Blatophaga is always wingless. It has no ocelli, and its compound eyes are greatly reduced in size. The fact that the male rarely leaves the fig in which it is hatched might almost be inferred from these facts of winglessness and partial blindness. When this wingless male issues from the seed-like gall in which it is contained, it seeks a female gall in the interior of the same fig, gnaws a small hole through its cortex, inserts its extremely long, almost telescopic, abdominal extremity through the hole, and fertilizes the female. The male subsequently, with her powerful jaws, gnaws the top of the gall off and emerges, crawling around the interior of the fig, and eventually forcing her way through the ostiolum, almost invisible to the naked eye, of young figs, which she enters, and should the fig entered prove to be a caprifig, lays her eggs at the base of as many flowers as she can find, and then dies. Should the fig entered, however, be a Smyrna fig, either through the fact of the caprifig from which she has been hung in the branches of a Smyrna-fig tree, or from the fact that she has flown to an adjoining Smyrna-fig tree, she walks around among the female flowers seeking for a proper place to oviposit. It is this futile, wandering search, when her body is covered with pollen from the caprifigs, that produces the extensive and almost perfect fertilization of the entire number of female flowers. The young larva is a delicate little maggot curved upon itself and showing no visible segmentation. In the full-grown larva the segments are more apparent, and with the growth of the larva the gall at the base of the male florets becomes hard, and greatly resembles a seed, turning light brown in color. The male and the female pupa each occupies a greater portion of the interior of the gall. Consult 'The Fig' (United States Department of Agriculture, Washington 1901).

Although figs are raised in California and
the Southern States they have long been inferior to the Smyrna fig, the standard kind of commerce, which owes its peculiar flavor to the number of ripe seeds which it contains. These seeds are obtained only by the process described above, and the United States Department of Agriculture devoted much attention to capitulation, with a view to the development of the American fig industry. The fig insects were introduced in California in 1899 and have greatly benefited the fig industry. It is now possible to produce Smyrna figs of the fine quality. About 250 tons were produced in 1915. See Fig.

CAPRIMULGIDE, kä-prî-mûl'jî-dé, the goat-suckers, better nightjars (so called) from a superstition regarding their habits), a family of birds of puzzling affinities, but nearest to the swifts (Cypselidae), with which, and the humming-birds, they are often considered to constitute an order, Macrophiles. The family is characterized by a small bill, enormous gape, fringed with elongated, stiff bristles, elongated tail of 10 soft rectrices, long pointed wings, very small feet with the middle pedal digit usually longer than any other, and very bare plumage. Two subfamilies, the Caprimulginae or true goatsuckers, and the Nyctibiinae of tropical America, are recognized, to which the oil-birds (Steatornis), and Podargus and its allies, are sometimes added as two more. The family is nearly cosmopolitan, and comprises 12 or 15 genera and perhaps 100 species, all birds of more or less crepuscular habits, which catch insects on the wing like swallows. The "night-hawk" and "whip-poor-will" are the common species of the eastern United States.

CAPRIVI, kâ-prô-vî, Georg Leo, Graf von, sometimes called Caprivi de Caprara de Montecuculi, German soldier and statesman; second Chancellor of the German Empire: b. Charlottenburg, 24 Feb. 1831; d. Skyren, 6 Feb. 1899. He studied in Berlin; entered the army in 1849; fought in the campaigns of 1864 and 1866; and was appointed major and member of the general staff of the First Army Corps. In the Franco-German War of 1870 he was chief of staff to the 10th Army Corps, served with distinction at Metz and Orleans and in the Loire campaigns. In 1882 he became commander of the 30th Infantry Division at Metz and in 1883–88 he was at the head of the Admiralty. This appointment was made by Bismarck and caused great dissatisfaction among the officers of the navy. Caprivi, however, soon mastered the details of the department, and the successful reorganization of the navy upon its present basis is in great part due to his capable and energetic direction. In 1888 he became commander of his old army corps. Hence he was removed, on the fall of Bismarck, in 1890, to become Imperial Chancellor and Prussian Prime Minister. His principal measures were the army bills of 1892 and 1893, and the commercial treaty with Russia in 1894, in which year he retired. He was made a count in 1891. His position as Bismarck's successor was one of peculiar difficulty and trial, but he showed himself an able and faithful administrator. Like Bismarck he was a man of giant stature, of great mental power and with an incredible capacity for work. Con-sult "Die Reden des Grafen von Caprivi . . . 1883–93" (Berlin 1894).

CAPROIC ACID. See HEXOIC ACID.

CAPRON, Allen Kissam, American military officer (son of Allyn Capron, g.v.): b. Brooklyn, N. Y., 24 June 1871; d. Las Guasimas, Cuba, 24 June 1898. He enlisted as a private (1890), and rose to a second lieutenantcy (1893), joining the "Rough Riders" on the outbreak of the war with Spain. He was made a captain for bravery, and was the first American army officer who fell in that war.

CAPRON, Allyn, American soldier: b. Tampa, Fla., 27 Aug. 1846; d. Fort Myer, Va., 18 Sept. 1898. He was graduated at West Point, 1867, and entered the 1st Artillery, receiving his captaincy 4 Dec. 1888. During the Sioux campaign of 1890 he made a brilliant record at the battles of Wounded Knee and Drexel Mission. During the war with Spain, 1898, he opened the fight at El Caney, Cuba, and shattered the first flagstaff in Santiago. During this campaign he was taken ill with typhoid fever, and succumbed to its attack. He was a fine mathematician, and a recognized authority on traveling distances and very human pluck. Erastus Allyn Capron, was killed at Churu-busco, in the Mexican War, 20 Aug. 1847.

CAPRYLIC ACID, or HEXOIC ACID (CH₃(CH₂)₄OOH), an acid found in butter and cocoa-nut oil. It is obtained from the latter by saponification with caustic potash and distillation with dilute sulphuric acid. It is a fermentation product of butyric acid. It has an oily appearance and an unpleasant odor resembling sweat.

CAPSICIN, a name given to two apparently different substances. One described by Bracconnot, obtained from chili pepper, is an acrid oil or oleoresin, of a red-brown color, the vapor of which excites sneezing and coughing. It is probably a mixture of different bodies. The other is a resinoid substance obtained from cayenne pepper; it is brown with a golden tint, has the consistency of tar, an aromatic smell and melts at 100°, and is used in America as a powerful stimulant in influenza, fever, indigestion and other disorders, and externally as a rubefacient. Quite recently a volatile alkaloid, also called capsicin, has been obtained from chili pepper, by first removing the acrid resin, then making the fluid alkaline, and extracting with petroleum spirit. On evaporating, a substance is produced with an odor like that of conia. It is distinguished from conia and nicotine by a variety of reactions.

CAPSICUM, a genus of plants of the order Solanaceae, consisting of annual or biennial plants, bearing membranous pods containing several seeds, noted for their hot, pungent qualities. C. annuum, a native of South America, furnishes the fruits known as chilies. These, in well preserved, and other species, are used to form cayenne pepper. For this purpose the ripe fruits are dried in the sun or in an oven, and then ground to powder, which is mixed with a large quantity of wheat flour. The mixed powder is then turned into cakes or dried and kept until they become as hard as biscuit, and are then ground and sifted. Cayenne pepper is largely adulterated with red lead and other substances. C. frutescens is the dried ripe fruit of C. fastigio-
CAPTAIN — CAPTAIN 573

**CAPSULELE, in botany,** a dry fruit containing several seeds, sometimes a large number, and opening of itself by means of valves or pores when it comes to maturity. According as it contains one, two, three or more cells, the capsule is called unilocular, bilocular, trilocular, etc., and when it has many cells it is called multilocular.

**In anatomy** a capsule is a mass of fibrous, connective tissue cells surrounding or supporting an organ, either as a bag, as is the case in the kidneys; or as a framework, as in the liver. The capsule is usually an integral portion of the structure of an organ.

**In bacteriology,** the term is applied to the thin envelope which surrounds certain microorganisms.

**In pharmacy** gelatin capsules are widely used for purposes of rendering medicines tasteless.

**CAPTAIN.** This is one of those many words derived from the Latin of the Middle Ages, and now to be found in all the different idioms of Europe. Captain comes from the Latin capitans, from capitum, head, and signified, first, a governor of a province, who in the first half of the Middle Ages was usually a military man. Thus the word captain soon came to be used chiefly to denote a high, or rather the highest, military officer. In the latter part of the Middle Ages, when armies were not yet so regularly divided and subdivided as at the present time, captains were the commanders of those small bodies of which the armies consisted. These were generally collected by their commander, who entered with his company into the service where most pay or most booty could be obtained. The practice of waging war by troops collected in this manner prevailed to the greatest extent in Italy, where the continual quarrels of the numerous small states afforded ample employment to the unsettled and the dissolve. These companies play an important part in the history of the Middle Ages, particularly that of the two centuries preceding the Reformation, and had a very important influence on the manners and morals of the south of Europe.

**CAPTAIN, in modern armies,** is the commander of a company of foot, a battery of artillery, or a squadron of horse, or a staff-officer of equivalent rank. In England companies and batteries are often commanded by majors. In the United States cavalry a captain commands a troop, and a major a squadron of four troops. In the United States army the captain nominates the non-commissioned officers of his company who are appointed by the colonel of the regiment; and from the sergeants he selects the first sergeant, mess-sergeant and supply-sergeant.

**CAPTAIN, in the navy,** an officer commanding a ship of war or a staff officer of equivalent rank. The naval captain is next in rank above the commander, and in the United States ranks with a colonel in the army.

**CAPTAIN-GENERAL,** the commander-in-chief of an army or of all the military forces of a country. In France it was an ancient title which conferred an almost unlimited power on the person who possessed it, as he commanded. But it never corresponded to that of generalissimo except in the case of the Duke of Savoy, in 1635, in the

**CAPTAIN.** This is one of those many words derived from the Latin of the Middle Ages, and now to be found in all the different idioms of Europe. Captain comes from the Latin capitans, from capitum, head, and signified, first, a governor of a province, who in the first half of the Middle Ages was usually a military man. Thus the word captain soon came to be used chiefly to denote a high, or rather the highest, military officer. In the latter part of the Middle Ages, when armies were not yet so regularly divided and subdivided as at the present time, captains were the commanders of those small bodies of which the armies consisted. These were generally collected by their commander, who entered with his company into the service where most pay or most booty could be obtained. The practice of waging war by troops collected in this manner prevailed to the greatest extent in Italy, where the continual quarrels of the numerous small states afforded ample employment to the unsettled and the dissolve. These companies play an important part in the history of the Middle Ages, particularly that of the two centuries preceding the Reformation, and had a very important influence on the manners and morals of the south of Europe.

**CAPTAIN, in modern armies,** is the commander of a company of foot, a battery of artillery, or a squadron of horse, or a staff-officer of equivalent rank. In England companies and batteries are often commanded by majors. In the United States cavalry a captain commands a troop, and a major a squadron of four troops. In the United States army the captain nominates the non-commissioned officers of his company who are appointed by the colonel of the regiment; and from the sergeants he selects the first sergeant, mess-sergeant and supply-sergeant.

**CAPTAIN, in the navy,** an officer commanding a ship of war or a staff officer of equivalent rank. The naval captain is next in rank above the commander, and in the United States ranks with a colonel in the army.

**CAPTAIN-GENERAL,** the commander-in-chief of an army or of all the military forces of a country. In France it was an ancient title which conferred an almost unlimited power on the person who possessed it, as he commanded. But it never corresponded to that of generalissimo except in the case of the Duke of Savoy, in 1635, in the

**CAPTAIN.** This is one of those many words derived from the Latin of the Middle Ages, and now to be found in all the different idioms of Europe. Captain comes from the Latin capitans, from capitum, head, and signified, first, a governor of a province, who in the first half of the Middle Ages was usually a military man. Thus the word captain soon came to be used chiefly to denote a high, or rather the highest, military officer. In the latter part of the Middle Ages, when armies were not yet so regularly divided and subdivided as at the present time, captains were the commanders of those small bodies of which the armies consisted. These were generally collected by their commander, who entered with his company into the service where most pay or most booty could be obtained. The practice of waging war by troops collected in this manner prevailed to the greatest extent in Italy, where the continual quarrels of the numerous small states afforded ample employment to the unsettled and the dissolve. These companies play an important part in the history of the Middle Ages, particularly that of the two centuries preceding the Reformation, and had a very important influence on the manners and morals of the south of Europe.

**CAPTAIN, in modern armies,** is the commander of a company of foot, a battery of artillery, or a squadron of horse, or a staff-officer of equivalent rank. In England companies and batteries are often commanded by majors. In the United States cavalry a captain commands a troop, and a major a squadron of four troops. In the United States army the captain nominates the non-commissioned officers of his company who are appointed by the colonel of the regiment; and from the sergeants he selects the first sergeant, mess-sergeant and supply-sergeant.

**CAPTAIN, in the navy,** an officer commanding a ship of war or a staff officer of equivalent rank. The naval captain is next in rank above the commander, and in the United States ranks with a colonel in the army.

**CAPTAIN-GENERAL,** the commander-in-chief of an army or of all the military forces of a country. In France it was an ancient title which conferred an almost unlimited power on the person who possessed it, as he commanded. But it never corresponded to that of generalissimo except in the case of the Duke of Savoy, in 1635, in the
CAPTAIN—CAPUANA

time of Louis XIII. The title is not in use at present, nor would it agree with the existing orsoni beyond reach. In Spain the rank of a captain-general corresponds with that of a marshal of France, the captain-general having command of an army or army corps. The title was also given to the head of a province in the Spanish colonies in South America, which was divided into vice-royalties and captain-generalships (capitanias-generales); thus Chile used to be a captain-generalship. The captains-general were not placed under the viceroy, but accountable only to the king through the council of the Indies. The captain-general of Venezuela, for instance, had no connection with the viceroy of New Granada. They decided, in the last instance, on all legislative, judicial and military affairs, and presided in the real audiencia. The time during which these governors remained in power was limited to a few years, probably in order to prevent them from becoming too powerful. The consequence was, that the colonies were oppressed the more to enrich the governors, for rich every one was when he left his office.

CAPTAIN of a merchant ship, he who has the direction of a ship, her crew, landing, etc. In small vessels he is more ordinarily called master, which indeed is the correct title.

CAPTION, in law, signifies the heading or part of a legal instrument such as an indictment or commission, which states when, where and by what authority it is executed. In Scotch law it signifies a warrant of imprisonment issued against a party to enforce an obligation, being now confined to a warrant served upon a party who has illegally retained papers in a lawsuit that had been borrowed by him, and intended to compel the return of the papers. The word is now not used with any other signification in Great Britain; it is never employed to denote the heading of, for instance, a newspaper article.

CAPTVI, cap-té-'vê ('The Captives'), a comedy of Plautus, declared by Lessing to be the best piece that had ever been put upon the stage. Such an estimate, even from so great a literary critic, savors rather of enthusiasm than of judgment. But the play has unusual merits. The plot, while simple, is very closely woven; the deception and its disastrous discovery, upon which the action turns, are handled to a certain extent in the spirit of tragedy; and the portrayal of character is so sympathetic that the interest of the audience is aroused almost equally for the deceived and for the deceived. Plautus himself, both in the prologue and in the epilogue, dwells upon the elevation of tone which distinguishes this play from the usual run, and expresses his regret that playwrights should seek few comedies, such as this, through which good men may be made better. This conception of the function of comedy is very rare indeed in Plautus, whose chief concern was to make his plays amusing but not necessarily edifying. In 'The Captives' the moral lesson is the more impressively taught because the hero has known only the life, and of the dissipation in Spain, stolen from home in early childhood. But this slave has the soul of a gentleman, and no scene in the play is greater than that in which, after the discovery of his real status, he fearlessly defends his loyalty to the master, now transformed for him by all that has imperilled his own life. There is a vivid translation in the 'Loeb Classical Library' by Paul Nixon, 'Plautus, Volume I' (New York 1916). Consult also the excellent chapters on Plautus in Sellers W. Youthful Shakespeare of the Republic' (3d ed., reissued, Oxford 1908), and Duff, J. W., 'A Literary History of Rome' (2d ed., London 1910).

NELSON G. McCREA.

CAPUA, ká-poo-á, Italy, city in the province of Caserta, 18 miles north of Naples, on the Volturno, which is crossed by a handsome bridge. The district is very fertile, but somewhat unhealthy. It is the seat of an archbishopric, and was the principal fortress that covered the approach to Naples from the north. It was in consequence of great importance to the former kingdom of Naples. It has two magnificent gates, three principal streets, two handsome squares and three public fountains. The town is dirty and badly built. The principal public buildings are the cathedral with a cupola supported by 18 columns, entirely modernized; the church of the Annunciation; the governor's palace, the town-hall, a museum with many ancient works of art, etc. The ancient city was situated two and a half miles southeast from the modern town, which was built from its ruins on the site of the ancient city by the Lombards in the 9th century. The site is now occupied by a considerable town called Santa-Maria-di-Capoa-Vetere. The ancient Capua, one of the finest and most agreeable cities of Italy, was of such extent as to be compared to Rome and Carthage. Hannibal wintered at ancient Capua after the battle of Cannae, and thus not only lost time, but also is commonly said to have rendered his army unfit to follow up the advantage he had gained. It was a favorite place of resort of the Romans, on account of its agreeable situation and its healthy climate; and many existing ruins attest its ancient splendor. In 456 a.d. it was devastated by the Vandals under Genseric, and in 840 the Saracens completely destroyed it. The Torre Mignana inside, and the Capella de' Morti outside, then commemorated the bloody attack on Capua in 1501 by Cesar Borgia. Not far from the city is the field where the soldiers of Garibaldi and of Piedmont defeated King Francis II of Naples, 1 Oct. 1860. Pop. 13,319.

CAPUANA, ká-poo-ánā Luigi, Italian poet, novelist and critic: b. Mineo, Sicily, 27 May 1839. Having devoted himself to journalism, he settled in Florence in 1864, where he wrote dramatic criticisms; from 1868 until 1877 he lived in his native town, then in Milan, again as a journalist. In 1902 he became professor at Catania. With Verga he stands at the head of the Sicilian group of 'realists' who, with their vivid portrayal of Italian regional life, represent one of the most virile branches of Italian fiction. His best-known work is 'Giacinta' (1879), a naturalistic novel. Besides this he has published several volumes of short stories, of which 'Amorale' (1881): 'Homo' (1883); and two collections of charming fairy tales: 'Once upon a Time' (1882) and 'Fairy Land' (1883). A curious
CAUCHIN — CAR BUILDING INDUSTRY

CAPUS, kə-puː (Vincent Marie), Alfred, French litterateur; b. 25 Nov. 1835. He was educated at Aix-en-Provence and at the Lycée Condorcet, Paris. He was intended for the engineering profession and to this end received a technical training. His tastes, however, turned him to literature; he entered the journalistic field as member of the staff of Figaro. He soon became known as a masterful critic and satirist. He published "Qui perd gagne" in 1890; "Faux départ" (1891); "Monseigneur veut rire" (1893); "Années d'aventures" (1895). These novels, while very successful, have been overshadowed by his dramas, in which his genius is best revealed, and which in 1914 led to his selection as a member of the French Academy. The plays are "Brignol et sa fille" (1895); "L'Innocent," with Alphonse Alais (1896); "Rosine" (1897); "Mariage bourgeois" (1898); "Les marris de Léontine" (1900); "La veine" (1901); "La petite fonctionnaire" (1901); "Les deux écoles" (1902); "La châtelaine" (1902); "L'Adversaire," with Emmanuel Arène (1903); "Roméo et Juliette" (1904); "Monseigneur Pigéon" (1905); "L'Agonie," with Descaves (1906); "Hélène Ardouin" (1913). He also published "L'Institut de beauté," and "Notre époque et le théâtre."

CAPUT MORTUUM (Latin), literally, a dead head; a fanciful term much used by the old chemists to denote the residuum of chemicals when all their volatile matters had escaped; hence the word is figuratively used of anything from which all that rendered it valuable has been taken away. It is used in historical research in this sense.

CAPUTIATI, kə-puːt-iːti (from Lat. caput, head), a Christian sect which arose in France in the 12th century, and so called because they wore as a distinguishing badge on their heads a leaden image of the Virgin Mary. They advocated liberty, equality and the abolition of all civil government. Hugo, bishop of Auxerre, was compelled to use military force to suppress them.

CAPYBARA, kə-pə-bərə, an aquatic rodent (Hydrochoerus capybara), of the family Cavi- dae, native to South America. It is the largest rodent known, being four feet long, and weighing nearly 100 pounds. It has a brown coat, a heavy flat head, small pig-like eyes and ears, and a blunt muzzle. Its feet are supplied with hoof-like claws, and its tail, unlike that of most rodents, is very short. The animal is herbivorous, browsing on grass along river banks, and often creating havoc in sugar plantations. It is awkward on land, but swims and dives well, and can remain under water a long time. The flesh is edible, except that of very old males. It is known throughout Spanish South America as capichona, but is called water hog and water horse in British Guiana. Consult "Proceedings of Zoological Society of London" (1894).

CARABAO, kə-raː-bəʊ, a small variety of water buffalo (B. Bubalus) found in the Philippines. See BUFFALO.

CAR BUILDING INDUSTRY. The memory of men still living is sufficiently elastic to stretch back to the beginnings of steam roads in this country, and to comprehend the various changes by which the modern railway has become a highly organized and elaborately
CAR BUILDING INDUSTRY

The fact that passenger trains, by displacing stages, threw out of use many of those vehicles, coupled with the other fact that the stage owners, submitting to the inevitable, often became railroad promoters, furnishes a reason why the early masters of transportation both used the stage-coach body as a matter of economy, and also built their new cars on the model in which the conveniences of travel had been most highly developed. The first passenger-coach used in Pennsylvania in 1832 was a stage-coach slightly enlarged. To be sure, the early print show that in 1830 Peter Cooper's first locomotive hauled an open boat-shaped car from Baltimore to Ellicott's Mills, on the Baltimore & Ohio Railroad; but this model must have been adopted for economy's sake, because in 1833 that railroad placed in service the Ohio, a car, stage-coach in shape, with seats on top as well as inside.

As President Mendes Cohen well observed in his address before the American Society of Civil Engineers in 1892, the first important modifications in the vehicle were concentrated on the speed developed in the locomotive. Naturally the wheels first demanded attention. The names of four men are connected with early wheel improvement. Mr. Knight improved the shape of the tread and flange; John Edgar and Ross Winans developed the chord features; and Phineas Davis further improved and perfected the wheel by altering the disposition of the metal in the tread and the angle of the flange, and by introducing within the cast-iron wheel a rib of five-eighths or three-quarters of an inch round iron both permitted the chill and added strength to the wheel. Mr. Winans' shops turned out thousands of these wheels for use not only in this country, but also in Germany and Switzerland. From 30,000 to 50,000 miles represented the capabilities of a Winans wheel.

With increased speed came the need for increased steadiness, and it occurred to Ross Winans that by adopting the device of the bogie, or swiveling truck used in the transportation of freight, he could build a riding passenger-car. A bogie-truck is a pair of wheels, or more commonly two pairs of wheels, connected by a framework, and having a very strong vertical central king-pin, on which one end of a locomotive or railroad car is supported. The device facilitates rounding the curves of a railway track. In 1833 Mr. Winans constructed three long houses on wheels, each capable of seating 60 passengers. Having patented his invention, he was confronted by the fact that the principle he had used was one that had been utilized frequently on trams and finally the courts annulled the patent.

We now know that prior to 1830 England had three bogie-engines at work; that in 1831 Stephenson's John Bull, built for the Camden & Amboy road, was made into a bogie after it reached this country; that Horatio Allen used a bogie-engine on the South Carolina Railroad in 1832, the same year in which the bogie-left on this coast came into use on the Mohawk & Hudson Railroad. Moreover, the bogie principle was patented in England in 1812. Yet it is certain that the American passenger-car of to-day originated with the three passenger-coaches built in Ross Winans' shop.
CAR BUILDING INDUSTRY

In 1833, England discarded the bogie principle for engines in 1830, and did not return to it until 1836, and yet it was, to this day has now adopted the bogie for passenger- or freight-cars. In 1889, the Paris, Lyons & Mediterranean Railway adopted the bogie for certain passenger-cars; and in 1895 the Great Western Railway of England began to experiment with the same. In America, the Winans passenger-coach almost immediately supplanted everywhere the stage-coach form, which England still retains in a modified shape, excepting only on the Pullman cars, introduced into that country between 1873 and 1874. With us not only the passenger-cars, but the baggage, mail and freight-cars, all were placed on swiveling trucks.

That the early railroads of this country were designed to carry passengers rather than freight is to be seen by their reports. The Baltimore & Ohio road, from 1 Jan. 1831 to 1 October carried over its 13 miles of track 5,931 tons of freight and 81,905 passengers; and so late as 1839 the Camden & Amboy carried only 13,943 passengers placed between its ends 47,475 tons of freight. In fact, the railroads as freight carriers could not compete with the canals, which in those days were the traffic routes. In 1831 the Tuscawora & Port Carbon Railroad could not meet canal rates by 39½ cents per ton, the railway charges being 40 cents, plus a toll of 15 cents per ton, while the canal rates were 10½ cents, plus 5 cents toll.

Mr. John Kirby, describing from memory the freight-car of 1848, says that it was the same square box it is to-day; but capacity was from 6 to 10 tons; the roof was covered with cotton duck painted and sanded. The hot sun cracked this covering and let the water in on the freight, an annoyance common also to passenger-coaches of that day. Few freight-cars were used in New York State at that date, the Erie Canal being sufficient for summer freight. Wood was the universal fuel, so there was no coal transportation. Wooden brakeheads were used, and it required three men to turn the screw that pressed the wheels on and off the axles. The ripping of planks was done by hand, as was also the dressing up; and when one man had tools to grind, a fellow-workman turned the stone. Carpenters and car builders of the earlier experience commanded $1.12½ a day wages.

Viewed from the standpoint of to-day, the passenger-car of the early fifties, built at a cost of about $2,000, was a combination of in-conveniences. The cast-iron stove in the centre of the car broiled those who immediately sat around it, while the unfortunate one seat removed from its satanic glare shivered and froze. In summer the dust was intolerable, and, notwithstanding elaborate devices for ventilation, the dust problem did not begin to solved before the appearance of the monitor roof or clearstory in 1860. Hot-water heating and the abolition of the deadly car-stove came with the Pullmans.

In 1856 Capt. (Later Sir) Douglas Galton, of the British railways, was sent to America to investigate our railways. His report to the Lords of the Privy Council for Trade gives a straightforward and unbiased account of his investigations. Perhaps there is extant no other report which so comprehensively discusses the railway situation in the United States about that date.

"The practice of constructing railways [in America] in a hasty and imperfect manner," says Captain Galton, "has led to the adoption of a form of rolling stock capable of adapting itself to the inequalities of the road; it is also constructed on the principle of diminishing the useless weight carried in a train. The principle is that the body of the car is carried on two four-wheeled trucks, to which the body is attached by means of a pintle in the centre, the weight resting on small rollers at each side. The framing of the truck is supported on springs resting on the axles, and the pintle and rollers are fixed to a cross-beam which is attached by springs to the main framing; so that between the body of the car and the axles are a double set of springs. India-rubber springs are in general use, but they often become hard; consequently sometimes steel springs are used, with great advantage. Any side movement which might result from the slight play allowed to the cross-beam is counteracted by springs for the pin on which the iron hoop attached to the framing passes under the axle on each side, so as to support the axle in case it should break."

The bearings Captain Galton found not unlike those used in England, but the use of oil as a lubricator was novel. He was told that under favorable circumstances the oil in an axle-box needed to be renewed but once a month; but that it was difficult to obtain good oil. The wheels were of cast-iron, with chilled tires; they were from 30 to 36 inches in diameter, weighed rather more than 500 pounds and were without spokes. When made by the best makers they would run from 60,000 to 80,000 miles before the tires were worn, and they cost from $14.50 to $17.00 each. The iron used in making wheels was of very superior quality; and so great was the practical skill required that but three firms in the United States could be relied on to furnish wheels of the first grade.

The most approved form of draw-bar was continuous under the car, and was attached to the elliptic springs, acting in both directions. The iron shackle was in general use, but some railways preferred an oak shackle 18 inches long, 2 inches thick and 6 inches broad. This block was bound with an iron band divided on each side at the centre, so that a car on leaving the rails would break the shackle transversely.

Already the automatic coupler for freight-cars was prefigured in a device by which the pin in the bumper of one of the cars was supported by means of a ball, so that the shackle of the on-coming car pushed back this ball and let the pin fall into its place. All passenger-cars and most freight-cars were supplied with brakes; and the Philadelphia & Reading Railroad was endeavoring to anticipate the day of train-brakes by an invention whereby a sudden check in the speed of the engine applied the brakes to the wheels of all the cars. The toilet, the car-stove and the ice-water tank all had established their certain virtue.

On the Illinois Central, between Cairo and Dubuque, some of the cars were filled with compartments in which the backs of seats turned up and so formed two tiers of berths

Vol. 5 — 37
CAR BUILDING INDUSTRY

or sofas, for the accommodation of persons who might wish to lie down and were willing to pay for the privilege. The passenger-car had attained a length of 60 feet, though the 30- and 45-foot cars were more common; the baggage-cars, with their compartments for mail and express, were 30 feet long, and the freight-cars from 28 to 30 feet long. In those days the freight-cars were constructed more strongly than were the passenger-coaches; a Baltimore & Ohio freight-car 28 feet long, and with a capacity of nine tons, itself weighed six tons.

Of necessity progress in car-building had to wait for the development of the railroads. The original roads were not constructed as through lines between the larger cities, but as connecting-links between natural waterways, answering to the portages or carrying places of the old days when commerce was conducted in canoes. Often built as the result of local or State enterprise, a short line was sufficient to use up the scanty capital available, or to exhaust the willingness of the people to be taxed for improvements. The great systems of to-day represent survivals of the fittest early ventures, and development according to environment. Thus the various small roads which traversed the present main line of the New York Central were not consolidated until 1833, and the same year the roads between Philadelphia and Pittsburgh came under one control. So late as 1862 there were five separate companies operating the lines between Lake Erie and Lake Michigan; and as each road had a gauge of its own, it was regarded as a triumph in car construction when freight-cars of compromise gauge were built to run over all five roads. In 1869, however, the Lake Shore & Michigan Southern lines came under a single head.

When in October 1865 a combination was formed among eight railroads to establish a fast freight line between New York and Boston and Chicago, the maximum difference in the gauges of the several lines was one inch; and this was compensated for by a broad tread wheel. Each company contributed a number of cars proportionate to its mileage, one car for every three (afterward increased to one for every two) miles. In 1865 the quota of the Lake Shore & Northern Indiana was 179 cars; while in 1894 that road's quota of Red Line cars was 2,200.

In 1862 the United States government conducted the greatest railroad business known up to that time. With headquarters at Nashville, the government operated 1,500 miles of road with 18,000 men, whose monthly wages amounted to $2,200,000. The rolling stock consisted of 271 engines and 3,000 cars. Not entirely new locomotives were built, but the 3,000 men employed in the locomotive repair shops pieced out fully equipped engines founded on a serviceable boiler or a pair of sound driving-wheels. Among the triumphs of the national car-shops were, first, a headquarters car for General Thomas, the car being 50 feet long, iron-plated, and provided with a kitchen, a dining room, a sleeping apartment and an office; and, secondly, the hospital trains, in which the jars and jolts were reduced to a minimum. It was during the year 1864 that General McCallum and Colonel Wyman came to Detroit and summoned the managers of the Michigan Car Company to stop all building then in progress and to work solely for the government. They gave a contract for a number of box- and flat-cars to be operated on Southern roads; and inasmuch as the gauge differed from that of the Northern roads, the new cars were loaded on flat cars and sent to Cincinnati. The government officials fixed the price of the cars and made payment in certificates, some of which the company exchanged for materials, and the remainder were held until money could be obtained for them.

The end-building had been developed by the war, together with the labor conditions and the paper-money issues, combined to raise the price of cars; so that the standard freight-car of 1864, a car 28 feet long and with a capacity of 10 tons, cost $1,000 or more. About 30 years later a car 34 feet long, with a capacity of 30 tons, and provided with automatic couplers, air-brakes and other improvements, could be purchased for about $300. When the war ended the managers of railroads were faced with a heavy drain in both freight and passenger traffic, due to the disbanding of the armies. Money was not plentiful, cars were very expensive and the mania for extending lines into new territory had begun. Under these conditions the roads began a systematic program of building both freight and passenger cars, mostly for builders or car-trust companies. The Michigan Car Company was probably the first to make contracts on a car-loaning basis; be that as it may, this company had at one time a loan of 150 cars to its own, and a loan of 700 cars, payment being made according to the car's mileage. With better times and better credit the roads began to buy cars for cash or on long time, as was most convenient; and loaning freight-cars to railroads on a mileage basis was practically discontinued. A majority of the refrigerators, however, continued to be owned by private parties and run on a mileage basis. The reduction in the mileage rate practically killed the business of private owners for they did not much more than pay for the repairs.

In the winter of 1868-69 the first Westinghouse air-brake was used on the Steubenville accommodation train running on the Pittsburgh, Cincinnati & Saint Louis Railroad. The Pennsylvania road adopted it, and since the automatic feature was added, in 1873, it has come into almost universal use on passenger-trains, while by far the larger proportion of new freight-cars built are equipped with it. In 1877, a train of 50 freight-cars made a triumphal tour of the great lines, and by repeated tests, under varying conditions, proved that the Westinghouse brake can stop a train in one-tenth the space required by the hand-brake. In 1867, Colonel Miller placed his patent plunger, buffer, and coupler on three cars building in the shops at Adrian, Mich.; and with great rapidity the dangerous old platform, with its loose link coupling, disappeared. In 1890 the Post-Office Department began to demand more room from the railroad companies by year, the mail-cars were increased from 17 to 20 feet in length, then to 35, and finally to 60 feet.

The interchange of cars among the various roads made it necessary to adopt standards in car construction, in order to facilitate repairs.
CAR BUILDING INDUSTRY

579
to cars when away from the home road. Some authority, too, was needed to settle disputes between roads, arising from charges for repair of broken track and signals, and, in general, to keep the work of construction fully abreast of the times. The Master Car Builders' Association, organized in 1867, amply fills this need; and the reports of its annual meetings contain the latest word on all subjects relating to car-building. Its arbitration committee also acts as a court of conciliation for the various roads.

Car-building has undergone a revolution during the past 25 years, due in part to increased demands on the railways, and in part to improved methods of construction. The use of wood as a material is markedly less, and the use of steel is steadily increasing, so that both passenger and freight cars of recent date seem to be of better and more durable type than ever before. Modern cars are a development, built for service and long life, and to meet the numerous demands of shippers and the traveling public. The parlor car has developed into an entire series of sumptuous apartments on wheels, but lacking in the accommodations for those who want comfort and luxury in their journeys, and are willing to pay for them; the difference in the needs of the commuters around a large city and of passengers going long distances has called for a differentiation in passenger cars. For express and mail service there has been developed a line of cars that enable business to be properly handled en route, avoiding delays at terminals. For freight transportation there have been put into use literally hundreds of styles of cars, adapted to convenient carrying of special goods of widely varying nature.

Passenger Cars.—The standard passenger car is termed a day coach, and is 78 feet long, 10 wide and 14½ high; it weighs 112,000 pounds, is practically all steel, and has 40 double seats, automatic windows, racks for coats, grips, etc., a toilet, ice-water supply, Pintsch gas or electric lights and minor conveniences. If for through traffic it has a vestibule, so that the public can enter the car without exposure to the weather. The construction cost is about $10,000. For suburban service, non-vestibuled cars are used, and many have cane-covered seats that do not hold the dust. There were 3,500 passenger cars in use on the steam railways of the United States in 1915, or about one car to five miles of track.

A cheaper grade of passenger car is known as the emigrant or tourist car, equivalent to the second-class car of Europe. Many companies use their older wood-en cars for this service, but the cars built for this traffic are simply a cheap grade of car, with usually cane-covered seats, fewer conveniences and slight decoration.

The standard sleeping car is 72½ feet long, of all-steel construction, has 24 berths and weighs 152,000 pounds. It is increasingly common to build them with two to a dozen separate compartments, like state-rooms on a steamboat, each compartment having two to four berths and toilet conveniences. Some sleepers are built with several compartments and the remainder of the car constructed as a parlor and observation compartment, so that a party or small number of passengers can have the conveniences of both bedrooms and drawing-room. The form of sleeper that is alterable to a day coach, the berths folding away, appears to be less popular than formerly.

Observation cars, with extra large windows, and often with individual seats, have come into considerable use in transcontinental travel. The term parlor car is now used by the railways for a day coach, handsomely fitted up with individual chairs, and for which an extra charge is made. Sometimes these are called chair cars. The terms palace car and drawing-room car are going into disuse.

Smoking cars are run on practically all passenger trains, and have usually imitation leather covered seats. Sometimes they are provided with card tables. The cafe car is not only a smoker, but card-room and bar-room combined—a high-class cafe or saloon on wheels. The dining car is fitted up with a kitchen, and the passengers are expected to have their meals at fixed tables to take their meals, or sometimes the service is extended through the train. The buffet car is fitted up for a simpler class of meals and a less extended menu than the dining car. The business car is fitted up for business writing, reading, writing tables, desks and stationery for correspondence; also typists and stenographers in attendance. The private car, built for railway officials and people who wish to travel in luxurious seclusion, is fitted up as a living suite of rooms, with hotel conveniences and elegant appointments.

Sleeping Car.—Improved railway travel may be said to date from 1836, when the first sleeping car was offered to the traveling public. In that year the Cumberland Valley Railroad of Pennsylvania installed a sleeping-car service between Harrisburg and Chambersburg. This first sleeping car was an adaptation of an ordinary day coach to sleeping requirements. It was divided into four compartments in each of which three bunks were built against one side of the car, and in the rear of the car were provided a towel, basin and water. No bed clothes were furnished and the weary passengers fully dressed reclined on rough mattresses with blankets and shawls drawn over them. Candles furnished the light, and the heat was supplied by box stoves burning wood or sometimes coal. Other similar cars were adopted soon after by various railroads and for a number of years these cars found an appreciative patronage, and temporarily served the patrons of the railroads. Improvements were negligible and the only justification for such cars existed in the ability of the passengers to recline at length during the long night hours. The first fundamental improvement came in 1858 when George Mortimer Pullman put several revolutionizing ideas to practical test by remodelling two Chicago and Alton coaches into sleeping cars. In these cars he inaugurated his invention of upper berth construction by means of which the upper berth might be closed in the day time and also serve as a receptacle for bedding. Other improvements were worked out and tested, and from these first experiments were drawn the plans from which the first cars entirely constructed by him were made. These cars were popular with the traveling public but in 1864 Mr. Pullman put in service a model car, entirely built according to his own ideas, at the
then unprecedented cost of $18,000. This car, named the Pioneer, had improved truck springs, but the improvement in springing was not enough; it was a foot wider and two and a half feet higher than any car then in service. Other cars of the same type were soon put in service and were universally admired. Within a comparatively short period railroads adopted new and superior accommodations to the popular demand for the increased comfort and safety offered by the new type of sleeping cars. Various companies began the building of sleeping and parlor cars in competition with the Pullman Company, incorporated in 1867. The Gates Sleeping Car Company and the Wagner Palace Car Company were for a time serious competitors and from 1870 to 1890 the Wagner and Pullman companies were the strongest in the field. Through the control of better patents and in course of competition the Pullman Company soon became the only important sleeping-car company in the United States. Its business grew rapidly and now it builds and operates sleeping cars throughout the United States, Canada, and Mexico on all important lines, and also builds other types of cars, both freight and express, for Europe, South America, and England. A few railway companies operate their own sleeping cars. The general arrangement between the Pullman Company and the railroad companies, over whose lines it operates its cars, differs widely as between different companies. Where the average number of passengers traveling in Pullman cars per car mile is very high, as it is on the line between New York and the West, the railway company pays the Pullman Company something for carrying the car on its trains. Where the passenger traffic in Pullman cars per car mile is very light the railway company pays a rental to the Pullman Company for its cars. The Pullman service has kept in advance in service and efficiency of all its competitors. Its standard has always been high. It was a pioneer in installing electric lighting and steam heating systems in its cars and many other devices tending to increased comfort and safety have been adopted and it is ever ready to adopt new ideas in the construction and equipment of its cars. Its service is superior to that on railways which operate their own sleeping cars, its cars are now constructed entirely of steel and are especially designed to secure the safety and comfort of passengers. Their rates were found to be entirely reasonable after an exhaustive investigation by the Interstate Commerce Commission in 1910. To-day the Pullman Company operates 7,500 cars over 137 railroads or a total of 223,480 miles of track. To operate these cars over 10,000 car employees are required, while 7,000 more are employed to keep the cars in repair, and maintain them in a clean and sanitary condition.

**Baggage and Combination Cars.**—The railways define a baggage car as one built for carrying trunks and passengers' baggage and having large side doors. There are usually end doors and a few windows. Where trains have short runs and consequently light demands for baggage, it is common to combine the smoking and baggage car in one, with a bulkhead dividing the compartments. Sometimes the baggage and mail are combined in a similar way, and a few cars are made with three compartments, for baggage, mail and smoking. Baggage compartments are also sometimes built as parts of solid roofs.

**Freight Cars.**—There were 2,500,000 freight cars in service on the steam railways of the United States in 1917, and about 125,000 new cars of this class are being built annually. This is only a small increase in number, but the increase in carrying capacity is probably 6 to 8 per cent, owing to the larger size of the modern-built cars. Much of the recent construction is pressed steel, that is, soft steel plates for the car-bodies, sheared to size at the rolling mill, and pressed into form and riveted and bolted together. The larger steel plates of simple form are cold-pressed, those of intricate form and small parts are mostly hot-pressed. The bolsters and framework of the trucks are also now mostly made of steel by machine forging, the tie-rods and attachments are mostly steel and the wheels are either iron or steel. The notion that some car-wheels are of paper is a pleasing fiction, originating with some newspaper reporter. Its only basis is the use of grease, water, and other things placed between the two parts of a car-wheel to deaden the "ringing" or noise of vibration. These all-steel cars involve higher first cost than the wooden cars, but being made in larger sizes and having much greater life, are coming more and more into use. The typical old-fashioned wooden box car is 40 feet long, 8 feet 10 inches wide and 8 feet high, weighs 36,000 pounds and cost, before the war, $1,300, having a carrying capacity of 60,000 pounds. The all-steel cars Pullman Company capacities ranging from 80,000 to 120,000 pounds.

Box cars are ventilated when designed for carrying food stuffs and double-walled or insulated for fruit transportation. When provided with icing conveniences they are termed refrigerator cars, and are specially built for carrying meat, beer, produce, etc. Stock cars are built with stalls for horses and cattle and pens for sheep, swine or poultry. Flat cars are the cheapest railway cars, many of them costing not more than $800. They consist simply of the running gear, trucks, with a deck and brakes. Keepers are inserted in the sides of the deck in which uprights can be inserted to keep the load from falling off. They are used for carrying stone, ore, lumber, glass, ordnance andanyakind offreight that will bear exposure to the weather. When provided with low sides they are termed gondolas, and may be used for conveying coal, coke, etc. Hopper cars are built with slanting bottoms and gates below, so that the contents can be discharged by opening the gates; two hoppers to a car is a common construction. Dump cars are usually arranged to tip sideways so as to slide off the load. These are used for conveying earth, gravel and ballast for road filling. Tank cars are built for oil, acids and other fluids that have to be handled in large quantities, and they are usually cylindrical in form.

**Special Service Cars.**—The steam railways of the United States have in service 125,000 cars designed for their own use. A few are owned twice as great as the total of passenger cars. Perhaps the most familiar of these to the public is the freight caboose, seen on the tail end of railway trains, and serving to house the
crew and carry their tools and supplies. There are repair cars with a general equipment of tools — traveling machine shops. Wrecking cars are supplied with very heavy and powerful cranes for lifting wrecked cars or locomotives. There are ditching cars for excavating, track-layer cars and an entire series of other special cars used for modern scientific railway construction and repair work. The snow-removal car plows, some of which have great rotating heads, are among those most readily noted by the public.

The smallest of all railway cars is the push-car, made of two pairs of wheels and a slight deck, designed for the convenience of track-workers. Next comes the handcar, with a hand lever and fixed crank to the wheels. A few active men can operate one for a short distance at almost railway speed. A new form of inspection car is an improvement on the handcar, having a small gasoline engine for winter service.

Street Railway Cars.—Since power was applied to street railway cars they have increased in size and developed along lines similar to steam railway practice. The earlier electric cars were short and mounted on a single truck. As traffic developed the two-truck car came in, and is now the accepted type. Open cars with cross seats and a running board are favored for summer traffic, but the standard car has seats of railway pattern, the tendency being to substitute reversible seats for two persons in place of longitudinal side seats. The front and rear platforms are now generally enclosed, to protect the motorman and conductor from the weather. Electric light and heat are commonly supplied, though in some the carstove burning coal is still in use. Since 1910, the "pay as you enter" type of car has become popular with the companies and passengers are detained in a rear vestibule until they have deposited their fares in a box.

All steel car construction is preferred, and in some cases is obligatory by law. These cars have both side and end doors, for the quick transfer of passengers. Elevated electric railway cars for city traffic follow closely the lines of development of steam passenger cars, but are of lighter construction.

Features of Construction.—The typical modern railway car is the day coach. It has spokeless wheels of either cast iron, wrought iron or cast steel, with a steel tire shrunk on. The wheels are fixed solid on the axles in pairs, and two pairs of wheels form a truck, though eight-wheeled trucks have been built. The body of the car rests on and is fixed to each truck by a central pin on which it turns. There are rolls and springs for steadying the car and preventing "jaming." Between the trucks, under the deck, is located the air-brake, consisting of a reservoir of compressed air, a brake-cylinder and connections. (See Air-BRAKE). Cars are provided with couplers at the end of the car and are coupled. The couplers are now generally in use, which hook the cars together when gently bumped. The car roof has a raised central section called the clearrain- stock, in which ventilators are placed, so that air circulation may be maintained without drafts. The car-seats have been the subject of hundreds of patents, but the accepted form is now a metal framed y, which, by means of levers for reversing the back, which is ordinarily high. Both seat and back are cushioned, most commonly covered with plush. See RAILWAY.

Statistics.—There are 110 establishments in the United States manufacturing strictly railway cars. The American Car and Foundry Company and the Pressed Steel Car Company are the largest, but a large business is done by the Southern Car and Foundry Company, Standard Steel Car Company, the Pullman Company, Haskell & Barker Car Company and Western Steel Car and Foundry Company. Each railway has its own repair shops and many of these make cars, their output being about 15 per cent of the total production. In addition, a number of foundries and machine works make some cars as a sideline, their production being about 9 per cent of the total. All these shops have a total capacity of nearly 300,000 cars a year, but rarely have more than 125,000 been made in a year. In 1909 the production was 101,243 cars, of which 1,601 were passenger, and 603 were for electrical use on trunk line terminals, and 2,089 were for street railways. It is estimated that there are in use now (1917) 2,800,000 cars of all sorts on the trunk line railways of the United States.

Railway cars are made by so many different concerns that are also engaged in other manufacturing that it is impossible to state with accuracy the capital invested in the business. The total manufacture, while given as 135,000, valued at $165,000,000 in the 1914 census, is really much higher, because the large railways all maintain very large repair shops, and often cars are made of two-thirds new and classed as "repairs." These repair shops in 1914 added a value of $245,000,000 to the rolling stock of the United States railways. Pennsylvania is the leading State in the steam-car building industry, with $93,600,000 production in 1914; Illinois was next with $41,496,000, Ohio third with $33,286,000; and New York produced $30,883,000. Indiana and California follow, but in other States the production is small.

CHARLES H. COCHRANE,
Author of "Modern Industrial Progress."

CARABAS, Marquis of, the exalted personage who figures in Perrault's story of 'Le Chat Botté' ("Puss in Boots"). The name is often applied to an extremely conservative aristocrat. In Disraeli's 'Vivian Grey' the Marquis of Clancaride is satirized as the Marquis of Carabas.

CARABIDAE, the family of Coleoptera, comprising the ground-beetles. See GROUND BEETLES.

CARABINE, or CARBINE. See SMALL ARMS.

CARABOBO, a state of Venezuela, bounded on the north by the Caribbean Sea; area, 2,984 square miles. The capital is Valencia, and the chief port Puerto Cabello. Coffee, cacao and sugar are cultivated. The village of Carabobo,
20 miles southwest of Valencia, was the scene of the battle fought 24 June 1821, which was decisive of the independence of Colombia.

CARACAL, a lynx-like wild cat of Africa and southern Asia, slender in form and usually red-brown in color. See Lynx.

CARACALLA, Roman emperor: b. Lyons 188 A.D.; d. 217. His real name was MARCUS AURELIUSantonius Bassianus, and he was the eldest son of Septimius Severus. He accompanied his father on his expeditions, notably to Britain; and on the death of his father he succeeded to the throne with his brother, Antochus and Gordian, whom he speedily murdered. To effect his own security upward of 20,000 other victims were butchered. In 212 he gave citizenship to all free inhabitants of the empire, his motive being to increase revenue from the taxes on inheritances. His reign as emperor was occupied largely with military campaigns. Among the buildings of Caracalla in Rome the baths—Thermes Caracalla—near Porta Capena, were most celebrated, and their ruins are still magnificent. He was himself baptized by Macrinus, the pretorian prefect, near Edessa, in 217.

CARACARA, a genus of large carrion-eating hawks of the tropical parts of America, with black and white plumage, the head somewhat crested, legs long and naked, and the general aspect vulture-like. They have increased greatly with the spread of the cattle-raising industry in South America, and have proved of much service as scavengers about the ranches and villages. They erect nests of sticks in trees or cliffs and lay only two eggs, heavily blotched and speckled. The gadget most strictly applies Polyborus cheriy, which is found from Venezuela to Texas and southern California. Another prominent species is the carancho (F. thorax), numerous and well known all over Brazil and Argentina. Compare Chimaera, Consult Selater and Hudson, 'Argentine Ornithology' (Vol. II, London 1889); Darwin, 'A Naturalist's Voyage' (London 1860).

CARACAS, Venezuela, city and capital of the United States of Venezuela, was founded in 1567 by Pedro de la Luna, who called the city Santiago de Leon. But in popular usage a more distinctive name was adopted—that of the Caracas tribe of Indians, formerly inhabiting the valley in which the city is built. It was twice destroyed—in 1555, when it was sacked by the English, under Preston, and in 1766, when the French put it to sack and pillage. But it continued to grow, and played an important part in the war of independence against Spain, claiming the honor of having been the first colony in South America that succeeded in throwing off the yoke of Spain. Caracas was the birthplace of Simon Bolivar. The great earthquake of 1812 killed 12,000 persons and laid half the city in ruins. The last serious shock occurred in 1590. Its altitude being about 3,000 feet above sea-level, the climate is generally mild and agreeable, the temperature seldom rising above 82° F. (with 84.2 as a maximum), or falling below 65° F. (with a minimum of 48.2). Toward the end of December the temperature is lowest, and it is highest from June to September. Mean temperature, 66.2° F., lat. 10° 32' N., long. 67° 4' 45" W.

The streets cross each other at right angles, running due east and west, or north and south, and the principal thoroughfares are paved with stone, and have sidewalks of cement. The Capitol building occupies an entire block of more than two acres. It includes the halls in which both chambers of the national Congress hold their sessions. The rooms of the High Federal Court and the Departments of Public Instruction and the Interior are in the galleries on the east and west sides of the capitol. La Casa Amarilla (the Yellow House), official residence of the President of the republic, is situated west of the Plaza Bolivar. On the north side of the same square is the main post-office. Near-by are the archbishop's palace, the cathedral and the municipal palace. Opposite the southern facade of the capitol are the university buildings (Gothic architecture, with interior gardens); the old temple of San Francisco and the Exposition Palace, the western wing of which contains the Bolivar Museum, the headquarters of the Academy of History, and the corresponding branch of the Spanish Royal Academy. The national library and museum are housed by the university. Other characteristic buildings are: The National Palace, the Masonic Temple, the three markets, the National Benevolent Institute, the Arsenal, the Institute of Arts and Trades and the Municipal Theatre. Besides the Plaza Bolivar, the principal public squares are the Washington, Pantheon and Fifth of July (Independence Day). The cathedral, dating from 1614, the Basilica de Santa Ana, and the Santa Capilla, are noteworthy among the churches of the city. Interesting relics of the heroes of the struggle for liberty, Miranda, Bolivar and Paz, are shown in the National Museum. There are several promenades (called Iron Bridge, Paradise Avenue and Independence) and among the places of amusement are a Plaza de Toros, baseball grounds and a bicycle park. An important institution supported by the government is the Vargas Hospital. The Linares Hospital for children is maintained by private contributions. Leading clubs are the Union, German, Italian and Agricultural. Caracas does little manufacturing except that is the centre of the export trade of the district, which produces cacao, coffee, tobacco, etc. Street railways are controlled by the Caracas and Bolivar companies. The city has cheap telephone service, furnished by two companies, and is lit by gas and electricity. All telegraph lines throughout the republic are owned by the government. Four lines of railway start at Caracas, three of which are designed to place the capital in communication with the interior, while the most important runs to Port La Guaira. Pop. including the six suburban parishes making up the Federal district is about 90,000.

CARACCIOLI, kā-rā-chō'ī-le, Francesco, Italian admiral: b. Naples 1752; d. 29 June 1799. He was distinguished in the Neapolitan service, but entered the service of the Parthenopean Republic set up by the Neapolitans in 1799, and repelled a Sicilian-English fleet. When Ruffo took Naples, Caraccioli was arrested, and being tried by court-martial was condemned to death, and hanged at the yard-arm of a Neapolitan frigate; his corpse was thrown into the sea. The court-martial was ordered by Nelson, to whom the King had given
command of the Neapolitan navy. Nelson is said to have been influenced in his decision by the notorious Lady Hamilton.

**CARACTACUS**, British king. He was a son of Cunobelin, King of the Trinovantes, and in 43 A.D., when Plautius landed, was at the head of the Catuvellauni. Plautius and his lieutenant, Vespasian, who afterward became emperor, defeated the British forces under Caractacus on several occasions, the chief battle probably taking place about Wallingford. When the Romans had pushed well down the Thames the Emperor Claudius arrived and took part in further military operations, but his stay was a very short one. Caractacus now established himself in South Wales among the Silures, whence he took every opportunity of harassing the Romans. In 47 A.D. Plautius was replaced by Ostorius Scapula, and that commander completely defeated Caractacus in a battle somewhere about Shropshire, probably at Caer Caradoc. The wife, daughter and brothers of the British leader were captured, and Caractacus himself fled to the country of the Brigantes in the north, only to be delivered up by their Queen, Cartama, into the hands of the Romans. He was taken to Rome and made to take part in a triumphal procession. Here he was fed before the Emperor Claudius and an assembly of the people. According to Tacitus ("Annales," book XII, chapter XXXVII) when he came to the seat of the Emperor he stopped and addressed him, and so won upon the monarch by his noble behavior and pathetic speech that the other pardoned him. According to the Welsh trad, he lived four years longer, and his children became Christians and introduced Christianity into Britain. He is introduced among the dramatis personae of Beaumont and Fletcher's play, "Bonducar."}

**CARADOC GROUP.** See BALA Beds.

**CARADOC SANDSTONE**, the name given by Murchison to a thickness of about 4,500 feet of sandstones, shales, grits and sandstones on the border between England and Wales, which he made a separate series. Subsequent investigation has shown that the Caradoc series is of the same age as the Bala, and the series is sometimes called Bala and Caradoc by geologists. The Gravelpits and Bala beds are fossiliferous and have been used largely as the basis of comparison in geological study. The rocks are of the uppermost division of the Ordovician system of England. See ORDOVICIAN.

**CARAFE, kâ-râf**, the French name for an ordinary glass bottle or decanter for holding drinking water.

**CARAFFA**, a celebrated Neapolitan family, which has produced several distinguished commanders and statesmen: 1. OLIVIERO, b. 1406; d. Rome, 1511. He was made a cardinal by Pope Paul II in 1467. Sixtius IV appointed him his legate to Alfonso of Naples, and in 1472 made him admiral of his fleet against the Turks, from whom he captured Smyrna, and the port of Sata in Asia Minor. 2. CAPO, b. 1717; d. 1801. He served first in the Netherlands under the Spaniards, then entered the order of Malta, and was made a cardinal by his uncle Pope Paul IV, who, for his sake, stripped the Colonias of their possessions. This involved them in a war with Philip of Spain, but the result proved favorable to the Caraffa family. Paul IV who succeeded Pius IV appointed a commission of high cardinals who tried Carlo and on 3 March 1561 put him to death for high treason. 3. ANTONIO, b. Naples 1538; d. 1591. He was made cardinal by Pius V, and entrusted with the superintendence of the congregation for the revision of the Bible, and an exposition of the canons of the Council of Trent. Under Gregory XIII he became librarian of the Vatican. He translated Theodoret's Commentaries on the Psalms, and the Orations of Gregory Nazianzus from Greek into Latin. 4. ANTONIO, another member of the family, distinguished himself in Hungary in the service of Austria, but made himself universally hated by his cruelty; d. Vienna 1693.

**CARAMBOLA**, the fruit of an East Indian tree of the same genus as the bilimbi, the *Averrhoa Carambola*, order Oxalidaceae. It is of the size and shape of a duck's egg, of an agreeable acidulous flavor. The fruit is yellow and smooth with five longitudinal ribs. In British India it is used for flavoring sherbets, tarts, etc., and is known as the caromandel gooseberry. The leaves are characterized by an extreme irritability and a tendency to display the phenomenon of sleep in

**CARAMEL.** When sugar is gradually heated, it loses water and other substances, and is converted into a dark mass with a characteristic smell and taste. All materials containing sugar form the same substance, such as coffee, malt, chicory. This is crude caramel, which is used in cookery as a coloring and flavoring ingredient. It is a mixture of several bodies, of which three have been described: Carame- lane, a brown bitter body, soluble in water; Carameline, a dark brown body, also soluble in water, and possessed of great tinctorial power; and Caramel, a black substance, of intense coloring power, which exists both in a soluble and insoluble modification. A kind of brown soft candy is also called caramel.

**CARAN D'ACHE, kä'rôn d'âsh** (French for lead-pencil), or POIRE, EMANUEL, French caricaturist and artist; b. Moscow, Russia, 1858; d. Paris, 26 Feb. 1936. His education was to be a military painter, but he is best known for his series of pictorial anecdotes contributed to La Vie Parisienne, La Caricature, le Figaro illustré, le Chat Noir, etc. Besides illustrating Bemadsky's "Prince Korako-koff" and other celebrated books he published several albums of sketches, the "Carnet de chèques" depicting the Panama scandals; "Album de croquis militaires et d'histoire sans lendemain"; "Histoire de Marlborough," etc. Consult Spielmann, M. H., "Introduction to Works of Caran d'Ache" (London 1898).

**CARANGIDÆ, kä-rang'-id-de**, a family of marine fishes, the pompanos. Among the more widely known members of the family are the leather jackets, pilot fishes, amber fishes, runners, horse mackerels, crevalles, moonfishes and pompanos. There are about 200 species in the family, and nearly all are good for food. They abound in the warmer seas, and many of them are remarkable for their graceful or strange forms.

**CARAPA**, a small genus of tropical trees of the family Meliaceae, with mostly imparipinnate leaves and regular flowers. A South
American species (C. guanensis) is a fine large tree, whose bark is in repute as a febrifuge. Oil made from its seeds (called carap-oil or crab-oil) is used for lamps, and masts of ships are made from its trunk. The wood is called crab-wood. The oil of the African species (C. procera), called condi, kundah or talicoona oil, is used by the negroes for making soap and anointing their bodies in order to protect them against insects. The oil of the South American carapa is used for the same purpose also.

**CARAPACE, the upper part of the hard shell or case in which reptiles—turtles, tortoises, etc.—belonging to the order of the Chelonia are enclosed, the lower part being called plastron. The same name is also given to the upper part of the shell of the Crustacea, and to the case enclosing certain of the Injursoria (qq.v.).**

**CARAPEAUA, kâ-râ-pâ-gwâ, Paraguay, interior town 37 miles southeast of Asuncion. Settled in 1785 it is situated in a fertile country, producing cotton, tobacco, corn, sugar cane and manioc. It has modern public buildings, including a church and two schools. Pop., 13,000.**

**CARAQUET, kâ-râ-keh, Canada, port of entry, Gloucester County, New Brunswick, on the Bay of Chaleur and on the Caraket Railroad. The settlement consists of Upper and Lower Caraquet and is noted for its fisheries. Pop., 4621.**

**CARAT, derives its name from qirâšt, which in Arabic signifies the pod of the Erythrina abysinica, the coral tree of Abyssinia, the seeds of which have, from time immemorial, been used in the East in weighing gold, because they never vary in weight when once dry. It is a weight of three and a sixth troy grains, used in weighing pearls and precious stones, and also serves to express the relative fineness of gold. Twenty-four carats being assumed as the standard of gold perfectly free from alloy, every specimen, in proportion as it falls short of this purity, has a fineness of less than 24 carats—for example, if the alloy amounts to a sixth of the whole, it is 20 carats fine; or to a fourth, it is 18 carats fine.**

**CARAUSIUS, kâ-rôsht-ûs, Roman general: b. among the Menapii, in Gallia Belgica. He was sent by the Emperor Maximian to defend the Atlantic coasts against the Franks and Saxons; but being suspected of permitting those pirates to commit their ravages in order to increase his own plunder when he afterward captured their vessels, and foreseeing that he was likely to fall into disgrace, he landed in Britain and had himself proclaimed emperor by his legions (287 A.D.). In this province he was able to maintain himself six years by guarding the English Channel with his fleet. He became co-emperor with Diocletian and Maximian in 289, but under Constantine his reign came to an end. A diptyque fell in 293 and in the same year he was assassinated by one of his officers named Allectus. Consult Gibbon, 'Decline and Fall' (Vol. I, chap. XIII, ed. by Bury, with notes, London 1896); Webb, 'The Reign and Coinage of Carausius' (London 1908).**

**CARAVACA, Spain, town in the province of Murcia, about 40 miles west by north of the town of Murcia. It occupies the side of a hill crowned by an ancient castle and overlooking the river Caravaca, here crossed by a stone bridge; is well built and has a handsome town-house and church, the latter with a lofty tower and some good sculptures and paintings. Its trade is chiefly in cattle, grain and manufactures of woolen and hempen goods, paper, soap, earthen and copper ware, chocolate and oil. Pop. 17,349.**

**CARAVAGGIO, kâ-râ-vâd-jô, Michel-Angelo Merino (or Meriali) da, Italian painter: b. Caravaggio, in the Milanese, 1569; d. near Porto Ercole 1609. He was at first a journeyman mason, but soon applied himself to the study of painting, studied in Milan and Venice, and afterward went to Rome where he was for a time associated with Cesare d'Arpino and Prospero Orsi, and distinguished himself as the founder of the naturalistic school. His characteristic traits are vigor and truth of form, curo, combined with excellent coloring. He was fond of introducing broad and deep masses of shade, whereby a great effect is given to the light. To aid him in producing this effect the room in which he worked was illuminated by a skylight, and the figures painted black. He excelled in the painting of naked figures. His faults are obvious. Narrow and servile imitation of nature was his highest aim. Annibale Caracci and Domenichino were, perhaps, less distinguished than Caravaggio during their lives, but after their death were ranked higher because, without neglecting coloring and the study of nature, they aimed at correctness of design and dignity of conception. His violent character involved him in many difficulties. He died in consequence of wounds received in a quarrel. The painters who have been influenced by him most are Manfredi, Valentini, Guido Reni, Guercino, Domenichino and Ribera, called Espagnole. His first paintings are genre pieces, of which the best are the 'Card Players' in the Scuola di San Paolo, Rome, and the 'Gipsy Fortune Teller' in the Palazzo dei Conservatori, on the Capitoline Hill. The works of his later life are large religious pieces, which aroused great opposition in Rome because he used to portray the saints as common types of humanity, 'Saint Matthew Writing the Gospel,' and the 'Death of Mary' are among those which were removed from the churches in Rome; the former being now in the Berlin Museum and the latter in the Louvre. The most renowned of his religious works and his generally accepted masterpiece is the 'Burial of Christ' now in the Vatican, but originally painted for the church of Santa Maria in Trastevere. The facial expressions of all of the figures are remarkable for the depth of emotion portrayed. It shows his execution and harmonious grouping. Accuracy and realism are used in the representation of the figure of Christ. Numerous pieces ascribed to him are to be found in the various galleries of Europe, notably at Berlin and London; but it is doubtful if all are originals. Among his portraits may be mentioned one of himself in the Uffizi at Florence, and that of the Grand Master of the Knights of Malta (Louvre). His influence as a master of realism in painting was widely diffused over Italy; and the Dutch Naturalists profited much by the careful study.
of his works. Consult Baglione, 'Le vite de' pittori' (Rome 1649); Fornone, 'Michelangelo Caravaggio' (Bergamo 1907).

CARAVAGGIO. Italy, town and commune in Lombardy in the province of Bergamo, 24 miles east of Milan, on the Gera d'Adda. A steam tramway connects it with Monza and Milan. It is celebrated as the birthplace of the two great painters, Poldoro Caldara and Michelangelo Merisi, both called da Caravaggio. It formerly was surrounded by walls and protected by a strong castle. The site of its ancient fortified walls is now occupied by promenades, but the moat remains and is spanned by six bridges. Its principal church has some good paintings, and a lofty campanile. The commune is famous for its melons. Pop. about 10,000.

CARAVAGGIO DA POLIDORO, Italian painter: b. Caravaggio 1495; d. 1543. His real name was CALDARA, but he was surnamed CARAVAGGIO from his birthplace. He went to Rome at the age of 17 and carried bricks at first for the masons who worked in the Vatican. He first felt a great desire to become a painter from seeing Giovanni da Udine and the other painters who were occupied in the Vatican. He formed a close friendship with Maturino of Florence, who availed him with his advice. Caldara soon surpassed him, and exerted himself to introduce improvements in drawing, having always in view the antiquities. Raphael employed him in the galleries of the Vatican where he painted, under his direction, several excellent friezes. At Messina he executed an oil-painting, representing Christ bearing the cross (1534; in the Museum of Naples), which contains a number of beautiful figures, and proves his ability to treat the most elevated subjects. He has approached more than any one to the style and the manner of the ancients, particularly in imitating their bas-reliefs. His figures are correct, well distributed and arranged; the positions are natural, the heads full of expression and character. It is evident that he would have acquired great celebrity if he had undertaken greater works. He applied himself to the chiaroscuro, particularly to that kind of it which is called sgrafitto. He showed, also, much taste in landscapes. At the sack of Rome in 1527 he fled to Naples, and on his return from that place to Rome, in 1543, he was murdered by his demonic. Consult Bertolotti, 'Artisti lombardi a Roma' (Milan 1881).

CARAVAN, a Persian word, used to denote large companies which travel together in Asia and Africa for the sake of security from robbers, having in view, principally, trade or pilgrimages. Such companies often have more than 1,000 camels to carry their baggage and their goods. These walk in single file, and the line is often four or five miles long. To avoid the excessive heat, they travel mostly early in the morning. As every Mohammedan is supposed to visit the tomb of Mohammed once at least during his life, caravans of pilgrims go to Mecca every year from various places of meeting. Of the various caravans which proceed to Mecca every year, the most important has always been the Syrian. The place at which it meets is Damascus, and here the pilgrims and merchants assemble many weeks before the day of departure, which is always fixed according to the season of the year in which the feast of Bairam occurs, the pilgrims requiring to be at Mecca on the day of the feast. As these caravans serve mercantile as well as religious purposes, Mecca, on the arrival of the caravan, resembles a great fair, and this fair is indeed the most important in all the East. The journey from Damascus to Mecca and back occupies about four months. The leader of such a caravan to Mecca, who carries with him a cannon for protection, is called Emir-el-Hadi (Prince of the Pilgrims). Trading caravans choose one of their own number for a leader, whom they call Karwan Bashl. Besides a leader, each caravan has its servants, guides, military escort and priests. Obedience is enforced by the leader in the matter of internal discipline, but in trafficking, each member is independent. Much information on the subject of caravans is to be found in the travels of Niebur, who made many journeys with them, and describes them, as is well known, minutely and faithfully.

CARAVANSARI, in the East, a sort of inn, situated in countries where there are no cities or villages for a considerable extent, to furnish travelers with a shelter. The building is generally spacious, enclosing a courtyard containing a fountain or well. Small unfurnished rooms constitute the interior, poorly ventilated and lighted. The interior court is entered at a large gateway, through which loaded camels may pass. Some of them are built with much splendor, though they are generally unfurnished, and the traveler is obliged to bring with him not only his bed and carpet, but also all his provisions and necessaries. In many, the hospitality is gratuitous. It is common for a pious Mohammedan to establish, during his life or by will, one or several of such caravansaries.

This kind of benevolence is considered peculiarly agreeable to the Deity, and promotive of the eternal happiness of the founder. Sometimes persons are kept in these establishments to guide the caravans for some distance. See KHAN.

CARAVEL, formerly the name of different kinds of vessels; one used in Portugal of 100 to 150 tons burden; another, a small lateen-rigged fishing vessel used on the coasts of Normandy and Picardy of 10 to 15 tons; and a third, a large Turkish ship of war.

CARAWALA, kâ-ra-wâlâ, a large vaper (Hypnale nepa) of Ceylon and southern India, numerous, and greatly dreaded by the natives, especially those who work in the pineapple plantations. It is of small size, rarely exceeding 20 inches in length, and has the extremity of the upturned muzzle covered with scales. Its poison has the peculiarity of not affecting the system until several days after the bite, so that proper remedies immediately applied will counteract the venom.

CARAWAY, an umbelliferous biennial plant (Carum carvi), with a tapering fleshy root, a furrowed stem, and white or pinkish flowers. It produces a well-known seed used in confectionery, and from which a carminative oil is extracted and a spirit cordial distilled. The plants found wild in America are the descendants of naturalized European plants.
that have escaped from cultivation. It is largely grown in England, on strong and rich clays, and is sometimes sown with beans, but more usually with coriander and teasel, or coriander alone. After the coriander, which is only a preparatory crop, has been removed the plants of the caraway are singed out and repeatedly hoed and cleaved. It is cut about the beginning of July, and produces on an average about 900 pounds per acre. It is a favorite crop with the Dutch. The volatile oils in caraway render it of much service in medicine. The action of these oils is to stimulate peristalsis and thus overcome flatulence. They are further antiseptic and check excessive intestinal putrefaction. They act also as mild local anesthetics and are useful in nausea and vomiting.

CARAYON, kâ-râ-yôn, Auguste, French historian: b. Saumur, 31 March 1813; d. Poitiers, 15 May 1874. A distinguished Jesuit, he wrote "First Canadian Missions of the Jesuits" (1864); "Banishment of the Jesuits from Louisiana" (1865), and similar studies.

CARBAJAL, kâr-bâ-hâl', Francisco, Spanish soldier: b. Alavaro 1464; d. near Cuco, 10 April 1548. He served in the army in 1486, 1489, and Mexico in 1528; and when Pizarro appealed for help against the Inca uprising he was one of the force sent by Cortez to Peru. He was marshal under Vaca de Castro, in the battle of Chupas. He later took office under Pedro Pizarro, in the war against Diego Centeno and De la Gasca. At first he was triumphant over Centeno in the Collao, but at the battle of Sacasahuana, 8 April 1528, he was taken prisoner with Pizarro and executed. Because of his remarkable activity in this campaign, despite his years, he was known as the "Demon of the Andes." He was extremely cruel in his treatment of his enemies, but was not less noted for his humor which never failed him, not even at his own execution. (Cortez, M.:"History of Peru"

CARBALLO, kâr-bôl-yô, Spain, a town in the province of Coruña and near the coast of the northwestern extremity of the peninsula. It has warm mineral springs and baths. Pop. 13,513.

CARBAZOTIC ACID. See Phosphoric Acid.

CARBERRY HILL, Scotland, a rising ground in Mid-Lothian, about seven miles southeast of Edinburgh, between Musselburgh and Ormiston, where Mary, Queen of Scots, surrendered herself to the confederate nobles of the kingdom, 15 June 1567, just before her confinement in Loch Leven Castle.

CARBIDE, in chemistry, a binary compound of carbon with a metallic element, or with certain of the non-metallic elements. Of the known carbides those of iron and calcium are most important. Carbide of iron occurs in steel, and is undoubtedly concerned in some manner, with the hardening of that metal, although the authorities are not agreed as to the precise role that it plays. The best-known carbide of iron is the one having the formula CaC₂, but Carbide has shown (American Chemical Journal, XVIII, 836) that a series of iron carbides probably exists, having the general formula CaFe₃n, and corresponding in a certain sense to the hydrocarbon series CH₄n:

so that when any one of the carbides of iron is treated with an acid, the corresponding hydrocarbon is set free. Calcium carbide is formed by the action of carbon upon lime at the temperature of the electric furnace. It has the formula CaC₂, and its commercial value depends mainly upon the fact that it is readily decomposed by water, with the copious liberation of acetylene gas (q.v.). Carbide of magnesium is not formed at the temperature of the electric furnace, probably because it is not stable at that temperature. It may be prepared, however, by the action of calcium carbide upon magnesium fluoride, in accordance with the equation CaC₂ + MgF₂ = CaF₂ + MgC₂. Like calcium carbide it is decomposed by water with evolution of acetylene gas, the yield being 50 per cent greater, per pound of the carbide, in the case of magnesium carbide. It is not unlikely that magnesium carbide will one day replace calcium carbide for the production of acetylene gas, on account of the larger yield; but this substitution cannot be made on a commercial scale until some cheaper mode of manufacture is found. The chemistry of the carbides is still in its infancy, but within the past few years, and largely owing to the splendid work of Moissan, many new bodies belonging to this class have been discovered. Gold, bismuth, lead and tin do not form carbides at the temperature of the electric furnace, nor do they dissolve carbon at that temperature. Platinum and iridium dissolve carbides in free, but deposit it again, upon cooling, in the form of graphite. Aluminum absorbs carbon freely, with the formation of Al₂C₃, and similar results are obtained with many other metals and metallic oxides. The carbides of chromium, molybdenum, titanium, tungsten and zirconium do not decompose water. Those of calcium, strontium, barium and lithium decompose it with liberation of pure carbon; but the carbides of aluminum and beryllium yield pure methane, and carbide of manganese gives a mixture of equal parts of methane and hydrogen. Other carbides decompose water with more complex results. Thus the carbides of the rare metals of the cerium group yield complicated mixtures of hydrogen, acetylene, methane and ethylene, and the titanium gives all these products (except, perhaps, acetylene), and, in addition, copious quantities of various liquid and solid hydrocarbons. The carbides of sodium and potassium, which are best prepared by passing dry acetylene gas over the corresponding metals at a temperature of about 450° F., decompose water with liberation of acetylene. The carbides of titanium and of silicon are characterized by extreme hardness, and it is said that they will even cut the diamond with facility. Carbide of silicon is an exceedingly stable substance, and is largely used under the trade name of "carborundum" as an abrasive material in the manufacture of grinding-wheels, whet-stones and polishing-cloth.

Moissan's researches with the electric furnace are reported chiefly in the Annales de Chimie et de Physique, and all of them have been printed at frequent intervals in Nature. Moissan claims to have been the discoverer of the crystalline carbide of calcium.
CARBIDE FURNACES — CARBOLIC ACID

that is now commercially familiar; but in the United States this honor is usually accorded to Mr. William, who has been quite independently of those of Moissan. See CALCIUM CARBIDE; CARBORUNDUM; ELECTRO-CHEMICAL INDUSTRIES.

RICHARD FERRIS.

CARBIDE FURNACES. See ELECTRO-CHEMICAL INDUSTRIES.

CARBOHYDRATE, in chemistry, a compound consisting of carbon, hydrogen and oxygen, and having the general formula CaH_{n}O_{m}. As will be seen, the number of carbon atoms in a carbohydrate is always divisible by six, and the oxygen and hydrogen are present in the same proportion in which they occur in water. It is not implied, however, that the compound contains water as such, but only that the oxygen and hydrogen atoms are present in the proportion of two atoms of the latter to one of the former. It will also be observed that a carbohydrate and a hydrocarbon are two essentially different things, inasmuch as a carbohydrate contains oxygen, while a hydrocarbon is a compound containing no element but carbon and hydrogen.

The carbohydrates constitute a large and very important class of substances, embracing the starches, sugars, glucoses and gums, as well as cellulose. Their chemical relations are intricate, and are far from being thoroughly understood. Several schemes have been proposed for their classification, but owing to the present imperfection of our knowledge none is entirely satisfactory. The classification proposed by O'Sullivan is convenient, however, and will be adopted here.

**Class 1. — SACCHARINES:** Amorphous substances, having the general formula nC_{6}H_{12}O_{6}, soluble in water but insoluble in alcohol, and further characterized by the fact that when they are treated with acids they yield substances of the type nC_{6}H_{10}O_{5}, directly, and without the formation of intermediate products. The oxygen and hydrogen atoms are amyloses and the galactans are examples. (These bodies are gums).

**Class 2. — SACCHAROSES:** Substances possessing a certain amount of structure, having the general formula nC_{6}H_{10}O_{5}, insoluble in either water or alcohol, and transformed by the action of acids and certain ferments into the foreign, and by the action of acids, into nC_{6}H_{12}O_{6}. Cellulose, starch, inulin and tunicin are examples; the first two falling under "amylose" in the general classification which divides the carbohydrates merely into amylase, saccharose and glucose.

**Class 3. — GLUCOSES:** Amorphous substances, having the general formula nC_{6}H_{12}O_{6}, soluble in water, but insoluble in alcohol; converted by acids first into nC_{6}H_{10}O_{5}, and finally into nC_{6}H_{12}O_{6}; and by certain ferments into nC_{6}H_{12}O_{6}. Glycogen, dextrin and malto-dextrin are examples.

**Class 4. — SACCHAROSES (sugars).**

**Group (a). — SACCHARONES:** Sweet, crystallizable bodies, soluble in water and in moderately strong alcohol, having the general formula nC_{6}H_{12}O_{6}, and convertible by acids and sometimes by ferments into nC_{6}H_{10}O_{5}. Sucrose (cane sugar), lactose (milk sugar), maltose and raffinose are examples.

**Group (b). — GLUCOSES:** Substances crystallizable, though not so readily as the members of the preceding group; having the general formula nC_{6}H_{10}O_{5}; yield on boiling with water and alcohol and converted by the prolonged action of acids into substances that are no longer carbohydrates. Some of these, such as dextrose, levulose and galactose, are fermentable by yeast; while others, such as sorbitine, are not fermentable.

**Group (c). — Certain substances, such as inosine and xylit, which probably belong in the aromatic series and bear no special resemblance to the other members of the carbohydrate family.

O'Sullivan has also a fifth class, including those substances which, though they may not be carbohydrates in the strict sense, are nevertheless closely allied to the carbohydrates and are easily converted into the latter by the action of certain simple fundamental substances that are formed in the green leaves of plants. Under the influence of sunlight the chlorophyll contained in the leaves is competent to split up the carbon dioxide of the air, retaining the carbon and setting the oxygen free. The carbon that is abstracted in this way is caused to combine with the water that the leaves contain, with the production of carbohydrates; but the identity of the carbohydrate that is first formed in this way, and which serves as the starting-point for the others, is not yet established. According to the views of Sachs the first obvious product is starch, the formation of which he explained by the equation:

\[ 6C_{6}H_{12}O_{6} + 5H_{2}O = C_{6}H_{12}O_{6} + 12O \]

It appears more likely, however, that formic aldehyde, CH_{2}O, is the first product, as is indicated by the equation

\[ H_{2}O + CO = C_{6}H_{12}O_{6} + 2O \]

and that the subsequent products are built up by polymerization.

Carbohydrate metabolism is one of the most important physiological processes of the animal body. The carbohydrates are the chief source of energy and heat in the body. Most of the carbohydrates are converted into maltose by the digestive processes. This, during the processes of absorption and assimilation, becomes dextrose, which sugar is the only normal sugar of the circulating fluids and the tissues. The dextrose is taken up by the blood, conveyed to the liver by the portal vein and a part stored up in the liver cells. Some of the dextrose is also transformed into glycogen, and certain portions of it are utilized by the nucleoproteids of the body. The fate of the glycogen of the body is to be oxidized into carbon-dioxide and water. The steps of this process of oxidation are very much involved, but it seems certain that an oxidizing ferment, perhaps from the adenine glands, acting in conjunction with the pancreas, is largely influential in the process. A failure to bring about sufficient oxidation of the sugar in the body causes the well-known symptom of glycosuria, one of the features of diabetes (q.v.).

RICHARD FERRIS.

CARBOLIC ACID, a substance having a formula C_{6}H_{5}OH, possessing feebly acid properties, and occurring chiefly in that part of the distillate from coal-tar which passes over at temperatures between 310° and 440° F., known as the "middle oils" or "carbolic oils." It is also found in small quantity in the later distillate, between 450° and 520°, known as "creosote oil." Chemically, carbolic acid has the structure of an alcohol (q.v.) and is an aromatic compound derived from benzene by the substitution of the hydroxyl group, OH,
CARBOLINEUM

for one of the typical hydrogen atoms. It is also known as phenol, phenyl hydrate or phenyl alcohol.

Carbolic acid is obtained for commercial purposes almost exclusively from gas-tar. The carbolic oil is washed with a solution of caustic soda of a specific gravity 1.075 to 1.100. In quantity this solution is somewhat more than sufficient to extract all the carbolic acid, but not enough to take up all the cresylic acid also. The resulting phenate of soda solution is drawn off and is used to wash another portion of the oil, when the cresylate of soda is decomposed and the acid is replaced by carbolic acid. In this way a solution consisting almost wholly of carbolate of soda is obtained. This is purified by blowing steam through it, as long as it carries away any oils. The purified phenate of soda is then decomposed by carbonic acid gas and a small quantity of sulphuric acid, and the carbolic acid set free floats on the surface and is skimmed off. The crude carbolic acid thus obtained contains about 15 per cent of water, and a little cresylic acid. It is purified by distillation and crystallization. A part remains liquid, and this is sold as liquid carbolic acid, or it is turned back to be worked up again. The drained crystals are treated with concentrated sulphuric acid and potassium dichromate, and redistilled. For medicinal purposes it is again distilled in glass vessels.

Carbolic acid, in the pure state, crystallizes in white, deliquescent needles, having a strong characteristic smell slightly suggestive of tar. The reddish color noted when it has been exposed to air, and it is treated to minute traces of lead. It melts at 106° F., and boils, under ordinary atmospheric pressure, at about 360° F. Its specific gravity is about 1.07. It dissolves in alcohol, ether, and many other organic liquids, but only moderately soluble in water, under ordinary atmospheric conditions. It readily absorbs a small quantity of water from the air, forming a hydrate which is fluid at temperatures above 63° F. If the liquid so formed is shaken with water, the greater part of the carbolic acid separates out in the water, and the vessel is found to contain an upper layer consisting of water in which a small amount of carbolic acid is dissolved, and a lower layer of carbolic acid in which a little water is dissolved. It does not exhibit very marked acid properties, but dissolves in the alkalis with the formation of salts called phenates. It does not have a strong affinity for the alkaline bases, however, and from a strong solution of sodium phenate (for example) it may be again separated in the form of an oily liquid by the addition of another acid; the new acid appropriating the base to itself, and setting the carbolic acid free. A solution of carbolic acid, even when very weak, develops a red color when boiled with a solution of mercuric nitrate. This reaction, which serves for the detection of carbolic acid, is said to be delicate enough to indicate one part of the acid in more than 100,000 parts of water. In the arts large quantities of carbolic acid are used in the manufacture of salicylic acid (q.v.), and it is an important source of picric acid and coralline in the dye-making industry. It is consumed in immense quantities in making high explosives after transformation into picric acid.

In medicine, carbolic acid has many uses. It is highly poisonous to living matter, and is used extensively to kill bacteria. In surgery it is used to disinfect wounds, and as an antiseptic dressing in proportions of from ¾–2 parts of acid to 100 of water. It, or some of its derivatives or allies, is used to sterilize instruments and bed linen, the walls and floors of rooms (by washing) and dejecta. Internally, carbolic acid is used as a bactericide, limiting excessive intestinal putrefaction. It is also an anesthetic, and is at times of service in irri-
tability of the stomach. When used in too concentrated a solution it is an active caustic, causing a white, painless burn. Alcohol is an excellent antidote. Taken internally in pure form in doses over two to three drops it causes poisoning with a characteristic series of symp-
toms. There is burning in the mouth, fauces, oesophagus and stomach. The whitish scars of the lips and mouth are characteristic. There is great pain, with vomiting of large quantities of mucus and the symptoms are found in the respiration. There is usually ringing in the ears, headache and vertigo; the urine may be suppressed, reddish or greenish; and death results with small, rapid pulse, collapse, and, may be, convulsions. Similar symptoms develop slowly in sub-acute forms of poisoning. The urinary symptoms usually lead to the diagnosis. The treatment of the acute form of poisoning is the free use of gastric lavage, ingestion of alcohol usually in the form of whiskey slightly diluted and the use of lime water, and solutions of sulphate of soda or sulphate of magnesia. Symptomatic treatment and careful nursing are necessary for other symptoms.

RICHARD FERRIS

CARBOLINEUM, derived from the Latin word carbo, coal, oleum, oil, to form a trade name for a new commodity, is a distillation from coal-tar or bituminous shale, containing phenoloid hydrocarbons of a highly pres-
servative nature. Extensive deposits from which carbolineum is obtained are found in the grape-growing countries bordering on the Rhine, various other parts of Europe and some places in America. The liquid in its commercial form is of a nut-brown color, but it is a stain rather than a paint. However, it can be washed off a person's hands with cold water without leaving any stain. Tests made with it prove that it has many times greater penetrating power than linseed-oil. It never crystallizes. When it has been painted upon wood and has become apparently thoroughly dry, its action does not cease. If the wood is then painted with a heavy coat of white-lead mixed with linseed-oil, the carbolineum will make its appearance through the paint in a short time. Consequently, any wood that is first treated with carbolineum cannot be painted without previous sizing. Owing to carbolineum being composed of heavy hydrocarbons, it is only slightly inflammable; but when ignited by holding a match in contact with a lineum for a short time, it burns with a bright red light, giving off considerable carbon in the form of a dense smoke. Large quantities of carbolineum are made by subjecting crude
CARBON—CARBON BLACK

anthracene (green oils) to heavy pressure, and adding zinc chloride and chlorine. There are also on the market imitations of carbolineum, made from the anthracene of petroleum. These are deficient in the specific preservation qualities which have given the original carbolineum its reputation. As made from coal-tar, carbolineum is a substance with distinctive physical and chemical qualities. It distils between the temperatures of 509 and 85°F., following the creosote oils. Unlike the latter it has no destructive effect upon wood fibre, nor does it have to be applied under heat (350°) and pressure (125 pounds) as with creosote oils, coating the wood fibre with its film. Owing to the outer layer of the wood is dry the carbolineum enters, leaving the pores open so that interior moisture escapes as the preservative makes its way in. The creosote oils close the pores and confine the interior moisture.

Carbolineum first came into use about the year 1876. The grape-growers of the Rhine valley were much annoyed with insects and sustained considerable loss by the rotting of the posts and poles used in their vineyards. It is said that Richard Avenarius, who was an officer in the army, first of all, tried the use of carbolineum as a wood preservative.

Carbolineum is usually shipped in barrels and then put in small packages to accommodate the retail trade. It is retailed at about 75 cents per gallon. The most extensive users are the tanners, railroad companies, maltsters and farmers. Railroad ties and posts are dipped in it in an open tank before setting.

Some of the railroad companies after due experiment have made extensive use of it, even painting the woodwork of their freight cars with it. It is used in a modified form by dyers. Farmers use it for painting hog-pens, chicken-coops and barns for the purpose of destroying lice and other vermin. The carbolineum may be applied directly to the skin, an analgesic and antiseptic for many injurious purposes.

Considerable litigation has grown out of the promiscuous use of the word "carbolineum" by manufacturers. Richard Avenarius did not obtain a trade-mark on the word "carbolineum" when he first used it, and never obtained a patent on it. After him, others began its manufacture under that commercial name. Eventually he filed the word "carbolineum" as a trade-mark in Austria. but subsequently his trade-mark was revoked and protection refused on the ground of the general use of the word. Also, he registered the word "carbolineum" as a trade-mark in the Patent Office of the United States, as No. 14,048, dated 2 Feb., 1887. His right to such use was questioned and considerable litigation ensued. The matter had not been settled definitely when, in 1917, American manufacturers were permitted to use German patents and trade-marks under license.

RICHARD FERRIS.

CARBON, a non-metallic element, existing in nature in large quantities, both in the free state and combined. It exhibits a remarkable allotropy, at least three distinctly different forms of it being known. These are (1) amorphous carbon; (2) graphite; and (3) diamond. Amorphous carbon is formed when wood or coal or almost any vegetable matter is heated strongly, out of contact with the air, and is familiar to everybody as charcoal, coke and lampblack. Graphite (q.v.) occurs native, and may also be artificially prepared in various ways. Diamond (q.v.), carbon, also occurs native in certain regions, and pure specimens that are devoid of color, or which have certain special tints, are highly esteemed as gems.

Carbon has the chemical symbol C, and an atomic weight of 12.005 if Q = 16, and 11.91 if H = 1. The specific gravity of diamond is 3.51, that of graphite is from 2.11 to 2.26 and that of hard gas-coke is about 2.35. The linear coefficient of expansion of diamond (Fahrenheit scale) is 0.0000006 at ordinary temperatures, and that of graphite is 0.000004. Graphite has an electrical conductivity of about one-twelfth that of mercury, and hard gas-coke, about one one-hundredth. Diamond is practically a non-conductor. The specific heats of diamond and graphite are quite different at ordinary temperatures. Thus at 50° F. diamond has a specific heat of 0.113, graphite 0.160 and wood charcoal about 0.165. These values increase as the temperature rises, and at about 1100° F. all three substances have a common specific heat of about 0.44.

Carbon is infusible, and insoluble in any known liquid at ordinary temperatures. It dissolves to a limited extent in melted cast iron, and in melted platinum it dissolved freely, separating out again in the form of graphite upon cooling. It is unaltered by the action of acids, except when some powerful oxidizing agent like chlorate of potassium or bichromate of potassium is also present. Chemically it is tetravalent in nearly all of its compounds. It combines with oxygen in three different proportions, with the formation of a monoxide CO, a dioxide CO2, and a suboxide CO. It also forms, with hydrogen, a great number of compounds known as hydrocarbons (q.v.), and it combines with many of the metals to form carbides (q.v.). With hydrogen, oxygen, nitrogen and small quantities of other elements, it constitutes the entire substance of animals and plants; and the coal beds upon which our modern civilization is founded are composed of vegetable remains of which the elements other than carbon have been mostly expelled by the combined action of heat and pressure. See AROMATIC COMPOUNDS; CARBON COMPOUNDS; CHARCOAL; COAL; ELECTRO-CHEMICAL INDUSTRIES; DIAMOND; FATTY COMPOUNDS; GRAFITE.

RICHARD FERRIS.

CARBON BISULPHIDE. See ELECTRO-CHEMICAL INDUSTRIES.

CARBON BLACK, the trade term given to black made from gas. It was originally called hydrocarbon gas black, and a black of a similar nature to that now made was manufactured both in this country and in Europe from natural gas. The industry did not, however, assume any importance before 1872, when the first patent was obtained for producing this black from natural gas. Since that date, many patents have been taken out in connection with the manufacture of this black from natural gas, and at the present time there are 10 distinct processes in use.
The abundance of natural gas in the United States, and the automatic method used in making the black, have enabled manufacturers in this country to produce it at so much lower prices that little of this black is now made from artificial gas, and large quantities of the product are exported annually. The total production of carbon black in this country in 1914 was valued at $900,630, of which about one-seventh was exported. See BLACKS.

CARBON COMPOUNDS, in chemistry, those compounds which contain the element carbon. These are of two classes, the organic and the inorganic, the former being by far the larger and more important; so much so that the chemistry of the carbon compounds is practically synonymous with organic chemistry. Until within the past half-century it was thought by many authorities that the compounds that occur in animals and plants are essentially different in nature from those that are produced in the laboratory, and that they cannot be obtained without the action of the vital principle. This idea received its first blow in 1828, when Wöhler prepared urea from substances that had been previously considered to be organic; yet as late as 1849 the great chemist, Berzelius, defined organic chemistry as "the chemistry of compounds formed under the influence of life." A vast number of substances that were formerly classed as organic have now been prepared in the laboratory, and the old classification of chemistry into organic and inorganic branches has broken down, the organic division being now more correctly called the "chemistry of carbon compounds." The organic carbon compounds form a group of great complexity, and are apparently unlimited in number. The reasons for this are that carbon is quadrivalent; that it forms multitudes of compounds with hydrogen alone, in many of which more or less of the hydrogen can be replaced by other elements, with the formation of new and altogether different substances; that its chemical bonds are apparently powerful; and that it unites with elements of the most widely different nature.

In a real way, the better-known carbon compounds are mostly divided into two great classes, according to the type of the "graphical" or "structural" formula that must be used in order adequately to represent their chemical relations. The first class includes all those bodies whose structural formulae are distinguished by the fact that the atoms (or radicals) that are present form "open" chains, which do not anywhere return into one another. The hydrocarbon "propane," which has the structural formula

\[
\text{H} - \text{C} - \text{C} - \text{C} - \text{H},
\]

is an illustration of this class. The "open chain" compounds are called fatty compounds, and are treated under that heading. The name was originally given because many of the substances that are included in the class have long been known in connection with fats and allied bodies; but it would be more logical to call them "methane derivatives," since they may be considered to be obtainable from the hydrocarbon methane, \( \text{CH}_4 \), by a process of substitution.

The second great class of carbon compounds is distinguished by the fact that the structural formulae that are required in order to exhibit the chemical properties of its members return into themselves, so as to form "closed" chains or rings, which (at least in the fundamental forms) contain six carbon atoms. Benzene is a familiar example. From the fact that many of the first known representatives were balsams, oils and resins, these substances are known collectively as aromatic compounds, and are described under that heading. A better name would be "benzene derivatives," since all the members of the class are derivable from benzene by substitution. See AROMATIC COMPOUNDS.

In addition to the aromatic and fatty compounds, others are known which do not properly come under either heading. Thus the structural formula of furfuran contains a closed ring, formed by the union of four atoms of carbon and one of oxygen. Closed rings, consisting of three, four and five atoms of carbon, are also known. The pronounced analogies and affinities that exist among the members of the aromatic and fatty groups, respectively, have forced those two groups upon the attention of chemists. Those compounds of carbon which are not strictly included within either have not yet been classified upon a similarly broad basis.

The principal phenomena of the carbon compounds are given under special headings. In addition to those already given, see, particularly, ISOMERISM; and RADICAL. For an excellent presentation of the whole subject, consult Hjelt, "Principles of General Organic Chemistry."

Among the inorganic carbon compounds the more important are dealt with under separate headings: see CARBONIC OXIDE, CARBON DIOXIDE and CARBON DISULPHIDE. With a few exceptions the others are interesting chiefly as chemical substances, with no distinctive use in the arts. The most useful of all is Carbon tetrachloride (CCl₄), at first produced by exposure of chlorine and chloriform in mixture to the action of sunlight, it is now generally prepared by the chlorination of carbon disulphide in the catalytic presence of powdered aluminium chloride. It is a colourless liquid, with a pungent aromatic odor, boiling at 170° C. It is soluble in alcohol and ether, and is itself a solvent of fatty organic substances. Through this property it is of considerable importance in manufactures, replacing carbon disulphide, as its vapor is not inflammable. In its effects on the human system it closely resembles chloroform.

Carbon trichloride (CCl₃) is produced by exposing chlorine to carbon tetrachloride in sunlight, or by heating propyl
chloride with iodine trichloride. It is colorless and nearly tasteless, and has an aromatic odor resembling camphor. It is insoluble in water, but dissolves in all oils and in ether and alcohol, from which it crystallizes in right rhombic prisms. It vaporizes at ordinary temperatures.

Carbon dichloride (CCL₂) is prepared by adding carbon trichloride in small portions to an alcoholic solution of hydrated potassium sulphide as long as sulphurated hydrogen is evolved. The liquid is then distilled, and the obtained water, with water, upon which the carbon dichloride separates. It is a stable liquid at zero F. and boils at 240°. It dissolves in alcohol, ether and the oils, but not in water, acids or alkalis. It absorbs bromine, in direct sunshine, forming carbon chloro-bromide.

Carbon oxychloride (COCl₂), a colorless liquid obtained when a mixture of carbon monoxide and chlorine is exposed to sunshine; and also by heating a mixture of chloroform, phosgene, dichlorethane and sulphuric acid. Its boiling point is 47° F.

Carbon suboxide (CO₂), or carbon car- bonyl, discovered by Diels and Wolf in 1906, is formed by treating a solution of dibromomalonyl chloride in ether with zinc shavings. The pure suboxide is a colorless liquid with a pungent odor resembling mustard oil, and is quite poisonous. It boils at 44° and is solid at -224°. At low temperatures carbon suboxide is quite stable, but between 30° and 60° if even a trace of impurity be present, it polymerizes into a dark red solid. It is inflammable, burning with a bright blue flame and the emission of much smoke.

Carbon nitride (C₃N), see Cyanogen.

Carbon subnitride (C₃N), at temperatures below 70° a solid substance crystallizing in fine white needles. Above 70° it is a liquid with an odor resembling cyanogen, boiling at 170°, and breaking into flame if heated to 265°.

Carbon oxysulphide (COS), a colorless gas soluble in water, with an odor resembling sulphurated hydrogen, and highly sulfocative. It has the notable specific gravity of 2.10, and may easily be poured from one vessel into another. It is inflammable, passing when burning into carbon dioxide and sulphur dioxide. At zero F., and under atmospheric pressure, some 12½ cubic volumes of the latter are produced in contact with atmospheric air, and highly explosive. From these compounds with bromine springs an extended list of derivatives.

RICHARD FERRIS.

CARBON DIOXIDE, CARBONIC ACID GAS, or CARBONIC ACID HYDROIDE, CO₂, is formed whenever carbon is burned in the presence of excess of oxygen or air. It is a colorless, odorless gas about 1.53 times as heavy as air, bulk for bulk, and soluble to a considerable extent in cold water, especially when subjected to pressure. Its solution possesses feebly acid properties, and has a peculiarly pungent taste, on account of the aqueous solution of the acid is greatly used as a constituent of various beverages. The effervescence accompanying the opening of a bottle of beer, soda-water or champagne is due to the escape of the carbon dioxide that was previously held in solution under pressure. Carbon dioxide occurs in great abundance in nature, both free and in combination with various elements in the form of carbonates. Carbonate of lime, CaCO₃, is one of the most common carbonates. It is formed when the gas is allowed to bubble up through a solution of lime water and exists in nature in vast masses as limestone and marble. (Other carbonates are described under the metals that constitute their bases). Carbon dioxide is a constant constituent of the atmosphere (see Air), occurring even at the tops of mountains and in the air collected by balloons at great height. It is generated by the combustion of fuel, by respiration, by fermentation and by the decay of animal and vegetable matter. In summer, too, immense quantities of the gas are emitted from the ground, or from mineral springs and wells, as at Saratoga Springs in the United States, and in the Grotto del Cane, the Cave of Montjoly in Auvergne, the valley of Wehr, in the Eifel, and at many other places in Europe. It is being simultaneously abstracted from the air by plants, which in the sunlight decompose the gas, fixing the carbon that it contains, and setting the oxygen free. Carbon dioxide has but feeble affinity for the bases with which it combines, and is readily displaced by almost any other acid. In preparing the gas for experimental purposes the usual method is to add a dilute mineral acid to pulverized marble or other carbonate, the carbon dioxide then being liberated continuously and in large quantities. On a large scale carbon dioxide is made by heating limestone to redness in closed retorts, at the bottom of which superheated steam is blown in. This passes through the heated limestone carrying with it the liberated carbon dioxide, and through outlets at the top into coolers and compressors. Besides its large use in the manufacture of aerated drinks, carbon dioxide is used in sugar factories to clarify the cane juice after boiling; sugar is made thus; it is also used to preserve wines from deterioration by certain molds, and other organisms which set up acetic fermentation. Wine thus treated is distinctly improved in quality. Carbon dioxide is the active principle in baking powders, being liberated from the soda carbonate by the acid constituent of the powder, and in its efforts to escape from the dough produces the lightening effect.

The critical temperature of carbon dioxide is about 88° F., and at any temperature lower than this it can be reduced to a liquid by the application of pressure. Liquid carbon dioxide is colorless. It will not mix with water, but dissolves readily in alcohol, ether and volatile oils. When the pressure is released, part of the liquid vaporizes rapidly, and the remainder sublimes through an intense cold. Solid carbon dioxide is a white mass resembling snow. It remains for some time open to the air without melting. Its interior temperature, however, as shown by a
CARBON DISULPHIDE — CARBONADO

Thermometer sunk into the mass, is — 110° F. Its melting point is — 70°.

Poisoning by this gas frequently results in closed rooms crowded with people. The symptoms may be very slight, consisting of a mild indisposition, or they may be severe — headache, nausea, vomiting, etc. In poisoning in the general atmosphere, the symptoms are: cyanosis, coma and unconsciousness. Carbon dioxide is not in itself a fatal poison; it becomes so, however, in the absence of a sufficient supply of oxygen, death being produced by simple asphyxiation.

RICHARD FERRIS.

CARBON DISULPHIDE, or SULPHOCARBONIC ACID, CS₂, a liquid formed when the vapor of sulphur is passed over red-hot charcoal and the resulting gases cooled in a condenser. Under normal conditions it is a very volatile, inflammable liquid, with a specific gravity of 1.29, and boiling at 115° F. It burns with a blue flame, giving off sulphurous and carbonic acid gases. Burned in a Bunsen burner, with proper precautions against explosion, it produces a flame of actinic power exceeding that of burning magnesium. A sprig of red-hot cotton soaked in carbon disulphide will catch fire with a blue flame. On migration, it forms a dangerously explosive mixture. Practically the whole commercial supply of carbon disulphide is made from coke and sulphur in the electric furnace. (See Electro-Chemical Industries.) The commercial disulphide has an exceedingly disagreeable smell, but this is due to the presence of impurities. The pure liquid, produced by simple distillation, has a pleasant, ethereal smell. Carbon disulphide (or bisulphide) dissolves sparingly in water, in the proportion of 1 part in 1,000, forming a valuable disinfectant. It mixes freely, however, with alcohol, ether, benzene and the fixed oils in almost every proportion. It dissolves sulphur, phosphorus, caoutchouc and many other organic bodies that are almost insoluble in other menstrua, and it is to this property that it owes its commercial value. It is used in largest quantity in the rubber goods manufacture, not only in the preparation of a cement, but also in the making of rubberized cloth by coating or infiltrating with a thin solution of rubber. It is also used to dissolve the natural grease out of wool, and fatty oils out of seeds and oilpress residues, or oilcake; and in the recovery of oils from all kinds of waste material. In its purest refined state the disulphide is employed to extract the most delicate essential oils from aromatic seeds and spices, and perfumes from flowers. In quite another direction it is efficient in preserving furs and woolens from moths, as an insecticide upon infested plants and in the burrows of such animal pests as moles, gophers, woodchucks, etc., to destroy them. As a chemist’s aid in quantitative analysis it is indispensable. It has a wide chemical interest as the most energetic of sulphurizing agents, aiding in the production of many substances not obtainable by other means. Because of its high degree of volatility it is used in the production of low temperatures by its own evaporation. Under the air-pump a cold of — 76° F. has been attained by its use.

Poisoning by carbon disulphide is becoming very prevalent since the use of rubber goods has become so extensive. The symptoms of acute poisoning are due to a poisoning of the blood and a central paralyzing action on the nervous system. The blood action is that of a breaking up of the red blood cells, hemolysis. This results in cyanosis, pain, headache, vertigo, nausea, vomiting, weakness, unconsciousness, coma and death. Such acute cases are rare, the poisoning developing as a rule much less rapidly. In workers in rubber factories, in which there is much vapor of CS₂, there develop disturbances of temper, loss of memory, pressure feelings on the head, heat, and the feeling as if the blood would burst through the skull, with headache. There may also be symptoms of irritation of the bronchi, coughing and roughness of the voice, etc. Treatment is fresh air and symptomatic.

RICHARD FERRIS.

CARBON MONOXIDE, or CARBONIC OXIDE, CO, is produced in addition to the dioxide, when carbon is burned with a limited supply of air or oxygen. It is also generated by passing carbon dioxide over a hot bed of carbon, in accordance with the equation CO₂ + C = 2CO. For experimental purposes the gas may be generated by decomposing oxalic acid by heating it with strong sulphuric acid, and passing the gases that are evolved through a solution of caustic soda or lime to absorb the carbon dioxide that is present. Another method is by passing electric sparks through carbon dioxide. It is evolved in large quantities in the manufacture of carbides, and is collected as a valuable by-product useful in the making of special steels. Carbon monoxide is a colorless gas with a density about 0.97 times that of air. It burns with a lamplent blue flame that is often seen in coal fires that have been freshly supplied with fuel. Carbon monoxide is highly poisonous, producing first giddiness and then asphyxiation, as small a quantity as one-half of 1 per cent in the air breathed being fatal, and even as small a percentage as one-fifth of 1 per cent resulting in death if breathed for some time. It combines with the haemoglobin of the blood, and destroys the efficiency of that fluid as an oxygen-carrying medium. Carbon monoxide poisoning is often followed by serious degenerative changes in the brain. This gas is often evolved by self-feeding stoves with deficient draft.

CARBON OXYCHLORIDE. See PHOSGENE.

CARBONADO, a massive, black or dark-gray variety of diamond, also called black diamond. Though possessing the adamantine or resinous lustre of the crystallized variety, it is opaque and, therefore, of no value as a gem. It is the hardest substance known and this fact makes it the most desirable for use in diamond drills; it therefore sells for as high a price per carat as one carat rough gem diamonds (q.v.). Being without cleavage it is less brittle than the crystals, and owing to its somewhat porous structure and specific gravity is less, 3.15 to 3.29. The commercial supply comes exclusively from the province of Bahia, Brazil, where it occurs in angular fragments which occasionally show a rough cubic outline.
CARBONARI, kár-bō-ná'rē (colliers, or more strictly, charcoal-burners), the name of a large secret society in Italy. Among its chief leaders were Alessandro Botta and Gaetano Gismondi. In 1820 Botta attempted to carry out the plan of revolution in Italy that he had mapped out during his residence in America. He went back to Italy in 1822 and in the same year his plans for an insurrection were discovered by the Austrian government and he was arrested. The Austrian soldiers entered Naples on the 23rd of July and took up their quarters in the streets. The reactionists employed this occasion to carry out a coup d'etat, and the Carbonari then began to act openly. By the fall of the reigning House of Bourbon, the Carbonari came into power. Among the most important of them were Giuseppe Mazzini, who afterwards became the most prominent figure in the national movement; Giovanni Crispi, who became premier of Italy in 1887; and many others. The Carbonari were finally suppressed by the government of Victor Emmanuel II. Their organization was based on the principles of democracy and equality, and they were devoted to the cause of Italian independence. Their symbol was the black flag with a white cross, and their emblem was the black cockade. They were opposed to foreign rule and to the privileges of the Church. Their activities were directed towards the overthrow of the ruling classes and the establishment of a democratic republic. They were active in many parts of Italy, including Lombardy, Piedmont, and Tuscany. They were also known as the "People's Party." The Carbonari were eventually suppressed by the Austrian government in 1821, but their ideals continued to influence the political and social movements in Italy.
the rank of a period. Mississippian and Pennsylvanian are terms derived geographically in the United States, and are not used abroad. A few American geologists consider that they too are of the rank of periods, and would discard the old term Carboniferous altogether. Permian is derived from the province of Perm, in Russia, and Carboniferous from carbon (coal) in the rocks of the system.

Palaeogeography of the Carboniferous in North America.—The Mississippian opened with shallow epicontinental seas widespread over central United States, as at the close of the Devonian (q.v.). In the east the Pocono and Mauch Chunk formations are largely terrestrial, being a great series of delta and coastal plain deposits built up at the west edge of a land mass, Old Appalachia, which was persistent through several of the preceding periods, on the site of the present Piedmont, Coastal Plain, and farther east into the present Atlantic Ocean. In the seas of the great interior the sediments of the Permian are largely limestone. At the close of the Mississippian there was widespread emergence east of the Rocky Mountains, with folding in the Ouachitas and also in Europe. This emergence was accompanied by widespread erosion, and the Pennsylvanian rocks rest unconformably on the Mississippian. The old land beds. Throughout Pennsylvanian times most of eastern United States was low and swampy with luxuriant vegetation, which accumulated and was buried to form coal. Occasional submergences occurred and marine beds are intercalated with coal seams. The marine beds are more abundant in central than in eastern United States; and in the Rocky Mountains and Great Basin the sea persisted practically through the epoch, and the rocks are almost wholly marine. During the Permian the region east of the Mississippi River was land, and humid during the early part of the epoch, as shown by coal beds. West of the Mississippi River, the land gradually emerged during late Pennsylvanian and early Permian times. The Great Salt lakes were extensive and beds of salt and gypsum are abundant. At the same time there were similar deserts in Germany, in which the great German salt deposits were formed. Strangely enough, other continents, even within the world's land belt, which bordered the sea at the same time, particularly Africa, Australia and India. These extreme conditions, together with the great period of folding that formed the Appalachian Mountains, wrought a profound change in types of plants and animals, and brought to a close not only the Carboniferous Period, but the Paleozoic Era as well.

As the rocks laid down in Carboniferous time furnish by far the greater part of the world's coal, and the coal beds are so well and carefully studied in many different places and accurately mapped, so that more is known of the Carboniferous rocks than those of any other Paleozoic system.

The Lower Carboniferous or Mississippian series in Nova Scotia and New Brunswick is made up of thick beds of sandstone and limestone overlaid by limestones containing masses of gypsum. The total thickness of the series is 6,000 feet. In Pennsylvania the Lower Carboniferous series has a total maximum thickness of 4,300 feet and shale. Farther west the Lower Carboniferous is represented largely by limestones with a maximum thickness of over 1,200 feet in southern Illinois. In southwestern Virginia are limestones, sandstones and shales of Lower Carboniferous Age, 2,000 feet thick, and containing a few workable beds of coal. In the Rocky Mountains the Lower Carboniferous rocks are, with few exceptions, limestones.

The rocks of the Upper Carboniferous or Pennsylvanian include the great coal fields of eastern North America. (For the origin of coal fields, see Coal.) They are sandstones or conglomerates, grits, shales, clays, limestones and seams of coal. The total thickness of the Nova Scotia coal measures is 7,000 feet, and 76 distinct seams of coal are known. In Pennsylvania the coal measures have a total thickness of 4,000 feet. In Michigan the coal measures are about 300 feet thick; in the eastern interior (Illinois-Indiana) field 600 to 1,000 feet, and in the western interior field the thickness varies widely, reaching a maximum in Arkansas.

The Upper Carboniferous rocks cover wide areas in Utah, Colorado and Arizona; they also occur in the Black Hills in South Dakota, and in California, and British Columbia. They are generally limestones or sandstones and contain no coal beds. The distinction between Upper and Lower Carboniferous is not as sharp as in the Mississippi Valley. The total thickness of the whole Carboniferous series in Nevada and Utah is about 13,000 feet.

Carboniferous in other Continents.—In western Europe the Lower Carboniferous limestones reach from Ireland to Central Germany, with a maximum thickness in England of 6,000 feet, and are overlaid by coal measures. In Asia the Chinese coal measures are of Upper Carboniferous Age, and are underlaid by Lower Carboniferous limestone. In South America the Lower Carboniferous is mostly made up of sandstones, and the upper of limestones, with very few coal seams.

Life of the Carboniferous.—The plant-life of the Carboniferous Period showed some advances from the Devonian. The ferns were most abundant, some being like tall trees, others as small as the maidenhair fern of to-day. The most conspicuous growths in the Carboniferous forests were the tree-ferns, typified by many of the gymnosperms represented by insignificant forms, but then growing sometimes 75 feet or more high, with trunks three feet in diameter, and spreading branches (Lepidodendron). Other Lycopods (Sigillaria) had short, thick trunks with few if any branches. Still another group, the horse-tail rushes, were of far greater importance in Carboniferous times than now. Of these the calameies, with their thin, slender stems, must have been the commonest plant forms of the Carboniferous forest. No plant with conspicuous flowers existed.

Of animal life, corals were abundant; and the Foraminifera, especially the genus Fusulina, became of importance. The extinct blastoids were abundant, and the Carboniferous is the period in which the crinoids, or sea-lilies, reached their highest development. Sea-urchins were more plentiful than in the Devonian, but the trilobites were slowly dying out. Scorpions were fairly abundant, and the first true spiders are represented. The brachiopods were less abundant than in the Devonian. Bivalve
mollusks were numerous, among them being the first land shell. Of the fishes, the sharks were remarkably developed. Amphibians, which probably existed in Devonian, increased greatly in Carboniferous time, but belonged to an order now extinct, and were of moderate size, no species being over eight feet long. Consult Chamberlin and Salisbury, 'Geology' (Vol. II, New York 1907); Cleland, H. F., 'Geology Physical and Historical,' (New York 1916); Dana, 'Manual of Geology' (New York 1895); Gekie, 'Text Book of Geology' (London 1903) 'Report of the United States Geological Survey' (1900-01, part III). See Coal; Clay; Geology.

CHARLES LAWRENCE DAKE,
Assistant Professor of Geology and Mineralogy,
University of Missouri, School of Mines.

CARBONIFEROUS LIMESTONE, or MOUNTAIN LIMESTONE, certain limestones of Lower Carboniferous Age, as named by Murchison and other English geologists. In the United States the silver-lead ores of Leadville and other Rocky Mountain camps, and the zine and lead ores of southwestern Missouri, are in limestones of Carboniferous Age. See CARBONIFEROUS.

CARBORUNDUM, a trade name for silicon carbide (SiC). This compound is produced by heating sand and carbon together in the electric furnace. It is characterized by extreme hardness, and its principal use is for abrasive purposes, as a substitute for corundum and emery. It was discovered in 1891 by E. G. Acheson, and is now manufactured in large quantities in the great electric laboratories at Niagara Falls. The operation is carried on in a furnace in which the bed and ends are permanent, and the side walls temporary, being made up of loose firebrick for each charge treated. The furnace is 16 feet long and 5 feet wide. The electrodes enter the interior through the ends. They consist of clusters of carbon rods, interspersed with copper connectors. The material used consists of 54.2 parts of sand, 45.9 parts of sawdust and 1.7 parts of common salt—the last acting as a flux. The amount of each charge is about 30,000 pounds, and this weight includes 34.2 parts of coke broken into pieces about the size of sea coal. A part of the charge is spread on the bed of the furnace so as not to touch the electrodes but up to their level. In the centre of this is built a core of coke connecting the electrodes. The remainder of the charge is then heaped upon the core, the walls being built up to a height of five feet, and the heap between them reaching eight feet. The current used is at the beginning of the process 165 volts and 1,700 amperes. Later this is reduced to 125 volts but increased to 6,000 amperes. The run continues for 36 hours, during which 1,000 horsepower is expended. The furnace is then allowed to cool for two days, when the walls are torn down and the contents removed. The coke core has been graphitized by the heat, and outside of this is a layer a foot thick of graphitic carbon. Next to this layer is the crystallized carborundum, amounting to about 6,700 pounds, and in addition there is about 5,000 pounds of amorphous silicon carbide. The carborundum is broken up in a crusher and the crushed material digested with sulfuric acid for three days at a temperature of 212° F. It is then washed, and after being kiln-dried it is graded by screens to the several degrees of fineness in which it is sold. Carborundum in powdered form is placed on the market in considerable quantities as carbide of silicon for the introduction of silicon into iron, the material being very readily dissolved by the fuse. A mixture of carborundum is infusible and is only oxidizable at extremely high temperatures in a large amount of free oxygen, it follows that the temperatures ordinarily generated for melting ores and metals are much below its point of destruction. Finely powdered carborundum is a highly refractory paste with fire clay, lime and sodium silicate, which is applied by means of a brush or otherwise to bricks which are intended to be used for building a furnace, or the bricks are actually immersed in the viscous liquid for a certain time. If the furnace has already been built, the paste can be painted on the surfaces exposed to the fire. It is stated that a coating one-twelfth of an inch thick will protect the bricks from the attack of the highest temperature that is ever produced by combustion methods in ordinary work.

RICHARD FERRIS.

CARBUNCLE, a general term used to describe any red garnet when cut en cabochon. Pliny and other early writers apparently applied the name *carbunculus* indistinguishably to ruby, ruby spinel and garnet. The best usage at the present time confines it to the almandite garnet when cut en cabochon, that is, with a rounded convex surface. Usually such stones are hollowed out at the back and a piece of metal foil is inserted in order to lighten the otherwise too dense red color.

CARBUNCLE, in pathology a deep infection of the subcutaneous tissues by means chiefly of the *Staphylococci* organisms, which are always present in the air. These infections take place through minute openings or cuts or the follicles and are located chiefly in the nape of the neck. In addition to the local discomfort graver constitutional symptoms such as fever, headache, loss of appetite and loss of flesh are present. The local discomfort is apt to develop into deep, painful burning and then a fistula is formed and gradually makes its way to the surface through minute orifices, or the whole area breaks down into a sloughing ulcer with a hard, deep, angry centre called the *core.* The whole process may take one or two months before complete recovery occurs. The treatment is dietetic, hygienic and surgical.

CARBURETOR. An essential adjunct to internal combustion engines of the explosion type, performing the twofold operation of vaporizing the fuel (gasoline, benzol or alcohol) and mixing this vapor with the proper proportion of air to form an explosive compound. The instrument consists of a tubular air-intake into which is projected the fuel tube. The liquid fuel is atomized into a fine spray by the rush of air past the open end of the tube through which the fuel is fed at a constant flow regulated by a float valve in a float chamber. The importance of the delicate adjustment of the carburetor appears in the fact that upon the accurate admixture of the air and fuel depends the smooth working of the
CARCAGENTE—CARMESIME

engine. The proportion of air to gasoline required under ordinary running conditions is 8,400 parts to one. In starting a cold engine, however, a larger percentage of gasoline is needed, and to supply this an auxiliary carburetor is sometimes arranged to cut in temporarily, until the engine gets warm. Many varieties of the carburetor are in existence, but all are the same in principle. Special forms of carburetor have been devised for kerosene and other liquid fuels, with but partial success. See AUTOMOBILE; AUTOMOBILE ENGINE; INTERNAL COMBUSTION ENGINE. Consult Bramley, F. H., ‘Modern Carbureters’ (London 1913); Brewer, R. W. A., ‘Carburetion’ (London 1913); Browne, A. B., ‘Handbook of Carburetion’ (New York 1916).

CARCAGENTE, kär-kä-hän’ta, Spain; town of Valencia province, on the river Jucar, at the junction of the Valencia-Murcia and Carcagente-Denia railways. The centre of a region of orange, palm and mulberry trees, it also cultivates rice extensively, for which climate and soil are particularly well adapted, and it has modern linen and silk mills. Carcagente is of great antiquity with interesting Roman ruins. Pop. 12,300.

CARCANET, kär’ka-nět, a jeweled necklace or chain, an ornament referred to by Shakespeare, and by Tennyson in ‘The Last Tournament.’ Venice was famous for its manufacture of carcanets in the 15th century.

CARCANO, kär’ka-nō. Giulio, Italian poet; b. Milan 1812; d. 1834. He was appointed professor at the Academy of Fine Arts in Milan in 1859, and became a senator in 1876. He wrote a narrative poem, ‘Ida della Torre,’ while a student at Pavia (1834). His next work, ‘Angiola Maria’ (1839), had extraordinary success; it is a deeply sympathetic story of Italian family life, and is regarded as the highest type of that class in Italian. In the same vein is the volume ‘Simple Narratives’ (1843). He wrote also ‘Damiano, the Story of a Family’ and other works. Consult Prina, ‘Giulio Carcano’ (1884); and Rizzi’s preface in ‘Lettere di Giulio Carcano’ (Milan 1887).

CARCAR, kär-käär, Philippines, a city on the northern coast of the island of Cebu, situated on the Bay of Carcar, 23 miles from the city of Cebu. It is near the head of the bay and on the road running along the eastern coast of the island. Pop. 31,895.

CARCARILLA, the bark of a tree (Croton eleuteria), of the family Euphorbiaceae. This is a shrub of the Bahamas and now yields most of the cascarilla of commerce, although in former years other species were used. It contains tannic acid, volatile oils, cascarillina, a glycoside and some resin. In medicine it is used as an aromatic bitter in combination with other remedies for constipation, indigestion and loss of appetite.

CARCASS, in military language, an iron spherical case filled with combustible materials, which is discharged from a mortar, howitzer or gun. It does not burst, but has three fuseholes through which the flame rushes, firing everything within its influence. Carcasses are of considerable use in bombardments for setting fire to buildings, vessels lying in harbors, etc.

They will continue to burn for 8 or 10 minutes, and are not even extinguishable by water.

CARCASSONNE, kär-kä-sön’, France, capital of the department of Aude, on both sides of the river Aude and on a branch of the Canal du Midi, 53 miles south of Toulouse. It consists of an old and a new town which communicate by a bridge of 12 arches spanning the river. The old town is surrounded by a double wall, part of it so ancient as to be attributed to the Visigoths, and is defended by a castle. Its streets are narrow, dirty and desolate, forming a striking contrast to those of the new town, which is regularly built, and has many handsome modern houses. The principal buildings are the restored cathedral of Saint-Nazaire, the courthouse, the prefecture, the old market and the churches of Saint Michel and Saint Vincent. The town contains a lyceum, a teachers’ college, a seminary, a public library and a museum. The boulevards are finely planted. The chief manufacture is that of woolen cloth which is exported chiefly to the Levant, the Barbary states and South America. Carcassonne also manufactures paper, leather, linen, soap and pottery, and there is also a considerable trade in wine, grain, brandy, fruit and leather. The whole department is represented at its November fair. The ancient city, Carcaso, in the province of Gallia Narbonensis, fell into the hands of the Visigoths about 725; it was ruled by viscounts from the 11th to the 13th century and was united to France in 1209. In 1247 King Louis the Saint founded the lower town. It was pillaged and burned by the Black Prince in 1355, and in 1560 a Huguenot massacre took place within its walls. Consult Fedie, L. ‘History of Carcassonne’ (Carcassonne 1888).

CARMESIME, kär’kém-ìsh, an ancient city on the Euphrates, formerly thought to be the same as the Roman Cirenceums, but now more generally located near Jerabis, a village on the west bank of the Euphrates. The earliest known references to Carmesime are found in the Cuneiform texts in the British Museum (II Bu. 885–12, 163; 11 and 885–12, 19, 8.) It was the northern capital of the Hittites. Thothmes III met the people of Carmesime in battle about 1440 B.C. and in 1140–05 B.C.; it was once captured by Tiglath-Pileser I. It was made to pay tribute by Asurnazirpal III, and Shalmaneser III, whose artists represented the famous fortress on the walls of Balawat, but was not finally subdued by the Assyrians until taken in 717 B.C. by Sargon II, who deported the inhabitants and settled Assyrians in the city. In 608 B.C. it was captured by the Egyptian Pharaoh, Necho. At this time Josiah, king of Judah, was killed (mentioned in 2 Chron. xxxvii); but the city was retaken by Nebuchadnezzar in 605. Consult Rawlinson, G., ‘The Five Great Monarchies’ (2d ed., Vol. II, p. 67); Finzi, ‘Ricerche per lo studio dell’ antichita Asira’ (pp. 257); De Carmesime Cepeci Situ et Historia Antiquissima’ (1873); Schrader, ‘Keilinschriften und Geschichtsforschung’ (pp. 221 ff. 1878); Delitzsch, ‘Wo lag das Paradies?’ (pp. 260 ff. 1881), containing extracts from the notebooks of George Smith; Hoffmann, G., ‘Aus dem syrischen Acten persischer Märtýrer’ (p. 163).
CARCINOMA. A tumor of the epithelial-tissue type. See TUMOR.

CARD INDEXING, Commercial, the adaptation of the principle of the modern library card catalogue to the multifarious uses of industrial, mercantile and commercial life. Following the practical American development and improvement of the various Old-World principles and rules laid down for the cataloguing of libraries, and the establishment after 1876 of library bureaus for furnishing standard supplies, it was speedily recognized that card systems for facilitating the record of the affairs of business life and their multitudinous details, whether in files and in other books of the telephone, the typewriting machine and accessories—indispensable adjuncts to the equipment of every well-appointed office, store, factory or institution throughout the world.

The invention of time and labor-saving systems and devices of all kinds speedily followed, and now, any branch of any kind of business, from the simplest to the most complex, can advantageously install and use a card system, and procure standard supplies of blank or special printed forms with full information as to their application for the keeping of accurate records of all affairs in the most practical way.

The development of commercial card systems also led naturally to a corresponding and commensurate growth of office furniture, fixtures and accessories for their accommodation, which include: box tray and drawer cases for card indexes; various kinds of folders, guides, indexes, storage and binding cases for vertical files; indexed transfer cases for flat files, elastic or expanding filing and other card sets for document, check and mercantile reports, etc.; specially designed stands, tables, desks, etc.

For classifying work by separating miscellaneous information—grouping information of the same kind together—no other method has been found to equal the card-index system, the impossibility of keeping different facts about the same business or profession recorded in a bound book with any degree of sequence or order being now universally recognized. The card-indexing system has proved of especial advantage, and is now extensively utilized in the offices of government, state and municipal departments, of railroad, telegraph, telephone, electric light, gas and waterworks companies, real estate and trust corporations, building and loan associations, fire, life and accident insurance companies, solicitors' and underwriters' agencies, benevolent societies, lodges, banks and other financial institutions, factories, wholesale commercial and mail order houses, publishers, advertising agencies, and other concerns, including men, lawyers, physicians, occultists, dentists, specialists, etc.

By means of the card index system, names, facts, figures of any description, recorded on cards of uniform size, are arranged alphabetically, numerically, territorially, chronologically, or according to any suitably defined order in boxes, trays or drawers of cabinets of special design. Various plans, ranging from simple and complex, are used for special indexing. All, however, are transparently concise in arrangement and of facile adaptation for reference. The most simple form of card-indexing is the alphabetical-subject plan in which the name is indexed alphabetically and the subject indicated by different tab cards. In territorial card-indexes, the names are first classified by states, with alphabetical guides for each city or commercial community in the state, the cards bearing the records of firms or individuals being filed back of the alphabetical guides. Chronological card-indexes are divided into monthly, daily and alphabetical sections, distinguished by different colored cards, and back of each monthly guide is arranged a set of blank daily guides, so that cards may be filed in advance for attention on any day of any month. Each card with its record has an individual existence in its relations to others of the system, and is always to be found in its place in the system, facilitating the cumulative and expansive principle of the index, which allows cards to be added or withdrawn as needed. Guide or signal cards of different colors with projecting edges or tabs facilitate the immediate finding of the card for rapid reference; the liberal use of these signal cards, carefully inserted in long lists of the same surnames, also obviates a considerable amount of handling and saves time, labor and the wear and tear of the cards.

One of the most ingenious uses of the card system for commercial purpose is its application to the keeping of ledgers, of which the loose-leaf ledger is an offshoot in the developing process of commercial card-indexing. The card ledger does away with the necessity of purchasing books, ledgers or binders and accounts can be posted, checked up, trial balance taken off and statements mailed in approximately half the time required for a book ledger. Accuracy is also promoted by each card representing one account only, which can be laid on the sales sheet or other original record, thus lessening the liability to error in posting. Each account being on a separate card is easily indexed, and no separate or cross-index is required; more perfect indexing is thus ensured; as the number of accounts per year by year, sets of index cards, with as many subdivisions of the alphabet as desired to facilitate quicker reference, may be substituted for the original set. Statements can be taken off promptly at the first of the month, and where necessary, several clerks can do the billing at the same time, which is impossible with the book ledger. Open accounts only are kept on the regular file; all closed accounts are removed and indexed in a separate file, the only practical method of providing for closure. Various plans, ranging from simple and complex, can be easily referred to as open ones. The card being removed from the files when the account is closed, and replaced when opened, also obviates the former necessity of transferring accounts from one ledger to another, at the end of each year. Finally the card index ledger can be profitably used for mailing and circular lists. Modern business houses no longer file their correspondence in the old letter boxes. There are various card systems, but the principal scheme is to have a cabinet in place
of the separate pasteboard letter boxes. This cabinet is divided into drawers, each deep and wide enough to hold the largest business letterheads when standing in a vertical position. The drawers themselves are divided into compartments for classifying the letters and separa-
tes by Manila dividers between which a
folder of heavy pasteboard. Marginal index guides on the dividers afford a mechanism for quickly finding any name or classification desired. Supple-
menting this are various schemes involving different kinds of cabinets for cross-indexing cards, by which the subject matter of letters or the names of the writers as well as of the
firms from which letters are received may be indexed. Consult Byles, B. B., 'The Card
Index System' and articles in System (Febru-
ary 1912) and Engineering Magazine (July
1913).

CARDAMINE, kärd'dā-mîn, a genus of
plants of the family Brassicaceae, containing
about 60 species with a very wide distribution.
They are herbaceous plants with usually pin-
nate leaves, white or lilac flowers of the usual cruciferous type, and the siliquose fruit which
characterizes a section of the family. One of
the best-known European and American species is the cuckoo-flower (C. pratensis),
growing in wet places from Vermont to New
Jersey, westward to Wisconsin, and south to
C. hirta is a common weed in eastern North
America, varying in size, according to soil,
from 6 to 18 inches in height. The leaves and
flowers of this species form an agreeable
salad. Numerous other species also occur in
North America.

CARDAMON, the seeds of several species of
plants of the family Zingiberaceae, perennial
plants growing in Asia and Africa. The fruit
is used as a stimulant and aromatic. Triangular
capsules, from four to five inches in length,
contain the seeds, which are of a brown color,
a pleasant, aromatic odor and a warm, pepper-
like taste. The cardamoms known in the shops are produced by Anomum augustinfolium, a
Madagascar plant, and A. cardamon, a native of
Sumatra and other Eastern islands. Those
reared in the United States pharmacopoeia,
called true or officinal cardamoms, and known
in commerce as Malabar cardamoms, are the
produce of Elettaria cardamomum, a native of
India. The seeds of cardamon are widely em-
ployed in medicine as the basis of vehicles for
carrying disagreeable drugs, and also as car-
minatives and digestants. The volatile oils of
cardamon act like other volatile oils in stimu-
ulating peristalsis, thus expelling excess of in-
testinal gases, and they also increase the gastric
and intestinal secretions.

CAR DAN, or CAR DANO, Girolamo,
Italian philosopher, physician and mathemati-
cian: b. Pavia, 24 Sept. 1501; d. Rome, 21
Sept. 1576. He was educated from his fourth
year in the house of his father. At 20 he went to
Pavia to complete his studies, and after two
years he began to explain Euclid. In 1524 he
took the degree of doctor of medicine at Padua and spent the following seven years practising medicine at Sacco. He was sub-
sequently professor of mathematics and medi-
cine in Milan (1534). In 1532 he journeyed
through Europe, became professor of medicine at Pavia and at Bologna, where he
remained eight years. He was forced to re-
sign from the university after his imprison-
ment on the charge of teaching heretical doc-
tines. Pope Gregory admitted him to the
College of Physicians at Rome, where he con-
tinued until his death. His biographers differ with regard to his religious opinions, but he was lost in calabistic frenzies and para-
noia, and pretended to have a familiar demon from whom he received warnings, etc. All this ex-
cited the theologians against him, who even
accused him of atheism, though the charge was
without foundation. He believed so implicitly
in astrology that he drew his own horoscope
several times, and ascribed the falsehood of his
predictions, not to the uncertainty of the art,
but to his own ignorance. His two works, 'De
Citatione Rerum' (1531) and 'Varia-
tate Rerum' (1545) contain the whole of his
natural philosophy and metaphysics. Cardan
wrote also on medicine, and his fame as a
physician was very great. His highest claims
to the gratitude of the learned rest on his
mathematical discoveries. In 1547 it was
told that Tartaglia had discovered the solu-
tion of cubic equations, and obtained the secret
from him by stratagem and under promise
of silence, but published the method in 1545, in his 'Ars Magna.' The honor of giving
his name to the invention has remained to him
who first made it known, and it is still called
the formula of Cardan. It is universally be-
lieved that Cardan discovered some new cases,
which were not comprehended in the rule of
Tartaglia; that he discovered the multiplicity
of the roots of the higher equations, and, finally the existence of negative roots, the use
of which he did not, however, understand.

Besides the works already mentioned there remain also'Practica Arithmetica Uni-
versalis' (1539); 'De Libris Propriis' (1571-75); 'Encomium Ge-
ometriae' (1535); 'De Regula Aliza, Excereto
Mathematicorum, Sermo de Plus et Minus'
(1540-50). The standard collection of Car-
dan's works is that of Spoliano. Consult
Morley, 'Jerome Cardan' (London 1854); Rixner and Siber, 'Leben und Lehr-
meinungen berühmter Physiker am Ende des
XVI. und am Anfange des XVII Jahrhun-
derts' (Sulzbach 1820); Firmiani, 'Girolamo
Cardano, la vita e l'opere' (Naples 1894).

CARDAUNS, kär'douns, Herrmann, Ger-
1847. He was educated at the universities of
Bonn, Munich and Gottingen, lectured on history
at Bonn in 1872-76 and from 1876 to 1907 was
editor-in-chief of the Kölnische Volkszeitung.
After 1907 he was engaged in literary work at
Bonn. He also served as general secretary of
the Göttingen student after 1891; was presi-
dent of the German Catholic Congress at
Mannheim in 1902. He has published 'Die
Reformatione Bernensis' (1868); 'Papst Alex-
ander III' (1874); 'Der Alte Fuhrmann'
(1875); 'Chroniken der Stadt Köln' (3 vols.,
1875-78); 'Erzbischof Konrad von Hostaden'
(1880); 'Der Sturz Maria Stuarts' (1883);
'Friedrich von Spee' (1884); 'M. Stuart,
1566-68, Memoiren ihres Sekr. Cl. Nau'
(1884); 'Die Erzählung der Füter des Eza-
poeten, a novel (1887); 'Die Glaubenslehre
des Johannes Reusch,' novel (1888; 1908);
CARDEN, Sir Lionel Edward Gresley, British Ambassador: b. 15 Sept. 1851. After education at Eton College, he went to Havana in 1877 as vice-consul, and in 1883 accompanied Sir S. St. John’s special mission to Mexico. In 1885 he was appointed British consul in the city of Mexico, and until 1889 was British commissioner on the Mexican Mixed Claims Commission. From 1898 to 1902 he was consul-general and from 1902 to 1905 British Minister to Cuba. In 1911 he was appointed Envoy extraordinary and Minister plenipotentiary to the republics of Central America; in 1912 was created K.C.M.G.; and in 1913 went to Mexico as British Minister. His recognition of the Huerta government was regarded in some quarters as indicative of an anti-American policy.

CARDEN, Sackville Hamilton, British admiral: b. 1857; entered the navy in 1870, served in the Egyptian War of 1882, in Suakim in 1884 and with the Benin Expedition in 1897. After holding various commands afloat and ashore he became admiral superintendent of Malta dockyard in 1912. In the European War he commanded the British naval force that made the first attempt to break through the Dardanelles in February 1915, assisted by a French squadron under Rear-Admiral Guépratte. After operating for a whole month the great attack on the Narrows failed, with a loss of three battleships and more than 2,000 men. The failure clearly demonstrated that ships alone could not force the passage. Vice-Admiral Carden was compelled by ill health to relinquish his command in March 1915. See War, European — Dardanelles Campaign.

CÁDENAS, kár'dá-nás, Cuba, a seaport in the province of Matanzas, situated on Cárdenas Bay, due east of Havana on the north coast of the island. It is connected with Havana by rail, and has a large trade in sugar and molasses. On 11 May 1898 the Spanish shore batteries and gunboats at Cárdenas attacked the United States vessels blockading the port, and in the engagement the United States torpedo-boat Winslow was disabled, and Ensign Worth Bagley (q.v.) and four sailors were killed. Pop. 32,028.

CARDI, kár'dé, Lodovico, surnamed Cigoli, Italian painter and architect: b. on an estate in the Arno Valley known as Castelvecchio, 12 Sept. 1559; d. Rome, 8 June 1613. The name by which he is commonly known, Cigoli, is that of the village where he was born. He studied painting under Allori in Florence and architecture under Buontalenti, who introduced him to Santì di Tito of the same city. His first important work dates from about 1581; it is a representation, in fresco, of Christ that the young artist made for the grand cloister of Santa Maria Novella at Florence. His most celebrated picture, ‘The Lame Man Cured,’ which unfortunately no longer exists, formerly adorned Saint Peter’s at Rome. Sacchi thought that it was entitled to hold the first place among the pictures in Rome, after ‘The Transfiguration’ of Raphael and the ‘Saint Jerome’ of Domenichino. His ‘Martyrdom of Saint Stephen,’ executed for the convent of Monte Domini, his ‘Tobias and the Angel,’ in the Hermitage at Petrograd, the ‘Saint Francis,’ in the Borghese, Rome, his own portrait, in the Uffizi, Florence, and ‘The Flight into Egypt,’ in the Louvre, Paris, are all noteworthy. His influence was extraordinary, according to Tiepolo, and he was the founder, in Florence, of the baroque style as exemplified in painting.

CARDIA, the upper or cardiac orifice of the stomach, where the gullet or oesophagus enters it, as distinguished from the intestinal opening or the pylorus.

CARDIAC MEDICINES, medicines which act upon the heart. See Heart.

CARDIALGIA, an intense pain over the general heart region. It is usually due to stomach disturbance, heartburn, and is often accompanied by pains in the oesophagus. Heartburn is nearly always due to the presence of large amounts of gas, causing pressure. These gases usually accompany and cause an indigestion. See Heart.

CARDIFF, Ira D., American botanist: b. Stark County, Ill., 20 June 1873. After study at Knox College, at the University of Chillicothe and at Columbia University he was appointed 1906-07 assistant professor of botany, and 1907-08 professor at the University of Utah. In 1908 he became professor of botany at Washburn College, Topeka, Kan., and in 1909 director of the Washburn Summer School. He
was professor of botany in the University of Kansas summer school 1911-12. His contributions to the "Crimson and Matronal Gazette" and the "Torrey Botanical Club's Bulletin" made him well known to fellow botanists.

CARDIFF, Wales (Welsh, Caerdydd, perhaps the fortress on the Taif, but derivation uncertain), a municipal and parliamentary borough, raised to the rank of a city (with the title of lord mayor for its chief magistrate) by royal charter in 1905, a seaport on the Bristol Channel, the capital of Glamorgan and the largest town in Wales. The city is built on both banks of the river Taif, a mile above its junction with the estuary of the Severn (known as the Bristol Channel) and extends to the rivers Rhymney on the east and Ely on the west. It is 135 miles west of London, on the Great Western main line from London to New Milford and Fishguard (for Ireland).

Geology.—Almost every geological formation from the Siarian up to the coal measures is found in the ring of higher ground surrounding the plain of recent alluvial deposits on which the city stands.

Trade and Development.—The rapid increase of the last century is due to the development of the coal trade consequent upon the construction of the Bute docks. The first dock, completed in 1839, was built by the second Marquess of Bute, and five great docks have since been constructed at a cost of £5,500,000. Their total water area is over 200 acres, and the shipments of coal exceed 20,000,000 tons per annum. There are also docks at the adjoining ports of Penarth and Barry. The coal is worked in collieries to the north (nearest colliery nine miles) and shipped at the docks below the city, which is singularly free from any evidence of the staple trade. The fine, wide streets, abundance of trees, freedom from smoke and other evidences of progressiveness are a surprise to visitors. Besides the dock operations, the most important works are the Cardiff Dowlais steel works, the Tharsis Copper Works, numerous ship repairing yards, extensive flour mills, biscuit works, ice and cold storage (with large import trade) and steam trams for the mining industry. The import trade has been developed of late years and Cardiff is now the chief wholesale centre for supplying the teeming populations of the mining valleys of Glamorgan and Monmouth.

Railways.—The Great Western Railway and its connections provide a good and quick service to distant places, while the local railways constructed primarily for mineral traffic, the Taif Vale, Rhymney and Barry respectively, communicate with the districts adjacent. The Midland and London and North Western company have good depots.

Government and Public Works.—The government of the city is vested in the lord mayor, aldermen and councillors. The oldest surviving charter, granted sometime before 1147, evidenced the existence of rights and privileges extending to a much earlier time. Other charters were given by the feudal lords, and later by the Crown. Cardiff returns one member to the House of Commons.

Public Buildings.—The public buildings are being grouped in a park of 50 acres. The town-hall and law courts (cost, £330,000) are completed, as are also the offices of the University of Wales, new buildings for the University College of South Wales and Monmouth and the National Museum. The secondary and elementary schools are modern, and efficiently equipped and administered, and special provision is made for blind, deaf and dumb, and defective children. Other public buildings include the post-office, custom-house, offices of the Board of Trade and Mercantile Marine, hospitals, etc. The castle, restored and extended at great cost by the third Marquess of Bute, is maintained as one of the residences of his successors.

Libraries.—The public libraries contain 156,000 volumes and include the largest collection of Welsh books and manuscripts in existence. The school library system of the city is one of the best in existence. The museum and art gallery, about to be merged in the National Museum of Wales, contains modern paintings and sculpture; Swansea, Nantgarw and other porcelain, and examples of pre-Norman sculptured stones and crosses.

Churches.—The only ancient church is Saint John's with a fine decorated tower, built in 1473, by Anne Nevill, who inherited the lordship of Glamorgan. She was the wife of Richard Nevill, Earl of Warwick ("the kingmaker") and mother of Anne, afterwards Duchess of York, known as Richard III. There are numerous modern Episcopalian, Roman Catholic and Nonconformist churches. The ancient cathedral of Llandaff is just outside the city boundary.

History.—The Romans had an important station here, extensive remains of their fortifications having recently been discovered in the castle grounds. According to tradition, Cardiff was an important place under the Welsh princes before the Roman occupation; it was certainly a stronghold of the Welsh after the departure of the Romans, and was ravaged by Danes and Norsemen. After the Norman conquest the district was subdued by Robert Fitzhamon and his followers, who established a powerful Marcher Lordship with Cardiff as the capital. The Castle Keep was erected inside the Roman fortification by the Norman lords. The town and district were in the hands of the feudal lords for centuries, and the scene of several bitter contests between the Welsh and their alien masters. Cardiff was at this time surrounded by a high and massive wall and a moat, while the castle, with its law courts and other appanages of feudalism, was a very strong place, guarded by relays of soldiers supplied in rotation from the forces of the under lords, who had castles in the surrounding districts. The lordship reverted to the King in 1495 and was in 1550 granted, stripped of its feudal privileges, to Sir William Herbert, afterward first Earl of Pembroke, from whom it has descended to the Marquess of Bute.

During the civil war Cardiff was an important centre of operations, and was held by the forces of the King and of Cromwell in turn. It was visited by Charles I in 1645, who there sought to revive the loyalty of his followers, but with poor success. The decay of feudalism stripped the town of its importance and it continued to decline until the dawn of the era of coal and iron. The navigator, Button, the captain of the "Colossus," was a native of Cardiff.
Population.—In 1801 the population was 1,820, and 50 years later, 18,351. In 1911 it was 182,259.

Bibliography.—'The Cardiff Records' (6 vols., published by the city council); 'Cardiff,' an illustrated handbook, edited by Ballinger (1896).

JOHN BALLINGER, Librarian of the Public Libraries.

CARDIGAN, Adeline Louisa Maria, Countess of, Comtesse de Lancastre: b. 24 Dec. 1824; d. England, 25 May 1915. She was the daughter of Spencer de Horsey, M.P., a notable man of fashion in his day, and her mother was a daughter of the 1st Earl of Stradbroke. One of her brothers was a general in the army, and another an admiral in the British navy, while a son of the latter is a rear-admiral. Miss de Horsey was highly educated in several languages, ancient and modern, and was reported an expert in fencing, riding, dancing, and music. In 1858 she married the Earl of Cardigan (q.v.), who died in 1868. She married, secondly, the Count de Lancastre Saldanha, a Portuguese nobleman, who died in 1898. She was a celebrated beauty in her day, and had known Tennyson, Wellington, Trafalgar, Theodore Hook and Tom Moore. In 1909 she started British society circles with a volume of 'Recollections,' a collection of anecdotes of prominent people she had met in her early life. Some of the tales were of a scandalous nature and not all of them were true, which raised a storm of protest from the descendants and relatives of the people referred to. She was in her 91st year when she died, and it is not improbable that old-age garrulity and confused memory were responsible.

CARDIGAN, James Thomas Brudenell, Earl of, English general: b. Hambleton, 16 Oct. 1797; d. 28 May 1868. He was educated at Christ Church, Oxford, and was gazetted 6 May 1824, as cornet in the 8th Royal Irish Hussars, under the courtesy title of Lord Brudenell. He quickly made himself known for his ability and wealth in England procured for him a rapid promotion, and in a few years he had attained the rank of major. Lord Brudenell was next, 3 Dec. 1830, made lieutenant-colonel of the 15th Hussars. He was a member of the House of Commons from the period of his coming of age in 1818, until 14 Aug. 1837, when on the death of his father, he became Earl of Cardigan. After his regiment returned from India Lord Cardigan got himself into difficulties with the officers, who, one by one, had to sell out until the feeling of the regiment broke into mutiny in what was known as the "black bottle quarrel." This quarrel arose in 1840, while Lord Cardigan's regiment was stationed at Canterbury. One of his officers, Captain Reynolds, having caused wine to be placed on the table in a "black bottle," Lord Cardigan accused him of degrading the mess to the level of a pothouse. This led to angry words: Captain Reynolds was placed under arrest, demanded a court-martial, but this privilege was withheld from him, and as the public thought, unjustly. The excitement created by this affair and by his subsequent misunderstanding with another officer, also of the name of Reynolds, had partly subsided, when he fought a duel with Capt. Harvey Tuckett because this officer had censured his conduct in the Morning Chronicle. Captain Tuckett was wounded, and Lord Cardigan tried before the House of Lords, but, although acquitted, public opinion was against him. His reputation, however, as an accomplished cavalry officer, and the satisfaction which the Duke of Wellington expressed in 1848 with the efficiency of the 11th Hussars' Regiment, which was under Lord Cardigan's charge, led to his promotion. On the outbreak of the Crimean War Lord Cardigan was raised to the rank of major-general and appointed brigadier in command of the light cavalry brigade. His brigade constituted the celebrated "Six Hundred," whose charge at Balaklava will long be remembered as one of the bravest yet wildest feats, perhaps, ever told in the history of war. On that occasion (25 Oct. 1854), Lord Cardigan is said to have received from Lord Lucan, his brother-in-law, an order to capture certain guns from the Russians. A mile and a half had to be traversed, under fire, before the enemy could be met, and the Russian forces stood in formidable array in every direction, which seemed hopeless. Cardigan, however, led on the charge, and actually took the guns, his men cutting their way through the infantry support and through the cavalry, and then back again, under the play of the Russian batteries, but with fearfully diminished numbers, the survivors not exceeding 150. As the hero of this daring exploit, Lord Cardigan was received with great enthusiasm on his return to England and appointed inspector-general of the cavalry. The charges, however, subsequently alleged by the Crimean commissioners, tended to reduce the high estimate placed upon his services. He published 'Cavalry Brigade Movements' (1861). See CARDIGAN, Countess of.

CARDIGAN, Wales, a seaport town and municipal borough, capital of Cardiganshire, on both banks of the Teifi, about three miles from its mouth, and 42 miles northwest of Carmarthen by rail. The most noteworthy buildings are the ancient chancel of Saint Mary's Church, a fine specimen of early Perpendicular architecture; the shire hall, Cardigan county school, etc. Cardigan Castle, originally the 11th century and famous in Welsh history, stands at the foot of an eminence near the bridge, two circular bastions only now remaining of it. Brick, tile and pottery works are here, and two iron-foundries are employed chiefly in the manufacture of agricultural implements. The salmon fishery is extensively carried on in the neighborhood, and many of the male population are engaged in the mercantile navy. Pop. 3,578.

CARDIGANSHERE, Wales, a maritime county, having Cardigan Bay on the west and on the land side chiefly Ceredigion, Brecknock, Radnor and Montgomery; area 443,189 acres. The northern and eastern parts are mountainous, the southern and western districts more level. The soil in the vales is chiefly peat, capable of growing either grain or grass, by the application of lime or its substitutes. The grass consists of a light sandy loam, and the mountains are composed chiefly of clay-slate. The agricultural produce is comparatively small. Cattle, sheep and wool are the staple commodities. The chief crops are barley and oats, very little wheat being grown. The lead mines still yield
lately, and zinc is obtained in several places. The coast-line is long, and many of the male population are sailors and fishermen. The principal towns are Cardigan, the county capital, Aberystwyth, Lampeter, Tregaron and Aberaeron. The chief crops are potatoes, vegetables, and woolens. The county returns one member to Parliament. Pop. 59,870.

CARDINAL-FISH, a fish of the family Chelidonotidae, characterized by two dorsal fins, the anterior of which consists of from six to nine spines. The anal fin is short and has only two spines. The scales are large and the color is often bright red, whence its name. They are especially abundant in the East Indian seas; but several species are found in America, one of which is known as the "king of the mullets." 5

CARDINAL FLOWER, the name commonly given to Lobelia cardinalis, because of its large, very showy and intensely red flowers. It is found in North America, growing on the muddy banks of streams. The stems are two or three feet high, the flowers in racemes. It admits of cultivation and is much prized abroad, particularly in England.

CARDINAL GROSBEAK, OR RED-BIRD, a large song-bird (Cardinalis cardinalis) of the finch family, very numerous in the southern United States. It migrates northward in spring, but never farther than Massachusetts. It is particularly distinguished for its loud, clear, sweet song, whose quality makes it popular as a cage-bird. It is a brilliantly red bird, with a vermilion head, its bill surrounded with a small band of glossy black, and having the long feathers of the crown erected into a conical crest. The female builds her nest, which is made of twigs, grasses, roots, etc., in bushes, and frequently breeds twice in a season, her bluish, brown-spotted eggs numbering about four. This bird is migratory only to a small degree, moving southward only along the northern limits of its range, and occasionally passing the winter in village gardens even in New England.

CARDINAL NUMBERS. See ALGEBRA.

CARDINAL POINTS, the four intersections of the horizon with the meridian and the prime vertical circle. They coincide with the four cardinal regions of the heavens, and are, of course, 90 degrees distant from each other. The intermediate points are called collateral points. See COMPASS.

CARDINAL VIRTUES, in morals, a name applied to those virtues to which all the rest are subordinate, or which comprehend all the rest. Of the virtues, which lies at the foundation of this notion, had its origin in the old Grecian philosophy, and the same number is found here as in the elements of nature. These principal virtues, as enumerated by Plato, are prudence, temperance, fortitude and justice. The first three seem to relate to the duties of man toward himself and to correspond with the triple division of the soul into the intellectual, the irrational (the seat of the sensual desires) and the seat of the affections. Justice either relates to our duties to others (Cicero, "De Officis,"), or is the union of the three first virtues. This division appears to be peculiar to the old Pythagoreans. Aristotle divided them still further. The Stoics, too, made the same division in their system of morals and Cicero introduced it into his "De Officis." Plotinus and many New Platonists divide the virtues into four classes — civil or public, philosophical, or purifying, religious, and, lastly, divine or pious virtues; a division coinciding with the rest of his philosophical views. In Roman Catholic theological systems, the cardinal virtues follow Plato. But there is a prior division into theological and moral virtues, the former being those of faith and charity. The imagination of artists has represented the cardinal virtues under sensible images. In modern times this division is regarded as useless in treating of ethics.

CARDINAL VON WIDERN, Kär'dé-nál von vid' dern, George, German military historian; b. Wollstein, 12 April 1841. He entered the army in 1859; was engaged in the war of 1866 and the Franco-Prussian War; and was professor of the military school at Neisse. He retired in 1890 and has since lived in Berlin. He wrote "Der Rhein und die Rheinfeldzüge" (1869); "Belgien, Nordfrankreich und die Rhein- und Holland als Kriegsfeld"; "Die Russischen Kavallerie-divisionen und die Armeecorps im Balkanfeldzug" (1878); "Das 76 Armeeorgan und der Kampf an Flusslinien" (1880); "Kritische Tage" (1900); "Verwendung und Führung der Kavallerie 1870-71" (1903); "Erörterung von der Polen im heutigen Deutschland" (1912).

CARDINALS, College of, an ecclesiastical body consisting of the highest dignitaries in the Roman Catholic Church. The name cardinal is applied to one of the principal advisers of the Supreme Pontiff as it is to the principal virtues or to the four points of the compass; etymologically cardinal is from cardo, hinge, pivot, tenon, point around which anything turns. In the 11th century the term cardinal appears to have come into use to designate the "bishops collateral to the Pope," those whose sees are in the neighborhood of Rome, and to the clergy of the principal churches, parishes or tituli of the city; but probably cardinalis was at first said of a principal church rather than of its ministers. Nor was the term cardinal at first restricted to designation of churches and their clergy in Rome and its vicinity; for a long time, even down to 1585, date of the bull "Postquam" of Sixtus V, which forbade the application of the term to any but members of the sacred college, it was customary to call the ecclesiastics attached to mother-churches or to all cathedrals even, cardinales. The use of the word "cardo" or its equivalent to express the relation of a bishop to his clergy and people is very ancient: Saint Ignatius, bishop of Antioch (d. about 102), speaks of the bishop of a church as the "cardo" of his people. Till the issuance of the bull "Postquam" the title of cardinals was currently bestowed, but not by authority from the centre, upon the clergy of cathedral chapters in countries beyond the Alps, as those of the sees of Bourges, Metz, Cologne, Compiègne and other cities in Germany, Spain and France; and the same usage was common; for it was with the
name Cardinalis as with the name Pope: they both were originally applied to church dignitaries, to pastors and Church officers generally; later their application was restricted.

Ever since the reign of Nicholas II the cardinals have possessed the privilege of electing the Pope. The decree of Pope Nicholas (1059) provides that on the death of the Pope the cardinal-bishops shall assemble in council and then the rest of the sacred college shall join them. In naming the Pope the college must take into account the choice of the clergy and people; only in case no Roman priest is found eligible in every way, shall the choice fall upon one that is not a Roman. In the 12th century the sacred college comprised seven cardinal-bishops of the "suburbicarian" churches, Ostia, Rufina, Porta, Albano, Tusculum, Sabina and Palestrina; the cardinal-priests were 28, and were the rectors of as many churches in the city; there were 18 cardinal-deacons, of whom 14 belonged to the clerical staff of churches in the city and 4 to the papal court or household. The bishops of the sacred college are very styled by the titles of churches in the city, but are no longer in any sense ministers of those churches or parishes. And, like other Church offices and Church dignities, the cardinalate became a sort of ambition or of a superstitious popes bestowed the honor, princes and popes bestowed the dignity and the emoluments of episcopal and primatial sees, with the cardinalate annexed upon minors and infants; thus, John de Medici was raised to the cardinalate at the age of 14 years, being already vested with a number of highest Church dignities; and as late as 1740 a prince of the house of Bourbon was archbishop of Toledo and cardinal at the age of eight years.

According to the present constitution of the sacred college that body consists of 70 members though very rarely indeed, if ever, are all the places filled. Of the 70 six are cardinal-bishops, and they are the ordinaries of sees in the neighborhood of Rome; 50 cardinal-priests and 14 cardinal-deacons. In 1916 the cardinal-bishops numbered 4, all Italians; the cardinal-priests 48, and of these 5 were Spaniards, 5 were Frenchmen, 2 German, 1 Belgian, 3 American, 3 British and Irish, 3 Austrians, 2 Hungarians, 1 Bohemian, 1 Portuguese, 1 Canadian, 1 Brazilian; the rest were Italians. There were 8 cardinal-deacons, among them 1 Dutch, 1 German; the rest were Italians.

The scarlet hat is distinctive of the cardinalitial dignity, and above the double cross in the arms of the archbishop who is a cardinal is the figure of the scarlet hat with its tasseled pendants. The gown of the cardinal is scarlet (purpura, commonly rendered purple, but our "purple" in the language of the ritual is violet, violaceus). Hence "to receive the hat" means to be made a cardinal; and to aspire to the purple is to aim at the cardinalitial dignity. Etiquette requires that a cardinal be addressed as Eminence; in English usually "your Eminence," and every cardinal is eminencississimus. A bishop or archbishop who is a cardinal uses such a formula as the following in official instruments (the example is taken from the approbation of a book by an archbishop of Mechlin or Malines in Belgium):

*Engelbert, by the divine mercy, cardinal-

priest of the holy Roman Church, of the title of Saint Bartholomew in the Island, archbishop of Mechlin, primate of Belgium,* etc.

CARDING, the process which wool, cotton, flax, etc., are made to undergo previous to spinning, to lay the fibres all in one direction and to remove all foreign substances. The card formerly consisted of a strip of iron, 4 ft. long, teeth fixed on leather strips called card-clothing, which are arranged on a series of cylinders so placed that the material is carried from one to another, until removed by still another and much smaller cylinder called the doffer, from which it is stripped by a moving comb, and then by a series of rolls is delivered in the form of a ribbon into a can, when it is ready for the drawing-frame, on which it is prepared for spinning. Consult Murphy, 'The Textile Industry' (Vol. II, London 1912).

CARDIOD, a heart-shaped curve. It is produced by drawing a great number of chords from a single point of the circumference of a circle, prolonging each beyond the further crossing of the circumference to a distance equal to the diameter of the circle, and joining the free ends by a smooth curve. It is a special case of the limaçon, in which the extension of the chords is of any uniform length. The limaçon was invented by Pascal, early in the 18th century.

CARDITIS, kār-dī'tis, an inflammation of the heart. The word is not now used, since more definite terms are accessible to designate particular types of inflammation. Thus myocardiit is an inflammation of the heart muscle, endocarditis, of the lining membrane, the endocardium; pericarditis, of the external membrane, the pericardium.

CARDONA, kār-dō'nah, Spain, town in the province of Barcelona, on the right bank of the Cardoner, 50 miles north-northwest of Barcelona. It is a picturesque town of great antiquity, surrounded by Moorish walls and castle, and a church dating from the 12th century. In its vicinity is a hill of rock salt 265 feet high and three miles in circumference, which affords inexhaustible supplies of salt. Pop. 4,002.

CARDON, a garden vegetable (Cynara cardunculus), of the natural order Compositae. It so closely resembles the artichoke (Cynara scolymus) that some botanists consider the two species merely as horticultural varieties. The plant, which is a native of southern Europe and the northern part of Africa, is a thistle-like, tender perennial which is cultivated as an annual. Seed is usually sown in spring in a hothed; the young plants are transplanted to the rich soil of the garden about four feet apart each way and kept cleanly cultivated until the leaves are nearly full grown, when the plant is tied up, covered with straw and earth, to blanch for two or more weeks. The thick leaf-stalks and the mid-ribs are the parts desired. In America the plant is not very popular except with the foreign population.
CARDS, pieces of cardboard, oblong in shape, bearing certain figures and spots; specifically, playing-cards used in various games of chance and skill. Playing-cards are probably an invention of the East, and some assert that the Arabs or Saracens learned the use of cards from the gypsies and spread them in Europe. The Chinese dictionary 'Ch'ing-tze-tung' (1678) states that they were invented for the amusement of Sùn-ho's concubines in the year 1120 A.D. The course that card-playing took in its diffusion through Europe shows that it must have come from the East, for it was found in the eastern and southern countries before it was in the western. The historical traces of the use of cards are found earliest in Italy, then in Germany, France and Spain. The first cards were painted, and the Italian cards of 1299 are found to have been so. The art of printing cards was discovered by the Germans between 1530 and 1560. The Germans have, moreover, made many changes in cards, both in the figures and the names. The Lanzknechtspiel, which is regarded as the first game with cards, is a German invention. Of this game we find an imitation in France, in 1392, under the name of lansquenet, which continued to be played there till the time of Molière and Regnard, and perhaps still longer. The first certain trace of card-playing in France occurs in the year 1361, and Charles VI is said to have amused himself with it during his sickness at the end of the 14th century. The modern figures are said to have been invented in France between 1430 and 1461. It has been said that cards were known in Spain as early as 1332; but what is certain is that card-playing must have become prevalent in the course of the century, seeing it was prohibited by the King of Castile, John I, in 1387. Mr. De la Rue, the most extensive manufacturer of cards in England, obtained in 1832 a patent for various improvements in manufacture. The figures on cards had been generally produced by the outlines first being painted on copper plates, and the colors then filled by stenciling. Mr. De la Rue's process was to print them from colored types or blocks exactly in the same way as calico-printing, but all the colors being in oil.

As early as the 15th century an active trade in cards sprang up in Germany, and was chiefly carried on at Nuremberg, Augsburg and Ulm, the demand from France, England, Italy, Spain and other countries producing great prosperity among the manufacturers. In England the manufacture of cards flourished especially under Elizabeth. But no sooner had cards come to be generally used in Europe, than they were prohibited by several governments, partly from moral considerations, the first games being games of chance; partly from considerations of political economy, as in England, where the importation of foreign cards was injurious to the prosperity of home manufacturers. The prohibition, however, only tended to increase the taste for cards. In England, under Richard III and Henry VII, card-playing grew in fashion; and in his latter days, his daughter Margaret was found playing cards by James IV of Scotland, when he came to woo her. The popularity which cards gradually obtained in England may be inferred from the fact that political pamphlets under the name of 'Bloody Games of Cards,' and kindred titles, appeared at the commencement of the civil war against Charles I. One of the most striking publications of this kind was one in 1660 on the royal game of ombre. Pepys, in his 'Diary,' under the date of 17 Feb. 1667, states that on Sabbath evenings he found 'the Queen, the Duchess of York, and another or two, at cards, with the rooms full of ladies and great men.' The modern pack of cards, used in most of the familiar games, is 52 in number, containing four suits; clubs and spades (black) and hearts and diamonds (red). Thirteen cards compose a suit, consisting of king, queen, knave or jack, and 10 pip-cards ranging in number of spots from one (ace) to 10. The figures of the four suits are supposed to have been originally intended for symbolic representations of the four great classes of men, and the names attached to these figures in England arose from a misapprehension of the names originally assigned to them. Thus, by the suit of clubs (aurore), the gents de chœur (clerks), the choir-men or ecclesiastics, and hence these are called cops, or chalices, by the Spaniards, whose word espada, sword, indicating the nobility and warriors of the state, has been corrupted into the English spade. The clubs were originally trefoils (trefoil leaves), and denoted the peasantry while the citizens and merchants were marked by the diamonds (carreaux, square tiles). The word knave (German, Knab, boy), was used, of course, in its older sense of servant, or attendant on the knights. The natural rank of the cards in each suit is, king highest, and so on down to ace lowest; but in many games this rank is varied, as in whist, where the ace is put highest of all; above the king; in écarté, where it is put between the knave and the 10; and in bêzique, where it is made the highest, but where the 10 is put between it and the king; in quadrille, the rank of some of the cards is variable in every hand. Sometimes the pack of cards is reduced to 32, by including the six, five, four, three and two of each suit; it is then called a 'piquet pack.' An immense variety of games may be played with cards, some involving chance only, others combining chance and skill, the best furnishing intellectual amusement. There are round games, in which any number of persons may join, as poker, hearts, loo, etc.; games for four persons, as whist, in its different forms, and euchre; for two, as piquet, écarté, bêzique, cribbage and pinochle, closely resembling bêzique, and at present much played in the United States; and there is one game, solitaire, played in many ways, at which a single person often finds both restful diversion and pleasant occupation for the mind.

Consult Singer, 'Researches into the History of Playing Cards' (London 1832), Chatto, 'Origin and History of Playing Cards' (London 1848); Willshire, 'Descriptive Catalogue of Playing and Other Cards in the British Museum' (London 1876); Taylor, 'The History of Playing Cards' (London 1848); Merlin, R. 'Origine des cartes' (Paris 1869); Van Rensselaer, 'The Devil's Picture Books' (New York 1890); id., 'Prophetical, Educational and Playing Cards' (Philadelphia 1912); Jessel, 'Bibliography of Works in Eng-
lish on Playing Cards and Gambling (London 1905); D'Allemagne, 'Les cartes à jouer' (Paris 1906), a very detailed account.

CARDUCCI, Kär-doo-chē, Giosue, Italian poet: b. Valdicastello, Tuscany, 27 July 1835; d. Bologna, 15 Feb. 1907. During his boyhood, which was spent in Tuscany, his father, a dissipated, hot-headed doctor, was his only teacher. An ardent admirer of Manzoni, Latin literature, and the French Revolution, he inspired his son with his own love of literature, thus giving him early those ideas and sentiments that were later on, to make him one of the great leaders of his country, and the most distinctive Italian innovator in literature of all time. 'I Promessi Sposi' the boy read and re-read until the characters of Manzoni's great work became living, breathing human beings to his vivid boyish imagination. 'Gerusalemme Liberata,' Rollin's 'History of Rome,' Thiers' 'History of France,' the 'Iliad' and the 'Aeneid' were also his constant companions. In 1849 Dr. Carducci, owing to his revolutionary sympathies, was forced to take refuge in Florence, together with his family; and there Giosue was sent to school, where he proved an excellent student and incidentally read the works of the foremost French, German, Italian, and English writers. His youthful poems attracted the attention of the rector of the Normal School at Pisa, then attached to the university, and he was admitted to this institution, receiving board and tuition free. He worked with furious energy, read omnivorously, wrote for the press and compiled an anthology of poetry. Graduating from the Normal School in 1856 he became teacher in the San Miniato Lyceum, which he was forced to leave the following year on account of his liberal tendencies. In 1857 his first volume of poems appeared under the title of 'Rime.' He went to Florence with the intention of making literature his life work, but the suicide of his brother Dante and the death of his father in 1858 threw upon him the support of the family. Then began a long and bitter struggle against poverty. He wrote for magazines, tutored and lived, with the family, in a small, ill-furnished cottage on Montevarchi. Forante he wrote articles covering almost every imaginable subject, and everything he did with the utmost care, devoting his days and nights to research; so that his work ever exhibited the earnestness of the scholar. During his 10 years with the Edizioni he produced literary material sufficient in volume and quality for the life work of most men. In 1859, after 10 years' engagement, Carducci married his cousin, Elvira Minicucci. The war with Austria, which broke out in the same year, inspired his poetic muse, and he began contributing stirring poetic odes to the press. Italy began to be curious about this young man who spoke with so much radical enthusiasm and authority. His poems to Vittorio Emanuele and 'Alia Croce di San Damiano' were popular. In 1860 the latter was set to music, sung in the theatres, recited in the schools and salons, whistled on the streets and repeated among the hosts of the army of liberty. Carducci was appointed professor of Greek in the Lyceum of Pistola, a position he resigned in a few months to accept the professorship of literature in the University of Bologna which he was destined to hold for 44 years. He continued working with the same prodigious energy, writing poetry and prose, editing works for the publishing house, preparing university lectures and making extensive researches. His earnestness, brilliant imagery, strong originality and oratorical powers attracted to his classes students from all over Italy and, later, from all over Europe, and Carducci became a name to conjure by. His graduated students formed Carducci societies for the propagation of his ideas round which the literary battle of the century in a few years already begun. Never before had such lectures on literature been given in any university in Italy as Carducci turned in his conferences on the 'Development of the National Literature' and its relation to the social history of the Italian people from the earliest days to his own time. In them he became the prophet of Italy whose glorious past he depicted as it had never before been painted. In her he saw Rome living over again in all the majesty and glory of Roman tradition. His influence on nationalism brought all liberal, progressive Italy to its feet, and his ardent admiration of ancient Italy and Rome revived the "glorious paganism" of classical days. He attacked bitterly the literary, political, and artistic views then generally accepted in Italy; and the more the battle raged the larger grew his classes and his followers which included most of the younger generation. He fought the suzerainty of Austria over Italy, the temporal power of the Catholic Church and the apathy of Italy herself. In turning away from Romanism he set his face against Christianity, as he knew it in Italy, and asceticism which he declared opposed to all progress, beauty and truth. This hatred showed itself in his 'Ode to Satan' (1865), the "immortal foe of autocracy and the banner-bearer of the great reformers and innovators in all ages." In 'Giambi ed Epodi' (1866) he struck a new and passionate note that roused all Italy and finally led to his suspension from his classes in the university (1868–70). 'Nuove Poesie' (1873), a collection of 44 new poems, added very greatly to his reputation at home and abroad and made his position secure. 'Odi barbari' (1877) had still greater success, the first edition being sold out in a few months. In these he discards rhymes and adopts the various metres of Horace with success, in lyrics of great beauty, force and originality.

Gradually, in his later days, Carducci, the ardent Republican, became a constitutional monarachist and he was elected member of the Senate in 1890. His last volume of poems 'Ritmi e Rime' appeared in 1899. He resigned his professorship in 1904 and two years later he received the Nobel prize for literature. His published works, which treat of history, biography, political and other controversy, literary criticism, philosophy, lyrical, erotic, descriptive, pastoral and dramatic poetry are among the most extensive in the history of Italian literature. Carducci drowned (Bologna, 1909); Chiarini, G. L., 'Carducci' (1913); Granett, R., 'Italian Literature' (1908); Holland, Maud, 'Poems of Giosue Carducci' (20 poems translated, 1907); Williams, Orlo, 'Giosue Carducci' (1914).

Jeune and Court, Cornell, ASTRONOMICAL STAFF OF THE AMERICANS.
CARDWELL, Australia, town of Cardwell County, Queensland, on Rockingham Bay, 800 miles direct northwest of Brisbane. Its fine harbor has a depth varying from 24 to 60 feet, accessible in all weathers. Dugong fishing and oil extracting, cedar lumber, canning meats, preserve and sauce manufactures are thriving industries. A large hill and tin are found in the vicinity. Pop. 3,500.

CARE SUNDAY, sometimes taken to be the Sunday immediately preceding Good Friday; but generally used to signify the fifth Sunday in Lent. Same as Passion Sunday.

CAREME, kah-rm, Marie Antoine, French cook: b. Paris, 8 June 1784; d. there, 12 Jan. 1833. He was chef de cuisine to many celebrated persons, including Talleyrand, King George IV and one of the Rothschilds. He cooked for the Congress of Aix-la-Chapelle, Vienna and Laibach. He wrote: 'Le pâtissier peintre' (1842); 'Le maître d'hôtel français' (2d ed., 1842); 'Le pâtissier royal parisien' (1828); 'L'art de la cuisine française au XIX siècle' (1833).

CARET, kah-ret, a turtle. See HAWKSBILL.

CAREW, ka-roy, Richard, English antiquarian and poet: b. East Antony, Cornwall, 17 July 1555; d. there, 6 Nov. 1620. He was a member of the House of Commons, high sheriff of Cornwall in 1586, and the author of a much valued 'Survey of Cornwall' (1602); and an English translation of a portion of Tasso's 'Jerusalem Delivered' (1594), and from an Italian version of Huarte de San Juan, 'The Examination of Men's Wits.'

CAREW, Thomas, English poet: b. 1598; d. 1639. He was educated at Corpus Christi College, Oxford. Cultivating polite literature in the midst of a life of affluence and gaiety, he was the subject of much eulogy by Ben Jonson, Davenant and other writers of the period. He was made gentleman of the privy-chamber to Charles I. The King bestowed on him the royal domain of Sunning Hill, a part of Windsor Forest. In him was exhibited the not unusual transformation of the courtly and libertine fine gentleman into the repentant devotee. Carew is coupled with Waller as one of the improvers of English versification. The first collection of his poems was printed in 1640, and the last in 1824. His elegant masque of 'Colom Britannicum' was printed both in the early edition and separately in 1651, and the whole were included in Chalmers' 'British Poets.' Carew was much studied by Pope, and Dr. Percy also assisted to restore him to a portion of the favor with which he has come to be held. One of the subtleties and the pathetic may be found in his works; the former in his admirable Masque, and the latter in his epitaph on Lady Mary Villiers. Recent editions are by Hazlitt for the Roxburghe Library (London 1870); by Ebsworth (London 1893); and by Vincent for the Musæ Major Library (London 1899). 'Poems,' edited by Arthur Vincent in 1899, is the best edition of Carew.

CAREX, kahr'eks, a genus of plants, belonging to the family Cyperaceae, or sedges, and containing numerous species, which are found in nearly all parts of the world where vegetation can exist, on the driest upland as well as the wettest marsh. The plants are perennial, often creeping, with mostly sharp-keeled leaves and solid triangular stems. The flowers are without perianth and unisexual, being grouped in spikelets. The male flowers have usually three stamens, the female having a single style with two or three stigmas. The number of known species is above 400, and of these the United States has about 300. Hardly any of them have any agricultural value, but C. arenaria, the sand-sedge, is of use in binding the sand on many seashores. In parts of the United States a poor quality of hay is made from some of the sedges. C. morrowii is an elegant variety with white-edged leaves cultivated by florists.

CAREY, Henry, English composer and poet: b. London 1696; d. there 1743. He is supposed to have been a natural son of George Saville, Marquis of Halifax. His first instructor in music was a German, named Linert, but he was afterward more thoroughly trained under Roseingrave and Geminiani. He was inexhaustible in the invention of new, pleasing and often deeply pathetic melodies, to which he not infrequently turned deep philosophic thoughts. His 'Sally in Our Alley' is still a well-known song. He has also been said to be the author of 'God Save the King,' but this appears to have been doubtful until substantiated by Chrysander. He supported himself by public and private teaching, but his whole life was a continued struggle with poverty, and it has been said that at last, in a fit of despair, he committed suicide (1743). His collected songs were published in 1740. Among other works are 'Teraminta' (1732) and other operas; 'Chrononhotonthologos,' the most tragic tragedy ever yet tragedized (1734), a burlesque; 'The Wonder, or An Honest Yorkshireman' (1735); 'The Dragon of Wantley' (1739); and the 'Musical Century, or a Hundred English Ballads' (1737; 3d ed., 1743).

CAREY, Henry Charles, American political economist: b. Philadelphia, 15 Dec. 1793; d. there, 13 Oct. 1879. He was the eldest son of Matthew Carey, and in 1814 became a partner in his father's book-selling and publishing firm, where he continued until 1835. In that year he published an essay on 'The Rate of Wages,' which afterward expanded into 'The Principles of Political Economy' (1837-40). His other important works are 'The Credit System in France, Great Britain and the United States' (1838); 'The Past, the Present and the Future' (1848); 'The Principles of Social Science' (1858-59); 'Letters on Political Economy' (1860 and 1865); 'The Unity of Law' (1872). Originally a free-trader, he became an advocate of protection on the ground of temporary expediency; held that the growth of population was self-regulating; and was opposed to the theories of Ricardo and others on the law of diminished returns from the soil and opposed to any arrangement on the subject of international copyright. Some of his works have been translated into other languages, and his writings have had considerable influence on economic writers such as Frédéric Bastiat and Dühring.

CAREY—CARHART

received a common school education and learned shoemaking. In 1895 he was chairman of a convention at Boston, which amalgamated three national organizations of shoemakers into one union. In 1894 he was one of the leaders in the agitation of the unemployed on Boston Common, and the governor appointed him commissioner of employment, but he was not confirmed. He was later elected president of the Haverhill common council. In 1898, 1899 and 1900 he was elected to the Massachusetts house of representatives, twice defeating combinations of Democratic and Republican parties. He was the first Socialist ever elected to political office in New England.

CAREY, Mathew, Irish-American writer and bookseller: b. Dublin, 28 Jan. 1700; d. Philadelphia, 16 Sept. 1839. An address to the Irish Roman Catholics emphasizing the oppression by the penal code brought about his expulsion from Ireland. Later he returned and established The Volunteer’s Journal. But his radical views invited Parliament’s distrust and he was imprisoned until the session was over. He came to the United States in 1788, and in Philadelphia began to publish the Pennsylvania Herald. He was subsequently connected with the Columbian Magazine and the American Museum. A few years later he became a bookseller and an extensive publisher. When the yellow fever epidemic was especially virulent in 1793, he spent great energy in combating it and wrote a history of the disease. In the same year he founded the Hibernian Society and in 1796, with Bishop White, established the first Sunday-School society. The best known of his political writings was his ‘Olive Branch’ (1814). It was an effort to promote harmony among political parties during the War of 1812. It passed through 10 editions. In 1819 he published his ‘Irish Vindications’ and in 1822 ‘Essays on Political Economy.’

CAREY, Rosa Nouchette, English novelist: b. London 1840; d. 1909. She began writing novels in 1868, and her fictions (of which she wrote nearly 40), in which the literary elements were not obtrusive, were very popular with girls, to whom they were excellently adapted. They include ‘Wee Wife’ (1869); ‘Woood and Married’ (1875); ‘Not Like Other Girls’ (1884); ‘Uncle Max’ (1887); ‘Only the Govemme’ (1888); and ‘The Sunny Side of the Hill’ (her last novel, 1908), etc.

CAREY, William, English Orientalist and missionary: b. Paulerspur, Northamptonshire, 17 Aug. 1761; d. Serampore, India, 9 June 1834. He was early apprenticed to a shoemaker, and continued to work at his trade till he was 24. With what assistance he could procure he acquired Latin, Greek and Hebrew, and studied theology. In 1786 he became pastor of a Baptist congregation at Moulton, and in 1787 was appointed to a similar situation in Leicester. In 1792 he sailed for the East Indies as a Baptist missionary, but became overseer of an indigo factory. He studied languages and natural history, and collected a rich store of Oriental knowledge. In 1800, in conjunction with Marshman, Ward and others, he founded the missionary college at Serampore; the year following he became professor of Sanskrit, Bengali and Maharrta at the newly-erected Fort William College, Calcutta. In Serampore he had a printing-press for more than 40 different Indian languages, and issued various translations of the Scriptures. His first work was a Marhra grammar. It was followed by other works, including a Bengali ‘Lexicon,’ in which he was assisted by Felix Carey, his son. Under his direction the whole Bible was translated into 6 and the New Testament into 21 languages or dialects of Hindustan; and considerable progress was made with the translation of the whole Scriptures into Chinese. He also edited Shroeder’s lexicon of the Thibetan language and Roxburgh’s ‘Flora Indica,’ in which a genus of plants which he discovered is named after him. He established an agricultural society at Calcutta, and a botanical garden, at his own expense, at Serampore. For biography consult Culross (London 1882) and Smith, G. (London 1885).

CAREY ACT. See RECLAMATION LAWS.

CARGILL, Donald, Scottish covenanting preacher: b. Rutherglen, Ayrshire, about 1619; d. Edinburgh, 27 July 1681. He was educated at Aberdeen and Saint Andrews, and became minister of the Barony Church in Glasgow in 1653. At the Restoration he refused to accept collation from the archbishop and was exiled beyond the Tay. In 1679 he took part in the battle of Bothwell Bridge, where he was wounded, but succeeded in escaping to Holland. In 1680 he published, along with Richard Cameron, the ‘Sanquhar Declaration.’ In September of the same year he formally excommunicated King Charles II, Duke of York and other great personages. After avoiding pursuit for several months, in May 1681, he was captured, and at Edinburgh tried and sentenced, and 27 July was beheaded.

CARGO, in law, the entire amount of goods carried by a ship; also, loosely, persons collectively carried by a ship. The term is occasionally applied also to the invoice of the cargo. The bill of lading (q.v.) contains a list of the goods constituting the cargo. The goods on deck or in holds, whether a part or the whole of the cargo, are usually not covered by the insurance policy. The master of a coasting vessel is required by law to keep a record of the goods constituting the cargo, the shippers, consignees and various other particulars, all of which is entered in the cargo book. See FREIGHT.

CARHART, Henry Smith, American scientist: b. Coeymans, N. Y., 27 March 1844. He was graduated at Wesleyan University in 1869, and since then has taught physics and chemistry. In 1886 he was appointed professor of physics at the University of Michigan, where he remained until his retirement as professor emeritus in 1909. Professor Carhart devoted himself largely to the study of electricity, particularly the subject of standard cells and primary and secondary types of the former having been devised by him and known as the Carhart-Clark cell. He has been a delegate from the United States to several international electrical congresses. He has written ‘Primary Batteries’ (1891), ‘University Physics’ (1894); ‘Electrical Measure-
ments' (1895); 'High School Physics' (1901); 'College Physics' (1910), and other books.

CARHEIL, kä-rä-ë, Étienne de, French Jesuit missionary in North America: d. after 1721. He labored for more than half a cen-
tury among the Canadian Hurons and Iroquois, and was long stationed at Michilimackinac.

CARIA, in ancient geography, the country forming the southwest corner of Asia Minor, bounded on the north by Lydia or Moeonia, from which it was separated by the Maeander; on the east by Phrygia, on the southeast by Lycia and on the south and west by the Medi-
terranean. Some confusion, however, exists in re-
gard to its boundaries. It is well represented at various points in South America. In the West Indies, however, the large native population disappeared rapidly after the Spanish conquest, Caribs and other tribes of the same stock (Arawaks, Lucayos, Boriquehos, etc.), either succumbed to the new conditions or losing their distinctive char-
acteristics by blending with Europeans and Africans. Surviving groups of West Indian Caribs may be studied to-day in the island of Dominica. A few remained in Martinique and Saint Vincent up to the time of the volcanic
eruptions in 1902. Great Britain deported 5,000 Caribs from Saint Vincent to the island of Ruatan in the Gulf of Honduras in 1796; thence they migrated to the Central American coast, where their numerous descendants have become a not inconsiderable element in the population of the mainland. In the 'Proceedings of the American Association for the Advancement of Science' (Vol. LI, 1902), Mr. J. Walter Fewkes of the Bureau of American Ethnology calls attention to the different characteristics which the Caribs displayed in different circumstances and localities. Thus the natives in the Bah-
emas, Cuba, Haiti and Porto Rico were mild, agricultural people who had lost in vigor, while gaining a rudimentary knowledge of the arts of peace, by their sedentary life. On the other hand, constant incursions from the home of the race (the Orinoco region in Venezuela) kept alive the savage customs and ferocious spirit of the Caribs of the Lesser Antilles. Such incurs-
ions took place even after the date of the Spanish settlements. The houses of the more peaceful Carib communities did not differ greatly from those of the peasantry in the same regions at the present time. In lieu of clothing, Carib men and girls covered their bodies, as well as their faces, with paint, to protect them from the bites of insects and the heat of the sun. A woven cloth of palm fibre, called naga,
— a breech-cloth with long ends,— was worn by the chiefs and the married women for purposes of decoration, and to distinguish members of one family or community from those of another, designs of animals and plants were painted on the body. Their social organ-
ization closely resembled that of the American Indians, the unit of organization being the clan, ruled by a cacique (chief). Combinations were sometimes formed by a number of caciques for mutual defense, and extensive territories were subjected to the control of the more ambitious leaders. Among the insignia of the cacique's rank were the gold disc called guarim, worn on his breast, and a stone amulet tied to his forehead. His numerous wives were practically slaves. Ex officio, he was a member of the priesthood. Columbus at first received the impression that the Caribs lacked spiritual insight; longer sojourn among them, however, convinced him that they wor-
shiped many supernatural beings whom they represented by idols, called zemis; they had temples for this purpose, in which rude idols were set up to be consulted as oracles by the priests. It is probable that belief in a future
life, although not universally held, as some authorities assert, was generally taught by the priests, and it is quite certain that the latter possessed great influence, influencing physicians to the people as well as ministers to the semites.

Like other savage races of the region from which they came, the Caribs were anthropophagi, yet the evil prominence given to them through the medium of the Spaniards (a Latinized form of Carib) is not wholly merited. The discoverers, finding a great number of human skulls in the Carib houses, jumped to the conclusion that each skull was the trophy of some revolting feast. In point of fact, the Caribs, being ancestor-worshippers, preserved these relics in honor of defunct members of their family. Consult Adam, 'Le Caraibe du Honduras et le Caraibe des Isles' (in Internat. Amerik.-Kongr. Vol. XIV, 1904); Rat, J. N., 'The Carib Language as now Spoken in Dominica' (in Journal Anthrop. Inst., Vol. XXVII, London 1897-98); Koch-Grünberg's 'Die Hiakakoto-Umana' (in Anthrop., Vol. III, 1906); id., 'Zwei Jahre unter den Indianern' (Berlin 1901).

MARRION WILCOX.

CARIBBEAN, kár-î-bé'ân, SEA, a part of the Atlantic Ocean occupying a basin 750,000 square miles in area, bounded by South and Central America and the Greater and Lesser Antilles. Its perimeter is wholly mountainous. Mountain folds (continued in submarine ridges from the Greater Antilles to Honduras) mark its limits on the north and south; but the volcanic chain of the Lesser Antilles rises on the east, and the volcanoes of Central America in the remote past formed a wall separating it from the Pacific on the west. Separating it from the Atlantic are steep submarine ridges, of which the Lesser Antilles are the summits. A portion of the broad equatorial stream, which flows from east to west, from the coast of Africa to that of Brazil, enters the Caribbean between the islands at the southern end of the Antilles chain; the waters of this sea, therefore, move from east to west and northwest, and seek an exit through the Yucatan Channel — a passage 120 miles wide between Cuba and the peninsula of Yucatan. On its South American coast the Gulf of Paria, Triste, Darien, Venezuela, Cariaco; on the west are the Mosquito Gulf and the Gulf of Honduras. But the latter is too small to allow an outflow equal to the inflow into the Caribbean; so that, after the trade winds have forced the equatorial water into the Caribbean basin, it must remain there a considerable length of time, thus becoming superheated, before it passes into the Gulf of Mexico, where, owing to similar differences between the rate of inflow and outflow, the water becomes still more superheated before passing through the Florida Strait as the Gulf Stream. The main western current in the Caribbean, after passing through the Banks Strait, between the Mosquito Reef and Jamaica, is joined by the Windward Channel. The trade-winds, blowing with a steady velocity across the Caribbean region, from east to west, make the surface of this sea much rougher than that of the Gulf of Mexico; they mitigate the tropical heat at all points where their influence is felt; and the moisture they bring from the Atlantic is precipitated in the form of abundant rains against the eastern slopes of the mountains, both on the islands and the mainland. Hence the distinction between the windward and leeward regions, insisted upon especially in the West Indies. The Gulf of Mexico, sheltered behind the Antilles and Yucatan, is practically a leeward expanse; but the summer climate of Texas and the great plains is somewhat modified by Caribbean influence.

Recent studies of the Caribbean basin have disclosed its interesting submarine topography — a configuration which, if it could be seen, would be as picturesque in relief as the Alps or Himalayas. Nowhere can such contrasts of relief be found within short distances. Some deeps vie in profundity with the altitudes of the near-by Andes. . . . Some of the depressions, like the Bartlett Deep, are narrow troughs, only a few miles in width, but hundreds of miles in length, from miles in depth, and bordered by steep precipices. . . . There are long ridges beneath the waters, which if elevated, would stand up like islands of to-day. . . . Again, vast areas are underlain by shallow banks, reaching a great depth on the surface of the water, like that extending from Jamaica to Honduras. . . . The greater islands and the mainlands are bordered in places by submerged shelves. (From 'Cuba and Porto Rico'; see authorities below). All the islands are, then, to be regarded, from a physiographic point of view, as the tops of a varied configuration, which has its greatest relief beneath the sea; and some of these submarine valleys and mountains have yielded a surprising number of animal forms previously unknown. Dredgings in depths of over 2,000 fathoms have brought to light new species of crustacea, and forms resembling the fossils of past geological epochs are taken alive in those profound marine valleys. Many phosphorescent creatures are found; in certain places dense forests of pentacrinia undulate on the bottom like aquatic plants; on the submerged banks and in the shallows, coral polyps and mollusks are employed as actively now as ever, in extracting the lime carried in solution by the sea-water, to build its shells and corals which are so large a part of the rock-making material in all this region, from Yucatan to Porto Rico. The most important marine highways for Caribbean commerce are those on the north; the Windward, Anegada and Mona passes and the Yucatan Channel. The Caribbean has attained a new importance since the completion of the Panama Canal. It is now traversed by several world trade-routes directed to the Pacific through the canal. The United States has a naval base at Guantanamo Bay, Cuba; the British have bases at Bermuda and Jamaica; the Virgin Islands acquired by the United States from Denmark in 1916 and occupied 31 March 1917, form another naval base for the defense of the canal. Several steamship lines make regular trips from New York. (For the origin of the name, see Carib). Consult Agassiz, 'The Gulf Stream' (in annual report Smithsonian Institute to July 1891, Washington 1893); Hill, of United States Geological Survey, 'Cuba and Porto Rico' (1889).

MARRION WILCOX.

CARIBBEAN, American Interests and Diplomatic Relations in the. The United
States has had a long historical interest in the Caribbean and its problems. This interest was enhanced by the discovery of a trade route to the British West Indies, the western desire for a trade outlet at the mouth of the Mississippi, the sympathy for the Spanish colonies in their struggle for independence and the American annexation of territories fronting on the Gulf. In the decade and a half after 1845 its continuation and increase was indicated by the Panama transit treaty with Colombia (then New Granada) in 1846, the ship canal agreement with Nicaragua in 1849, the famous Anglo-American Clayton-Bulwer treaty of 1850, a series of negotiations for the acquisition of Cuba and certain West Indian naval stations and various efforts to prevent the danger of European interference in Central America and the West Indies. In the Civil War American attention was attracted toward the Caribbean by the problem of blockading Confederate ports against blockade runners operating from certain West India bases; and after the war, the earlier preoccupations for greater influence in the region were kept alive by the memory of the difficulties and limitations of the American navy in maintaining the blockade of the Confederate ports, and also by the unsatisfactory conditions of Spanish rule in Cuba.

The Spanish-American War, resulting in the American possession of Porto Rico and the assumption of new international duties in Cuba, brought the vision of new economic and political advantages in the Caribbean and the realization of new responsibilities. The development following the war revolutionized the American national position. By the logic of events the United States was forced into a place of increasing importance in international leadership in the Caribbean. The construction of the Isthmian canal under American control, the logical conclusion of a long series of events and the immediate result of a wise diplomacy and policy which terminated a long period of irritating discussion and delay, attracted the attention of the United States to the necessity of larger responsibilities in the development of the Caribbean tropics to serve the world's needs.

Under the administrations of Roosevelt, Taft and Wilson, the general policy of the American government toward Caribbean countries was fundamentally the same in the assumption toward weaker neighbors of increasing responsibilities which might involve intervention to keep order. A positive policy, preventive rather than remedial, gradually supplanted the former negative or passive policy which involved intervention only after a wrong was done. In 1903, under President Roosevelt, the government extricated Venezuela from a humiliating experience with Germany and other European powers. In 1905 it assumed control of customs collection in the Dominican Republic, and soon thereafter exercised its treaty right to interfere in Cuba to preserve order. Later, under President Taft, it actively intervened in the rebellion in Nicaragua and negotiated with Nicaragua and Honduras treaties for the extension of agreements similar to the one in force in the Dominican Republic. Later, under President Wilson, it retained forces in Nicaragua for the preservation of order, and sent a force of American officials to the Dominican Republic to supervise the elections, and (in 1916) ratified convention arrangements for establishment of fiscal protectorates over Nicaragua and over Haiti. In 1917 the policy of increased police duties in the Caribbean also resulted in the acquisition of the Danish colonies.

The occupation of Porto Rican development under American control, and of American supervision in Cuba and San Domingo—a practical demonstration that public order and security of life and property is an essential condition for economic development—has made a deep impression upon all Caribbean peoples.

As a result of the construction of the Panama Canal, the international importance of the Caribbean has greatly increased by the development of new trade routes which will make it the trade centre of the American tropics—the cross-roads of the western world; and the United States more than any other great power is concerned in the political ownership of the territory, the fiscal policies of their governments, the memory of the difficulties and limitations of the American navy in maintaining the blockade of the Confederate ports, and also by the unsatisfactory conditions of Spanish rule in Cuba.

The Spanish-American War, resulting in the American possession of Porto Rico and the assumption of new international duties in Cuba, brought the vision of new economic and political advantages in the Caribbean and the realization of new responsibilities. The development following the war revolutionized the American national position. By the logic of events the United States was forced into a place of increasing importance in international leadership in the Caribbean. The construction of the Isthmian canal under American control, the logical conclusion of a long series of events and the immediate result of a wise diplomacy and policy which terminated a long period of irritating discussion and delay, attracted the attention of the United States to the necessity of larger responsibilities in the development of the Caribbean tropics to serve the world's needs.

Under the administrations of Roosevelt, Taft and Wilson, the general policy of the American government toward Caribbean countries was fundamentally the same in the assumption toward weaker neighbors of increasing responsibilities which might involve intervention to keep order. A positive policy, preventive rather than remedial, gradually supplanted the former negative or passive policy which involved intervention only after a wrong was done. In 1903, under President Roosevelt, the government extricated Venezuela from a humiliating experience with Germany and other European powers. In 1905 it assumed control of customs collection in the Dominican Republic, and soon thereafter exercised its treaty right to interfere in Cuba to preserve order. Later, under President Taft, it actively intervened in the rebellion in Nicaragua and negotiated with Nicaragua and Honduras treaties for the extension of agreements similar to the one in force in the Dominican Republic. Later, under President Wilson, it retained forces in Nicaragua for the preservation of order, and sent a force of American officials to the Dominican Republic to supervise the elections, and (in 1916) ratified convention arrangements for establishment of fiscal protectorates over Nicaragua and over Haiti. In 1917 the policy of increased police duties in the Caribbean also resulted in the acquisition of the Danish colonies.

The occupation of Porto Rican development under American control, and of American supervision in Cuba and San Domingo—a practical demonstration that public order and security of life and property is an essential condition for economic development—has made a deep impression upon all Caribbean peoples.

As a result of the construction of the Panama Canal, the international importance of the Caribbean has greatly increased by the development of new trade routes which will make it the trade centre of the American tropics—the cross-roads of the western world; and the United States more than any other great power is concerned in the political ownership of the territory, the fiscal policies of their governments, the memory of the difficulties and limitations of the American navy in maintaining the blockade of the Confederate ports, and also by the unsatisfactory conditions of Spanish rule in Cuba.

The Spanish-American War, resulting in the American possession of Porto Rico and the assumption of new international duties in Cuba, brought the vision of new economic and political advantages in the Caribbean and the realization of new responsibilities. The development following the war revolutionized the American national position. By the logic of events the United States was forced into a place of increasing importance in international leadership in the Caribbean. The construction of the Isthmian canal under American control, the logical conclusion of a long series of events and the immediate result of a wise diplomacy and policy which terminated a long period of irritating discussion and delay, attracted the attention of the United States to the necessity of larger responsibilities in the development of the Caribbean tropics to serve the world's needs.

Under the administrations of Roosevelt, Taft and Wilson, the general policy of the American government toward Caribbean countries was fundamentally the same in the assumption toward weaker neighbors of increasing responsibilities which might involve intervention to keep order. A positive policy, preventive rather than remedial, gradually supplanted the former negative or passive policy which involved intervention only after a wrong was done. In 1903, under President Roosevelt, the government extricated Venezuela from a humiliating experience with Germany and other European powers. In 1905 it assumed control of customs collection in the Dominican Republic, and soon thereafter exercised its treaty right to interfere in Cuba to preserve order. Later, under President Taft, it actively intervened in the rebellion in Nicaragua and negotiated with Nicaragua and Honduras treaties for the extension of agreements similar to the one in force in the Dominican Republic. Later, under President Wilson, it retained forces in Nicaragua for the preservation of order, and sent a force of American officials to the Dominican Republic to supervise the elections, and (in 1916) ratified convention arrangements for establishment of fiscal protectorates over Nicaragua and over Haiti. In 1917 the policy of increased police duties in the Caribbean also resulted in the acquisition of the Danish colonies.

The occupation of Porto Rican development under American control, and of American supervision in Cuba and San Domingo—a practical demonstration that public order and security of life and property is an essential condition for economic development—has made a deep impression upon all Caribbean peoples.

As a result of the construction of the Panama Canal, the international importance of the Caribbean has greatly increased by the development of new trade routes which will make it the trade centre of the American tropics—the cross-roads of the western world; and the United States more than any other great power is concerned in the political ownership of the territory, the fiscal policies of their governments, the memory of the difficulties and limitations of the American navy in maintaining the blockade of the Confederate ports, and also by the unsatisfactory conditions of Spanish rule in Cuba.

The Spanish-American War, resulting in the American possession of Porto Rico and the assumption of new international duties in Cuba, brought the vision of new economic and political advantages in the Caribbean and the realization of new responsibilities. The development following the war revolutionized the American national position. By the logic of events the United States was forced into a place of increasing importance in international leadership in the Caribbean. The construction of the Isthmian canal under American control, the logical conclusion of a long series of events and the immediate result of a wise diplomacy and policy which terminated a long period of irritating discussion and delay, attracted the attention of the United States to the necessity of larger responsibilities in the development of the Caribbean tropics to serve the world's needs.

Under the administrations of Roosevelt, Taft and Wilson, the general policy of the American government toward Caribbean countries was fundamentally the same in the assumption toward weaker neighbors of increasing responsibilities which might involve intervention to keep order. A positive policy, preventive rather than remedial, gradually supplanted the former negative or passive policy which involved intervention only after a wrong was done. In 1903, under President Roosevelt, the government extricated Venezuela from a humiliating experience with Germany and other European powers. In 1905 it assumed control of customs collection in the Dominican Republic, and soon thereafter exercised its treaty right to interfere in Cuba to preserve order. Later, under President Taft, it actively intervened in the rebellion in Nicaragua and negotiated with Nicaragua and Honduras treaties for the extension of agreements similar to the one in force in the Dominican Republic. Later, under President Wilson, it retained forces in Nicaragua for the preservation of order, and sent a force of American officials to the Dominican Republic to supervise the elections, and (in 1916) ratified convention arrangements for establishment of fiscal protectorates over Nicaragua and over Haiti. In 1917 the policy of increased police duties in the Caribbean also resulted in the acquisition of the Danish colonies.

The occupation of Porto Rican development under American control, and of American supervision in Cuba and San Domingo—a practical demonstration that public order and security of life and property is an essential condition for economic development—has made a deep impression upon all Caribbean peoples.

As a result of the construction of the Panama Canal, the international importance of the Caribbean has greatly increased by the development of new trade routes which will make it the trade centre of the American tropics—the cross-roads of the western world; and the United States more than any other great power is concerned in the political ownership of the territory, the fiscal policies of their governments, the memory of the difficulties and limitations of the American navy in maintaining the blockade of the Confederate ports, and also by the unsatisfactory conditions of Spanish rule in Cuba.
CARIBOU — CARICATURE AND CARICATURISTS

oids. A distinguishing characteristic is the fact that the abdomen is serrated with sharp spines, and it is said to be due to the Study of Fishes' (Edinburgh 1899).

CARIBOU, kəh-ri-boo', the name of two or more species of reindeer inhabiting Canada, which are of great importance as a source of food and clothing to the natives of Arctic and sub-Arctic regions, and also are of much interest to sportsmen. The caribou is so completely a reindeer (q.v.) that there seems little practical reason for separating it specifically from that of Europe, whence no doubt it came by migration in early Pleistocene time; and still less for the division of this very variable deer into the many species and subspecies that have been described by those who believe that the infinite variations of nature must be followed by an infinity of names. It will be convenient, nevertheless, to follow the general practice and recognize two groups — the Arctic or Barren-Grounds caribou (Rangifer arcticus), and the Woodland caribou (Rangifer caribou).

The Arctic caribou is to be found from Greenland to Alaska wherever tundras and alpine tundra north of the limit of tree growth, and on all the islands of the Polar Sea. This is in summer, when herbage springs up along the coasts and watercourses, and reviving lichens and mosses furnish abundant fare. The does and fawns scatter in little parties by themselves at this season, separated from the widely wandering stags. Their coats are gray or light brown, varying locally, and the summer-coat is acquired in July when the old winter-coat is shed. This new summer hair is long and soft, and is white at the roots, but tinted toward the end. As it grows and thickens the hair becomes brittle, the white base lengthens as fast as the brown tips wear or break off, and finally the color of the coat disappears and it is virtually white all over the body. Thus is acquired the white winter-coat characteristic of this species. As autumn approaches these caribou gather toward the south from the outlying coasts and islands until huge herds are brought together and travel south to the northern edges of the Canadian forests, in whose shelter they pass the winter, shedding and renewing their antlers at that season. In the spring they go north as soon as the snow permits.

These semi-annual migrations are the harvest times of the Eskimos and northern Indians, and a successful attack on a helpless herd provides them with a supply of flesh and useful materials that ensures a comfortable winter; but the slaughter has been so inconsiderate that in the Barren Grounds these herds are now small and scattered as compared with a century ago, and local famines are more and more suffered, or districts have been permanently abandoned by the inhabitants in consequence. Every edible part of the animal, even to the entrails and marrow of the bones, is eaten. From the bones and horns various implements are made, while the hide furnishes the best of clothing and bedding. The Arctic folk are as dependent on their caribou as are the Indians on the camel.

The Woodland caribou has never been so necessary, although always valuable, to the Indians of central and southeastern Canada, except perhaps in Labrador, because there was plenty of other game. This species is in general of larger size and darker color, and has heavier antlers with more points, than the Arctic species just described. It is variable in all respects; and two or three forms from the Rocky Mountains and westward have been called separate species; but the distinctions are obscure. The largest specimens recorded come from southwestern Alaska. This species avoided the open plains, but in summer once roamed through all the wooded region of Canada south to the Great Lakes and central New England. It is now to be seen in the United States only in northern Maine and along the rough northern border of Minnesota, and in Canada has been so threatened with extinction that it has long been protected by law. This decrease is owing mainly to the acquirement of fire-arms by all the Indians of the interior, and to the extension of settlements far toward the north; but it is largely due, also, to the work of sportsmen. To these men caribou hunting in autumn and early winter yields sport of a high order. This deer, sensitive in sight, hearing and smell, and exceedingly wary, affords stalking-tactics so difficult as to make the getting within rifle range of, and finally obtaining, a "good bead," a feat to be proud of. An easier and more deadly way is to track and overtake a band, but this also requires great skill and endurance, and good shooting. The writings of sportsmen-travelers in all parts of Canada and Alaska abound in narratives of this sport, and describe the habits of this fine deer. Consult Elliot, The Deer Family (in Spiritman's Life and Letters, 1902); Ingersoll, Life of Mammals (New York 1909); Seton, 'Northern Mammals' (New York 1909); Tyrrell, 'Report Canadian Geological Survey for 1896' (Ottawa 1897).

ERNST INGERSOLL.

CARICA (from caria, a district of Asia Minor, whence it was supposed to have come), a genus of plants, the typical one of the order of Papayads (Papayacea). See PAPAW.

CARICATURE AND CARICATURISTS. A tendency to burlesque and caricature is a feeling deeply implanted in human nature, and it is one of the earliest talents displayed by people in a rude state of society. An appreciation of, and sensitivity to, ridicule, and a love of that which is humorous, are found even among savages, and enter largely into their relations with their fellow-men. When, before people cultivated either literature or art, the chieftain sat in his rude hall surrounded by his warriors, they amused themselves by turning their enemies and opponents into mockery. They laughed at their weaknesses, joked at their defects, whether physical or mental, and gave them nicknames in accordance therewith, — in fact, caricatured them in words, or by telling stories which were calculated to excite laughter. When the agricultural slaves were indulged with a holiday from their labors, they spent it in unrestrained mirth. And when these same people began to erect permanent buildings, an object to ornament them, the favorite subjects of their ornamentation were such as presented ludicrous ideas. The warrior, too, who caricatured his enemy in his speeches over the festive board, soon sought to give a more permanent form
to his ridicule, which he endeavored to do by
draw seven or eight in that time. Formerly
rude delineations on the bare rock or on any
the best caricaturists were employed on
other convenient surface which presented itself
to the weekly papers, while now the better class
his hand. Thus originated caricature and
are employed on the great dailies. But the times
the grotesque in art. In fact, art itself, in its
have brought this about, not necessarily the
earliest forms, is caricature; for it is only by
the caricaturists. Workmen have no time to
that exaggeration of feature which belongs to
read, and a picture which may tell all at a
the art of caricature, that unskilful draughtsman could
picture may mean more to the reader than the
make themselves understood. The field of
editorial that the combined editors of the
two kinds of transition from antiquity to the Middle
country could write. A picture can be
Ages, the Roman mimus continued to exist, and
understood by all, whereas we have many languages
and the evolution of the religious and secular carica-
the press for time increases, we find our time
the forerunners of which whistles our minds, and we refer to them on a moment's
true caricature of the period and of the caricatures
for reading diminishes, thus the moving-pict-
notice. Every day, as the pace quickens,
preceding the Reformation was associated with
ure excels the finest description ever written of
the period. During the period of transition from the
the same thing.
the mimus performers who sung songs and told
the 4th century Saint Augustine calls these per-
stories, accompanied with dancing and music,
formances nefaria,—detestable things—and says,
an ever-popular form of amusement. In the
they are called to continue consist not only of
the idea, he writes: "I have never tried to hide
4th century, Saint Augustine calls these per-
general, but of personal, satire and con-
that it was a caricature, and therefore shouldn't be
formances nefaria,—detestable things—and says,
tained scandalous stories, frequently accom-
considered as the critic was considering it. Where-
his judgment and had received a severe lecture
panied by rough illustration or caricature, of
upon he replied: "No, never try to hide behind
on the bad drawing it displayed made an
persons living and well known to those who
that. Remember one thing: that poor drawing
people; not caricature, but another, that all
attempts to hide behind the fact that it was
heard and saw them. The Reformation and
is not caricature, and another, that all the
true caricature, and therefore shouldn't be
the 15th century. The com-
 admired artists in the country are not caricaturists.
the contrary, those who exaggerate the
manding figure of the 17th century in
Caricature is William Hogarth, the English-
salient features must draw them even better,
ning caricature is William Hogarth, the English-
spirit predominant, and without it their productions are not
true caricatures.

Thus, in trying to be caricaturists, such men
are robbed of the chance of being serious illus-
tative. In which work they might succeed; and
they never succeed as caricaturists.

There are three kinds of good caricatures:
First, the strong, powerful, almost brutal; sec-

True, Nast was practically alone in his field, and he did
not work as long as did Tenniel, still, to judge
him at his best, though the period was compara-
tively short, he stood high as a picture-maker
of that class. Nast was as brave as his sub-
ject, Tweed, the New York city boss, was
crooked, and the two furnished the best series of
caricatures by far that have ever been seen
in this, or, it might be said, in any other coun-
try. Nast, however, was not the draughtsman
that the art demands more of the artist, in order to
finish he made up in power and force of ex-
}

Since the day of Tenniel and Nast, cari-

aryle hands. Tenniel and Nast each drew a cari-


Caricature and Caricaturists
the sympathy is the surest way to the emotions. No caricaturist ever drew a caricature that would cause people to shed tears on seeing it, unless the artist shed tears when he drew it, any more than one could draw an angry political boss unless at the time of drawing one wore the same angry and hateful expression on one's own face. So with the humorist. One must wear a broad smile when he draws a man laughing, unless one is drawing him from life; and unless one is smiling when drawing smiling people, the subjects will seem to look and laugh only in mechanical fashion.

If the caricaturist is strong enough in his line to be called one, the first person he wins is himself. Once he has settled in his own mind that he is working for a just cause, it will be noticed at once that his work improves, and he will acquire a following. If a cartoonist in his politics keeps side by side with his pictures he will be rich; he will be more successful than one who will work on a Democratic paper one day and the next on the Republican side. A young man in starting out should study and choose for himself and in that way he will find that he can lend more power and force to his work. It would be hard to imagine Thomas Nast being in private life a sympathizer with Tweed. The difficulty with caricaturists is that they are sometimes like the politician after the election, when he says: "No wonder the other side won; they bought us." What interest could one take outside of the mechanical reproduction if one knew that the caricaturist who had one year drawn powerful caricatures for one party would turn around the next year and work for the opposition. The power of a caricature becomes power only when the reader of the picture is convinced that that which is represented in the picture really did happen, and that cannot be done by a caricaturist if one day he is with the poor, and the next day with the rich, in the same relation with any case that comes up.

The late John J. Ingalls said that the caricature did harm that good might follow. Caricatures, to be effective, should be founded on fragments of truth, though you are permitted to dig below the frost line. Without truth at the bottom they are powerless, and with truth at the bottom they are powerful and everlasting. Though Tweed, the man, is dead, Tweed, in the caricature, still lives, a prisoner in stripes, with ball and chain to his leg. A good caricature may be called an exaggeration of the truth. In these times there are great opportunities for the cartoonist. The millionaire will have to deal kindly and justly with his fellowmen, or else he will be more of a target than ever before, but the honest man need never fear a caricature; on the contrary, he can laugh and go about his business, and if he is attacked, the attacks will react in his favor. But they cannot be recommended as the steady diet for a dishonest person, since whether he has a conscience or not, if they don't bring him to justice they will give him many a sleepless night.

Bibliography.—Flotel, E., 'Geschichte des Ger. Künstlerlebens' (Lips. 1879); Chal- fleury, F., 'Histoire générale de la caricature' (Paris 1865–80); Wright, F., 'History of Caricature and Grotesque' (London 1875); Parton, J., 'Caricature and other Comic Arts' (New York 1877); Grand-Carteret, J., 'Les mœurs et la caricature en Allemagne, en Autriche et en Suisse' (Paris 1885); Everitt, W., 'English Caricaturists of the 19th Century' (London 1886).

CARIES, kār'-i-ēz, a form of local death in bone, due to a variety of agents. Caries is usually distinguished from necrosis, another type of local death in bone, by the slower disintegration of the bone affected by the carious process. Necrosis usually results in the death of large pieces of bone, with the formation of sequestra. Caries is a gradual disintegration without sequestration. Caries is the result of inflammation of the softer tissues in the bone spaces, and is due usually to some definite form of irritant. It may be that of a gas, such as chlorine, or phosphorus, the latter causing in match-works a form of caries of the jaw; but bacteria of tuberculosis and syphilis are the most frequent causes. Tuberculous caries is the most frequent form of the disease. See HEPATITIS; TUBERCULOSIS. For caries of the teeth, see TEETH.

CARIGARA, kā-rē-gā'rá, Philippines, a town of the province of Leyte, situated on the north coast of the island, 22 miles west of Tacloban. It has a harbor formed by a bight extending 11 miles inland, carries on a considerable coast trade and is an important hemp port. Pop. about 16,000.

CARIÑANNO, kā-rēn'ān-no, Italy, a city in the province of Turin, 11 miles south of the latter on the left bank of the Po. It is surrounded by old walls, and has a handsome square ornamented with arcades, some fine churches, some silk-spinning mills and sugar-refineries. From this town is named a branch of the house of Savoy. Pop. 7,000.

CARILLON, kā-rēl-lōn, a kind of chime, played either by hand or clockwork on a number of bells, forming a complete series or scale of tones or semi-tones, like those of the organ or harpsichord. See CHIMES.

CARIMATA, kā-rē-mā'ta, or KARI- MATA, a name applied to the strait between Borneo and Billiton; also to a cluster of a hundred islets and reefs (area, 57 square miles; pop. 500) in that strait; and lastly, to the principal member of the group, whose highest point reaches 2,600 feet, and is in lat. 1° 36' S. and long. 108° 54' E.

CARINI, kā-rēnē, Italy, city in the province of Palermo, island of Sicily, 17 miles northwest of the city of Palermo. It is beautifully situated four miles from the sea, in a fertile region. It has a Gothic castle of the 14th century. In the vicinity are caves in which animal fossils are found. The Sicilian revolutionists were defeated here, 18 April 1860, by the Bourbon troops. North of the town was the ancient Hycara, from which the Athenians carried off the 12-year-old Laos, who grew up to be so famous a courtesan. Fishing is the chief occupation. The district produces much corn and wine. Pop. about 14,000.

CARINTHIA (Ger. KÄRNTEN), a duchy and crownland, between lat. 46° 24' and 47° 24' N., and long. 12° 35' and 15° 10' E., bounded on the north by Salzburg and Styria, on the
east by Styria, on the south by Carniola and on the west by Italy and Tyrol; area, 3,966 square miles. It is extremely mountainous, generally sterile, and one of the most thinly populated provinces of Austria. The arable land does not exceed 290,000 acres, but there are some fertile valleys, and a considerable extent of rich pasture land. It has several rivers and lakes. Of the former the principal is the Drave. All of them abound with fish. The country does not yield corn enough for the consumption of the inhabitants, who import the deficiency from Hungary. The cereals most extensively cultivated are rye and oats. Some wine is produced in Lower Carinthia, but it is of inferior quality. Cattle, sheep and horses are raised in considerable numbers, but the mines of Carinthia are the main sources of its wealth. The chief of these are lead, iron and calamine. Various kinds of gems are met with. Its operative industry is chiefly confined to the working of its metallic ores, though there are also manufactories of woolens, cottons, silk stuffs, etc., most of which are in Klagenfurt, the capital. Bessemer steel rails, wire, wire nails and bar-iron are produced in great quantities. Some machinery, firearms, textiles, leather goods, paper and wood pulp are exported. Klagenfurt is the centre of the railway lines, of which there are about 385 miles. The Diet consists of 37 members and the crownland sends nine members to the Lower House of the Austrian Reichsrat. The principal towns are Klagenfurt and Villach. Carinthia formed part of the empire of Charlemagne, and afterward belonged to the dukes of Friuli. It subsequently passed through various hands, and finally became an appendage of the Austrian Crown in 1321. In 1809 it was annexed to the empire of Napoleon, but was restored to Austria in 1814. Nearly all the inhabitants are Roman Catholics. The population of Klagenfurt, the capital, is 24,284; that of the crownland 396,200.

CARINUS, Marcus Aurelius, Roman Emperor.-286 A.D. He was the eldest of the two sons of the Roman Emperor Carus, who jointly succeeded to the throne on the death of their father, 284 A.D. His brother was supposed to have been murdered on his return from the East, and Carinus, ruling alone, became one of the most profligate and cruel of the Roman emperors. The soldiers having rebelled and proclaimed Diocletian emperor, Carinus collected the troops that were in Italy and marched into Moesia to meet Diocletian and quell the revolt. A decisive battle was fought near Margus, in which Carinus gained the victory, but in the moment of triumph he was slain by one of his own officers, whom the vices of the Emperor had outraged.

CARIPE, kär'e-pä, Venezuela, town situated in a valley in the northern part of the principal range of hills on the west of Caracas, and contains the ruins of their church cloister. In the vicinity is the large cave described by Humboldt (2,800 feet from front to back and from 70 to 80 feet high) in which lives the bird known as guacharo, a kind of night-hawk. Pop. about 5,000.

CARISBROOKE, England, a village pleasantly situated near the centre of the Isle of Wight, and overlooked by the ruins of its ancient castle, where Charles I was imprisoned 13 months, previous to his trial and execution. The castle and grounds cover 20 acres. Within the walls is a well 200 feet deep. The parish church of Saint Mary is a venerable structure, with a fine perpendicular tower containing a chime of bells. It was formerly attached to a Benedictine priory founded under William the Conqueror, but the priory no longer exists. In 1859 a Roman villa was discovered at Carisbrooke, and the place seems to have been a fortress at the time of the Roman occupation. Pop. 5,139.

CARISBROOKE, Marquis of. See BATENBERG, Prince Henry Maurice.

CARISSIMI, că-rís'sé-mē, Giacomo, Italian composer: b. Marino 1604; d. Rome, 12 Jan. 1674. In 1624-28, he was Kapellmeister at Assisi, and then became musical director of the church of Saint Apollinaris in Rome, and continued in that position until his death. He wrote many oratorios, cantatas and motets, and has been praised for his characteristic expression of feeling and his elegance of form. He deserves most honor for the improvement of the recitative, having given it a more expressive and natural language, and he greatly developed the sacred cantata. His oratorio 'Jonah' has been revived in recent times. It anticipates in the descriptive passages some of the effects since elaborated by the modern classical composers, and it is altogether distinguished by freedom, boldness and striking antiphonal imitations. Other works are 'Jepthah'; 'Judicum Salomonis'; 'Baltazar'; 'Jonas' (in Vol. II of Chysander's 'Denkmäler der Tonkunst' 1856); 'Motets' (1664 and 1667); 'Masses' (1663 and 1667); 'Arie da camera' (1667); and 'Ars Cantandi' (3d ed. 1696). As a teacher Carissimi was greatly esteemed. Alessandro Scarlatti, Buononcini, Cesti, Kerll, Krieger and Charpentier being among his pupils.

CARL, William Crane, American organist: b. Bloomfield, N. J., 2 March 1865. He was educated in Paris under Alexander Guilmant; received the degree of Mus.D. from the University of New York 1911, and at the Direction Publique, and member of the French Academy of Music (conferred by the French government). He is organist and musical director of the old First Presbyterian Church, New York, and has given concerts there; is director of the Guilmant Organ School, New York; inaugurated many of the large organs in America, including a series in Dawson City (Klondike); has appeared with the leading orchestras at expositions, and at music festivals. He toured Japan and made successful study of the music of the Orient. Author 'Masterpieces' (1898); 'Ecclesia Organum'; 'Festival Music for Organ' (5 vols.); 'Master-studies'; 'Novelties for Organ' (2 vols.), was an authority on and worked on musical subjects. A founder of the American Guild of Organists; membre de l'Alliance Française; member of the National Association of Organists and Fraternal Society of Musicians.

her first novel, 'Waldemar Klein,' and among the best of her subsequent works are the 'Professor' (1840); 'A Year' (1846); 'The Brother's Bet;' and 'The Guardian' (1851). Seven of her novels have been translated into English. After his death in 1833, she decided to devote herself to literature. In 1841 she married J. G. Carlén, a lawyer and poet. After his death in 1875, her literary activity ceased altogether, although her salon had been the center of literary life at the capital. In 1878 she published a volume of 'Reminiscences of Swedish Literary Life.' She had clear insight into the conditions of human life, especially of life in the middle class, and she describes it with admirable fidelity. Characteristic are 'Gustav Lindorm' (1839); 'The Rose of Tistelön' (1842); 'The Maiden's Tower' (1848), all translated into English. Consult Svanberg, 'F. C. Carlén'; 'En studie' (Stockholm 1912); Schoeldstroen, 'F. C. Carlén' (ib. 1888).

CARLETON, Guy, 1st Lord Dorchester, British general and colonial governor: b. Ireland 3 Sept. 1724; d. Maidenhead, England, 10 Nov. 1808. He served under General Amherst at the second siege of Louisburg 1758, and under Wolfe in 1759 at Quebec, where he was wounded. In 1762 he greatly distinguished himself in the British attack on Havana. Sent out as lieutenant-governor of Quebec in 1766, he remained closely identified with Canada for well-nigh 40 years. He inspired the Quebec Act (1774); when the Revolutionary War broke out, he was commander of the British army in Canada, defended Quebec with great skill, and, reinforced by a British squadron in May 1776, forced Benedict Arnold's army to retire. In 1782 he became commander-in-chief of the British army in North America and during his command peace was finally concluded. Again appointed governor of Quebec in 1786 he was soon rewarded with a peerage as Baron Dorchester. He helped to frame the Constitutional Act of 1791, which divided Canada into two provinces. He remained at Quebec until 1796, and died in England in 1808, aged 84. By defeating Arnold's attack on Canada, Carleton really saved British North America to Great Britain. He was a stern but humane officer, and was especially loved by the newly-conquered French whom he ruled in Canada.

GEORGE M. WONG.

CARLETON, James Henry, American soldier: b. Maine 1814; d. San Antonio, Tex., 7 Jan. 1873. In February 1839 he took part in the "Aroostook War," relative to the northeast boundary of the United States, and later was commissioned 2d lieutenant in the 1st United States Dragoons. In 1846 he took part in Kearny's expedition to the Rocky Mountains, served on General Wood's staff in the Mexican War, received the brevet rank of major for gallantry at Buena Vista; and later was chiefly employed in exploring expeditions and against hostile Indians. In 1861 he was ordered to southern California, raised the famous "California column," and marched across the Yuma and Gila deserts to Mesilla on the Rio Grande. As the chief of the Department of New Mexico he was active in a number of severe engagements. For his services he was brevetted major-general, 13 March 1865; became lieutenant-colonel of the 4th Cavalry, 31 July 1866; and was promoted colonel of the 2d Cavalry, June 1868, and ordered with his regiment to Texas. He wrote "The Battle of Buena Vista" (1849).

CARLETON, Mark Alfred, American grain expert: b. Jerusalem, Ohio 1866. After studying at the Kansas Agricultural College he was appointed in 1894 cerealist in the United States Department of Agriculture. In 1898-99 he proceeded to Russia and Siberia to investigate agricultural conditions, and on his return introduced among several other new crops durum wheat. Durum wheat has now taken the place of the soft spring wheat varieties in Texas, Nebraska, Oklahoma and Kansas, with an annual yield estimated at $40,000,000. His writings, chiefly bulletins of the United States Department of Agriculture, include 'Cereal Rusts of the United States, 1899'; 'The Basis for the Improvement of American Wheats' (1900); 'The Commercial Status of Durum Wheat' (1904); 'Barley culture' (1908); 'Ten Years experience with Swedish Select Oats' (1910); 'Winter Eymer' (1911).

CARLETON, Thomas, English soldier and administrator: b. Newry, County Down, Ireland, 1735; d. 1817. He entered the 20th Regiment in his 18th year, was present at the battle of Minden and served in Canada under his brother, Sir Guy Carleton, during the American Revolutionary War. He was first governor of New Brunswick, 1784-1817. In his administration of that province it was said that he showed "a generous contempt of his own private wealth, and an exact frugality in the management of that which belonged to the public."

CARLETON, Will, American poet: b. Hudson, Mich., 21 Oct. 1845; d. 1912. Soon after his graduation at Hillsdale in 1869, he traveled widely as a lecturer in the northern and western states, Great Britain and Canada. He is best known in literature by his ballads of home life, many of them having gained great popularity. His books include 'Poems' (1871); 'Farm Legends' (1875); 'City Ballads' (1888); 'City Legends' (1889); 'City Festivals' (1892); 'Rhymes of Our Planet' (1899); 'The Old Infant and the Young Folks' Centennial Rhymes'; 'Songs of Two Centuries' (1902); 'Difted In' (1908); 'A Thousand Thoughts' (1908). He was also for a time editor of 'Everywhere,' an illustrated magazine.

CARLETON, William, Irish novelist and short-story writer: b. Pollisk, County Tyrone, 20 Feb. 1794; d. Sandford, 30 Jan. 1869. His father was a farmer on a small scale. The son, intended for the priesthood from a tender age, spent his boyhood in pursuit of an education, and managed, in spite of difficulties, to acquire a fairly creditable education. With no other equipment, and without a penny in his pocket, he set out on foot from his native county, about the age of 24, to seek his fortune, for he had long abandoned all ambition for the sacerdotal dignity. Arrived in Dublin, he decided to change his religion, and became a member of the Established Irish Protestant Church. He subsisted for a time on some tuitions, and when he obtained a clerkship, with a salary of £60 a
year, in the Sunday School Society, he thought that he was provided for life. On the strength of this clerkship and the income derived from some evening tuitions, he married Jane Arlott, his faithful and loyal companion for the remainder of his life; but before his first child was born he was ousted from his position in the Society. A period of schoolmastering, first at Mullingar and afterward at Carlow, followed; but he eventually gravitated back to Dublin. At that time (1823), the United Kingdom was rocked to its base by the climax of the agitation for Catholic Emancipation. The Evangelicals, an aggressive party which had taken the Church of Ireland under its special protection, were then powerful in Dublin. For the propagation of their views they had a monthly publication, The Christian Examiner, and to this magazine Carleton was invited to contribute stories and sketches based on the superstitions of the Catholic Irish peasantry, an aspect of which he was thoroughly acquainted. He made his first appearance in its pages in April 1828 with the first part of 'A Pilgrimage to Patrick's Purgatory,' in which several Catholic tenets and practices were severely condemned by the editor, and he continued to write for the Examiner, along much the same lines until December 1831. In the meantime, he brought out, in 1830, the first series of his inimitable 'Traits and Stories of the Irish Peasantry,' and he followed this up, in 1833, with the second series. Both collections are brimful of humor and pathos, the second containing, among other pieces, 'The Poor Scholar' and 'Rubber Derg,' two of the finest things he ever wrote. For some years Carleton continued himself with producing short stories and sketches, so that it became a by-word among his friends that a long novel, with an intricate and sustained plot, was beyond his range. Jane Sinclair (1836) did not do much to dissipate this belief, but when 'Fardougha the Misericordious' came out in 1837-38, it became evident that a new star had risen above the literary horizon. This pathetic novel excels in the portrayal of the vice of avarice: Fardougha has been compared, and not unfairly, with Balzac's 'Mme. Lamboy,' while 'L'Aware' and with Balzac's Père Grandet in 'Eugénie Grandet.' In Honor O'Donovan Carleton has presented to us one of those heroines in humble life in whose delineation he admirably excels.

The success of the Nation newspaper, founded in Dublin in 1842, gave a new direction to Carleton's thoughts. Hitherto his attitude had been, on the whole, one of satirical censure on the religion of the great majority of his fellow-countrymen, as well as on the boldness of his exposition of his views. He now saw that, if he wished to be popular, he must accommodate the popular taste. Accordingly, in 'Valentine McClutchy' (1845), he made a regular 'right-about-face,' and let himself go, almost without restraint, in attacking Orangeism, the Grand Jury system, the methods by which the Union was carried, the Charter Schools, absentee landlords with their conscienceless agents, the corruptions of Irish Protestantism, and the war of the Reform Bill. Carleton wrote for the Evangelical party. 'Valentine McClutchy,' although loosely constructed, is yet instinct with the power of genius. Two of its characters, Solomon McSlieme, the hypocritical attorney, and Darby O'Drive, the apostatizing bailiff, are great original creations. This was Carleton's most prolific period. In rapid succession work after work flowed from his pen: 'Ari Maguire,' 'Tales and Traditions,' and 'Siobhan of Inishmoyle' (not to be confused with 'Traits and Stories'), 'Rody the Rover,' and 'Parra Sasta.' In 1840 he wrote 'The Black Prophet,' one of his best works, with two wonderfully contrasted heroines. The same year (1847) saw another pathetic Emigrants of Ahdalarra.' 'The Tithe-Proctor' (1849) showed another kaleidoscopic change. It gave mortal offense to many of his readers, both from the stand it takes regarding the Anti-Tithe War of the thirties, and from the aspirations deliberately cast in the preface on the character of the Irish people and the popular movements of the forties. 'The Squanders of Castle Squander' (1852) is also full of rancorous and bitter political and religious life. He was to greater advantage in 'The Black Baronet,' originally published in 1852 as 'Red Hall.' This is a story depicting love, ambition, and revenge, and has a most intricate and baffling plot. His novel 'A Tale of Two Cities,' one of its great characters is Father MacMahon, the prototype of many of the clerical oddities who have since contributed to the gaiety of nations. The popularity, which Carleton won with 'Valentine McClutchy' and lost with 'The Tithe-Proctor,' he regained in full measure with 'Willy Reilly and his dear Colleen Bawn' (1855). The scene is laid in the days of the Penal Laws, and the obvious sympathy displayed with the cruelly oppressed Catholics restored the author to the affections of his warm-hearted and forgiving fellow-countrymen. The novel itself is poorly constructed, and the plot hinges on a series of improbabilities, but its subject has made it the most popular of Carleton's works. Other novels are 'The Evil Eye' (1860), 'The Double Prophecy' (1861), and 'Redmond Count O'Hanlon, the Irish Rapparee' (1862). Carleton wrote some verse and one play. His verses are generally of a pensive and meditative cast. His best and best-known poem is the ballad 'Harriet, the Heroine of the Bride' (1830), which has been pronounced the most successful legendary ballad of modern times. His solitary play, 'The Irish Manufacturer, or Bob Gawley's Project,' produced at the Theatre Royal, Dublin, in March 1841, was not a success, and was withdrawn after a few nights. On some of his novels plays have been founded by other hands, and several of his books have been translated into French and German. From the time of his return to Dublin in 1823, Carleton's life was singularly uneventful. He was a devoted husband and father, and loved to spend his time in the bosom of his family. He was always poor, and nearly always in debt, and even a literary pension of £200 a year, which was granted to him in 1848, and which he drew for the remaining 21 years of his life, did not help materially to mitigate his financial troubles. Cancer of the tongue was the cause of his death, which occurred at Sandford, County Dublin, on the 29th of May 1869, as he lived, in the profession of the Protestant faith.

Carleton made some incursions into middle-class life, and even into the domains of higher
society, but it is with ordinary people, and especially with the peasantry, that he is in his element and entirely at home. No one ever understood or described the Irish peasant of 75 or 100 years ago as he did. The faction fight, the party fight, the courtship, the wedding, the christening of the death-bed, the wake, the funeral, the hedge school, the secret society, the workings of landlordism, the practices of the unjust and rapacious land agent, the eviction, the revenge, the piety, superstitions, customs, vulgar expressions, modes of thought and outlook on life of the people—he brings them all before us clearly, vividly, unmistakably. Consult O'Donoghue, D. J., 'Life of Carleton' (1896).

PATRICK J. LENNOX,
Professor of English Language and Literature,
Catholic University of America.

CARLETON COLLEGE, Minn., at Northfield was founded in 1866, and named in honor of William Carleton of Charlestown, Mass, who bequeathed for the purpose $50,000. While conducted under Congregational auspices, its instruction is undenominational, and its property valued at $600,000 includes a campus and grounds of over 120 acres. The endowment is over $1,000,000. There are well-equipped chemical, physical, biological and astronomical laboratories, a conservatory of music and growing library. There is a general annual attendance of over 400 pupils, with a college faculty of 34 professors and instructors.

CARLETON PLACE, Canada, town of Lanark County, Ontario, on a navigable tributary of the Ottawa called the Mississippi River, at the foot of Mississippi Lake, and on the Canadian Pacific Railway, 28 miles southwest of Ottawa, 46 miles northwest of Brockville. It has a fine water power, large lumber and shingle mills and woolen and iron manufactories; water and sewerage systems; and is lighted by gas and electricity. The neighborhood is a favorite camping ground for summer pleasure parties. Pop. 3,621.

CARLI, kär lë, Giovanni Rinaldo, Count, Italian economist and antiquarian: b. Caio d'Istria, 14 April 1720; d. 22 Feb. 1795. He was of noble family, and early manifested an inclination for the study of the Middle Ages, with which he connected the study of belles-lettres and of poetry. In his 24th year the senate of Venice made him professor of astronomy and naval science. He published his works (1784-94) in 15 volumes, under the title 'Opere del Sig. Commendatore D. Gian Rinaldo, Conte Carli, Presidente,' etc., but this edition does not include his work on the coins of Italy 'Delle Monete' (3 Vols., 1754-60); and 'Delle Antichità Italiane' (3 vols., 1788-91). His complete works appeared in 18 volumes, 1784-94.

CARLILE, John S., American lawyer and statesman: b. Winchester, Va., 16 Dec. 1817; d. Clarksburg, W. Va., 1878. After admission to the bar in 1840 he settled at Beverly, Randolph County, and began the practice of law. From 1847 to 1851 he served in the State senate. He was also a delegate to the Virginia Constitutional Convention of 1850-51, and represented his district in Congress 1855-57. At the outbreak of the Civil War, he was an avowed Unionist. He was a member of the Wheeling Convention which established the Reorganized Government of Virginia and urged quick action in the election of a new State. He was elected to Congress in 1861 to represent the Wheeling district of the Reorganized Government of Virginia, but soon thereafter was promoted to the senate, where he served until 1883.

CARLILE, Richard, English freethinker and publisher: b. Ashburton, Devonshire, 8 Dec. 1790; d. London, 10 Feb. 1843. First apprenticed to a chemist, then to a tinman, he found employment in the latter line as a journeyman worker in London, where after reading Paine's 'Rights of Man,' he became a bold freethinker, and a publisher and purveyor of its forbidden literature. He reprinted William Horne's 'Parodies' and an imitation entitled 'The Political Litany' (1817), for which he underwent 18 weeks' imprisonment. In 1819 he was fined $7,500 and imprisoned for three years for publishing the works of Paine and other freethought writers. While in prison he conducted the publication of the first 12 volumes of The Republic (1819-26), for which his wife was sentenced to two years' imprisonment. Started by the Duke of Wellington, a fund of $30,000 was raised to prosecute Carlile's assistants, his property was confiscated, his sister was fined $2,500 and nine assistants received terms of imprisonment ranging from six months to three years. Public opinion made the government discontinue the prosecutions. On his release Carlile started The Gorgon, a radical weekly periodical. Before his death he was again imprisoned for terms of three years, and of being sentenced to pay church rates. He was the boldest agitator and the greatest factor for freedom of public speech and printing of his period.

CARLIN, Thomas, American politician: b. Kentucky 1790; d. 2 Feb. 1852. He removed to Illinois in 1813, and gradually accumulated wealth, and became known and respected among the scattered population about him. He was elected governor in 1838, and retained that office for four years, during a period of unusual and violent political excitement. Illinois, having engaged largely in internal improvements, suffered severely from the commercial revolution which was then paralyzing the whole country. She was much in debt, and had within her borders no specie, and no available means of payment. The discussion of the slavery question, too, was then furious, and had just led to the tragic death of E. P. Lovejoy. At the same time the Mormons took up their position at Nauvoo, and politicians were beginning those movements for partisan ends which seemed likely to throw the State into anarchy, and which ended ere long in the violent death of the Mormon leader. That Governor Carlin, amid such a condition of affairs, was three times re-elected to the chief magistracy affords a sure indication both of his popularity and his force of character.

CARLINE THISTLE. See THISTLE.

CARLING, Sir John, Canadian statesman: b. Middlesex County, Ontario, 1828; d. 1911. He received early education in public schools; in 1839 he removed to London, Ontario, where he joined his father in the brewing and malting business. After serving as a public officer, of school trustee and alderman, he was elected
CARLINVILLE — CARLISLE

in 1857 Conservative member for London in the Canadian legislative assembly. From 1867–72 he represented London in both the House of Commons and the Ontario legislature, resigning his seat when dual representation was abolished. In 1862, he was Receiver-General; in 1867–71 Commissioner of Agriculture and Public Works; 1882–85 Postmaster-General; 1885–91 Minister of Agriculture. In 1891 elected to the senate, he resigned in 1892 but was reappointed in 1896. He received the honor of knighthood in 1893. His efforts on behalf of Canadian agriculture were of incalculable value.

CARLINVILLE, Ill., a city and county-seat of Macoupin County, 60 miles southwest of Springfield, on the Chicago & Alton and other railroads. It has a prosperous local trade and manufactures of bricks and tiles, agricultural implements, etc. There are coal-mines, oil and natural gas wells in the vicinity. It is the seat of Blackburn University, a Presbyterian institution. Its courthouse is considered one of the finest public buildings in the State. It was settled in 1833 and incorporated in 1855. Pop. 3,616.

CARLISLE, kär-i'sl', Charles Arthur, American business man: b. Chillicothe, Ohio, 3 May 1864. He received a public school education, and early in life began work on the Maitland & Cincinnati Railway as messenger boy. From 1884–86 he was connected with the Ohio State Journal; and in the latter year returned to railroad work in the freight department of the Nickel Plate road; in 1890 he was made purchasing agent of the Burke System of railroads; later became director of the Studebaker Brothers Manufacturing Company at South Bend, Ind., and in 1904 was elected president of the American Trust Company of South Bend. He is vice-president of the National Association of Manufacturers; is a member of the American Academy of Political and Social Science, and of the American Institute of Civics, and is prominent in charitable work and public affairs in his home city.

CARLISLE, George William Frederic Howard, English statesman and author: b. 18th or 19th century; d. 18 April 1802; d. Captain Howard, 4 Dec. 1804. He was educated at Eton and at Christ Church, Oxford, where in 1821 he won the Chancellor's and the Newdigate prizes with a Latin and an English poem. He became early 7 Oct. 1848, previous to which, as Lord Morpeth, he had traveled extensively in the United States. He was a long time attaché to the British embassy at Saint Petersburg. In the reformed House of Commons he represented the West Riding of Yorkshire, and under the Melbourne ministry was secretary of state for Ireland. In 1841 he was defeated in the West Riding by his Conservative opponents. In 1846, under the administration of Lord John Russell, he was appointed commissioner of woods and forests, and chancellor of the duchy of Lancaster. He was the first of the Whig noblemen of the official class to give in his adherence to the views of the Anti-Corn Law League. In 1856 he delivered before the Mechanics' Institute at Leeds two lectures, since published on the life and writings of Pope, and on the United States. Previous to the Crimean War, he made a tour in the east of Europe, and published his 'Diary in Turkish and Greek Waters.' On the accession of Lord Palmerston in 1855, he was nominated lord lieutenant of Ireland, which office he held till the resignation of the Palmerston ministry in 1858. His works include 'The Life and Writings of Pope,' ('1853') and 'The Last Days of the Greeks'; and a volume of 'Poems' issued posthumously. His 'Viceroyal Speeches,' edited by J. Gaskin, appeared in 1860.

CARLISLE, John Griffin, American statesman: b. Kenton County, Ky., 5 Sept. 1835; d. 31 July 1910. He received a common-school education, studied law, and was admitted to the bar in 1858. He served several terms in the State legislature. During the Civil War he actively opposed secession, and in 1866 and 1869 was a member of the State senate. He was lieutenant-governor of Kentucky, 1871–75; was elected to Congress, 1876, and five times re-elected. His ability soon made him a Democratic leader. In the 48th, 49th and 50th congresses he was chosen speaker. In 1890 he was elected United States senator, but resigned in March 1893, to accept the portfolio of Secretary of the Treasury in President Cleveland's Cabinet. At the close of his term he settled in New York to practise law. In 1896 he opposed Bryan and made able 'sound money' speeches.

CARLISLE, England, city, capital of Cumberland County, on the river Eden, eight miles from the Solway Firth, and eight miles from the Scottish border, 300 miles by rail northwest of London. One of the oldest cities of England, important during the Roman occupation, its nearness to the border made it a prominent military station in the wars between the English and the Scotch. The Norman castle built in 1092 is well preserved and is still used as a garrison fortress. In the Civil War Carlisle sided with the King against Cromwell, and in 1745 declared for the pretender. The bishop's see dates from 1133; the cathedral, built in the Middle Ages, has no great architectural interest. The city is well provided with municipal institutions and its chief industries are the manufacture of cotton and woolen goods, iron foundries, railway workshops, tanneries and breweries. Pop. 46,500.

CARLISLE, Pa., borough and county-seat of Cumberland County, on the Cumberland Valley and Philadelphia and Reading railroads, 18 miles west of Harrisburg. It is the farming and manufacturing trade centre of Cumberland County, and is the site of Dickinson College, founded 1783, Metzger Female College and the United States Indian Training School. It has a national bank, large manufacturing establishments, Hamilton Library, Todd Hospital, and an assessed property valuation of $3,000,000. The industries include machine shops, chain and switch works, axle factory, cotton-weaving and silk-loomier mills, body and gear works, ribbon mills, shoe factories, flour mills, hosieries, paper-box and carpet factories. Mount Holly Springs, in the mountains just outside the city, is a popular summer resort. The government is administered by a burgess elected for three years and a borough council. It was the headquarters of Washington during the Whisky Rebellion in 1794, and was bombarded by the Confederates in 1863. Pop. 10,303.
CARLISLE INDIAN SCHOOL — CARLOS

sult Wing. 'History of Cumberland County, Pa.' (1879).

CARLISLE INDIAN SCHOOL. See United States Indian Training and Industrial School.

CARLISTS, a Spanish political faction which advocated the claims of Carlos of Bourbon and his descendants to the Spanish throne. In 1813 the Carlists, whose chief strength lay in the Basque provinces, and who, because of their Catholic traditions and tendencies, were secretly favored by the Pope and the Eastern powers, raised the standard of revolt. They had the advantage until 1836, when Ferdinand inflicted on them a terrific defeat at Luchana. In August 1839 their commander, Maroto, treacherously made peace, and the remaining Carlists soon fled to France. In 1873 the grandson of the first pretender raised another revolt in the Basque provinces of Navarre and Biscay, but after several sharp conflicts the rebels were hemmed in along the north coast, and in 1876 the pretender and his chief supporters fled into France. See Carlos de Bourbon.

CARLONE, kär-lön'ā, the name of an Italian family of distinguished artists, who flourished in the 16th, 17th and 18th centuries. The most celebrated of them are: 1. TADDEO, a native of Rovio, who excelled in sculpture and architecture, and was employed principally in Genoa: b. 1545; d. 1613. 2. GIOVANNI ANDREA, eldest son of Taddeo: b. Genoa 1590; d. 1630 in Milan. He made great progress in painting under the tuition of Pietro Sorri in Siena, and, having afterward studied under Paul Veronese, distinguished himself particularly by his frescoes, in which the freedom and spirit of design, the depth of expression, grandeur of conception and richness of coloring are admired. 3. GIOVANNI BATTISTA, brother of Giovanni Andrea: b. Genoa 1592; d. in Turin 1677. He was also a scholar of Paul Veronese, and, like his brother, painted for years in Genoa, but ultimately entered the service of the Duke of Savoy. He excelled particularly in frescoes. 4. ANDREA, son of Giovanni Battista: b. 22 May 1590 in Genoa; d. there, 4 April 1697. He studied in Rome, in Venice (where he was powerfully influenced by the style of Veronese); lived for several years in Perugia and founded an academy of art there. The ancestor of this branch of the family was Giovanni Carbone, who came from Rovio to Genoa about 1570. Another branch is traced back to Scaria, near Rovio. Carlones of more or less artistic distinction are more than 50 in number, as shown in Thieme-Becker, Vol. VI, pp. 3-10.

CARLOS, Don, dón kär'los, Infant of Spain, son of Philip II and Maria of Portugal: b. Valladolid, Nov. 1545; d. 1621. He was sickly, and one of his legs was shorter than the other. The extreme indulgence with which he was educated by Joan, sister of the King, confirmed his violent, obstinate and vindictive disposition. Recent historical research has proved that he was afflicted with hereditary insanity, which an accident (occurring in 1562) involving skull fracture, emphasized. In 1560 Philip caused him to be acknowledged as the heir of the throne by the Estates assembled at Toledo, and in 1562 he sent him to the University of Alcalá de Henares in hopes that the study of the sciences would soften his turbulent character. Contemporary historians differ in the description of the Prince. According to some he had a thirst for glory, an elevated courage, pride and a love of power. According to others he was fond of whatever was strange and uncommon; an accident or opposition irritated him to frenzy; address and submission softened him. He is also represented as a favorer of the insurgents in the Netherlands, and in particular as an enemy of the Inquisition; yet he possessed neither knowledge nor principles, nor even sufficient understanding to be capable of liberal views. With him all was passionate excitement, which resistance converted into fury. Llorente, the historian of the Inquisition, has corrected the accounts of the character and fate of this Prince from authentic sources in his work on the Spanish Inquisition (q.v.). According to him Don Carlos was arrogant, brutal, ignorant and ill-educated. So much is certain, that at the Congress of Cateau Cambresis (1559) on marriage of Don Carlos with Elizabeth, daughter of Henry II of France, was proposed; but Philip, being left a widower by the death of Mary of England, took the place of his son. Don Carlos is said to have loved Elizabeth, and to have never forgiven the Pope for having deprived him of her. Llorente proves, however, that Don Carlos never had fallen in love with the Queen, and that she was never too intimate with him. In 1563 Philip, who had no other heir than Don Carlos, considering him unfit for the throne, sent for his nephews, the archdukes Rudolph and Ernestus, to secure to them the succession to his dominions. Don Carlos, who lived in continual misunderstanding with his father, resolved in 1565 to leave Spain, and was on the point of embarking when Ruy Gomez de Silva, a confidant both of Philip and Carlos, dissuaded him from his resolution. In 1567, when the rebellion in the Low Countries disquieted Philip, Don Carlos wrote to several grandees of the kingdom that he had the intention of going to France. He disclosed his plan to his uncle, Don Juan of Austria, who told Philip what Don Carlos had confided to him. It is believed that he was touched by the sufferings of the people of the Netherlands. Philip himself believed that his son intended to go to the Netherlands. The Infant had often shown a vehement desire to participate in the government. But Philip, jealous of his own authority, treated his son coolly and with reserve, while he gave his confidence to the Duke of Alva, to Ruy Gomez de Silva, Don Juan of Austria and Spinola. Don Carlos conceived an invincible aversion to them. The architect of the Escorial, Louis de Foix, narrates the following story relating to Don Carlos, which has been preserved to us by De Thou. The Prince had always under his pillow two naked swords, two loaded pistols, and at the side of his bed several guns, and a chest full of other firearms. He was often heard to complain that his father had deprived him of his pride. On one occasion he confessed to a priest that he had resolved to murder a man. The priest, therefore, refused him absolution. The prior of the monastery of Atocha artfully drew from him expressions from which it could be inferred that he meditated an attempt upon his own
father. The story was then communicated to the King, who exclaimed, "I am the man whom my son intends to murder; but I shall take measures to prevent it." Thus Philip, impelled by hatred or fear, by policy or superstition, resolved on the destruction of his only son, in whom he saw only a criminal, unworthy of the crown. On 18 Jan. 1568 while Don Carlos was buried in a deep sleep, Count Lerma entered his chamber and removed his arms. Then appeared the King, preceded by Ruy Gomez de Silva, the Duke of Feria, the grand privy council of Saint John, brother of the Duke of Alva, and several officers of the guard and state councillors. Don Carlos still slept. They awoke him: he beheld the King, his father, and exclaimed, "I am a dead man." Then, addressing Philip, he said, "Does your Majesty wish to kill me? I am not mad, but reduced to despair by my sufferings." He conjured with tears those who were present to put him to death. "I am not come," answered the King, "to put you to death, but to punish you as a father, and to bring you back to duty." He then commanded him to rise, deprived him of his domestics, ordered a box of papers under his bed to be seized and committed him to the care of the Duke of Feria and six noblemen, enjoining them not to permit him to write nor to speak with any one. These guards clothed Don Carlos in a mourning dress, took from his chamber the tapestry, the furniture and even his bed. Don Carlos, full of rage and despair, caused a large fire to be kindled, under pretext of the extreme cold of the winter, and threw himself suddenly into the flames. It was with difficulty that he was rescued. He attempted by turns to finish his life by thirst, by hunger, by eating to excess. After Philip had endeavored to justify his measures to the Pope and the principal sovereigns of Europe, and had also given notice to the superior clergy, the courts of justice and the cities of his empire, of what had passed, he referred the case of the Prince, not to the Inquisition, but to the council of state, under the direction of Cardinal Espinosa, who was state councillor, grand inquisitor and president of the junta of Castile. This court is said, after a minute examination and hearing many witnesses, to have condemned him to death. Other accounts, however, state that he died of a malignant fever before any judgment was passed, after having taken the sacrament with much devotion, and having asked his father's pardon, 24 July 1568. The melancholy fate of Don Carlos has served as a subject for several dramas. The romantic story may be found in works by Lord John Russell and M. J. Chénier, and in the following: C. V. de Saint-Rémy, 'Don Carlos, nouvelle histoire' (Paris 1672); Schiller, 'Don Carlos'; Alfieri, 'Philip the Second'; de Campstron, J. G., 'Andronic'; Otway, T., 'Don Carlos, Prince of Spain'; Núñez de Arce, 'Ház de Leña.' For a discussion of plays on this subject, by Ximénez de Enciso and Juan Pérez de Montlaván, consult Bacon, G. W., 'The Life and Dramatic Works of Doctor Juan Pérez de Montlaván' (1602-38) (in Revue Hispánique, Vol. XXVI, pp. 1-474, 1912). For the historical account consult Ranke, in 'Wiener Jahr-buch der Literatur' (Vol. XIII, Vienna 1829); Gachard, L. P., 'Don Carlos et Philippe II' (Paris 1867); Maurenbrecher, 'Don Carlos' (Berlin 1876); Prescott, 'Philip II' (Boston 1855); Hume, 'Spain: Its Greatness and Decay, 1479-1788' (Cambridge, 1st ed., 1898; 2d ed., 1899, reprinted 1905); Hume, 'The Spanish People' (London 1901).
CARLOTA — CARLSBAD

France. In the meantime he and his descend-ants had been formally excluded from the succession by a vote of the Cortes in 1836. On arrival, one of the Bourges was assigned him as a residence, and he was also detained a prisoner there for a considerable time owing to his refusal to make the renuncia-tions demanded of him. In 1845 he resigned his claims in favor of his eldest son, and in 1847 was permitted to take up his abode in Trieste, where he died. Consult Baumgarten, 'Geschichte Spaniens' (Leipzig 1861); Butler-Clarke, 'Modern Spain' (Cambridge 1906) with a useful bibliography; Hume, 'Modern Spain' (London 1906), an account by one whose family took a considerable part in the events of the first half of the book, and who himself witnessed much of what is related in the last half.

CARLOTA, kär′lō-tä, Philippines. (1) A town of Negros Occidental, situated in the western part of the island of Negros, 20 miles south of Bacolod. Pop. 13,097. (2) A town in the eastern part of the island of Negros (Negros Oriental). Pop. 6,386.

CARLOTTA (Marie Carlotta Amélie), Empress of Mexico: b. near Brussels, 7 June 1840, daughter of Leopold I, King of Belgium, and married Maximilian, Archduke of Austria, 27 July 1857. In 1863 she went with her husband to Mexico and remained there till 1866, when the dissatisfaction against the empire forced her husband to send her from the land in France the castle of her birth. She could obtain no assistance from Napoleon III and went to Rome to appeal to the Pope. Before negotiations there were completed, her health gave way under the strain, and after the end of the empire and the execution of her husband (19 June 1867) she became totally insane. She was taken at first to the Château de Laken, and afterward to the Château de Bou-choute, near Brussels, Belgium, where she was still living in seclusion at the time of the in-vasion of her native land and the beginning of the war in Europe.

CARLOVINIANS, or CAROLIN-GIANS, the second dynasty of the French or Frankish Kings, which supplanted the Merovingians, deriving the name from Charles Martel or his grandson Charlemagne (that is, Karl or Charles the Great). Its origin is usu-ally traced to Saint Arnulf, bishop of Metz (d. 641), whose grandson, Pepin of Heristal, held the office of mayor of the palace in Bur-gundy, Neustria and Austrasia. This Pepin of Heristal, who died in 714, left as his successor a young grandson; but the actual inheritor of his ability was Charles Martel, a natural son. Charles Martel became mayor of the palace in 714 to the Merovingian roi foutant Childeric, and in his office was succeeded by his son Pepin le Bref, who in 751 deposed the merely nominal King and himself assumed that title. He was succeeded by Charlemagne and his brother Carloman (768-71). Charlemagne became sole king in 771, and extended greatly the dominions of his grandfather. He was crowned Emperor of the West. On his death in 814 he was succeeded by his son Louis the Pious, who divided his empire among his sons, and at his death, in 840, his son Charles the Bald became King of Neustria, the Spanish Mark and Aquitania, and is therefore regarded as the founder of the French dynasty. He died in 877, and was succeeded by a number of feeble princes. The dynasty came to an end with Louis V who died in 987. The house of Capet followed it, and the Capets also traced their descent from Charlemagne, but only because they were connected by marriage with the Carlovingians.

CARLOVITZ, or CARLOWITZ. See Karlovitz.

CARLOW, Ireland, an inland county in the province of Leinster, surrounded by Kildare, Wicklow, Wexford, Kilkenny and Queen's County. It is generally level or undulating except in the southeastern parts. The chief river are the Slaney and Barrow. From the remark-able fertility of its soil it is almost entirely an agricultural county, producing a great deal of butter, corn, flour and other agricultural produce for exportation. Agriculture is here carried on with as much skill and knowledge of recent improvements as anywhere in Ire-land, and there is less poverty than in most parts. There is abundant limestone, and granite is quarried. Area 346 square miles. Pop. (1911) 36,252, of which 89.2 per cent are Roman Catholics.

CARLOW, Ireland, the capital of the county of Carlow, on the Barrow, 56 miles southwest of Dublin by rail, with which it is also connected by canal. It has two principal streets intersecting at right angles. A bridge of five arches leads over the Barrow to the suburban village of Graigue, in Queen's County. The principal public buildings are the Roman Catholic cathedral and college and the Prot-esant parish church. It is lighted by electricity, and has an excellent water supply. Carlow is the principal mart for the agricultural produce of the surrounding country, has brewing and corn milling industries, and anthracite coal is worked. On rising ground to the south stand the ruins of the ancient castle of Carlow, still representing a very imposing fragment. In the Rebellion of 1798 Carlow was unsuccessfully attacked by the insurgent forces. Pop. (1911) 6,619.

CARLSBAD, kärls′bätd, Bohemia, a town on the Tepl, near its influx into the Eger, 116 miles west by north of Prague by rail. It is widely celebrated for its hot mineral springs, and is perhaps the most aristocratic of the watering places of Europe. In the season, April to October, the visitors may number from 30,000 to 60,000. Set in most lovely scenery 1,165 feet above sea-level, the town is well built and offers good accommodation for its guests. The temperature of the hot springs varies from 47° to 165° F. The principal spring, the Sprudel, has a very large volume, and is forced up to a height of 40 feet above the ground. Altogether, the daily flow of the springs of Carlsbad is estimated at 2,000,000 gallons. Somewhere approaching 2,000,000 bottles of water are exported annually. The principal ingredient in the water is sulphate of soda. The whole town and its environs stand on a vast caldron of boiling water, which is kept from bursting only by the safety-valves the springs provide. Ascribing its foundation to the Emperor Charles IV (1347), Carlsbad was made a free town by Joseph I. Here were
formulated in 1819 the reactionary Carlsbad Decrees (q.v.). Pop. 17,446.

CARLSBAD, Congress of, a conference of ministers representing Austria, Prussia and many small German states, which met at Carlsbad in August 1819 to concert measures to arrest the democratic tendencies then manifesting themselves in Germany. Its members recommended to their governments and to the German Diet the famous 'Carlsbad Decrees,' which were adopted by the Diet, 20 Sept. 1819. Among the most important of the decrees were those recommending severe press censorship, the establishment at Mainz of a central commission for the investigation of political intrigues, the suppression of the secret student organization, the opposition to dechristianism and government inspection of the universities.

CARLSBAD DECREES, the resolutions adopted in the summer of 1819 at the conference of the German ministers at Carlsbad, for the suppression of the so-called Demagogic Movement. The fear of a far-spreading conspiracy against the German princes, which had been excited by the murder of Kotzebue by Karl Sand, was skilfully employed by Metternich as an excuse for combining the German governments for the extermination of Liberalism. The representatives of Austria, Prussia, Bavaria, Saxony, Hanover, Württemberg, Baden, Mecklenburg, Nassau and Saxe-Weimar participated in the meeting. It was decided, that the censorship of the press should be rendered more strict, that the universities should be forbidden to spread liberal doctrines, that secret societies should be suppressed, and that a commission to sit at Mainz should be appointed to extirpate the revolutionary conspiracy which was supposed to exist. An attempt to depose more precisely the nature of the constitution permissible for the states of the German Confederation led to a stalemate between the conservative Austrians and the Württembergers who already had a liberal constitution. This was only solved at the conference of Vienna the following year. (See METTERNICH). Consult de Martius, 'Nouveau recueil général des traités' (Göttingen 1846).

CARLSBURG, kärl'sboorg, or KARLSBURG, Austro-Hungary, a royal free city (ancient Apulum) on the right bank of the Maros, 48 miles south of Klausenburg. It consists of an upper and a lower town, situated on opposite sides of the river, and communicating by a long bridge. It is defended by a citadel, and has a cathedral (dating from 1443) with a number of ancient monuments, a mint where the gold and silver obtained in Transylvania are purified and coined, an observatory with a good collection of instruments, an excellent library, a theological college, a gymnasium, arsenal and barracks. Pop. about 12,000.

CARLSCRONA, kärl'skron-na, or KARLSKRONA ("Charles' Crown"), Sweden, a seaport at the southern extremity of the peninsula, on the Baltic, capital of the län or province of Blekinge or Carlsholmen, 85 miles east by north of Christiansand. It stands on several rocky islets connected with one another and with the mainland by bridges, has broad, clean but somewhat steep streets, with houses mostly built of wood. The harbor is safe and spacious and the entrance is protected by forts. It was founded by Charles XII in 1688. As the chief Swedish naval station the town largely depends on the trade thereby occasioned, but it has also a considerable export trade in timber, tar, potash, fish, etc. Pop. 27,434.

CARLSEN, Emil, American artist: b. Copenhagen, Denmark, 19 Oct. 1853. He came to the United States in 1872 and studied art in Boston. Since 1891 he has lived in New York and has exhibited frequently there. His special field is still life painting, but he is also favorably known as a landscape artist. His landscapes are sincere and direct in presentation, and his marine subjects in particular are good in the movement of the water. He excels especially in line and in arrangement. Among his best known works are 'Sooty Kettle'; 'A Connecticut Hilltop'; 'The Rising Storm'; 'Night—Old Wyndham' (1905. Webb prize, Society of American Artists); 'Wind in the East'; 'A Lazy Sea'; 'A Stormy Afternoon' (1909); 'The Sky and the Ocean' (1914). He is represented in the Metropolitan Museum, New York, by a still life and two marines, of which 'Sail Breaking' is especially fine; in the Brooklyn Institute Museum and the Worcester Museum. He received a gold medal at the Saint Louis Exposition in 1904, and is a member of the National Academy of Design and of the National Institute of Arts and Letters.

CARLSHAMN, kärl'shamn ('Charles' Haven'), Sweden, a seaport town 27 miles west of Carlscrona, in a beautiful valley at the mouth of the Mie-A. It is regularly built, and its square market-place, planted on all sides with trees, has a fine appearance. It has an elegant townhouse, a good harbor and an active trade. Timber and articles of timber, granite, charcoal and fish constitute the chief exports. The manufactures are sail-cloth, sacking, tobacco, leather, etc.; and there is also some ship-building. It was founded in 1664. Pop. about 7,000.

CARLSON, Anton Julius, American physiologist: b. Bohuslan, Sweden, 1875. In 1891 he came to the United States, and after studying at Augustana College, Ill., and the University of Chicago, he became instructor and assistant professor in physiology in 1904 at Woods Hole laboratory. In 1909 he received the appointment of professor of physiology at the University of Chicage. He is the author of 'Physiology of the Nervous System of the Snake and the California Hagfish' (1904) and of numerous articles in physiological journals on saliva and saliva secretion, on the thyroids, parathyroids and pancreas, lymph and lymph formation, heart and circulation.

CARLSON, Fredrik Ferdinand, Swedish historian: b. Upland, 13 June, d. Stockholm, 18 March 1897. After leaving the University of Upsala, he became tutor to the royal family at Stockholm (1837—46). He returned to the university as professor of history (1849) and became rector (1860). He represented the university in the National Stock; later he sat for the Swedish Academy of Sciences (1858); and represented Gefleborg in the first chamber from 1873. He was appointed head of the Department of Public Worship, which post he held from 1863—70 and
again from 1873–80. He was prominent in public matters for many years, being Minister of Ecclesiastical Affairs, 1863-70 and again, 1875-78. He completed Geijer’s "History of Sweden" (7 vols., Stockholm 1855-83).

CARLSRUHE, kärl’sroo-ü, or KARLSRUHE (*Charles’ Rest*), Germany, the capital of the grand duchy of Baden, 39 miles north-northwest of Stuttgart. It was laid out in 1715, and is one of the most regularly built towns in Europe. The castle of the Grand Duke stands in the centre of the city, and from this point a number of streets radiate fan fashion, at regular distances from each other. Other streets intersect these in parallel circles. The road leading to the city correspond to this regular disposition, which, as is apt to be the case in strictly regular cities, often leaves upon the traveler the impression of monotony rather than that of agreeable order. The city is ornamented with several beautiful public buildings, including the palace, in front of which is a bronze statue of the founder of the city, the Margrave Charles William, the Parliament house, town-hall, etc. The court library contains 150,000 volumes; there are also here several famous museums and cabinets, a botanical garden, several institutions for the promotion of literature and the fine arts. The city has a largely developing trade in engines, carriage works, furniture, paper and plated goods. Pop. (1911) 134,313.

CARLSTAD, kärl-stäit, Sweden, town and the capital of the län of Vermland, on an island in Lake Wener formed by the two mouths of the Klar, and connected with the mainland by a bridge across either stream. It is beautifully situated, regularly built, is the seat of a bishop, and has a cathedral, gymnasium, townhouse, etc., and some trade in copper, timber, iron, machinery, tobacco, matches and grain, and also exports wooden ware and iron. The city was founded in 1584 and rebuilt after the fire of 1805. At the conference between Sweden and Norway was held here in 1905 to decide on the discontinuance of the union between these countries. Pop. 17,000.

CARLSTADT, Andreas Rudolf Bodenstein, German theologian: b. Carlstadt, Franconia, 1480; d. Basel, Switzerland, 25 Dec. 1541. He is celebrated in the history of the Reformation for his fanaticism as well as his misfortunes. He studied at Erfurt (1500–03), Cologne (1503) and Wittenberg (1510), where he was finally appointed professor of theology in 1513. In 1515 he went to Rome to study law and took the degree of LL.D. His learning enabled him to render great support to Luther in his first steps for the introduction of a reformation. In 1520 he was included in the bull which condemned Luther; and his spirited appeal from it was sent to a general council, of which he gave the first example, as well as his opinion openly expressed, in favor of the marriage of the priesthood, was among the many proofs which he gave of his zeal for the Reformation. While Luther was at Wartburg Carlstadt’s zeal urged him to acts of violence, which even wounded the people and students to the destruction of the altars and the images of the saints, greatly to the displeasure of Luther, who lost the friendship of Carlstadt by his opposition to his excesses. He publicly declared himself the opponent of Luther, and the Elector Frederick banished him from the country in September 1524. Carlstadt then commenced the controversy respecting the sacrament, denying, in opposition to Luther, the bodily presence of Christ in the sacramental elements, and recognizing in the rite a token of remembrance simply. This controversy was carried on with the bitterest animosity; and Zwinglius having declared himself in favor of Carlstadt’s doctrine, a dispute ensued between the Swiss and Wittenberg theologians which ended in the separation of the Calvinists and Lutherans. Carlstadt in the meantime being suspected, not without reason, of having taken part in the revolt of the peasants in Franconia, was obliged to wander through Germany, and being ultimately reduced to extreme distress, sought relief of Luther who procured him an asylum at Kempen, on condition that he should refrain from the expression of his opinions. Here he lived nearly three years. His restless mind, however, soon led him to break his promise, by the publication of some writings in 1528; and he even went so far as to plot against Luther’s person. To escape from the conduct of his life he repaired to Switzerland at the end of the same year, where he was appointed vicar of Altstadt, in the valley of the Rhine; in 1530, deacon at Zurich; and in 1534, vicar and professor of theology at Basel. Consult, for his biography, Jäger, J. C. (Stuttgart 1856) and Lindsay, ‘History of the Reformation’ (Vol. I, New York 1906). Many of his letters are in Ölearius, ‘Serinium Antiquarium’ (Halle 1698).

CARLSTADT, Austria, a town in Croatia, 34 miles southwest of Agram, agreeably situated in a perfectly level and richly cultivated plain near the junction of the Kulpa, Korana and Dobra, which are here navigable. It consists of the town proper and the citadel, together with the suburb of Dubovac. It is in the seat of a Greek bishopric, is tolerably well built and has an important trade. It also has a higher gymnasium and military school and has a distillery and a turbine rolling mill. Pop. 16,000.

CARLSTADT, N. J., borough of Bergen County, 10 miles north of Jersey City, on the Erie Railroad. It has brass, onyx and marble works, silk mills, cotton cloth mills, sable cloth works and air valve manufactories. It is governed by a mayor and council, the former being chosen for a period of two years. Pop. 3,807.

CARLYLE, kär-lí', Alexander, Scottish clergyman: b. Prestongrans, 26 Jan. 1722; d. Inveresk, 28 Aug. 1805. He was educated at the universities of Edinburgh and Glasgow, and afterward studied at the University of Leyden. Licensed as a preacher in 1747 he became minister of the parish of Inveresk, in Midlothian, where he continued to the end of his life. He was one of the leaders of the Moderate party in the Scottish Church, the party which, during the latter half of the 18th century, ruled with such predominating sway. The names of Robertson, Blair and Home among its members. As an eloquent debater and skilful ecclesiastical leader in the General Assembly he had no rival. He was of such striking personal appearance that he was called ‘Jupiter
Carlyle. He strenuously resisted all attempts to give additional influence to the popular ele-
ment in ecclesiastical matters. He left behind him a well-known autobiography, which,
though commenced in his 79th year, is a sin-
gularly interesting production, both from the
vigor and sprightliness of its style, and the
pictures which it presents of Scottish society in
the 18th century, and the more or less intimate
account it gives of such noted characters as
Home, the dramatist, Adam Smith and David
Hume. After remaining long in manuscript it
was published in 1860, under the editorship of
John Hill Burton.

CARLYLE, Jane Baillie Welsh, Scottish
letter writer: b. Haddington, Scotland, 14 July
1801; d. London, 21 April 1866. She was the
daughter of John Welsh, a Haddington sur-
geon, and was married to Thomas Carlyle
(q.v.) 17 Oct. 1826. Her letters, edited by her
husband, were published in 1883. Consult
Ireland, 'Life' (London 1891); and 'New Let-
ters and Memorials' (London 1903).

CARLYLE, John Aitken, English physici-
ian, brother of Thomas Carlyle: b. Eccle-
fechan, Dumfriesshire, 7 July 1801; d. Dum-
fries, 1840. He studied at Edinburgh
where he took his degree of M.D. in 1825,
and later completed his education in Germany.
He practised for a short time at London, where he
was unsuccessful. He attempted literature for
a while, assisting his brother in translating
Legendre's 'Geometry.' He then received an
appointment as traveling physician to Lady
Clare (1831-37), and later to the duke of
Buccleuch (1838-43). Retiring to a place near
the Chelsea residence of his brother, he de-
voted himself to literary labors and in 1840
published a translation of Dante's 'Inferno,' a
very scholarly and finished work. A very
friendly relation existed between the brothers,
as evinced by letters and the will of Thomas.
Dr. Carlyle edited also Irving's 'History of
Scottish Poetry' (1861).

CARLYLE, Joseph Dacre, English Ori-
tenalist: b. Carlisle 1759; d. Newcastle-upon-
Tyne, 12 April 1804. He was graduated from
Cambridge, became chancellor of Carlisle in
1793, professor of Arabic at Cambridge in 1795
and was subsequently appointed to the Turkish
embassy. He published 'Specimens of Arabic
Poetry' (1796); 'Poems' (1805), and a trans-
lation of an Arabic history of Egypt. His
Arabic Bible was published in 1811, completed
and edited by H. Ford, professor of Arabic at
Oxford.

CARLYLE, Thomas, Scotch essayist, his-
torian and miscellaneous writer: b. Ecclefe-
chan, near Annandale, in Dumfriesshire, Scot-
Carlyle's ancestors were said to have come to
Annandale from Carlisle, England, in the time
of David II, but at the author's birth the in-
mediate family was living in very straitened cir-
cumstances at Ecclefechan, where the grand-
father, Thomas, was village carpenter and his
five sons masons. The second of these, James,
as a man 'largest natures,' assertive, choleric, and pious, with an uncommon
gift of forcible expression, married as his
second wife Margaret Aitken, a woman of
affectation nature and piety of mind. By her
he had four sons and five daughters, of whom
the eldest was Thomas. The third son, John
Carlyle (q.v.), became distinguished as the
translator of Johann Anschütz, whose, as a moody,
-sensitive child, he was much bullied by the
other boys, and probably suffered acutely.
At the age of 13 he was ready to enter Edinburgh
University, which he attended from 1809 to
1814, without, however, taking a degree. His
individuality did not readily allow itself to be
molded to the academic routine. Finding him-
self unable, because of religious doubts, to
enter the ministry, he went to Annan Academy
as tutor in mathematics, in 1814. Later he
taught at Kirkcaldy, where he made the ac-
quaintance of Edward Irving (q.v.), one of his
warmest friends. Irving's friendship was of
great value to Carlyle, and his library enabled
the latter to gratify his love of reading and to
mitigate the distaste which he previously
had. In October 1818 the work became so repellent
that he resigned from his school, saying that
"it were better to perish than to continue
school-mastering." Then he went to Edinburgh
to try to earn his living.

The next three years were perhaps the most
trying of his life. He was tormented to an un-
common degree by his lifelong enemy, dyspe-
sia, and as a result was greatly depressed in
spirit. Uncertain what career to follow, trying
his hand at many vocations and different
studies, miserably poor, finding his only em-
ployment for a time in writing hack articles,
he was "mentally and physically adrift in the
sense that is described in his "Everlasting No"
of 'Sartor Resartus.' Toward the middle of
1821, however, he seems, by much resolution
and energy of will, to have shaken off much
of the depression, to have attained the position
of the "Everlasting Yea." The men who at
this time most influenced him were the Ger-
mans, particularly Goethe, Johann Christian
Richter, and the philosopher Fichte. German literature
was now his most absorbing study, and later
this study bore fruit in his 'Life of Schiller'
(1823-24), his translation of Goethe's 'Wilhelm
Meister' (1824), and in several essays. These
books mark his formal entrance into the litera-
ture. Up to the time of their publication Carlyle's
published writing had been a series of articles
for Sir David Brewster's 'Encyclopædia,' a
translation of Legendre's 'Geometry,' to which
he prefixed an 'Essay on Propriety,' and miscella-
nous hack work. The 'Life of Schil-
ler' and the translation of 'Wilhelm Meister'
met with favorable reviews, and the transla-
tion is usually regarded as one of the best of all
renderings into English. While he was at
work on these books he was (1822-24) tutor
in a well-to-do family, the Bullers, from whom
he received £200 a year for not disagreeable
work. In spite of the kindness of his patrons,
he managed, as was usual with him during
life, to demand money, assertive, choleric, honest and pious, with an uncommon
gift of forcible expression, married as his
second wife Margaret Aitken, a woman of
affectation nature and piety of mind. By her
he had four sons and five daughters, of whom
Returning to Scotland in 1825 he established himself at Hoddam Hill, a farm near the Solway, where he farmed and wrote. On 17 Oct. 1826, Carlyle, after a somewhat prolonged, vacillating and rather stormy wooing, succeeded in marrying Jane Baillie Welsh, a woman in many ways as remarkable as himself and distinguished as a descendant of John Knox. The humors and distemper of their married life have become proverbial and are to be found most fully recorded in Froude's biography. Both seem to have been extremely and uninvitingly selfish and so vain as to be wholly lacking in reticence about their domestic life. For two years they lived at Scotscraig near Edinburgh, where they had the advantage of the intelligent society of the capital, and where Carlyle supported himself by writing for the reviews. In the Edinburgh Review, under the editorship of his friend Jeffrey (q.v.), he published, in 1827, his well-known essay on 'Richter' and 'The State of German Literature,' an article which led to the famous quarrel which was the only medium of publication. He essayed a novel but failed, and was disappointed in his attempts tosecure the chair in moral philosophy at St Andrews and a professorship in London University.

In May 1828 the Carlyles removed to a lonely farm, Craigenputtoch, overlooking the Solway. Here he wrote his 'Essay on Burns,' one of his most sympathetic pieces of criticism (Edinburgh Review, 1828), several other essays of much importance, as 'Voltaire,' 'Novalis,' and his 'Sartor Resartus,' the book for which he is perhaps most famous. Refused by several publishers, Sartor Resartus first saw light in Fraser's Magazine, between December 1833 and August 1834, where it excited such a storm of protest that no separate English edition appeared till 1838. Meanwhile (1836) it first appeared in book form in America, where it was especially commended by Emerson. This most characteristic book of Carlyle purports to be a review by an English editor of a treatise by a learned German professor, Herr Teufelsdröckh, with whose life and opinions it deals. The book is written around the famous philosopher, and is divided into two parts: (1) the creed and is in the main symbolic of Carlyle's creed at this time—that as clothes express the taste of the wearer, so life in all its forms may be regarded as the vesture of the mind. The idea is not a very original one, but is expressed with such oddity of phrase and image that it appears as profound as forcible. The most interesting feature is the account of the moral and spiritual attitude of Teufelsdröckh, who is Carlyle himself. It is the querulous, stormy tale of early suffering, lack of sympathy from fellowmen, disappointment alike in the business of the head and the affairs of the heart, despondency and despair over the great question why man is in the universe, doubt and wavering, and final acceptance of the only solution through stern endeavor. The book might be called a prose epic of the inner life, and it is wholly egotistic and anthropocentric.

In 1834 the Carlyles removed to London, where they settled in Cheyne Row, Chelsea, and here were their headquarters for the remainder of their lives. Soon after the change he began his 'French Revolution,' a work which was completed in 1837 and which gave him much more reputation than he had heretofore enjoyed. During the same period he wrote the 'Diamond Necklace,' and the articles on 'Mimbau' and 'Sir Walter Scott,' the honorarium from which was of great benefit in his impecunious state. The success of the history enabled him, in the four following years, to gain audience for four series of lectures, 'German Literature,' the 'History of European Literature,' 'Revolution to Restoration,' and 'True Heroic Characteristic, 'Heroes and Hero-Worship.' Published in book form in 1841, this series remains to-day one of the most widely read of Carlyle's works and is perhaps the clearest expression of his philosophy of history. As he says, "universal history, the history of what man has accomplished in this world, is at bottom the history of the great men who have worked there." The moral animus of the book is expressed further on in the same introduction: "We cannot lose our eyes upon a great man, without gaining something by him. He is the living light-fountain which it is good and pleasant to be near." Again, speaking of the Hero as a man of letters, he tells us the purpose of all his own writing: "The writer of a book, is he not a preacher, preaching not to this parish or that, on this day or that, but to all men in all times and places?"

The book may conveniently mark an important time in Carlyle's life. The pamphlet on 'Chartism' of 1840 had enunciated a doctrine, of a political sort, that "Might is right,"—"one of the few strings," says Nichol, "on which, with all the variations of a political Paganini, he played through life." About this time, in short, his ideas of history, of morals, of politics, of his own mission, seem to have crystallized. Furthermore, his circumstances had definitively bettered. His name was well known and he was able to refuse a chair of history at Edinburgh University and later another at Saint Andrews. In 1842 the death of Mrs. Carlyle's mother threw an income of at least £200 in the hands of the Carlyles and relieved them of the fear of penury.

From this time on Carlyle's work falls mainly into two main divisions: (1) biographies of great individuals and (2) pamphlets of a quasi-political sort, powerful lashings of modern institutions. The most important of the latter, "Past and Present," written in seven weeks, appeared in 1843. Herein Carlyle commits a common and characteristic fallacy in comparing a charming picture of monastic England with some of the worst things of modern life, to the obvious disadvantage of the latter and, by extension and implication, to modern civilization as a whole. Nevertheless, the book makes a strong appeal to our humanity, and is perhaps the best example of Carlyle's many protests against modern barbarism. It is said to have been productive of good in factory legislation. Meanwhile he was engaged on an important work of the same sort, "Cromwell," which, after three years' preparation, appeared in 1845. Carlyle, with characteristic thoroughness, spent a large part of the summers of 1842 and 1843 in visiting the battlefields of the Civil War. It is significant that the "great man" was now, with Carlyle, not
necessarily a man of letters, as in his works previous to the ‘French Revolution,’ but a man of political prowess as well, and this tendency to exalt the man of might reached its climax in the ‘History of Frederick II.’ The years between ‘Cromwell’ and the beginning of ‘Frederick’ are marked by his notable ‘Letter-Day Pamphlets’ (1849), one of the most denunciatory of his books, and his ‘Life of John Stirling’ (1851), a dear friend who had died six years before and who, like Edward King and Arthur Hallam, is chiefly remembered through the work of the lover. ‘A greater man was never on a trip in the fall of 1851, with the Brownings, to France, where he met the chief literary celebrities of the time—and passed unfavorable comment on them as on all affairs French—he settled down to the planning of the ‘History of Frederick II.’ On the preparation of this work and the composition of it he was engaged for the next 13 years. His study was indefatigable and he made two trips to Germany, in 1853 and 1854, to study the battlefields of Frederick. In 1850 the first jottings were published with great success, the third in 1862, the fourth in 1864 and the fifth and sixth in 1865. During the composition he had done practically no side work; a somewhat unhinged state of affairs in America, in Norway, on the American War, and his ‘Prinzemarcb’ are the only pieces. The compilation of ‘Frederick’ marks the climax of Carlyle’s life. It won for him recognition in England as the foremost of prose writers, and in Germany, too, his fame was naturally great. Even the Scotch decided to honor a prophet of their own country; he was elected lord rector of Edinburgh University, and in the spring of 1866 delivered the inaugural address, on the ‘Reading of Books.’ While on his trip he received news of the death of Mrs. Carlyle, which, in spite of their disagreements, was a severe blow to him and may be said to mark the beginning of his decline. He was over 70 years of age and the labor of ‘Frederick’ had left him worn and weary. Thereafter he wrote only three books of comparative importance, ‘Shooting Niagara—and After,’ of the type of ‘Past and Present,’ the ‘Early Kings of Norway,’ of the hero type, and ‘The Wise Men’ of Jeffrey and Edward Irving, written in the months following the death of his wife, but not published until after his death. His last public utterance, according to Froude, was a letter which he wrote, in May 1867, to the ‘Times,’ protesting against the moral support which England was giving to Turkey in the war with Russia. His life at this time is described as one surrounded by honors and supported by a few staunch friends, but as one of growing weariness and despondence to be at rest until, after two years of physical feebleness, he died quietly in his 86th year.

Carlyle’s character and place in literature have, since his death, as during his life, been subjects of much comment and of comment of the most diverse sorts of comment. It is thereon as the greatest of prophets, the most eloquent of sages; and condemned, on the other, as the noisiest of egoists. It is therefore impossible to fix with any approximation his value as a character or as a man of letters, in the sense that Milton, Addison, Gray and others may be tolerably well characterized. His severest critics, like Mr. Robertson, are undoubtedly right when they accuse him of inconsistency and irrationality and when they point out in his character certain elements of brutality and narrow egotism, and yet the fact remains that he has been the inspiration of many men and that there is a feeling abroad that he is one of the great names in English prose. Perhaps the most sensible of these opposing views may best be summed up in Huxley’s words (letter to Lord Stanley, 9 March 1881) ‘He is much more beloved more strongly from his way of looking at things than I; but I should not yield to the most devoted of his followers in gratitude for the bracing, wholesome influence of his writings when, as a very young man, I was essaying without rudder or compass to strike out a course for myself.’

In view of such diverse opinions, all of which contain truth, it seems necessary merely to protest against those extremist views which have just been referred to. We regard him as the wisest of men or the noisiest of hypocrites is, after all, a question of temper or of what one regards as valuable in the universe, and usually has value only as the expression of personal opinion. Carlyle’s influence, like that of Dr. Johnson, is the personal influence of a powerful and upright man rather than that of a philosopher or a discoverer of new truth. His personal qualities as expressed in his writings—his integrity, his earnestness, his independence, his sincerity, his hatred of sham, cant and affectation, his vigor—are what count in his hold on people. As a system, his work, as his critics justly remark, is unscientific and untrue. His work, so voluminous and, on the face of it, consisting of translations, literary, biographical, historical essays and books, tracts of the times and satires, comes down to the glorification of a galaxy of interesting and, in different ways, powerful individuals: Schiller, Goethe, Cromwell, Frederick, himself (in ‘Sarto Resartus’) and others, and to the doctrine that their power is good. There is, of course, no means of testing the general truth of such views. They are really personal. He is, therefore, to be regarded as a seer, a prophet, a preacher, he is a great worker of his time, like Dr. Johnson, of the ‘meanings of life, and exhorts his readers to feel rightly and live rightly, to ‘do the duty which lies next them,’ to ‘work and despair not.’ These things he said with an impressiveness equaled by few men and to a very large body of listeners. See FRENCH REVOLUTION, THE; HERO AND HERO WORSHIP; SARTOR RESARTUS; FREDERICK THE GREAT.

Bibliography.—Of the numerous editions of Carlyle’s writings the best, aside from his correspondence, is probably the Ashburnton Edition, in 17 volumes. The ‘Early Letters of Thomas Carlyle’ (1886; 2d series, 1888); the ‘Correspondence between Goethe and Thomas Carlyle’ (1887); and the ‘Correspondence of Thomas Carlyle and Ralph Waldo Emerson’ (1883), each has been reprinted in other editions of his letters. Froude’s ‘Thomas Carlyle’ (4 vols, 1882–84) is the great biography, and is, incidentally, the most censured biography of recent times, because of the frankness with which it discloses the domestic life of the Carlyles. Excellent short lives are those of
JOHN NICOLL, in the 'English Men of Letters Series,' 1894; R. W. Garnett, in the 'Great Writers Series,' 1887 (together with a very full bibliography), and Sir Leslie Stephen, in the 'Dictionary of National Biography.' The critical essays of Matthew Arnold, Emerson in 'Discourses in America,' Augustine Birrel, Collis P. Huntington, 'Prosper Works,' Vol. II, John Morley, 'Miscellanies,' Vol. I, J. M. Robertson, 'Modern Humanists,' the severest of Carlyle's critics, and Stephen, 'Hours in a Library,' Vol. III, may be cited as representing different views among the most eminent of modern critics. Consult also Froude's 'Letters and Memorials of Jane Welsh Carlyle' (1883); Roe, F. W., 'Carlyle as a Critic of Literature' (1910); Craig, R. S., 'The Wakening of Carlyle' (1909); Wilson, 'Froude and Carlyle' (1898); Sheppard and Williamson, 'Memoirs of the Life and Writings of Thomas Carlyle' (1881); Wylie, 'Thomas Carlyle the Man and his Books' (1881).

WILLIAM T. BREWSTER, Professor of English, Columbia University.

CARLYLE, William Arthur, Canadian mining engineer: b. Hamilton, Ontario, 1862. A graduate of McGill University in 1887, he afterward was appointed at his alma mater special lecturer in mining and metallurgy (1891-95), and in 1895 professor of mining and engineering. He was provincial mineralogist and director of the Department of Mines, British Columbia, for three years, and from 1898 to 1908 was general manager of the Rio Tinto Company's mines in Spain. In 1908 he settled in Toronto, as a consulting engineer, and the following year received the appointment of professor of technology and metallurgy in the Imperial College of Science.

CARLYLE, Ill., city and county-seat of Clinton County, 45 miles east of Saint Louis, on the Baltimore and Ohio Southwestern Railroad, and on the Kaskaskia River. It has flour mills, and paper manufactories and a large trade in flour and grain. It contains a county courthouse and a hospital. Carlyle was in pioneer times a station on the Vincennes trail. The elegant public library and the mineralogical gardens are the property of the municipality. Pop. 1892.

CARMACK, Edward Ward, American politician: b. near Castalia Springs, Sumner County, Tenn., 5 Nov. 1858; d. Nashville, Tenn., 9 Nov. 1908. He studied law and after admission to the bar practised his profession at Columbia, Tenn. He was member of the State legislature in 1884; was on the editorial staff of the Nashville American (1886-88), and in 1892 became editor of the Memphis Commercial. He served two terms in Congress as Democratic representative from the 10th Tennessee district 1897-1901, was United States senator 1901-07, and later editor of the Nashville Tennessean. In 1906 he contested the Democratic nomination for governor, but was defeated. He was assassinated 9 Nov. 1908 by Robert J. Cooper, son of his long-time bitter political opponent, Col. Duncan Cooper. He published 'Character; or, The Making of the Man' (1909).

CARMAGNOLE, kár-man-yôól', Italian condottiere: b. Carmagnola, about 1390; d. Venice, 3 May 1432. His real name was Bussone, but he adopted as his own the name of his birthplace. The son of a peasant, he was a herdman in his youth, but enlisting in the service of the Duke of Milan (Filippo Maria Visconti), he rapidly rose in rank, and aided his master in regaining a great part of Lombardy, and in extending his possessions. The Duke, however, became suspicious of his loyalty, confiscated his property, cast his wife and children into prison and banished him; upon which Carmagnola entered the service of the republic of Venice, from which he received the appointment of generalissimo. He wrested Brescia from the Duke of Milan, and entirely routed his army at the battle of Macalo in 1427. After the battle he released his prisoners, which was frequently done at that time by condottieri, but incurring the suspicions of the Venetian senate for doing so, and his subsequent military operations not proving successful he was recalled to Venice, under the pretext that his advice was needed for affairs of state, placed under arrest, accused of treason, put to the torture and beheaded. His fate has been celebrated in Manzoni's tragedy, 'Il Conte di Carmagnola' (1820). Consult also Brown, 'Studies in Venetian History' (London 1907).

The author and composer of the song are unknown. It is notable simply for its historical associations, not for the intrinsic merits of words or music. The song and dance were first used at the time of the indignation of the people on account of the veto allowed to the King on the resolves of the National Assembly. The Carmagnole was commemo rated at fiestas, popular festivals, and at the Revolution. Several members of the National Convention — Barère, for instance — by way of jest, gave this name to their communications to the assembly.

CARMAN, Albert, Canadian Methodist bishop and college president: b. Iroquois, Ontario, 1833. A pupil of Dundas Grammar School and of Victoria University, Cobourg, he was graduated in 1855. He received the appointment of professor of mathematics in Albert College, Belleville, in 1857, the following year being selected principal. Ten years later in 1868 he was appointed first chancellor of Albert University, to which standard, with a charter in all the faculties, he had raised Albert College by his persistent and successful work. From 1876 to 1883 he was bishop of the Methodist Episcopal Church, having been ordained minister in 1859. When the various Methodist bodies united in 1883, Carman became general superintendent for now 30 years. He was also a senator of Toronto and Victoria universities, a governor of Wesleyan Theological College, Montreal, and was one of the
founders of Alma Ladies' College, Saint Thomas. He made a missionary tour of the world in 1888, during which he was regarded as a prominent force among the ranks of prohibitionists.

CARMAN, Bliss, Canadian poet and journalist; b. Fredericton, N. B., 15 April 1861. He was educated at the universities of New Brunswick, Edinburgh and Harvard. In 1890 he became office editor of the New York Independent, was with this magazine since then he has had editorial positions on The Literary World, The Cosmopolitan and several other magazines. In 1894 he was associated with the late Herbert S. Stone in founding the Chap-Mak, the first of the little pocket magazines. He received the degree of LL.D. from the University of New Brunswick in 1906. His verse has been widely read and his successive volumes include 'Low Tide on Grand Prè' (1893); 'A Sea Mark' (1895); 'Behind the Aries' (1897); 'Ballad of Lost Haven' (1897); 'By the Aurelian Wall' (1897); 'Songs from Vagabondia,' joint author with R. Hovey (1894); 'More Songs from Vagabondia' (with Hovey) (1896); 'Last Songs from Vagabondia' (1900); 'A Winter Holiday' (1901); 'St. Kitt's Ballad' (1894); 'St. Michael's Gate' (1895); 'The Girl in the Poster' (1897); 'The Green Book of the Bards' (1898); 'The Vengeance of Noel Brassard' (1899); 'Ode on the Coronation of King Edward' (1902); From the Book of Myths' (1902); 'Pipes of Pan,' No. 1 (1902); 'Pipes of Pan,' No. 2 (1903); 'Pipes of Pan,' Nos. 3, 4, 5 (1904–05); Poems (collected ed. 2 vols., 1905); 'Kinship of Nature' (1903); 'Friendship of Art' (1904); From the Book of Valentines (1905); 'The Making of Personality' (1907); 'The Gate of Peace' (1907); 'The Rough Rider' (1909); 'A Painter's Holiday' (1911); 'Echoes from Vagabondia' (1912); 'Daughters of Dawn,' with Mary Perry King (1913); 'Earth Deities,' with M. F. King (1914).

CARMARTHEN, or CAERMAERTHEN (Welsh, Caer Fyrdwg), South Wales, a seaport town, capital of Carmarthenshire, nine miles from Carmarthen Bay, Bristol Channel, and 14 miles northwest of Llanelli, on the right bank of the Towy. The principal buildings are the abbey church of Saint Peter's Church, with some interesting monuments—one an altar tomb of the 16th century—and Saint David's Church. There are excellent schools, two infirmaries and a literary and scientific institution. There are some tin and lead ore works, cloth manufactories, slate quarries and iron foundries, and the salmon fishery is extensive. Carmarthen was the Moridunum of the Romans, and under the native Welsh Princes the capital of South Wales. Pop. 10,221.

CARMARTHENSIRE, or CAERMARTHENSHIRE, South Wales, a maritime county and the largest of all the Welsh counties; extreme length, 45½ miles; breadth, 26 miles; area, 588,472 acres. It is mountainous generally, but not so rugged as some other Welsh counties. Some of the vales are beautiful, particularly that of Towy, which is 30 miles in length. This river and the Tawe are the only two rivers, of any extent, in the county. The valleys are fertile, and numerous herds of small black cattle are raised on the hills. The mineral products are copper, silver, iron, lead, coal, marble and building stone. There are considerable fisheries. The Rebecca Riots (1843–44), in opposition to the competition of factories, were not the only disturbances which caused alarm and loss of property. The great coal-mining centres of the county, Carmarthen, is one of the great coal-mining centres of the county, Carmarthenshire returns two members to Parliament. Pop. 160,406.

CARMAUX, kär-mō, France, a city in the department of Tarn, nine miles northeast of Albi by rail. It is one of the great coal-mining centres of France, the annual output sometimes reaching as high as 1,200,000 tons. The frequent labor strikes and riots took place here in 1892. There are also glass manufactures. Pop. (1906) 8,618.

CARMEL. (1) A mountain ridge in Palestine, constituting part of Lebanon, on the southern frontier of Galilee, in the pashalik of Acca. It consists of several rich woody heights, separated by fertile and habitable valleys within a circuit of about 28 miles, and terminates at the mouth of the Kishon in a lovely plain, which forms the southern coast of the Gulf of Ptolemais or Acca, on the Mediterranean. Upon different parts of this mountain there are ruins of churches and monasteries from the time of the Christian kingdom of Jerusalem, and the cave which, according to tradition, was inhabited by the prophet Elijah. (2) A city of Judah, about eight miles southwest of Hebron. Eusebius mentions it and calls it a very great town. The modern city is Khirbette Cemel.

CARMELITES, one of the four mendicant orders of the Roman Catholic Church; its full title is Friars of Our Lady of Mount Carmel. The order has, traditionally, a very ancient origin, but as a religious order approved by the Roman Catholic Church is contemporary with the Dominican and Franciscan orders. According to the legends the Carmelites trace the origin of their order back to the early days of the kingdom of Israel, the time of the prophets Elijah (Elias) and Elisha (Eliseæus). Elias, in his early manhood, says the legend, retired for religious contemplation to Mount Carmel, and there, taught by an angel, gathered to himself a number of men of like disposition, and instituted a society of contemplatives for worship of the true God and the attainment of spiritual perfection. Among the disciples attracted to the school of religion were the youths who afterward were the minor prophets Jonah, Micah and Obadiah; and at a later period the renowned philosopher of Magna Græcia, Pythagoras, was numbered among the inquirers after the true religion and the science of divine things in this great school of the prophets: Pythagoras' instructor was the prophet Daniel. Elijah's wife instituted an order of female recluses. As pointing to the existence on Mount Carmel of some such institution as the legend postulates, reference is made to 1 Kings xvii, 19 and following; 2 Kings ii, 25; and 2 Kings iv, 25.

The world outside the precincts of those religious communities appears to have been entirely ignorant of this ancient institution till early in the 13th century, when Phocas, a Greek monk of Patmos, brought to the Latin Patriarch of Constantinople evidence of the existence in olden time of a great monastic or eremitic establishment on Mount Carmel, of which the cesar or abbot was the chief. The constitutions of the Acta Sanctorum were able to demonstrate that the present order owes its origin to the Crusader Berthold who, having become
a monk in Calabria, took up his abode on Mount Carmel in 1156, with 10 companions. For these Phocas petitioned the patriarch to formulate or to approve a rule of monastic or eremitical life. This was done, and afterward the rule was approved by Pope Honorius III in 1224. The connection of this order with the ancient school of the prophets, even if the traditional story be accepted, seems to lack proof. All that we are told is that a rule of monastic life existed in the line of succession from the eminent school of prophets is, that in a vision Elias gave orders to the monk from Calabria to found a religious establishment on the ancient site. The community was expelled by the Saracens from its seat on Mount Carmel and took refuge in the West. One of the earliest houses of the Carmelites in the West was founded at Alnwick in England; and about the same time, near the middle of the 13th century, Saint Louis the King, founded at Paris the first Carmelite house in France — the Carmes, of terrible celebrity in the great Revolution. Pope Innocent IV modified the rule of the order and assimilated it to that of the Premonstratensians. One of the traditions represents Jesus and his mother as initiators of the ancient order; and Saint Simon Stock, sixth general of the order, an Englishman, received from the hands of the Virgin the scapular of Mount Carmel with the assurance that whoever should die wearing that scapulary would surely not be damned. A relaxation of the primitive severity of the rule was permitted by Eugenius IV in 1431, and this led to a scission of the order into two sub-orders, the Conventuals or Calced (wearing shoes) and the Observants or Discalced (barefooted). Pope Benedict XIII in 1725 permitted the order to add to the statutes in Saint Peter’s Church of founders of religious orders one to their founder, which was erected with the inscription: "Universus Ordo Carmelitarum Fundatori sui Sancto Elicio propheta erexit" ("The whole order of the Carmelites erected this statue to their founder, Saint Elias the prophet"). The order of Carmelites nuns dates from the middle of the 15th century. In 1562 the great mystic Saint Teresa, who was a Carmelite nun, in virtue of a papal brief established a separate branch of the sisterhood, under a very severe rule: these are the Barefoot Carmelite Nuns. She then undertook to restore in the original order of Carmelites Friars the ancient severity of discipline, and succeeded; the result is the order or suborder of the Barefoot or Discalced Carmelites. The Carmelite order, in its several forms, has establishments all over the world. The headquarters of the order in America are at Niagara Falls.

CARMEN. Mérimée’s short novel, ‘Carmen,’ is probably less known than the opera to which it gave its name. This story, like many of Mérimée’s literary productions, appears merely as an incident in the course of more serious work. Indeed, it begins with an archaeological discussion and ends with a dissertation on gypsy dialects and manners. The intervening 90 pages contain however a vivid picture of gypsy life in Spain in its strongest and most picturesque features. Mérimée’s travels in Spain, his acquaintance with the history of the country, its literature, its language and dialects, including the difficult Basque and that of the Romani or gypsies, furnished him abundant material for his story. This material he handles in his impersonal manner with a logical development, a precision and a finish of style which make of his works little gems of literary achievement. In spite of his detached attitude toward his characters, he endows them with an impressive or rather oppressive realism. Few characters in French literature are more skillfully drawn or more strongly alive than those found in Mérimée’s stories. In ‘Carmen,’ the heroine is a romantic conception of the classic Gitansila of Cervantes. She combines the virtues and vices of gypsy life carried to extremes. In her many-sided roles, either as cigarette-maker, a fortune teller, a secret agent of highwaymen and smugglers, or as the fun-loving dancer and the devoted nurse of her wounded companions, she is intensely passionate or revengeful, greedy or extravagant, selfishly sensuous or ideally self-sacrificing, but always exercises a strong fascination upon all of those who willingly or unwillingly come under her fateful influence. This fascination has been transformed into that of an honest sergeant in the army into a smuggler, a bandit and a murderer, when, driven by jealousy, he stabs Carmen herself after he had gained undisputed possession of her by killing her gypsy husband in a trumped-up duel.

Although such adventures and strange pictures may startle and puzzle the reader, they nevertheless leave a strong impression because in spite of an exaggerated individualism, they show a solid humanistic foundation, and on the part of the author an accurate sense of observation even if tinged with a certain dilettantism and indifference bordering on cynicism. Dramatized by Meilhac and Halévy, ‘Carmen’ was set to music by Bizet and played for the first time in Paris on 3 March 1875; since then it has been one of the most popular operas of the French school. Consult Ives, George Burnham (translator), ‘Carmen and other stories’ (New York 1903).

L. A. LOISEAUX.

CARMEN, an opera comique in four acts by Georges Bizet (libretto by Meilhac and Halévy, founded on a tale by Prosper Mérimée) first produced at Paris on 3 March 1875. Not only Bizet’s masterpiece, but the greatest opera that has come out of France, ‘Carmen’ was not at first a success, and the coolness of its reception is generally believed to have hastened the composer’s death, which occurred three months later. The story of the beautiful Spanish gypsy, flirtatious and fickle, cruelly oblivious to the ruin she spreads, until her career is tragically ended by Don José, one of her lovers, is familiar to every opera-goer. There is no more popular song in the modern repertory than that of the Torero with its graphic portrayal of the character of Escamillo, the bull-fighter. In the Habanera, sung by Carmen in the first act, use is made of an old Spanish song; but except in that instance, the music is all Bizet’s and not the least noteworthy fact is its crisp, compact Spanish color, at realistic and as warm as a Sorolla painting. The rhythmic lift of the Seguidilla, with which Carmen subjugates Don José, and of her dance with castanets in the second act, is not easily
forgotten. Indeed, the whole score is a mine of rhythm of inexhaustible variety. The romantic charm of Michael William Balfe's work is so compelling as easily to overcome the natural reluctance of the most celebrated prima donna to taking second place. While the Wagnerian influence is in a general sense present in the orchestral portion of Carmen, harmonically and rhythmically it is Bizet alone and his originality and dramatic power as displayed in this work (think of the eloquent Fate motif) suggest that he might have risen to the greatest heights had he lived beyond the short 37 years of life permitted to him. It was Nietzsche who said: "Bizet was the last genius to discover a new beauty.—Bizet discovered new lands—the Southern lands of music." Carmen has always enthused the powers of great dramatic singers. The original was Mme. Galli-Montez. Minnie Hauk introduced the rôle in London and New York. But the greatest of all Carmens was Emma Calvé, who made her American début in 1893. Her sensational performance was long before the public in this country and will not soon be forgotten.

CARMEN SECULARE. See HORACE.

CARMEN SYLVA, pen name of ELIZABETH, Queen of Rumania (q.v.).

CARMI, Ill., city and county-seat of White County, 150 miles southeast of Springfield, on the Louisville and Nashville Railroad and the Little Wabash River. It is the centre of an agricultural region and exports fruit, grain, flour, tile and lumber. It has flowering and sawmills, brick works, machine shops, a stave and heading factory, an ice factory, etc. Pop. (1910) 2,833.

CARMINATIVES, remedies that cause a warm, pleasant sensation in the stomach and act as stimulants to the muscles, causing peristalsis, that is relieving distention; and that increase the flow of the gastric and intestinal secretions. Most of the drugs containing volatile oils are carminatives; as, the mint family, parsley, anise, fennel, caraway, cardamon, ginger, cinnamon, cloves. See VOLATILE OILS.

CARMINE, the most splendid of all the red colors, is made from cochineal insect, or Coccus cacti. It was first discovered by a Franciscan monk at Piza, while compounding some medicine containing cochineal, and in 1656 it began to be manufactured. The finest is that which is thrown down from an aqueous infusion by chlorid of tin. This, after deposing, is collected and dried. The operations require the greatest care, for the brilliancy of the color is affected by the weather, light and temperature. The color produced by alum has a darker tint, and constitutes lake. Carmine, or carminic acid, is also the name given by chemists to the coloring matter of cochineal. The acid is a purplish body, extremely soluble in water and in alcohol. It forms salts with the heavy metals, and it yields various products when acted on by chlorine, nitric acid and other reagents. Carmine is used to some extent in dyeing, in water-color painting, to color artificial flowers, confectionery, etc.

CARMONA (ancient Carmo), a town in Spain, 20 miles from Seville, on a height overlooking a large plain covered with olive-trees. It is well built, containing many handsome mansions belonging to the nobility, who though usually resident in Seville, spend a part of the year there. The principal square is well planted, and, among other edifices, possesses a handsome Gothic church with lofty spire. Another conspicuous object is a Moorish castle, flanked with massive towers, and there are two old Roman gates. The most remarkable feature are the chiefy woolen hats, leather and earthenware. Recent important excavations on the site of the ancient necropolis, to the west of the modern town, have brought to light a large number of tombs and funeral trichinae in almost perfect preservation. Considerable portions of the Moorish wall and Alcazar still remain. The city retained its prominence throughout the Middle Ages. It fell into the power of the Moors, but was recaptured by Saint Ferdinand of Castile in 1247. Consult M. Sales y Ferré, 'Estudios arqueológicos e históricos' (Madrid 1887). Pop. 18,855.

CARMONTEL, kär-món-tél, or CARMONTELLE, Louis Carroqis, French poet: b. Paris, 15 Aug. 1717; d. there, 26 Dec. 1806. He is best known in English by his Proverbes. See PROVERBS.

CARNEUS, or Carneus Antiquities (10 vols., Paris 1768-81, new ed., 4 vols., Paris 1822). These are without much connection in themselves, being, in fact, only a series of dramatic scenes, but are well adapted for private theatres. The fertility of Carneus was as extraordinary as his ingenuity in writing. His 'Théâtre de campagne,' a collection of more than 25 comedies, was published in 1775 (4 vols.). He painted portraits, mostly profiles, of some of the most eminent persons of the 18th century. 'Proverbes des neuf provinces de Carmonnelle' was published by a memoir by Mme. de Genlis (3 vols., Paris 1825).

CARNAC, kär-nak, France, a Breton village in the department of Morbihan, on a height near the coast 18 miles southeast of Lorient, and remarkable for the so-called Druidical monuments in its vicinity. These consist of more than 1,100 rude blocks of gray granite, some of which are upward of 18 feet high, standing on end in the midst of a wide heath. They are in the form of unpolished obelisks, with the vertex reversed, and are arranged in 11 lines, forming 10 avenues, with a curved row at one end. There are many gaps in the lines; almost every house and wall in the vicinity is seemingly built from this artificial quarry. They are evidently of very ancient date, but their origin is unknown. At a distance of a mile and a half from Carnac there is a wonderful group of mounds called the Bossenno, and the remains of a Gallo-Roman town were uncovered in 1874. Pop. 3,250. Consult Lukis, 'Chambered Barrows and Other Historic Monuments in Morbihan' (1875); Miln, 'Excavations at Carnac' (1877-81); Worsfold, 'The French Stonehenge' (British Archaeological Association Journal. 1898).

CARNALL, Rudolph von, German mining engineer: b. Glatz 1804; d. 1874. He began the study of mining in Breslau, became connected with the mining industry in Upper Silesia and rose to be superintendent of mines and director of the general mining office in Breslau. He took part in founding the German Geological Society, lectured at the University
of Berlin on the science of mining engineering, and rendered important service to the development of German mining enterprises. He engaged in the mines and mining section of the Prussian Ministry of Commerce from 1855 to 1861. The *Zeitschrift für das Berg-, Hütten- und Salinenwesen im preussischen Staate* was founded by him.

**CARNALLITE**, a hydrous double chloride of potash and magnesium, one of the principal potash-yielding minerals of the great German potash deposits at Stassfurt, Germany. In composition it consists of potassium chloride, 26.5 per cent, and magnesium chloride, 34.2 per cent. Its equivalent in potash is 14.1 per cent.

**CARNARVON, kär-nâr’vôn, Henry Howard Molyneux** (4th Earl of), English statesman: b. London, 24 June 1831; d. 28 June 1890. He received his education at Eton and Christ Church, Oxford, taking his degree in 1852. After this he spent several years in travel in the Orient. He succeeded his father in the earldom in 1849, and was secretary of state for the colonies, June 1866 to March 1867. He was chosen high steward of Oxford University and created D C L (1859). During his secretaryship he devised a scheme for the federation of the British North American Colonies, subsequently approved by Parliament. He was again colonial secretary, 1874–78, and lord lieutenant of Ireland, 1880–85. He published *The Druses of Mount Lebanon* (1880); an address on Berkshire Archaeology (1890); edited *Reminiscences of Athens and the Morea* by the late Earl of Carnarvon, his father, and published translations of the *Agamemnon* (1879), *the Odyssey* (1886), and *from the Iliad* (1893).

**CARNARVON, or CAERNARVON, Wales**, a seaport town and parliamentary borough, on the southeast side of the Menai Strait, and capital of the county, 209 miles northwest of London. The ancient walls thrown around it by Edward I, and flanked by round towers, are still fairly entire. The magnificent castle or palace of Edward I, and in which Edward II was born, stands at the west end of the town, almost overhanging the sea, and is externally entire. Including its courtyards, etc., it covers about two acres of ground. There are extensive ironworks in the town, which supply machinery for steamers, etc. The chief exports are copper ore, coal and slates, of which the town is a centre of distribution for the neighborhood. It is much frequented by summer tourists. Consult Hartshorne, 'Carnarvon Castle' (in the *Archaeological Journal*, Vol. VII, London 1850).

**CAERNARVONSHIRE, or CAERNARVONSHIRE**, a maritime county of North Wales, having Carnarvon Bay on the west; Denbigh on the east; the island of Anglesea and the Irish Sea on the north and Cardigan Bay on the south. Its extreme length, southwest to northeast, is about 52 miles; extreme breadth, 20 miles, although the greater portion of the coast has developed in even or eight miles on an average; area, 365,986 acres. This county is traversed throughout its whole length by lofty mountains, including the Snowdon range, whose highest peak is 3,557 feet above the sea. There are other summits varying from 1,500 feet to more than 3,000 feet. Dairy farming, and cattle, horse and sheep breeding are the principal occupations, and farming of a large extent. The cattle and sheep are of a small breed. Lead, zinc and copper ores are found in the mountains in the south, and granite is worked; but slate is the principal mineral product of which there are extensive quarries at Bethesda. The county returns two members to Parliament. Pop. 125,043.

**CARNATIC, kär-nâ’tik, former province of British India, on the east coast of the peninsula. Its limits were ill defined, but it is commonly thought to have extended from Cape Comorin to lat. 16° N., and from the coast line to an average of about 20 miles inland. It was formerly included in the dominions of the Nabob of Arcot, and the contentions arising from a disputed succession first brought the French and English into collision, and ended by the subjugation of the Carnatic under British influence, which was completely effected in 1801. The Carnatic as one of the wealthy provinces has been the cause of endless native warfare and bloodshed, by which, whoever was victor, the unhappy cultivator suffered in the end; as each successive ruler, feeling his tenure uncertain, cared only to make revenue while the power lasted, an example which was but too closely imitated by his unscrupulous ministers and officials. The Carnatic is now included within the administration of the presidency of Madras.

**CARNATION, a half-hardy perennial herb (Dianthus Caryophyllus) of the family Sileneaceae, a native of southern Europe. It has more or less erect stems with enlarged joints, linear opposite leaves covered with a bloom, and solitary, variously colored, terminal, perfumed flowers, which naturally appear during summer, but which are produced artificially in certain varieties throughout the year. The plant has been in cultivation for its flowers for more than 2,000 years, but not until the early 16th century did its flowers become greatly differentiated from the original flesh tint, which suggested the popular name (Latin *carnatio*). So numerous became the varieties that systems of classification were adopted. The popular European system of today is: (1) *Sels*, flowers of one color; (2) *flakes*, flowers with yellow or white ground and striped with either rose, scarlet or purple; (3) *bizarres*, resembling flakes except that they are striped with more than one color; (4) *pictoreas*, with white or yellow petals margined with red, etc. The summer-blooming carnations which suggested this classification are little grown in America, but are very popular in Europe. They seem to demand a moist, cool climate. The group most cultivated in America, known as perpetual-flowering tree, or monthly carnations, originated in France about 1840 as the result of crossing and selection. The first of these varieties imported into America is said to have arrived in 1856, since when the growing of carnations under glass as a crop has developed. The extent of the industry is very great and is steadily growing. According to the census report of 1900 the value of the carnation crop in 1899 was about $4,000,000, produced in about 9,000 American commercial greenhouses.
Propagation of the monthly carnations is usually effected by means of cuttings of young stems. When well rooted they are potted in good soil and kept until late spring, when they are transplanted to the open ground or to the benches where they are to blossom. A winter temperature ranging between 50° and 55° at night and preferably only 10° higher during the day is desirable. At the end of the winter they are thrown away.

The most common insect pests of the carnation are the red spider and the green aphis. The red spider thrives best in dry atmosphere, and is most easily controlled by syringing with water and evaporating (not burning) sulphur in the greenhouse once a week for about five weeks, when the insects become troublesome. The green fly or green aphis seems to thrive under any ordinary conditions. It is usually fought with tobacco fumes of various extracts of tobacco. Three fungous diseases are often troublesome, rust (Uromyces caryophyllinus), spot, or blight (Septoria dianthi), and anthracnose (Volutella Sp.). These are largely prevented by judicious management, and when they occur may be controlled by destroying diseased plants and by spraying with Bordeaux mixture (See FUNGICIDE). Rust appears on the stems and leaves as blisters which break and expose brown spores. Spot consists of brown dots with black centres where the spores are borne. Anthracnose is characterized by grayish-brown spots. (Bailey, 'Cyclopedia of American Horticulture,' New York 1914). Thirty-seven acres of land are devoted to the raising of carnations at a nursery in Los Angeles, Cal. Nine greenhouses, each 200 feet long and 15 feet wide, together holding 35 tons of glass, are used to raise the young plants.

Carnation (Latin, cora, corni, "flesh"), in painting, the representation of the color of flesh. It is also used in the fine arts to signify the nude or undraped parts of a figure. The use of carnation requires very attentive study and great skill in the artist. It varies with the sex of the individual, with the age and heirs to which the subject belongs, with the passions, the state of the health, etc. The cheeks are, in a healthy subject, of a lively red; the breast, neck and upper part of the arms of a soft white; the belly yellowish. At the extremities the color becomes colder, and at the points assumes a violet tint, on account of the transparency of the skin. All these shades require to be softly blended. Two faults in carnation are chiefly to be avoided — hardness, the fault of the masters of the 15th century, and too great weakness. Guido Reni not infrequently painted his flesh so that it appeared almost bloodless. The French school has gone farthest in this respect. The flesh of the followers of this school often looks like porcelain or wax. Titian and Rubens are unrivaled in carnation.

Carnauba, kār-nā-oob'a, the Brazilian name of the palm, Copernica cerifera, which has its leaves coated with waxy scales (whence the name) and yields a useful wax by boiling. It withstands drought excellently. A slight saline composition in the soil produces the best trees. The fruit and pith are eaten, the leaves are variously employed and the wood is used in building.

Carneades, Greek philosopher: b. Cyrene, Africa, about 214 B.C.; d. 129 B.C. The date of his birth is uncertain. Cicero states he was 90 years old at the time of his death, which would place his date of birth in 219 B.C. He studied first under Diogenes the Stoic, but subsequently attended the lectures of Egesinus who explained the doctrines of Arcesilaus; and succeeding his master in the chair of the Academy, he restored its reputation by softening the prevailing pyrrhonism and admitting practical probabilities. The doctrine of Carneades specifically was, that "as the senses, the understanding, and the imagination frequently deceive us, they cannot be the basis of truth;" but the natural working of the highest powers from the impression made by the senses we infer appearances of truth, which, with respect to the conduct of life, are a sufficient guide. He was a strenuous opposer of Chrysippus, and attacked with great vigor the system of theology of the Stoics. He was an advocate of free-will against the fate of the same sect, and urged just the same difficulties in reconciling divine prescience with the freedom of human actions as have divided some contending sects of Christianity. One of the most distinguished events of his life was his being joined in an embassy to Rome with Diogenes the Stoic and Critolaus the Peripatetic, in order to gain the mitigation of a fine levied by the Roman Senate on the Athenians. This extraordinary embassy was successful, and Carneades so captivated the people by his eloquence, one day delivering a harangue in praise of justice, and on the next proving it to be an odious institution, that Cato the censor, fearful of its effect on the Roman youth, persuaded the Senate to send the philosophers back to their schools without delay. In his latter years Carneades became totally blind and continually complained of the shortness of life, lamenting that the same nature which composed the human frame could dissolve it. Consult Hicks, 'Stoic and Epicurean' (New York 1910).

Carnegie, Andrew, American ironmaster, manufacturer and philanthropist: b. Dunfermline, Scotland, 25 Nov. 1835. Not even of the mighty makers of their own fortunes began closer to absolute zero; certainly none who have owed success not to fortunate speculations, but to steady labor, sagacity and self-culture, the highest powers on opportunities open to all and less to him than to most. His father owned a small hand-loom business, which was closed in 1848 by the competition of steam. He then emigrated to the United States and settled in Allegheny City, Pa. The 10-year-old child here became a bobbin-boy at 20 cents a day; his alertness in a few months brought him transference to an engine-room, his penmanship and arithmetical chance to do clerical work. Next a telegraph messenger boy at Pittsburgh (with a mother and younger brother to support from his slender wages), he promptly mastered telegraphy, was soon given a place as operator, and won himself extra earnings and experience in composition as a newspaper telegraph reporter. Superior fitness brought him the post of telegraphic train dispatcher to the Pennsy-
vania Railroad; then of secretary to its general superintendent, Colonel Scott; and in 1860, when his chief became vice-president, Mr. Carnegie was made superintendent of the Westinghouse Air Brake, an important business fortune which had opened with the tentative adoption by the road, through his agency, of the Woodruff sleeping-car system, in which he shrewdly embarked some borrowed money; his expert knowledge made it investment, not speculation; and his contacts with Nantucket oil lands around Oil City, selected with equal judgment.

At the outbreak of the war, Colonel Scott was made Assistant Secretary of War, and gave Mr. Carnegie charge of the eastern military railroads and telegraph lines, and of this department there was no complaint or scandal, and no breakdown except of Mr. Carnegie's health from overwork. He was also the third man wounded on the Union Side, while removing obstructions from the Washington tracks.

Already a small capitalist, 1861-1862 in Pennsylvania road's experiments in replacing wooden with iron bridges led him to forecast the future monopoly of the latter, and organize the Keystone Bridge Works, which built the first iron bridge in the United States. To increase their profit by furnishing their own iron, he entered the field which has made him one of the industrial sovereigns of all time. The first step was the erection of the Union Iron Mills, furnaces and rolling mills, the last, after inspection of the Bessemer process in England, to establish it in this country in 1868. The story since is one of swift aggregation of plant to plant, till they have dominated their class, and become one of the chief industrial factors of the entire business world in this its greatest age. By 1888 he had acquired a controlling interest in his foremost rival, the Homestead Steel Works, and in seven other immense establishments centred around Pittsburgh; in 1899 he consolidated all these into one giant structure, the Carnegie Steel Company; and in 1901 he retired from business life, transferring his company at a valuation of $500,000,000 to be merged into one still vaster, the United States Steel Corporation, founded by J. Pierpont Morgan. His United States remains in his son, but the imperial establishment at Skibo Castle, in the extreme north of Scotland.

Such supreme success, fairly won in a struggle with the world, is of course the result of a supreme individual genius not to be taught or explained, but as the amount of work any one man can do unassisted is a trifle, the chief instrumentalities is always the faculty of organization. Mr. Carnegie himself once said that the organization was the business; that if stripped at a blow of all his material property and business connections, but left his organization, in four years he would have re-established himself. But the organization is simply the men who work it, with their capacity of selecting capable subordinates, and understanding public needs and the means of supplying them; and this leaves the faculty of creating and sustaining it no nearer solution than before. In the last analysis it means a nicely accurate judgment of men, resulting from an intuitive gift, an experience, and a long experience; and as men are not paws, it implies the power of persuading them into and keeping them in alliance as well.

Always a generous and helpful man, he had definitely begun, a few years before his retirement, a new existence consecrated to public service, and to which he will owe enduring remembrance. Another business fortune would not have forgotten the mere business man however great; for after all it would have had steel from some source, if perhaps less cheaply; but it could not have had from lesser men, and would not have had from any, the splendid, judicious and persons helpful influence which he has endowed it, and which no change of social ideals can render obsolete or harmful. No one has ever so royally returned to the public what he had (to its own benefit) drawn from the public. This is his own expressed conviction of duty; that "surplus wealth is a sacred trust to be administered for the highest good of the people," and that sometime "the man who dies possessed of millions free and ready to be distributed, will die disgraced." But he is equally emphatic in declaring, that indiscriminate giving is mostly sheer mischief, and that no person and no community can be permanently helped except by their own cooperation. Therefore, every gift of his to a community is conditional, and he insists on seeing it; and all those to institutions are thought out, and so bestowed that they forward the work without impairing the springs of public interest, or the ties to the public, which must after all be their permanent stay. These gifts are mostly not to charities in the current sense, but to the relief of material distresses, for which the spirit of human brotherhood should be adequate; but for that mental and spiritual cultivation which should raise communities out of the lowest plane of social evils. An apparent exception, which, however, is not charity but justice and business sense, is the endowment of $4,000,000 given for an annuity fund to the workers at Homestead. The remainder of his benefactions may be divided broadly into institutions for research and the discovery of fertile new ideas; those for teaching the best of ideas and their practical appliances already known; and those for storing the results of knowledge and creation and distributing them to the public,—in a word, university, technical schools and libraries. Even the organs he has presented to several hundred churches may be classed in this category; as he genially observed, he is willing to endorse unservedly all the utterances of the organs, but not of the preachers. The greatest single foundation will be the Carnegie institute at Pittsburgh an enormous technological school, with library, art gallery and every imaginable accessory,—the people's college of what he thinks the coming type,—which has received $25,000,000 in all.

Next is the Carnegie Institution (q.v.) at Washington, to promote original research and enable original workers to use their whole time for study, experiment and creation; perhaps his most valuable benefaction ultimately, since new ideas are at once the scarcest and the most valuable items of the world's income, and the work of one great man outweighs that of 10 generations of small ones. Of the others, perhaps the most useful, considering the work, and the chief, is the gift of $600,000 to the Tuskegee Normal and Industrial Institute in Alabama, conditioned on the trustees using enough of its income annually to free its president
from money cares and the need of "drumming" support for his college. Fifty-six libraries in New York have received $5,200,000, one in Saint Louis $1,000,000, and two in Detroit and San Francisco $750,000 each; libraries at Homestead, Bradenton, and Dunfermline $1,000,000; and the universities in Scotland $10,000,000. In 1905 he established the Carnegie Foundation of $10,000,000, the income from which provides retiring pensions for teachers in colleges, universities and technical schools; and in December 1910, France, founded on $10,000,000; $5,000,000 to the Carnegie Hero Fund Commission, Pittsburgh; $1,500,000 to the Carnegie Hero Fund Trust, Dunfermline, Scotland; and the following amounts to various Hero Funds: France $1,000,000; Germany $1,500,000; Belgium $230,000; Denmark $125,000; Holland $200,000; Sweden $230,000; Switzerland $130,000; Italy $750,000; Norway $125,000.

He has also given $3,500,000 to the Carnegie Dunfermline Trust; $1,500,000 for the Peace Foundation; $1,500,000 to the Allied Engineers' Society; and his total benefactions exceed $300,000,000, including over $60,000,000 for over 3,000 municipal library buildings; also the building and grounds for the Pan-American Union, Washington, 1906; $16,150,000 for Foundation for the Advancement of Teaching in United States, Canada and Newfoundland.

He is a life trustee of the Carnegie Corporation of New York ($125,000,000) which was founded to carry on the various works in which he has been engaged and to which he announced in 1912 that he had given all his fortune except $25,000,000. He was lord rector of Saint Andrew's University in 1901-02 and 1906, and of Aberdeen University in 1912.

Mr. Carnegie has also won fame as an author. His first work, 'Notes of a Trip Around the World' (1879) and 'Our Coaching Trip' (1882) were printed first for private circulation, but published in consequence of the great pressure for private copies. 'An American Four-in-Hand in Britain' (1883) and 'A Round the World' (1884) followed; but his greatest success was attained with 'Triumphant Democracy' (1886), which sold 40,000 copies within two years. 'The Gospel of Wealth' (1900), 'The Empire of Business' (1902, since translated into eight languages); 'James Watt' (1906); and 'Problems of To-day' (1909) have maintained his reputation as a clear, forcible and interesting writer and thinker. Consult Alderson, 'Andrew Carnegie: the Man and His Work.'

CARNEGIE, Pa., borough in Allegheny County, five miles southwest of Pittsburgh, on the Pittsburgh, Cincinnati, Chicago and Saint Louis, the Pittsburgh, Chartiers and Youghiogheny and the Wabash Pittsburgh railroads. It has a Carnegie library, an Elks' Home, a high school and a fine orphan asylum. It is the centre of a coal-mining region and has extensive steel works. There are also lead works and manufactures of granite ware and stones. In 1914 there were 432 persons engaged in manufactures in 19 establishments, the salaries and wages amounted to $328,000, the capital invested amounted to $2,202,000, the value of the materials used was $762,000, and the value of the products amounted to $1,724,000. The borough was formed in 1894 by the consolida-

Carnegie, one of the most important of all the many research departments allied with the Carnegie Institution at Washington, situated near Tuc-

Carnegie Desert Laboratory, one of the most important of all the many research departments allied with the Carnegie Institution at Washington, situated near Tucson, Ariz. In connection with the department of botanical research, this laboratory was established in 1903 and almost at once took its place among the great institutions of the world. It concerns itself chiefly with the plant life of the desert, seeing how the impoverished plants which grow there can be made to thrive and improve and become of benefit to mankind, and is a movement of great agricultural import.

The equipment of the Carnegie Desert Laboratory is in proportion to the elaborate work undertaken there. The area embraces for experimental work comprises 860 acres, situated just west of Tucson. Within this tract Tumamoc Hill rises to a height of 800 feet above the lower mesas. These topographical features present a wide range of varied conditions for plant growth. The laboratory proper is located half-way up the hill, and the entire grounds are fenced in. The laboratory forms three sides of a quadrangle 126 feet long with a short axis of 85 feet. Bes-

The laboratory is conducting interesting work on Alpine and Austral plantations, located on the mountains, for the furtherance of which work it is provided with a complete pack equipment, including two pairs of heavy rawhide kyacks suitable for transporting instruments without damage. Although the greater part of the departmental work is carried on here, it is essential to a comprehensive study of desert plant life to explore distant as well as adjacent arid regions and much important work has also been carried on in the Salton Basin, where it has been established that the highly specialized flora is of comparatively recent origin. This basin and its accompanying vegetation have suggested experiments relative to the influence of altitude and climatic factors upon vegetation. To carry on these, plantations have been established on the Santa Catalina Mountain at various altitudes, ranging from 2,300 feet to 8,000 feet in height. Thermometric observations are made at each of these plantations. Culture has also been carried on at the tropical station at Cinchona, island of Jamaica, for comparisons. In order to obtain more complete comparisons the establishment of a station is now being contemplated in the San Francisco Mountain in northern Arizona, having an elevation of about 12,000 feet. Nota-

The study has been greatly facilitated by a topographical survey and a geological survey, both of which were conducted under the direction of the University of Arizona. Twelve well-defined plants are considered by the staff in this field of science, and various stations established, to demonstrate correlate plant be-
behavior with known factors of environment, with special attention to water, supply, conditions of soil, exposure and drainage. Other notable work of the laboratory has been the measurements of bodies of certain succulents in which the storing of water has been developed; experiments in the physiology of stomata, covering research in relation to the color of the flowers. In this, convincing data have been collected through the agency of the dark room, starvation and feeding. Similar investigation has been made in regard to the topography of chlorophyll masses, one of the distinct characteristics here noted being the depth to which the chlorophyll has been deposited in some desert plants, primarily, it is believed, because of the highly intensified light of the desert regions. Experiments have also been carried on in regard to the habits of roots in the desert regions, with comparative results obtained in the New York Botanical Gardens and data from the Jamaica institute. A great deal of highly interesting work has also been done in studying the water storage capacity of certain desert plants. Many species appear to have developed this capacity to a remarkable extent in order to tide them over through the long droughts which often occur there. The work of the Carnegie Desert Laboratory is thorough and comprehensive, and particularly by that portion of the population which is interested in the deserts of the West and other cultivation.

CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE, an institution created and maintained by a fund of $10,000,000,000 set apart by Andrew Carnegie in 1910. The purpose of the Endowment, as outlined by one of its prominent active members, Dr. Nicholas Murray Butler, president of Columbia University, is "to work for the promotion of peaceful development of civilization by aiding and developing, supporting and directing the forces that will bring about the prevention of war, the perfection of means for the establishment of arbitral justice between nations, and the development of a world congress or parliament, a high international court, and an international police, and to take such steps and promote such undertakings as shall bring about the substitution of law and justice for war as a means of settling international disputes and difficulties."

The trustees selected by Mr. Carnegie to receive the fund and administer its income met at Washington on 14 Dec. 1910. At this meeting Mr. Carnegie read a letter informing the trustees of his gift of $10,000,000 in 5 per cent first mortgage bonds, the revenue of which, he stated, "is to be administered by you to hasten the abolition of international war, the foulest blot upon our civilization." The donor made no restrictions of the gift, but left discretionary with the trustees the expenditure of $500,000 annually accruing from the fund; he did not attempt, moreover, to outline future action as regards the measures, methods and policies that were to be adopted to the end of accomplishing the purpose specified. The only stipulation made was that the trustees were to "keep unceasingly in view, until it is attained, the speedy abolition of international war between so-called civilized nations." The original trustees selected by Mr. Carnegie were: United States Senator Elihu Root, representative of the United States at the Hague Tribunal; Nicholas Murray Butler, president of Columbia University; Henry S. Pritchett, president of the Carnegie Foundation for the Advancement of Teaching; Joseph H. Choate, former ambassador to Great Britain; Albert K. Smiley, educator and humanitarian; Charles W. Eliot, president-emeritus of Harvard University; James Brown Scott, solicitor for the State Department; John W. Foster, ex-Secretary of State; Andrew J. Montague, ex-governor of Virginia; Congressman William M. Howard, Lexington, Ky.; Congressman James L. Slayden, San Antonio, Tex.; Judge Thomas Burke, Seattle, Wash.; Andrew D. White, ex-ambassador to Germany; Robert S. Brooking, lawyer, Saint Louis, Mo.; Samuel Mather, banker, Cleveland, Ohio; J. G. Schmidlap, railroad man, Cincinnati, Ohio; Arthur W. Foster, regent of the University of California; Robert A. Franks, banker, Hoboken, N. J.; Charles E.评价, ambassador to Germany and Russia; Oscar S. Straus, ambassador to Turkey; Austen G. Fox, lawyer, New York; John Sharpe Williams, senator-elect from Mississippi; Charles L. Taylor, chairman of the Carnegie commission; John C. Cadwalader, lawyer, New York; George W. Perkins, financier, New York; Cleveland H. Dodge, philanthropist and financier; Luke E. Wright, ex-Secretary of War; Robert S. Woodward, president of the Carnegie Institution.

At their first meeting these 28 trustees accepted the fund by formal resolution, and appointed a committee on organization which at the next meeting, held in Washington on 9 March 1911, presented the following statement of the aims and purposes of the Endowment:

That the objects of the corporation shall be to advance the cause of peace among nations, to hasten the abolition of international war, and to encourage and promote a peaceful settlement of international difficulties, and in particular—(a) To promote a thorough and scientific investigation and study of the causes of war and of the practical methods to prevent and avoid it; (b) to aid in the development of International Law, and a general agreement on the rules thereof, and the acceptance of the law among nations; (c) to diffuse information, and to educate public opinion regarding the causes, nature, and effects of war, and the means for its prevention; (d) to establish a better understanding of international rights and duties, and a more perfect sense of international justice among the inhabitants of civilized countries; (e) to cultivate friendly feelings among the inhabitants of the different countries, and increase the knowledge and understanding of each other among several nations; (f) to promote a general acceptance of peaceable methods in the settlement of international disputes; (g) to maintain, promote, and assist such establishments, organizations, associations, and agencies as shall be deemed necessary and useful in the accomplishment of the purposes of the corporation, or any of them.

At this same meeting the following officers were elected: President, Elihu Root; vice-president, Joseph H. Choate; secretary, James Brown
CARNEGIE FOUNDATION

Scott; treasurer, Walter M. Gilbert (temporary appointment).

At the same time the by-laws of the association were drawn up, and provision was made, inter alia, for the establishment of an executive committee (consisting of the president, the secretary and five trustees), which at its first meeting, held likewise on 9 March 1911, decided to divide the work of the Endowment into three divisions: (1) the Division of Intercourse and Education, to promote the objects specified in sections (c), (e), (g); (2) the Division of Economics and History, to promote a scientific investigation and study of the causes of war and of the practical means to prevent and avoid it, as specified in section (a); (3) the Division of International Law, to promote the objects specified in sections (b), (d), (f). These three divisions may be described as popular, scientific and juristic, in which the work of the Endowment naturally falls. Thus the main activities of the Endowment were established on definite lines, and a world-wide co-operation in each branch of its work was planned. It was decided to inaugurate a series of conferences with foreign publicists, economists and statesmen, to be held in European cities, and a large number of eminent and influential men of all nationalities were invited to take a more or less active part in the propaganda.

While the outbreak of the European War in the summer of 1914 seriously interfered with the carrying-out of the program, that catastrophe only emphasized the incalculable importance and need of the work to which the Endowment is dedicated. War itself, indeed, is throwing light on the main problem, that of preventing war, and is bringing the solution of the problem nearer. On 20 April 1917, the trustees of the Endowment unanimously adopted a formal resolution, declaring their belief that the most effectual means of promoting durable international peace is to prosecute the war against the Imperial German government to final victory for democracy, in accordance with the policy declared by the President of the United States. On the same day, moreover, a sum of $500,000 was appropriated, by formal resolution, "for the reconstruction of devastated homes of Belgium, France, Serbia or Russia." The main office of the Endowment is located in Washington, D. C., while a branch office is located in New York, where the directors of the divisions of intercourse and education and of economics and history have their desks; the director of the division of international law, who is also secretary of the Endowment, has his office at the Washington headquarters.

PAUL B. THOMAS.

CARNEGIE FOUNDATION. The Carnegie Foundation for the Advancement of Teaching had its inception on 16 April 1905, with a fund of $10,000,000. The act of incorporation was passed by Congress and approved by the President of the United States on 10 March 1906. The aim of this institution is the establishment of a world-wide movement to provide retiring allowances for teachers in colleges, universities and technical schools of the English-speaking countries of North America, and to serve the cause of higher education by advancing and dignifying the profession of the teacher in these higher institutions of learning. In order to be admitted to the retiring allowance system of the Foundation, the essential work of an institution must be that of higher education and of such a character that graduation from a four-year high school course, or equivalent training, constitutes a prerequisite therefor.

A technical college must have entrance and graduation requirements equivalent to those of the college, and must offer courses in pure and applied science of equivalent grade.

Institutions which maintain a course or courses for which high school graduation, or equivalent training, is not required for admission, must present to the Foundation the number of students and the names of the teachers in such course or courses; also, separately, the number of students of whom high-school training, or the equivalent, was required for admission, and the names of the teachers engaged exclusively in instructing the latter class of students.

No institution will be accepted which is so organized that stockholders may participate in its benefits.

Institutions of higher learning are recognized as eligible, under the following conditions:

1. Colleges, universities and technical schools of requisite academic grade, not owned or controlled by a religious organization, whose charters specifically provide that no denominational test shall be applied to trustees, officers, teachers or students.

2. In the case of colleges, universities and technical schools, not owned or controlled by a religious organization, the trustees of such institutions are asked to certify that, notwithstanding the lack of specific prohibition in the charter, no denominational test will be imposed in the choice of trustees, officers or teachers, nor in the admission of students, nor will denominational tenets or doctrines be taught to the students. Upon the passage of such resolution by the governing bodies of such institutions, they may be recognized as entitled to the benefits of the Foundation, so far as considerations of sectarian control are concerned.

An institution not supported by taxation must have a productive endowment of not less than $200,000 over and above any indebtedness of the institution.

A tax-supported institution must be in receipt of an annual income of not less than $100,000.

Retiring allowances are granted in the colleges, universities and technical schools on the accepted list of the Foundation on two distinct grounds: (1) To a teacher of specified service on reaching the age of 65; (2) to a teacher after 25 or 30 years of service, or of physical disability. To these two main divisions the trustees have added many extra conditions.

At the instigation of the Carnegie Foundation, a plan for an exchange of teachers between the United States and Prussia was put into effect. This provision has been in active operation ever since. During the year 1910 a sensation was created in educational circles through the rejection by the Foundation of several western colleges which did not, in the opinion of the trustees, come up to the require-
ments set by Mr. Andrew Carnegie in his deed of trust. In the same year Mr. Morris Llewellyn Cooke, a member of the American Society of Mechanical Engineers, undertook at the instigation of the Carnegie Foundation a detailed study of some of the American institutions of learning, with a view to ascertaining whether they were being run in a proper manner and whether or not the large sums of money being expended by all of them were put to the best and most practical uses. In the course of his investigation Mr. Cooke examined at length the departments of physics at the universities of Harvard, Columbia, Toronto, Wisconsin, and Princeton, at Haverm and Williams colleges, and at the Massachusetts Institute of Technology. His opinion was considered of great importance, it being the first time that a practical business man had officially applied the principles of practical business to the system of education in the United States. His verdict was that there was a decided waste apparent at all of the institutions he visited. In his report he has a great deal to say for himself for most part and rarely uttered any direct criticism, although he did take occasion to score the life tenure of professorships where they occurred, the committee system of management and the stress laid on the importance of research. Mr. Cooke declared that he found researches being pursued in some of the colleges for which no possible excuse was offered, except by the man who happened to be conducting them, and he believed that altogether too much attention was uniformly paid to this branch of collegiate work.

Owing to the requirements already mentioned for admission to the benefits of the Foundation, the list is somewhat limited of institutions which can apply for pensions. In welcoming eligible institutions to this limited list, the Foundation has sought to distribute them not only geographically, but among colleges of different types. In 1913 13 institutions shared in the pension fund. Twenty were small colleges of the type of Middlebury College in Vermont and Franklin College in Indiana. Twenty-five were strong colleges like Williams College in Massachusetts and Colorado College in Colorado. The remaining 28 were about equally distributed between universities like Lehigh University in Pennsylvania and Tulane University in Louisiana, and a similar group of the strongest universities in the country, whether privately endowed like Harvard in the East or State-supported like the University of California in the West. According to the ninth annual report for the fiscal year 1914-15, the income received from the general endowment of the Foundation was $604,038.60; from the endowment of the division of educational inquiry, now kept as a separate budget item, $50,358.34. The total expenditures under the general endowment were $609,532.99, of which $510,750.97 went to pay the retiring allowances and pensions in institutions on the accepted list of the Foundation, and $124,112.80 to allowances and pensions to individual officers, teachers and widows in institutions outside of this list. Forty-four allowances were granted during the fiscal year, involving a total of $100,990. The number of deaths during the year was 15, making a net increase of 29 to the number of allowances and pensions in force, which at the end of the year were 432, with a total grant of $867,370. The grants made during the year represented in all 32 institutions. The trustees held in trust at the close of the fiscal year under the general endowment securities of the face value of $14,129,000; under the division of educational inquiry $1,250,000. The Foundation and its work have received considerable adverse criticism and opposition. "The spectre of a baneful educational influence" writes President Henry S. Pritchett, "exercised by a remote agency upon the policy of struggling colleges and universities is one that has been successfully invoked in some quarters. The apprehension that college professors could be influenced in their attitude by the pensions they are to receive rests upon two misconceptions: the first, as to the methods of administration. The teacher in the associated colleges does not deal with the Foundation at all. He deals entirely with his college and receives his pension from the college exactly as he receives his salary. The other misconception rests upon a misconception of the character of the American college professor. The university teacher in America has a fairly stiff backbone. Nothing would so arouse his opposition as any effort, however indirect, to control his opinions about education, college administration or any other subject. The sole opportunity the Foundation has to influence the educational judgment of professors is through its publications, and these have weight only as they are sound and prove in the end to be wise."

CARNEGIE HERO FUND. During 1904, through the munificence of Mr. Carnegie, a fund called the Carnegie Hero Fund was created for adequately rewarding such persons as should perform deeds of heroism which would otherwise receive no appreciable beyond a possible paragraph in a daily newspaper. Mr. Carnegie endowed the Fund with $5,000,000, the expenditure of which was to be directed by a commission of his own naming, of which Mr. Charles L. Taylor was appointed president. In his deed of trust to the commission Mr. Carnegie expressed himself as having learned that heroes and those dependent upon them should be freed from pecuniary cares resulting from their heroism. In establishing the Fund, it was his purpose to place in a somewhat better pecuniary position than before those following peaceful vocations who have been injured in heroic efforts to save human life, and, in case of their death, to provide for the widows and children as long as that should be necessary and advisable. He made the stipulation, however, that no grant was to be continued unless it were sober and proportionate used and unless the recipient remained sober, respectable, well-behaved members of the community. In all cases a medal of gold, silver or bronze, according to which the deed in question was believed in, was to accompany each grant, and, in cases where no monetary aid was called for, an appropriate medal was in any event to be awarded, setting forth the heroic deed it commemorated. Subsequent resolutions and by-laws passed by the number of deaths the operative work of the Fund, but the broad,
general lines of its scope remain those which Mr. Carnegie recited. It has been widely praised for its work on all sides, and has been an incalculably powerful factor in relieving people in want whose real worth was fully revealed for the first time perhaps through their deeds of unselfish heroism.

The field embraced is the United States, the Dominion of Canada, the colony of Newfoundland and the waters thereof.

Such acts must have been performed on or after 15 April 1904 and brought to the attention of the commission by letter addressed to the manager, Oliver Building, Pittsburgh, Pa., within three years of the date of the act. Up to 1915 the commission had awarded 723 bronze, 367 silver and 18 gold medals; $1,249,666 had been awarded for disablement benefits and for educational and other specific purposes, and for the dependents of heroes who lost their lives. Pensions in force on 31 Dec. 1915 amounted to $79,250 annually. The commission had also awarded $169,462 for the relief of sufferers from disaster; Bridgeton, Mass., $10,000; California earthquake, $54,462; Monongah Mines, W. Va., $35,000; Darr Mine, Pa., $25,000; Lick Branch Mine, W. Va., $20,000; McCurtain Mine, Okla., $15,000; Jed Mine, W. Va., $10,000; and for the relief of Ohio and Indiana flood sufferers, $10,000.

CARNEGIE INSTITUTION OF WASHINGTON. This institution was founded by Andrew Carnegie on 28 Jan. 1902, with an endowment of $10,000,000 of registered 5 per cent bonds; to this fund he added $2,000,000 on 10 Dec. 1907, and $10,000,000 on 19 Jan. 1911. The Institution was originally organized under the laws of the District of Columbia and incorporated as the Carnegie Institution, but was reincorporated by an act of the Congress of the United States, approved 28 April 1904, under the title of The Carnegie Institution of Washington. The articles of incorporation of the Institution declare in general that the objects of the corporation shall be to encourage in the broadest and most liberal manner investigation, research and discovery, and the application of knowledge to the improvement of mankind, in the belief that to forward these objects have been developed. The first of these involves the formation of departments of research within the Institution itself, to attack larger problems requiring the collaboration of several investigators, special equipment and continuous effort. Eleven such departments have so far been established. The second provides means whereby individuals may undertake and carry to completion investigations not less important but requiring less collaboration and less special equipment. The third agency aims to provide adequate publication of the results of research coming from the first two agencies and to a limited extent also for worthy works not likely to be published under other auspices. The Institution is placed under the presidency, which meets annually in December to consider the affairs of the Institution in general, the progress of work already undertaken, the initiation of new projects and to make necessary appropriations for the ensuing year. During the intervals between the meetings of the trustees the affairs of the Institution are conducted by an executive commission chosen by and from the board of trustees and acting through the president of the Institution as chief executive officer. A view of the history of the Institution may be gained from the contents of the 'Year Books' and from its other more formal publications, general and classified, of which may be had on application. The publications themselves, numbering over 300, may be found in nearly all the greater libraries of the world. The executive offices of the Institution are in its Administration Building at 5th and P streets, northwest, Washington, D. C.

CARNEGIE TECHNICAL SCHOOLS, Pittsburgh, Pa., a co-educational institution founded by Mr. Andrew Carnegie with an endowment of $4,000,000. The schools are housed in five buildings. The United States Geological Survey has established in Machinery Hall the main laboratory of the Chemical Division, Technologic Branch, where investigations of fuels from all parts of the country are conducted. The courses in the schools are arranged for day and night students. There are four departments: (1) The School of Science, offering preliminary and specialized courses in the fields of engineering and chemical practice. The time for completion of the course depends on the aptitude and application of the individual students; (2) the School for Apprentices and Journeymen, which gives general training to supplement the usual apprenticeships in order to counteract the dangers of specialization and over-emphasis of the practical as opposed to the theoretical sides. Courses are given during slack seasons, etc.; (3) the School of Applied Design, offering courses in architecture and interior decoration. The standards for admission are high school or equivalent certificate and an entrance examination; (4) the Margaret Morrison Carnegie School for Women, giving training in the home-making arts, dress-making and design and secretarial work. Candidates are admitted on personal interview if they are over 18, and by examination if they are under 18.

CARNEGIE YACHT. The Carnegie is one of those little known developments which prove that principal agencies to-day are, and, on the other hand, how far it has advanced even within a quarter of a century. The peculiarity of this yacht is that it is non-magnetic; in other words, the only magnetic steel on board her is the compass.

The compass does not, as common thought conceives, point directly to the pole. It is deflected by the variations in the magnetic influence of the earth, by the presence of large masses of iron on board ship and by the neighborhood of certain mountains and islands of volcanic origin. Along the inner passage from Seattle to Alaska the attraction from shore affects a ship's compass a mile away. Navigation to-day involves the possession of correct information as to these variations of magnetic attraction of general publications. The Carnegie is engaged in securing.

The yacht is neither owned nor controlled by the man for whom she is named. She was built from the funds of the Carnegie Institution of Washington, the Carnegie, and is launched on 12 June 1909. In six weeks, with the appliances on board, a single
cruise enabled her officers to discover systematic errors of importance in the best charts now available. For 10 years the existence of these errors had been more or less suspected, and thousands of observations had been taken by skilful and experienced navigators without definite results. The information gained by the Carnegie is of immense importance to the leading hydrographic offices of the world.

The best that the commanders of iron vessels have been able to do, hitherto, has been to entrust the examination of their compasses to a professional adviser, who, when his work is completed, furnished what is called a deviation card showing the corrections or errors of the compass on the various headings of the ship. The investigations of the Carnegie will enable the steamer captain to check up these adjustments with full knowledge of the correct or undisturbed variation, or direction of the compass, in all waters he is likely to traverse. Hitherto the captain's only means for this "checking up" was by personal astronomical observation of the stars, the practice being to have his ship's time observed on a liner on rocks supposed to have been correctly charted. On 8 June 1914, after refitting at New York the Carnegie left for an expedition in the North Atlantic. After visiting Norway, Spitzbergen, the latitude of 79° 52', and Iceland, and covering 10,600 miles, she returned to her base station at Greenport, Long Island, 9 Oct. 1914. She refitted at Brooklyn for a longer cruise during 1915-16, in southern latitudes (50° to 75°), where magnetic observations required were the most difficult.

CARNEIA, national festival of the ancient Spartans celebrated in honor of Apollo, and in the Spartan month Carneios. The festival lasted nine days, during which the Spartans were not allowed to enter on a hostile campaign. It was originally a herdsman's festival, but at Sparta had assumed a military character. The men bivouacked in booths, in nine divisions, and all the exercises were governed by the commands of the herald. There were musical contests, and a singular foot race, in which one man was pursued by a number of others. If he was caught, it was a sign of good luck; his escape foreshadowed evil.

CARNEIRO, kahr-nah-ro, Joaquim da Silva, Portuguese engraver and writer: b. Oporto in 1727; d. Lisbon 1818. When 12 years of age removed to Brazil, where he lived 17 years. As he began early to display his artistic talents, he was placed under the tuition of Joao Gomez, the celebrated engraver, at Rio de Janeiro. In 1756 he returned to Europe to complete his studies where, in 1769, he became the head of the royal engraving school at Lisbon, and later was made teacher of design in the royal college. He studied art for a time in Rome and did some of his best work there. He was also a prolific writer and translator of technical books relating to the engravers' art, and author of a great number of engravings of high merit for which he is chiefly remembered, especially for 'The Child Jesus carried by Saint Joseph,' and the even more celebrated picture, 'The Annunciation of the Virgin Mary.'

CARNELIAN. See CARNELIAN.

CARNIFEX PERRY, W. Va., place at which occurred a tragic fire, the Pony Express, 10 Sept. 1861. On 23 August Gen. John B.
Floyd, who had marched from Lewisburg, crossed to the north side of Gauley River at Carnifex Ferry with five regiments of Virginia infantry, 100 cavalry, and five guns, aggregating about 2,600 men. The 7th Ohio had been guarding the ferry, but had been recalled to within six miles of Gauley Bridge, and then ordered to return to Cross Lanes, two miles from Floyd’s position, which it reached in the night of the 29th. Early on the morning of the 20th Floyd advanced, surprised the regiment while at breakfast, and routed it, killing and wounding 45 and capturing 96. About 200 men escaped to Gauley Bridge and about 400 were collected and led by Major Casement to Charleston on the Kanawha. Floyd’s intention in crossing the Gauley was to force the retreat of Gen. J. D. Cox from Gauley Bridge down the Kanawha Valley, whither he proposed to follow him and make a raid of 50 miles into Ohio, but Gen. H. A. Wise, who commanded one of his two brigades, had refused to obey his order to the Gauley, upon which Floyd abandoned his idea of invading Ohio, and intrenched his position in a bend of the Gauley, both flanks resting on the precipices rising abruptly from the river. The presence of Floyd north of the Gauley gave General Rosecrans some uneasiness, and turned his attention from the Cheat Mountain region where he had been confronting Gen. R. E. Lee. Leaving Gen. J. J. Reynolds to oppose Lee, he drew troops from posts in the rear and assembled at Bulltown seventeen and a half regiments of Ohio infantry, two batteries of artillery and three companies of cavalry, which were formed into three brigades, commanded by Gen. H. W. Benham and Cols. E. P. Scammon and R. L. McCook. On 9 September he marched from Bulltown, crossed Big Birch Mountain, drove the 30th Virginia and a company of cavalry from Summersville, on the morning of the 10th, and followed to Cross Lanes, which he reached at 2 P.M., and heard that Floyd was intrenched about two miles distant. Benham, commanding the leading brigade, was ordered to advance cautiously and feel Floyd closely, but not to engage him until the entire column came up, unless he saw a good opening. Benham drove in Floyd’s pickets, and believing that he was in full retreat, pushed rashly forward in the face of a severe artillery fire, becoming closely engaged and making some spirited charges upon Floyd’s works, which were repulsed. He then called for help. Rosecrans hastened up the brigades of Scammon and McCook and going to the front, was surprised that the reconnaissance order had developed into a severe and badly conducted engagement. It was too late to withdraw without giving the appearance of defeat; other efforts were made, in which Scammon and McCook participated; but it was growing dark, the men were exhausted after their march of 17 miles, and Rosecrans withdrew, intending to renew the fight in the morning. During the night Floyd recrossed the Gauley, destroyed the foot-bridge behind him, sunk the ferry-boat and, with Wise, retreated to Sewell Mountain. The Union troops, fully exposed and not well handled, had 17 killed and 141 wounded. The Confederates, well protected by log-blocks, had none killed and only wounded. Contingent Office (Vol. V) and ‘Battles and Leaders of the Civil War’ (Vol. I, New York 1887, ed. by Johnson and Buel).

E. A. CARMAN.

CARNOVLA (German, KRAIN), Austria, a province with an area of 3,856 English square miles. It is bounded by Carinthia on the north, Styria on the northeast, Croatia on the east, southeast and south, and Istria and Görz on the west. It is covered with valleys some of which are about 10,000 feet high, and, generally speaking, is one of the most unfertile regions of the empire. Some districts, however, produce considerable quantities of wheat, barley, wine and, in the south, fruits of various kinds and excellent flax. There are some iron, lead and quicksilver mines, the latter exceedingly rich. It abounds in clays and valuable stones, and in coal and marble. There are considerable manufactories of iron, fine linen, lace, woolen cloth, flannel, worsted stockings, leather, wooden articles, etc. Its chief exports are steel-wares, quicksilver, hats, linens, glasswares, wax, wine, lignite, flour, etc.; principal imports—salt, oil, fruit, coffee, sugar, tobacco, cloths, cattle, etc. Nearly 300 miles railway line, with Laibach, the capital, as the centre, facilitate the commerce of the crownland. There are about 380 elementary schools, attended by over 75,000 children. Carniola is represented in the Lower House of the monarchy by 11 delegates, of whom two are drawn from the landed aristocracy, three from the towns, five from the rural communities, and one elected by the people at large. Its own Diet consists of 30 members drawn from the same classes and in about the same proportion. Nearly 94 per cent of the people are Slovenes, and the remainder consists of Germans, Serbo-Croatians and Italians. Almost the entire population belongs to the Roman Catholic Church. Carniola was made a duchy in the 12th century, under the dominion of the counts of Tyrol, who became extinct in 1335, and were succeeded by the earls of Görz. After the Treaty of Vienna, in 1809, it was ceded to France, and incorporated in the kingdom of Illyria. In 1814 it came again into the possession of Austria. Capital, Laibach with a population of 36,547. Pop. 525,063.

CARNIVAL. The same views which led men to propitiate the higher invisible powers by gifts, sacrifices and purifications, also introduced fasts, abstinence from pleasure, and penances. By fast is meant an abstinence from the usual means of nourishment, in order to mortify the appetites, and thereby to propitiate the Deity. In every nation of importance customs of this kind are found. Their historical origin is in the religious customs of the East, where the priests were originally the physicians of the people, and prescribed these fasts as a part of the regimen necessary in this warm region, as well as from religious views. Fasts are observed to this day in the East. The religions of the Persians and the Hindus, those of the Mohammedans, and of the worshippers of the Laxmic, in India, and many of them are found in the religion of the ancient people of the North. The earliest Christians fasted on the vigils (q.v.). The fasts on the jejunia qualior temporum, which continued for three days every quarter, were penances that of the period of 40 days (before Easter, or rather before Good Friday,
(quadrigensima), which was called, by way of excellence, the fast, and which commemorated the 40 days' fast of Jesus in the wilderness. With regard to the origin of Christian fasts, opinions differ. The most common is, that Telephorus, bishop of Rome, in the middle of the 3d century, first instituted the 40 days' fast as a rule of the Church. By Pope Gregory the Great, about 600, Ash Wednesday was made the beginning of the fast, and the day before was called fast eve, because in the night of this day, at 12 o'clock, the fast began. The Christian fast was preceded by a feast of three days, very obnoxious to the strict zealots. *Christians, it is said, on these days deliver themselves up to voluntary madness, put on masks, exchange sexes, clothe themselves like speciers, give themselves up to Bacchus and Venus and consider all pleasure allowable.* This is the origin of the present carnival, or Fasching, as it is called in the south of Germany, and which continues in that country from Twelfth Day to Ash Wednesday. This name carnival is derived from the Latin caro, carnis, flesh, and vale, farewell (according to Ducange, from the Latin denomination of the feasts in the Middle Ages, carnis levamen, solace of the flesh), because at that time the people took leave of flesh. Previously to the commencement of their long abstinence, men devoted themselves to enjoyment, particularly during the last three days of the carnival. The carnival is nothing but the Lupercalia of the Christian Romans, who could not forget their pagan festivals. At least it greatly resembles the Saturnalia which were celebrated annually in December, with all kinds of mirth, pleasure and freedom, in honor of Saturn, and the golden age when he governed the world, and to preserve the remembrance of the liberty and equality of man in the youth of the world. In Rome, the carnival brought to view, in a lively manner, the old Saturnalia in a new form. During the last days of the carnival, and particularly during the day which precedes the fast, the mummiaries, players, tricks and freedom of every kind abounded. From Italy, the modern Saturnalia passed to the other Christian countries of Europe. The wealthiest class commenced their amusements 8 or 10 days before Ash Wednesday, the middle classes two or three days, the poor only observed one day (the Fastnacht of the Germans). In the amusements of this period the dramatic poetry of Germany had its origin, after the cities had attained a flourishing condition. Its first traces appear in the 13th century. The mummiaries of the carnival produced the idea of adopting some character, and carrying it through. To please the multitude, and make the laugh more certain, the manners of common life were caricatured. There exhibitions afterward became more cultivated and developed. On fast eve persons in disguise sometimes went from one house to another, to make sport with their friends and acquaintances. A merry society of this kind formed a plan to represent something in their disguises, and hold a regular conversation at one of these mummiaries. The unknown players received praises, entertainments or presents. Encouraged by this success, the company grew stronger, their fables and speciers became longer by degrees, until they attained to regular representations of the life. It was in Nuremberg, renowned for its wares and its wit, that the first fast eve's play was produced, coarse and frolicsome, to suit the taste of the citizens. The earliest of these pieces that have come down to us date from 1450-70; they have a near relationship to the masques of the English and the farces of the French, as have the spiritual fast eve's plays religious burlesques, to the Mysteries and Moralities. In Italy the carnival is now celebrated with the greatest show and spirit at Rome. It lasts for the 10 days preceding Ash Wednesday, certain observances taking place on certain days. Some days, for instance, are devoted to the throwing of comfits, or small plaster pellets that take their place, these being hung from the balconies of the houses upon the persons in the streets—especially in the Corso—who retaliate in the same way, and in order that they may do this many of them are mounted upon lofty cars or other vehicles, all being masked. On other days the finest eque- pages move along in procession, and flowers instead of comfits are thrown. Races of riderless horses in the Corso are another feature of carnival time. After sunset on Shrove Tuesday everybody carries a lighted taper (these being known as moccolleti), and each tries to extinguish as many others as he can while keeping his own alight. Turin, Milan, Naples, Florence, etc., also celebrate the carnival with more or less ceremony, and the same can be said of various towns of the south of France, Nice in particular. The carnival at Rome has been excellently described by Goethe. In Germany the carnival is celebrated with brilliancy only in the Catholic cities of the Rhine Valley, Mayence, Bonn, but above all Cologne. In Protestant countries, generally, the feast is not observed to any extent. In the United States the principal observ- ance of this nature is that held annually at New Orleans. Various civic organizations take part in a great street pageant, in which are elaborate tableaux, brilliantly illuminated and placed on vehicles. Historic, poetical and other scenes are artistically portrayed often at great expense. A Paris a fat ox (boeuf gras) was led in the procession, followed by a child in a triumphal chariot, who is named *king of the butchers.* From this taking place on the Tuesday (Mardi) preceding Ash Wednesday the festival came to be known under the title Mardi Gras, which name is now generally applied to such festivals in America and elsewhere. See PAGEANT.

CARNIVORA, broadly, those animals which prey upon other animals; but in a re-stricted sense, that order of mammals more or less adapted for predatory life and including most animals popularly called beasts of prey. To this order the cat, dog, bear and seal are long. The head is small in proportion to the hulk of the body, and the skin is well covered with hair. The limbs, four in number, are fully developed, and are adapted either for walking or swimming. Two sets of teeth, deciduous or milk and permanent, are always developed in succession, and in both sets incisors, canines and molars, are distinguishable. The order is divided into two groups, the Fissipedia, which include such animals as the lion, wolf, bear, etc., whose life is terrestrial; and the Pinnipedia, or those which are specially adapted for aquatic life. The Carnivora are found in
CARNIVORA

all parts of the world except Australia and New Zealand, where flesh-eating marsupials prevail. The extent is probably limited to those of this order, being but a few inches in length. The largest is the bear, some of the latter weighing as much as a ton. The carnivores serve as a check on the too rapid multiplication of herbivores, rodents, etc. From this class man has derived the dog and the cat. With the other genera of the order his relations are those of constant warfare. Some genera hunt for their fur or flesh, others for sport, others he kills to protect his domestic animals. In civilized areas, consequently, the larger carnivores disappear entirely or to a great extent, and the result is the increase of various pests, as rats, mice, etc. In lands less civilized the larger carnivora hold their own even against man, tigers, lions and leopards killing thousands of human beings annually.

1. fissipedia.—All the carnivores of this division, except the sea-otter (Enhydra), have six incisor teeth in each jaw, the canine teeth are prominent, and one of the molar series in each jaw is usually compressed laterally, so as to prevent a cutting bite. The toes are furnished with claws, and the anterior limbs are used for seizing and holding prey as well as for walking. The skull is contracted behind the orbits, so as to give an hour-glass form when seen from above. The hollow formed by this constriction on each side of the head is bridged over by the wide zygomatic arch, and thus gives room for the powerful muscles of mastication. The lower jaw is articulated to the skull, so that it can only be moved up and down. The incisor and canine teeth are represented by the formula

\[ 3-3 \quad 1-1 \quad 4-4 \quad 8-8 \]

and vary from 3-3 in the cat, to 4-4 in the South African otocyon, the total number of teeth of all kinds ranging from 30 to 48. The posterior teeth are divided into premolars and molars; the last of the premolar series in the upper and the first of the molar series in the lower jaw presenting the lateral compression and trenchant margin which earns for them the name of sectorial or carnassial teeth. Behind the carnassial teeth the molars have tuberculated crowns. The stomach is simple and undivided, and, as a general rule, is more rounded in the flesh-eating genera. The limbs terminate in digits, which are never fewer than four, and are furnished with sharp claws, which in the Felidae are retractile within sheaths of the integument on the dorsal surface of the toes. In walking, the extremities of the toes are applied to the ground, as in the "digitigrade" cat and dog; or the whole sole of the foot is put down, as in the "plantigrade" bear. The six families included under the fissipede carnivores are: (1) Felidae: lion, tiger, leopard, cat, etc. These present the highest type of the carnivorae structure. The claws are retractile. (2) Canidae: wolf, dog, jackal, fox, etc. The claws are not retractile, and the gape is longer. The toes in this and the previous family are five on the anterior and four on the posterior extremities. (3) Hyenida: myana, aardwolf, etc. The hyenas have the anterior limbs longer than the posterior, and both terminate in four toes. The skull and dentition are closely related to those of the Felidae. (4) Viverrida: The supra elongated bodies of these animals are intermediate between those of the cats and the martens. Some, as the civet, gennet, zibet, have the claws retractile; in others, as the ichneumon and raccoon, they are not retractile. Those mentioned are digitigrade, but the suricate of Central Africa is plantigrade. In this family glands are found under the tail, the secretions of which have powerful odors. The diet of this family is not purely animal. (5) Mustidae: The members of this family have elongated bodies with short limbs, terminating usually in five-toed feet with retractile or non-retractile claws. The marten, weasel, polecat, glutton or wolverene, constitute one sub-family of exclusively terrestrial life. The badgers, the skunks and the like constitute another division. (6) Ursida: In this family the carnassial tooth is no longer trenchant, but tuberculated. All are plantigrade, but the habits and aspect vary considerably, and include, besides the bears, the raccoons, and similar forms. The raccoon and its allies are sometimes made a family with the name Procyonida. See Mammalia; Bear; Cat; Dog, etc.

2. pinippedia.—The aquatic carnivores comprise three families, represented by the walrus or sea-horse, the eared seals and the common seals. They are related to the preceding families through the otters and the bears, and agree in having the extremities modified into swimming organs or flippers, and the teeth in uniform character. See Seals; Walrus.

CARNIVORA, Fossil. A few remain of animals regarded as belonging to the Carnivora have been found in rocks of Eocene Age, but they are extremely generalized forms, and have a doubtful, if any, connection with the earlier creodonts (see Creodontia). The Miocene rocks have yielded more, but still of very generalized, or "synthetic" types, suggesting the ancestry of the dogs and civets; one is the European fossil genus Cynodictis, called a "viverrine dog," because it combines rudely characteristics of the fox and civet. "This, with another fossil ("Life of Mammals" New York 1909), "shades off into the many species of Galemyzon, and of Amphiicon, plantigrade animals existing in all parts of the Miocene world, and varying in size from that of a small fox to that of a long-bodied bear,—a huge combination of wolf, mungoos, and bear! Others of the same or a later time are more nearly typical civets, or stand between such and the linsangs, or connect civets and weasels; while at the beginning of the next, or Pliocene, period, there appears a curious animal, the icthiarch, which completely unites the civets with the hyenas. Amphiicon was plantigrade and had other bearlike characteristics. Besides it, as we know from Miocene fossils, lived another animal (Hemicyon), which was more dog than civet, plus bearlike features; and later we find Hyenomastis still more ursine, so that these represent a line of change from bearlike dogs into doglike bears, and connect the Amphiicon stock with the true bears and raccoons. In a similar way fossil forms of the Upper Eocene
and Lower Miocene connect the civet stock with the apparent ancestors of the fur-bearers (the porcupines, otters, etc.) only, indeed, until the late Miocene, near the end of the Tertiary period, that the groups of Carnivora as we now see them became distinctly set apart from one another by the dying out of the old intermediate stock formerly consigned to the genus *Urocyon* (New York 1910); Scott, *History of Land Mammals in the Western Hemisphere* (New York 1913).

**CARNIVOROUS PLANTS**, plants of various genera which subsist partly upon insects and other small animals which they entrap in various ways. The apparatus in each case is a modified leaf or part of a leaf, and in some cases the modifications are so curious, so well adapted to the use to which they are put, and so perfect in action, that the plants seem almost intelligent. The object sought by these plants seems to be to supply themselves with nutritious food, which is generally in meagre supply where they usually live—undrained swamps. Probably, too, such carnivorous plants as do not live in these habitats formerly did, but have not yet lost the use of the apparatus. In connection with this the genus *Utricularia* (see BLADDERWORT). In this genus various species provided with active bladders, which act like eel-traps, live submerged in ponds; other species, also possessing active but less perfect and useful traps, live in the marshy soil of swamps. Still others live on dry ground, but these have usually abortive traps. The conclusion is that as the ponds became swamps, and the swamps were converted into dry land, the supply of nutritious food increased, and hence the traps became aborted, because they were no longer needed.

Probably the most nearly intelligent of these carnivorous plants is the Venus' fly-trap (*Dionaea*), found in North Carolina. The trap (leaf-blade) consists of two pieces hinged together. On the margins are bristles, and in the interior a few sensitive hairs, which, when touched, act like a trigger, and the apparatus closes. Should an insect cause this action the bristles will prevent its escape and the trap will remain closed about it, and when open it will open, cast out the indigestible portions and be ready for another victim. If the trap fails to catch its prey, or if it be sprung by something it cannot utilize, it will open again in a short time. In the sundew (*Drosera*) the leaves are not provided with glandular hairs, which close over the insect that alights upon the leaf, and a glistening sticky substance holds it fast until its digestible parts are absorbed by the plant. In the pitcher-plants (*Sarracenia, Nepenthes*), the pitcher consists of a tube-like leaf either with or without a lid or hood. Around the mouth there is usually a sugary secretion which acts as a lure. The insect that alights cannot escape because the tube is lined with hairs that force him downward to the bottom of the tube, which is usually partly filled with water. Some other genera in which the carnivorous habit is developed are *Darlingtonia, Aldrovandia* and *Pinguicula*. Consult Darwin, *The Vegetables of the Tropics*.

**CARNOC, kár'no-kán**, John Murray, American surgeon, famous for his bold and skilful operations; b. Savannah, Ga., 4 July 1817; d. New York, 28 Oct. 1887. He studied at Edinburgh and at various European universities; and began his practice in New York in 1847. In 1851 he became professor of surgery at the New York Medical College, and surgeon-in-chief to the State Immigrant Hospital. At one time he was medical officer in examining the whole trunk of the second branch of the fifth pair of nerves. In 1852 he tied the femoral artery to cure exaggerate nutrition. He also tied the primitive carotid artery on both sides, to cure elephantiasis of the neck. In 1853 he excised the entire radius, in 1854 the entire ulna. He published a treatise on 'Congenital Dislocations' (1850); a translation of Rokitansky's 'Pathological Anatomy,' and 'Contributions to Operative Surgery' (1858 and 1877-80), besides numerous monographs of value on subjects connected with his profession.

**CARNOT, kár-nó**, Lazare Hippolyte, French statesman and journalist, second son of the following; b. Saint Omer, 6 April 1801; d. 16 March 1888. He studied for the law but was debarred from practice for refusing to take the oath of allegiance to the Bourbon. He was of liberal opinions, became a disciple of Saint Simon, and wrote the 'Exposition générale de la doctrine Saint Simonienne,' the authorship of which was, with his consent, ascribed to Bazard. He became editor of *Le Producteur*, a radical journal of the day. But as soon as Saint Simonism assumed the form of a religious creed, Carnot parted with his friends, and became a journalist, and the chief editor of the *Revue encyclopédique*. He was also entrusted with the publication of Gregoire's and Barres 'Mémoires.' He was elected to the Chamber of Deputies in 1839, and re-elected in 1842 and 1846. After the revolution of February 1848, he was Minister of Public Instruction until 5 July, and improved, as such, the condition of the teachers, rendered the normal schools free and established free lectures. In 1848 he was elected to the Constituent, and 10 March 1850, to the Legislative Assembly. After the coup d'état of December 1851, he left France; during his absence he was a member of the corps législatif, but refused to take the oath. He was re-elected in 1857, but again refused to serve. He did not take his seat until 1864, and was made a life senator in the same year. He spoke for the last time in 1888, a few weeks after his son Sadi had been elected President of the Republic, and was the author of "Mémoires sur Carnot par son fils* (2 vols., 1861-64); 'La Révolution française" (2 vols., 1867); 'L'Azée Roche,' (1874); and with M. d'Angers' *Mémoires de Barrand Barère* (4 vols., 1842-43). For his biography, consult the Proceedings of the Académie des Sciences, Morales et Politiques (Paris, January 1894); also Hubbard, 'Une famille républicaine: les Carnots' (Paris 1888).

**CARNOT, Lazare Nicolas Marguerite**, French soldier and statesman; b. Nola, Burgundy, 1753; d. Magdeburg, 2 Aug. 1823. From his youth he exhibited an uncommon talent for the mathematical and military sciences, entered the corps of engineers, and rose in office by the favor of the Prince of Condé. He published, afterward, 'Mathematical Essays,' which
CARNOT

causod him to be elected a member of several learned societies. His eulogy on Vauban received the prize of the Academy of Dijon. In 1791 he was appointed deputy to the Constituent Assembly, but at first took part only in military operations. On his proposals, the officers of the nobility were removed from the army, and others substituted from the citizens. He also proposed that implicit obedience should only be demanded of the soldier in presence of the enemy, at other times he should have all the privileges and rights of the citizen; a seige proposal to come from a military chief. As a member of the convention he voted for the death of Louis. In the following March he was sent to the Army of the North, where he put himself at the head and repulsed the enemy. On his return to the convention he was made a member of the Committee of Public Safety. The influence of Carnot in the military operations now began to be more deeply felt. In possession of all the plans deposited in the archives of Louis XIV, he organized and directed the French armies; and his direction undoubtedly contributed very much to their success. After the fall of Robespierre he was often accused, but always acquitted, because his duty had been to take care of the defense of the country, and he could not be made answerable for the cruel decrees of Robespierre, in which Carnot's name, as he was a member of the committee, was of course to be found. At the establishment of the Directory in 1795 Carnot was chosen a member, and for some time maintained an important influence. Barras at length succeeded him in the Department of War, and was ever after his enemy. His plan for the overthrow of Barras was unsuccessful, and with some others he was sentenced to transportation on the 18th Fructidor (4 Sept.) 1797. He fled to Germany and published a defense, which was eagerly read in Paris, and by the exposure of the conduct of his former colleagues hastened their overthrow on the 30th Prairial (18 June) 1799. After the 18th Brumaire Carnot was recalled, and appointed inspecteur aux revues, and two months later, in April 1800, Minister of War. He soon after retired into the bosom of his family, but was called to the tribunate, 9 March 1802, on account of his proposals the views of the government, voted against the consulsrap for life, and his was the only voice raised against the proposal for the Imperial dignity. He remained, however, a member of the tribunate till it was abolished, passed the next seven years of his life in retirement and published several valuable military works. In 1814 Napoleon gave him the chief command at Antwerp. He connected a vigorous defense with a careful regard for the interest of the city, which, by the command of Louis XVIII, he afterward surrendered to the British General Graham. He still retained his titles and his honors, but as a firm republican he could never expect the favor of the court; particularly as, in his memorial to the King, he openly and severely accused the measures of government, in consequence of which he was passed over in the new organization of the Academy of Sciences. When Napoleon was once more at the helm of state in 1815, he made Carnot count and peer of the empire, and restored him to the Ministry of the Interior. Carnot discharged the difficult duties of this office with his usual integrity. After the Emperor's second fall he was made a member of the provisory government of France, and was afterward the only one of the members of it comprehended in the ordinance of 24 July. He retired to Cerney, where he employed his pen on political subjects; then to Warsaw with his family; and finally to Magdeburg. Among Carnot's writings the most valuable are his 'Essai sur les machines'; 'Réflexions sur la métaphysique du calcul infinitésimal'; 'Sur la géométrie de position'; 'De la défense des places fortes'; 'Exposé de la conduite politique de Carnot, depuis le 1 Juillet 1814.' In Magdeburg Carnot published 'Mémoire sur la fortification primitive' and a volume of poems. He was rigid in his love of virtue, a scholar, a general and an inflexible republican. He was universally esteemed, both in France and in foreign lands, and was honored by all parties. Consult Arago, 'Eulogy of Carnot' (in Vol. I of Arago's 'Oeuvres complètes,' Paris 1854).

CARNOT, Marie François Sadi, President of the French Republic, grandson of Lazare Nicolas Carnot (q.v.), b. Lione, 11 Aug. 1837; d. Lyons, 24 June 1894. He was educated at the Ecole Polytechnique and became a civil engineer. His construction of the large tubular bridge at Colognès-sur-Rhône brought him to the public's attention. He was stationed as government engineer at Annecy in 1870 and in 1871 M. Gambetta appointed him prefect of the Seine-Inférieure, entrusting him with the duty of seeing to the defenses of his department, a task which he fulfilled with great ability. After Paris capitulated, he resigned, to become deputy from Côte d'Or in the National Assembly. In 1876 he was elected member of the new Chamber of Deputies; the year following, secretary to that Chamber; and occupied and important post with the Public Works Committee, becoming its minister in 1880-81, and was re-elected in 1885 in M. Brisson's Cabinet; in 1886 he became Minister of Finance, retaining this post under Brisson's successor, De Freycinet. In 1887 he was elected President of the French Republic in succession to M. Jules Grévy, but before his term of office had expired he was assassinated at Lyons by an Italian anarchist named Caserio. Consult Hubbard, 'Une famille républicaine, les Carnot' (Paris 1888).

CARNOT, Nicolas Léonard Sadi, French physicist: b. Paris, 9 July 1796; d. there, 24 Aug. 1832. He was educated at the polytechnical school; in 1814 he entered the engineer corps, where he served until 1823, becoming captain in 1826. In 1824 he published his book, 'Réflexions sur la puissance motrice du feu,' in which he laid down the principle that the efficiency of a thermodynamic engine is proportional to the amount of heat transferred from the source of heat to the condenser; and that heat passes only from a warmer to a colder body. This is called the second law of thermodynamics and is known also as Carnot's principle. It is also significant that he observed the principle of the constant quality of energy, a theory which was later developed as that of the conservation of energy. An English translation of his book was published by Kelvin; Kelvin's elaboration is appended (New York 1890).
CARNOTITE, a mineral first described in 1899, and now one of the most important ores of uranium. It is a hydrous vanadate of uranium and potassium, its formula being, perhaps, K₂O, 2UO₃, V₂O₅, 3H₂O. Radium has been shown to be present, and large quantities of radium might be made from the crude mineral. It seems likely that it will become an important ore of radium. It is a canary-yellow crystalline powder, usually occurring disseminated through sandstone, but sometimes in earthy masses of considerable richness. Its chief locality is in Montrose County, Colo., but it has recently been reported from Utah.

CARNUTES, kär-nü'tez, or CARNUTI, an ancient tribe living in central Gaul, at war with Cesar in 52 B.C., having joined Ver- cingetrix. Cesar burnt their chief town, called Cenabum. Augustus made the Carnutes, a "civitas foderata" (an allied state) and permitted them to retain their own institutions. Their chief city was also called Carnutes. Consult Holms 'Cesar's Conquest of Gaul' (2d ed. Oxford 1911).

CARO, kär'ō, Annibale, Italian author: b. Civita Nuova 1507; d. 1566. In 1543 he was appointed secretary to Pietro Ludovico Farnese, Duke of Parma and Piacenza, who entrusted him with several missions to Charles V. After the assassination of the Duke his own life was in considerable danger. He took refuge in Parma, and was treated in a friendly manner by the new Duke, Ottavio Farnese, whose two brothers, the cardinals, Ranuccio and Alessan- dro, took him successively into their service. With the latter he remained from 1548 to his death in 1566, and received from him several ecclesiastical preferments. Caro devoted himself chiefly to the study of numismatics and the Tuscan language, and his pure and elegant style in verse and prose soon became generally admired. His translation of the Æneid in blank verse is excellent. After his death appeared a translation by him of Longus, and of Aristotle's 'Rhetoric,' also 'Rime' (1569), and 'Lettere familiari' (1572-75), the former of which are admired for the elegance of the verse, and the latter as models of beautiful Italian prose. The best editions of Caro's works were published in Venice (1757), in Milan (1806), and a volume of selected works appeared in Florence (1864).

CARO, Elme Marie, French philosopher: b. Poitiers, 4 March 1826; d. 13 July 1887. He studied at the Stanislas College and the École Normale, graduating in 1848. He was at first professor in several provincial universities, and, having received the degree of doctor, was appointed master of conferences at the École Normale (1858). In 1861 he became inspector of the Academy of Paris; in 1864 professor of philosophy; in 1874 a member of the French Academy. He married Pauline Cassin, the author of 'Pêché de Madeleine.' He was a very popular lecturer on Christianity. He contributed to magazines; and wrote 'l'Idée de Dieu' (1864); 'La Philosophie de Goethe' (2d ed., 1889); Études morales sur le temps passé.' He died in Paris (1888).

CARO, Jakob German historian: b. Gnesen, 2 Feb. 1836; d. 1904. He was educated at Berlin and Leipzig, traveled in Galicia and southern Russia, and in 1863 became lecturer at the University of Jena and later professor; in 1868 he was professor at Breslau. He has written 'Das Interregnum Polens 1856' (1861); 'Liber Cancellarie Stanislai Ciole' (1871-74); 'Lessing und Swift, Studien über Nathan den Weisen' (1869); 'Das macht, was man macht, von den Progressiven' (1873); 'Das Bundniss zu Canterbury' (1880); 'Beata und Halska, eine Pol- nisch-Russische Geschichte aus dem 16. Jahr- hundert' (1880); and a continuation of Röp- pel 's 'Geschichte Polens.'

CAROB, kär'ōb, a tree, Ceratonia silique, of the family Fabaceae, native of the Mediterranean region, now widely cultivated in warm countries. It is known also as algaroba, karoub, carouba and Saint John's bread. It has shining pinnate leaves, racemes of red flowers, and flat pods 4 to 12 inches long filled with a pulp in which are embedded numerous seeds. The pods are an important forage crop in some countries, being eaten by all kinds of stock, and they are frequently used for human food, the sweet pulp being very palatable. They are reputed to be the locusts and wild honey found by Saint John in the wilderness, hence one of the common names. Thousands of tons of the pods are imported into England annually to be ground and used for stock-feed. In the United States they are sometimes seen on fruit-stands. The seeds are said to have been the original carat weight of goldsmiths.

CARÖE, ka'ro-ē, William Douglass, Eng- lish architect of Danish parentage: b. Liver- pool 1857. He was educated at Trinity College, Cambridge, and studied architecture with the eminent architect, John I. Pearson. He was architect to Southwell Cathedral, to the dean and chapter of Canterbury and to the ecle- siastical commissioners. Among his principal works are the bishop's palace at Can- terbury; bishop's palace at Bristol; Saint David's Church at Exeter; Wycombe Abbey School; the Jubilee Monument to Queen Victoria at Mentone, France. He has also restored many buildings of historic interest. He was president of the Architectural Association in 1895.

CAROL, a song of praise sung at Christ- mas or Easter. It originally meant a song ac- companied with dancing, in which sense it is frequently used by the old poets. It appears to have been danced by many performers, by taking hands, forming a ring and singing as they went round. It has been said that the oldest carol was that sung by the heavenly host when the birth of the Saviour was announced to the shepherds on the plains of Bethlehem. It is probable that the practice of singing carols at Christmas-tide arose in imitation of this, as the majority of the carols declared old tidings of great joy; and the title of Nils, newells or novelles, applied to carols, would seem to bear out this idea. Carol singing is of
great antiquity among Christian communities, as the carol by Aurelius Prudentius, of the 4th century, will show. The Middle Ages were especially familiar with these songs. The first authorization for a collection of such carols to be made was issued to Thomas Tysdale (1552). For a while they disappeared under the Puritan régime, but with the Restoration a new book appeared called 'The New Carols for the Merry Time of Christmas, to Sundry Pleasant Tunes.' In England, the custom of "wais" — i.e., groups of boys and men who go about singing in the village, still prevails in some sections. 'Hark the Herald Angels Sing,' (1739) and 'While Shepherds Watched Their Flocks by Night' are two well-known carols. Collections have been made by H. R. Bramley and Sir J. Stainer under the title 'Christmas Carols, Old and New' (London 1874); and by Martha E. Rickert, 'Ancient Christmas Carols, 1400-1700' (New York 1910).

CAROLAN, or O'CAROLAN, kâr'ô-lân, Turloch, Irish musical genius: b. near Nobber, County of Westmeath, about 1670; d. 1738. He was first seen as a singer at the age of 16, when he studied the harp, and in after life not only maintained himself thereby, but even became famous. A collection of his ballads was published during the 18th century, but others have been handed down by the peasantry.

CARULLI, Pietro Francesco, Italian painter: b. Turin 1638; d. Rome 1716. He studied painting at Venice, Florence and Rome, and was professor in the Academy of Rome at his death. He is celebrated for his careful execution and beautiful coloring, and excelled particularly in perspective, of his skill in which he has left excellent specimens in his drawings of the interior of some of the Roman churches. Consult de Boni, F., 'Biografia degli artisti' (Venice 1840).

CAROLINA, P. R., town 15 miles southeast of San Juan, with which it is connected by rail. It is well built, has a fine climate and is in good sanitary condition. It contains a city hall, public schools and churches. Dairy farming and sugar-planting are the chief industries. Pop. 2,520.

CAROLINA, kâr-ô-lê'na. This name is generally given to a certain law of the German Empire, of the year 1532, under Charles V, which he himself called an ordinance of criminal procedure (Peinliche Gerichtszurichtungen). From him it was a later period called Constitutio criminalis Carolina, or shortly Carolina. The arbitrary administration of justice, the disorder and cruelty which had become customary in the courts of Germany, where many a process was begun and ended with torture, and persons were sentenced even to death without regular process, gave occasion to this law. From the beginning of the peace of the land the necessity of such a law was felt throughout the country; but it was difficult in this, as in all other cases, to make the different members of the empire agree on one general measure. The Baron Jo- hann Friedrich von Solms, who was already instrumental in introducing this ordinance. He became Minister of State of the Prince-bishop of Bamberg, and succeeded in procuring an ordinance of criminal procedure for Bamberg to be drawn up, which passed in 1531. The same was also adopted in 1510 by the Margrave of Bran-
denburg and Franconia; and at last a law of criminal procedure for the empire at large was passed by the Diet at Ratisbon, in 1532. The Carolina contains 219 articles, which regulate the standing and oath of judges, the character of witnesses, the penalties of different crimes, and the order of procedure throughout the empire. This time common in criminal jurisprudence should be applied. Several German princes, as the Elector of Saxony, the Elector of Brandenburg, and of the Palatinate, protested against it, in order to protect the laws of their states and their own privileges against the "legitimate power of the Emperor; but at last the Carolina was established in almost every part of the empire. From the connection of Switzerland with Germany, and the fact that several Swiss towns were Imperial cities, German laws frequently passed into Switzerland, and the Carolina became the law by which even the Swiss troops in the service of the kings of France were governed until the French Revolution. Consult Zopfi, 'Die poetische Gemälde und Kaisers Karl V.' (Leipzig 1883); Esmein, 'Histoire de la procédure criminelle en France' (Paris 1882, pp. 300ff.); Daguin, F., 'Introduction d'un code de procédure pénale allemande' (Paris 1884, pp. 30ff.).

CAROLINA, Original Constitution of. For many years after the subversion of the old English order by political and religious insubordination, 1642-60, the dominant idea of the conservatives was to prevent its recurrence, as with the conservatives after the French Revolution; and their chief dread was of republicans and dissenters. It is an almost grotesque incident of this reaction, that by far its narrowest embodiment came from a liberal philosopher and an unbelieving incendiary politician,—John Locke and Lord Shaftesbury (Anthony Ashley Cooper). A group of eight noblemen, headed by the famous Lord Clarendon, and including Shaftesbury, were granted, on 24 March 1668, a tract called the province of Carolina, after Charles II.; as extended 30 June 1665, it included the whole of South Carolina and Georgia, and in theory stretched west to the Pacific. "To avoid erecting a numerous democracy, in their own words, they had Locke, who was Shaftesbury's secretary, draw up (whether on his own lines or Shaftesbury's is a moot point) a form of government called the "Fundamental Constitutions," which is a classic for impractical absurdity even among Utopias. The mass of the people (not alone, be it remembered, the future immigrants, but a considerable population already living there in pure democracy) were to be hereditary "leet-men," or serfs of the soil. Next above them was a sort of upper middle-class commons called "lords of the manor," who could let out 10-acre tenant farms. Over both (as the charter gave the proprietors the right to create titles of nobility other than English ones) were a fantastic self-perpetuating colonial noblesse, of "landgraves," and "caciques." Crowning the whole were the proprietors; the eldest instrument in the state, the others were admiral, chamberlain, high constable, chief justice, chancellor, high steward and treasurer. The "leet-men" held three-fifths of the land; the nobility and "lords of the manor" one-fifth, not to be alienated after 1707; the proprietors the remaining fifth. The prov-
CAROLINA ALLSPICE — CAROLINE

CAROLINA ALLSPICE. See CALYCANThUS.

CAROLINA-PINK, MARYLAND PINKROOT, or WORM-GRASS, names given to the Spigelia marilandica, a plant of the order Loganiaceae, bearing scarlet flowers, and having a root used as a vermifuge. It occurs in rich woods and extends from New Jersey west, north and south to Wisconsin and Texas.

CAROLINA RIDGE, in geology, the name given to an elevation of the bottom of the Atlantic Ocean off North Carolina, that occurred in Miocene time. It deflected the Gulf Stream and caused a great change in climate along the Atlantic Coast. See MIocene; TERTIARY PERIOD.

CAROLINE, The, an American steamboat used in 1837 by the American sympathizers with the Canadian insurgents under William Lyon Mackenzie (q.v.). The latter, after years of agitation, had gathered a force of 10,000 men; and in December, 1837, entered Kingston, Upper Canada, seized the fortifications, and proclaimed a republic. In January, 1838, he was defeated, and fled to New York. The American sympathizers joined him, and he set up a provisional government, issued paper money and offered bounties for volunteers and a reward for the apprehension of the lieutenant-governor. On 29 December an American steamer, the Caroline, crossed over to his camp from Schlosser on the American side, laden with reinforcements, provisions and munitions; and returning, lay at Schlosser that night full of men presumably ready for a similar trip to the next day. The Canadians, incensed at this outrageous violation of neutrality, sent over an armed party in boats to enforce it. They boarded the Caroline, hustled the passengers and crew ashore, killing one man (Amos Durfee) on shore in the fray, towed the vessel out into the stream, set it on fire and sent it over Niagara. A great uproar ensued. President Van Buren issued a proclamation ordering the neutrality laws to be respected, and, calling out the militia under Winfield Scott, he then demanded reparation from the British government. The latter naturally showed no great alacrity in responding. Shortly afterward, one Alexander McLeod came over to the American side, boasting that he was one of the boarding party and had killed one of the Caroline’s men with his own hand. He was arrested, indicted by the grand jury for the murder of Durfee and imprisoned to await his trial. Fox, the English Minister, demanded his release; the Secretary of State (Forsyth of Georgia) replied that he was in a hands of justice in New York State and must await its course; Lord Palmerston thereupon assumed for the English government full responsibility for the assault on the Caroline and again demanded his release. But Fox in his letter curiously added that the government had every reason to believe that McLeod was not one of the boarding party; in which case, of course, he was either a mendacious braggart or a common murderer, and the matter of the Caroline was irrelevant. Webster, now Secretary of State, replied, ignoring this point, that if the case were in a Federal court the President would order a nolle prosequi entered; but it being in a State
CAROLINE AMELIA ELIZABETH — CAROLINE MATILDA

court, he could only wait its action, and if it did not discharge McLeod, the case should go up to the United States Supreme Court. In the July term of 1838 a writ of habeas corpus was sued for in the New York Supreme Court, but refused. McLeod was acquitted, however, and the whole affair dropped. See CANADA. DIPLOMATIC RELATIONS OF THE UNITED STATES WITH.

CAROLINE AMELIA ELIZABETH, Queen of England, wife of George IV, King of Great Britain and Hanover, second daughter of Duke Charles William Ferdinand of Brunswick: b. 17 May 1768; d. London, 6 Aug. 1821. She was married to the Prince of Wales, afterward George IV, in 1795. After the birth of her daughter, Charlotte Augusta (7 Jan. 1796), her husband abandoned her, declaring that no one could force his inclinations. This was the beginning of the disgraceful dispute between the parties, which lasted till the death of Caroline, and exposed her honor to repeated accusations from her husband. The Princess of Wales lived retired from the court, at a country-seat at Blackheath, till 1808. In 1813 the contest was renewed between the Princess of Wales complaining, as a mother, of the difficulties opposed to her seeing her daughter. In 1814 the Princess obtained permission to go to Brunswick, and afterward to make the tour of Italy and Greece, in which the Italian Bergami was her confidant and attendant. Many infamous reports were afterward circulated, relating to the connection between the Princess and Bergami. When the Prince of Wales ascended the throne, 29 Jan. 1820, he offered her an income of £50,000 sterling, on condition that she should renounce the title of Queen of England, and every title appertaining to that dignity, and should not again return to England. She refused the proposal, returned to England, 5 June, and the next day entered London amid public demonstrations of welcome. She was now tried for adultery, but not convicted, and in this trial Brougham acted as the Queen's attorney-general. Though banished from the court, the Queen still lived at Hanover, maintaining a style suitable to her rank. She was refused admission to Westminster Abbey on the occasion of the coronation of her husband, on 19 July 1821, and published a protest in the newspapers. Her tomb at Brunswick has a very short inscription, in which she is called the unhappy Queen of England. Consult Nightingale, 'Memoirs of Queen Caroline' (London 1820); Adolphus, 'Life' (London 1821); Hushe (London 1821); Wilk. (London 1822); also Clerk, 'Life of Her Majesty Queen Caroline' (London 1821).

CAROLINE BOOKS, or LIBRI CAROLINI, a theological work in four books, prepared under the direction of Charlemagne (Carolus Magnus), in connection with the disputed question of image worship that seriously agitated the Church during the reign of that monarch. The second synod of Nicea had given its approval to the use of images, agreeing in this point with the views of the Eastern Church. Owing to a misunderstanding of the Nicean canons through a bad translation, which seemed to make the Eastern synod declare that the worship due to God alone, iatros, should be paid to images, the 'Libri Carolini' severely reviewed the doctrine. The condemnation of image worship as formulated in the Caroline Books does not, however, bear upon the inferior honor, duly, paid to the saints and their images, or that given to the Virgin, hyperdulia. The author is unknown. Consult Hefele, 'Conciliengeschichte' (Vol. III, bk XX, chap. II, 2d ed., Freiburg 1877).

CAROLINE ISLANDS, a large archipelago in the north Pacific Ocean, between lat. 3° and 12° N., and long. 132° and 163° 6' E., and between the Philippines and the Marshall Isles. Area, about 560 square miles. It contains many groups, embracing in all about 525 islands and islets. Many of them are mere coral reefs, lofty elevations, the chief of which are Yap or Goup, lie northeastern of the last. The chief island, which is mountainous, precious metals have been found. The other principal groups are Lutike, Mortlock, Simiaoin, Enderby, and Hogolou. The most easterly island is Ululan. Between the two principal groups are palms, breadfruit trees and bananas. Copra is also an important product, while some of the islands also yield shells. The commerce is mostly in the hands of the German Japu Company, which has stations on every important island. The inhabitants, numbering about 55,000, though mainly Micronesians, include various races, and have made very different degrees of progress in civilization. In the central groups they are of a handsome physical type, active and industrious, and have some commerce. On the east generally, and on the west, with the exception of the Pelew Islands, the inhabitants, though apparently of the same stock, are far less advanced. The islands were discovered in 1527 by the Portuguese, who gave them the name of Seequera. In 1686 they were annexed and renamed in honor of Charles II by the Spaniards, who soon changed the name to New Philippines. After several futile missionary attempts in the 18th century, Spain took little active interest in the group until August 1888, when the German flag was raised over Yap. A serious dispute followed this act, and the question being submitted to the Pope as arbitrator, he decided in favor of Spain, reserving special trade privileges to Germany. In 1887 disturbances broke out at Ponape, in which the governor, who had arrested one of the American Protestant missionaries, was killed by the natives; but the rising was soon suppressed. In February 1899 Germany purchased from Spain for about $4,000,000, the Caroline and Pelew Islands, and all of the Ladrones, but Guam, which had been ceded to the United States in the treaty of peace that ended the Spanish-American War. Consult Christian, 'The Caroline Islands' (1899); Furness, 'Island of Stone Money' (1890); Sailer, 'Die Karolinen Inseln Jap' (1904).

CAROLINE MATILDA, Queen of Denmark, daughter of Frederick Louis, Prince of Wales: b. 1751; d. Celle, Hanover, 10 May 1775. She was married in 1766 to King Christian VII of Denmark. She became the object of court intrigues caused by the jealousy of the grandmother and stepmother of her hus-
band. These led to the execution for treason of Counts Struensee and Brandt, who were of the Queen's party, and to the imprisonment of the Queen herself, who was liberated through the interference of her brother, George III of England. She received a pension of £5,000 and was allowed to retain the title of Queen. She spent her last years in a castle at Celle, Hanover. Her last hours: 'Die letzten Stunden der Königin von Dänemark.' Consult Lagrize, 'La reine Caroline-Mathilde' (Paris 1887), and Willkins, 'A Queen of Tears.'

CAROLINGIANS. See CAROLOGYANS.

CAROLUS, a gold coin struck in the reign of Charles I, and originally 20 shillings in value, afterward 23 shillings. The name was given also to various other coins.

CAROLUS-DURAN, că-rō-lūs-du-rān, Auguste Emile, French portrait painter. b. Lille, 4 July 1838; d. Paris, 18 Feb. 1917. His name was originally Charles Emile Auguste Durand. He studied under Souchon at the Lille Academy of Art, and afterward in Paris, where he copied the old masters in the Louvre, especially Velasquez and Leonardo. In 1861 he won the silver prize for painting and went to Italy and Spain, continuing his study of Velasquez, who remained his chief model. During his stay in Rome he completed his first important work, 'The Evening Prayer.' His first painting to receive a medal was a historical subject, 'Assassin,' in 1866. It was presented to the Lille Museum by the French government. After 1866 Mr. Carolus-Duran turned his attention to portraiture, and in 1869 exhibited 'The Lady with the Glove,' a full length portrait of his wife in outdoor costume. The portrait was placed in the Luxembourg. Mr. Carolus-Duran made a specialty of painting portraits of women and children. He had painted portraits of the Duchess of Marlborough, the Marchioness d'Aubigné, the February de Wagram, Mrs. Astor, the Countess of Warwick, the Countesse Castellane, Queen Maria Pia of Portugal and the Princess Obolinsky. His first exhibit in America was at Philadelphia during the Centennial Exposition of 1876. He exhibited a portrait of Mile. Sophie Croizette, a well-known actress, who was his sister-in-law. He made several trips to this country. On one occasion he gave a lecture at the Chase School of Art and illustrated it by painting a portrait. In 1889 he was made commander of the Legion of Honor and was made a director of the French Academy at Rome in 1905. He also was made president of the Société Nationale des Beaux-Arts and was a member of the Institute. He painted a series of historical and genre subjects, among them being 'The Bathsheba,' 'Gloria Maria Medici,' a decorative composition for a ceiling in the Louvre; 'The Burial of Christ'; 'Dawn' and 'The Vision.' His portraits of men included those of Pope Pius X, Emile de Girardin, Gounod, Gustave Doré and Alphonse Carr. In his younger days Mr. Carolus-Duran gave fencing exhibitions and was known as one of the best swordsmen in France. He also showed skill as a sculptor. He married Mile. Pauline Marie Croizette, herself an artist. Mme. Carolus-Duran received a medal at the Salon of 1875. The couple had a son who joined the French army.

Mr. Carolus-Duran was commander of the Order of Leopold, grand officer of the Order of Saint Maurice et Lazare, commander of the Order of Charles III of Spain, commander of the Order of Christ de Portugal and grand officer of the Legion of Honor. He received the Grand Croix of the Order of Isabel la Catholique of Spain and the Medaille de Saucytagge. Consult Muther, 'History of Modern Painting' (New York 1907) and the biography by Alexandre (Paris 1902).

CARON, René Edouard, Canadian statesman: b. Sainte Anne, Lower Canada; d. 1878. He was educated at the Quebec Seminary and Collège Saint Pierre and called to the bar of Lower Canada in 1826. He was mayor of Quebec 1833-37 and was a member of assembly 1834-36. He was called to the legislative council in 1841, of which he was speaker 1843-47 and 1849-53. After holding office in the La Fontaine-Baldwin and Hincks-Morin governments, he became a judge of the Superior Court of Quebec, and afterward of the Court of Queen's Bench. He was one of the judges of the special Seigniorial Court, which in 1855 adjudicated on the questions arising out of the abolition of seigniorial tenures in Lower Canada.

CARORA, că-ro-rā, Venezuela, city of the state of Lara, situated 95 miles south of Coro and 40 miles southwest of Barquisimeto on a tributary of the Tocuyo River. It was founded by the Spaniards in 1572. It has a considerable trade in gums, rubber and cochineal, tanneries and the raising of cattle, horses and mules are the chief industries. The city dates from the Spanish foundation of 1572. Pop. 6,000.

CAROTID ARTERY, either of the two great arteries which convey the blood from the aorta to the head and the brain. In the article on the aorta (q.v.) the origin of the carotid arteries is described—that from the right side springing from the innominate artery, and supplying most of the right side of the head; that on the left side arising directly from the aorta to supply all of the structures of the left side of the head. Apart from these slight variations in their origin on the two sides, the carotid arteries and their branches are practically duplicated in the two halves of the head. Thus the main branches, the common carotids, soon branch into two, the external and internal carotids. This division takes place about the level of the thyroid cartilage. The external carotid supplies the upper part of the front and side of the neck, the tongue, larynx, pharynx, face, the pterygoid regions, the upper part of the back of the neck, the scalp and the major portions of the brain membranes. The internal carotid soon enters the skull and supplies the greater part of the brain tissue, the orbital structures (the eye, etc.) and portions of the brain membranes. The branches of homologous arteries of the two sides anastomose somewhat, although many of the arteries of the brain are terminal arteries and do not anastomose. Occlusion of one of these vessels in the brain usually results in permanent injury. In deep cuts of the throat these arteries may be involved, but they lie very deep as a rule.
and are not often severed. (Morris, 'Anatomy'; Gray, 'Anatomy').

CAROTIN (Lat. carota, "a carrot"), the coloring-matter of the carrot. It always accompanies chlorophyll and xanthophyll in the chloroplast, and is the coloring matter of some peelings and roots of other plant organs. The substances described by the terms erythrophyll, chrysophyll and etolin are probably carotin. Carotin is a hydrocarbon of the empirical formula $\text{C}_2\text{H}_4\text{O}$ and is closely related to xanthophyll, which has the formula $\text{C}_2\text{H}_4\text{O}_2$ and is possibly an oxidation product of carotin. It differs from xanthophyll in its ease of crystallization, solubility in a variety of solvents, slightly different melting points and spectra. It may be extracted from the chopped carrot by the action of carbon disulfide, in which (as also in benzene) it is very soluble. It crystallizes in small, red plates, which are insoluble in water and in alcohol. A similar compound, called "hydrocarotin," is also known.

CAROTTO (kä-ro’to) FAMILY. 1. GIAM FRANCESCO, jàn frán-chês’kô, Italian painter; b. Venice, 1470; d. there 1546. He studied under Liberale at Verona and under Andrea Montegna at Mantua. His earlier productions are in imitation of the style of Montegna; but at a later period the study of the works of Leonardo da Vinci and Raphael produced a decided change. Carotto is not distinguished by the grandeur of his conceptions, but excels in character and expression, and in the softness and warmth of coloring. Verona contains most of his works. Among these is the 'History of pictures in the church of Saint Eufemia. Others are the fresco of the 'Annunciation' (San Girolamo 1506); the altar of San Fermo Maggiore (1528); various frescoes and panels in San Giorgio in Braida; and several panels in the Pinacoteca Communale. Good examples of his art are in the Castello, Milan, the Chiesa di Carità, Mantua, in the Uffizzi and Pitti, Florence, and in the museums of Dresden, Budapest, etc., 2. GIOVANNI, jò-vân’né, Italian painter; d. 1555. He was the son of Giovanni and his pupil. He was chiefly an architectural painter and is celebrated for his copies of ancient ruins. He is also said to have given instruction to Paul Veronese.

CAROUGE, kä-roozh', Switzerland, a town of the canton of Geneva, on the left bank of the Arve, opposite Geneva, with which it is connected by a bridge. It has machine works, foundries, dye works and manufactures of watches. Founded in 1780 by one of the Sar- dinian kings as a rival of Geneva, the capital of the province of Carouge, it was ceded to Switzerland in 1816. Pop. (1911) 7,890.

CARP, a name applied to many fishes belonging to the Cyprinidae. The members of this family inhabit fresh waters and are extremely numerous in genera, species and individuals. It is estimated that there are more than 1,000 species. One group of the family, found in North America, includes fishes known as suckers, buffalo-fishes, redhorse and mules, while another group contains the minnows, dace, fatheads, chubs, etc. They are all soft-finned fishes, with a stout, serrated spine, which stands in front of both the dorsal and anal fins. There are no teeth in the mouth, but they are developed in the pharyngeal bones; that is, in the throat. The flesh is not of the best quality and is full of fine bones. The name carp is especially applied to one fish — Cyprinus carpio. This was introduced into North America from Europe by the United States government, but it came originally from Asia. It inhabits our streams and lakes, where it is increasing rapidly in numbers. It reaches a length of two feet and may attain a weight of 40 pounds. It is a scaly, compressed, robust fish, with well-developed barbels and dorsal fin, and a short anal one; it is of brownish hue. Owing to its hardiness, its durability under extreme temperatures, the facility with which it may be raised because of its adaptability to sluggish ponds and swampy lakes, it might form an important element in the fish food-supply of the North American interior, since farmers can raise it easily in their mill-ponds. It feeds upon vegetable fare, larvae, insects, etc., and during the winter months hibernates, at which time it requires no food. The eggs, also, are very hardy, and number several hundred thousands to each individual. They adhere to aquatic grasses and weeds.

The carp is usually covered with large scales; but one variety of it, the "mirror carp," has only a few large scattered scales; while another species, the "leather carp," is wholly without scales. Consult the publications of the United States Fish Commission, and Gill, 'Smithsonian Miscellaneous Collections' (Vol. XLVIII, Washington 1907).

CARP-SUCKER, a common and little-valued fresh-water fish of the genus Carpiodes, related to the buffalo-fishes and suckers. It is found throughout the central part of the United States, takes its name from its carp-like form, averages about two feet in length and is a dull green above, grading into silver beneath.

CARPACCIO, kär-pä’tshô, Vittore, Italian artist: b. Venice about 1450; d. 1525. He was one of the most celebrated masters of the old Venetian school, and was the rival of Bellini and the last Vivarino. He studied probably with Basilio and Bartolomeo, and his pupil was the Ford of Gentile Bellini. All that is known of his life is that he belonged to Venice, of which he has reproduced in the background of his pictures the streets and monuments. His distinguishing characteristics are natural expression, vivid conception, correct arrangement and great variety of figures and costumes. He also excelled as an architectural and landscape painter. His favorite employment was the dramatic representation of sacred subjects, several of which he has illustrated by a series of paintings. Of these the most celebrated are the histories of Saint Ursula and Saint Stephen. The former, consisting of nine pictures, is now in the Academy of Venice, and has been engraved; the latter, in five pictures, is in the National Gallery, Milan. He also painted a number of smaller pictures. The latest research on Carpaccio may be found in the monograph by Ludwig Frommenwiler (Milan 1906; trans. by Cust, London 1907).

1825. Having prepared for the profession of the law, he afterward devoted himself to literary pursuits, and produced a great number of plays and operas, partly translations and partly original. In 1792 he was editor of the *Gazetta di Milano*, and wrote violent articles against the French Revolution. He was obliged to leave the city after the invasion of the French and went to the Swiss theatre, and the director of the theatre. In 1809 he accompanied the Archduke John in the expedition against Napoleon. Under the title of 'Hay-dine,' he published a series of curious and interesting letters on the life and works of his friend Haydn, and is considered as the author of the *Notice sur la vie et les ouvrages de M. Beyle* (1840).

**CARPATHIAN MOUNTAINS.** A range of mountains in central Europe, forming for the greater part of their extent a natural boundary of Hungary, in the shape of a semicircular belt of nearly 800 miles in length, extending from Orsova on the Serbian frontier, to Pressburg: its breadth is considerable, reaching a maximum of 240 to 250 miles, between the Banat and Transylvania. The Carpathian chain may be divided into two great sections, the East and the West Carpathians, the former curving from the mouth of the Nera to the source of the Tisa, and the latter between Austria and Rumania; the latter proceeding from the sources of the Theiss and the Pruth, and terminating on the banks of the Danube west of Pressburg, and forming the boundary between Hungary and Galicia. The Carpathians belongs the remarkable group of the Tatra, in which is situated the culminating summit of the whole system, the Gerlach Peak, 8,377 feet. Several other peaks exceed 8,000 feet, and the highest of the Carpathians reaches an elevation of 8,318 feet. The most remarkable and frequented passes are those of Teregova, leading from Orsova to Temeswar; of Vulkar, forming the valley in which the Schyl flows; and of the Rohenthurh, in a gorge formed by the Aluta at the foot of Mount Szurul. The outer bend of the Carpathians is much steeper than that which descends toward the valleys of Transylvania and Hungary. The only important rivers which actually rise in the chain are the Dniester and the Theiss. Small lakes abound in the interior of the mountains, some at great elevations and of great depth. The formation of the Carpathians took place mostly in the Tertiary period, and was practically completed at the end of the Miocene. The eastern part of the Carpathian chain, from Orsova to the source of the Burca, near Konstopp, is entirely composed of primitive rocks. These are succeeded by gruvâcke, which extends to the source of the Theiss, and is only interrupted by a primitive group between the pass of Borgo and the source of the Viso. A great chain of trachyte appears on the frontiers of the Bukowina and stretches to the point where the Aluta begins to flow southwest. To the west of this chain, on approaching the plains, an extensive tract of sandstone belonging to the coal formation begins to appear, and covers the greater part of Transylvania. Tertiary formations surround the vast plains of Hungary, which consist of a rich alluvium and must once have been the bed of a lake. Basalt frequently occurs, but no distinct traces of extinct volcanoes have been found. The Carpathian range is rich in minerals, including gold, silver, lead, quicksilver, copper and iron. Salt occurs in beds which have sometimes a thickness of 600 or 700 feet and are apparently inexhaustible. On the plateaus corn and fruit are grown to the height of 1,500 feet; higher up the mountain steeps are covered with forests of pine, oak, beech, chestnut and fir, some of them as high as 5,500 feet. Bears, lynxes and wolves are numerous in the mountains. See Hungary; Galicia; Rumania.

**CARPATHOS, kärp'-póthós,** an island in the Aegean Sea, now called Scarpono. In ancient times it belonged to Rhodes. It has been under Italian rule since 1912. It is situated midway between the island of Rhodes and Crete. It is 31 miles long and 8 miles in extreme breadth. Area 126 square miles. It has bare mountains, reaching a height of 4,000 feet. There are ruins of towns in several places. Pop. about 8,000, mostly Greek workers in wood and fishermen.

**CARPEAX, Jean Baptiste,** zhô'ni bâp'tést kärp-pxá', French sculptor; b. Valenciennes, France, 14 May 1827; d. Chercheau, near Paris, 12 Oct, 1875. He studied at the School of Architecture in Valenciennes, and later went to Paris, becoming a pupil of Rude and of Duret. In 1854 he obtained the Prix de Rome. His bronze ‘Napoléon, eastern and western,’ and ‘Ugo lino and His Four Sons’ (1863), also in bronze, though it defied the canons of sculpture, made him famous. He settled in Paris in 1862. His masterpiece, a marble group, *The Dance,* in the façade of the New Opera in Paris, fully showed his dramatic power and the exuberance of his imagination; but it provoked much hostile criticism as involving an attempt to stretch beyond their natural province the limits of the plastic art. The most notable of his later works are the great fountain in the Luxembourg Gardens, representing *Four Quadrants of the World Sustaining the Sphere,* a monument to Watteau at Valenciennes, and a painting of *Napoléon in His Coffin* in the same museum. For his originality and virility he has been ranked with Rodin, Rude and David d’Angers. In painting he exhibited the same fearless handling of theme. Paris contains several thousand of his drawings; the Louvre possesses many of these as well as notable portrait busts of Alexandre Dumâx fils, Napoleon III and the Princess Mathilde. Consult biographies by Clairée (Paris 1875); Chesneau (ib. 1880). Consult also Gonse, *La sculpture française* (ib. 1895).
CARPEL, the leaf forming the pistil. Several carpels may enter into the composition of one pistil. See Flower.

CARPENTARIA, Gulf of, a large gulf indenting the northern coast of Australia, named for its discoverer, Pieter Carpent, Cape York Peninsula, the northern extremity of Queensland, is on the east and Arnhem Land on the west. It contains a number of islands, among them Groote Eyland, Sir Edward Pellew Islands and Wellesley Islands. Its maximum width is about the last-named, painting he was closely associated with President Lincoln, and his observations during this period are embodied in his book entitled 'Six Months in the White House with Abraham Lincoln.'

CARPENTER, Fred Warner, American diplomat: b. Sauk Centre, Minn., 12 Dec. 1873. He received a law degree at the University of Minnesota, in 1898 was admitted to the bar and was stenographer to a law firm for several years. He became private secretary to William H. Taft, governor of the Philippines in 1901, continuing while Mr. Taft was Secretary of War and during part of his term as President. He was appointed Minister to Morocco in 1910, and 1911-13 was Minister to Siam.

CARPENTER, Joseph Estlin, English Unitarian scholar: b. Ripley, Sussex, 5 Oct. 1844. He was educated at University College, London, and (Manchester N.G., at Oxford). He was minister of Oakfield Road Church, Clifton, 1869-69, and of Mill Hill Chapel, Leeds, 1869-75; was lecturer in Manchester New College, 1875-1906, and principal, 1906-15. He is one of the leading living authorities as a Sanskrit scholar and biblical critic, and besides editing Ewald's 'History of Israel' (Vols. III-IV) and translating Tiele's 'Outlines of the History of Religion,' is the author of 'Life and Work of Mary Carpenter' (1879); 'Life in Palestine'; 'The First Three Gospels: Their Origin and Relations' (1890); 'The Bible in the Nineteenth Century' (1903); 'James Martineau, Theologian and Teacher'; 'The Historical Jesus and the Historical Christ'; 'Comparative Religion' (1918). With Rhys Davids he has edited the 'Sumair-gala Vilasini' (1886); and the 'Diga Nukaya' (1899). With Harford-Battersby he has also edited the Hexateuch according to the revised version.

CARPENTER, Lant, English Unitarian clergyman: b. Kidderminster, 2 Sept. 1780; d. at sea, 5 April 1840. Designed for the ministry, he was sent in 1797 to the Northampton Academy. That school being temporarily discontinued, young Carpenter was placed at Glasgow College, where, however, he did not continue the length of time necessary to take his degree. Leaving college in 1801, he spent some time in teaching, and as librarian of the Athenaeum, Liverpool. At Liverpool, Carpenter's views were so clearly in sympathy with those of the Unitarian denomination generally that he received several invitations to the pastoral charge of Unitarian congregations, and a call to a professorship in their college at York. In 1805 he accepted a call to Exeter, where he continued for 12 years. In 1817 Exeter University of Glasgow gave him the degree of LL.D., although he had applied only for the degree of M.A. From Exeter he removed to the pastoral charge of the Unitarian congregation at Bristol (1817), where he continued until his death, which occurred by falling from a vessel between Cape N. and Labrador, 1844, for his health. Dr. Carpenter's piety was of an eminently practical turn. The instruction

President Fillmore, in the City Hall, New York; a portrait of President Lincoln, in the capitol at Albany, N. Y.; and the 'Emancipation Proclamation' (1864), in the capitol at Washington. While executing the last-named painting he was closely associated with President Lincoln, and his observations during this period are embodied in his book entitled 'Six Months in the White House with Abraham Lincoln.'
of children was an object of constant interest. Amid all his pastoral and literary labors he also found time and energy to devote to juvenile instruction, and, even against the prejudices of his congregations, established Sunday-schools among the children of Exeter and Bristol. In his pastoral charges at Exeter and Bristol he was active in co-operation with others in the establishment of libraries, schools, savings banks and institutions for general improvement and welfare. His published works are mainly theological and doctrinal, in support of the Unitarian sentiments he had early espoused. Among his more important works are: "An Essay on the Geography of the New Testament"; "Unitarianism, the Doctrine of the Gospel" (1809); "Examination of the Charges Against Unitarianism" (1820); "Harmony of the Gospels"; "Systematic Education" (2 vols., 1815); "Principles of Education" (1820); and a volume of sermons. Mild in controversy, faithful in humane labors and practically devoted to the improvement of society, Dr. Carpenter was greatly respected even by those who were his most staunch antagonists in theology. Consult his "Memoirs," edited by his son, R. L. Carpenter (London 1842).

Carpenter, Louis George, American engineer: b. Orion, Mich., 28 March 1851. He was graduated at Michigan Agricultural College in 1879, and after serving there as instructor in mathematics and engineering taught post-graduate courses at the University of Michigan and Johns Hopkins University. In 1888 he became professor of engineering at the Colorado Agricultural College and meteorologist at the Agricultural Experiment Station, and organized the first systematic course in irrigation engineering given in any American college. He founded the American Society of Irrigation Engineers in 1881. He was special agent of the United States artesian wells investigation in 1890, and in 1899 was appointed director of the Agricultural Experiment Station at the Colorado Agricultural College. He is a member of many American and foreign engineering societies. He has published government reports, "Artesian Wells in Colorado" (1890); "Irrigation Progress in Colorado" (1891); and many papers on irrigation.

Carpenter, Margaret Sarah, English painter: b. Salisbury, England, in 1793; d. London, 13 Nov. 1872. Her first studies in art were obtained from the collection of Lord Radnor at Longford Castle, and later she competed for several years for the prizes offered by the Society of Arts, several times successfully, and once being awarded the gold medal for the study of a boy's head. In 1814 she went to London, where she secured for herself a wide reputation as a portrait painter; in that year her exhibits of a portrait of Lord Folkestone at the Royal Academy and the pictures "Fortune-Teller" and "Peasant Boy" at the British Institution at once gained for her great popularity and began the beginnings of her rapid rise. In 1856 upon the death of her first husband, W. H. Carpenter, keeper of the prints and drawings in the British Museum, she was granted by the Queen an annual pension of £100. Between the years 1816-66 she exhibited 147 pictures at the Royal Academy, 50 at the British Institution and 13 at the Society of British Artists. Chief among her works were: "Lord Kilcoursie and Lady Sarah de Crespigny" (1812); "Lord Folkestone" (1814); "Mr. Baring" (1815); "Sir Henry Bunbury" (1822); "Lady Eastnor" (1825); "Lord de Tabley" (1829); "Justice Coleridge" (1830); "Lady Denbigh" (1831); "Mrs. Herbert" (1833); "Lady King, daughter of Lord Byron" (1835); "Archbishop Sumner" (1852), etc. In the National Portrait Gallery are also three portraits from her brush—those of Richard Parkes Bonington, the painter; John Gibson, the sculptor; and Patrick F. Tyler, the historian. In the South Kensington Museum are three pictures: "Devotion" (1822); "The Sisters" (1840); and "An Old Woman Spinning." Consult Clayton, E. C., "English Female Artists" (Vol. I, pp. 336-388, 1876).

Carpenter, Mary, English philanthropist: b. Exeter, 3 April 1807; d. Bristol, 15 June 1877. She was the eldest daughter of Lant Carpenter (q.v.). Her special work was for the neglected children of the poor and young criminals. She established a number of schools and reformatories, including the Reformatory School at the Penitentiary and Dangerous Classes (1851); "Juvenile Delinquents" (1853); "Our Convicts" (1864); and "Six Months in India" (2 vols., 1868). Consult Carpenter, J. E., "Life of Mary Carpenter" (London 1879).

Carpenter, Rella Clinton, American engineer: b. Orion, Mich., 26 June 1852. She studied at the Michigan Agricultural College, M.S., LL.D.; was graduated at the University of Michigan in 1875; student Cornell, M.M.E., 1888; was professor at the Michigan Agricultural College, 1878-90; professor of experimental engineering, Cornell University, since 1890; member American Society Mechanical Engineers (vice-president; chairman Committee on Research); American Society Civil Engineers; American Society Mining Engineers; American Society Heating and Ventilating Engineers (president, 1896); Society Automobile Engineers (vice-president); consulting engineer for Helderberg Portland Cement Company, Cayuga Lake Portland Cement Company, Quaker Portland Cement Company, Great Northern Portland Cement Company, Belleville Portland Cement Company, Atlas Portland Cement Company, Kosmos Portland Cement Company, California Portland Cement Company and others; has constructed numerous power stations for electric railways and has had active charge of many engineering constructions; patent expert in several important cases; judge of machinery and transportation, World's Fair, Chicago, 1893, Pan-American Exposition, Buffalo, 1901, Jamestown Exposition, 1907; member of committee to report to President of United States engineering slides in Panama Canal 1915-16; author "Experimental Engineering" (7 eds., 1890, 1902, 1909); "Heating and Ventilating Buildings" (7 eds., 1898, 1902, 1909); and numerous papers
in 'Transactions American Society Mechanical Engineers,' 'Transactions Heating and Ventilating Engineers,' etc.

Carpenter, William, English editor and author: b. Saint James, Westminster, 1707; d. at his house in St. James's, Islington, 21 April 1874. Being the son of a poor tradesman he was put to work early in life and obtained no education, but entering the service of a bookseller he soon learned to speak fluently several ancient and modern languages and took great interest in the study of biblical subjects. With William Greenfield he edited the *Scripture Magazine*, which was later known as 'Critica Biblica' (4 vols., 1824–27); in rapid succession he became editor of *Shipping Gazette* (1830); *Era* (1838); *Railway Observer* (1843); *Lloyd's Weekly News* (1844); *Court Journal* (1848); *Sunday Times* and *Bedfordshire Independent* (1854). He issued a publication 'Political Letters' (1830–31), which he claimed was not liable to the stamp duty on newspapers, but at his trial in 1831 was convicted and imprisoned for some time. Carpenter wrote many treatises on the subject of political reformation and from 1851–53 was honorary secretary to the Chancery Reform Association. Among his works are 'The Elector's Majesty' (1832); 'The Political Text-book' (1833); 'Peerage for the People' (1841); 'The Corporation of London as it is and as it should be' (1847). Of his other publications the most noteworthy are 'Sancta Biblia' (1825); 'Anecdotes of the French Revolution of 1830' (1830); 'Life and Times of John Milton' (1836); 'The Biblical Companion' (1836); 'Relief for the Unemployed: Emigration and Colonization Considered' (1841); 'A Comprehensive Dictionary of English Synonyms' (6th ed., 1865); 'An Introduction to the Reading and Study of the English Bible' (3 vols., 1867–68), etc.

Carpenter, William Benjamin, English physiologist and naturalist: b. Exeter, 29 Oct. 1813; d. 19 Nov. 1885. He was the eldest son of Lant Carpenter (q.v.); was educated in his father's school at Bristol, and in 1833 entered University College, London, as a medical student. Two years later he went to Edinburgh University, where he was graduated as M.D. in 1839; and in that year also he produced his first important work, 'The Principles of General and Comparative Physiology.' In 1844 he was elected a fellow of the Royal Society and also obtained the Fullcrum professorship of physiology at the Royal Institution. From 1847 to 1852 he was editor of the *British and Foreign Medico-Chirurgical Review*, was one of the editors of the *Natural History Review*, and in 1856 he was appointed registrar of the University of London, a post which he resigned in 1879. He wrote several well-known works on physiology, one of which has been already referred to. Among these are 'Principles of Mental Physiology' (4th ed., 1876) and 'Principles of Human Physiology' (1846, new edition by H. Power 1881). Still other works of his are 'Introduction to the Study of the Foraminifera' (1862); 'The Microscope and its Revelations' (1868); 'The Physiology of Temperance and Total Abstinence' (1833); 'Zoology and the Instincts of Animals' (1857); 'Mesmerism and Spiritualism' (1877); 'Nature and Man' (1888); besides many papers in scientific journals. He took a leading part in the expeditions sent out by the government in 1868–70 for deep-sea exploration in the north Atlantic and contributed largely to the knowledge of ocean circulation. He advocated the doctrine of vertical circulation independently of Dr. Lenz of Saint Petersburg, who in 1845 had begun to advance that theory. He was chosen president of the British Association at Brighton in 1872.

Carpenter, William Henry, American philologist: b. Utica, N.Y., 15 July 1853. He received a university education at Cornell and Johns Hopkins, and at Leipzig and Freiburg universities; became instructor in rhetoric and lecturer on North European literature in Cornell University in 1883; instructor of German and Scandinavian languages in Columbia University, 1883–89; assistant professor of Germanic languages and literature in the same institution, 1889–90; adjunct professor, 1890–95; and in 1895 professor of German philology there. Since 1912 he has been provost of the university. He is vice-president of the Germanic Society of America and editor of the *Germanic Society Quarterly*; and trustee and secretary of the Columbia University Press. He is a member of the Authors and Century Clubs of New York. He has published several works in the line of his specialty, and has contributed largely to dictionaries and encyclopedias and to magazines and reviews.

Carpenter-Bee, a species of bee (Xylocopa virginica) which burrows into dead tree-trunks, lumber and even into woodwork of buildings. It is a large, black-bodied bee, as big as the biggest bumblebee. Its burrow is about half an inch in diameter, runs horizontally across the grain of the wood for a short distance, then forms a tunnel at right angles to this entrance, running sometimes 12 to 18 inches. When the tunnels are complete, the cells are made and supplied with pollen. The cells are about seven-eighths of an inch long, and are separated from each other by partitions made of sawdust glued together. When the eggs, which are laid one in each cell, are hatched, the larva feed on the pollen, and when they are ready to bore their way out. The carpenter-bee will use the same burrow again and again, and its home is sometimes utilized by other species of bees.

Carpenters' Hall, Philadelphia, on the south side of Chestnut street between Third and Fourth. It was built shortly after 1770 (as an assembly house and club) for the carpenters guild of that city, and probably for civic uses if desired. In 1774 it became famous as the chosen meeting-place of several conventions for the liberation of the colonies. The first was on 15 July, when the committee of correspondence of the colony appointed a session of committees from each county as "the most effective means toward a union." Later, on 5 September, the first Continental Congress met in its "plain but spacious rooms" on the lower floor, although the State House had been offered them. When its closed doors were prepared the papers which Chatham said ranked with the greatest of the world. The second Congress also began its sessions there, 10 May 1775.
CARPENTRES—CARPENTRY

CARPENTRES, kär-pə-trə, France, a town of the department of Vaucluse, situated 16 miles northeast of Avignon. In Roman times it was known as Carpentoracte, was a place of importance and possessed many handsome edifices, of which a few traces are left. The principal structures are an aqueduct, which crossed the valley of the Azon by 48 arches; a Roman triumphal arch, a Gothic cathedral, a museum containing a collection of Phoenician bas-reliefs and the library containing 50,000 volumes. Carpentres has a considerable local trade, and weekly markets are among the most important in southern France. It was formerly the seat of a bishopric, and Pope Clement V had his residence there in 1313. The chief products are leather, wax, chemicals and fruit. It has also a considerable trade for its manufactures of silk, dyed fabrics and hats. Pop. 11,390.

CARPENTRY, the art of combining pieces of timber to support a weight or sustain pressure. The work of the carpenter is intended to give stability to a structure; that of the joiner is applied to finishing and decoration. The scientific principles of carpentry are founded on the doctrines of the composition and resolution of mechanical forces, and a knowledge of these doctrines, either theoretical or practical, is indispensable to the skilled carpenter. To go into the principles of the art would be merely to explain a particular application of these mechanical forces, which would be beyond the scope and limits of this work. An explanation of the terms employed in carpentry may, however, be useful to the general reader. The term "frame" is applied to any assemblage of pieces of timber firmly connected together. The points of meeting of the pieces of timber in a frame are called "joints." "Lengthening" a beam is uniting pieces of timber into one length by joining their extremities. When neatness is not required this is done by "fishing." In this mode the ends of the beams are abutted together, and a piece of timber placed on each side and secured by bolts passed through the whole. Sometimes the parts are indented together, and pieces termed "keys" are mortised into the beams and side pieces. When it is desirable to maintain the same depth and width throughout the beam, "scarfinning" is employed. This is cutting from each beam a part of the thickness of the timber, of the length of the intended joint, and on opposite sides, so that the pieces may be jointed together and bolted or hooped. In bolting scarfs, side plates of iron are used to protect the wood. When greater strength is required than can be produced by a single beam, "building" and "trussing" beams are resorted to. Building beams are combining two or more beams in depth so as to have the effect of one. In trussing the beam is cut in two in the direction of its length, and supported with cross-beams, as in roofing. "Mortise" and "tenon" is a mode of joining timber. An excavation called a mortise is made in one piece and a projecting tongue to fit it, called a tenon, in the other. The tenon is confined in the mortise by a pin penetrating it laterally through the side of the mortised beam, or by an external strap of iron passing round the mortised beam and riveted in the one terminating in the tenon. The timber frame-work of floors is called "naked flooring." It is of three kinds—single, double and framed. Single flooring consists of a series of joists stretching across the whole void from wall to wall, without an intermediate support. The flooring boards are laid on the top of these, and the ceiling of the lower story fixed to the underside. Double flooring consists in laying binding joists across the floor about six feet apart, crossed above by bridging joists and also crossed below by the ceiling joists. Framed flooring is provided with girders or beams in addition to the binding bridging and ceiling joists. To prevent the transmission of sound, a double ceiling of lath and plaster is sometimes used, but generally pugging is inserted between the roof and the ceiling. "Cornice bracketings" consists in rough wooden profiles of the room cornices, which are afterward lathed around and plastered. Partitions, when not required to bear weight, are formed by laying along the floor a piece of timber called a "sill," together with a corresponding piece along the ceiling joists, the space between filled with vertical pieces called "quarter," to which the lath is nailed. When the partition has weight to support, it has to be trussed with posts and braces. The timbers which support the steps of a wooden staircase are termed the "carriage." They consist of two pieces of timber inclined to the "rake," or projection of the steps, and termed "rough strings," which may rest upon a piece of timber projecting horizontally from the upper wall, called a "pitching" or "apron" piece, which also supports the joists of the landing or "half pace." The "roof" is the framework by which the covering of a building is supported. It may consist of a series of timbers which are called "rafters" with the ends resting on the opposite walls, and the other ends meeting in a point. When loaded with the weight of the covering, this framework would be apt to thrust out the roof; a third piece is consequently added, which, like a string, connects the lower extremities of the rafters and prevents them from spreading. This is called a "tie," and the whole frame a "couple." When the tie is of such a length that it is apt to droop in the middle, or "sag," by its own weight, a fourth piece is added to unite it directly with the apex of the couple, and is called the "king-post." If the rafters, too, are liable to sag, cross pieces called "struts" are introduced, uniting their centres with the centre of the tie. Instead of the king-posts and struts, the centre of each rafter may be joined to the tie by a piece falling perpendicularly on the latter, and to each other by a piece running across parallel to and above the tie, forming a parallelogram with the perpendiculars and the section of the tie enclosed by them. The suspending pieces are called "queen-posts," and the horizontal one a "collar-beam." The whole frame, constructed in either way, is called a truss. The trussed frames are placed at intervals of about 15 feet apart, and support horizontal pieces called "purlings," which run the whole length of the roof and support the common rafters with their covering. Ship carpentry is a special form of carpentry. The timbers are larger and heavier and of the harder kinds of wood. These must be shaped to the curved lines of the vessel and properly beveled to make close joints. This branch of carpenter-
try is now confined to small vessels such as yachts, coaster schooners, barges, scows, etc.

The principal instruments used in carpentry are chisels, rasps, planes, and tenon-saws; planes, as the jack-plane, smoothing-plane, molding-plane, etc.; chisels, gouges, brad-aws, gimlets, descriptions of which will be found in their places. See Building; Cabinet; Cabinet-Joinery; Shipbuilding.

Bibliography—Fletcher and Fletcher, 'Carpentry and Joinery for Architects, etc.' (London 1898); Hatfield, 'The American House Carpenter' (New York 1888); Hodgson, 'Modern Carpentry and Joinery' (ib. 1906); Jacoby, 'Structural Details, or Elements of Design in Heavy Framing' (ib. 1909); Riley, 'Manual of Carpentry and Joinery' (ib. 1906).

CARPET (Lat. carpea, to pluck or card, as wool), a thick woolen fabric used for covering floors. The word originally meant (in old French) a coarse cloth in which packages were wrapped for packing upon the backs of men and animals. As man advanced in civilization and desire for comfort, he began to use his packing carpet as a wrap for himself and to cover his feet and limbs at night. From that he began to use it to protect his sandaled feet from cold stone floors. Then the material was made finer and gradually embellished with colors and designs. The art progressed most rapidly in the cold mountain districts of western Asia—Persia, Turkey, Syria. The people in these regions had time, patience and a love for things beautiful. They produced wonderful results with wool, camel's hair, or goat's hair, combined with a flaxen warp. All their work was (and still is) done most laboriously by hand on looms of the crudest sort. These fabrics of the better sort are almost indestructible with ordinary wear. Carpets are still in use in some of the palaces of Persia which have been constantly used since the end of the 16th century.

When woven floor-coverings were first used by men is hard to tell. Fragments of what might be such are found in Egyptian excavations indicating a possible use of them as early as 3000 B.C. That the skins of animals and rush mats were used by prehistoric man as protection from the cold stone of the cave dwellings is certain. Cyrus the Great had wonderful carpets when he placed Persia at the forefront of nations. Alexander found them in use in his victorious march through Asia to India.

The art of carpet-making in its best sense still remains with the Orient. No Occidental possesses the matchless patience properly to weave by hand the marvelous creations of the Far East. Some of the Indian carpets approach the fineness of those of Persia. The jute and cotton rugs of Japan, and the grass matting of China are samples of this art in poorer material.

In the United States there are samples of native workmanship which compare well with the productions of the East. The work of the Navajo Indian in particular is very quaint and picturesque. His rugs are playing mats, colored with native pigments and laboriously woven by hand, will wear for many years. Cortez found the palaces of Montezuma covered with grand rugs, many of them made of the skins of hummingbirds sewn together. See Carpets and Rug Industry.

CARPET-BAGGERS, CARPET-BAG GOVERNMENTS. After the admission of the Southern negroes to the franchise after the war involved their organization and leadership, and their representation in State and national offices by intelligent whites. As no Southern whites of character would undertake what they regarded as a crusade against emancipation, the task fell to Northern Republicans. Those who undertook it were of all grades of personal integrity and honesty of purpose, from sincere old-fashioned abolitionists to mere scalawags; but they had one characteristic in common: the lack of property interests in the South to make its injury theirs. Hence the name, implying that their only possessions were in their carpet-bags. The name was at first given only to those whose one motive for residence there was election to office by aid of the negro vote; and the purpose of many was voiced in the utterance of one high official, that when he could no longer hold office from there he would no longer live there. But the regime of monstrous plunder and social and industrial ruin which the carpet-bags fostered, the levying of fraudulent taxes, and the piling up of huge State debts for the future, soon effaced all distinctions. All Northerners who upheld the system or tried to protect the negroes' voting rights were confounded under the name; all State governments in any way protected from overthrow by United States troops were carpet-bag governments; and finally the entire years of Reconstruction, and that attempt itself, are compendiously known as the Carpet-Bag Regime.

CARPET-BEE, a small beetle (Antherus scrophulariae), often wrongly called "buffalo bug." In the grub or larval state, it is injurious to carpets and similar fabrics. It is an active, brown, hairy larva, the size of a grain of wheat, which works in a hidden manner from the under surface, sometimes making irregular holes, but more frequently following the floor-cracks and cutting long slits in a carpet. This insect was brought from Europe about 1874, and is abundant in the New England States and westward to Kansas. The adult insect is a minute, broad-oval beetle, about three-sixteenths of an inch long, with a red stripe down the middle of the back. When disturbed it folds up its limbs and feigns death. As a general thing the beetles begin to appear in the autumn, and continue to issue, in heated houses, throughout the winter and following spring. Soon after issuing they pair, and the females lay their eggs in convenient spots. The eggs hatch in a few days, and the larvae develop rapidly. Their development is retarded by cold weather or by lack of food, and they may remain inactive for an indefinite period. When, under normal conditions, the larva reaches full growth, the yellowish pupa is formed within the last larval skin, from which the beetle emerges later. The beetles are day-fliers, and when not engaged in egg-laying, usually fly about the windows, and may often be found upon the sills or panes. The carpet-beetle is very difficult to exterminate, and the best preventative is the use of movable rugs on hard-wood
CARPET AND RUG INDUSTRY

floors. Suspected carpets should be taken up, beaten, spread out on the floor, and then well aired. Before relaying the carpet, tarred roofing-paper should be laid upon the floor.

Another similar pest is the black carpet-beetle (Attagenus piceus), whose larva is readable. It has also been known to infest flour mills, and is to a certain extent a feeder upon cereal products. Two years are required for its development from egg to beetle. Consult Howard and Marlett, 'Household Insects' (United States Department of Agriculture, Washington, 1896).

CARPET AND RUG INDUSTRY. Like many American industries, the manufacture of carpets had its beginnings in the Old World. Probably the first carpetings made on a large scale were those made in an establishment founded by Henry IV, King of France, at the Louvre in 1607. This establishment was followed in 1627 by one called the 'Savonnerie' at Châtillon, the building having previously been used as a soap factory, and by one at Beauvais, established in 1662 by Colbert, minister of Louis XIV. Many of the weavers employed in these factories were Protestants and the revocation of the Edict of Nantes in 1685 caused a tremendous emigration of these people to other countries, more particularly to England, Holland and Flanders. Thus in England in 1735 we find that in the town of Kidderminster the manufacture of ingrain carpetings had been established, and although carpet-making had been attempted as far back as the reign of Edward III at Bristol, it did not gain a permanent foothold in the country until after the immigrations from France. In 1745 the Earl of Pembroke established a factory at Wilton in which he employed only French weavers, and this was followed in 1750 by an ingrain carpet factory at Tewkesbury, owned by a Capuchin friar for the manufacture of Savonnerie carpetings, but this was a failure.

The manufacture of Brussels carpet was introduced into England from Flanders, where it undoubtedly originated, by John Broughton, who put the first loom into operation in 1749. This loom, though the secret of its operation was carefully guarded, was copied, and within a short time there was a number of similar looms in operation, and so successful were the makers of this kind of carpet that Kidderminster rapidly became the centre of trade for this class of goods.

With the opening up of trade with the colonies, the carpet manufacturers of the Old World began to look westward for new markets, and along with the early settlers came men who had learned the art of weaving and were seeking new fields in which their energies might have full sway.

The early carpet dealers in this country, the first records are meagre, but in Parker's New York Gazette, issue of 30 June 1760, an advertisement appeared reading as follows: 'J. Alexander and Company have removed their store to Mr. Kayne's house on Smith Street, where Mr. Proctor, watch-maker, lately lived, where they sell check handkerchiefs, linens of different kinds, lawns and muslins. Scott's carpets, broad and narrow cloths, shoes of different kinds, undershirts, hats, stockings, with several other goods; Fine Scott's barley and herrings. Also a choice parcel of Old Madeira in pipes.' Thus we see that carpets were sold in this country as early as the middle of the 18th century, but the manufacture did not commence until many years after the introduction.

The history of carpet-making in America may be divided into two periods, the first covering the times when all carpets were made on hand looms, and extending up to the year 1841, when the perfected power loom was introduced; the second period extending from 1841, when Erastus B. Bigelow of Boston, Mass., brought forth his perfected power loom and completely revolutionized the methods of carpet-making, up to the present time.

The earliest records show that W. P. Sprague was the pioneer in the weaving of carpets, and in 1791 opened a factory in Philadelphia for the manufacture of carpeting. It was the importation of this style of carpet that first suggested the principle of the protective tariff duty. At the time Alexander Hamilton, as Secretary of the Treasury, transmitted a message to the House of Representatives in which he recommended that a duty of 24% per cent be laid on all imported carpets "to which the nature of the articles suggests no objection, and which may at the same time furnish a motive the more to the fabrication of them at home, toward which some beginnings have been made." This factory was followed in 1816 by one at Worcester, Mass., owned by Peter and Ebenezer Stowell, in which were six looms invented and constructed by themselves.

The manufacture of ingrain carpets in this country was begun early in the 19th century, the first ingrain mill probably being that established in 1810 by George M. Conradt, a native of Württemberg, Germany, at Frederick City, Md. There carpets were made on a hand loom, on a drum having rows of pegs similar to the cylinder of a music box, driven by a Capuchin friar for the manufacture of Savonnerie carpetings, but this was a failure.

The manufacture of Brussels carpet was introduced into England from Flanders, where it undoubtedly originated, by John Broughton, who put the first loom into operation in 1749. This loom, though the secret of its operation was carefully guarded, was copied, and within a short time there was a number of similar looms in operation, and so successful were the makers of this kind of carpet that Kidderminster rapidly became the centre of trade for this class of goods.

With the opening up of trade with the colonies, the carpet manufacturers of the Old World began to look westward for new markets, and along with the early settlers came men who had learned the art of weaving and were seeking new fields in which their energies might have full sway.

The early carpet dealers in this country, the first records are meagre, but in Parker's New York Gazette, issue of 30 June 1760, an advertisement appeared reading as follows: 'J. Alexander and Company have removed their store to Mr. Kayne's house on Smith Street, where Mr. Proctor, watch-maker, lately lived,
and making the operation more easy and certain. Of course these looms did not reach a state of perfection till many years afterward, and the machinery was so expensive, the operation so tedious, and the skill required so great, in early times that it was thought the demand for carpets would not justify such an outlay, but through perseverance and the gradual introduction of improved methods the efforts put forth by the Lowell company were amply repaid. The use of power looms to see the establishment become one of the largest carpet factories in the country.

In 1840 the carpet industry was started in New York by Robert Beattie, followed in 1841 by E. S. Higgins and Company, who engaged in the manufacture of ingrain carpetings. In 1844 Alexander Smith started a factory at New York, N. Y. In 1845 John Bromley commenced to manufacture in Philadelphia and was practically the pioneer in what has grown to be the largest manufacturing centre of the country. There were more than forty factories at that time in operation, 1,500, probably not more than 1,250 were used for ingrain, the others being used for the manufacture of Brussels, damasks, Venetian, or rugs. The largest mills then were: The Lowell company, operating 150 looms; W. H. McKnight, Saxonville, Mass., 150 looms; Orrin Thompson, Thompsonville and Tariffville, Conn., 250 looms; and W. H. Chatham, Philadelphia, 100 looms, while numbered among them were the first plants of such companies as the Hartford Carpet Company, Robert Beattie and Sons, E. S. Higgins Carpet Company and McCallum and McCallum.

It was in 1841 that the second period in the history began. Erastus B. Bigelow (q.v.), a young man of 20 years of age, in 1839 became interested in the weaving of coach-lace, and started in to improve on the machinery, by which this class of goods was made, with the result that inside of two years he had brought forth an invention by the use of which the cost of the manufacture of these goods, which had been 22 cents a yard, was reduced to three cents. The same year he introduced a power loom for weaving ingrain carpets, raising the product of eight yards a day possible on the hand loom to 10 or 12 yards, and later, after making several improvements, extending this total to 25 or 27 yards a day. He also invented and patented the power loom for weaving Jacquard Brussels, Wilton and tapestry carpets. He was, however, unable to interest any of the larger companies in his inventions and finally started a plant of his own at Clinton, Mass., and which was later organized as the Bigelow Carpet Company, now one of our greatest and most progressive companies. The exclusive right to use his process of manufacture in England was at once purchased by the Crossleys of England and A. & E. S. Higgins of New York, and the Roxbury Carpet Company of Massachusetts acquired the use in the United States of his loom for tapestry and velvet during the term of the patent.

To John Johnson of Halifax, England, belongs the honor of having introduced the weaving of Brussels and velvet carpetings in this country. He began operations at Newark, N. J., in a mill with 25 looms, but this later was moved to Troy, N. Y., and in 1855 was purchased by the Roxbury Carpet Company and moved to Roxbury, Mass. The product of these looms originally was 5 yards per day; in 1856 it had advanced to 16 yards under the management of the Roxbury company, and now the average output per loom ranges from 60 to 65 yards, mainly possible through the introduction of the Bigelow inventions.

In 1856 Halcyon Skinner, a mechanic in the employ of Alexander Smith at his West Farms factory, began his investigations into the construction of a power loom with the intention of making one himself of the same capacities, and the result of his labors was that about a year later his patent was brought forth, but owing to the destruction of the mill by fire it was not until 1864 that his loom was put into operation. The mills that Smith had built at Yonkers, N. Y. In January 1877 Skin- ner invented his power loom for the manufacture of moquette carpetings and later several important improvements were made on this, not only by him but by his sons, Charles and A. L. Skinner. This increased the output of one and one-half yards a day, the result of the labors of two men and a boy, to about 11 yards a day, and this has gradually been increased till the output now reaches about 15,000,000 yards a year, made on 1,000 power looms and employing over 5,000 people.

Of the more recent inventions the most interesting is perhaps that of James Dunlap of Philadelphia, who patented a process of printing tapestry carpeting in the cloth, a marked improvement over all other previous methods because of the fact that the coloring matter was pressed down into the roots of the pile and extended entirely through the fabric.

The employment of power looms for making rugs is in Boston, 20 years old. The importation of Oriental hand-made rugs led to imitations being woven, and so successful was this branch of the industry that a large proportion of dwellings is now supplied with one-piece rugs in place of carpeting made in breadth.

Ingrain was the first machine-made carpet to be widely introduced. It was first manufactured as a two-ply cloth, with two colors of yarn, the pattern on one side appearing in reverse colors on the other side. Later a three-ply was made with concealed cotton string warp. No pile is used with either two- or three-ply. Ingrain has also been known as Kidderminster or Scotch, from the place of its origin.

Brussels, like most carpets, is made with a pile. This is thick, hair-like surface given to a fabric, so that the weaving is covered. A cut pile leaves short, protruding ends, as in plush; an uncut pile leaves protruding loops. In Brussels the pile is uncut, being looped tight, these loops forming the pattern. The body fabric may be woven of linen, cotton or jute; dyed worsted is used for the pile.
CARPET-SNAKE

Wilton carpets or rugs, sometimes known as imperial Brussels, and also velvet, are made similarly to Brussels, except that the pile is cut automatically in the loom during the process of weaving.

Axminster carpet, sometimes termed Chenille Axminster, has a fluffy thick pile, with a linen or hemp warp and Chenille filling. This Chenille cord may be of woolen or other material, but its distinguishing characteristic is that it has four or more soft threads.

Tapestry carpet resembles Brussels, being really an imitation, more loosely woven, and having the warp-yarn forming the pile colored, or printed in the warp. Upon tapestry are built various tufted fabrics as moquette. Persian or Smyrna rugs usually have a linen or hemp warp and filling, and a pile or tufts of colored wool twisted about the warp. The Turkish rug is very similar, but the manner of attaching the tufts is different.

Rag carpet is a separate industry, carried on by a considerable number of very small concerns, mainly by some lone weaver, who has a suitable loom, and makes a living by weaving up a few yards of housewives of the neighborhood. There are no statistics of the rag carpet industry.

In 1849 there were 116 establishments making carpets and rugs in the United States. They employed over 6,000 hands, and their product in that year was worth $5,400,000. In 1914 there were only 97 factories, but the volume of business had increased many times, and some of the factories, as in Philadelphia and Yonkers, are very large. The wage earners numbered 31,309, besides 1,720 salaried men. Nearly half the employees were women and children, and their average earnings were under $10 weekly. The salaried men averaged $33 weekly. The capital invested was $85,153,000, and the annual product was valued at $69,128,185, of which $25,847,962 was the value added by manufacture. The industry experienced its greatest growth during the decades from 1880 to 1900, and from 1900 to 1910, showing 50 per cent gain in each 10-year period specified. Pennsylvania was the leading State in the industry almost from its inception, but New York State was in the lead in 1914. Each of these States produces about one-third of the carpets and rugs manufactured in the country. Massachusetts was third with 16 per cent, and no other State made much showing. There are now about 12,000 carpet and rug looms in operation, and the annual yardage manufactured is close to 100,000,000.

Axminster and moquette carpets and rugs ranked first in respect to quantity produced in 1914, and also in respect to value. The output reported for that year was 15,742,835 square yards, valued at $18,578,693.

Tapestry Brussels carpets and rugs had the second largest output in respect to quantity, 13,614,454 square yards, valued at $19,306,856. There was no decrease since 1909 being 20.3 per cent. In respect to value, however, this class of products occupied fourth place, being led by Axminster-moquette, tapestry velvet and Wilton.

Tapestry velvet carpets and rugs ranked third as to quantity and second as to value of output in 1914, and showed pronounced increases in both respects as compared with the 1909 figures. The production in the later year was 13,227,819 square yards, valued at $12,867,635, representing increases of 24.1 per cent in quantity and 42.3 per cent in value as compared with 1909.

Wilton carpets and rugs which ranked fifth in respect to quantity and third in respect to value in 1914, also showed pronounced gains, the output in that year amounting to 5,616,263 square yards, valued at $11,920,685, and representing increases of 5.1 per cent in quantity and 17.9 per cent in value over the corresponding figures for 1909.

The remaining products of the industry—consisting of body Brussels carpets and rugs, ingrain carpets and rugs, Smyrna rugs, Colonial or rag rugs, wool and paper-fibre rugs, other wool rugs, and other products—were valued at $15,899,605 in 1914. The production of body Brussels, ingrain and Smyrna rugs showed pronounced declines in 1914 as compared with 1909.

The chief constituent material of the carpet and rug industry is wool, either in raw or in partially prepared form. The raw wool used in 1914 amounted to 52,352,449 pounds and cost $10,493,743. Woolen and worsted yarns also constituted important materials. Of woolen yarn, 21,626,360 pounds, costing $5,821,848, was used; of worsted yarn, 9,267,278 pounds, costing $4,392,906; of materials other than wool, yarn made of jute, ramie and other vegetable fibre is of greatest importance, the amount consumed being 59,148,266 pounds, costing $6,040,186; cotton yarn to the amount of 24,619,137 pounds, costing $4,637,673; and linen yarn amounting to 7,602,200 pounds, costing $1,414,824.

More than three-fourths of the mills purchased the yarn which they used in weaving carpets, there being only 22 establishments which bought the wool, hair or cotton, and themselves spun the yarn they consumed. These establishments produced, for their own consumption, 35,615,821 pounds of woolen, 10,253,791 pounds of worsted and 2,068,435 pounds of cotton yarn. Thus the total amount of woolen yarn used in the manufacture of carpets and rugs was 57,242,181 pounds; of worsted yarn, 19,521,069 pounds; and of cotton yarn, 26,687,572 pounds.

CARPET-SNAKE, the name of two different snakes, given in reference to the variegated pattern of their coloration. (1) An Australian python, about six feet long when fully grown, and beautifully marked, but subject to much variation. The more typical specimens are black above, each scale with a yellowish dot, with yellow spots more or less arranged in rows. The under parts are yellow. It is widely distributed and numerous in Australia, except in the northern deserts, and is now regarded as a variety (variegata) of the diamond python (Pythom spilotes). In their habits they are quite alike. They frequent open, stony ridges, well supplied with water, or the banks of swamps and lagoons, where they find the small mammals and young waterfowls on which they feed; they also spend much of their time in trees. (2) A viper (Echis carinatus) of northern Africa, and southern Asia, buff in color, marked with whitish spots and dark Y-shaped marks on the head. It rarely exceeds two feet in length, but
CARPET SWEEPERS. Carpet sweepers of a crude pattern were made in England hundreds of years ago, but not until 1876 was this device seriously considered as a time-saving, labor-saving household article. Several attempts had been made in this country as early as 1856 to produce a satisfactory carpet sweeper, but all fell short of the requirement. To Mr. M. R. Bissell is due the credit of producing the first carpet sweeper that did its work properly and satisfied the user, and millions of Bissell carpet sweepers are now in use throughout the world. It consists of a brush enclosed in a wooden or metal dustpan carried on four wheels, which also cause the brush to revolve. A later type is fitted with an air pump and in this the dust is drawn into the dustpan by suction as in the vacuum cleaner.

It is justly claimed for the carpet sweeper that it is at once the modern sanitary device for sweeping carpets and rugs, that it performs the work in one-quarter the time the corn broom required, with 5 per cent less effort; that it raises no dust, thus protecting the furniture, draperies, etc.; that it confines all the dangerous germs within the pan receptacles, after which the contents can be burned or buried, thus promoting health and cleanliness at the same time.

The carpet sweeper has been constantly improved until to-day it is a thing of beauty as well as utility, and its use is recommended by the leading physicians of the world. As dust is admittedly a carrier of disease, it is clearly apparent that the sweeper is invaluable as a health-promoting appliance in the home, confining as it does all the dust and dangerous germs, to say nothing of its labor-saving, time-saving qualities. Where power or electric current is available the vacuum cleaner is fast displacing the early type of mechanical sweeper.

In the vacuum cleaner the dust is drawn into a receptacle by suction. See VACUUM CLEANER.

CARPI, kär'pē, Italy, a town in the province of Modena and nine miles north of the city of Modena. It is the seat of a bishopric, suffragan to Bologna. It is surrounded by walls, defended by a citadel, and has two cathedrals, a seminary and manufactures of straw hats and spun silk. The neighborhood produces rice, wheat, hemp and flax. The chief industry, however, is the cultivation of silk-worm. Carpi was formerly the capital of the principality of Carpi. Pop. (1911) 27,465.

CARPIO, Manuel, má'nú-o-él kär'pē-o, Mexican poet and physician; b. Casimaloapan, 1 March 1791; d. 11 Feb., 1850. He studied medicine at the University of Mexico. Entering political life he became a leader of the Conservatives. In 1825 and 1848 he was deputy, in 1851 senator and in 1852 councillor of state. Several editions of his Odes and Poems have been published, the latest at Vera Cruz and Paris in 1883.

CARPOPHORE, a stalk of a sporocarp; the stalk raising the gyneceum above the whorl of the stamens, as in Passiflora. Also a prolongation of the axis between the carpels, as in Umbellifera.

CARPUS, in anatomy, the bones between the forearm and hand, the wrist in man, or corresponding part in other animals. See HAND.

CARPZOV, kärp'sov, the name of a German family which has furnished several eminent jurists and theologians. The founder of the family was Simon Carpzov, burgomaster of Brandenburg, in the middle of the 16th century. He had two sons: Joachim, who at his death at Gluckstadt in Holstein, in 1628, was commander-in-chief of the Danish army; and Benedict, b. 22 Oct. 1565; d. 26 Nov. 1624. He was appointed professor of law at Wittenberg in 1595, became chancellor of the Dogger-Electress Sophia at Kolditz, but afterward returned to Wittenberg. A second Benedict, son of the former, b. Wittenberg 1595; d. 1666; became assessor of the Supreme Court and professor of law at Leipzig in 1645, then councillor of the Court of Appeal and member of the privy council at Dresden. He was one of the most eminent jurists of his day, and is the author of several valuable legal works; but is justly censured for the severity and cruelty of his proceedings. He is said to have signed the death-warrants of not fewer than 20,000 persons. JOHANN BENEDICT CARPZOV, his brother (b. Rochlitz 1607; d. 1657), became professor of theology at Leipzig, and is famed as the author of the 'Systeme Theologicum' (1653). He left five sons, one of whom, JOHANN BENEDICT, born at Dresden in 1679, became professor of Oriental languages at Leipzig, and died as superintendent at Lübeck in 1767. He was one of the most eminent theologians of his time, and wrote, among other treatises, 'Critica Sacra Veteris Testamenti' (1728); 'Introductio in Libros Canonicos Veteris Testamenti.' The family of Carpzov, see Dreyhaupt, 'Beschreibung des Saulkreises' (Beilagen zu Theil 2 S. 26).

CARQUINES, kär-ké'nēs, or KARQUENAS, a strait between Contra Costa and Salano counties, California; its greatest width is two miles and its length seven miles; it is navigable, and connects the bays of San Pablo and Suisun. Benicia is on the north and Martinez, Port Costa and Crockett are on the south shore.

CARR, Dabney, American colonial politician; b. 26 Oct. 1743; d. May 1773. He was graduated at William and Mary College in 1762 and entered the profession of law. He was a member of the house of burgesses of Virginia, and moved and eloquently supported a resolution to appoint a committee of grievances and correspondence, in consequence of British encroachments. His resolution was adopted 13 March 1773. He married a sister of Jefferson, by whom he is described as a man of sound judgment and inflexible purpose, mingled with amiability, and of a fanciful eloquence.

CARR, Eugene Ada, American army officer. b. Concord, N. Y., 20 March 1830; d.
1910. He was graduated at the United States Military Academy in 1850, and joined the Mounted Rifles. He accompanied the Sioux Expedition in 1855, and was active in suppressing the insurrections on the Kansas border in 1856. In 1860 he was engaged in a campaign against the Comanche Indians. He was in active service throughout the Civil War, commanding the 4th division of the Army of the Southwest and subsequently acting as commander of the same army. He commanded a division in the Vicksburg campaign in 1863, and led the assault on the works of that city, 18 May. In December 1863 he was assigned to the Army of Arkansas. At the close of the war he was promoted to brigadier-general, United States Army, and brevetted major-general of volunteers. In 1868-69 he was engaged against the Sioux and Cheyenne Indians, and afterward took part in other expeditions against hostile Indians. He fought in 13 engagements with Indians, was four times wounded in action, and received a congressional medal of honor and the thanks of the legislatures of Nebraska, Colorado and New Mexico. He was retired in 1893.

CARR, Joseph Bradford, American military officer; b. Albany, N. Y., 16 Aug. 1828; d. Troy, N. Y., 24 Feb. 1895. He joined the militia in 1849, and rose to the rank of colonel. In 1861 he was appointed colonel of the 28th New York Volunteers, and led them at the battle of Big Bethel and in McClellan's Peninsula campaign. He took part in the battles of Chancellorville and Gettysburg, and for his bravery throughout the war he was brevetted a major-general of volunteers. After the war he became prominent in Republican politics in New York State, and was elected secretary of state in 1879, 1881 and 1883. In 1885 he was an unsuccessful candidate for lieutenant-governor.

CARR, Joseph William Comyns, English art critic and dramatist; b. 1 March 1849. He was educated at London University and was admitted a barrister of the Inner Temple in 1869. He has been English editor of L'Art et de la Peinture, and of The Pow'Mall Gazette. He has published 'Drawings by the Old Masters' (1877); 'The Abbey Church of Saint Albans' (1878); 'Examples of Contemporary Art' (1878); 'Essays on Art'; 'Papers on Art'; 'A Fireside Hamlet'; 'The United Pair'; 'The Naturalist'; 'The Friar'; 'Forgiveness'; 'King Arthur'; 'Some Eminent Victorians'; 'Coasting Bohemia.'

CARR, Lucien, American archaeologist: b. Troy, Lincoln County, Mo., 15 Dec. 1829; d. Cambridge, Mass., 27 Jan. 1915. He was graduated at Saint Louis University in 1846. Having marked literary ability he turned to journalism, and from 1848 was connected with the Missouri Republican. Editorial work began to undermine his health and he retired for a time to the country, where he devoted himself to study. In 1867 he removed to Cambridge, which was his home for the rest of his life. Having early taken an interest in the study of the Indians and of American archaeology, he was soon recognized as an expert in that field, and after the establishment of the Peabody Museum he was closely associated with its work, serving as assistant curator of the museum from 1877 to 1894. With Prof. N. S. Shaler of the Lawrence Scientific School he wrote 'Prehistoric Remains of Kentucky.' Among his independent publications are 'The Mounds of the Mississippi Valley Historically Considered' (1883); and an historical volume on Missouri (1888).

CARR, or KER, Robert, Viscount Rochest,e Earl of Somerley, British politician; b. Scotland; d. July 1645. He followed James I to England, when that monarch became Elizabeth's successor. James chose him as his chief favorite and adviser, knighted him, gave him a seat in the House of Lords and assisted him in his litigation with Lady Essex. The latter after procuring a divorce was married to the Earl, and in 1615 the couple were tried for the murder of Sir Thomas Overbury, who had been Carr's confidant in the amorous intrigue with Lady Essex. They were condemned to death but pardoned. Somerset lived in obscurity until his death. Consult Ranke, 'History of England, Principally in the 17th Century' (Vol. I, Oxford 1875); Gardiner, 'History of England' (Vol. II, London and Boston 1888); the latter's article in the 'Dictionary of National Biography' (Vol. IX); Archbishop Abbot 'The Case of Impotency in that Remarkable Tryal An. 1613 Between Robert, Earl of Essex, and Lady Frances Howard' (London 1715); Amos, 'The Great Oyer of Poisoning' (London 1846).

CARR, Sir Robert, British commissioner in New England: b. Northumberland; d. Bristol, England, 1 June 1667. He was appointed to that office by Charles II in 1664, in conjunction with Nicolls, Cartwright and Marriage. In 1664, Nicolls and Carr captured New Amsterdam from the Dutch, calling it New York, in honor of the King's brother, the Duke of York, after James II. Carr forced the Swedes and Dutch on the Delaware into a capitulation. He returned to Boston in 1665, but met with stubborn opposition from the authorities, who refused to acknowledge his commission, as did also the people of New Hampshire. Maine, however, submitted and was governed separately from Massachusetts. He returned to Boston in 1655, but met with stubborn opposition from the authorities, who refused to acknowledge his commission, as did also the people of New Hampshire. Maine, however, submitted and was governed separately from Massachusetts. He returned to Boston in 1655, but met with stubborn opposition from the authorities, who refused to acknowledge his commission, as did also the people of New Hampshire. Maine, however, submitted and was governed separately from Massachusetts. He returned to Boston in 1665, but met with stubborn opposition from the authorities, who refused to acknowledge his commission, as did also the people of New Hampshire. Maine, however, submitted and was governed separately from Massachusetts. He returned to Boston in 1665, but met with stubborn opposition from the authorities, who refused to acknowledge his commission, as did also the people of New Hampshire. Main
CARRACCI — CARRAEGHEN

graver worked better than the painter, Annibale removed his brother, under the pretext that his style, though elegant, was not grand enough. Agostino went then to the court of the Duke of Parma, and painted there a picture representing the heavenly, the earthly and the infernal regions. This was only one figure wanting when, exhausted by labor and mortification, he retired to a Capuchin monastery where he died. He wrote a treatise on perspective and architecture. As an engraver he deserved great praise, and often corrected the imperfect outlines of his originals. He left behind 278 plates, a large number of which are original. He was distinguished for his exactness in drawing, his harmonious composition and the extreme delicacy of his coloring. For bibliography see CARRACCI, Lodovico.

CARRACCI, Annibale, Italian painter: b. Bologna 1560; d. Rome 1609. He worked first with his father, who was a tailor. By the advice of Lodovico Carracci he learned drawing, and made the most astonishing progress, copying first the pieces of Correggio, Titian and Raphael, and painting, like them, small pictures, before he undertook large ones. In the academy founded by the Carracci he taught the rules of arrangement and distribution of figures. He is one of the greatest imitators of Raphael. His 'St. Roqué Distributing Alms,' now in Dresden, was the first painting which gave him reputation. His 'Genius of Glory' is likewise celebrated. In the Farnesian Gallery at Rome, where he is aided by his brother Agostino, painted (1600-04), there is the most magnificent and grandest piece of work. Annibale had a loftier spirit, more spontaneity, naïveté and naturalness, and his style is more eloquent and noble. His atelier in Rome was the workshop of many famous artists, among them Domenichino and Albani. He was buried at the side of Raphael in the Pantheon. His best picture is that of 'The Three Marys,' now at Castle Howard, in Yorkshire, England. He excelled in landscapes, many of which may be found in Paris, Berlin, Madrid, Florence and especially in the Palazzo Doria Panfilii, Rome. Consult Tietze, 'Annibale Carraccis Gallerie in Palazzo Farnese und seine römische Werkstatte,' in 'Jahrbuch der kunsthistorischen Sammlungen des allerschönsten Kaiserhauses XVII' (Vienna 1906); Schmerber, 'Betrachtungen über die italienische Malerei im 17ten Jahrhundert' (Strassburg 1906).

CARRACCI, Lodovico, 1o-dó-vé'kô, Italian painter: b. Bologna 1555; d. 1619. He was the eldest of the three Carracci, and is regarded as the chief founder of their school. He was the son of a butcher, and appeared at first to be more fit for grinding colors than for transmitting them to canvas. But his slowness did not arise from deficiency of talent, but from zeal for excellence. He detested all that was called ideal, and studied only nature, which he imitated with great care. At Florence he studied Andrea del Sarto, and enjoyed the instruction of Passagino. He went to Parma for the purpose of studying Correggio, who was then imitated by almost all the Florentine painters. At Bologna he endeavored to gain popularity for his new principles among the young artists, and united himself with his relatives, Agostino and Annibale Carracci, whom he sent in 1580 to Parma and Venice. In 1585 they established an academy for painters at Bologna, called the 'Academia degli Incamminati' (i.e., 'of those on the right way'), which they directed jointly till 1600, the year of the departure of Agostino and Annibale for Rome. From that time till his death Lodovico was sole director. The academy was so successful that similar institutions in Bologna had to be closed. Among his most famous pupils were Domenichino and Guido Reni. His first principle was that the study of nature must be frequent in the imitation of the best masters. He soon gave an example of this principle in his 'Prophecy of John the Baptist,' in the monastery of the Carthusians, imitating in single figures the style of Raphael, Titian and Tintoretto. With his two relatives he painted the frescoes in the Palazzo Magnani, showing the 'Story of Romulus'; the frieze of the Palazzo Sampiere, in which his share was the 'Battle of a Giant with Zeus'; the frescoes of the monastery of Santa Maria in Bosco, representing the lives of Saint Benedict and Saint Cecilia. The finest works of Lodovico are in Bologna, especially in the picture gallery or Pinacoteca, and among them are 'The Annunciation'; 'The Transfiguration'; and 'St. George and the Dragon.' For the cathedral of Piacenza he painted in 1608-09 two large canvases, representing the 'Burial of Mary' which are now in the Galleria Farnese, Parma, and a series of fine frescoes; in the sanctuary, 'Choruses of Angels,' a 'Limbus,' and in the arch over the tribune, 'Augustus Seating on the Chariot.' In the same year, he executed 'Conversion of Saint Paul' for the Munich Gallery. He excelled in architectural views and in drawing, and in general was very thorough in all the branches of his art. He also executed several fine engravings. Consult 'Die Malerschule von Bologna' in Dohme, 'Kunst und Künstler Italiens' (Vol. III, Leipzig 1879); Bolognini-Amorini, 'Vite dei pittori ed artefici Bolognesi' (Bologna 1843); id., 'Le vite di Lodovico, Agostino, Annibale ed altri dei Carracci' (Bologna 1842); contemporary accounts by Malvasia, 'Felsina pittrice' (Bologna 1678; new ed., 1841); Baglione, 'Le vite dei pittori dal pontificato del Gregorio XIII' (Rome 1649).

CARRAEGHEN, kä-rä'-gên, CARRAEGHEN, or IRISH MOSS, a name applied to several species of marine algae found abundantly near Waterford, Ireland, at a place called Carrageen, from which the name is derived. It abounds also on the rocks in other localities in Great Britain and Ireland, and is found on the east coast of North America. The species from which the carrageen of commerce is chiefly derived is seaweed called Chondrus crispus. The frond is thick, cartilaginous,
somewhat fan-shaped, and repeatedly forked; each variety shows shades of purple or green. It is gathered from the rocks, washed, bleached in the sun and dried, and is then the Irish moss of commerce. In hot water it swells up, and on boiling it dissolves. The results of the analysis of Irish moss are somewhat discordant; but the hio acid, which differs from gums, starches and jellies by not giving their characteristic reactions. It is nutritious, and is substituted for animal jelly and starches in the preparation of soup, jellies, creams and similar dishes. It is of value in pulmonary troubles, and is also used by painters and others in preparation of size. It is sometimes confounded with Iceland moss, which is a lichen. See Iceland Moss.

CARRARA, kār-rā’, Italy, city in the province of Massa-carrara, Tuscany, on the Lavens, near the Mediterranean, and 60 miles west-northwest of Florence, and in a valley surrounded by the marble hills to which it owes its celebrity. An academy of sculpture is established here, and several artists have their residence, attracted by the convenience of obtaining marble at almost cost-free. Carrara has some fine churches, an academy of the fine arts, a statue of Garibaldi. From 400 quarries 4,500 workmen cut and ship more than $1,000,000 worth of marble yearly, and 600 quarries in the neighborhood give employment to 10,000. The finest and whitest Italian marble, of which the most valuable varieties are Polvaccio, Bortogoli and Crexton, is found in the valley of Torano, although in recent years the bluish marble of Bardiglio has come into favor. The Romans, who frequented these quarries, called the stone "marmor lunense," from the city of Luni, whose ruins are about three miles distant from Carrara. There is a museum containing numerous statues and Roman antiquities, also several fine churches. Pop. (1911) 49,492. See Carrara Marble.

CARRARA, kār-rā’, marble (so called from the city of Carrara), the variety of marble generally employed by statuaries. It is a white crystalline limestone, sometimes with black or purplish veins, and occurs in deposits of enormous extent, veritable "marble mountains," marble, which was formerly supposed to be a primitive limestone, is now considered an altered sub-carboniferous limestone. The plutonic action to which it has been subjected has served to obliterate the traces of fossils. The mountains containing the marble are situated a few miles from the sea, and reach the height of over 5,000 feet. Although the quarries have been worked for 2,000 years, having furnished the material for the Pantheon at Rome, the supply is still practically inexhaustible. Those quarries supplying the pure while marble used for statuary are the most valuable. The so-called "Carrara district," embracing the communes of Carrara, Massa, Pietrasanta, Seravezza, Stazzema and Arni, is the centre of the marble industry. Carrara and Massa are the most famous, having a population in the city of 21,000 people, with an additional 21,000 in the mountain villages surrounding it and forming part of the commune. These villages are inhabited almost entirely by quarrymen and the laboring class. The commune of Massa has a population of about 24,000. Broadly speaking, the entire male population of these two communities is actively engaged in some branch of the marble industry. There were in 1901 in the district 611 quarries in active operation, of which 345 are at Carrara, 50 at Massa and the rest distributed among the places named above. In addition to these, there are perpetual quarries which have been opened and afterward abandoned as being unproductive, or in which, for various reasons, active work has for the time being ceased. Under the sanction of ancient laws, the mountains where the quarries are found are the property and under the direct control of the municipality of the district in which they are located. Applications for leases are made to the syndic of the town, and within a reasonable time, after survey, etc., the concession is granted. The concession is permanent, the only condition being that the grantee should formally renew it every 30 years, pay the annual rent, and work the property. The rent is merely nominal. Failure to pay it for two successive years or to develop the property in the same degree as the law renders the concession void. Quarries thus leased may be sold or transferred, or left as an inheritance by the grantee at any time, without formal permission from the grantor. Until 1890 most of the output of the quarries was transported to the local mills, and to the Marina for shipping, by ox-teams. But now the quarry railroad, completed in 1890, greatly facilitates this transportation. From Carrara it makes the difficult ascent of the mountains, through many tunnels and over high viaducts, to a point some 1,500 feet above the sea-level. Tremendous obstacles were overcome in the construction of these 15 miles of railroad, the completion of which cost about $4,000,000. Although largely patronized by the quarry owners, it has not as yet entirely supplanted the former method of hauling by ox-team. The United States is represented by a consular agent. The buildings of the city of Carrara are of marble, and in the churches of Sant' Andrea (13th century) and of the Madonna della Rosa marble statues of Rossi, Garibaldi and Mazzini. There is also a museum containing numerous statues and Roman antiquities.

CARRARAY, Philippines, a small island about 30 miles long and 6 miles wide. It has coal deposits. The population is sparse and wholly uncivilized, subsisting by trade with the neighboring islands of Samar and Luzon.

CARRÉ, kār-ā', Michel, French dramatist: b. Paris 1819; d. Argenteuil, near Paris, 27 June 1872. He first published a volume of Poems, 'Folles rimes'; then turned to the drama and wrote 'La jeunesse de Luther' (1843) and 'Scarasmouche et Pascariel.' He then worked in collaboration with other authors, especially with Jules Barbier. With him he wrote many dramas, vaudevilles and opera librettos, several of which met with much success; among their joint works are 'Van Dyck à Londres' (1855), 'Maleficia' (1860), 'Dantès et Nanette' (with Battu, 1849) and 'Le Tourbillon' (with Deslandes, 1866); 'Galatée' (1852); 'Faust et Marguerite' (1859); 'Lalla Rookh' (1862); 'Romeo et Juliette' (1867); 'Mignon' (1867); 'Hamlet' (1868); 'Paul et Virginie' (1876).
CARREL—CARRERA

CARREL, bəˈrɛl, Nicolas Armand, French writer and republican leader: b. Rouen, 8 May 1800; d. 24 July 1836. He was educated at the military school of Saint Cyr. He entered enthusiastically into several of the secret political societies which were numerous in France after the restoration of the Bourbons. In 1819, when the legitimacy of the garrisons of Belfort and Neubreisach, he became implicated in a conspiracy, and though his conduct escaped investigation he was removed with his regiment to Marseilles. He resigned his commission to take an active part in the politics of his time. Finally settled in Paris, he zealously prosecuted his historical and political studies, and became intimate with Thiers, Mignet and Augustin Thierry, particularly the last. He published a 'History of the Counter Revolution in England,' and in 1830 united with Thiers and Mignet in editing the National, which soon rose to be the leading opposition newspaper. After the revolution his colleagues joined the government, and he was left with the chief direction of this paper, which still continued in opposition. In 1832 the National became openly republican. Carrel was mortally wounded in a duel with Émile de Girardin. He has been called the Bayard of republican journalism. Littré republished his articles under the title, 'Oeuvres politiques et littéraires' (5 vols., 1854–58).

CARRÉÑO, káˈrēnˈyo, Teresa, Venezuelan pianist: b. Caracas, 22 Dec. 1853. She was educated by her father and by Julius Hofen; in 1862 she appeared as a concert player in New York and attracted the interest of Gottschalk, who gave her some instruction especially in regard to playing his own compositions. She has traveled widely in America, and given many concerts; she not only has a high rank as a pianist, but also has won success as a concert singer, and has published a number of musical compositions. Her first husband was Sauret, the violinist, from whom she was divorced; she has also married and divorced Tagliapietra, the singer, and Eugene d'Albert, the pianist. In 1902 she married the younger brother of her second husband. A woman of musical tastes, she composed a string quartet and piano pieces of the salon order and the Venezuelan national hymn; she won admiration as a concert singer, and, while managing an opera company, successfully wielded the baton during the absence of the conductor. The chief traits of her playing are brilliancy, dash and masculine vigor, for which she gained the appellation of 'the Valkyr of the piano.' The softer qualities are not greatly in evidence, but her intellectual grasp and breadth of interpretation place her among the greatest pianists.

CARRERÓN DE MIRANDA, Juan, Spanish painter: b. Avilés, Asturias, 25 March 1614; d. Madrid 1685. He was a pupil of Bartolomé Roman and Pedro de Las Cuevas in Madrid, and became court painter to Philip IV and Charles II. He painted many portraits and excelled in religious subjects. He succeeded Veronese as the first portrait painter of renown in the Spanish court. As a colorist the Spaniards rank him with Titian and Vandyke. His principal paintings are a 'Magdalen in the Desert,' at Madrid; a 'Holy Family,' at Toledo; and a 'Baptism of our Saviour,' at Alcalá de Henares. His principal surviving frescoes were commissioned in 1669 by Velázquez and painted with the assistance of Francesco Rizi. They are at Saint' Antonio de los Portugueses in Madrid and at the cathedral in Toledo. Consult Beruete y Moret, 'The Madrid School of Painting' (London 1909).

CARRERĂ, káˈrɛrə, Luigi, Venetian poet: b. Venice 1801; d. 23 Dec. 1850. He was professor of philosophy at Padua from 1830 to 1833, when he went to Venice, where he conducted a literary journal for nine years, during which time he was also appointed by the municipal council professor in the school of arts and sciences, and director of the museum. Here he published several works, the most popular of which is 'L'Anello di sette gemme,' a poetic description of the history and customs of Venice. His works were published with a biography by Crespini (Venice 1869) and by Abrate, 'L'opera poetica di L. Carreră' (Turin 1905).

CARRERA, káˈrɛrə, the name of three brothers distinguished as Chilean revolutionists—José Miguel, Juan José and Luis. The chief of them, José Miguel, was born at Santiago, 15 Oct. 1785; d. 5 Sept. 1821. They were the sons of a rich landlord in Santiago, Don Ignacio Carrera. José Miguel Carrera became a major in the Spanish infantry. The revolution attracted him to Chile where he became a member of the junta in 1810, usurping the presidency, and, in 1811, becoming military dictator. His internal administration was most effective. He established the newspaper La Aurora, the first paper in Chile. In 1813 he was deposed and succeeded by O'Higgins. The brothers Juan José and Luis were apprehended in 1817 near Mendoza, on a political charge, and having been first induced to attempt an escape, were brought to trial and executed 18 March 1818. José Miguel raised a body of troops to revenge their death, and a conspiracy was formed in his favor; but it was detected and suppressed, and he himself being defeated and taken prisoner, was executed on the same spot as his brothers. A bronze statue to José Miguel was erected at Santiago, Chile, 1864.

CARRERA, Rafael, Guatemalan revolutionist: b. Guatemala 1814; d. there, 14 April 1865. He was of mixed Indian and negro blood. In 1837 he placed himself at the head of a band of insurgent mountainneers. Enlisting the sympathies of the Indian population, the rebellion spread. Carrera was in turns courted and caressed by members of the opposite factions which divided the government. In February 1838, he occupied the city of Guatemala with 6,000 Indians, and succeeded in restraining his followers from anticipated pillage and massacre. Having secured his victory, he became dictator in 1840, and from 1844 to 1848 was President of Guatemala; was re-elected in 1852, and made President for life in 1854. He recalled the Jesuits, who in 1767 were banished, and in 1863 he engaged in war with Salvador. After capturing San Salvador, the capital, he deposed President Barrios and appointed Dueñas in his stead.

CARRERA, Valentino, Italian dramatic poet: b. Turin, 19 Dec. 1834. He was connected with the Italian Customs Department
until his retirement from office in 1878. He is one of the most original dramatists of Italy, especially in comedy. Among his many comedies, vaudevilles, etc., the play which won for him a wide reputation was 'La quaderna di Nanni' (1870), a perfect picture of Florentine life. Other works are 'Galateo novissimo' (1875), 'La commedia del guida' (1884), and 'La filosofia di Giannina' (1885). A collective edition appeared in Turin in 1887-90 (4 vols.).

CARRERE, John Merven, American architect: b. Rio de Janeiro, Brazil, 9 Nov. 1858; d. 1 March 1911. He was of American parentage and his education was obtained in Switzerland. He was graduated from the École des Beaux Arts, Paris, in 1882, and since 1884 was a partner in the firm of Carrere & Hastings, New York. The firm rapidly acquired a distinguished reputation for the imaginative and audacity of its work, strongly colored by French influence. The first important commissions of the young practitioners were the Ponce de Leon and Alcazar hotels at Saint Augustine, Fla. Other early works were the Central Congregational Church at Providence, R. I., and the Mail and Express and Edison buildings in New York. The list of their later works is very long; by far the most notable is the Public Library of New York, erected at a cost of over $8,000,000 from designs which won the prize in a competition in which many of the ablest architects of the country were employed. He died 1 March 1911, as the result of an accident. The body was laid in state in the still unfinished Public Library, and the great throng that pressed to view it attested the high regard in which he was held.

CARRHÆ, kär'rē, the name of the site of an ancient city in northwestern Mesopotamia, supposed to have been the biblical Haran. It is famous in history for the disastrous defeat of Carthians, 53 B.C.

CARRIACOU, kär-rē-ə-kō', the largest of the Grenadine Islands, in the British West Indies, seven miles long and from two to four broad. It is well cultivated and produces good crops of cotton. The town and harbor of Hillsborough are on its west side. Area, nearly 11 square miles. Pop. (1911) 6,880.

CARRIAGE, a general term for vehicles of all sorts, especially wheeled vehicles; in a narrower sense confined to those vehicles that carry persons only, for pleasure or business. The carriage is as old as the wheel. The first man who cut two slices from a tree-trunk and mounted them on an axle was the builder of the first carriage. The early Egyptians and Assyrians knew how to make wheels, as evidenced by carvings on their monuments. Some of these show a wheel made with tire and spokes, a construction indicating considerable mechanical knowledge.

Wheels held in place by wooden pins in the axle, a pole to which the horses were attached, and a rude box open at the rear, constituted the early chariots. These and the primitive carts were found in the ruins of the ancient cities of Greece and Rome. As the two-wheeled carriages came into use with the formation of comparatively smooth roads, being ill adapted to rough and unkept highways. The earliest vehicles were made almost wholly of wood, pinned together, the holes being often burned in, and the parts tied with thongs. The Romans made use of the two-wheeled carrus (from which word 'carriage' is derived), but although chariots of war and carts for transportation were comparatively common from early times, the carriage proper, for conveying persons, was in very slight use before the 16th century. As late as 1572, there were only three coaches in all Paris, and the stage coach did not make its appearance in England until 1555. When the coach and covered carriage first came into use they were considered fit only for women and children, men scorning to seek such protection from the weather as is afforded by a covered vehicle. By the opening of the 17th century the coach had become popular, and not only crowned heads, but titled families, commonly employed them, emblazoned with their arms and decorated to the highest degree. Some of the most beautiful and elegant handiwork of that period was expended in the ornamentation of coaches. Elaborate painting, upholstery and 'joiner-work' combined to produce the most sumptuous of vehicles. No extreme effort at display has characterized carriages of later generations.

About 1625 the hackney coach came into existence in London, and the hired cab soon became an established institution. The increase of post-roads and general improvement in highways caused a gradual increase in private carriages and wheeled vehicles of all sorts during the 17th and 18th centuries. The bodies of these early carriages and coaches were suspended by leather straps, and depended on these, in combination with the springiness of the timber employed, to reduce the shocks and jolts to the occupants. That they were jolty enough to afford considerable exercise can be testified to by those who have taken up the modern sport of coaching in imitation of the old-time tally-ho coach. About 1700, steel springs were introduced, but they did not make very rapid headway. The C spring was a radical improvement, but gave way to the elliptic spring, which was invented in 1804 and remains in use to the present day. The rubber-tired wheel was borrowed from the bicycle about 1875, and still further added to the comfort of carriage riders, while the pneumatic tire of more recent date affords the latest refinement of comfort.

The various wheeled vehicles that may be grouped under the name 'carriage' embrace a wide nomenclature, the best known being here grouped.

Auto-car, Auto-truck, etc. A car, truck, etc., having an automatic engine. See AUTOMOBILE. Barouche, a four-wheeled, falling top carriage, with low body, two inside seats facing, and an outer driver's seat. Berlin, a four-wheeled covered carriage having a rear seat and body. Brottska, or Breet, a four-wheeled Russian carriage with falling top and a rear seat uncovered. Brougham, a four-wheeled covered carriage having with outer driver's seat, and the fore body cut under so as to form a sort. The miniature brougham seats only two. Buckboard, a very simple form of carriage, in which a springboard of wood takes the place of the springs, the seat being placed in the centre of the springboard.
Buggy, a light carriage with either two or four wheels, and with or without a top. 
Cab (short for cabriolet), but of more general meaning, a carriage licensed to carry passengers for hire, usually closed, with an outer driving seat.
Cabriolet, a two-wheeled (later four-wheeled), two-seated, covered carriage with falling top.
Calash, or Calèche, a two-wheeled carriage with a falling or folding top, a seat for two passengers and a narrow seat on the dashboard for the driver; much used in Canada. The top itself is also called a calash.
Car, (1) An automobile with two or more seats; (2) a railway carriage; (3) a carriage of unusual magnificence, as for use in a procession; (4) a van; (5) one of various special forms of vehicle, as the Irish jaunting-car.
Carryall, a four-wheeled covered carriage, light and commodious, having two or more seats.
Cart, (1) a two-wheeled, light, topless pleasure vehicle; (2) a heavy two-wheeled springless vehicle, with a strong box, for carrying rough material.
Chaise, originally a two-wheeled, one-horse vehicle with a top, the body being hung on springs; later, a light, topless, four-wheeled carriage of varying construction.
Chariot, the early two-wheeled war-carriage; also a light 18th-century coach, with one inner seat and a driver’s seat.
Coach, a four-wheeled covered carriage of large size, having two or more inner seats and one or more outside — a tally-ho; also, a two-seated four-wheeled cab, or large hack.
Coupé, a four-wheeled carriage, low-bodied, with an outer driver’s seat.
Curtsey, a simple form of two-wheeled two-horse carriage.
Dog-cart, a light pleasure cart with back-to-back seats, the rear seat covering a box to carry a dog or dogs.
Drog, a form of coach or tally-ho, sometimes uncovered.
Drosky, a long-bodied, four-wheeled Russian carriage. In its primitive form the body is a plank on which the passengers ride astride; also, in some European cities, a public hack.
Fiacre, the French name for a public cab.
Gig, a very light, small-bodied, two-wheeled, one-horse vehicle, with seat for one.
Hack, a hackney coach; loosely, any cab.
Hackney Coach, a four-wheeled coach kept for hire.
Hansom, or Hansom Cab, a two-wheeled, low-bodied, one-horse, covered carriage, having a single seat closed in with front doors, and a seat for the driver behind.
Jaunting-Car, a light two-wheeled, sometimes four-wheeled, vehicle having a perch in front for the driver, and longitudinal seats outside the wheels, and a well between them for baggage.
Landau, a coach-like vehicle having a top, the forward part of which is removable and the rear part folding.
Landauet, a one-seated landau.
Omnibus, a four-wheeled open carriage with two or more seats running longitudinally, a rear door with steps; often with seats on the roof.
Phaeton, a light pleasure carriage of varying construction, usually low-bodied.
Rockaway, a four-wheeled pleasure carriage with two seats and permanent top.
Sociable, a four-wheeled topless pleasure carriage, with facing seats.
Stage, a four-wheeled carriage of large size, with several seats inside and on top, for long journeys; called also stage coach; loosely, an omnibus.
Sulky, a two-wheeled carriage, of skeleton construction, with a seat for one directly on the shafts.
Surrey, a light four-wheeled box carriage with two seats and often side-bars.
Tally-ho, a four-in-hand coach.
T Cart, a pleasure cart having a T-shaped body.
Trap, a pleasure carriage; a term used very loosely.
Van, a very large covered wagon for conveying bulky articles, as furniture.
Victoria, a four-wheeled carriage with falling top, a seat in the body for two and an elevated driver’s seat cut under.
Wagon, a heavy four-wheeled vehicle, usually with rectangular box, for carrying goods, sometimes with removable seats, and often with removable top.
Wagonette, a light wagon for pleasure riding, with longitudinal seats facing each other, and entered by steps and a door in the rear.
To these might be added many more compound names, as top-buggy, box-buggy, post-chaise, etc. It is difficult sometimes to draw the line of distinction absolutely between many of the forms of carriages here named. Even the very common names of *coach* and *cab* overlap in use, that which one would call a cab in one part of the country being known as a coach in some other section.
The important parts common to the typical form of carriage are as follows: Body, seat, top, hood, dashboard, apron, step, springs, running-gear, perch, forward gear, clip, fifth-wheel, tongue, shafts, swingletree, doublletree, axle, wheel, hub, spoke, felloe. The body of a carriage is commonly made of selected hard wood, ash, oak, hickory, etc., being preferred. It is put together with iron braces, screws, mortises, and tenons, and glue. The top, if permanent, is supported on selected wood uprights, or, if falling, is framed of iron or steel rods that fold up and open into a braced position. Leather, canvas and leatherette are used as coverings. The gear, axles, shafts, poles, etc., are commonly of wood, selected with special reference to straight grain and consequent strength. The parts are largely reinforced with metal at all points where special strength or resistance to friction is essential. The tendency is to increase the use of metal to replace wood, and many carriages are made with steel axles and side-bars.
The fifth-wheel is the circular device in which the forward axle turns, and is made of iron or steel. The axles have metal boxes, which in the old style are lubricated with axle-grease, but in many modern vehicles rollerbearings are being substituted that run with very little or no lubrication at all. The regulation wooden carriage-wheel has spokes let into the hub and felloes, the whole being held together.
by the pressure of an iron tire. Instead of
making a wheel in the form of a flat disc, the
practitioners of the art of wheel-making utilized
spokes inclining slightly away from the body of
the carriage. The reason for this is that a
vehicle wheel that is one of a pair receives the
most strain when the vehicle is on an incline
tipped to one side. In this position of severest
strain the spoke of the inner wheel is nearer to
the side nearest the ground bear the weight, and
when dished are inclined to the best position
to receive the load.

This dishing of the wheel produces a neces-
sity for placing the axle box slightly out of
alignment. A dished wheel running on a
straight axle tends to bear against the end nut
and work off the axle. By drawing the axle
skein slightly inward at the forward end this
tendency is overcome and the wheel runs true.

The normal spoke, commonly called, is made on a different principle,
and dishing of the spokes and drawing of the
axle are unnecessary. In these wheels the hub
may be regarded as suspended from the tire,
and the wire spoked are so spread that they
receive the strains due to an inclined roadway
to as good advantage as would the spokes of a
dished wooden wheel.

Previous to 1850 most carriages were built
by wheelwrights, assisted by blacksmiths, and
the wheelwright’s shop was to be found beside
the blacksmith’s shop in nearly every village.
The development of carriage manufactories
changed all this. The carriage factories buy
their lumber and hardwood and supplies in
large quantities, and use up the raw material
in a more economical manner than could the
wheelwright; but their greatest advantage is
the use of special machinery.

The term “railway carriage” was commonly
employed in the early days of railroads, and is
still in use in Great Britain, where “coach” is,
however, the technical word, but in the United
States it has given way almost wholly to the
shorter and more distinguished “car.” See CAR
BUILDING INDUSTRY.

CHARLES H. COCHRANE,
Author of ‘Modern Industrial Progress.’

CARRIAGE AND WAGON INDU-
STRY. Probably one of the most salient fea-
tures of the progress of the world and one
which has added greatly to the sum-total of
human happiness has been transportation by
means of vehicles. The attempt to discover the
birthplace of the industry and the study of the
advancement in the art of construction are of
great interest not only for the history itself,
but for the fact that in it are bound the true
history of the advancement of the world; the
histories of peoples, long forgot, who have con-
tributed largely to the comfort and ease which
we now enjoy. The historical records of which
we are possessed prove that mankind has util-
ized wheels as a means of transportation from
the earliest periods. The float was undoubt-
edly the first means of constructive transporta-
tion and from this we find the inventive genius
of man devising all manner of conveyances
for use on land. First came the sledge and
this gradually developed into a more perfect
mode of conveyance, mounted on rollers, until
we have the axle and the wheel. The roller
made from a tree trunk with the centre shaped
down so as to make a rotating axle was the
most primitive form of wheel. The next move
came in the shape of the bastion formed from
shorter sections of tree trunk attached to a
rotating axle; then came the stationary axle
on which the wheels revolved. Carts drawn by
men and by oxen and innumerable chariots may
be seen on the great sculptured stones now in
the British Museum, taken from the ruins of
the city of Nimrod near Nineveh. The body is
framed up with posts and a top rail and the
basket is made of handsome wicker-work; the
wheels are about 42 inches in height, well pro-
portioned, have six spokes and over them is an
arched guard to prevent anything from com-
ing in contact with them. On another slab, the
king’s chariot with an elegant canopy over-
head, and carrying also the charioteer and an
arms-bearer, is shown. The next noteworthy
advancement was in the cart wheel, which was
similar in shape to that now in use in the in-
land districts of Mexico. The Assyrian Em-
pire, though founded prior to that of the Egyp-
tians, did nothing whatever to advance the
methods in construction, that is, until the
Egyptian to originate and develop the more
perfect chariot, which for centuries afterward
was the sole means of land transportation and
which was connected with all great undertak-
ings. In Biblical, mythological and all ancient
history, chariots form an interesting and im-
portant part. In Biblical history the chariot is
frequently referred to; the strength of a na-
ton was determined by the number of chariots
in its army. Pharaoh gave much time and
thought to the improvement and perfection of
his chariot, with such effect that he was enabled
to overtake the children of Israel in their flight,
although his whole army was eventually en-
gulfed in the Red Sea. In the New Testa-
ment we find the word “carriage” referred to as
baggage. “After these days we took up our
carriages and went to Jerusalem.” During
these years the chariot developed and finally
wagons for use on the farm made their ap-
pearance, some having two and others four
wheels. To the Egyptians must be given the
credit for first putting into use the canop
Solomon tells in one of his songs of a beauti-
ful stage coach which he built for his “Be-
loved,” of cedarwood, having a canopy of
wonderful beauty and richness, supported by
pillars of gold. According to Herodotus (450
B.C.), the Scythians built and had in daily use
two-wheeled carts with a platform and basket
and thatched with the reeds among which these
people lived, and when not in use these cas-
tets were taken off the cart and used as tents.
The Greeks and Romans had of course made
use of the horse in drawing their chariots, and
in the story of the Trojan War, Achilles is
described as dragging the body of Hector,
lashed to his chariot, around the walls of Troy.
There was little of luxury in any of the ve-
hicles of ancient days; the chariot with all its
splendor and decoration was a comfortless
thing without springs; even the triumphal
and funeral cars of early history were spring-
less; their demand and use for other than warlike
or agricultural purposes was limited; but as
the world progressed so did the vehicle,
and though the improvement was slow, it was nev-
ertheless sure. The Acerca was developed and
first used in Rome as an ambulance; then fol-
allowed the Lectica and the Basterna, similar to the Palanquin of India, a two-day, splendidly decorated and upholstered in finest silk, with cushions stuffed with rose leaves. Following this came the Carpentum, decidedly a ladies' vehicle, which became very popular and was named in honor of Carmenta, the mother of Evander, the leader of the Arcadian-coloured Latium. Then followed the Carruca, from which our modern name of carriage undoubtedly comes. This was a gorgeous affair, mounted originally upon one wheel after the fashion of a modern wheelbarrow, but later on two and then four wheels. The Romans considered it a great honor to ride in a Carruca and those vehicles were often highly decorated in gold, silver and ivory. As the Carruca became the popular vehicle for pleasure use, the Chariot for warlike purposes, so did the Balena come into general use as the popular vehicle for agricultural purposes. Julius Caesar (55 B.C.) brought back with him from his triumphant visit to Britain a chariot that surpassed for destructiveness and convenience any then known, indicating that the industry was making progress in the manufacture of vehicles even beyond the confines of Rome.

During the "Imperial Reign of Terror" under the brutal ruler, Nero, we find but slight improvement in construction, although vehicles were extensively used. The practice of letting out vehicles for hire is of quite respectable, not to say hoary, age, for Suetonius, a noted Roman biographer and historian, mentions the custom as very general in his day, 150 A.D., and in his writings refers to a certain lord who rode in the name of Rheda, the Reda Meritoria, and the Vehicule Meritoria, both of which are ready to be found in the order of a hackney coach open and closed.

When the world awakened from its apparent long sleep of the Middle Ages, during which the art of vehicle construction, like all other arts, sank into oblivion, manufacturing was revived and from this awakening, about 1400 A.D., very marked improvements are found. Engineers and kings were working in the effort to outshine and outclass one another, and through this rivalry we note substantial advancement. In 1550 it is said that there were but three coaches in Paris, and within the next century all lords throughout continental Europe supplying themselves with the most extravagant and luxurious of equipages, some costing more than $10,000 each. The artist's skill was employed, poets sang beautiful songs in their praise, and the epidemic spread, creating an eager desire in all to outstrip their neighbors. Legislators became alarmed and a bill was introduced into the British Parliament seeking to restrain the excessive use of coaches. Taylor, the poet, complained as follows:

Carrousels, coaches, jades and Panderers mean,
Do for our shires, our wares, our fares;
Against the ground we stand and knock our heels,
While all our profit runs away on wheels.

Stow, in his survey of London, gives credit to Queen Elizabeth, a dirt road lady, who in 1564 became the Queen's coachman, as being the first to bring coaches into England. In 1582 the French King presented to Queen Elizabeth an exceedingly marvelous "coache" with four of the fairest white "moiels." This wonderful state coach, with its highly ornamented and canopied body, was without springs. It was a sort of triumphal car for ceremonial processions. Her usual mode of locomotion was by water or on horseback. Captain Bailey introduced hackney coaches into England in 1625, and by his wide-awake advertising methods, made them the talk of all London.

Carriages without wheels were in use as late as the 17th century and were known as litters and were supported upon the backs of horses by means of shafts attached before and behind the litter. Carriages on wheels propelled otherwise than by horses are to be found in Japan, known as the Jinrikisha, and are drawn by a man running between the shafts. The modern vehicle has assumed almost limitless shapes and forms, and ages of progress lie between the gorgeous chariots and state cars of the ancient Romans and the modern buggy. From the old-time stage coach we have progressed to the dray or tally-ho; we no longer have the post-chaise or the curricule; but many of the olden types are still to be seen, of course with modifications which make the American buggy probably represents the acme of development of the carriage-maker's art. Many of these types have been imported from abroad, among them the English brougham, named for Lord Brougham; the landau, taking its title from the German town where it originated; and a few specimens of the Irish jaunting-car, which were so popular in their native land. In 1834 the hansom cab was patented by Mr. Hansom, and this originally was a heterogeneous vehicle with a hood hung in the centre of a square frame, with two wheels seven feet six inches in diameter and of the same height as the vehicle. The hackney coach was purely an English product, but to-day we see its lineal descendant in the American hack.

It was not, however, until after the middle of the 17th century that the manufacture of carriages gained much impetus, but from that time we find the brains and ingenuity of the American constantly making changes and improvements and when the progress was slow but steady, the industry took a wonderful place in the history and development of our nation. All vehicles prior to 1790 were absolutely springless as previously stated; the running gear of the old dead-axle carriage, was the first step in advancement in this line. The body of the carriage was suspended on these thorough-braces which were stretched from upright iron jacks at each end of the running part, and gave the carriage a long swinging motion, which, even though extremely uncomfortable, was far superior to the jolt caused by the springless vehicle. Next came the spring jack, made of steel plates, and which later was given a sweeping curve, and from which our more modern C spring evolved. The elliptic spring came into use about 100 years ago, and at about the same time the Collings axle was invented.

The Romans, who began a general means of travel in the beginning of the 18th century. It was a rambling affair, the body hung very high on leather straps, the wheels were far apart, and the postilions rode the "near" horses. This was improved upon until
we see the stately chariot with its richly draped coachman's seat, but which, however, was not used except at state functions or at royal receptions. Before the Revolution, very little manufacturing was done in this country, the main business being repairing. The aristocracy of those times living in the large cities imported their coaches, carriages and phaetons from England and France, and of course the manufacturing end of the business languished through lack of customers. The number of repair shops grew as the number of vehicles increased and in all the large cities these establishments thrived, employing, for the most part, the skilled workmen who came from England, Ireland and Scotland.

The Revolution had left its mark upon the land, and during the times of poverty and distress which followed there was little use made of vehicles of any kind except among the wealthier class, and it was the mechanics and tradesmen that this class found the means of transportation inadequate and insufficient to cope with the amount of travel made necessary by the foundation of the new republic. The next development was the chaise, a two-seater, which, though it grew and became more popular and came into greater demand as the prosperity of the country grew. It was known as a shay and became the subject of the well-known poem by Oliver Wendell Holmes, entitled 'The One-Horse Shay.' At the beginning these chaises were built without dashers, had high wheels and the tops were stationary. This style of vehicle grew to be very popular and for some years there were no changes made in construction.

In the early part of the 18th century, the stagecoach was introduced into England, and in 1745 the first line was established between London and Edinburgh, a distance of 400 miles, and it was stated that a two-end glass coach machine, hung on steel springs, exceeding light and easy, would go through in 10 days in summer and 12 in winter, the passengers lying over during the Sabbath at one of the villages on the route. They were introduced into the United States some years later and it is a mistaken idea that there were no stagecoaches here prior to 1810, for William Brant, attorney for General Hancock, states that in 1776, when Hancock married Dorothy Quincy, he took her by stage coach to Philadelphia on his wedding journey. The roads at this time were little better than bridle-paths and in them were many ruts or quagmires, making travel uncertain, slow and uncomfortable. In 1770 President Quincy of Harvard College wrote as follows of the stage journey between Boston and New York:"The carriages were old and shackling and much of the harness made of ropes. One pair of horses carried us 18 miles. We generally reached our resting place for the night, if no accident intervened, at 10 o'clock, and after a frugal supper, went to bed, with a notice that we should be called at 3 o'clock next morning, which generally proved to be half past two, and then, whether it snowed or rained, the traveler must rise and make ready by the help of a horn lantern and a farthing candle, and proceed on his way over the quagmire and mud getting out to help the coachman lift the coach out of a quagmire or rut, and arriving at New York, after a week's travel, wondering at the ease, as well as the expedition, with which our journey was effected." In 1791, there were only 1,905 miles of post-roads in the United States, and in these roads the heavy laden stagecoaches, sloughs and corduroy bridges which consisted of logs laid crosswise over swamps sometimes for long distances, but with the improvement of the roads and the advancement of civilization we find the industry of vehicle construction developing and growing in America. Military roads and post-roads were built by the government across the mountains of Virginia, connecting the East with the valley of Ohio; through the forests of Maine to the town of Houlton on the New Brunswick frontier, and also in other parts of the country. Stage lines were established on these roads and thrived; much capital was invested; the business rapidly grew, and the returns from the investments proved enormous. Factories began to spring up here and there. The greatest estlogo wagon, with its broad wheels and canvas-covered body, and drawn by six or eight horses, came into use in New York, New Jersey and Pennsylvania for the transportation of freight and passengers. The Concord coach, originally made in Concord, N. H., by the house of Abbot, Downing & Company, who later, in 1815, moved to Salem, Mass., loomed up as manufacturing centres, but the most famous was undoubtedly the Concord coach, originally made in Concord, N. H., by the house of Abbot, Downing & Company, who later, in 1815, moved to Salem, Mass.

The War of 1812 further helped the industry in that it threw us upon our own resources and started the emigrant and pioneer toward the great unknown West. This necessitated the emigrant wagon or prairie-schooner as it was called, and after that the lighter farm wagon. Stylish carriages and fine coaches began to come into demand in all the large cities. Boston, New Haven, Bridgeport, Newark, all had flourishing shops, and New York, Philadelphia, Baltimore and Wilmington were rapidly coming to the front. A considerable trade with the planters in the West Indies grew up, the vehicles being exchanged for the products of the plantations. These vehicles, which were two-wheeled and had very long American-type volantes. The wheels were placed in the rear, thus throwing a large portion of the weight on the horse's back, and besides this, the postilion rode the horse, giving him a double load.

As the emigration toward the West became greater and greater, the establishment of permanent factories and repair shops became necessary and the volume of business began to assume considerable proportions. One of the first to enter this new field was John Studebaker, who in 1835 settled at Ashland, Ohio, and there opened a small shop, though it remained, however, for his five sons to lay the foundation of the business at South Bend, Ind., operating under the name of Studebaker Brothers Manufacturing Company, and who are now among the largest of the 4,870 carriage and wagon manufacturers in the United States. It is a far cry from a village blacksmith shop with its solitary forge and one anvil to the marvelously equipped factories now operating, and when one considers the vast output (1,600,000 carriages, wagons and sleighs annually) he wonders where the markets are and where the purchasers are to be found. In
in the early part of the 19th century, the business was carried on by what was known as the "dicker" system. Money was seldom used in the transactions. But as the country rapidly changed from this system and well-organized and well-equipped shops took their places, and it seems as though we have almost reached the limit in quick and cheap methods of production, but undoubtedly the inventive genius of the American manufacturer will continue to assert itself along this line and, instead of retrograding, we shall advance and always keep abreast of the times.

The modern system of factory production, making all parts in large quantities, and using skilled machinery, template work, and dies has to a great extent lessened the labor and cost of production; hence the cheapness in the price of vehicles at the present time. Of course there are many different grades of vehicles made in this country and, while in some cases the price may be a fair indication of the quality of stock employed in the making, yet the tendency of the times is that the best grade of workmanship and material obtainable shall be put in all styles of vehicles, regardless of price, and the manufacturer who disregards this tendency may some time regret it. There is no reason why the downward rush of the selling price, which has been made possible only by the decline in the cost of production, should lower the quality or grade of the article produced; nor is this true of the large manufacturer in this country, who, realizing that the average American has neither the time nor the ability to make a close examination of the construction, and would not if he had, is perfectly willing to pay well for a good article, and who is bound by this trust put in him to give to the public the finest grade of work which the highest skill and care of the best designers and mechanics can produce. The most noteworthy feature in vehicle construction at the beginning of the 20th century is the rapid increase in the use of rubber tires. These tires first came into use about 1890, but were used mainly for trotting sulks or runabouts and were not adaptable for the majority of pleasure vehicles for some time. The tires were then made solid and universally approved and broader tires were later adopted, especially in wagons to carry heavy loads, owing to the strong movement for good roads throughout the United States.

In 1892 the Carriage Builders National Association was founded by the leading manufacturers of the country. Realizing the necessity of having skilled workmen for the trade, a fund was raised to establish a school in New York city, where carriage drafting and construction was to be taught. This was a great success and has contributed largely to the advanced methods now in use in all our modern factories.

From the census tables it is apparent that there was a fair growth in the number of establishments doing business during the 10 years from 1890 to 1900 but a decline from 1900 to 1905, which decline continues. The invested capital has increased, but the number of wage earners is reduced. The total production showed a gain of 10 per cent from 1900 to 1905, but since then has been set back by the development of the automobile in place of the farm wagon and of the auto-truck in place of the wagon is, of course, responsible for the slowing down in the carriage and wagon industry.

This loss is in part compensated for in that carriage factories make a vast number of automobile tops and other parts and the development of motor vehicles. The United States census of manufactures for 1914 classes carriages and wagons together as one industry, and the figures show that it is still large and prosperous. In that year there were built 558,492 family and pleasure carriages of the value of $34,193,518; and 572,613 wagons, three-fourths of which were farm wagons; and 1,287 miscellaneous buses, vans, etc.; besides 54,700 sleighs and sleds. There are 5,320 establishments, which produced $113,792,357 worth of vehicles, with an invested capital of $175,474,000, and employing 52,540 workers. To the above might be added the 622 establishments which make materials sold to carriage and wagon builders, with products of $16,500 and over of their materials and over 17,000 employees. If the children's carriage industry be added this gives a count of 84 more factories, with 5,769 employees, turning out over $4,000,000 worth of goods.

Ohio and Indiana are the leading States in the carriage building industry, closely followed by Pennsylvania and New York. There are also a considerable number of factories in Illinois, Michigan, Wisconsin, Missouri, Kentucky and Massachusetts.

J. M. Studeraker

CARRICKFERGUS, kär'-rik-fér'gus, Ireland, a seaport town in the county of Antrim, 10 miles by rail northeast of Belfast. It is a municipal borough, and also a county of itself, called the county of Carrickfergus. It comprises an area of about 25 square miles, of which only 120 acres is enclosed in the town proper, the remainder belonging to the territory of the county. The Bay of Carrickfergus is a small indentation on the north side of Belfast Lough, increasing use as a landing-place of King William III, who disembarked on its shore at the quay of the town of Carrickfergus on 14 June 1690. The castle stands upon a rock projecting into the bay and is still maintained as a fortress, having a number of guns on the walls and a small garrison. The public buildings, besides the Episcopalian, Roman Catholic and other churches, are a townhall, courthouse, market-house, etc. Pop. about 9,000.

CARRIER, Common. See Common Carrier.

CARRIER, kä-rē-er, Jean Baptiste, French Jacobin; b. Yole, near Aurillac, 1756; d. Paris, 16 Dec. 1794. At the beginning of the Revolution he was an obscure attorney, but in 1792 he was chosen a member of the convention. He aided in the establishment of the revolutionary tribunal, 10 March 1793, and exhibited the wildest rage for persecution. He was one of the candidates for the death of Louis XVI, demanded the arrest of the Duke of Orleans, 6 April 1793, and contributed greatly to the outbreak of 31 May. On 8 Oct. 1793 he was sent to Nantes with a
commission to suppress the civil war and finally put down the Vendeans. Multitudes, informally and precipitately condemned, were executed daily; but Carrier resolved to destroy the prisoners by numbers. The trial, to which he was condemned, took place at Paris. He first caused 94 priests to be conveyed to a boat with a perforated bottom, under pretense of transporting them, but in reality with a view of having them drowned by night. This artifice was repeated a number of times, and the victims were of every age and of both sexes. These wholesale murders by drowning were called noyades. It has been estimated that 15,000 individuals perished in this manner. The banks of the Loire were strewed with the dead, and the water was so polluted that drinking it was prohibited. Out of terror people refrained for a time from drawing public attention to these atrocities, but at last the truth began to become known and Carrier was recalled. Shortly after the fall of Robespierre, when he was arrested and brought before the revolutionary tribunal, which condemned him to death, he was guillotined accordingly.

**CARRIER-BELLEUSE, kā-ré’-bəl-lēz’**
Albert Érnest, French sculptor: b. Anzizy-le-Chateau, 12 June 1824; d. Paris, 3 June 1887. He was a pupil of David d’Angers, and while studying was compelled to earn his living by making casts of the marbles and bronzes. His first work, a marble statue representing "The Death of General Desaix," brought him to the notice of the public (1859); and it was followed a few years later by a statue of the Emperor Napoleon III as Saint Vincent de Paul's at Rome, won him the medal of honor 1867. Toward the close of his life he was director of the art department of the porcelain works at Sévres. His works include marble sculptures and terra-cotta busts; among them are "Angelica"; "Madonna and Child" (in the church of Saint Vincent de Paul in Paris); "Sleeping Hebe"; "Forsaken Psyche"; and of bronzes of remarkable truthfulness to life of Gauthier, About, Renan, where he is seen at his best.

**CARRIERE, pī-gōn’**

**CARRIER SHELL, or MASON SHELL**, a gastropod mollusk of the genus *Phasus*, which covers its shell with grains of sand, shell, coral, etc. These bits are fastened by an exudation from the mantle, and are apparently protective in their purpose.

**CARRIÆRA, kā-rē’-ra’**, Rosalba, an Italian miniature painter: b. Venice 1675; d. 1757. After learning lace-making from her mother she applied herself to decorating snuff-boxes. After this she studied miniature and pastel, but soon surpassed her teachers and became known throughout Italy. Her early portraits include those of Maximilian II of Bavaria, Frederick IV of Denmark, 12 Venetian ladies, portrait of the artist and her sister Nanetta (at the Uffizi Palace) and August the Strong, who was one of her early patrons. In 1720 she paid a visit to Paris, where she was enthusiastically received and elected a member of the Royal Academy. Her picture of reception was "Muse de l'Europe." She kept a very interesting diary in Paris, which has been published by the Abbé Vianelli (1793). In 1721 she returned to Venice and visited Modena, Parma and Vienna. Her colors are extremely delicately laid; and her works, though often faulty in design, are full of a vivacious charm, which ranked her as the leading miniature and pastel painter of her day and comparable with Correggio. Specimens of her art are to be found in all the galleries of Europe, especially at Dresden and in the Louvre. "The Four Seasons" (Dresden), six pastel portraits (Royal Gallery, Venice) and the portrait of the Princess Più di Savoia Valcari are excellent examples. In her old age she became blind and died insane. There are good biographies by Sensier (with a translation of her diary, Paris 1863), Von Hoerschelmann (Leipzig 1908) and Malamani (Milan 1910).

**CARRIÈRE, Meritz, German philosopher:** b. Griesel, Hesse, 5 March 1817; d. Munich, 19 Jan. 1895. He studied philosophy at Giessen, Göttingen, Berlin and in Italy. In 1849 he became professor of philosophy at Giessen and after 1853 held that position at Munich. He was a defender of Christianity, opposed Universalism and was of the liberal school. He also took high rank as an art critic. Among his published works are "Der Kölner Dom als freie deutsche Kirche" (1843); "Abalard und Heloise" (1844); "Die Religion in ihrem Bei- gifi" (1841); "Die philosophische und moralische schauung der Reformationzeit" (1847); "Das Charakterbild Cromwells" (1851); "Die Kunst im Zusammenhang der Kulturweltentwicklung und der Ideale der Menschheit" (5 vols., 3d ed., 1879-80); "Das religiöse Gefühl und Gewissen" (1882). His "Gesammelte Werke" (14 vols.) appeared in Leipzig in 1886-94.


**CARRINGTON, Edward Codrington**, American lawyer: b. Washington, D. C., 10 April 1872. He was educated under private tutors; was admitted to the Maryland bar in 1894 and has practised in Baltimore and New York. He is a member of the firm of Carrington & Carrington of Baltimore and New York, and specializes in corporation law. Governor Goldsborough appointed him a member of his staff with the rank of colonel. He was campaign manager for President Theodore Roosevelt in Maryland in 1912, and delegate to the Republican National Convention in Chicago the same year. He signed the call for the Progressive National Convention in 1912, and later became delegate-at-large to same; was a member of the Progressive National Committee 1912 and chairman of the Maryland Progressive State Committee. After the pre-
CARRINGTON — CARROLL

dential election of 1912, he led a movement in Maryland, having for its object the union of the Republicans and Progressives. He was the regular Republican nominee for the United States Senate in 1914, but was defeated. He is a member of the Maryland State Bar Association. Mr. Carrington is interested in many large concerns, is president of The American Corporation and treasurer of the J. B. Lyon Company, Albany, N. Y.

CARRINGTON, Fitzroy, American print expert and lecturer: b. Surbiton, Surrey, England, 6 Nov. 1869. He was educated in the island of Jersey at Victoria College, and came to the United States in his 17th year. From 1892-1913, a period of 21 years, he was connected with the art firm of Frederick Keppel & Company, in 1899 becoming a member of the firm. He became known by his illuminating analytical introductions to art editions of works such as Dante's 'New Life'; 'The Queen's Garland', American Reversions; 'Rossetti's Picturesque and Poems'; William Morris's 'The Doom of King Ærisius'; 'The King's Lyrics' (1899); 'The Shepherd's Pipe' (1903); 'The Pilgrim's Staff' (1906). He published 'Prints and their Makers' (1912) and was editor of the unique 'Print Collector's Quarterly' from 1911 to 1913, when he retired from business to become lecturer on the history and principles of engraving at Harvard University, and curator of prints at the Museum of Fine Arts, Boston.

CARRINGTON, Henry Beebee, American lawyer, soldier and historian: b. Wallingford, Conn., 2 March 1824; d. 1912. He was graduated at Yale in 1843; taught at Tarrytown, N. Y., 1846 and at Yale Law School 1847; began the practice of law in Columbus, Ohio, in 1848, and took an active part in the anti-slavery movement. In the convention which met in 1834 to organize the Republican party, Carrington was a member of the committee appointed to correspond with persons in the different States with a view of making the movement national. In 1857 he was adjutant-general on the staff of Governor Chase and organized the State militia in preparation for war. In 1861 he was appointed colonel of the 18th United States infantry, served through the Civil War, and afterward was in service on the plains; was wounded in war with Sioux Indians and retired in 1870; he became professor of military science and tactics in Washash College, Ind., a position which he held till 1873. In 1890 he took a census of the Six Nations and the Cherokees. He wrote 'Russia as a Nation' (1849); 'American Classics'; 'Ad-sa-ra-ka, Land of Massacre'; 'Battles of the terren' (1876); 'Washington the Soldier'; 'The Washington Obelisk and its Voices' (1887); 'Lafayette and American Independence' and other works.

CARRINGTON, Paul, American statesman: b. Charlotte County, Va., 16 March 1733; d. 23 Jan. 1818. He was graduated at the College of William and Mary. During the Revolution he was a member of various conventions and of the Committee of Safety; opposed the Stamp-Act resolutions of Patrick Henry; became a member of the Court of Appeals, and in the Virginia convention voted for the adoption of the Federal constitution.

CARRINGTON, Richard, English astronomer: b. Chelsea, 26 May 1826; d. November 1875. Carrington entered Trinity College, Cambridge, in 1844, to prepare for the Church, but his scientific tendencies being awakened by the lectures of Professor Challis he turned his attention to astronomy. He held the post of observer at the University of Durham from 1849 to 1852. He was elected a fellow of the Royal Society (7 June 1860). His work 'Observations on the Spots on the Sun' (1863) furnished data that materially affected the study of solar physics.

CARRION CROW, any of several large carrion-eating birds. The only true carrion crow (Corvus corone) is found in England. It is larger than a crow, of black plumage and with feathered neck. It is seldom seen in flocks, and lives upon carrion, small mammals, eggs and birds. In the southern United States the name is locally given to the black vulture (Cathartia atrata), a bird closely related to the turkey-buzzard (c.v.), but smaller, and resembling it in habits and public service as a scavenger. Its bluish and spotted eggs number from one to three and are placed in a nest built under logs and bushes.

CARRION-FLOWERS, certain species of the genus Strepelia (natural order Asclepiadoidea), so called because of their putrid odor. See SMILAX.

CARRIZO MOUNTAIN, a prominent peak in the northeastern corner of Arizona; altitude 9,420 feet. It consists of a faciollite or core of igneous rock which has uplifted the Dakota sandstone capping its summit. Consult W. B. Emery in (American Journal of Science, Vol. XLII, p. 349, 1916).

CARROLL, Charles, "of Carrollton," American patriot: b. Annapolis, Md., 20 Sept. 1737; d. Baltimore, 14 Nov. 1832. He attended several schools abroad; studied law in Paris and London, where he became a member of the Inner Temple; returned to his native country in 1764. In 1775 he became a member of the Committee of Observation at Annapolis and in the same year was chosen member of the provincial convention. In 1776, he was one of the commissioners sent to Philadelphia to join the War of Independence. He was elected to the Continental Congress in 1775, and with the other members signed the Declaration of Independence, on 2 August of the following year. To make certain his identity, he added "of Carrollton" to his signature, thus distinguishing himself from another by using the name of his family mansion. After many more years of important public service to the State of Maryland and to the new republic, as draper of the Maryland constitution, State senator, congressman, again senator (1789) and member of the Maryland and Virginia Boundary Commission, in 1804 he withdrew to private life at Carrollton, which was his patrimonial estate. There as his life advanced he became an object of universal veneration. He survived 21 years after the date of the Declaration. Consult Latrobe, J. H. B., 'Life' (Philadelphia 1824); Mayer (ed.), 'Journal of Charles Carroll of Carrollton during his Visit to Canada in 1776, as One of the Commissioners from Congress' (Baltimore
CARROLL — CARROLLTON

1845); Rowland, 'Life of Charles Carroll of Carrollton' (2 vols., New York 1898).

CARROLL, Henry King, American clergyman and editor: b. Dennisville, N. J., 15 Nov. 1848. He was on the staff of *Hearth and Home* (Methodist), and from 1876 to 1896 was religious editor of the *Independent*. He has written 'The Religious Forces of the United States'; and many reviews, reports and miscellaneous papers. He supervised the compilation of religious statistics for the 11th census, and in 1898 was appointed to prepare a report on the internal conditions of Porto Rico. In 1900 he became secretary of the Methodist Episcopal Church Missionary Society. He was executive secretary of the western section of the Ecumenical Methodist Conference of 1911. Besides government reports and numerous reviews, he has published 'Missionary Growth of the Methodist Episcopalian Church' (1907).

CARROLL, Howard, American journalist and politician: b. Albany, N. Y., 1854; d. New York, 30 Dec. 1916. After his family moved to New York he was educated at the old Henry street grammar school in that city. His later education was completed by study at Hanover, in Germany, and at Geneva. He then (1877) became a reporter on the *New York Times*, and later received a roving commission from the *Times* as a political correspondent. While engaged in this political work he became acquainted with the late John H. Starin, whose daughter he married. Some time spent as special correspondent in Washington was followed by his reporting the yellow fever epidemic in the South. He was a close friend of President Arthur, but declined when President Arthur offered to make him private secretary and later Minister to Belgium. General Carroll for many years was an earnest Republican, a convention and had a country-wide acquaintance among the Republican leaders, who entertained much respect for his ability. He was chief of artillery in the New York National Guard from 1895 to 1898. During the Spanish-American War he was inspector-general of the New York troops. General Carroll, whose father had died while leading his brigade in the 2d Army corps at the battle of Antietam, was well qualified for his post. While in Hanover he had for three years studied fortification and drilled with the Polytechnic Cadet Corps. General Carroll was a thorough German scholar and was able to use this language in some of his campaign work. His interest in German affairs caused the Kaiser to bestow on him the order of the Red Eagle. He was the author of several books and plays, among his books being 'Twelve Americans, Their Lives and Times', 'A Mississippi Incident' and 'The American Countess'. General Carroll was president of the Sicilian Asphalt Paving Company and director of the Boston, Hartford and Buffalo Asphalt Company, Sicily Asphalt Company, Ulster Stone Company and the Fultonville National Bank.

CARROLL, John, American prelate: b. Upper Marlborough, Md., 8 Jan. 1735; d. Georgetown, Oct. 1795. He was a cousin of Charles Carroll of Carrollton and first Roman Catholic bishop in the United States. At the age of 13 he was sent to Europe to be educated. He studied at Saint Omer for six years and later at the University of Louvain. He was professor (1759–71) at Saint Omer's and Liège; then, becoming a Jesuit, he was made prefect of the Jesuit College at Bruges. On the suppression of the Jesuits in 1774, he returned to the United States. In 1784, at the suggestion of Franklin, he was appointed superior of the Roman Catholic clergy in the United States; was made bishop in 1789; and in 1800 was created archbishop of the archdiocese. Georgetown College was founded by Bishop Carroll in 1791. Consult Shea, 'Life and Times of the Most Rev. John Carroll' (New York 1888), being Volume II of his 'History of the Catholic Church in the United States'; Brett, 'Biographical Sketch of the Most Rev. John Carroll' (Baltimore 1843); White's 'Appendix to Darras' 'History of the Catholic Church.'

CARROLL, John Joseph, American Roman Catholic clergyman: b. Enniscrone, County Sligo, Ireland, 24 June 1856. He came to the United States in infancy, was educated in Saint Michael's College, Toronto, Ontario, and at Saint Joseph's Theological Seminary in Troy, N. Y. He became assistant priest in the Cathedral of the Holy Name, Chicago, in 1889, and subsequently rector of Saint Thomas' Church there. He is a Gaelic scholar of prominence and has written 'Notes and Observations on the Aryan Race and Tongue' (1894); 'Prehistoric Occupation of Ireland by the Gaelic Aryans' (1898); 'Tale of the Wanderings of the Red Lance' (1908); translation into Gaelic verse of 'The Rubaiyat' of Omar Khayyam (1909).

CARROLL, Lewis. See DODGSON, CHARLES LUTWIDGE.

CARROLL, Iowa, city and county-seat of Carroll County, on the Chicago Great Western and the Chicago Northwestern railroads, 98 miles northeast of Omaha, Neb. It has manufactures of tractor engines, wire fencing and wire novelities, etc.; roller and flour mills, ice factory, cream factory, marble, cement and brick works, and owns and operates municipal waterworks. The settlement of Carroll dates from 1867. Pop. (1910) 3,346.

CARROLLTON, Ga., city and county-seat of Carroll County, 50 miles southwest of Atlanta, on the Little Tallapoosa River, and on the Central of Georgia Railroad. It has extensive cotton, fruit and live stock interests and contains flour mills, rolling mills, foundries, cottonseed-oil mills, machine shops, fertilizer works, broom factories, brick and marble yards. The city owns the waterworks. Pop. 3,297.

CARROLLTON, Ill., city and county-seat of Greene County, 55 miles southwest of Springfield, on the Chicago & Alton Railroad. It has a large trade in the products of the region, has flour mills, a public library and a county courthouse. The city operates the water supply system. It was settled in 1819 and laid out in 1821. Pop. 2,323.

CARROLLTON, Mo., city and county-seat of Carroll County, 65 miles northeast of Kansas City, on the Atchison, Topeka & Santa Fe, the Chicago, Burlington & Kansas City and the
CARROLLTON—CARRUTH

Wabash railroads. It has flour mills, wagon and harness factories, foundry and machine shops, agricultural implement works, furniture works and a creamery. It has in addition a poultry-feeding station and is the commercial centre for a thriving agricultural region. It was settled in 1819 and incorporated in 1830. It contains a monument erected by the government to Gen. James Shields. Pop. 3,433.

CARROLLTON, Ohio, village and county-seat of Carroll County, 25 miles southeast of Canton, on the Wheeling & Lake Erie Railroad. It is located in an agricultural region which also has deposits of clay, coal and natural gas. It has manufactories of pottery, rubber, toys, granite and paving brick. The village owns the waterworks. Pop. 1,730.

CARRON OIL, a mixture of equal parts of linseed oil and lime water, much used as a dressing for burns. It has no particular advantages over other simpler and nearer dressings, notably vaseline or oxide of zinc ointment. Its name is derived from its use in the Carron Foundry, Scotland.

CARRONADE, an iron gun introduced in 1770 by the director of the Carron Foundry, in Scotland, from which it took its name, said to have been invented in 1752 by General Melville, and first used in the American Revolutionary War. See Ordinance.

CARROT, a biennial plant (Daucus carota) of the family Apiaceae. It is a native of Europe, introduced into America, and is known as a troublesome weed upon poor land, especially in the eastern United States. It is more favorably known by its cultivated varieties which are said to have been derived originally from Holland prior to the 16th century, since when it has become deservedly popular in all temperate climates. Certain large-rooted varieties are raised for stock feeding. The most popular culinary varieties are small, rapidly growing plants with diversely formed roots. Since they are most used as a flavoring in soups, stews and other dishes which have not become specially popular in America, they are less cultivated here than in Europe. The plants succeed best in a warm, friable, rich soil, well supplied with moisture, free from weeds, etc., and in the best physical condition. The seed may be sown in drills one-half foot apart as soon as the ground has become warm, since they are slow to germinate and since the seedlings are very tiny. A few radish seeds of an early maturing variety are usually planted with them to break the soil and indicate the positions of the rows, so that cultivation may be commenced early. The radishes are pulled when they reach edible size and the carrots given clean cultivation, the plants being thinned to stand two or three inches apart. When they reach edible size they are hunched and marketed. The larger growing kinds are planted in rows 24 to 30 inches apart and the plants thinned to three or four inches. When mature they are stored in pits or root cellars. Cabbage as well as attack the carrot rust and the few harmful insects are usually controlled by their parasites.

The average percentage composition of carrots is: Water, 86.6; nitrogen-free extract, 7.6; carbohydrates, 0.5; protein, 1.1; fat, a trace; ash, about 1 per cent. They resemble other root and tuber vegetables in their succulence and nutritive value. They are greatly relished by stock, especially horses, but are usually replaced in American rations by cheaper foods.

CARROUSEL, kä-roo-sel', formerly an exhibition of various knightly exercises, as riding at the ring, throwing the spear, etc., which were celebrated at the courts of princes on festival occasions with great pomp and splendor. They are very ancient, but are first mentioned in history in 842, on occasion of the meeting held by Charles the Bald and Louis the German. They were superseded by tournaments, but when these had fallen were again revived. Their introduction or revival in France took place after tournaments had fallen out of fashion in consequence of the accident which ended in the death of Henry II. Similar fêtes had already long existed among the Moors, Spaniards and Italians. These exhibitions were common during the continuance of the old French monarchy. The Place du Carrousel in Paris was so called from one of these fêtes given there in 1668 in honor of Mademoiselle de la Vallière. The greatest extravagances were enacted at these displays. Recitations accompanied them, some verse in outrageous taste and full of absurd allegorical personages, being usually recited in honor of the heroine of the fête, and the most dramatic performances were sometimes given by professional actors. A revival of the carrousel was attempted in Berlin in 1750. In the United States the name carrousel is applied to a merry-go-round, a machine with a revolving circular platform and fixed wooden horses, etc., upon which both children and grown people ride for amusement.

CARRUTH, (Fred) Hayden, American journalist: b. near Lake City, Minn., 31 Oct. 1862. He studied at the University of Minnesota 1884-82, and began his journalistic labors at Minneapolis and afterward had a country newspaper in Dakota 1883-86. He was on the editorial staff of the New York Tribune 1888-92; had charge of the Editor's Drawer department of Harper's Magazine since 1890. Since 1905 he has been on the editorial staff of the Woman's Home Companion; is a frequent contributor to many magazines, such as Youth's Companion, Saturday Evening Post, Collier's, Century, etc. He has published: The Adventures of Jones (1885); 'The Rattlesnake' (1887); 'Mr. Milo Bush and Other Worthies' (1889); 'Tracks' End' (1911).

CARRUTH, William Herbert, American scholar and author: b. Osawatomie, Kan., 5 April 1839. He was educated in the University of Kansas and at Harvard, and was professor of German in the former institution from 1857 to 1913. Since 1913 he has been professor of comparative literature and head of the English department at Stanford University. He has published 'Schiller's Wallenstein with Introduction and Notes' (1894); 'Scheffel's Eckhart' (1895); 'Schiller's Wilhelm Tell' (1898); 'Die Auswahl aus Luther's Deutschen Schriften' (1889); 'Schiller's Die Braut von Messina' (1901); 'Otis' Elementary German Grammar' (1904); 'German Reader' (1904); 'Letters to American Boys' (1867); 'Schiller in His Own Time' (1899); 'Translator of Cornill's 'History of the People of Israel' (1898) and Gunkel's 'Legends of
CARRYING-TRADE — CARSON CITY

Genesis ; and is a contributor to philological journals and literary magazines.

CARRYING-TRADE, a phrase used in political economy and also in commercial transactions. It usually refers to the commerce of different countries with each other, and is most frequently applied to carriage by sea. In a purely commercial sense the carrying-trade is simply the carriage of commodities from one place or country to another, irrespective of the mode of conveyance. In political economy the term is used in a special and restricted sense. In considering the entire commerce of a country it may be found that a part of that commerce is not directly with any one foreign country, but consists in supplying facilities for the conveyance of goods from one foreign country to another. The ships of the United States, for example, may be employed in carrying goods between India and China. This is called a carrying-trade. The carrying-trade does not consist merely in the occasional charter of vessels to foreign merchants for a foreign voyage. Though this may be included in it, the real organization implies more than this. A ship-owner, instead of lending his vessels incidentally to foreign merchants, may build or purchase them expressly for the purpose of conveying goods between different foreign ports at his own risk. He invests capital in merchandise to be so conveyed. It is to this abnormal development of commerce that the term carrying-trade in its restricted sense is applied. It is an investment of capital common in the case of commercial communities who have acquired or acquired great surplus wealth, or from the limited range of their territory have few home investments. From the earliest time the principal commercial communities, especially the great trading cities of antiquity and those of the Middle Ages which have formed communities in themselves, have embarked largely in this kind of commerce.

CARSON, Christopher, popularly known as Kit Carson, American mountaineer, trapper and guide: b. Madison County, Ky., 24 Dec. 1809; d. Fort Lyon, Colo., 23 May 1868. While yet a boy his family emigrated to what is now Howard County, Mo. At 15 years of age he was apprenticed to a saddler, with whom he continued two years, when he joined a hunting expedition. The next eight years of his life were passed as a trapper, which pursuit he relinquished on receiving the appointment of a hunter to Brent's fort, where he continued for eight years more. At the expiration of this time, he chanced to meet Frémont, by whom he was engaged as guide in his subsequent explorations. In 1847 Carson was sent to Washington as bearer of dispatches, and received an appointment as lieutenant in the rifle corps of the United States army. In 1853 he drove 6,500 sheep to California, a difficult but successful undertaking, and on his return to Taos was appointed Indian agent in New Mexico. He served in the Federal army during the Civil War, attaining the rank of brevet brigadier-general. Consult Bradley, 'Winning the Southwest' (New York 1912); Sabin, 'With Carson and Frémont' (Philadelphia 1912).

CARSON, Sir Edward Henry, Irish Unionist leader: b. Dublin, 9 Feb. 1854. He was educated at Trinity College, Dublin, was called to the Irish bar in 1889, and became solicitor-general for Ireland 1892. He was called to the English bar in 1894; and was solicitor-general for England in the Unionist administrations 1900-06. He became very prominent during the passage of the Irish Home Rule Bill in 1912; organizing the resistance of Ulster to that measure; inaugurated and was the first to sign the Solemn League and Covenant which pledged the Ulster Protestants to resist, by force of arms if necessary, submission to a Dublin Parliament; and he was the head of the provisional government nominated in 1913 to administer the province in that event. This work of organization and the ensuing political campaign entailed enormous inroads on his time and strength, and in order to carry it through he surrendered a great practice at the bar that was yielding him an income of $100,000 a year. For a time it appeared as if civil war might be the issue; when the Great European War intervened to put an end, for a time at least, to factional strife in Ulster; and Sir Edward's energies became devoted to stimulating the government to stronger measures with a view to winning the war. He became Attorney-General in the Asquith Coalition Government in June 1915, but resigned on 18 October following, owing to the diverging view, mainly on the Balkan question. He negotiated with Mr. Lloyd-George and Mr. Redmond the provisional agreement on the Irish question, which, as modified by the Cabinet, was repudiated by the Nationalist members, and subsequently withdrawn. On the occasion of that withdrawal, on 24 July, he made in the House of Commons what was perhaps the greatest speech of his life, and one which showed that the European War had sensibly altered his horizon when he declared that it would be a good thing for Ireland if he and Mr. Redmond could shake hands on the floor of the House, and gave a contingent hint that Ulster might become reconciled to Home Rule and desire inclusion, if she saw the rest of Ireland well governed by a Dublin Parliament.

CARSON, Hampton Lawrence, American publicist: b. Philadelphia, Pa., 21 Feb. 1852. He was graduated at the University of Pennsylvania in 1871, and became a lawyer, rising speedily to prominence by speeches and addresses on topics of the time. He has written 'History of the Supreme Court of the United States'; 'The Law of Criminal Conspiracies as Found in American Cases'; 'History of the One Hundredth Anniversary of the Promulgation of the Constitution of the United States'; also many papers in law journals and addresses. He is a lecturer on law at the University of Pennsylvania.

CARSON CITY, Nev., city, capital of the State and county-seat of Ormsby County, on the Virginia & Truckee railroad, 52 miles southeast of Reno. The city is in a mining and agricultural district, and is the location of a mint, a Federal building, State capitol, State prison, an orphan's home and an Indian school. The business is mainly connected with mining, agriculture and lumbering. Here are railroad and machine shops, etc. Carson City is only 12 miles from Lake Tahoe, and on account of its beautiful scenery at the base of the Sierra Nevada.
CARSON RIVER — CARTAGENA

Nevada is a popular summer resort. The State prison is two miles southeast of the city, and a United States government Indian school is three miles to the south. Founded in 1858, it became the capital of Nevada in 1861 and was chartered as a city in 1875. Pop. 2,500.

CARSON RIVER, a river of Nevada, rising in the Sierra Nevada and flowing northeast for about 150 miles. It then divides, and the main branch flows into Carson Lake, a small lake with no apparent outlet. The other branch flows in the opposite direction and is lost in Carson Sink.

CARSTAIRS, or CARSTARES, William, Scottish clergyman of political eminence; b. Cathcart, near Glasgow, 1649; d. 1715. He pursued his studies at the universities of Edinburgh and Utrecht. He returned to Scotland with the view of entering the ministry, but after receiving a license to preach resolved to return to Holland. As he was to pass through London, he was employed by Argyle and his party to treat with the English exclusionists and became privy to the Rye-house plot. On the discovery of that conspiracy he was apprehended. After a rigorous confinement in irons he was subjected to the torture and endured this trial with great firmness; but being afterward deluded with the hopes of a full pardon, and assured that his answers should never be made evidence against anyone, he submitted to make a judicial declaration. Being released he returned to Holland, and was received by the Prince of Orange as a sufferer in his cause. The Prince made him one of his own chaplains and procured his election to the office of minister of the English congregation at Leyden. He accompanied the Prince in his expedition and always remained among his persons, both at home and abroad. During this reign he was the chief agent between the Church of Scotland and the court, and was very instrumental in the establishment of Presbyterianism, to which William was averse. On the death of William he was no longer employed on public business; but Anne retained him as her chaplain-royal and made him principal of the University of Edinburgh. When the union of the two kingdoms was agitated he took a decided part in its favor. The memory of Carstairs is for the most part revered by his countrymen as that of an enlightened patriot; and few men of active power and influence have steered between parties more ably and beneficially. Consult McCormick, "Life of Carstairs," prefixed to "State Papers and Letters Addressed to William Carstairs (London 1774); and Story, "Character and Career of William Carstairs.

CARSTENS, Assmus Jakob, Danish painter; b. St. Jürgen, near Schleswig, 20 May 1754; d. 26 May 1798. He was a miller's son, but received a superior education from his mother. He had a youthful passion for painting, but after his mother's death was placed in a mercantile house. After quitting his master, he learned the art of woodcrop in 1861 and then studied for seven years, supporting himself by portrait painting, at the same time working on a large historical picture on the 'Death of Æschylus.' He went to Italy after finishing this work, then lived at Lübeck for five years, toiling on in poverty, when he was introduced by the poet Overbeck to a wealthy patron, by whose aid he went to Berlin, where the merit of his 'Fall of the Angels,' a colossal picture, containing over 200 figures, gained him a professorship in the Academy of Fine Arts. Two years later he was enabled to accomplish his cherished wish to go to Rome, and study the works of Michelangelo and Raphael. His best works were designs in aquarelle and painting in fresco; he rarely painted in oil. His cartoons at Weimar have been engraved by Müller. Homer, Pindar, Aristophanes and Dante supplied him with his best subjects; and among the painters who endeavored to infuse a classic spirit into the fine arts of the 18th century, he holds a prominent position. His works are distinguished by correctness of form and outline, gracefulness of attitude and loftiness and vigor of expression; but they frequently exhibit a certain harshness, arising from too close imitation. He was often defective in anatomy and perspective and, having begun late to paint in oil, was unaquainted with the secrets of color. His pupils were Pauli, 'A. Carstens' (Berlin 1876) and Fernow, 'Carstens Leben und Werke' (new ed. by Riegel, Hanover 1867).

CART (A. S. cæt, Gaelic cait; connected with 'car*'), a carriage with two wheels, fitted to be drawn by one horse or other animal and used in husbandry or commerce for carrying many sorts of goods. There are various descriptions of carts used in agriculture, and for many kinds of agricultural work the cart is preferable to the wagon. The ordinary cart for heavy goods has no springs, but there are many carts provided with springs to go over rough roads of France and Germany, the carrier's cart is built to carry heavy loads. Other varieties of cart are the dump cart, constructed so that it can be emptied by tilting the body; the dogcart, originally used for conveyance of sporting dogs; gadabout, a lower form of dogcart; the white-chapel cart, for tandem driving; the gig, with a single seat; the Canadian calash, with a low seat for the driver; the trotting sulky used with race-horses; and numerous road carts.

CARTAGENA, kär-ta-jé'na, Colombia, capital of the department of Bolivar, founded 21 Jan. 1533, by Pedro de Heredia. Early in the 17th century it ranked next below Mexico among the cities of the Western world, and was called "Queen of the Indies." At that time its inhabitants numbered about 20,000, of whom 3,000 were Spaniards; it was strongly fortified, and one of the main entrepôts of commerce between the hemispheres—a distinction due, in part, to its proximity to the Isthmian route, but even more to the excellence of its harbor, which is one of the best on the northern coast of South America. As the principal stronghold of Spanish America, it was repeatedly attacked: by a French fleet in 1544; by the English under Drake in 1585; again by the French in 1697; and by the English under Vernon in 1741. The British captured it in 1815, when Bolivar took it; but the same year it was surrendered to the royalists, after a memorably heroic defense; and finally it was taken by Republican forces 25 Sept. 1821. Its population at present is little more than one-half the number accredited to it three centuries ago. Cartagena is situated in lat. 10° 25' 48"
CARTAGENA — CARTE 677

N. long. 75° 34' W. Its temperature averages 82 1/2 F., and its location is unhealthful. The city is surrounded by the old fortifications and possesses a cathedral, two fine churches, a government building, a college, seminary and a theatre. The town manufactures chocolate and candles, and exports cattle, hides, fine woven precious stones and tobacco. Pop. 14,000.

CARTAGENA, Spain, a city and fortified seaport and naval arsenal in the province of Murcia, and 27 miles south-southeast of the city of Murcia. Its harbor is one of the largest and safest in the Mediterranean. The city, located at the northern end of the harbor, is surrounded by a lofty wall, flanked with bastions. The principal buildings are the cathedral dating from the 13th century, now converted into a simple parish church; the old castle, supposed to date from the foundation of the city by the Carthaginians; the barracks, arsenal, presidio or convict establishment, the military hospital, the Hospital de Caridad, the artillery park, the observatory, the convenits of Saint Augustine and Monjas, and several other convents. The tenements have been made recently in the accommodation for shipping by the construction of moles, wharves, breakwaters and a floating dock. Lead smelting is largely carried on; and there are also in the neighborhood rich mines of excellent iron, which are connected with the harbor by means of a tramway about eight miles in length. Esparto grass, compressed by hydraulic power, is largely shipped; other exports are metallic ores, wine and fruit. Timber, coal and codfish are the principal imports. Cartagena (ancient Cartago Nova) was founded by the Carthaginians about 228 B.C. and it was the Carthaginians who first worked the copper mines. It was taken by Scipio Africanus 210 B.C., and afterward became a Roman colony. In 425 A.D. the Vandals largely destroyed it; and in 711, after having been in possession of the Visigoths, it again suffered destruction at the hands of the Saracens. Under them it became an independent principality, which finally became an integral part of Aragon in 1276. In 1585 it was sacked by the English fleet under Sir Francis Drake. When Spain possessed her colonies and was in a flourishing condition, Cartagena was one of her most important naval stations and carried on a very extensive commerce. In 1873 a body of communists obtained possession of the city and fortifications, but they were compelled to surrender in the following year. Pop. (1911) 106,542. In 1670 the population was 26,000.

CARTAGO, kär-tä'gö, Colombia, town in the valley of the Carara, 150 miles west of Bogota on the Viaje, a tributary of that river. Its trade is principally in dried beef, pigs, fruits, coffee, cacao and tobacco. The sugar-cane thrives well here. Cartago is the entrepôt for the trade of Santa-Fé-de-Bogotá. The climate is hot, but dry and healthful. Pop. about 10,000.

CARTAGO, Costa Rica, city, formerly capital of Costa Rica, now capital of the province of Cartago, on the right bank of a river of its own name, 14 miles east-southeast of San José. It was once a place of considerable commercial importance, and had a population of about 37,000. It was so ruined by an earthquake 2 Sept. 1841, that only 100 houses and a church were left standing. It had already superseded both as a capital and a seat of commerce by San José. The railroad from San José to Limon passes through it. Near the town are the springs of Aguacaliente, and also Mount Cartago or Irazu, an active volcano, rising 11,490 feet above the sea-level. The town has a considerable coffee trade, and derives much importance from its position on the inter-oceanic railway. Pop. about 4,536.

CARTAS DE FEIJÓO, The 'Cartas' (Letters) and 'Teatro critico universal' (Treasury of Universal Criticism) of the Benedictine monk Benito Gerónimo Feijóo y Montenegro, constitute collectively one of the most important contributions made to Spanish thought during the 17th century, the period of its awakening from the political and intellectual stagnation consequent upon the Hapsburg dream of world dominion. They are associated with the earlier days of Spanish journalism, when miscellanies of encyclopaedic character had not yet given way before the periodical press. 'La Mancha,' as the ten volumes of the 'Cartas' were generally called, are full of essays of the 'Teatro critico,' a prior and more vigorously written work, cover a wide range of topics, from natural history and the then known sciences and education, history, religion, literature, philology, philosophy and medicine, down to superstitions, wars, points of contemporary journalistic interest, all in a spirit of candor and cool judgment, which proved to be of decisive influence in the assault upon 18th century Peninsular scholasticism. The style, especially in the letters, is encumbered by the prolixity of formal eloquence, while philologists have questioned its purity. Nevertheless, Feijóo's was a comprehensive, catholic mind, familiar with the European thought of his day to an extent unprecedented among his countrymen. In temper and content, Feijóo is suggestive of the inchoateness of Montaigne, with his mixture of the rational and the fabulous, rather than of the polished sophistication of Addison and Steele. His fame spread quickly. It is said that he wrote 50 sermons and 1500 letters in 15 years, and that his work was translated into most of the languages of Europe, but in the advancement of learning, his writings have been relegated to a place of mere historical interest. It has been commonly said that a monument should be erected to Feijóo, at the foot of which all his works should be burned. The 'Teatro' was first published at Madrid (1726-41) the 'Cartas' at the same city (1742-60). In the edition of 1777 they occupy nine and five volumes respectively, to which three supplementary volumes must be added. A modern edition was published in the 'Biblioteca de Autores Españoles,' with an introduction by Vicente de la Fuente. Consult also Bazán, Emilia Pardo, 'Feijóo.'

John Garrett Underhill.

CARTER, Thomas, English historian: b. Clifton-upon-Dunsmoor, Warwickshire, April 1656; d. near Abingdon, 2 April 1754. He was educated at University College, Oxford, and Cambridge, where he received his M.A. in 1706. He took holy orders in 1707 and was appointed reader at Abbey Church, Bath; on account of his allegiance to the Stuarts he resigned. His first publication was entitled 'The Irish Massacre Set in a Clear Light, etc.' in
which he defended Charles I. from the common charge of secretly instigating the rebellion and massacre in Ireland in 1641. During the rebellion of 1715, a warrant was issued for his apprehension, which he eluded by concealment; and later when it was supposed that he was concerned in a conspiracy, and a reward of £1,000 was offered for his capture, he escaped to France. Here he collected material for an English edition of the 'History of Thuanus' (de Thou). At length Queen Caroline procured leave for him to return to England. His important work, the 'Life of James, Duke of Ormonde,' was published in 1735-36, and gained him great reputation, especially with the Tory party. In 1744 he was arrested on a suspicion of being employed by the Pretender, but was discharged. His other works include illustrations for the 'History of Thuanus' (edited by S. Buckley, 7 vols., 1733). He published three volumes of his 'History of England' between 1747 and 1752, the fourth, which brought down the first part, was never printed, and his death the character of this work is deservedly high for research. Numbers of his manuscripts are preserved in the Bodleian Library, Oxford. Hume and other historians have been indebted to it, but the prejudices of the present day are everywhere conspicuous. Consult Nichols, 'Literary Anecdotes' (Vol. II, London 1812-15), and his 'Literary Illustrations of Literary History' (London 1817-58, Vol. V. pp. 152-56).

CARTE BLANCHE, kart blanch, a blank sheet of paper with an authoritative signature, to fix up with such conditions as the person to whom it is given may think proper; hence absolute freedom of action.

CARTE DE VISITE, kart de vez-eh-te, literally a visiting card, a photographic likeness executed on a card somewhat larger than a visiting card, and usually inserted in a photograph album. For an historical account of these cards, consult 'La Grande Encyclopédie' (Vol. IX, pp. 568-69).

CARTEL, an agreement for the delivery of prisoners or deserters; also, a written challenge to a duel. A cartel-ship is a ship commissioned in time of war to exchange prisoners; also to carry proposals between hostile powers, and is not permitted to carry instruments of warfare.

CARTER, Elizabeth, English poet and linguist: b. Deal, 16 Dec. 1717; d. London, 19 Feb. 1806. She was the daughter of Dr. Nicholas Carter, a clergyman of Kent, and was educated by her father, soon becoming master of Latin, Greek, French and German, to which she afterward added Italian, Spanish, Portuguese, Hebrew and Arabic. She was for 50 years the friend of Dr. Johnson to whose Rambler she contributed two papers. Several of her poetical attempts appeared in the Gentleman's Magazine before she attained her 17th year, and these procured her much celebrity. In 1739 she translated the critique of Crousaz on Pope's Essay on Man, and in the same year gave a translation of Algarotti's explanation of the Newtonian philosophy. She published a translation of Epictetus in 1758.

CARTER, Franklin, American educator: b. Waterbury, Conn., 30 Sept. 1837. He was educated at Yale, at Williams and at the University of Berlin, and received many honorary degrees. He began his professional career at Williams, where he was professor of French and Latin 1865-68 and of Latin 1868-72. In 1872 he became professor of German at Yale, and during this period studied theology and was licensed to preach. In 1881 he was chosen president of Williams College and administered the affairs of this college with signal ability until 1901, when he resigned. He lectured on Theism in Williams College 1904-10, and is president at the Clarke School for the Deaf since 1896. He is a fellow of the American Academy of Arts and Sciences. He published 'Life of Mark Hopkins' (1892); and a translation of Goethe's 'Iphigenia in Tauris' (1870).

CARTER, Sir Frederic Bowker Terrington, Newfoundland, jurist: b. Saint John's, Newfoundland, 12 Feb. 1819; d. Saint John's 28 Feb. 1900. He was called to the Newfoundland bar in 1842, served in the Newfoundland assembly from 1853 to 1878, and two years later became chief justice of Newfoundland. He was created K.C.M.G. in 1878.

CARTER, George Robert, American politician: b. Honolulu, Hawaii, 26 Dec. 1866; was educated at Phillips Andover College and Yale University. In 1891 he was appointed Hawaiian consul at Seattle, Wash. He returned to Honolulu in 1896 and was governor of Hawaii by appointment of President Roosevelt 1903-07.

CARTER, Henry. See Leslie, Frank.

CARTER, James Coolidge, American lawyer: b. Rochester, Massachusetts, 29 Dec. 1826; New York, 14 Feb. 1905. He was educated at Harvard, and his admission to the bar took place in New York in 1853. He was counsel for the city of New York in the famous case of the people against William Tweed, and in 1875 was appointed a member of the commission to devise a system of municipal rule for the cities of the State of New York. In 1892, he shared as counsel in representing the claims of the United States to the Bering Sea tribunal. He published 'The Proposed Codification of Our Common Law' (1883); 'The Provinces of the Written and the Unwritten Law' (1889); 'The Ideal and Actual Law' (1890); 'Law: Its Origin, Growth and Function' (1907).

CARTER, James Madison Gore, American author, teacher, lecturer: b. Johnson County, Ill., 15 April 1843. He was educated at the State Normal University, Saint John's College and Northwestern University Medical School. He served in an Illinois regiment during the Civil War, being captured and taken to Libby Prison. Was professor of pathology and hygiene 1891-95; clinical and preventive medicine 1895-99; professor emeritus since 1900, at the College of Physicians and Surgeons, Chicago. Among his works are 'Outline of Medical Botany of the United States' (1888); 'Catastrophic Diseases of the Respiratory Organs' (1895); and 'Diseases of the Stomach' (1902); and various monographs on medical and literary topics.

From Latin instructor in 1895 and assistant professor in 1898, he became professor in 1902 at Princeton University. He had lectured on Roman religion at the University of Wisconsin in 1900, and in 1904 was appointed professor of Latin at the American School of Classical Studies in Rome, three years later (1907) being made director. His published writings include 'De Deorum Cognominibus' (1898); 'The Roman Elegiac Poets' (1900); 'Epitheta Deorum' (1902); Virgil's 'Eneid' (1903); 'The Religion of Numa' (1906); 'The Religious Life of Ancient Rome' (1911), etc. He also translated Huelson's 'Forum' (1906), and wrote a 'Memorial Service to J. Pierpont Morgan' (1913).

CARTER, Louise Leslie, American actress: b. Lexington, Ky., 1862. Her stage career began 10 Nov. 1890, when she appeared in the 'Ugly Duckling' in New York. Her other roles have been the Quakeress in 'Miss Helyett'; Maryland Calvert in 'The Heart of Maryland'; Zaza in 'Zaza'; Dame Du Barry in 'Du Barry'; and Adrea in 'Adrea.' She was married to William L. Payne 13 July 1906. Consult Strang, 'Famous Actresses.'

CARTER, Samuel Powhatan, American naval and military officer; b. Elizabethtown, Tenn., 6 Aug. 1819; d. Washington, D. C., 28 Mar. 1891. After attending Princeton for a short time he became a midshipman in 1840, fought in the Mexican War in coast attack, and in 1856 took part in the capture of the barrier forts, Canton, China. In 1861 he was detailed to go to Tennessee, where he started the Tennessee brigade. All through the Civil War he was of great service to the government, and for his gallantry was brevetted major-general of volunteers. He returned to the navy and from 1869-72 was commandant of the Naval Academy at Annapolis. In 1882 he was promoted rear-admiral on the retired list.

CARTER, Thomas Henry, American politician: b. Scioto County, Ohio, 30 Oct. 1854; d. 1911. He was bred to farming, but later became a lawyer, removing to Montana in 1882. He was Montana's first representative in Congress (1887-89), United States senator from that State from 1895 to 1901, chairman of the National Republican Committee in 1892-96, and was appointed in 1900 United States commissioner to the Saint Louis Exposition. He served a second term as United States Senator in 1905-11, and in the latter year was appointed a member of the international boundary commission of the United States and Canada. In 1901 he spoke for 16 hours against the river and harbor bill with appropriations for $50,000,000.

CARTER, William Harding, American army officer and author: b. Nashville, Tenn., 19 Nov. 1851. He is a graduate of the United States Military Academy, West Point, N. Y.; was on duty on the Western frontier, 1873-97; promoted from captain of cavalry, by selection, to major and in 1891 assistant adjutant-general, and to duty at War Department, 1897-1902; promoted from colonel to brigadier-general and duty on the War College Board 1902-03. He was a member of the General Staff to 31 Dec. 1903; was sent to England and Europe to investigate remount systems, 1904. He has held the following commands: Department of Visayas, Philippine Islands 1904-05; Department of Lakes 1906-08; provisional division, manœuvres, regulars and national guard, 1906-08; Department of Missouri, 1908-09; was promoted to major-general, 13 Nov. 1909; Department of Luzon, Philippine Islands 1909-10; to the General Staff, 1910-12; Manœuvres Division, Texas, 1911; Central Division, 1912-13; Central Department, 1913-14; Second Division (Mobile Army) Texas, 1913-14; Department of Louisiana, 1914-15; retired from active service, 19 Nov. 1915. He received medal of honor "for distinguished bravery in action," and is author of 'The American Army'; 'From Yorktown to Santiago with the Sixth Cavalry'; 'Old-Army Sketches'; 'Horses, Saddles and Bridles'; 'Giles Carter of Virginia' (genealogical memoir).

CARTER-COTTON, Francis L., Canadian editor and statesman: b. Yorkshire, England, 1847. After early education in England, he emigrated to Canada, and settled at Vancouver, B. C. He founded the 'Vancouver Daily News-Advertiser' in 1886 and became its editor. A Conservative, he was elected a member of the British Columbia legislature in 1890, and was appointed minister of finance 1898-1900; a position to which his writings and speeches on financial and economic questions added considerable weight. He was chief commissioner of lands and works (1906-10), and subsequently president of the council. He was elected first chancellor of the University of British Columbia in 1902, and in 1906 endowed a professorship of pure and applied mathematics in the McGill University College of British Columbia.

CARTERET, kär'te-r, Antoine Alfred Desiré, Swiss statesman and fabulist: b. Geneva, 3 Apr. 1813; d. there, 29 Jan. 1889. His political career was long and brilliant; and in literature he made a name with pleasing 'Fables' (1873), and a novel, 'Two Friends' (1872), descriptive of Genevese customs. For the history of his political career see 'La Grande Encyclopédie' (Vol. 9).

CARTERET, kär'te-r, Sir George, English provincial proprietor: b. Saint Ouen, Jersey, between 1609-17; d. 14 Jan. 1680. He had a distinguished career in the British navy, was an active supporter of the royalist cause, was made lieutenant-governor of the island of Jersey and vice-admiral. He manifested an interest in colonization and received a royal grant, "in perpetual inheritance," of certain lands in America 'to be called New Jersey,' the name being taken from the island of which he had been governor. In 1651 he surrendered to the Commonwealth and served for a time in the French navy, returning to England at the Restoration. He was made treasurer of the navy in 1661 and suspended in 1669 for mismanagement of funds. Nevertheless he was appointed deputy treasurer of Ireland in 1667 and continued in royal favor. In 1664 he was made joint proprietor with Lord Berkeley of the province of New Jersey under a grant from the Duke of York, and in 1676, when the province was divided, East Jersey fell to his share. He was one of the first proprietors of Carolina.

CARTERET, John, Earl Granville, British statesman: b. 22 April 1690; d. Bath, 2 Jan. 1763. He received his education at West-
CARTERET — CARTESIANISM

minister School and Christ Church College, Oxford. From Oxford he proceeded to London, plunged into the political and social excitements of the period, made the acquaintance of Swift and in 1710 married Lady Frances Worsley. Entering the House of Lords on 25 May 1711, as second Baron Carteret, he espoused the side of the Whigs, then led by Stanhope and Sunderland, and in 1714 made his first speech in the House of Lords in support of the Protestant Succession. On the accession of George I Carteret became a lord of the bedchamber. In 1719 he was appointed by Stanhope Ambassador Extraordinary to Sweden, and succeeded in arranging two treaties of peace, the first between Sweden, Hanover and Russia, and the second between Denmark and Sweden. In 1721 he was appointed to one of the two foreign secretariats, that for the *Southern Department* of Europe, and as such, attended, in 1723, the congress of Cambria, which attempted the settlement of differences between Germany and Spain, and accompanied George I to Berlin. In 1724 Carteret was appointed lord lieutenant of Ireland. Though he came into collision with Swift over the Drapier prosecution, the two ultimately became warm friends. Between 1730 and 1732 he took the lead in the House of Lords of the party opposed to Sir Robert Walpole. When this opposition succeeded in overthrowing Walpole, Carteret became the real head of the administration, but was driven from power by the Pelhams in 1744. In the same year he became Earl Granville on the death of his mother, who had been created Countess Granville in her own right. In 1749 he became Knight of the Garter, and from 1751 to his death was lord president of the council under Henry Pelham. Consult Bal- lantyne, *'Lord Carteret: A Political Biography'* (London 1887); Lecky, *'History of England in the 18th Century'* (New York 1878–91); and Mahon, *'History of England'* (Vols. III–IV, London 1836–54).

CARTERSVILLE, Ga., city and county-seat of Bartow County, 45 miles northwest of Atlanta, on the Seaboard Air Line, the Western and Atlantic and the Nashville, Chattanooga and St. Louis railroads, off the center of a region producing cotton, fruit and grain in abundance and of a mining district with rich deposits of gold, graphite, iron, manganese, ochre and other minerals. The industrial establishments comprise cottonseed-oil mills, fertilizer works and cotton mills. The city has a county courthouse and a public library. The electric-lighting plant and waterworks are the property of the municipality. The commission form of government was adopted in 1911. Pop. 4,067.

CARTESIANISM, the philosophy of René Descartes (q.v.) and his school, among whom may be reckoned Guélinac, Malebranche, Arnauld, Nicole, and even many who stood outside the circle of professional philosophers like Bossuet and Fénélon. Spinoza and Leibnitz have much in common with Descartes in standpoint and method, but the divergences of our systems from his are too great to justify us in classifying them as Cartesians. Among the many noteworthy points in Descartes' system we may mention the deliberate determination to doubt everything that could intelligibly be called in question. This was not scepticism, but a principle of method that he employed to enable him to reach something absolutely certain. This basal fact he found in the famous proposition, "I think, therefore I am" (*Cogito ergo sum, je pense donc je suis*). No doubt could shake the certainty the ego possesses of its own existence. Moreover, Descartes finds in consciousness certain ideas that are not due to experience and not the product of the imagination. These ideas he pronounces innate, original possessions of the mind. Among them the chief is that of the conception of God as an infinite and all-perfect being. Now the presence of this idea, Descartes argues, proves the actual existence of God as its cause, for no finite being can be the author of the idea of infinity. Having thus established the existence of God, Descartes maintains that the veracity of God warrants us in believing that whatever we perceive through the medium of clear and distinct ideas must be true. Adopting the traditional notion of substance he holds that besides the infinite substance, God, there are two finite created substances, namely, matter or extended substance, and mind or thinking substance. These have no essential relation in common, and are absolutely opposed to each other. Thus his philosophy is a Dualism (q.v.). In the human organism these two substances are united. The soul has its seat in the pinal gland, and at this point receives influences from the body, and in turn controls and governs the direction of bodily movements. Descartes' account of the physical world is given in terms of the mechanical theory, the principles of which he was one of the earliest thinkers to formulate clearly. All bodies are extended, figured, substances, without any internal prop-

CARTERVILLE, Ill., city in Williamson County, 100 miles southeast of Saint Louis, on the Illinois Central and the Saint Louis, Iron Mountain and Southern railroads. Coal mining is the principal industry. Pop. 2,971.

CARTERVILLE, Mo., city of Jasper County; on the Frisco and the Missouri Pacific railroads, 10 miles southwest of Carthage, the county-seat. Carterville was founded in 1875 in a rich lead-mining and zinc silicate-bearing region and has smelters, foundry and machine shops, iron works, boiler works and stone quarries. Pop. (1910) 4,539.
erties or differences. Everything that takes place in the physical world consists in the movement of an extended body. There, the sciences of physical nature can be comprehended in a mathematical physics which has for its data the size, shape, velocity (amount of motion) and direction of the various bodies of which the physical world is composed. God at the beginning created bodies with a fixed quantity of motion and rest; and since God is unchanging, this amount is subject to no increase or diminution. From this statement, which is couched in scholastic language, has come, through a closer analysis of conceptions, the modern principle of the conservation of energy. Descartes' view of the relation of body and mind was not satisfactory even to the members of his own school, and led to the doctrine of Occasionalism and with Spinoza to a thorough-going Parallelism (q.v.). He also left to his successors the further elaboration of the problem regarding the relation of the one infinite substance, God, to the two created substances. In the "Passions de l'amour" he made an attempt to construct a psychological theory of the emotions, deriving all forms of emotional experience from the six primary emotions, wonder, love, hate, desire, joy and grief.

Bibliography.— Bouillier, "Histoire de la Philosophie (3d ed., Paris 1858); Descartes, "Discours de la méthode"; "Meditations on the First Philosophy," and "Principles of Philosophy" (in Veitch's or Torrey's translation); Fisher, Kuno, "Descartes and His School" (English translation by J. Gordy); Maffey, J. H., "Descartes" (in Blackwood Philosophical Classics); Smith, Norman, "Studies in the Cartesian Philosophy."

JAMES E. CREIGHTON,
Professor of Logic and Metaphysics, Cornell University.

CARTHAGE (conjectural native name, the Phoenician Kereth-hadesheath, new city, from which the Greek Karchdon, and the Roman Carthago are supposed to have been derived), the most famous city of Africa in antiquity, capital of a rich and powerful commercial republic, situated on the north coast, not far from the modern Tunis. According to tradition, Dido, fleeing from Tyre, came to this country, where the inhabitants agreed to give her as much land as could be compassed by an ox-hide. Dido cut the hide into small thongs, with which she enclosed a large piece of land. Carthage was founded, according to Aristotle, 287 years later than Utica. The actual date of its foundation is much contested. The date commonly given is 878 B.C. The history of Carthage is usually divided into three periods. The first is the epoch of its gradual rise; the second that of the struggles with other states occasioned by its extended power; the third that of its decline and fall. These epochs interlock each other, and it is only as a matter of convenience that we can interpose equal dividing dates between them. The first epoch has been extended as far as to 400 B.C.; the second limited to the period chiefly distinguished by wars with Greece, 401-265; the third is the period occupied with the Roman wars, and ending with the fall of Carthage.

Carthage appears early to have been independent of Tyre. There existed, however, a close relationship between Carthage and affinities of race and religion. This appears from various incidents in their history, as when the Tyrians refused to follow Cambyses in a contemplated attack on Carthage, and when Alexander, having attacked Tyre, the women and children were sent to Carthage. There is no evidence that the government of Carthage was ever monarchical. She appears soon to have acquired an ascendency over the earlier Tyrian colonies, Utica, Tunis, Hippo, Leptis and Hadrumetum. This was probably gained without any effort as the result of her material prosperity. The rise of Carthage, then, may be attributed to the superiority of her site for commercial purposes, and the enterprise of her inhabitants. Her relations with the native populations, as is evident from her subsequent history, would always be those of a superior with inferior races. Some of them were directly subject to Carthage, others contributed to her strength by recruiting her armies, although frequently in hostility with her. They were admitted for commercial purposes along the whole northeastern coast of Africa, west of Cyrenaica, and these colonies enabled her to maintain and extend her influence over the native tribes. These Phoenician colonies, together with the Phoenician subject colonies to her, possessed little strength in themselves, and easily fell a prey to an invader; hence they were in the end a source of weakness, although it is not easy to see how her prosperity could have been attained without them. It is only after the fall of Carthage that the little empire of Africa has thus been placed at her command that Carthage appears formally on the stage of history. One of her earliest recorded contests is that with Cyrene, when the boundary between the two states was fixed, to the advantage of Carthage, at the bottom of the Greater Syrtis, the Carthaginian envoys, according to the traditional story, consenting to be buried on the spot. The immediate wants of the city were provided for by the cultivation of the surrounding territory, which alone was directly dependent on her.

Commerce naturally led Carthage to conquest. The advantages, both for the promotion and protection of her trade, of possessing islands in the Mediterranean, led to her first enterprises. Expeditions to Sicily and Sardinia appear to have been undertaken before the middle of the 6th century. The war was carried on in the latter half of this century by Magno and his sons Hasdrubal and Hamilcar. At the same time a war arose with the Africans on account of the refusal of the Carthaginians to continue the payment of a ground-rent for their city. In this the Carthaginians were unsuccessful, but at a subsequent period they achieved their object. Sardinia was their first conquest, and was held by them with the utmost jealousy. The Romans, by the first treaty 509 B.C., were allowed to touch at it; but this permission was withdrawn in the second. It was the entrepot of their trade with Europe, and lessened their dependence on their own territory for corn. They founded its capital, Caralis, now Cagliari. They soon occupied Corsica, where they united with the Tyrrhenians, its previous possessors, against the Greeks. Sicily was already occupied by
Greeks and Phoenician colonies. The latter, on the
decline of Tyre, seem to have fallen under
the dominion of Carthage, which gave her a
foothold on the island. The Greeks were still
the more powerful party, and the Carthaginians
occupied themselves in promoting dissensions
among their cities. When the Greeks were
occupied with the Persian invasion, they organ-
ized a great expedition to take possession of
the island, in which they landed 300,000 men,
contributed by all their dependencies. Among
these were Sardinians, Corsicans and Ligurians, the
latter from the gulfs of Lyons and Genoa, are
enumerated. They were totally defeated by
Gelon, tyrant of Syracuse, and their leader
slain, in the battle of Himera, 480 B.C. The
Belaric, and many smaller islands in the Medi-
terranean, had already been occupied by the
Carthaginians. Spain had also been colonized
by them with peaceful commercial settlements.
No other great enterprise took place in the
first period of her history.

The war of the Greeks in Sicily was re-
newed in 409. Hannibal, the son of Gisco,
landed an army at Lilybeum, in the spring of
that year, and reduced Selinus and Himera. In
a subsequent expedition Agrigentum was sub-
ddued. A pestilence, seconded the efforts of
Driscyllus and saved Syracuse, 396 B.C. A treaty
put an end to the war in 392. The struggle
between the Greeks and the Carthaginians con-
tinued with varying success throughout the
remainder of this period. Its most remarkable
event in the invasion of Africa by Agathocles,
310 B.C. Defeated in Sicily by the Carthagin-
ians, to avert the total ruin of his affairs, he
raised an army and passed over to Africa. The
most extraordinary success awaited him, show-
ing at once the weakness of the hold which
Carthage had of her external possessions on the
continent, and the danger she constantly en-
countered from factions and dissensions within
the city itself. Agathocles was the precursor of
Scipio. After the death of Agathocles the
Carthaginians renewed their enterprise in
Sicily, and had nearly completed its conquest
when the Greeks called in the aid of Pyrrhus,
who for a time arrested their progress, 277-75
B.C. Notwithstanding numerous and disastrous
defeats in their contests with the Greeks, the
Carthaginians seem to have been the superior
of Pyrrhus, to have the conquest of Sicily at
length within her power. A dissension with
the Mamertines, their former allies, called in
the Romans, and with their invasion, 246 B.C.,
the third period of Carthaginian history begins.

The First Punic War, in which Rome and
Carthage contended for the dominion of Sicily,
was prolonged for 23 years, 264 to 241 B.C.,
and ended, through the exhaustion of the re-
sources of Carthage, in her expulsion from the
island. The Second Punic War, conducted on
the African shores, by the genius of Hannibal,
lasted 17 years, 218 to 201 B.C., and
after just missing the overthrow of Rome,
ended in the complete humiliation of Carthage.
The policy of Rome, at the end of this war, in
placing Carthage, disarmed, at the mercy of her
African enemies, and razing her a powerful
opponent in Masinissa, occasioned the Third
Punic War, in which Rome was the aggressor.
It lasted only three years, but served to throw
a halo of glory round the fall of Carthage, in
whose total ruin it ended. This war, begun 150
B.C., ended, in 146 B.C., in the destruction of the
last vestige of its power.

The repeated and not always unsuccessful
struggles of Carthage with her African neigh-
bors, in the very midst of her schemes of for-
eign conquest, indicate the marvelous tension
to which a power inherently so strong was
wrought in those great enterprises which vir-
tually grasped at the supremacy of the world.
In this matter the experience of Carthage was
not unparalleled by that of Rome; but the great
difference between them was that the former
was surrounded by alien tribes, the latter by
races kindred in language and manners, with
whom, after conquest, she could easily unite.
The invasion and conquest of Spain, begun by
Hamilcar and carried by Hasdrubal and
Hannibal, and which led to the Second Punic
War, can only be mentioned in passing.

Carthage perished leaving no historians to
tell her tale; hence many interesting circum-
stances in her history can never be known, and
what is preserved has the color of tradition,
often hostile authority. Recent excavations
show that the streets crossed each other regu-
larly at right angles. The long streets ran
parallel to the quays and were distant from
each other about 150 feet. The inhabitants
are said to have numbered about 700,000 in
149 B.C. No foreign traders were allowed at
any of her western colonies, and only the port
of Carthage was open to foreigners. Traders
found elsewhere were drowned. The revenue
to cover her garrisons, navy and local expen-
tures appears to have been derived from tribute
imposed on the neighboring subject races, from
mines in Spain and from import duties on her
vast commerce. Her merchant ships reached
to every coast and island of the Mediterranean,
and even to Britain and the Baltic shore. Her
caravans penetrated far into the Dark Continent
to the gold districts of the Niger and up the
Nile. Many citizens, however, were not en-
gaged in commercial pursuits, but cultivated
large estates by means of slaves. The consti-
tution of Carthage has occasioned much of the
attention of scholars, but still remains in many
points obscure. The name of king occurs in
the Greek accounts of it, and the first Cartha-
ginian general who is recorded to have invaded
Sicily and Spain is a Carthaginian for king, but the monarchical constitution,
as commonly understood, never appears to have
existed in it. The officers called kings by the
Greeks were two in number, the heads of an
oligarchical republic, commonly called sufetes,
the original name being considered identical
with the Hebrew shoqetim, judges. These offi-
cers were always chosen from the principal
families, and were elected annually. It is not
known if they could be re-elected. There was
a senate of 300, and the citizens were divided
into classes similar to the Roman tribes, curia
and gentes. There was a smaller body of 30
chosen from the Senate, sometimes another
smaller council of 10. Various other officers
are mentioned, but the particulars regarding
them are often obscure, and sometimes contra-
dictory.

After the destruction of Carthage, her terri-
tory became the Roman province of Africa. A
curse was pronounced upon the site of the city,
and any attempt to rebuild it prohibited. The
attempt was, however, made 24 years after her
fall, by Caius Gracchus, one of the leading men of Rome. The same plan was entertained by Julius Caesar, and it was accomplished by Augustus. The new city became the seat of the proconsul of Old Africa in place of Utica, and continued to flourish till the Vandal invasion. It bears the name distinguished in the annals of the Christian Church. Cyprian was its bishop, and Tertullian is supposed to have been a native of it. Genseric made it the capital of the Vandal kingdom in 439. Belisarius took it in 533, and remained there till the occupation by the Byzantines. It was taken and destroyed by the Arabs, under Hassan, in 647. A few miserable hamlets and ruins mark its site. In recent times many excavations have been made, uncovering parts of the ancient walls and remains of the harbor; the citadel, the forum and the amphitheatre have been almost completely excavated, and have yielded many small objects and inscriptions, principally those from tombs of Punic and Roman times.

The ancient Carthaginians was essentially that of their Phoenician ancestors. They worshipped Moloch or Baal, to whom they offered human sacrifices; Hercules, the patron deity of Tyre and her colonies; Asarte, and other deities, which were identified with the heavenly bodies, but propagatized by cruel or lascivious rites. Their religion was considerably modified by their intercourse with the Greeks. After their defeat by Gelon he made it a condition of peace with them that they should abandon human sacrifices. Some of their deities were identified with those of the Greeks, and they adopted others of that people, and no doubt received also some of their ideas regarding them. Consult Arnold's and Mommsen's histories of Rome; Smith, R. B., Carthage and the Carthaginians (London 1877); Church, A., Carthage, or the Empire of Africa (New York 1886); Davis, N., Carthage and Her Remains (London 1861); Meltzer, Geschichte der Karthager (Berlin 1912); Moore, Carthage of the Phoenicians in the Light of Modern Excavation (London 1905); de Sainte-Marie, E., de, Mission à Carthage (Paris 1884); id., Atlas archéologique de la Tunisie (Paris 1893); Audollet, Carthage romaine et postcarthagéenne, tome 1, Rendu de l'Academie des Inscriptions et Belles Lettres (Vol. XXVIII, Paris 1901), and map issued in 1907 by the French Minister of Public Instruction.

CARTHAGE, Ill., city and county-seat of Hancock County, on the Chicago, Burlington and Quincy and the Wabash railroads, 32 miles south of Burlington, Iowa. It is noted as the place where Joseph Smith, the Mormon prophet, was imprisoned and killed in 1844. Carthage was settled in 1837 and received a city charter in 1883. It operates its own waterworks. Carthage (Lutheran) College was opened here in 1872. Pop. 2,373.

CARTHAGE, Mo., city and county-seat of Jasper County, in the southwestern part of the State, on Spring River, and on the Saint Louis & San F., Missouri Pac., Iron M., Carthage and Western and Southwest Missouri Electric railways, 150 miles south of Kansas City. It is the center of a fertile farming and fruit-raising region, and in the vicinity are rich mines of zinc and lead and extensive quarries of marble and building stone. The city exports large shipments of stone, marble, grain, flour, strawberries and other fruits, poultry, live stock and hides. It has 10 large quarries, zinc and stone works, bed-spring, shoe, overall, broom and cigar factories, flour mills and general storeships. There are five banks with $450,000 capital and an annual business of $2,000,000; and daily and weekly newspapers. Carthage has a county courthouse (cost $100,000), government post-office building (cost $80,000), a public library, high school building (cost $110,000), good public schools, a business college and a piano school. The following churches are represented: Presbyterian, Congregationalist, Baptist, Methodist (North and South), Episcopal, Christian, Roman Catholic, Christian Scientist, Dunkard and Adventist. The site of the city was first settled in 1833 by Henry Piery. On 28 March 1842 it was made the county-seat and named Carthage. The town was practically destroyed in the Civil War (see CARTHAGE, BATTLE OF) and has been almost entirely rebuilt since that time. The government is vested in a mayor and 10 councilmen elected for a term of two years. Pop. (1910) 9,483.

CARTHAGE, N. Y., village of Jefferson County, at the terminus of the Black River Canal and on the New York Central Railroad 18 miles east of Watertown. With West Carthage, joined by a bridge across the Black River, it forms a busy manufacturing centre with paper mills, machine shops, foundries, ice plants, house woodwork and furniture factories, brick works, etc. The village operates its own waterworks and maintains a public library. Pop. of West Carthage, a separately incorporated village, 1,893; of Carthage, 3,563.

CARTHAGE, Battle of. On 17 June 1861, Gen. Nathaniel Lyon, U. S. A., drove the Confederates from Boonville, Mo., and Claiborne F. Jackson, the disloyal governor of Missouri, ordered a concentration of the State troops, who adhered to him, in the southwestern part of the State, to unite with the Arkansas troops, under the command of Gen. Ben. McCulloch. Anticipating McCulloch's movement into Missouri, Lyon ordered Gen. T. W. Sweeny, with three Union regiments, a small detachment of regulars and some Rendezvous de l'Academie des Inscriptions et Belles Lettres (Vol. XXVIII, Paris 1901), and map issued in 1907 by the French Minister of Public Instruction.

CARTHAGE, III., city and county-seat of Hancock County, on the Chicago, Burlington and Quincy and the Wabash railroads, 32 miles south of Burlington, Iowa. It is noted as the place where Joseph Smith, the Mormon prophet, was imprisoned and killed in 1844. Carthage was settled in 1837 and received a city charter in 1883. It operates its own waterworks. Carthage (Lutheran) College was opened here in 1872. Pop. 2,373.

CARTHAGE, Mo., city and county-seat of Jasper County, in the southwestern part of the State, on Spring River, and on the Saint Louis & San F., Missouri Pac., Iron M., Carthage and Western and Southwest Missouri Electric railways, 150 miles south of Kansas City. It is the center of a fertile farming and fruit-raising region, and in the vicinity are rich mines of zinc and lead and extensive quarries of marble and building stone. The city exports large shipments of stone, marble, grain, flour, strawberries and other fruits, poultry, live stock and hides. It has 10 large quarries, zinc and stone works, bed-spring, shoe, overall, broom and cigar factories, flour mills and general storeships. There are five banks with $450,000 capital and an annual business of $2,000,000; and daily and weekly newspapers. Carthage has a county courthouse (cost $100,000), government post-office building (cost $80,000), a public library, high school building (cost $110,000), good public schools, a business college and a piano school. The following churches are represented: Presbyterian, Congregationalist, Baptist, Methodist (North and South), Episcopal, Christian, Roman Catholic, Christian Scientist, Dunkard and Adventist. The site of the city was first settled in 1833 by Henry Piery. On 28 March 1842 it was made the county-seat and named Carthage. The town was practically destroyed in the Civil War (see CARTHAGE, BATTLE OF) and has been almost entirely rebuilt since that time. The government is vested in a mayor and 10 councilmen elected for a term of two years. Pop. (1910) 9,483.

CARTHAGE, N. Y., village of Jefferson County, at the terminus of the Black River Canal and on the New York Central Railroad 18 miles east of Watertown. With West Carthage, joined by a bridge across the Black River, it forms a busy manufacturing centre with paper mills, machine shops, foundries, ice plants, house woodwork and furniture factories, brick works, etc. The village operates its own waterworks and maintains a public library. Pop. of West Carthage, a separately incorporated village, 1,893; of Carthage, 3,563.

CARTHAGE, Battle of. On 17 June 1861, Gen. Nathaniel Lyon, U. S. A., drove the Confederates from Boonville, Mo., and Claiborne F. Jackson, the disloyal governor of Missouri, ordered a concentration of the State troops, who adhered to him, in the southwestern part of the State, to unite with the Arkansas troops, under the command of Gen. Ben. McCulloch. Anticipating McCulloch's movement into Missouri, Lyon ordered Gen. T. W. Sweeny, with three Union regiments, a small detachment of regulars and some Rendezvous de l'Academie des Inscriptions et Belles Lettres (Vol. XXVIII, Paris 1901), and map issued in 1907 by the French Minister of Public Instruction.
teries of four guns each, marched to Spring
River, a short distance southeast of Carthage,
where he heard that Jackson, with over 4,000
men, was but nine miles in his front in the
direction of and, four divisions under com-
mmand of Gens. James S. Raines, John B. Clark,
M. M. Parsons and W. Y. Slack, numbering
nearly 5,000 men, 1,200 of whom were unarm
About 1,800 were mounted men, armed with
shotguns, and judiciously posted on the flanks
of the infantry. Jackson had eight guns. After
some skirmishing Sigel, at 10 o'clock, brought
up seven guns and opened fire, which was
promptly returned, but not effectively, for, be-
ning in want of proper ammunition, the Con-
federate guns were chiefly friends, with pieces
of chain, iron spikes, broken iron and round
stones or pebbles. After a desultory artillery
fire of three hours the Confederate horsemen
advanced from both flanks and making a wide
circuit, to avoid Sigel's artillery, began to close
in on him and threaten his train, whereupon,
disposing four guns in rear and two on either
flank he fell back, harassed at every step, until
he reached Carthage, where he made a stand.
But, as the enemy was still pressing hard on
him, working on both flanks and threatening
the road to Springfield, he again fell back,
skirmishing all the way, some two or three
miles beyond Carthage, where pursuit ended,
and Sigel marched to Sarno, and thence by
way of Mount Vernon to Springfield, where
Lyon joined him on the 13th. The Union loss
was 13 killed and 31 wounded, to which must
be added the loss of Conrad's company of 94
men surprised and captured at Neosho, on the
5th, by Churchill's Arkansas regiment of Mc-
Culloch's command. The Confederate loss
was about 30 killed and 125 wounded. The
day after the engagement Jackson marched
from Carthage and met McCulloch and Price
coming to join him. Consult Official Rec-
dords, Vol. III. Century 4, 'Battles and Leaders
of the Civil War' (Vol. I).

E. A. CARMAN.

CARTHAGE, New. See CARTAGENA.

CARTHAGENA. See CARTAGENA.

CARTHUSIANS, an order of monks in the
Roman Catholic Church founded in 1084 by
Saint Bruno (q.v.), a priest of the diocese of
Reims and principal of the theological school
there. Displeased with the impurity of his
budding order and seeking solitude in the
diocese of Grenoble, and settled in a
bleak and rocky wilderness near that city,
called Cartusium (La Grand Chartreuse). The
rule was at first not written, the followers
imitating Bruno. The order was very rigid,
prescribing perpetual silence, abstinence from
flesh, habitual wearing of the cicium or horse-
hair shirt, the eating of meals only once a day,
excepting festival days. A Carthusian mon-
astery covered a great deal of ground. It con-
sisted of the great and the eat cloister, in the
which were separate houses or "cells" of the
monks; the lesser cloister with cells of various
officials; worship of lay brothers, chapter-

house, refectory, etc. The time of the monks
was spent in oral and silent prayer, in manual
labor and in study and a little recreation. The
organization was democratic. The prior, who
was elected by the profession of monks of the
community, was the general of the order. The
visitors and prior's formed the governing body,
and all of these might be removed or reinstated
at will. The officials assisting the prior were
the vicar, or vice-prior, the procurator, the
temporal administrator, the tutor, or master,
the antiquary, who takes the vicar's place, the
sacristan and the novice master.

A written rule was given to the Carthusians
in 1129, by Guigo, the fifth prior. It comprised
the hitherto unwritten laws of Saint Bruno,
and additional rules for the government of the
then much larger establishment. The order
grew slowly. In 1300 there were but 39
monasteries. The order extended to Spain,
England and even to Mexico. The original
house, La Grande Chartreuse, existed, the
troublesome times of the Revolution down,
to 1903, when it was suppressed. In 1907,
there were seven monasteries in Italy; four in
Spain; the largest of all at Parkminster, Sus-
sex, England; one in Germany, Switzerland
and Austria. Some of the distinguished Carthusians
were Saint Hugh, Saint Stephen, Saint Arthold
and the famous copyists and authors, Ludolf
of Saxony, Tromby, Sirius, Denis the Carthusian
and Henry of Kalkar.

An order of Carthusian nuns was formed in
the priory of Saint Arthold, about 1245.

The arrangement of their day, with a few ex-
ceptions, is the same as that of the monks.

Among the famous nuns have been Roseline
of Villeneuve and Blessed Beatrix of Ornaciers.

(See CHARTREUSE.) Consult Heimbuchner,
"Orden und Kongregationen der Kirche" (Paderborn 1907); "La Grande Chartreuse
par un Chartreux" (Lyons 1898); Le Couteux,
"Annales Ordinis Cartusiensis" (8 vols., Montreuil 1901). The best description
of Carthusian life is Thoreld, "Six Months
in the Grande Chartreuse" (in the Dublin Review, April 1892).

CARTIER, kár-tyá, Sir George Etienne.
Canadian statesman: b. Saint Antoine, Ver-
chères County, Quebec, 6 Sept. 1814; d. London,
21 May 1873. He claimed descent from the
family to which Jacques Cartier belonged; was
among the followers of Papineau in the reb-
bellion of 1837, distinguishing himself for his
courage, but ultimately was obliged to take
refuge in the United States. Returning when
amnesty was decreed, he resumed the practice
of law and attained to some eminence in his
profession. He entered the Canadian Parlia-
ment as a Conservative in 1848, became a
Cabinet Minister in 1855, and from that time till
his death was closely associated with the Eng-
lish-speaking Conservative leader, Sir John A.
Macdonald (q.v.). Cartier was Prime Minister
1858-62. When Canadian Federation was set
foot he took a prominent part in the negotia-
tions, and it was under his leadership, aided by
the Church, that French-speaking Canada was
reconciled to the Federal system. He carried
on the management of the company which resulted in the surrender to Canada
of the company's rights in the Northwest, and
it was he who carried through the Canadian
Parliament the bill creating the province of Manitoba. This bill embodied elaborate safeguards for Roman Catholic separate schools, but its provision was not accepted in the well-known later agitation for a uniform school system in Manitoba. Perhaps Cartier's principal domestic achievement was the enactment in 1864 of the Civil Code for what is now the province of Quebec. In 1868 he was created a baronet, to the great astonishment of the Makens family, and he was made a Companion of the new Dominion. He carried through the Canadian House of Commons in 1872 the first charter of the Canadian Pacific Railway.

When Sir John Macdonald's government fell in 1873, Cartier was involved in the discredit to his chief, springing from what is known in Canadian history as the Pacific Scandal. Sir John Macdonald relied greatly upon Cartier's influence with the French Canadians, which, however, had declined before his death. See De Celles 'Cartier' in the 'Makers of Canada' series.

GEORGE M. WONG, Professor of History, University of Toronto.

CARTIER, Jacques, French navigator: b. Saint Malo, 31 Dec. 1491; d. 1 Sept. 1557. After gaining some experience in fishing-fleets off the Labrador coast, he commanded an expedition to North America in 1534, entering the Strait of Belle Isle and sailed down the whole west coast of Newfoundland. He discovered Magdalen and Prince Edward Islands which he took for the main shore. He decided to wait before exploring further, and returned to Saint Malo. In 1536, he set sail again and, passing through the Strait of Belle Isle, anchored on the 9th of August in Pillage Bay. He named this the Saint Lawrence, and the name was gradually given to the entire river. In the same year he took possession of the mainland of Canada in the name of Francis I. The next year he sailed up the Saint Lawrence as far as the present Montreal. In 1541 he went out as captain-general in command of a first detachment of ships to prepare the way for Roberval, who had been named viceroy. Finding, however, that his chief did not arrive, after he had waited some time, he returned to Saint Malo. The natives usually received him well, but when about to return from his second voyage he treacherously kidnapped Donaconna, one of the chiefs, and some others, in order to show them in his native country. In 1544 he set out to bring Roberval back. From this time until his death he gave technical advice in nautical matters and acted as Portuguese interpreter.

His book, 'Discours du voyage fait par le capitaine Jacques Cartier aux terres neuves de Canada,' was published in 1598. A critical edition has been published by the University of Toronto and the best English version is that by James Phinney Baxter, published at Portland, Me., 1906.

CARTILAGE, one of the primary tissues of animal structures, of the connective-tissue class (q.v.), characterized by its peculiar basement substance. The most abundant form of cartilage is the hyaline variety, but there are also fibrous and fibro-elastic cartilages. Hyaline cartilage is the supportive tissue of the body, the cartilage of the bones, is whitish and translucent, firm and elastic. The cells are imbedded in an abundant homogeneous basement substance which is made up largely of chondrin. Fibrous cartilage is less abundant, and its basement substance is fibrillated. It is found about the intervertebral cartilage at the joints, and around the tendons of some of the larger muscles. The fibro-elastic form is found only in certain structures,—the epiglottis, the larynx, the Eustachian tube and in the external ear. Cartilage tissues protect the ends of the long bones by reason of their firm elasticity. They provide strong, firm and yet moveable structures, where bone, by reason of its rigidity, would not be serviceable, as in the epiglottis, larynx, etc. See JOINTS.

CARTON, Richard Claude, English actor and playwright: b. 1856. His real name is R. D. Critchett, and he early appeared in plays in Bristol and London. After being known as a collaborator with Cecil Raleigh on 'The Great Pink Pearl' (1885); 'The Pointsmen' (1887); and 'The Treasure' (1888), he produced two original sentimental plays, 'Sunlight and Shadow' (1890); and 'Liberty Hall' (1892; revived New York 1913). Among his light comedies are 'The Home Secretary' (1895); 'The Tree of Knowledge' (1897); 'Lord and Lady Aley' (1898); 'The Ninth Waltz' (1900); 'A Clean Pair of Heels' (1901); 'The Rich Mrs. Repton' (1904); 'Lorrimer Sabiston, Dramatist' (1909); 'The Bear Leaders' (1911); 'A Busy Day' (1912).

CARTON, Sydney, the hero in Dickens' 'Tale of Two Cities.'

CARTOON (It. cartone, from Lat. charta, paper) a term having various significations. In painting, it denotes a sketch on thick paper, pasteboard or other material, used as a model for a large picture, especially in fresco, oil, tapestry and sometimes in glass and mosaic. In fresco painting, cartoons are particularly useful, because in this a quick process is necessary, and a fault cannot easily be corrected. In applying cartoons, the artist commonly traces them through, covering the back of the design with black-lead or red chalk; then, laying the picture on the wall or other matter, he passes lightly over each stroke of the dotted line, which leaves an impression of the color on the plate or wall; or the outlines of the figures are pricked with a needle, and then, the cartoon being placed against the wall, a bag of coal-dust is drawn over the holes, in order to transfer the outlines to the wall. In fresco painting, the figures were formerly cut out and fixed firmly on the moist plaster. The painter then traced their contour with a pencil of wood or iron, so that the outlines of the figures appeared on the fresh plaster, with a slight but distinct impression, when the cartoon was taken away. In the manufacture of a certain kind of tapestry the figures are still cut out, and laid behind or under the wool, by which the artist directs his operations. In this case the cartoons must be colored. In very modern times the term is commonly applied to pictures caricaturing notable characters or events of the moment. See Caricature and Caricaturists.

Among the most famous cartoons in existence are those executed by Raphael for the celebrated tapestries which were made at Arras, and hence called Arazzi. Two sets of these tapestries were ordered by Leo X, one for the Vatican and the other for pres-
ENTATION TO KING HENRY VIII. THE SECOND SET, OR FRAGMENTS OF IT, ARE STILL IN EXISTENCE ON THE WALLS OF NEW CATHEDRAL. THESE CARTOUCHES LAY NEGLECTED AT ARRELS, AND HAVE REPEATEDLY FALLEN INTO NEGLECT AGAIN, SO THAT OUT OF 25, THE ORIGINAL NUMBER, ONLY SEVEN REMAIN, AND THESE HAVE HAD TO BE RESTORED. THEY WERE PURCHASED AT THE ADVICE OF RUBENS BY CHARLES I ABOUT 1630. ON THE EXTERNAL OF HIS ESTATE IN LONDON THEY WERE PURCHASED BY THE ORDER OF CROMWELL FOR THE NATION, BUT AGAIN FELL INTO NEGLECT IN THE TIME OF CHARLES II. WILLIAM III HAD THEM RESTORED, AND BUILT A GALLERY FOR THEM AT HAMPTON COURT, WHERE THEY REMAINED, UNTIL IN 1865 THEY WERE LENT TO THE SOUTHERN MUSEUM. THE SUBJECTS OF THE SEVEN ARE: (1) PAUL PREACHING AT ATHENS; (2) THE DEATH OF ANANIAS; (3) ELYMAS THE SORCERER STRUCK WITH BLINDNESS; (4) CHRIST'S CHARGE TO PETER; (5) THE SACRIFICE AT LYSTRAN; (6) PETER AND JOHN HEALING THE Cripple; AND THE BEAUTIFUL GATE OF THE TEMPLE; (7) THE MIRACULOUS DRAUGHT OF FISHES. THE CARTOUCHES HAVE BEEN REPEATEDLY ENGRAVED, AMONG OTHERS BY DORINGY, HOLLOWAY AND GRIBELIN. THEY HAVE ALSO BEEN EXTENSIVELY MOUNTED INTO PANELS. THE EXAMPLES ARE MANTEGNINI'S NINE CARTOUCHES OF THE 'TRiumph of Julius Caesar,' NOW PRESERVED AT HAMPTON COURT.

The cartouche of the School of Athens, carried to Paris by the French, and a fragment of the battle of Maxentius and Constantine, are preserved in the Ambrosian Gallery at Milan. There are, likewise, cartoons by Giulio Romano in the Sala Borgia, by Domenichino and other Italian masters, who caused their pictures to be executed, in a great degree, by their scholars, after their own cartoons. The value set upon cartoons by the old Italian masters may be seen by Giovanni Armenini's 'Precetti della Pittura' (1687). In later times large paintings, particularly in fresco, were not executed so frequently. The art was also laboured with less care, and formed their great works more from small sketches. In modern times some German artists have prepared accurate cartoons. Among them is Cornelius, whose cartoons for his fresco paintings in Munich have acquired much celebrity. He prepared, too, a cartoon for the fresco picture representing 'Joseph Interpreting the Dream.' Overbeck and Julius Schnorr may also be mentioned for their cartoons.

CARTOUCHE. Kähr-Tooth, Louis Dominique, French robber: b. Paris about 1693; d. Châtele, France, 28 Nov. 1721. He was the leader of a noted company of robbers, and being captured was broken alive on the wheel in 1721. His life has formed the subject of a modern French drama, and was formerly represented on the English stage. Consult Maurice, 'Cartouche, histoire authentique' (Paris, 1859).

CARTOUCHE, or CARTOUCH. (French cartouche). (1) A wooden case about three inches thick at bottom, and girt round with marline, holding 200, 300 or 400 musket-balls, with 8 or 10 iron balls weighing one pound each, to be fired from a mortar, gun or howitzer, for the defense of a pass, retrenchment, etc. Such missiles have been superseded. In French military language cartouche signifies the entire charge of a firearm. (2) In architecture, sculpture, etc., an ornament representing a scroll of paper, being usually in the form of a table, or flat member, with wavings, whereon is some inscription or device. (3) The name given by the French literati to that oval ring or border which includes, in the Egyptian hieroglyphics, the names of persons of high distinction. (4) In heraldry a name given to a sort of oval shield, much used by Popes and secular princes in Italy, and others, with clergy and laity, for painting or engraving their arms on.

CARTIDGE, a case of paper, parchment, metal or flannel suited to the bore of firearms, and holding the exact charge, including, in the case of small arms, both powder and bullet (or shot). In loading with the old style of cartridge for muzzle-loading rifles before the Civil War, the paper over the powder was bitten or twisted off and the powder poured in, the bullet being then inserted and rammed home. In the first breech-loaders similar cartridges were used but trouble developed through the escape of gas from the breech to the mechanism and the metallic cartridge was developed to obviate this difficulty. At first copper was used, with the primed cartridge being loaded separately. Accidental discharge being very great the primer was placed opposite the centre of the head in a small cap outside the case, for which brass was now used. The cartridges used for breech-loading rifles contain the powder in a case of solid brass, and have the percussion-cap by which they are ignited fixed in the base. Such cases can be refilled and used a number of times in succession. Cartidges for shot-guns are similar to those for rifles, but are usually of less solid construction, being commonly of strong paper with a base of metal. Those for large guns are usually made of flannel and contain only the powder, the projectile being loaded separately. Machine guns became possible after the advent of metallic small-arms ammunition, and in turn developed it. This kind of gun increased in calibre and fixed ammunition continued to be used and many difficulties in manufacture were overcome. Cartridge cases now are generally drawn from one piece in dies, whether they are small or large cases. Blank cartridge is a cartridge without ball or shot. It is used for practice, salutes or signals. A dummy cartridge has no powder, and is used for drill purposes only. Cartridges for blasting are filled with dynamite or other explosive. See AMMUNITION.

CARTIDGE-PAPER, a thick paper originally made for the manufacture of cartridges, but extensively used in the arts, its rough surface giving it an advantage for drawing upon, as a wall paper and for other purposes.

CARTWRIGHT, Edmund, English clergyman and inventor: b. Marnham, Nottinghamshire, 24 April 1743; d. Hastings, Sussex, 30 Oct. 1823. He was educated at University College, Oxford, and having taken orders in the Church, obtained first the living of Brampton, near Chesterfield, and afterward that of Goodby-Marwood, in Leicestershire. It was, however, on the death of his father, near 40 years of age that his attention was first turned to the subject on which his claim to remembrance is founded. In the summer of 1784 he began to investigate the subject of mechanical weaving,
and experiment regarding improvements. His efforts were crowned with success, and in April of the following year he brought his first power-looms both by manufacturers and workmen; and the first mill erected for them, containing 500 looms, was burned down. His attention once turned in the direction of mechanical improvement, he continued to make progress in discovery. He not only patented his power-loom, but took out 10 patents for different inventions, among which was one for combing wool. He also assisted Robert Fulton in his steamboat experiments. He expended much of his means in these investigations, and in 1781 as an acknowledgment of their value a grant from Parliament of £10,000, which relieved him from straitened circumstances, although, it is said, it did not cover his expenditure. He also received premiums for various improvements from the Society of Arts and the Board of Agriculture. His life was published by his daughter (London 1843).

CARTWRIGHT, John, English reformer, brother of Edmund Cartwright (q.v.): b. Marnham, Nottinghamshire, 17 Sept. 1740; d. London, 23 Sept. 1824. He entered the navy in 1758, and became a first lieutenant in 1766. In 1774 his attention was turned to politics. In his 'Letters on American Independence' (Independence of America considered as supremely useful and glorious to Great Britain), written in this year, he advanced a union between the colonies and the mother state, under separate legislatures, and argued this great question on the foundation of natural, inherent right; maintaining that the liberty of man is not derived from charters, but from God, and that it is original in every one. In 1775 he was appointed major of the Nottinghamshire militia, and after several ineffectual attempts on the part of government to remove him from that post, his dismissal was finally accomplished in 1781, in consequence of an act of Parliament. In the American war Lord Howe was desirous of having him with him in America; but Major Cartwright, although always eager for promotion in the navy, refused the proposal, alleging that he could not fight in a cause in which he disapproved. From this time he devoted himself to the favorite objects of annual parliaments and universal suffrage. He was the author of a Declaration of Rights, distributed by the society for constitutional information. The French Revolution was warmly welcomed by Cartwright. In the trials of Tooke, Hardy, Thelwall and other reformers, Cartwright was present as a witness, and displayed much firmness and fearlessness. By his writings, public addresses, etc., he continued to promote the work of reform and constitutional liberty; and as late as 1820 was tried for conspiracy and sedition, for advising the inhabitants of Birmingham, which had then no parliamentary representation, to do all that he called their "legislatorial attorney" to the house; but he escaped with a fine of £100. Major Cartwright was not a political reformer only. The plan of making the slave-trade piracy is said to have been first developed in his 'Letters on the Slave-Trade.' A statue has been erected in London to his memory. A list of his writings has been compiled by his niece F. D. Cartwright, 'The Life and Correspondence of Major Cartwright' (2 vols., London 1826).

CARTWRIGHT, Peter, American Methodist clergyman: b. Virginia, 1 Sept. 1785; d. near Pleasant Plains, Ill., 23 Sept. 1872. He was ordained in Kentucky in 1806, and in 1823 removed to Illinois, where he set forth for the next half a century. He also sat in the State legislature there, and in 1846 was defeated by Abraham Lincoln in an election for congressman. Admired for his eloquence and strong common sense, he was also loved for his quaint eccentricity of manner, and possessed great influence in his own denomination. He published many pamphlets, among which the best known is 'Controversy with the Devil' (1853). Many of the stories of his adventures with the backwoodsmen are found in 'Fifty Years a Preaching Elder,' and 'Autobiography of Peter Cartwright' (New York 1856). Consult Stevens, 'Observations on Dr. Cartwright and the Backwoods Preacher' (London 1869).

CARTWRIGHT, Sir Richard John, Canadian statesman: b. Kingston, Ontario, 4 Dec. 1835; d. 24 Sept. 1912. He was educated at Trinity College, Dublin, and entered the Canadian Parliament in 1863 as a Conservative, but on account of a disagreement with Sir John A. Macdonald joined the Liberal party. He was Minister of Finance from 1873 until 1879; and Minister of Trade and Commerce, 1896-1911. He was a member of the Joint High Commission of 1897 appointed to settle outstanding questions with the United States, and was in favor of the establishment of freer trade relations with that country. He was created G.C.M.G. in 1879.

CARTWRIGHT, Thomas, English Puritan divine: b. Hertfordshire 1535; d. Warwick, 27 Dec. 1603. He studied theology at Cambridge and was elected to a scholarship at Saint John's College there in 1550. He was at first active in defending the new religious opinions then current at Cambridge. He withdrew in Mary's reign from the university and was a law clerk for a time. He suffered imprisonment and exile more than once for his nonconformist opinions. He was a learned man, and at one time professor of divinity at Cambridge. He made a visit to Geneva, where he met Theodore Beza. In 1572 he returned to England just at a time when intense excitement was being caused by the publication of 'Admonition to the Parliament,' written by Field and Wriothesley. Cartwright espoused the cause of the authors, who were imprisoned, and defended the book in a second 'Admonition to the Parliament.' This was answered by Whittgift and was followed by another paper from Cartwright. The controversy led Hooker to publish his 'Ecclesiastical Polity.' In 1573 Cartwright, learning of a warrant being issued for his arrest, fled to the Continent. His chief books are 'A Confutation of the Rhenish Translation'; 'Harmonia Evangelica'; at 'A list of what he called their 'Legislatorial attorney' to the house; but he escaped with a fine of £100. Major Cartwright was not a political reformer only. The plan of making the slave-trade piracy is said to have been first developed in his 'Letters on the Slave-Trade.' A statue has been erected in London to his memory. A list of his writings has been compiled by his niece F. D. Cartwright, 'The Life and Correspondence of Major Cartwright' (2 vols., London 1826).
CARUCATE, kä'- rut-, in medieval times, as much land as one team would plow in a year. The size varied according to the nature of the soil and practice of husbandry in different districts.

CARUPANO, kä-roop' -nä, Venezuela, seaport of the state of Bermudez, on the north coast of the peninsula of Paria, with a light-house and一个灯塔。The surrounding district is fertile, and has mines of copper, sulphur, silver, lead and lignite. The city exports cotton, dyewoods, coca, coffee, fish, etc., and manufactures hats, ropes, soap, brandy, sugar and earthenware. Pop. about 9,000.

CARUS, kär-ü-s, Julius Victor, German zoologist: b. Leipzig, 25 Aug. 1823; d. 1903. After studying at Leipzig, Würzburg and Freiburg, he became at the age of 26 keeper of the Oxford museum of comparative anatomy. In 1853, two years after his return to his native city, he was appointed professor of comparative and his arms bearing the name of the Zoological Institute there where subsequently he was made professor extraordinarius of zoology. Among his numerous writings are 'System der tierischen Morphologie' (1853); 'Handbuch der Zoologie' 'Geschichte der Zoologie.' He has translated most of Darwin's works into German and in 1878 became editor of the Zoologischer Anzeiger.

CARUS, Karl Gustav, German physician and physiologist: b. Leipzig, 3 Jan. 1789; d. Dresden, 28 July 1869. He became professor of obstetrics at the Medical Academy of Dresden, and then royal physician, being subsequently a privy councillor. He published a great number of writings covering a wide field of science, including medicine, physiology, anatomy, physiology, physics, painting, besides memoirs of his life. Among these are 'System der Physiologie' (1838-40); 'Lebenserinnerungen und Denkwürdigkeiten' (1856-66); 'Lehrbuch der Zootomie' (1818); 'Über den Blutkreislauf der Insekten' (1827); 'Psyche' (1851).

CARUS, Marcus Aurelius, Roman Emperor: b. Neronia, Dalmatia, about 222 A.D.; d. Menton, Mesopotamia, 283. His father was an African and his mother a noble Roman lady. He was proclaimed emperor by the legions, on the assassination of Probus, 282. He caused justice to be executed upon the assassins. He lined a signal pass over the Sarmatians, and prosecuted the war against the Persians. Undertaking the campaign in mid-winter, and making a rapid march through Thrace and Asia Minor, he ravaged Mesopotamia, made himself master of Seleucia and carried his arms beyond the Tigris.

CARUS, Paul, American philosophical writer: b. Ilmenburg, Germany, 18 July 1852. He was educated in the universities of Strassburg and Tübingen, and has been a resident of Chicago for several years, where he is editor of The Open Court and The Monist. Under his name the Open Court Publishing Company has done fine service in putting before the public valuable works on philosophy and religion. He has published 'The Ethical Problem,' 'Fundamental Problems,' 'The Soul of Man' (1891); 'Primer of Philosophy,' 'Truth in Fiction,' 'Monism and Materialism' (1891); 'The Religion of Science' (1893); (The Philosophy of the Tool,' 'Our Need of Philosophy,' 'Science: a Religious Revelation,' 'The Gospel of Buddha,' 'Kanna,' 'Nirvana,' 'Homilies of Science,' 'Chinese Philosophy,' 'The Idea of a God,' 'Buddhism and Its Christian Critics,' 'The Dawn of a New Era,' 'Kant and Science,' 'The Nature of the State,' 'The History of the Devil' (1900); 'Whence and Whither?' 'Eros and Psyche,' 'God: an Inquiry into Man's Highest Ideals' (1908); 'The Mechanistic Theory, and the non-Mechanical' (1911); 'The Principle of Relativity' (1913); 'Truth in Science and Pragmatism'; 'Philosophy as a Science'; 'Goethe: the man and his work'; 'Nietzsche, and other Exponents of Individualism' (1914); 'Venus and Woman as the Cosmic Principle.'

CARUSO, Enrico, Italian operatic tenor: b. Naples, 25 Feb. 1873. At the age of 11 he began to sing in the churches of his native city. He studied under Guglielmo Vergine for three years, and was also a pupil of Lamperti and Concone. He made his début in 'L'Amico Francesco,' at the Nuovo Teatro, Naples, in 1894; and later toured Italy and America and was engaged for four seasons at La Scala, Milan. He attracted general attention in 1896 in 'Traviata' at the Teatro del Fondo, Naples. Engagements followed at Petrograd, Moscow, Warsaw, Rome, Paris, Lisbon and the Nuevos Aires. He was everywhere hailed as one of the most promising young tenors Italy had produced. He came to the United States in 1903 and was received with great acclaim. His repertoire includes more than 40 operas (chiefly Italian). He created roles in 'Fedora,' 'Mascagni's 'Le Maschere'; 'Franchetti's 'Germania'; 'Puccini's 'Bohème'; 'Madame Butterfly' and 'The Girl of the Golden West.' Since his first appearance in 1903 he has become the chief attraction of the Metropolitan Opera House Company in New York, his voice being one of extraordinary beauty and power, thereby lacking the highest artistic refinement and expression, while his acting does not rise above the conventional. Consult Wagenmann, H., Enrico Caruso und das Problem de Stimmbildung' (Altenburg 1911).

CARUTTI DI CANTONO, kär-ru-tit de kann-tön’-yö, Domenico, Baron, Italian historian and publicist: b. Cumiana, 26 Nov. 1821; d. Turin, 1909. As a young man he took to romance writing, bu was speedily absorbed in politics and rose to great distinction. When he was in the pen, it was to compose such solid works as 'History of the Reign of Victor Amadeus II' (1856) and 'History of the Reign of Charles Emmanuel III' (1859). These are interesting and scholarly. In 1884 he became president of the Royal Commission on the Study of National History at Turin and in 1889 was made senator of the kingdom. Other works, in addition to those above, are 'History of the Diplomacy of the House of Savoy' (Turin 1876); 'Count Umberto I' (Florence 1878); 'Poems' (Rome 1872) and an essay on Propertius.

CARVAJAL, kär-vä-hal, Gaspar de, Spanish missionary: b. Spain, early in the 16th century; d. Lima, Peru, 1584. He entered the Dominican order and went to Peru in 1553.
In 1538 he accompanied the expedition of Gonzalo Pizarro to the countries east of the Quito as chaplain. He was appointed sub-prior of the convent of San Rosario at Lima; after the pacification of Peru he was sent to the mission of Tucuman and after working among the Indians there was made vicar-general of the province of Tucuman. With the aid of the Dominicans, whom he brought into the country, he established several Indian towns and Spanish colonies. He wrote 'Descubrimiento del Rio de las Amazonas' unedited until 1894.

CARVAJAL, Tomas José Gonzales, Spanish statesman and author: b. Seville, 21 Dec. 1733; d. 9 Nov. 1834. He was educated in Seville, where he studied theology and jurisprudence, becoming also famed as a Latinist. He was appointed in 1795 governor of the new colonies in Sierra Morena and Andalusia, and protested against the French invasion of Spain in 1808. From 1809 to 1811 he served as commissioner in the Spanish army against Bonaparte; in 1813 he became Minister of Finance; relinquished these offices to assume the directorship of the Royal University of Isidro, where he became involved in difficulties by establishing a professorship of constitutional law. He was arrested and detained in prison from 1813 to 1820, when the revolution reinstated him at San Isidro. A counter revolution brought his opponents into power, and he was exiled from 1823 to 1827. However, at the time of his death he was member of the supreme council of war, of the military department of the Spanish and Indian boards and a grandee of Spain. He learned Hebrew at the age of 57 in order to translate the Psalms. This translation has gained for him a high reputation for poetical power. He also wrote metrical translations of the other poetical books of the Bible and other works in prose and verse, of which the high quality brought him membership in the Real Academia Española and in the Real Academia de la Historia. The Spanish Academy included his name in the 'Catálogo de autoridades de la lengua castellana.'

CARVALHO, kär-vål'yô, José da Silva, Portuguese statesman: b. Beira 1782; d. 3 Feb. 1845. He studied law at the University of Coimbra, and became a judge in 1810. His participation in the revolution of 1820 caused him to become a member of the provisional government. He was a member of the regency and appointed Minister of Justice until 1823, when, on the downfall of the constitutional government, of which he was a foremost champion, he was obliged to resort to flight to England, where he remained until 1826, when he returned to Lisbon, but Dom Miguel's success again compelled him to leave. Eventually he was named a member of the council of guardianship instituted by Dom Pedro for the young Queen, Donna Maria, and succeeded in negotiating the first English loan for Portugal. Having accompanied Dom Pedro to the Azores, he filled, on his return to Portugal, important official positions. In 1835 he retired with the Palmina administration, and was presently obliged to leave for England, where he remained until 1838, when a general amnesty was proclaimed. He retired in 1842. When the constitution of Dom Pedro was re-established, he became councillor of state.

CARVALHO, Paez de Andrade, Manoel de, Brazilian politician: b. about 1795; d. Rio de Janeiro, 18 June 1855. Elected temporary President of Pernambuco in December 1823, he led a revolt the next year against Pedro the Emperor, and on 2 July 1824 announced a republic entitled 'Confederação do Equador.' On the suppression of the revolt in October, Carvalho fled to England, but subsequently returned to Brazil and was a senator from 1835.

CARVELL, Frank Broadstreet, Canadian legislator: b. Bloomfield, County Carleton, New Brunswick, 14 Aug. 1862. He was graduated LL.B. at Boston University in 1890, and called to the bar of his native province in the same year. He represented Carleton in the provincial assembly as a Liberal, 1899-1900; resigned his seat in the latter year to contest (unsuccessfully) the same county for the Dominion House of Commons, but was elected in 1904 and has since retained the seat. He made his mark in the House in the debates on the administration of the Militia Department under the Borden government during the Great War, and his searching criticisms on the subject were followed by investigation by a commission appointed by Parliament but he supported (1917) the principle of compulsory military service with which that government identified itself, and on that question voted against his leader, Sir Wilfrid Laurier. In October 1917 he became Minister of Public Works in the Union government of Sir Robert Borden.

CARVER, John, first governor of the Plymouth colony: b. England, about 1575; d. Plymouth, Mass., April 1621. He joined the Leyden colony of English exiles about 1608, and as their agent assisted in securing a charter from the Virginia Company and in selecting and equipping the Mayflower. He was elected governor, probably 11 Nov. 1620, after the Mayflower reached Provincetown, showed great ability and judgment in governing the infant colony after the landing at Plymouth, and established by a treaty with the Indians peaceful relations that remained undisturbed. He was re-elected in March 1621, but died a few days afterward. His chair and sword are still preserved as Pilgrim relics.

CARVER, Jonathan, American traveler: b. Stillwater, N. Y. (the universal ascription to Connecticut is an error), 1732; d. London 1780. He embraced a military career, and in the French War of 1756 commanded a company of provincials, in the expedition across the lakes against Canada. When peace was concluded in 1763, Carver undertook to explore the vast territory which Great Britain had gained. His object was to acquire a knowledge of the manners, customs, languages, soil and natural productions of the nations and region beyond the Mississippi, and to ascertain the breadth of the continent by penetrating to the Pacific over its widest part, between lat. 43° and 46° N. He accordingly set out from Boston in 1766, and having reached Michilimackinac, the remotest English post, applied to Mr. Rogers, the governor, for an assortment of goods as presents for the Indians dwelling in the parts through which his course was to be corrected. Receiving a portion of the supply which he
desired, and a promise that the residue should be sent to him at the falls of Saint Anthony, he continued his journey. But not obtaining the goods at the appointed place, in consequence of their having been disposed of elsewhere by those to whom he had entrusted them, he found it necessary to return to La Prairie du Chien. He then, in the beginning of the year 1767, directed his steps northward, with a view of finding a communication from the head of the Mississippi into Lake Superior, in order to meet, at the grand portage on the northwest side of that lake, the traders that usually came about this season from Michilimackinac, from whom he intended to purchase goods, and then to pursue his journey. He reached Lake Superior in good time; but unfortunately the traders whom he met there could not furnish him with any goods, as they had barely enough for their own purposes, and, in consequence, he was obliged to return to the plains whence he first departed, which he did in October, 1767, remaining some months on the north and east borders of Lake Superior, and exploring the bays and rivers that empty themselves into that body of water. He soon after repaired to England with the view of publishing his journal and charts, and of obtaining reimbursement for the expenses which he had incurred. Having undergone a long examination before the lords commissioners of trade and plantations, he received permission to publish his papers; but when they were nearly ready for the press an order was issued from the council-board, requiring him to deliver immediately into the plantation office all his charts and journals. He was, consequently, obliged to repurchase them at a great expense from the bookseller to whom he had disposed of them—a loss for which he received no indemnification, but was forced to be satisfied with that obtained for his other expenses. He had fortunately kept copies of his papers, and he published them 10 years afterward in Boston, while in the situation of a clerk of a lottery. His works are The Travels Through the Interior Parts of North America (1778); Treatise on the Culture of the Tobacco Plant (1779); The New Universal Traveler; Literary History of the American Revolution. Consult The Carver Centennial (1867, published by the Minnesota Historical Society); Bourne, E. G. (in the American Historical Review, January 1906).

CARVER, Thomas Nixon, American economist: b. Kirkville, Iowa, 25 March 1865. He studied at Iowa Wesleyan University, the University of Southern California, Johns Hopkins and Cornell; was professor of economics at Oberlin College from 1894 to 1900, when he became assistant professor of political economy at Harvard University and full professor in 1902. In 1913 he was given charge of the rural organization service of the Department of Agriculture to investigate the marketing and distribution of farm products. A frequent contributor to economic reviews, his published works include The Theory of Wages adjusted to Recent Theories of Value (1894); The Distribution of Wealth (1904); Sociology and Social Progress (1905); Principles of Rural Economics (1911); The Religion Worth Having (1911–12).

CARVING, as a branch of sculpture, the art of cutting a hard material by means of a sharp instrument: but there are extended uses of the term, as shown below.

The term is generally employed for work which is in wood, as distinguished from grand sculpture; thus the wrought stone leafage, scroll work and even animal forms in a Gothic porch, are carving in common parlance, and so are the human figures of the porch if they are conventional or stiff, as often happens in mediaeval work. In a Roman temple or a neo-classic edifice the leafage of Corinthian capitals or of any panel or string-course would be called carving, while the statues and even the reliefs of human subjects would be spoken of as sculpture (q.v.). Small pieces, even of human subjects, such as decorative statuettes and groups, are spoken of as carving, and these may be wrought in wood, ivory, bone, marble, and other stones, and even in hard and semi precioses stones, such as agate and jade. The carving of Japanese work is especially in demand in Western lands, because of their picturesque beauty. When they are of wood they are often painted, gilded or lacquered with a rich polychromic effect.

Throughout the middle ages of Europe, ivory statuettes were the most permanent of all such ornamental objects were treated in the same way, the carving being helped out by color and gold with extraordinary results.

Carving, when done in very hard material, such as rock crystal and jade, requires much use of the drill, in which case the meaning of the term must be extended to include the result produced by a rapidly revolving pin with emery powder or the like. One of the most ingenious and useful purposes to which carving has been converted in more modern times is that of engraving wood-cuts or blocks for printing. (See Wood-Engraving.) Carving has been applied to almost innumerable uses in manufactures as well as in art. Some of these applications have given way to the art of engraving in metal and other processes, but new ones are continually arising. The first carving-press was invented about 1800, and many others have since been patented.

CARY, Alice, American poet: b. near Cincinnati, Ohio, 26 April 1820; d. New York, 12 Feb. 1871. When quite young she began writing sketches and poems for the press, and in 1852 she, with her sister, Phoebe (q.v.), removed to New York, where they lived during the rest of their lives. In 1850 the sisters published a volume entitled Poems by Alice and Phoebe Cary. Alice soon after published Clovermook, or Recollections of Our Neighborhood in the West (1851–53); Lyra, and Other Poems (1853); Haggar, a Story of To-day (1852); Married, not Mated, a novel (1856); Lyrics and Hymns; The Bishop's Son; The Lover's Diary (1867); and Snow Berries: A Book for Young Folks (1869). The works of the Cary sisters still retain a hold upon the affections of readers and not a few lines of their works have become familiarized by frequent quotation. While living in New York they attracted about them a circle of literary people, and for 15 years their Sunday evening receptions were a feature in the literary life of the city. Consult Ames, Mary C.
CARY — CARY REBELLION

"Memorial of Alice and Phoebe Cary" (New York 1873).

CARY, Annie Louise, American singer: b. Wayne, Me., 22 Oct. 1842. She studied in Milan, made her operatic début in Copenhagen in 1868, had a successful European career for three years, and returned in 1870 to the United States, where she won great popularity and remained, with the exception of one brilliant European tour, until 1882, when she married Charles M. Raymond, and retired from the stage while her voice was still unimpaired. Since then she has sung only in private or for charity. She created, in New York, the part of Amneris in "Aida" (1873).

CARY, Archibald, American statesman: b. Virginia, about 1730; d. Chesterfield, Va., Sept. 1786. He early became a member of the House of Burgesses, and in 1764 served on the committee which reported the address to the King, Lords and Commons, on the principles of taxation; and in 1770 was one of the signers of the "Mercantile Association," which pledged its members to use no British fabrics thereafter, that the officers might not be accused of the encroachments of the government. In 1773 he was one of the celebrated committee of correspondence by which the colonies were united into one great league against Parliament. When the State government was organized he was returned to the legislature, where he presided with great dignity and efficiency. At this time occurred the incident with which his name is most generally connected. The scheme of a dictatorship had been broached, and without his knowledge put into effect. He was accused to his face of the secret ceremonies, and upon his own confession of his guilt, by being on the committee of correspondence, was accused of being an agent of the British government. He was tried, in the midst of the general agitation Cary met Henry's half-brother in the lobby of the assembly, and said to him: "Sir, I am told that your brother wishes to be dictator. Tell him from me, that the day of his appointment shall be the day of his death, for he shall find my dagger in his heart before the sunset of that day." The project was speedily abandoned. He was a good representative of the former race of Virginia planters, delighting in the rural pursuits, in blooded horses and improved breeds of cattle, which he imported from England, and attended to with great care.

CARY, Henry Francis, English clergyman, translator of Dante: b. Gibraltar, Spain, 6 Dec. 1772; d. London, 14 Aug. 1844. In 1790 he entered Christ Church, Oxford, and he took orders in 1796. In 1796 he was presented to the vicarage of Abbot's Bromley, Staffordshire, and in 1800 he removed to Kingsbury, in Warwickshire, another living to which he had been presented. His studies while at college had embraced a wide range of Italian, French and English literature, and in 1805 he gave proof of his Italian scholarship, as well as of his poetic powers, by the publication of the "Inferno" of Dante in English blank-verse, accompanied by the Italian text. The entire translation of the "Divina Commedia" was accomplished in 1814, and the work was not very widely known, but it lay unnoticed for several years, till Samuel Taylor Coleridge drew attention to its merits. It has since been recognized as a standard English work. Cary subsequently translated the "Bucolic of Archilochus" (1814), the "Odes" of Pindar, and wrote a continuation of Johnson's "Lives of the English Poets," and a series of "Lives of Early French Poets." He was for some time curate of the Savoy, London, and in 1826 was appointed assistant keeper of printed books in the British Museum, which office he resigned in consequence of his being passed by on the appointment of Mr. Panizzi in 1837 to the office of keeper of the printed books. The government in 1841 granted him a pension of £200 a year as a recognition of his literary abilities, and he devoted himself henceforth to the annotation of a new edition of his translation of Dante, and the collection of the English poets, Pope, Cowper, Milton, Young, etc. He was buried in Westminster Abbey. His son, Henry Cary, has written a "Memoir" (London 1847).

CARY, Lott, American negro slave: b. Virginia 1790; d. Africa 1828. He educated himself, became a Baptist minister, purchased the freedom of himself and his two children for $850, and joined the colony sent in 1822 to Liberia, where he performed inestimable services in behalf of the new republic. He was acting as vice-agent with full power when he was accidentally killed while making cartridges for defense against the slave traders.

CARY, Lucius. See Falkland.

CARY, Phoebe. American poet and prose-writer, sister of Alice Cary (q.v.): b. Cincinnati, Ohio, 4 Sept. 1824; d. Newport, R. I., 31 July 1871. She contributed numerous sketches to various periodicals; and with her sister published several books, among which are "Poems and Parodies" (1854); and "Poems of Faith, Hope and Love." She will be longest remembered as the author of the popular hymn beginning, "One Sweetly Solemn Thought." Consult Trent, "A History of American Literature" (New York 1903).

CARY REBELLION, in North Carolina, an outcome of the religious and political disturbances set going by the constitution of Locke and Shaftesbury, whose laws and constitutions survived itself. (See CAROLINA, ORIGINAL CONSTITUTION OF). One of these, requiring an oath to support the constitution and laws, debarred the Quakers (who were among the most influential of the early settlers) and by no means inclined to submit peaceably to oppression) from voting or holding office, or being witnesses in criminal suits. The establishment of and taxation for the Church of England was a common grievance to all the colony, nearly all its population being dissenters; and there were other obnoxious ordinances. At this time Albemarle County (North Carolina) had its separate deputy governor, appointed by the governor of the entire colony; and in 1704 Sir Nathaniel Johnson so appointed Robert Daniel, a churchman, and "landgrave" or hereditary noble and councillor. He tried to enforce the laws; and one John Porter, an influential Quaker, shortly went to England to complain of him and of vexatious legislation against his sect. One of the latest, John Archdale (q.v.), ex-governor, was himself a Quaker, and induced the other proprietors to remove Daniel; and Johnson appointed Thomas Cary, a Carolina merchant, said to have been Archdale's son-in-law, in his place. Cary, however, felt bound to enforce the laws, and again the Quakers complained. Cary was removed (the
CARYATIDES — CASA GRANDE

accepted account says he was in ill odor with the proprietors for having been short in his accounts as collector of revenue for them); and this time the appointment of a deputy for Albemarle was taken from the governor, and a new proprietary council formed, with Porter and several other Quakers on it. On Porter's return to America in 1707, he convened the council, which elected William Glover, a churchman, president. Glover insisted on enforcement of the laws as before, and Porter's party turned against him, declared his election illegal, struck a bargain with Cary and elected him president in Glover's place. Glover and his section refused to recognize the validity of the new election, and held their meetings in one room of the executive mansion, while Cary and his councillors met in the other. Daniel, as a landgrave, was ipso facto a councillor, and sat alternately in both. Each party issued writs for election to the assembly, and it seems to have been a formal recognition of either; but Cary's party held the majority. In 1710 Edward Hyde, a relative of Clarendon's, was appointed deputy governor by the proprietors, and came out in August 1710 to assume office. In June 1711 it was to be taken from Tynte who had succeeded Johnson; but Tynte had died, and Hyde had only his letters from the proprietors to show. The Cary party, however, was glad to acknowledge him so long as it held the power and had confirmed it; but the next assembly was held by its enemies; Hyde apparently aided it in enforcing the laws in favor of the Church, and Cary's party promptly refused to acknowledge his authority and made open war on him. Cary attacked Edenton with two armed vessels, but was repulsed, and Hyde called on Governor Spotwood of Virginia for help. Spotwood admitted that the revolters were "dangerous incendiaries," but said the country was almost inaccessible, and he had only militia; but finally sent some of his marines from the guard-ships at Hampton Roads. Cary, with his chief men, Levy, Truitt, etc., thereupon went to Virginia, apparently for temporary refuge, declaring that they would go to England and appeal to the proprietors. Some friends took them at their word, and set them, seemingly against their will, to England; and they disappear from history. That they were discharged, however, is apparent from a circular letter of Lord Dartmouth to the colonies, at this juncture, to send no more prisoners to England for trial without proof of their guilt. At home, theburgesses refused to provide for the defense of the colony unless they could have share in the government and what they held to be their rights; and the result was a fearful desolation in a war which soon broke out with the Tuscaroras.

CARYATIDES, or CARYATIDS, kar-īatherine, in architecture, a name used to designate female figures made to support a roof, cornice, etc., instead of columns. The goddess Artemis (Diana), who had a temple in Caryae, a Peloponnesian city, was for this reason called Caryatis. In honor of her, virgins danced in a festive procession during an annual feast, which suggested to the architects the idea of adopting the images of virgins to serve as columns. Thus Lessing and others explain the name and form of the caryatids. Another explanation of their origin is the following: The inhabitants of Caryae allied themselves with the Persians in their war with the Greeks. The Greeks, on the successful termination of that struggle, exterminated the males of Caryae, and reduced all the women to slavery. As a mark of infamy, and to keep the memory of the traitors, the architects of the time made statues representing these women in the servile office of supporting entablatures. The figures are distinguished by gracefulness and quiet dignity of position. There are fine examples in the Erechtheum at Athens and British Museum. Consult Homolle, in Bulletin de Correspondance hellénique (Vols. XXIII, XXIV, Paris 1899).

CARYOCAR, kā′-rō-kār, a genus of plants belonging to the family Caryocaraceae, consisting of lofty trees, natives of tropical America, which produce good timber. They have evergreen, ternate or pinnate leaves, and flowers in racemes. C. nuciferum, a species abundant in British Guiana, yields the kidney-shaped souari-nuts, or beternuts. Other species are C. glabratum and C. amygdalum.

CARYOPSIS, the small, peculiar, one-seeded, dry indehiscent fruit of the grasses, as wheat, barley, etc.

CARYOTA, a genus of palms, with doubly pinnate leaves, the best-known species of which (C. urens) is a native of most of tropical Asia. It supplies an inferior kind of sago, and from its juice is made toddy or palmwine. The leaf-stalks yield kittle fibre, which is used in making baskets, brooms, etc.

CARYSFORT REEF, a dangerous coral reef near the southern extremity of Florida, lat. 25° 13' N., long. 80° 13' W., lying about five miles east of Key Largo, on which is erected a lighthouse of the first order, 106 feet high.

CASA, kā′zā, Giovanni della, Italian writer: b. Mugello, near Florence, 1503; d. Rome, 14 Nov. 1560. He studied in Bologna, Florence and Rome, and entered as an ecclesiastic into the service of the two cardinals, Alessandro Farnese, the first of whom in 1534 ascended the papal chair, under the name of Paul III. He rose through various offices in the Church, including the archbishopric of Benevento, till Paul IV made him his private secretary. His most celebrated work is 'Galetto, ovvero de' Costumi' (1560), a manual of good-breeding, to which another book, 'Degli Uffizi communi tra gli Amici Superiori e Inferiori,' forms a supplement. This last is a translation of his Latin treatise, 'De Officiis Inter Potentiorem et Tenuiores Amicos.' The best and most complete edition of his works appeared at Venice (1752).

CASA BRACCO, brāch'ō, Italian romance, by Francis Marion Crawford, published 1896. The first half of the novel is much the better.

CASA GRANDE, grāndē, or the CASA GRANDE Ruin (see National Parks and Monuments), the Spanish name (signifying "large house") of the ruins of a prehistoric building in Arizona, near the Gila River, about 12 miles from Florence, Ariz., and somewhat farther from the Casa Grande station. It is the best-preserved structure of a type which was widely distributed. The space enclosed by
the walls now standing measures about 43 by 59 feet; and the walls, which are high, show that there were three habitable stories. A large area surrounding this building is covered with mounds and debris of other buildings, indicating that there was originally a considerable settlement on the site. It was set aside, as the most interesting object in a small reservation, by executive order dated 22 June 1892, under the act approved 2 March 1889. By presidential proclamation of 10 Dec. 1909 the boundaries of the reservation were changed by the elimination of 120 acres on which there were no prehistoric ruins and the inclusion of a tract of equal size adjoining the reservation on the east, on which are located mounds of historic and scientific interest. Casa Grande was a ruin when discovered. Since that time the identity of its builders has furnished a theme for speculation; and although it has been ascribed to the Aztec, the better opinion seems to be that the ancient people who inhabited this building were not closely related to any tribes of the Mexican plateau, whose culture was different from that of the sedentary tribes of Arizona. The walls are of a fawn color slightly tinged with red. They are constructed of a cement called caliche, composed of lime, earth and pebbles; this was made into blocks, which were laid in courses. Consult Fewkes, J. W., detailed report in Twenty-eighth Annual Report Bureau American Ethnology.

CASABI ANCA, kə-za-bə-ănˈkə, Louis, French naval officer: b. Bastia, Corsica, 1755; d. 1 Aug. 1798. With the Comte de Grasse, he took part in the American Revolution. He sat in the National Convention of 1792; and in 1798 was captain of the flagship L'Orient in the expedition to Egypt. He was mortally wounded at the battle of the Nile, 1 Aug. 1798, the ship caught fire; his 10-year-old son would not leave him, and both were killed by the exploding of the ship. The story of their death is the subject of Mrs. Hemans' well-known poem.

CASAL, kə-sål’, Julián del, Cuban poet: b. 1863; d. 1893. He was a half morbid striver after the super-esthetic and a pronounced lover of the luxury and elegance of the Orient and of Paris. Endowed with a fervid imagination and a strongly poetic touch he found followers not only in Cuba, but throughout Latin America, and later in Spain itself. None of the countries that he loved and whose manners and customs and modes of thought he imitated, had he ever visited. Highly colored were his mental pictures of them, by wonderful visions from the land of imagination and of dreams in which he lived. Yet, with all his love of beauty, luxury and elegance, he was very much a pessimist and his discontent with life finds constant expression in his writings. He handled the sonnet with a master-hand and made it do duty in picturing the many phases of life into which his active imagination constantly led him. His work covers a wide variety of subjects, ranging from clear-cut pictures of heroic characters of classical Greece, to sketches of native life in Havana, in prose and poetry, and side-stepping at times into politics, society and biography. Casal was an intimate friend of Rubén Darío, the Nicaragua group, and his work spread the enthusiasm for Latin America from 1895 to 1915; and the latter borrowed a number of his reactionary ideas from the young Cuban poet, whose writings in La Habana Elegante and other periodicals had early made him the leading figure of his day in Cuban literature. Among Casal's published work are 'Hojas al Viento' (1890); 'Nieve' (1891); 'Bustos en Rímac' (prose, 1893). In a study of Jairis Karl Huysmans, he displays his critical ability and his love of the exotic and sensuous. Consult Meza, Ramón, 'Julián del Casal' (Havana 1910).

CASAL, or CAZAL, Manoel Ayres de. See CAZAL.

CASALE, kə-sål, or CASALE DE MONFERRAT0, Italy, city in the province of Alessandria, on the right bank of the Po, 18 miles north-northwest of Alessandria. The citadel, founded by Duke Vicenzo in 1590, was one of the strongest in Italy, and within recent years the fortifications have been greatly strengthened and extended. In 1640 the Spaniards were defeated here by the Duc d'Harcourt, and the possession of the town was repeatedly contested by the Austrians and French during the wars of Napoleon. Casale was the capital of the ancient Montferrat. It is the seat of a bishop and of a district court of justice, and has a cathedral which is said to have been founded in the 8th century. Its church of San Domenico, containing a tomb in memory of the Princess Paleologo, is remarkable for the elegance of its design, and several fine works of art are found in other of its churches. The medieval history of Casale goes back to its settlement in 730 by Lintprand, on the site of the ancient Roman city Bodincomagus. The church of San Ilario replaced the former pagan temple of worship which stood here. In 1215 Casale was almost totally destroyed by its neighbors, but in 1220 was rebuilt and in 1292 became the property of the marquises of Montferrat. Modern Casale has tramway communication with the neighborhood and nearby is the famous Sacro Monte di Crea with its 18 chapels. Cement, liqueurs, silk, fertilizers, tools and machinery constitute the chief industries. Pop. about 34,000.

CASALE PUSTERLENGO, pəs-tər-lənˈɡo, Italy, town in the province of Milan, south-east of Lodi, beautifully situated in a fine plain between the Po and the Adda. It has a trade in Parmesan cheese. In 1790 the Austrians were attacked here by the French, and driven back to Lodi. Pop. 7,000.

CASAL MAGGIORE, kə-sal-mädˈjörə, Italy, a town in the province of Cremona, 13 miles north of Parma, and 22 miles southeast of the city of Cremona (with which there is railway connection), on the left bank of the Po. There are a cathedral and other churches, theatre, etc. The manufactures include pottery and glass-ware, leather and laces; and there is a trade in wine, grain, hemp and cheese. In 1448 the Venetians were defeated here by Francesco Sforza. Pop. 17,500.

CASALS, Pablo, Spanish violoncellist: b. Vendrell, Catalonia, 1876. He studied at Barcelona with Garcia and Rodereda, and in 1894 in Madrid with Breton. He made his debut in 1899 at one of the Concerts Lamoureux in Paris. His success was immediate and he devoted himself to the concert stage. He has
toured Europe and both North and South America where he has been met with much acclaim. His interpretation is excellent and his technique perfect. As a composer, he has won recognition with two symphonic poems, several smaller works for orchestra and numerous pieces for piano and 'cello and for piano and violin.

CASAMICCIOLA, kâ-sâ-mé-chô-lâ, Italy, favorite watering-place on the island of Ischia, beautifully situated in a valley on the north side of Monte Epomeo, with hot springs (158° F.), baths, hotels, etc. The season extends from June to September. By the earthquake of 28 July 1883, the place was almost entirely destroyed, and even at present, although the government has aided in its rebuilding, a considerable part of the town is in ruins. Pop. (1911) 3,490.

CASANARE, kâ-zâ-nâ're, a river of the Republic of Colombia, which rises in the mountains of Chita, flows through a region called the orinoco, and, after a course of 180 miles empties into the Meta, lat. 5° 58' N. It is navigable for small craft.

CASANOVA, kâ-sâ-no'vâ, Francesco, Italian painter: b. London 1727; d. Brühl, near Vienna, 1805. He studied in Florence under Simonini. He went to Venice with his parents, was in Paris in 1751, but after a brief stay went to Dresden, where he remained from 1752-56. Here he studied and copied the paintings of Wouwerman. He acquired renown as a painter of battle pieces, and was admitted to the Academy of Fine Arts in 1763. Catherine II of Russia employed him to paint her victories over the Turks. He settled in Vienna in 1785, and the gallery there contains several of his paintings. At Paris he was painter to the King. Among his pictures are 'The Battle of Freiburg,' 'Hannibal Crossing the Alps' and 'The Battle of Lyons.'

CASANOVA DE SEINGALT, kâ-sâ-no'vâ dé suâ-gâl, Giovanni Giacomo, Italian adventurer: b. Venice, 2 March 1725; d. Dux, Bohemia, 4 June 1798. The year of his death is uncertain, some maintaining that he lived until 1803. He was the son of an actor and actress; he studied law at Padua, but gave this up to study for the priesthood. He was expelled from the Seminary of Saint Cyprian for a scandalous intrigue, and was also imprisoned for a short time. The influence of his mother procured him a place in the establishment of Cardinal Aquaviva, but he did not retain it long; and after visiting Rome, Naples, Corfu and Constantinople, in the characters of diplomatist, preacher, abbot, lawyer and charlatan, he was imprisoned at Venice in 1755, but escaped owing to his wonderful keenness and skill. In his travels throughout Europe he formed associations with many distinguished characters, Louis XV, Rousseau, Voltaire, Suvroff, Frederick the Great and Catherine II. His most celebrated work is his 'Memoirs' (1828-38), in which he relates with a cynical freedom the whole of his extraordinary adventures, and presents a picture of society without conventional disguise. Among his dupes were Mme. de Pompadour, Frederick the Great, and even that other prince of charlatans, Cagliostro. Besides his 'Memoirs,' Casanova was the author of several works of history or imagination in French and Italian, which show the versatility of his genius. The most remarkable are 'Récit de sa Captivité' (1788), and a translation into verse of the Iliad. His 'Memoirs' are now recognized as of important historical value as a portrayal of private life in the 18th century. A complete critical edition is in preparation by Brockhaus of Leipzig from the original text. The general reliability of the 'Memoirs' is attested by 'Lettre de donne a G. Casanova,' edited by Ravà (Milan 1912). Consult Ravà, 'Contributo alla bibliografia di G. Casanova' (Turin 1910); Maynal, 'Casanova et son temps' (Paris 1911); Symonds, 'Casanova at Dux' (in North American Review, 1902).

CASARTELLI, Louis Charles, English Roman Catholic prelate and writer: b. Manchester, England, 14 Nov. 1852. He was educated at the Salford Grammar School, Ushaw College and Louvain University. He was ordained in 1877; and in 1880-83 was professor at Saint Bede's College, Manchester, 1877-91, and was rector there from 1891-1903. He edited Illustrated Catholic Missions in 1889-1903 and from 1900-03 was professor of Zend and Pahlavi languages at Louvain University. In 1903 he was consecrated bishop of Salford. He has been lecturer on Iranian languages at Manchester University. In 1908-10 he was president of the Dante Society of Manchester and of the Manchester Egyptian Association. He represented the universities of London and Manchester at the jubilee of Louvain University. He is president of the Manchester Oriental Society and member of the Royal Asiatic Society. He has published Lectures on Commercial Geography (1884); La philosophie religieuse du Mazedémie sous les Sassanides (1884); Traité de médecine Mazdéenne (translated from Pahlavi 1886); Sketches in History (1906). He contributed to the Catholic Encyclopedia; was a collaborator in Encyclopedia of Religion and Ethics. He is a frequent contributor of articles on religious and Oriental topics to periodicals.

CASAS, kâ-sâs, Bartolomé de las, Spanish prelate, better known as the Apostle of the Indies: b. Seville 1474; d. Madrid, July 1560. In his 19th year he accompanied his father, who sailed with Columbus, to the West Indies. Five years afterward he returned to Spain, and pursuing his studies he entered the priesthood. He accompanied Columbus in his second voyage to Hispaniola (Haiti), and on the conquest of Cuba settled there, and distinguished himself by his humane conduct toward the oppressed natives. He set at liberty the Indians who had fallen to his share in the division; and so much was he interested for them, that in 1536 he went to Spain to lay a statement of their case before King Ferdinand, whose death at that time prevented any measures for their benefit. The regent, Cardinal Ximenes, however, appointed a commission to examine circumstantial on the spot, and to determine accordingly, of which Casas was a member, with the title of Protector of the Indians. The commissioners found that it was impossible to liberate the Indians, and therefore en-
deavored to secure their humane treatment; but Las Casas, still dissatisfied, remonstrated so warmly that he was obliged to take refuge in a convent from the rage of the planters. He again returned to Europe; and on the accession of Charles V, in consequence of his representations, the council appointed a chief judge to re-examine the points of controversy between the partisans of Indian liberty and the colonists. Las Casas, in his zeal for the Indians, became the author (or the encourager at least) of the slave-trade, by which, with such purposes, he went from the Portuguese in Africa to supply the planters with laborers, of the want of whom they complained; and this was unfortunately put into execution. He next applied for a grant of an unoccupied tract, in order to try his own plan with a new colony. This he at length obtained, and with 200 persons, whom he persuaded to accompany him, landed at Porto Rico in 1521, but found that an expedition was advancing to ravage this very tract, and asserted his authority over such persons as the Moslem slaves. He endeavored in vain to prevent the threatened danger, and with the few who still adhered to him returned to Hispaniola to solicit succor. During his absence the natives attacked the settlement, whose populousness was increased by the returns of the Spaniards. In a short time not a Spaniard remained in that part of South America. Las Casas, in despair at the failure of his project, retired to the Dominican convent at Saint Domingo, and assumed the habit of the order. Notwithstanding his retirement his zeal in the cause of the Indians did not abate; and being sent on a mission to Spain by a chapter of his order at Chiapas in 1542, he pleaded their cause with his pristine warmth, and composed his famous treatise 'Brevissima Relacion de la Destruccion de las Indias,' in which he exposed the cruelties practised by the Spaniards. His unremitting perseverance at length obtained a new set of laws and regulations, by which the natives were greatly relieved. In 1544 he returned to America as bishop of Chiapas, but left it three years later, and resigned his bishopric in 1550.

Besides the treatise above named he wrote 'Historia de las Indias.' This was first printed in 1875-76. It is one of the most notable of books in America. From his own and later Spanish discoveries from 1492 to 1520, and a contemporary Spanish Catholic criticism as well as story of Columbus,—but in the circumstances which prevented its publication for more than 300 years, and which still leave it inaccessible except to readers of Spanish. Sultani Lorente, 'Oeuvres de las Casas' (1822); Quintana, 'Vidas de Españoles Célebres'; Help, 'Life of Las Casas and Spanish Conquest' (Philadelphia 1868); Fabie, 'Vida y Escritas de Las Casas' (Madrid 1879); Sabin, 'Works of Las Casas' (New York 1870); Prescott, 'Conquest of Mexico' (Philadelphia 1902); MacNutt, F. A., 'Bartholomew de Las Casas' (New York 1909).

CASAS GRANDES, ká-sás grán'dás (Span. "great houses"), a town in Chihuahua, Mexico, on the Casas Grandes or San Miguel River, 35 miles south of Llanos, and 130 miles south of Ciudad Juárez. It is one of the most remarkable for a number of ruins, apparently relics of an aboriginal race. These ruins are found about half a mile from the small Mexican village, partly on the declivity of a small hill, and partly on the plain at its foot. They consist chiefly of the remains of a large edifice of the pueblo type, built entirely of a substance resembling adobe, mud mixed with gravel and straw and formed into blocks 22 inches thick and about three feet long. The portions which must have been constructed of wood have entirely crumbled away. The outer walls are almost all prostrate, except at the corners, and were probably only one story high; the inner walls are better preserved, varying in height from 3 to 6 feet, and in some cases five feet thick at the base. The portions remaining erect seem to indicate an original height of from three to six stories. The doorways have the tapering form noticed in the ancient structures of Central America and Yucatan, and over them are circular openings in the partition walls. The stairways were probably of wood and placed on the outside. Clavigero, in his 'History of Mexico,' tells us that the building, according to popular tradition, was erected by the Molas, as a storehouse for slaves. He endeavored in vain to prevent the threatened danger, and with the few who still adhered to him returned to Hispaniola to solicit succor. During his absence the natives attacked the settlement, whose populousness was increased by the returns of the Spaniards. In a short time not a Spaniard remained in that part of South America. Las Casas, in despair at the failure of his project, retired to the Dominican convent at Saint Domingo, and assumed the habit of the order. Notwithstanding his retirement his zeal in the cause of the Indians did not abate; and being sent on a mission to Spain by a chapter of his order at Chiapas in 1542, he pleaded their cause with his pristine warmth, and composed his famous treatise 'Brevissima Relacion de la Destruccion de las Indias,' in which he exposed the cruelties practised by the Spaniards. His unremitting perseverance at length obtained a new set of laws and regulations, by which the natives were greatly relieved. In 1544 he returned to America as bishop of Chiapas, but left it three years later, and resigned his bishopric in 1550. Besides the treatise above named he wrote 'Historia de las Indias.' This was first printed in 1875-76. It is one of the most notable of books in America. From his own and later Spanish discoveries from 1492 to 1520, and a contemporary Spanish Catholic criticism as well as story of Columbus,—but in the circumstances which prevented its publication for more than 300 years, and which still leave it inaccessible except to readers of Spanish. Con- sult Llorente, 'Oeuvres de las Casas' (1822); Quintana, 'Vidas de Españoles Célebres'; Help, 'Life of Las Casas and Spanish Conquest' (Philadelphia 1868); Fabie, 'Vida y Escritas de Las Casas' (Madrid 1879); Sabin, 'Works of Las Casas' (New York 1870); Prescott, 'Conquest of Mexico' (Philadelphia 1902); MacNutt, F. A., 'Bartholomew de Las Casas' (New York 1899).

CASATI, ká-sá'té, Gaetano, Italian explorer in Africa: b. Lesmo, Italy, 1830; d. Como, 7 March 1902. He entered the army of Piedmont at 21, and resigning in 1879 went
to Africa, commissioned by the Société d'Esplorazione Commerciale d'Africa. He followed the Welle River and explored the basin of the Bahr-el-Ghazal. He joined his countryman, Gessi Pasha, there, but the schemes of the Mudir of Lualaba shut them in in the Niam-Niam region with Emin Pasha. At the request of the latter he consented to act as 'President' in King Kabba Rega's country, but after being at first well treated by that monarch he was later condemned to death. Escaping with great difficulty to the Albert Nyanza Lake, and losing all his notes and manuscripts, he was finally rescued by Emin Pacha in 1888. The expedition of Stanley came a little later to the relief of both. On his return to Italy Casati published a volume descriptive of his adventures, entitled 'Dici anni in Equatoria.'

CASAUBON, kä-zô-bôn, Isaac, Swiss classical scholar and theologian: b. Geneva 1559; d. London about July 1614. In his ninth year he spoke Latin fluently. In his 19th year he entered the university at Geneva, where he studied Greek, theology, the oriental languages, etc., and in 1582 he proceeded B. D. and in 1586 was appointed to the chair of Greek in the University of Louvain. In 1596 he accepted a professorship of Greek and belles lettres at Montpellier, but held it only two years. In 1600 Henry IV invited him to Paris. His Protestantism, the jealousy of other scholars, and perhaps his rather unyielding character, were the occasion of many unpleasant occurrences, for which, however, he was indemnified by the office of royal librarian. After the death of Henry IV in 1610 he went to England on the invitation of the archbishop of Canterbury, where he was received with distinction, was presented with a prebend in Canterbury Cathedral, and had a pension conferred on him by James I, with whom he was a great favorite. He was buried in Westminster Abbey. Casaubon was a liberal theologian, a man of extensive learning, a good translator and an excellent critic. As a critic, he commented on Diogenes, Laertius, Aristotle, Theophrastus, Suetonius, Persius, Polybius, Theocritus, Strabo, Dionysius of Halicarnassus, Athenaeus, Pliny the Younger, etc. Nearly all the ancient classics are indebted to his valuable researches. His profound dissertation on the satirical poetry of the Greeks and the satire of the Romans ('De Satyrca Graec Po. si et Romanorum Satira') deserves particular praise. His theological writings are of less value. His diary, which had been preserved by his son, Marc, was edited by Russell (Oxford 1850) under the title of 'Ephemeredis.' Casaubon's 'Letters' were published at Rotterdam (1709). A 'Life of Casaubon' was written by Mark Pattison (1875; i.d., ed., ed. by Nettlethorpe, Oxford 1892). Consult also Nozelle, 'Isaac Casaubon, sa vie et son temps' (Paris 1897).

CASAUBON, Micie, son of the preceding. Swiss classical scholar in England: b. Geneva 14 Aug. 1599; d. Oxford, 14 July 1671. He went to school at Sedan, and in 1611 followed his father to England, and studied at Eton and Christ Church, Oxford. He held successively several livings in the Church, when the revolution, Charles I to the scaffold, deprived him of his income. Still he rejected the proposal of Cromwell to write the history of his time, as also the invitation of Queen Christina to live in Sweden. On the return of the Stuarts he was rewarded for his loyalty by restoration to his offices in the Church, which he held till his death. Besides various works in Latin, he wrote several in English on theological and other subjects. Through the efforts of Charles I, he became doctor of divinity. He also wrote some critical works on the classics, a treatise, 'De Verborum Usu' (1647), etc.

CASBIN. See KASBIN.

CASCA, Publius Servilius, Roman statesman: d. 42 B.C. He assisted in the assassination of Julius Caesar in 44 B.C., and, according to Plutarch, he struck the first blow, in the back of the neck.

CASCADE MOUNTAINS, a range in the western United States and Canada, the northward continuation of the Sierra Nevada (q.v.). The range begins in California near the Oregon boundary and extends across Oregon and Washington into British Columbia. It parallels the Pacific coast at a distance of from 100 to 150 miles. The Columbia River and the Klamath have cut their way across the southern portion of the range and the Fraser River passes across the northern end. The range is extremely rugged in outline. The greater part of its mass is composed of igneous and volcanic rocks. Firs, pine and hard wood cover a goodly portion of the slopes. The highest peaks are Mount Shasta, 14,380 feet; Mount Hood, 11,225 feet; Mount Jefferson, 10,300 feet; Mount Rainier (Tacoma), 14,363 feet; Mount Baker, 10,500 feet; Mount Adams, 12,470 feet. Some summits are recently extinct volcanoes and there are large snowfields, or which feed several glaciers. The range was first folded about the close of the Jurassic. During Tertiary time it was re-elevated, with the outpouring of great lava sheets.

CASCEPDIAC RIVER, Great, a river of Canada, in the province of Quebec, flowing southeast into Chaleur Bay. Its length is 150 miles.

CASCEPDIAC RIVER, Little, a river of Canada, in the province of Quebec, east of the Great Cascepdiac, and with an almost parallel but shorter course.

CASCARA SAGRADA, the bark of a northwestern tree (Rhamnus Purshiana, or California buckthorn), of the natural order Rhamnaceae. The composition of cascaria is extremely complex, but its main action is due to the volatile oils, the anthracene resins, at least three, the amoroids and the tannin, malic and oxalic acids. It stimulates peristalsis, increases the intestinal juices and has marked effects on general excretion. It is an excellent laxative and one of the very best purgatives for habitual and chronic constipation. It is best used in the form of a fluid extract. Because of its valuable properties, many patent drugs with similarly sounding names have been created on the public. These mostly contain other and more powerful and pernicious cathartics. See BUCKTHORN.

CASCO BAY, a bay on the southwest coast of Maine. It is about 20 miles wide and so deep as to constitute one of the best harbors
of the world, for all kinds of vessels. It contains many islands. Portland is located on the west side.

**CASE, Augustus Ludlow, American naval officer:** b. Newburg, N. Y., 3 Feb. 1813; d. Washington, D. C., 17 Feb. 1893. He entered the navy as a midshipman in 1828. In the Mexican War he took part in the capture of Vera Cruz and Tabasco, and during the Civil War served as fleet captain of the North Atlantic blockading squadron. He took part in the capture of Forts Hatteras and Clark, and cut out the blockade-runner Kate, under the fire of the forts at New Inlet, N. C. He was a lighthouse inspector in 1867; chief of bureau of ordnance, 1869; commander of the European squadron in 1873; was placed in command of the fleet at Key West at the time of the Virginia affair; and was retired in 1875, with the rank of rear-admiral.

**CASE, Leonard, American philanthropist:** b. Cleveland, 27 June 1803; d. 6 Jan. 1880. He was graduated at Yale College in 1824, and continued to pursue literary and scientific studies, contributing to the best magazines. Inheriting from his father a large estate in the city of Cleveland, he devoted a certain part of it for the support of his educational institution, which was incorporated after his death as the Case School of Applied Science (q.v.).

**CASE, Theodore Spencer, American physician:** b. Jackson, Ga., 26 Jan. 1832; d. Kansas City, Mo., 16 Feb. 1900. He was graduated at Marshall College in 1852 and at the Starling Medical College, Columbus, Ohio, in 1856. In 1883 he received the honorary degree of Ph.D. from the University of Kansas. Subsequent to the receipt of his medical degree he settled in Kansas City, and from 1880 to 1891 edited the Medical Review there, also holding the office of alderman in 1860. He became second lieutenant of the 25th Missouri infantry in June 1861, and later captain and assistant quartermaster. In February 1865, he was made colonel and later quartermaster-general of Missouri, and in 1866-68 was curator of the University of Missouri. From 1873 to 1885 he was postmaster of Kansas City and in 1885 became professor of chemistry in Kansas City Medical College. He edited the Kansas City Review of Science and Industry from 1877 to 1885, and in 1886 became president of the Kansas City real estate and stock exchange.

**CASE, Thomas, English philosophical scholar.** He was educated at Rugby and Balliol College, Oxford, was Waynflete professor of moral and metaphysical philosophy at Oxford from 1889 to 1910, and was appointed president of Corpus Christi College in 1904. He has published 'Materials for History of Athenian Democracy from Solon to Pericles' (1874); 'Realism in Morals' (1857); 'Physical Realism' (1888); 'Saunders's Mary's Clusters' (1893).

**CASE, in grammar, a form, modification or inflection of a noun or pronoun, indicating or corresponding to its relationship to some other word or words in a phrase or sentence, as, John (nominative case) speaks; John's (possessive) dog barks; John beats his (possessive) dog (object); to maintain the nominative, the objective, the dative, the genitive, the ablative, the locative, and the vocative: English pronouns have three cases—nominative, genitive and accusative, as he, his, him. The last often serves as a dative. Adjectives undergo no modifications in English. In Sanskrit there are eight cases—nominative, accusative, instrumental, dative, genitive, ablative, locative and vocative. In Latin there are six cases—nominative, genitive, dative, genitive, accusative, vocative, ablative. In Greek there are five, the ablative not being used. In both Latin and Greek there are traces of a locative case. In French, Italian, Spanish and Portuguese, the nouns have no case-inferences. In German both nouns and adjectives are in- flected for case. There are four cases in German—nominative, genitive, dative, accusative. In law, the word has various meanings. An action upon the case is one in which damages are sued for, for some cause of complaint where the injury done is not direct, as in trespass, but consequential. A case stated is a statement prepared by one court for the decision of a point of law by a superior court. A special case is a written statement of facts agreed upon by two or more litigants in an action, in order that a court may decide their legal effect. In the United States the term is used in brief for case on appeal, meaning the statement laid before a court of appeal by an appellant and presenting the complete record of the original trial in the lower court. Thus the appellate court is allowed to review the findings as well as the points of law involved and here case differs from a bill of exceptions in which points of law only are submitted for the consideration of the appeal court. A case reserved is a statement drawn by counsel and certified by the judge, to be used as a basis for argument on points of law before a full bench of the court.

In letter-press printing, a case is a receptacle for types, generally made of wood, 34 inches long, 15 inches wide and 1½ inches deep, and divided into compartments or boxes, each of which contains types of one class or letter. A pair of cases consists of an upper and a lower case; the upper one has 96 boxes, and contains the capitals, small capitals and some other signs that are only occasionally required in composition; the lower one has 54 boxes, and holds the letters of the small characters, figures, spaces and most of the points. Thus the small characters are habitually spoken of by printers as lower-case letters, and the capitals, etc., as upper-case letters. The places assigned to the several letters of the alphabet in the boxes of the case are not precisely the same in all printing-offices, but the differences are few. The different sizes of the boxes in the lower case depend upon the comparative frequency with which the several letters occur in composition, and the position in the case allotted to each letter is such as to afford the greatest facility in composing. The letter e, which is most run upon in the English language, has a box much larger than any of the other compart-
CASE-HARDENING, the process of converting the surface of certain kinds of malleable-iron goods into steel, thereby making them harder, less liable to rust and capable of taking on a better polish. Fire-irons, gunlocks, keys and other articles of limited size, and not commonly so treated, but the process is sometimes applied to large objects, such as iron railway-bars. The articles are first formed, and heated to redness with powdered charcoal or cast-iron, the malleable iron taking carbon from either of these to form a skin of steel upon it; the heated objects are then cooled in cold water, or in oil when they are of a delicate nature. Yellow prussiate or potash or parings of leather have also been a good deal used for coating iron articles with steel by heating them together. Some chemists consider that in this case nitrogen combines with the iron and effects the hardening. The coating of steel is very thin, seldom exceeding one-sixteenth of an inch. Where a thicker coating is needed the articles are treated several times. The so-called "Harveyizing" process of hardening steel armor plate is similar to case-hardening in that the surface is made very resistant to the entrance of projectiles by heat treatment in carbon, while the back is softer and tough in resist the smashing effect of the projectile after it has penetrated the hardened surface. A Swedish ironmaster has found that a very excellent case-hardening is obtained by treating iron or steel objects with a mixture of animal matter, such as rasped leather or horn, and arsine acid dissolved in hydrochloric acid, and heating as usual. Charcoal alone is also used with success.

CASE-SCHOOL OF APPLIED SCIENCE. The, at Cleveland, Ohio, founded by Leonard Case (q.v.) of that city. In 1877 a deed of trust was executed setting apart certain real estate for the support of the institution, the deed to take effect upon his death, which occurred in 1880. The Case School was incorporated 29 March 1880. Instruction began in 1881, with a class of 16 students, the school being carried on from that until the summer of 1885 in the old Case homestead. A commodious building having been erected for the use of the school, it was occupied at the beginning of the term in September 1885. A year later the building with all that it contained was destroyed by fire. It was promptly rebuilt and occupied in 1888. Since that time several additional buildings have been erected, with superior apparatus and appliances. The Case School of Applied Science offers six regular courses of instruction, each requiring four years. They are civil engineering, mechanical engineering, electrical engineering, mining engineering, physics and chemistry. There are 53 professors and instructors and 557 students. The degree of bachelor of science is granted to all who complete one of the regular courses. That of master of science may be conferred upon graduates who have devoted at least one year exclusively to graduate study. There are professional degrees, namely, civil engineer, mechanical engineer, electrical engineer and engineer of mines may also be conferred after one year of graduate study or after professional work for a period of three years after graduation. The property left by Mr. Case as an endowment for the support of the school is valued at about $2,500,000, and the amount invested in buildings and equipment is about $1,000,000. The school derives its support in part also from the government, which is its present source of revenue. Its government rests with a corporation consisting of 20 men, from whom six, known as trustees, are selected.

CASE-SHOT, a projectile formed by putting a quantity of bullets into a cylindrical tin box called a "canister," that just fits the bore of the gun. In case of necessity, the canister's filled with broken pieces of iron, nails, stones, etc. The case is closed at both ends by a disc of wood or iron. Shot of this sort is thrown from cannons and howitzers, and is very injurious to the enemy, being shot into a solid clot contained in the canister spread, diverging in proportion to the distance. The balls vary in weight, according to the character of the ordnance, from one or two pounds to half an ounce each, in some the range is 3000 yards, but only 200 to 300 yards. It is also called "canister-shot." The shrapnel-shell, in its present cylindrical shape, may be considered a variety of case-shot. See ORDINANCE.

CASE-WORM. See CADIS-FLY.

CASEIN, ka'-se-in (Lat. caseus, "cheese") a colloidal substance resembling albumen in its general constitution, and obtained from milk. The older chemists gave the name "casein" both to the precipitated substance that is now known by that name, and to the corresponding substance as it exists in solution in the milk; but it is the scientific practice at the present time to distinguish the latter as "caseinogen." Caseinogen is the principal nitrogenous constituent of milk, in which it occurs to the extent of about 3 per cent, forming 80 per cent of the protein content. It is precipitated by a curdy mass, when acetic acid or a mineral acid is added to milk that has been previously diluted by the addition of its own bulk of water. If the caseinogen so prepared is made into a paste and then treated with a small quantity of rennet, the mass that is thus obtained consists of true casein; but Hämmersten has shown that if the caseinogen is first washed entirely free from calcium phosphate, rennet is without action upon it. The precise function of the calcium phosphate is obscure, and the same may be said of the chemical relations of
the proteids in general. If rennet is added to fresh milk a bulky deposit of casein and butter fat comes down immediately; but to obtain the casein in pure form, the oily matters in the milk should be first removed by the action of a centrifugal separator. Caseinogen is not precipitated by heat, nor does it (like fibrinogen) coagulate spontaneously. The coagulation observed when milk is boiled is due to the albuminogen present, and not to the casein; and that which occurs upon standing may be due either to the generation of lactic acid through the fermentation of the lactose present, or to the rennet-like action of the ptolemains liberated by micro-organisms that happen to fall into the milk from the air. According to the analyses of Chittenden and Painter, the elementary percentage composition of casein is as follows: Carbon, 53.30; hydrogen, 7.07; nitrogen, 15.91; sulphur, 0.82; phosphorus, 0.87; oxygen, 22.03.

Casein is insoluble in water, alcohol or ether, but dissolves easily in alkaline solutions. It also dissolves in very weak hydrochloric acid, from which it is again precipitated upon the addition of the same reagent in more concentrated form. Casein for commercial purposes is prepared almost wholly from cow's milk. The milk is first put through a centrifugal separator to remove the fat, and then from 4 to 6 per cent of caustic alkali is added. The milk is then run into a vat, and dilute sulphuric acid is added, the whole being stirred constantly. When the curd has settled it is washed with cold water and drained on cheesecloth filters. It is pressed in a cheese press as dry as possible, and then broken up into very small pieces in a curd mill; after which it is dried at a low temperature in a vacuum. The chief use of casein in the arts is as a glue. In this from it is widely utilized in the wall paper industry in the production of washable wall papers, and also in the production of enamelled papers, in which casein glue is used as the binder for the materials of the enamel coating. It is also used in the making of erasable tablets, paper slates, etc. As a binder for various fillers many solid articles are produced in imitation of ivory and tortoise-shell. A compound of casein and denatured alcohol is used in the dyeing industry for "animalizing" cotton fabrics so that the fibres will retain the colors applied to them. In medicine, casein is being more and more employed, its combination with certain drugs immensely enhancing their efficacy. This is particularly marked in the administration of iodine, phosphorus, arsenic, mercury and iron, as well as many alkaloids and organic compounds. See Proteins. Consult Hammarsten-Mandell, 'Physiological Chemistry' (New York 1914); Sherer, R.J., 'Casein: Its Preparation and Technical Utilization' (London 1906).

CASEMATES (Sp. casa, "a house," and matare, "to kill"), in fortification, vaults which are proof against bombs, and which may be constructed under a parapet and provided with embrasures or ports through which guns are fired. They may serve, at the same time, as a place for keeping the heavy ordinance and various stores, and in case of necessity as habitation for the garrison or shelter for sick or wounded.

CASEMENT, Sir Roger, Irish revolutionist: b. Ireland, 1 Sept. 1864; executed in Lon-

don, 3 Aug. 1916. Though born in Ireland, Casement was of English parentage and a Protestant by creed. He entered the British consular service at the age of 28, and served in the Niger Coast Oil River Protectorate from 1892 to 1895, when he was appointed consul in the Portuguese province of Lorenzo Marques. In 1898 he was made consul for the Portuguese possessions in West Africa, south of the Gulf of Guinea. During the war in South Africa he was engaged on special service at Cape Town in 1899 and 1900, and on the conclusion of hostilities he was decorated with the Queen's medal. In 1900 Casement was transferred to the Belgian Congo, and in 1901 was appointed to act as consul also for part of the French Congo. In 1905 he was made a C.M.G. and in the following year was appointed consul for the state of Sao Paulo. His next promotion took place in 1908, when he was made British consul-general at Rio de Janeiro. Between 1909 and 1912 he was employed in making inquiries relative to the rubber industry atrocities, and retired on a pension in 1913 after an honorable and useful career. He received his knighthood in June 1911, on which occasion he wrote the following letter to the Secretary of State for Foreign Affairs:

"I find it very hard to choose the words with which to make acknowledgment of the honour done me by the King. I am much moved at the proof of confidence and appreciation of my services on the Putumayo, conveyed to me by your letter, wherein you tell me that the King had been graciously pleased, on your recommendation, to confer upon me the honour of knighthood. I am indeed grateful to you for this signal assurance of your personal esteem and support. I am very deeply sensible of the honour done to me by his Majesty. I would beg that my humble duty might be presented to his Majesty, when you may do me the honour of conveying to him my deep appreciation of the honour he has been so graciously pleased to confer upon me. I am, dear Sir Edward Grey," etc.

In view of his tragic end and the circumstances that brought it about, this expression of Casement's sentiments was strangely at variance with his subsequent action during the European War. Suspicion was first directed toward him a few months after the war broke out, when it became known that Casement, after moving about at large in Germany at a time when all British subjects in that country were either interned or under police supervision, Questions were asked in the British Parliament, and Casement's pension was withdrawn on 30 Sept. 1914, up till which time it had been paid to him. A large number of British prisoners of war had fallen into German hands between September and December 1914. In the latter month a great many Irish soldiers were collected in a large camp at Limburg, apparently for a special purpose. These prisoners were assembled on several occasions and addressed collectively and individually by Casement, who moved about the camp freely with the full approval of the German authorities. He introduced himself as Sir Roger Casement, the organizer of the Irish volunteers. Telling the men that he was forming an Irish brigade, he invited all Irish prisoners to join it. Those who agreed, he said, would be sent to Berlin as the guests of the German government, and that, if Germany won the war, the brigade would be landed in Ireland to fight against England. In the event of Germany losing the war, each man would receive from
CASERTA — CASEY

Cassetta (formerly Terra di Lavoro), a province of Italy, north of Naples, along the Mediterranean Sea. Its chief industries are agriculture and cattle raising; there are also some flourishing manufactures. Area, 2,033 square miles. Pop. 749,414.

CASERTA, ká-zár-tá, Italy, capital of the province of Caserta, 17 miles northeast of Naples. It is the seat of a bishop, and contains many fine buildings. The principal edifice is a palace, one of the finest in Europe, a large and richly decorated structure commenced in 1724 by Charles III of Spain, and designed by Vanvitelli. This magnificent edifice forms with its four courts a huge rectangle, whose south side is 830 feet long and 134 feet high, and has 37 windows in each story. The middle of the rectangle runs a splendid colonnade 541 feet long, from the centre of which rises the beautiful marble stairway with 116 steps. The chapel of the palace is richly decorated and contains many noteworthy works of art. The theatre of the palace has 40 boxes and 12 Corinthian columns of African marble from the palace of Serapis at Pozzuoli. The water for its fountains is brought 26 miles from Mount Taburno by an aqueduct which crosses the Maddaloni Valley on a daringly constructed bridge, 1,700 feet long and 190 feet high, and situated among gardens adorned with numerous ancient and modern statues. The principal manufactures are silk goods, carpets, linen, etc. The district produces excellent wines. Pop. 31,000.

CASEY, Silas, American army officer: b. East Greenwich, R. I., 12 July 1807; d. Brooklyn, 21 Jan. 1852. He was graduated from the United States Military Academy at West Point in 1826; served in the Mexican War, being present at the battles of Contreras, Churubusco, Molino del Rey and the siege of Chapultepec. When the Civil War broke out he was given charge of organizing the volunteers near Washington; later served in the Army of the Potomac, and won much distinction at Fair Oaks; was president of the board to examine candidates for officers of colored troops in 1863-65; brevetted major-general U. S. A., 13 March 1865; and retired in 1868. His publications include 'System of Infantry Tactics' (1862); and 'Infantry Tactics for Colored Troops' (1863).
CASEY, Thomas Lincoln, American military engineer: b. Sackett's Harbor, N. Y., 10 March 1831; d. Watertown, D. C., 5 March 1896. He was graduated from West Point in 1852, and entered the engineer corps of the army. During the Civil War he was superintending engineer of defenses on the coast of Maine, and on special duty with the North Atlantic squadron in the first expedition against Fort Fisher. In 1865 he was brevetted colonel for gallant services during the war. In 1868 he was put in charge of one of the departments in the chief engineer's office at Washington; in 1873 was sent abroad for professional service; and in 1877 was placed in charge of the construction of the state, war and navy building, and of the Washington aqueduct, and also of the Department of Public Buildings and Grounds. Later he built the White House conservatory and the Army Medical Museum, completed the Washington monument and took charge of the construction of the Congressional Library. He was president of the board of engineers for fortifications at New York in 1886-88; was appointed chief of engineers and brigadier-general in 1888; and was elected to the National Academy of Sciences in 1890.

CASEY, Timothy, Canadian Roman Catholic bishop: b. Plumeridge, County Charlotte, New Brunswick, 20 Feb. 1862. He was educated at St. Stephen Grammar School, Saint Joseph's College, Memramcook, and Laval University. He was ordained to the priesthood in 1886, became successively curate at Fredericton, rector of the cathedral of Saint John, chancellor of the diocese, and rector of Saint Dunstan's Church, Fredericton. In 1899 he was appointed bishop of Utica and coadjutor to Bishop Sweeney of Saint John, being consecrated 11 Feb. 1900, and he succeeded to the bishopric 25 Mar. 1901. He was appointed archbishop of Vancouver 2 Aug. 1912. He attended the Eucharistic Congress at Montreal in 1910, and is known as an ardent temperance reformer.

CASGRAIN, kás-graˈn, Henri Raymond, French Canadian author: b. Rivière Buelle, Quebec, 1831; d. Quebec 1904. He was educated at College Sainte Anne and Quebec Seminary, and was ordained to the priesthood in 1856. He relinquished the ministry in 1872, owing to an affection of the eyes, and subsequently devoted himself to literature. His works include 'Légendes Canadiennes' (1860); 'Histoire de la Mère Marie de l'Incarnation' (1864); 'Histoire de l'Hôtel-Dieu de Quebec' (1878); 'Pelerinage au Pays d'Evangelie,' which was crowned by the French Academy (1885); 'Biographies Canadiennes' (1885); 'Montcalm et Levi' (1891); 'Une Seconde Acadie' (1894); 'Les Sulpiciens et les préces des Missions étrangères en Acadie' (1897).

CASGRAIN, Philippe-Baby, Canadian lawyer, statesman, politicians: b. Quebec 1826. A student of Saint Anne's College, he was admitted a lawyer in 1850, and for several years was deputy prothonotary of the provincial Superior Court, before becoming clerk of the Circuit and Revision Court. From 1872 to 1891 he was 31st member of the House of Commons, prominent in public affairs and notably in a program for a Canadian navy. He was also known for high historical and literary gifts and on three occasions, 1898, 1899 and 1906 was elected president of the Literary and Historical Society of Quebec. Besides numerous contributions to the Transactions of the Royal Society of Canada and the Transactions of the Quebec Literary and Historical Society, his published writings include: 'Lettre de Saint Just et son temps' (1885); 'La Fontaine de Champlain à Quebec' (1888); 'La vie de Joseph-François Perrault' (1898); 'Les Plaines d'Abraham' (1900); 'Seconde bataille des Plaines d'Abraham et de Sainte Foye' (1900); 'La maison de Montcalm' (1902); 'La maison de Borgia' (1904); 'Le moulin de Dumont' (1905); 'Cadet, sa maison et sa résidence à Quebec' (1906); 'A Few Remarks on Various Gallicisms and French Locutions in the Plays of Shakespeare' (1907); 'La Chapelle et le tombeau de Champlain' (1907); 'Notre système judiciaire' (1911).

CASGRAIN, Thomas Chase, Canadian statesman: b. Detroit, 28 July 1852; d. 29 Dec. 1916. He was educated at Quebec Seminary and Laval University, Montreal. He was called to the bar of Quebec in 1877, and was junior council for the Crown at the trial of Louis Riel for high treason at Regina in 1885. He was returned to the provincial assembly of Quebec in the Conservative interest 1886-90, 1892-96, holding office as attorney-general 1891-96. He was chairman of the Royal Commission appointed in 1894 to revise and amend the civil procedure. He represented Montmorency in the House of Commons, 1896-1904. He opposed the Taft-Fielding reciprocity agreement of 1909. He was appointed a member of the International Joint Commission in 1911, and was chairman of the Canadian section, and held the office of Postmaster-General in the Borden administration from 1914 until his death, during which period he represented Quebec County.

CASH REGISTER, an automatic device for recording all transactions handled in retail stores. It is probably the most antique, and yet in its improved form the most modern device known to commerce. More than 6,000 years ago the ancients used a registering device known as the Abacus (q.v.) for the purpose of showing visibly to the buyer and seller the amount purchased. The modern cash register was invented by Jacob Ritty, of Dayton, Ohio, patented 1879, it being suggested to him by the dial on a steamship which recorded the number of revolutions of the propeller. The first practical cash register was a crude device which punched holes in a strip of paper. By counting the number of holes the merchant could tell how much money he should have in his cash drawer. The present day cash register is a combination adding machine and printing press, which, by its perfect mechanism, provides a record of all transactions handled. It tells instantly how much business each clerk has done; how many customers each clerk has waited on; who, if anyone, has made a mistake; the total amount of money taken in; the number of change, received on account and paid out transactions handled. It issues a receipt, which bears printed figures of the amount of the transaction, the initial of the clerk who handled it, the consecutive number of the sale, the kind of sale and the date. In
addition, this receipt contains the merchant's name and address, together with any advertising he may care to use. Some registers do not issue a receipt, but print the same information on a sales slip inserted in the register. This receipt is often required as evidence in the package with the goods going to the customer. At the same time the receipt is issued, the miniature printing press prints the detail of every transaction that occurs upon a roll of paper locked up inside the register. This gives the proprietor full information concerning every detail of his business, offering him at a glance facts showing the progress of his store, as well as the industry of each clerk.

The object of the cash register is to stop mistakes, remove temptation, eliminate carelessness, increase trade and increase profits. It furnishes information concerning a business which could be obtained in no other way except through a large amount of detail work. It protects the money received by providing a correct account of all incoming cash, and accounts for the money paid out, and at the same time provides a record of the amount of credit business handled. It not only indicates the amount of each and every transaction, as well as the initial of the clerk who handled it, but at the same time transmits the amount indicated to various sets of adding wheels, and also prints that amount on the receipt going to the customer. A receipt going to the customer bearing printed figures of the transaction makes it necessary to record the correct amount on the register. This ensures the proprietor that he will get an accurate record of every transaction handled in his business. More than 2,000,000 of these machines are in use the world over. See CALCULATING MACHINES.

CASHAN or KASHAN or KASHIN, Persia, a town in the province of Irak-Ajeme, noted for its production of shawls, silk stuffs and other goods. It is one of the most flourishing towns in Persia, and has a royal palace, numerous mosques, colleges, bazaars and baths. The carpets are noted for their industry, and besides shawls and silk stuffs already mentioned, they manufacture copper goods, gold and silver articles, brocade and cottons. They also carry on an active trade in agricultural produce and carry on commerce with all parts of the Orient and with Europe by way of Isphahan. The silk stuffs produced at Cashan are held in high esteem, and are worn by the Shah and his entourage. Foreigners from the West who have visited the place have found the inhabitants, who belong chiefly to the Shiite sect of Mohammedans, more enlightened and liberal in their treatment of strangers than most Orientals. Many of the merchants are very wealthy, but are compelled by the oppressive exactions of public officials to hide their riches as much as possible from view. The interior of the homes of some of them, which present a neglected aspect on the outside, are said to be palatial in splendor. The province of Irak-Ajeme, in which Cashan is situated, has nearly the same boundaries as the country known to the ancients as Great Media, or Media Proper. It is the most productive portion of Persia, fertile and with a flourishing trade. Cashan has a population of about 30,000. See PERSIA.

CASHEL, Ireland, town in Tipperary County, about 49 miles northeast of Cork; noted as containing the most interesting ruins in Ireland. These consist of a Gothic cathedral founded in 1169; a stone-roofed chapel, built in 1127; Hore Abbey, founded in 1272; the palace of the Munster kings; and a round tower, 88 feet high, said to be the ancient residence of the kings of Cashel. They are built on the Rock of Cashel, an elevation 300 feet high, and form the summit of the slope which the town occupies. Here was held the great synod, in 1172, when the Irish priests first acknowledged the authority of the Pope. The city of Cashel is now a Roman Catholic archdiocese. Dean Swift was a native. Pop. 2,813.

CASHEW (a corruption of açajou, the French form of the native Brazilian name açaijuba), a tree (Anacardium occidentale) of the order Anacardiaceae, common in the West Indies. It is a spreading tree, from 20 to 40 feet high, and is a native of the tropics. It has alternate, obtuse, ovate leaves, and bears bunches of red, scented flowers. The juice of the stem is used as a varnish; and an aromatic drug is prepared by decoction and fermentation of several parts of the tree, afterward consolided by evaporation. The nut is small, kidney-shaped, ash-gray, about an inch long, and is seated on the end of a large fleshy receptacle varying in size from that of a cherry to a medium-sized pear. The shell consists of three layers, the outer and inner of which are hard and dry, but the intermediate layer contains a quantity of black, extremely acrid, caustic oil, which is destroyed by roasting the nuts before eating them. The oil is applied to floors in India and elsewhere to protect them from the attacks of white ants. In the West Indies it is put into wine, especially old Madeira, to which, it is said, it imparts an especially agreeable flavor. It is also used in chocolate. A gum with properties similar to those of gum arabic is obtained from the plant.

CASHEW-BIRD, kāsh'ā-bīrd, another name for the galeate curassow. See CURASSOW.

CASHGAR, or KASHGAR, Turkestan, the capital city of the Chinese dependency of eastern Turkestan, in the province of Sin-Kiang or Kashgaria. It is on the Kizil-Daria or Kashgar River, in a position of strategic importance, 100 miles northwest of Yarkand, and comprises an old and a new town. They are both surrounded by mud walls and moats, and the new town is also defended by a citadel. The latter was built in 1838, is strongly garrisoned and contains the palace of the Chinese governor. There are considerable manufactures of cotton, gold and silver cloths, carpets, etc., and an extensive trade, its position at the junction of several great routes making it the emporium of much of the commerce of central Asia. It was the capital of an independent kingdom till conquered by the Chinese during the 16th century. In 1865 it revolted but was again subdued in 1877. The civil government of the region is in charge of a Chinese official, with the rank of Laotai. Pop. about 62,000. Consult Lansdell, 'Chinese Central Asia' (1894); Younghusband, 'The Heart of a Continent' (1904).

CASHIBO, kā-shē'bo, or CACHIBO, a savage tribe of Panano stock living near the Ucayale River, a tributary of the Amazon, in
eastern Peru. They are said to eat their old people at death, and have repeatedly killed the white missionaries who attempted to convert them. The men are bearded and wear long skirts. The women go entirely naked until after marriage.

**CASHIER.** To, in a military sense to dismiss from the service by annulling or withdrawing a commission. It is not an official term in the United States, and is commonly construed among military men as having a more disgraceful significance than "dismission," although there is no analogy or precedent in the use of the word by leading English authors to support this construction. Macaulay uses the term in the sense of simple dismissal or annulment of commission. Nevertheless in ordinary military parlance it means dismissal in disgrace, and its use in any other sense is regarded as unostent.

**CASHMERE,** or **KASHMIR,** a principality in the northwest of Hindustan, subject to a Maharajah belonging to the Sikh race, but under British protection and supervision. It is an irregularly shaped mountainous region, noted for its gorgeous scenery and the healthfulness of its climate. It is composed of various provinces and districts of which Cashmere proper is the most famous and interesting. It is situated in the southwestern portion of the state, and largely consists of an elevated valley intersected by the Jhelum. Besides Cashmere proper, the state embraces the territory of Jammu, Balti or Iskardo, and Ladakh and Gilgit. The whole principality thus formed is estimated to cover about 84,432 square miles, and its population in 1911 was 3,158,126. It extends from about lat. 32° to 35° N. and from about long. 73° to 80° E. Srinagar is the capital. The territory of Jammu, which forms the most populous portion of the principality, lies to the north of the Punjab, between the spurs of the Himalaya Mountains leading up to Cashmere and the Jhelum or Skardo. Its chief town is of the same name. Balti, also called Little Tibet, is an elevated region on the upper Indus, to the north of Kashmir proper, lying to the southwest of the Karakorum Mountains, and having for its capital Iskardo or Skardo. Ladakh, also called Middle Tibet, lies to the southeast of Balti, between the Himalaya and Karakorum Mountains, and is also traversed by the Indus. Its passes form some of the most important media of communication for central Asia. Its capital is Leh on the Indus. Gilgit is a district on the northwest of Balti. Sheep are largely kept by the inhabitants; and the main crops grown are maize, cotton, saffron, tobacco, hops, and barleys and beans. Butter is one of the exports. Within recent years there has been shown in improving means of communication, but in many parts of the country wheeled traffic is unknown, and there are only a few miles of railway. Educationally it is the most backward part of India, with 98 per cent of illiterates. As an independent monarchy until 1856, it was thereafter successively ruled by Moguls, Afghans and Sikhs, and was placed under British protection in 1846. The present Maharajah, Sir Pertab Singh, is a distinguished soldier and fought in Flanders with the British army in the Great European War.

The language of the people is called Kashmiri and is descended from the Middle Indian vernaculars, and is thus ultimately related to the Sanskrit, although many Arabic and Persian words have been adopted into it. The language has no written literature of native origin, but portions of the Bible have been translated into the vernacular. The script in which it is written is generally Persian; but the older Sharada alphabet, derived from the Devanagari, is sometimes used. Kashmiri folk literature is rich in tales and proverbs, many of which have been published in Knowles's *Dictionary of Kashmiri Proverbs and Sayings* (London 1885); and *Folk-Tales from Kashmir* (ib. 1888). Ethnological and anthropological information of value will be found in the following works: Duke, *Kashmir Handbook* (Leipzig 1903); Pirie, *Kashmir* (New York 1909); Bruce, *Kashmir* (ib. 1911); Grierson, *Manual of the Kashmiri Language*, comprising Grammar, Phrase-Book, and Vocabulary (2 vols., Oxford 1911); Neve, *Arthur, Thirty Years in Kashmir* (London 1913).

**CASHMERE GOAT.** See **Goat.**

**CAGURAN BAY,** ká-sé-goó-rán, an inlet on the east coast of the province of Princes, Luzon, Philippine Islands, reached through Casiguran Sound. The sound is about nine miles long from Cape Ildefonso to a narrow passage affording access to the bay. The bay itself is about three-quarters of a mile long and two and a half miles wide. Its depth is some 16 to 26 fathoms.

**CASIMIR,** ká-sí-mér, properly **KAZIMIERZ** ("founder of peace"), was the name of many Polish princes and kings. (1) **CASIMIR I:** b. 1015; d. 1058. During his minority he was under the regency of his mother and was driven from the kingdom with her. In 1041 his power was re-established, and through his efforts the predominance of Christianity was decided in Poland. (2) **CASIMIR II,** the Just; b. 1145; d. 1194. He was a son of Boleslas III, and ascended the throne in 1179. He pushed his armies into Volhynia and Lithuania and reconquered several places formerly belonging to Poland. He abolished tithes and other illegal imports and in 1180 convened an assembly at Leczyca, which in time became the Polish Senate. In 1185 he repulsed an attack by the Hungarians and four years later was in conflict with his brother Mieczias, who aimed to seize the throne. In 1192 he fought the Prussians. He renewed with the Hungarians the treaty fixing the Carpathians as the boundary between the two nations. (3) **CASIMIR III:** b. 1309; d. 5 Nov. 1370, called Casimir the Great, who succeeded his father, Vladislav Loketek, as king of Poland in 1333, was the most distinguished of the races. He added Little Russia and Red Russia to his dominions, and repelled the Tartars, who then threatened Poland. He founded the University of Cracow (1364), as well as several schools and hospitals, and showed great care and protection for the advancement of the arts and of learning in his kingdom. In 1347 he caused a new code of laws to be compiled, and protected the peasants, on which account he was called the peasants' king. He had a Jewish mistress who procured for her nation great liberties and protection. With him the line of the Piast, which

pensable to every orientalist. In the Madrid National Library are other interesting manuscripts, one of which is a copy and Latin translation of an ancient Arabic version of the canons of the Visigothic Church.

**CASKETS, The**, a group of rocks in the English Channel, seven miles west of Alderney. They have often been fatal to vessels, and, in 1119, Prince William, son of Henry I, and his subjects perished there. In 1744 the Victory ship of war, of 110 guns, also was shipwrecked upon them. On the highest there is a lighthouse. Victor Hugo has immortalized them in his "Tolliers of the Sea."

**CASLER, John Overton, American soldier:** b. Frederick County, Va., 1 Dec. 1838. He served in the Confederate army during the Civil War and was a prisoner of war from February to May 1865. He lived in Texas 1877-89, and has since been a resident of Oklahoma City, where he is justice of the peace. He is the commander of the Oklahoma division of United Confederate Veterans, and has published "Four Years in the Stonewall Brigade" (1893); "Lilian Stuart, the Heroine of the Pappanmock" (1889).

**CASORIA, ka-so-re' a, Italy, town in the province of Naples (Napoli), six miles north-northeast of Naples. It has four fine churches and is the residence of a district judge. Silk and wine are produced in the neighborhood. Pietro Martino, the painter, was born here. Pop. about 14,000.

**CAPARI, käs-pär' e, Karl Paul, German Church historian:** b. Dessau, 8 Feb. 1814; d. 11 April 1892. He was born of Jewish parents, and studied in Leipzig and Berlin. He was converted to Christianity in 1838, and subsequently became instructor of theology in the University of Christiania, Norway, in 1847. He became full professor in 1857. His Arabic grammar is in high repute, and his contributions to the study of the Old Testament include works on Obadiah, Isaiah, Micah and Daniel. He published besides the 'Grammatica Assyriaca,' (1844); the 'Beiträge zur Erleuchtung in Jesaja' (1848); 'Alte und neue Quellen zur Geschichte des Taufsymbols und der Glaubensregel' (1879).

**CASPE, käs pä' e, Spain, town in the province of Saragossa, 12 miles north-northeast of Alcañiz, left bank of the Guadalupe, near its confluence with the Ebro, on several small hills and in the intervening valleys. It is a paved streets, one principal and nine smaller squares, a handsome Gothic college and two churches, several chapels, three schools a townhall and prison in a suppressed convent, an hospital and several public fountains. Olive and mulberry trees are extensively cultivated, and coal and iron are mined in the neighborhood. Manufactures—wine, oil and soap. Some trade is also carried on in grain and cattle. A congress of Aragonians, Catalanians and Valencians assembled here in 1412 to settle the royal succession. Pop. 8,427.

**CASPER, Wy., town and county-seat of Natrona County, 150 miles northwest of Cheyenne, on the Platte River, the Chicago, Burlington and Quincy and the Chicago and Northwestern railroads. It contains a Carnegie library, the Wyoming General Hospital, and is the site of Fort Casper. It has extensive interests in live stock, oil and wool. The town owns the waterworks. Pop. 2,700.

**CASPIAN GATES**, a name given to the Russian fortress Dariel, situated in a narrow defile of the Caucasus, on the Terek, 80 miles north of Tiflis.

**CASPIAN SEA**, a large lake or inland sea between Europe and Asia, now nearly surrounded by Russian territory but having Persia on the south; 730 miles in length, from north to south, and from 130 to 270 in breadth; area about 170,000 square miles; the largest isolated sheet of water on the globe. The water is less salt than that of the ocean, of a bitter taste and of an ochre color, without ebb or flow. In some places it is exceedingly deep, yet it abounds in shallows, so as to prevent the navigation of ships which draw more than 9 or 10 feet of water. The level of the Caspian Sea is considerably lower than that of the ocean. Among the rivers which flow into it are the Volga, Ural, Terek and Kur. In ancient times the Oxus (Amoo Daria) also flowed into it. It has no outlet. The fisheries here, which are very valuable, occupy and train many seamen. Sturgeons and sterlets are caught in great quantities, and there are also salmon, trout, perch, Silurus glanis, two kinds of carp and porpoises; seals abound in the upper coasts, and tortoises between the mouths of the Volga and the Ural. In the northern region the first fishing season, called the caviar season, occurs between March and May, when the Volga, Ural, etc., are getting cleared of ice. The second season is in July, when the sturgeon descend the rivers; and the third open-sea fishing goes on from September to November. The only ports at all worthy the name on or near the Caspian are Astrakhan, Baku, Derbend and Astrabad (in Persia). The navigation is at all times difficult and often perilous. Steam packets are now established on this sea. The Russians have also a fleet of war vessels in the Caspian, and a new naval station has been established at Krasnovodsk, on the east side of the sea. By means of river and canal there is water communication between the Caspian and the Black Sea, Baltic and White Sea.

**CASS, Lewis, American statesman, diplomat and soldier:** b. Exeter, N. H., 9 Oct. 1782; d. Detroit, Mich., 17 June 1866. In 1800 he removed to Marietta, Ohio, where he entered on the study of the law. He was admitted to the bar in December 1802, and soon after established himself at Zanesville, where he gradually acquired practice. In 1806 he was elected to the Ohio legislature. He served in the first year of the second war with England and in 1813 was appointed governor of Michigan Territory, holding office till July 1831. Michigan at this time had no territorial legislature, and the business of selecting laws fell to the members of the cessions of the States devolved on Governor Cass and the territorial judges. Governor Cass was also ex officio superintendent of Indian affairs for the territory, which then included what now constitutes the two States of Michigan and Wisconsin, and this remained for several years the most important part of his duties. Of all this extensive territory, it was only a little tract bordering on Lake Erie and the Detroit River to which the Indian title had not been ex-
tistinguished. Within the bounds of his Indian superintendency, ultimately made to embrace all the tribes northwest of the Ohio, there were removed from 6,000 to 9,000 warriors. The recent hostilities, and the distrust and suspicions of the Indians, occasioned by constant calls upon them for additional cessions of land, rendered this office one of great delicacy and difficulty. But Governor Cass, skilfully trying out the policy of acquisition, succeeded also in maintaining the respect, and even in securing the affection of the Indians. In 1817 he obtained, in conjunction with Governor McArthur, a cession of most of the remaining Indian lands within the State of Ohio, with adjoining tracts in Indiana and Michigan, to the extent of 4,000,000 acres in the whole. This cession removed the Indian barrier hitherto intervening between the settlements of Ohio and those of Michigan. In 1819 he had another tract, in which he had a most liberous part, and of which an account has been published by Schoolcraft, was set on foot in 1820, for exploring the northern shore of Lake Superior, and the course of the upper Mississippi. The next year, in a long, circuitous river navigation, he visited Chicago, then nothing but a military post, with a wide wilderness all about it, and there made a treaty with the Chipewas, Ottawas and Potawatamies, by which a large additional tract was obtained, completing the extinction of the Indian title to the peninsula of Michigan south of Grand River. In 1828 he made two treaties, one at Green Bay, the other at Saint Joseph's, by which many millions of acres were credited to the United States. Up to his resignation from the office of governor of Michigan, in July 1831, he had concluded 22 treaties with the Indians, by which cessions had been acquired in Ohio, Indiana, Illinois, Michigan and Wisconsin, to an amount equal to nearly or quite a fourth part of the entire area of those states. While occupying this important position he constructed his Cabinet in August, 1831, Cass was appointed Secretary of War. The policy of the removal of the Indians, especially the southern tribes, to districts west of the Mississippi, had been warmly espoused by General Jackson. The defense of this policy, which had elicited much criticism and a warm opposition, was ably entered upon by Secretary Cass in his first annual report. In 1836 he was appointed Minister to France, a post which he held until 1842. He was on excellent terms with Louis Philippe, of whose character he gave a very friendly and favorable account. In his "King, Court and Government of France," published in 1840, originally as an article in the "Democratic Review," by far the most remarkable part of his diplomatic career occurred just at its close, in his attack on the quintuple treaty for the suppression of the slave trade. He was United States senator (1845-48), and having opposed the Wilmot Proviso, became the Republican candidate for President in 1848, but was defeated. He returned to the Senate in 1849, and was Secretary of State (1857-60), resigning because President Buchanan would not consent to strengthen the garrison at Fort Sumter. He wrote "History, Traditions and Languages of the Indians" (1823); "France, Its King, Court and Government," (1827); "Albany (1848); Smith, W. L. G. (New York 1856); McLaughlin, Andrew C. (Boston 1891); Young, "Life and Public Service of General Lewis Cass" (Detroit 1852).

CASSABA or KASSABA, kás-sá-há, Tur- key-in-a-house, town of Marquette, 63 miles by rail east of Smyrna. It is noted for the melons of Cassaba which are widely exported, along with cotton, silk and other produce. Pop. 23,000.

CASSAGNAC, kás-sán-yáRN. Bernard Adolphe Granier de, French journalist and Bonapartist: b. Averon-Bergelle, 11 Aug. 1806; d. Château de Coulommé, 31 Jan. 1880. He studied at Toulouse and then began his career at Paris as contributor of literary criticisms to the "Journal de l'Éducation," and obtained a reputation for the cause of Romanticism and his attacks on the conservatism of Racine were the talk of Paris. In 1840 he was sent by the government on a mission to Antilles, where he married a Creole. On returning to France he devoted himself to politics and published a "Histoire des classes ouvrières et des classes bourgeoises;" a "Histoire des classes nobles et des classes anobies," a "Monographie de l'église de la Madeleine;" and a romance entitled "Danaé." During the revolution of 1848 he left Paris, but returned in 1850 as a Bonapartist. He became editor of the "Pouvoir, Le Rêveul, Le Pays." His entire career was filled with duels, lawsuits, arrests and other sensational indiscretions. After the revolution of 4 September, he left France and published "Le Dropeau" which was sent gratuitously to the prisoners interned in Germany. In 1876 he was chosen deputy by the Anti-Republican party. He defended the Jesuit cause and opposed the creation of departmental normal schools. In addition to the works mentioned above he wrote "Histoire de la Révolution française" (1850); "Histoire du Directoire" (1851-56); "Histoire des Girondins;" "Histoire populaire de Napoléon III." His worst enemy, Jackson, was a man of no mean caliber, superficial but rich in a vigorous journalistic style.

CASSAGNAC, Paul-Adolphe Marie Prosper Granier de, son of Adolphe; had a career and a reputation not dissimilar to those of his father. He was born 2 Dec. 1842; d. at Saint Loire-et-cher, 4 Nov. 1904. He was taken prisoner at Sedan in 1871, and underwent eight months' confinement in Silesia. His violent advocacy of Bonapartism led him into innumerable duels, at terms with Louis Philippe, of whose character he gave a very friendly and favorable account. In his "King, Court and Government of France," published in 1840, originally as an article in the "Democratic Review," by far the most remarkable part of his diplomatic career occurred just at its close, in his attack on the quintuple treaty for the suppression of the slave trade. He was United States senator (1845-48), and having opposed the Wilmot Proviso, became the Republican candidate for President in 1848, but was defeated. He returned to the Senate in 1849, and was Secretary of State (1857-60), resigning because President Buchanan would not consent to strengthen the garrison at Fort Sumter. He wrote "History, Traditions and Languages of the Indians" (1823); "France, Its King, Court and Government," (1827); "Albany (1848); Smith, W. L. G. (New York 1856); McLaughlin, Andrew C. (Boston 1891); Young, "Life and Public Service of General Lewis Cass" (Detroit 1852).

CASSANDER, King of Macedon, son of Antipater: b. about 354 B.C.; d. 297 B.C. He disputed the sovereignty of Macedon with Polyperchon, whom Antipater had appointed regent

Garrison at Fort Sumter. He wrote "History, Traditions and Languages of the Indians" (1823); "France, Its King, Court and Government," (1827); "Albany (1848); Smith, W. L. G. (New York 1856); McLaughlin, Andrew C. (Boston 1891); Young, "Life and Public Service of General Lewis Cass" (Detroit 1852).
at his death in 319 B.C. Allying himself with Ptolemy and Antigonus, he conquered Athens; captured Olympia, the mother of Alexander the Great, and put her to death; and connected himself with the royal family by marrying Thessalonica, half-sister to Alexander. He joined, in 315 B.C., the coalition against the growing power of Antigonus; murdered the rightful heir to the throne, Alexander Egerus, and his brother; and took the title of king in 306 B.C., which was confirmed to him by the decisive battle of Ipsus in 301 B.C. In 297 he was succeeded by his son Philip.

**CASSANDRA,** also called **ALEXANDRA,** daughter of Priam and Hecuba, and twin-sister of Helenus. Both children, according to tradition, were playing in the vestibule of the temple of the Thymbresian Apollo, not far from Ithium; and having stayed there too late to be carried home, a couch of laurel twigs was prepared for them in the temple. When the nurses went to fetch them the next morning they found two serpents at the side of the children, which, instead of injuring them, harmlessly licked their ears. This miracle produced a still greater one: the hearing of the children was rendered so acute that they could distinguish the voices of the gods. Cassandra subsequently spent much of her time in the temple of Apollo, who, becoming enamored of her charms, disclosed to her all the secrets of the prophetic art, and in return demanded her love. But Cassandra, who had been satisfied, refused the dishonorable reward. Apollo, incensed at this solemnly decreed that her prophecies should never find belief. She frequently and continually foretold the destruction of Troy, and warned her countrymen in vain against the deceitful horse. When Troy was conquered, and Cassandra, with the other maidens, fled to the temple of Minerva, Ajax, son of Oileus, tore her from the altar, deflowered the virgin in the sacred place, and dragged her away to the other female slaves, with her hands tied. On the division of the booty she fell to Agamemnon, who carried her as his slave and mistress to Mycenae. Clytemnestra murdered them both. Agamemnon had twins by her— Teledamus and Pelops, who were put to death by Egeus. The ancients regarded this rape of Cassandra as a most infamous atrocity. It has often afforded a subject to poets and sculptors. The Locrians, the countrymen of Ajax, were afflicted on this account for many years with storms, and their country was desolated with the plague. Aeschylus tells her story in the *Agamemnon.*

**CASSANDRA,** the most westerly of the three tongues of the Chalcidica peninsula, between the gulfs of Salonica and Cassandra. Its ancient name was Pallene. The Gulf of Cassandra is also called Toroneous Sinus.

**CASSASSO D'ADDIA,** called Càssà-nò dàddà, Italy, town in the province of Milan, and 16 miles north-northeast of the town of Milan, pleasantly situated on a hill on the right bank of the Adda. It is very old, and built mostly of bricks. A bridge of 800 paces connects it with the opposite bank, and there are numerous silk-mills. Its military position on the right bank of the Adda has caused it to be the scene of several battles. Here Erzelino da Romano, the leader of the Gibelines in Italy, in the time of the Emperor Frederick II, was defeated in 1259; here also Prince Eugene was defeated in 1705, by the Duc de Vendôme, and the French under Mornau, by Suvaroff in 1799. Pop. of commune 9,150.

**CASSAREEP,** Cassarepe, Cassarepe, or Cassaripa, the concentrated juice of the roots of the common or bitter cassava (*Manihot utilissima*), flavored by aromatics, and deprived of its poisonous properties by boiling. It is used to give a relish to soups and other dishes, and forms the basis of the West Indian "pepperpot."

**CASSAS,** Cassas, Louis François, French landscape-painter and architect: *b.* Azay-le-Féron, 3 April 1756; *d.* Versailles, 2 Nov. 1827. A pupil of Jean-Jacques Lagrenée, he journeyed in Italy and in the Levant. On his return he was appointed inspector and professor of design at the Gobelins in Paris. From the materials collected in his travels have been compiled 'Voyage pittoresque de la Syrie, de la Phénicie de la Palestine, et de la Basse Egypte' (30 vols., Paris 1799), and 'Voyage historique et pittoresque de l'île et de la Dominique,' (2 vol., 1802, with 69 copper plates). The original drawings for both works were oil paintings, and they were deposited in the Bibliothèque Royale. His *Galerie d'architecture des différentes peuples,* a collection of models of restorations of ancient architecture, has been placed in the École des Beaux Arts in Paris.

**CASSATION,** a term used in the courts on the continent of Europe. It is derived from the Middle Ages, and signifies the annulling of any act or decision if the forms prescribed by law have been neglected, or if anything is contained in it contrary to law.

**CASSATION,** Court of (Cour de Cassation), one of the most important institutions of modern France, which gives to the whole jurisdiction of that country coherency and uniformity without endangering the necessary independence of the courts. It was established by the first National Assembly, and has been preserved in every essential respect, under all the changes of the Revolution and Restoration. It has been maintained even in those districts which, by their union with France became subjected to French laws, but by the Peace of Paris again became part of the Prussian monarchy. In France, as early as the reign of Louis IX (1226–70), though a separate court of justice had come into being, petitions were presented to the King by appellants from the decisions of the courts. In later times appeals to the parliaments, as the highest courts of the kingdom, came into use, and their decisions were not liable to be set aside by the ordinary forms of law. Yet the parties were allowed to dispute even these decisions if they were founded upon errors of fact or violated undisputed principles of law; and by an ordinance of 1302 it was provided that the parties should be allowed royal letters for the defense of their rights against the decisions of the Supreme Courts (lettres de grâce de dire contre les arrêts), which should be issued from the chancery (by the chancellor of France). The case was then sent back to the Parliament for further investigation, but was examined and decided in the presence of the king himself, or
of a special commissioner. An abuse, however, crept in of transferring these cases to the royal council, where they were decided by officers called maîtres des requêtes. These letters received the name of lettres de proposition d'erreur, and during the civil commotions at the end of the 14th century began to be more frequently presented to the council, which, as soon as one party complained of the partiality of the parliaments, transferred the case to its own bar, and obstructed the course of justice by lettres d'état, suspensions of the process, on the pretext of the abuse of the service of the king. Under the Chancellor Poyet (1538-42), this abuse reached its highest pitch; but the Chancellors Olivier (1545-51) and Hôpital (1560-68), the two great reformers of French jurisprudence, limited the use of these lettres till, by the Ordinance of Blois (1576), all the provisions against the decisions of the parliaments were reduced to these three:—the proposition d'erreur, for an error of fact; requête to the objection to the former condition on account of the fraud of one of the parties or the mistakes of the attorney; and cassation (petition for abrogation), for violation of forms or settled principles of law. By the famous Order of Procedure of 1667 the first of these provisions was abolished, but the province of the requête civile and cassation was enlarged and more precisely defined. The former was always brought before the court itself and decided there, the latter before the council of five, or conseil privé, or conseil des parties, a particular committee was formed, consisting of the chancellor, the four Secretaries of State (Ministers of the Departments), the Council of State, and all the maîtres des requêtes (in 1789, 78 in number). The decisions of this committee were too much influenced by the will of the king and the ministers, and by various other circumstances, so that they did not enjoy great respect, though they often exposed acts of great injustice on the part of the Parliament and other high courts. It was therefore abolished in the first National Assembly, and its place supplied by an independent court—the tribunal de cassation (decrees of 27 Nov. and 1 Dec. 1790), which was retained in all the constitutions and received under the Imperial government (1804) the name cour de cassation, which it still retains. It consisted, according to the organization of 1800, of 48 members, chosen from the Senate, on the nomination of the consuls, who elected their own president from among themselves. The appointment of president was afterward vested in the emperor. In the Charte Constitutionelle of 1814 the number of members of the Cour de Cassation was fixed at 49, at which it still remains. The members are appointed for life by the President of the Republic, and consist of a first president, three presidents of sections, and 45 counsellors, a public prosecutor, the procureur-général and 6 substitutes, the avocats-généraux. The Minister of Justice, or Keeper of the Seals (garde des sceaux) has the right of presiding on certain occasions. This court never decides on the main question at issue, but on the competency of the other courts and on the petitions to have their decisions reviewed or annulled, and assigns the question to another court if a decision is to be set aside for an evident violation of the forms or the principles of the law. For this purpose it is divided into three sections or chambers:—the chambre des requêtes, which decides on the admissibility of the petitions in civil cases; the chambre de cassation civile; and the chambre de cassation criminelle. After a decision has been reviewed by the court decides the same case in the same way, and an appeal is entered again, the Court of Cassation must either request an authentic explanation of the law from the government, or at least all the three sections must unite, to pronounce a second reversal or cassations in which, as in the preceding, the court before which the case is again brought must submit to the doctrine of the Court of Cassation on the point of law in dispute. This system, which dates from 2 April 1837, gives great authority to this court in matters of jurisprudence. According to the law in force before 1837, the court before which a case was brought for decision a third time was not required to adopt the views of the Court of Cassation; the decision of this court was no further appeal. The government, however, in that case gave an authentic interpretation of the law if there was any occasion for so doing. Until the end of 1852 there was a similar Court of Cassation for the Prussian province of the Rhine, but in 1853 its jurisdiction was transferred to the supreme Prussian tribunal sitting at Berlin. The sentences of the Court of Cassation are not only recorded in the journals of the courts, the decisions of which are reversed, but published likewise in an official bulletin, by which consistency and uniformity are preserved. The tribunal of cassation has enjoyed from its commencement the respect and confidence of France, and has numbered among its members several of the most distinguished lawyers; as the President Henrion de Fansey, the councillors, Chabot, Merlin and Carnot. The court possesses disciplinary powers over the judges of other courts, and the procureur-général over other procureurs-généraux. See Appeal; Court.

CASSATT, Alexander Johnston, American railway president: b. Pittsburgh, Pa., 8 Dec. 1839; d. Philadelphia, Pa., 20 Oct. 1910. He was educated in the University of Heidelberg, and the Rensselaer Institute, Troy, N. Y., and in 1859 was employed as civil engineer in surveying a railroad route in Georgia. He entered the service of the Pennsylvania Railroad as rodman in 1861, became general superintendent of the Pennsylvania system and general manager of the lines east of Pittsburgh, 1871-74; third vice-president, 1874; and first vice-president, 1880. He resigned this last-named post in 1882, but was elected a director in 1883, and in June 1889 was elected president of the Pennsylvania system and was the successful procurer of the terminal for this railroad in New York city. He was president of seven companies, and a director in 23, including transportation, banks, and trust companies.

CASSATT, Mary, American artist: b. Pittsburgh, Pa., about 1853. In 1875 she went to Europe to study art, and lived for some years in Spain, where she gave particular attention to the works of Velasquez. Removing to Paris, she was influenced by the work of Manet and Legas, and exhibited in the Impressionist Exhibition of 1880. In 1886 she exhibited some
of her works in New York city. Returning to Europe, she established a studio in Paris, where she later gained considerable fame as an etcher, ranking among the first of the modern artists in this medium. Her subjects are almost invariably women and children, particularly mother and child, in the environment of home. The children, especially, are depicted with truth, originality and a remarkable power of observation, but without prettiness. Among her best-known paintings are 'The Bath'; 'Breakfast in Bed'; 'Mother's Caress'; 'In the Garden'; 'At the Mirror'; 'Maternity'; 'Child Playing with a Dog'; 'Child's Toilet'; 'In the Box.' Miss Cassatt is represented in the Luxembourg by 'The Young Mother,' a pastel; in the Metropolitan Museum, New York, by 'Mother and Child,' and in the museums of Boston and Worcester by similar subjects. She is also known for her tinted etchings, the best known of which is a series of 10 entitled Maternity.

CASSAVA, käs-sä’və, MANIOC, män'i-ək', or MANDIOG, a South American shrub (Manihot utilissima) belonging to the natural order Euphorbiaceae, sub-order Crotonae. There are two forms, popularly known as bitter and sweet, the root of which is widely cultivated in the warmer parts of the world. The root contains about 30 per cent of carbohydrate materials. The roots of the sweet cassava are used as stock-food and to make glucose and starch. Florida is the only State in which sweet cassava has been cultivated successfully, but it seems to be not very profitable on account of the high price of labor and fertilizers. Consult United States Department of Agriculture, Bureau of Chemistry, Bullets 167 (1897), 168 (1907), and Farmer's Bulletin 167 (1907).

CASSGRAINIAN TELESCOPE, a form of the reflecting-telescope in which the great speculum is perforated like the Gregorian, but the rays converging from the surface of the mirror are reflected back by a small convex mirror in the axis of the telescope, and come to a focus at a point near the aperture in the speculum, where they form an inverted image, which is viewed by the eyepiece screwed into the tube behind the speculum. In use this telescope thus possesses the convenience that the observer looks directly through the object to be examined, exactly as in using the more usual refracting telescope. Moreover, as in all reflecting telescopes, the light, as it is merely reflected, is not separated into its component colors, as is the case when it passes through a lens. For this reason reflecting telescopes are widely used in certain branches of astronomy, especially in spectroscopic and photographic work. In particular, an enormous Cassgrainian telescope has been completed (1916), for use in the new Dominion Astronomical Observatory at Victoria, Canada. The mounting of this instrument is by Warner and Swasey of Cleveland, Ohio; the great 72-inch mirror was figured by the John A. Brashear Company of Pittsburgh.

CASSEL, käs’əl, or KASSEL, formerly the residence of the Elector of Hesse-Cassel, and now the chief town in the principality of Hesse-Nassau, lies on the Fulda, 35 miles southwest of Göttingen and 91 miles north-northeast of Frankfort-on-the-Main. It is divided into the Altstadt, or Old Town; the
CASSELLS — CASSIANUS

Ober Neustadt, or Upper New Town; the Unter Neustadt, or Lower New Town; and the new West Quarter; all but the third being on the left bank of the river. Cassel has several fine squares, or open areas, on the principal of which, the Friedrichsplatz, stands the electoral palace, an indifferent structure; and next to it the museum, a handsome building, containing a library of 235,000 volumes, and many valuable MSS, including the Hildebrandian dating from the 8th century. The brothers Grimm were librarians here from 1814 to 1830. The Murhard Public Library contains 155,000 volumes. At one end of this area is a handsome triumphal arch and war monument over-looking the Fulda Valley, in which is the Karlssue, finely laid out, and forming a favorite promenade. On this side of the city are also the building for the courts and government officers, the Bellevue palace containing the academy of arts, and the handsome picture gallery containing some fine examples of the old Flemish and Dutch schools. The other more noticeable public areas are the Königsplatz, in the form of a circle; the Friedrich-Wilhelmsplatz, with an ornamental fountain; the Ständeplatz, a broad tree-plant ed avenue, etc. The most noteworthy church is the Rathaus Kirche, whose choir is of the 15th century. An observatory is likewise situated here. Cassel is the seat of the provincial and district government and of the supreme provincial court. The town's affairs are administered by a municipal council of 48 and an executive board of 21 members. There is a modern sewage system and a copious water supply, and the town owns and operates gasworks, an electric-light plant and a slaughterhouse. There are numerous educational institutions, including two gymnasium, three municipal high schools and a score of technical schools. There are many hospitals and other charitable institutions. Cassel has excellent railway facilities, and the electric street-railway lines accommodate the city traffic. It is the seat of a United States consulate. Cassel has iron-foundries and machine-shops, works for railway-carriages, mathematical instruments, pianos, gloves, jute works, etc. The town dates from the year 913, when, under the name of Chassala, it was the residence of King Conrad I. It received its first municipal rights in the 13th century from the landgraves of Thuringia. In the Seven Years' War it was several times captured by the French. Landgrave Frederick II sent 12,000 Hessians to aid the British in the American Revolution and was paid $22,000,000. In 1807 it was made the capital of the newly-formed kingdom of Westphalia. In 1866 it was occupied by Prussian troops and became a part of Prussia. In the vicinity is Wilhelmshöhe, the ex-elector's summer palace the temporary residence of Napoleon III after Sedan. Pop. about 107,000.

CASSELLS, Sir Walter (Gibson Fringle), Canadian judge: b. Quebec city, 14 Aug. 1845. He was educated in Quebec and Toronto University, and graduated B.A. in 1865. He was admitted a barrister in 1869, became one of the leaders of the Ontario bar, and held briefs in many important causes. He was appointed a judge of the Exchequer Court of Canada in 1906, and was knighted in 1917.

CASSIA, a genus of leguminous plants, of the family Casalpiniaee, inhabiting the tropical parts of the world, consisting of trees, shrubs or herbs, the leaflets of several species of which constitute the well-known drug called senna. That imported from Alexandria is obtained from C. acutifolia. C. falcata is found wild in India. Its legumes contain a quantity of thick pulp, which is a mild laxative and cathartic, and enters into the composition of the confection of cassia and the confection of senna. It is a valuable laxative, its properties being due for the most part to the water-attracting properties of sugar while in the intestinal canal. The leaves and flowers are also purgative. The bark and roots of several of the Indian species are much used in medicine. "Cassia bark" is a common name for the bark of an entirely different plant, Cinnamomum cassia, belonging to the laurel family. It is much imported into Europe, mostly from China, and is also called "Cassia lignea." Its flavor somewhat resembles that of cinnamon, and as it is cheaper it is often substituted for it, but more particularly for the preparation of what is called oil of cinnamon. The cassia of the Bible was probably cassia bark. Cassia buds, which are similar in flavor, are the immature fruit bodies, with a navel of the 14th and a choir of the 15th century. An observatory is likewise situated here. Cassel is the seat of the provincial and district government and of the supreme provincial court. The town's affairs are administered by a municipal council of 48 and an executive board of 21 members. There is a modern sewage system and a copious water supply, and the town owns and operates gasworks, an electric-light plant and a slaughterhouse. There are numerous educational institutions, including two gymnasium, three municipal high schools and a score of technical schools. There are many hospitals and other charitable institutions. Cassel has excellent railway facilities, and the electric street-railway lines accommodate the city traffic. It is the seat of a United States consulate. Cassel has iron-foundries and machine-shops, works for railway-carriages, mathematical instruments, pianos, gloves, jute works, etc. The town dates from the year 913, when, under the name of Chassala, it was the residence of King Conrad I. It received its first municipal rights in the 13th century from the landgraves of Thuringia. In the Seven Years' War it was several times captured by the French. Landgrave Frederick II sent 12,000 Hessians to aid the British in the American Revolution and was paid $22,000,000. In 1807 it was made the capital of the newly-formed kingdom of Westphalia. In 1866 it was occupied by Prussian troops and became a part of Prussia. In the vicinity is Wilhelmshöhe, the ex-elector's summer palace the temporary residence of Napoleon III after Sedan. Pop. about 107,000.

CASSIANUS, otherwise called JOANNE MASSILIENSIS and JOANNE EREMITA, early theological writer and zealous advocate of the monastic system: b. about 360, probably in Provence; d. Marseilles about 435. It is certain however, that he traveled extensively in the East, spent a few years in Bethlehem, traveled to Egypt and seems to have visited the hermits in the desert. He was deeply attached to Saint Chrysostom and when the latter, through the intrigues of his opponents, was removed from the episcopal chair, Cassianus was sent with Germanus to Rome to present a memorial to the clergy who adhered to Chrysostom. Here he became personally acquainted with Pelagius. About 415 he went to Marseilles, where he continued his restless activity as a presbyter till his death. He founded a monastery and a convent on the principles laid down by him in his works 'De Institutis Cenobiorum' and 'Collationes Patrum Seeticotorum', (that is, 'Catecheses of the Fathers in the Desert of Sketis'). The views advanced in these works, and still more the strong leanings which he showed to the dogmas of Pelagius, involved him in a controversy with Augustine. He ultimately modified his opinions so far as to adopt the system to which theologians have given the name of Semi-pelagianism, holding that man, since the fall, is not absolutely incapable of good, but, on the contrary, both derives from nature the seeds of virtue, and is able of himself to commence their primary development, though he requires the aid of divine grace to bring them to maturity. These views found great favor with the monks of France, and long maintained their ground in opposition to the efforts of Augustine and his friend Paul of Mirepoix. When Leo, then Pope, wrote against Nestorius his 'De incarnatione Domini' in seven volumes. The best edition of the works of Cassianus is that of Frankfort (1722, fol.). They are found in the English translation by E. C. S. Gibson in volume IX of 'Nicene and

CASSIN, John, American ornithologist: b. near Chester, Pa., 6 Sept. 1813; d. Philadelphia, 10 Jan. 1889. He resided in Philadelphia from 1834, and excepting a few years partially given to mercantile pursuits, devoted himself to the study of ornithology. He contributed descriptions of new species and synoptical reviews of various families to the 'Proceedings' and the 'Journal' of the Philadelphia Academy of Natural Science; and his more elaborate publications are 'Birds of California and Texas' (1862), containing descriptions and colored engravings of 50 species not given by Audubon; 'Mammalogy and Ornithology of the Wilkes Exploring Expedition' (1858); 'Ornithology of the Japan Expedition'; 'Ornithology of Gilliss's Astronomical Expedition to Chile'; and the chapters on rapacious and wading birds in the 'Ornithology of the Peary Arctic Explorations and Surveys' (Washington 1858); 'The Birds of North America' (1860). His works are the result of careful research, and are especially valuable for their descriptions and classification of many birds not given in the previous works of Wilson and Audubon. According to Coues he was the only American ornithologist as familiar with the birds of the Old World as with those of America.

CASSINI, kas-senë, Arthur Pavlovitch, Russian diplomat: b. 1835. He began his public career in 1855, being attached to the Department of Foreign Affairs. He held various minor diplomatic offices in Europe and in 1891 became Minister at Peking, during the war with China and Japan successfully advancing Russian interests. He became Minister at Washington in 1897 and later the first Russian Ambassador to the United States. In 1905 he went as ambassador to Madrid and represented Russia at the Algeciras conference.

CASSINI, Giovanni Domenico, Italian astronomer: b. Perinaldo, near Nice, 8 June 1625; d. Paris, 14 Sept. 1712. He studied at Genoa with the Jesuits. Chance turned his attention to astronomy, in which he made such rapid progress in 1650 the senate of Bologna bestowed on him the first professorship of astronomy at the university. He worked out more correct tables of the sun and a more precise determination of its parallax. By an observation at Città della Pieve he discovered the shadows cast by the satellites of Jupiter on the disc of that planet when they are between it and the sun. By means of these he corrected his theory of the motion of the satellites; he also determined the period of Jupiter’s revolution. In 1660 he published his Ephemerides of the Satellites of Jupiter. In 1671 he became director of the observatory at Paris and in 1673 became naturalized as a French subject. He discovered four new satellites of Saturn and the zodiacal light; proved that the Clairaut’s theorem was not applicable to the plane of the ecliptic, and showed the causes of her libration. The laws of this motion are one of his finest discoveries. He also wrote observations on the Indian calendar. He believed that the planetary orbits were not ellipses, but members of a family of curves called after him Cassinian ovals (q.v.). The meridian commenced by Picard and Lahire was continued by Cassini in 1700 to the extreme limits of Roussillon, and when measured 100 years later showed a difference of only 21 toises (about 134 feet). His 'Opera Astronomica' was published at Rome in 1666.

CASSINI, Jacques, French astronomer: b. Paris, 18 Feb. 1677; d. Thury, department of Oise, 16 April 1756. He was the son of Giovanni Domenico Cassini and succeeded him in his post at the Paris observatory. In 1694 he was admitted into the Academy of Sciences. His labors to determine the figure of the earth are well known. The first measurement of 1718 made the degrees of the meridian shorter toward the north than toward the south, whence it was concluded that the earth was an oblate spheroid. Cassini continued the measurement, and maintained this opinion in his work 'De la grandeur et de la figure de la terre.' In order to settle this question the Academies commissioned in 1733 to measure the whole length of France from Brest to Strassburg. Cassini directed this undertaking, but was led into some errors by the defective instruments of former observers. The astronomical tables which he compiled were published by Paradis in 1740. He compiled the first tables on the inclinations of the orbits of Saturn’s satellites and ring. In addition to his astronomical works, he wrote several essays on subjects in natural philosophy, etc.

CASSINI, Jacques Dominique, COMTE DE, French astronomer: b. Paris, 30 June 1748; d. Paris (?), 18 Oct. 1845. He was the son of Cassini de Thury and succeeded his father in 1784 as director of the Paris observatory. He was a member of the Academy, and a statesman of ability as well as a mathematician. In 1789 he completed the topographical work which was begun by his father. The 'Atlas National' was a reduction of it on a scale of one-third. Cassini was arrested by order of the revolutionary tribunal. He escaped with life, but lost the copper-plates of the 'Carte de France,' which had cost 500,000 francs. Napoleon made him a count of the empire.

CASSINI DE THURY, tu-rë, César François, French astronomer: b. Paris, 17 June 1714; d. 4 Sept. 1784; son of Jacques Cassini. He was a member of the Academy from his 22d year, and director of the observatory in 1756. He undertook a geometrical survey of the whole of France in 1744. When the support of the government was withdrawn in 1756, Cassini formed a society for advancing the requisite sums, which were to be repaid by the sale of the maps constructed from the survey. The work was almost entirely finished when he died.

CASSINIAN, or CASSIAN OVAL, the locus of a point the product of whose distances from two fixed points is constant. It varies in shape as the constituent distances vary, and the distance between the fixed points are differently chosen, and may break up into two separate but symmetrical figures. A special form is that of Bernouilli’s lissmæctes. Its general Cartesian
CASSINO — CASSITERITE

equation referred to its axes of symmetry is

\[(x^2 + y^2 + z^2) - 4a^2 x^2 + a^2 = m^2,\]

and the corresponding polar equation is

\[r^2 - 2a^2 r \cos 2\theta + a^2 = m^2.\]


CASSINO, Italy, until 1871 known as SAN GERMANO, city of Caserta province, on the Rapido, 85 miles southeast of Rome. Of great historic interest, and the seat of the celebrated monastery of Monte Cassino, nearby are interesting ruins of the village of M. Terentius Varro where, according to Cicero, Antony led a dissipated life, also a ruined amphitheatre built by Ummidia Quadratilla, a Roman lady of whom Pliny writes in his letters. Popes and emperors resided at San Germano and here Frederick II and Gregory IX effected a peace in 1230. It was the scene of an Austrian victory over Murat 16 March 1815. Pop. 14,000.

CASSINO, a game at cards usually played by four persons (although more can enter the game), two on each side. In it the ten of diamonds, technically called big cassino, counts two; and little cassino, the two of spades, counts one. The points possible to be scored in one deal (exclusive of sweeps) number 9. They are: Big cassino, 2; little cassino, 1; cards, 1; spades, 1; each ace, 1=4. A sweep is counted when a player takes up all the cards on the table. The object sought in the game (besides the points already enumerated) is to arrange the cards on the board in combination so that the sum of the spots on the cards thus combined may equal those on one card in the hand of the player, who has the right to take as many cards from the board as he can thus combine; or he may capture any card from the board the counterpart of which he has in hand. This can be done also by playing cards from the hand in such a manner that the sum of the spots on these cards and on cards on the board equals that on a card in the player's hand.

CASSIODORUS, Flavius Magnus Aurelius, Roman historian and statesman, who lived from about 480 to 568. He entered the service of the Ostrogoth king of Italy, Odoacer, at the age of about 20 years and under him and his successor, Theodoric, was treasurer of the kingdom and councilor, administering his office with extraordinary prudence in a most difficult time. As statesman, scholar and historian he kept alive the lamp of the Greek-Roman learning after the overwhelming of the ancient civilization by the barbarians. After a term of 50 years in public station he withdrew to a monastic institution founded by himself in his native province, Bruttium, and there spent the remaining 30 years of his useful life, imprinting his monks with a love of the ancient texts and employing them in copying the ancient texts of profane no less than of religious writings. He may be regarded as the father of the monastic scrip- torium to which modern learning is indebted for a great part of what has come down to us of the ancient literature and of the history of the West in those troublous times. He composed treatises on rhetoric and grammar which were used as textbooks in the schools of the Middle Ages till the revival of the ancient learning, which inspired men with a longing for the ancient knowledge. Of great service also were his works ‘De Artibus ac Disciplinis Liberalium Litterarum’ (of the liberal arts and courses of study), and ‘De Institutione Divinorum Litterarum’ (instructive on scholastic knowledge); but above all his 12 books of ‘Epistolae Variae’ (various letters), containing decrees of the Ostrogoth kings, upon which is based the whole history of Italy under the rule of the Ostrogoth potentates. This collection was first printed at Augsburg 1533. With one Epiphanius he made a compendious Latin version, entitled ‘Tripartita Historia’ (tripartite history) of the history of the Church as written by the three Greek historians, Socrates, Sozomen and Theodoret, however, continued Socrates' history to the year 518. An edition of his complete works was printed at Rouen in 1679 and at Venice in 1729. His ‘Life’ was written by the eminent Benedictine, Sainte Marie, and published in Paris in 1694. His works are published in Migne, ‘Patrologia Latina’ (Vol. LXXIX). Consult Sandys, ‘A History of Classical Scholarship’ (Vol. I, especially pp. 258-270, Cambridge 1906).

CASSIOPEIA, käs-ür-pé-yo̱, in Greek mythology, daughter of Aratus and wife of Cepheus, King of Ethiopia, whom she bore Andromeda. She dared to compare her own beauty to that of the Nereids, who, enraged, besought Poseidon for vengeance. The god, in compliance with the request of the water-nymphs, laid waste the dominions of Cepheus by means of a deluge and a dreadful sea-monster.

In astronomy Cassiopeia is a conspicuous constellation in the northern hemisphere, situated next to Cepheus. In 1572 a new and brilliant star appeared in its place. It was a comet and was met by Hinal and Plummer with a reddish, 11th-magnitude variable which is still visible. The five brightest stars in the constellation of Cassiopeia are arranged in the form of a straggling W, which is easily recognized.

CASSIQUIARI, käs-sē-kē-är'ē, or CASSIQUARE, a deep rapid river of South America, in Venezuela, branching off from the Orinoco, and forming a water-way by which that river has navigable communication with the Rio Negro. It leaves the Orinoco in lat. 3° 10' N.; long. 66° 20' W., about 20 miles west of Esmeralda, and, after a southwest course of 128 miles falls into the Rio Negro near San Carlos, in lat. 2° 5' N.; long. 67° 40' W. It is estimated to carry off about a third of the water of the Orinoco, being 100 yards broad where it leaves that river, and about 600 yards at its junction with the Rio Negro. By means of this river, the Rio Negro, the Amazon and its tributaries, it is practicable to sail from the interior of Brazil to the mouth of the Orinoco.

CASSITERIDES, käs-si-tir'-dēz, a name derived from the Greek kassileros, tin, and anciently applied, but with no uniformity or precision, to the tin district of Cornwall, to the Scilly Isles or to small islands off the northwest coast of Spain.

CASSITERITE, native dioxide of tin, SnO₂, crystallizing in the tetragonal system, and
also occurring uniform and in rolled grains. The crystals are usually brown or black, brittle with an uneven fracture, and with a specific gravity of from 6.8 to 7.1, and a hardness of from 6 to 7. Ordinary massive or crystallized cassiterite is often called "tinstone," especially in England; "wood tin," a botryoidal form, "stream tin" is the mineral in small rolled pebbles found in the streams or placer deposits and is formed by the disintegration of stanniferous rocks. Cassiterite is the most important ore of tin. It occurs in Cornwall (England), Saxony, Portugal, Sweden and in Australia, the Malay Peninsula, Banca, Bolivia and Mexico. In the United States it is found in small amounts in various States, and it has been mined to some extent in Virginia, in South Dakota and in San Bernardino County, Cal.

CASSIUS, kāsēus, Andreas, German physician who was born in the first half of the 17th century at Schleswig; d. Hamburg 1673. He was graduated at Leyden in 1632, was physician to the Duke of Holstein and bishop of Lübeck, and practised at Hamburg. His name is most frequently mentioned in connection with a purple color obtained from gold, which was briefly described in a treatise published by his son in 1685.

CASSIUS, Purple of. See Purple of Cassius.

CASSIUS LONGINUS, Gaius, the friend of Brutus, was the quæstor of Crassus, and preserved the few troops of that general who escaped from the bloody battle with the Parthians. With these he defended Syria against the Parthians till the arrival of Bibulus. In the famous civil war that broke out between Pompey and Caesar he espoused the cause of the former, and, as commander of his naval forces, rendered him important services. When Caesar, after the victory of Pharsalia, was in pursuit of Pompey, he advanced with a few vessels, while crossing the Hellespont, against a fleet of 70 sail commanded by Cassius, and called upon him to surrender. The latter, astonished by his daring courage, surrendered at his summons, Caesar pardoned him, and afterward bestowed various honors on him; but Cassius, who had always cherished feelings of bitter hatred toward Caesar, joined in the conspiracy against him, and, with the aid of several fellow-conspirators, assassinated him, 44 B.C. He then, together with Brutus, raised an army to maintain the cause of their faction. They were met by Octavianus and Antony, who professed themselves the avengers of Caesar, at Philippi. The wing which Cassius commanded being defeated, he imagined that all was lost, and killed himself, 42 B.C.

The name is also applied to a Roman jurist who flourished about 3-75 A.D., consul in 30, proconsul of Asia (45-50). After serving as governor of Asia, he was banished for his loyalty to the memory of Cassius, the murderer of Caesar. In the reign of Vespasian, he was recalled. His book, 'Libri Juris Civilis' was used by Justinian in his codification. See Brutus; Caesar.

CASSIVELLAUNUS, kāsī-vēl-lōnūs (in Shakespeare's 'The Cymbeline,' Cassibelun), a noble and warlike British chief of the Catuvellauni, who, when Caesar invaded Britain in 54 B.C., held sway over several tribes living to the north of the Thames, and led the resistance to the advance of the Roman general. Having advanced to the Thames, Caesar found the Britons under Cassivellaunus posted on the north bank of the river prepared to dispute his passage. He crossed, however, without much difficulty, but the British charioteers persistently harassed his line of march. The Trinobantes, a tribe of Essex and Middlesex, soon sent in their submission to Caesar, and as their example was followed by others, Cassivellaunus found himself unable to oppose resistance to the Romans. His stronghold, which contained many cattle, was captured by Caesar; and an attempt made to storm Caesar's naval camp proving unsuccessful, Cassivellaunus sued for peace, gave hostages and promised an annual tribute. Consult Caesar, 'Gallic War' (bk. V).

CASSOCK, a name formerly applied to a long loose gown worn over the other garments, in which sense the word is found in Shakespeare. It is now applied to a long, close-fitting garment worn by priests and clergies and in Catholic countries forming the ordinary dress of the priest. In the Roman Catholic Church, priests wear a black cassock; bishops and other prelates, purple; cardinals, red; and the Pope, white. In the Anglican Church, black is worn by all three orders of clergy, but bishops on state occasions often wear purple.

CASSOWARY, a corruption of the Malay name for ratite birds of the family Casuariidae, inhabitants of the Papuan Islands and Australasia, and forming, with their near allies the emus, the group Megapodes. They are large birds, the females standing five or six feet high (males are less in stature), and are clothed in hair-like feathers, which appear double, as the aftershaft is as large as the feather proper; these may reach a length of 12 inches or more on the rump, where they drape over the invisible tail. This coat is glossy black in both sexes and all species, whose distinguishing marks are found in the varying colors about the head. Like other ratite, or "wingless" birds, the wings are so reduced as to be hidden beneath the drooping plumage, except the ends of five stiff quills; these wings are quite useless for either flight or running, but are of some service as weapons. The legs are extremely stout, and are actuated by powerful muscles; and the three toes are armed with strong scratching-claws. The special feature of this family of birds, however, is the head, which is almost naked of feathers, and carries a crest, "helmet," or "casque" of spongy bone which in some is flattened, and in others rises into a triangular or a pyramidal boss. The beak is stout, and keeled on top. The neck is naked, and in most cases adorned with one or more pendent wattles. These naked parts, and the head and helmet are brilliantly colored, differing in the various species of which 10 have been described. Thus the Casuarius papuensis of New Guinea is described as having a dusky head, throat and fore-neck, gray-green occiput and auricular region, and orange hind-neck, changing into rosy flesh-color toward the sides. All the others are nearly as gaudy. The cassowaries are forest-keeping birds, and have become very wary since their...
CAST — CAST IRON

jungles were invaded by hunters. They are swift runners, hurling themselves forward with a peculiar striding gait, and bounding over obstacles. They are almost omnivorous, but feed mainly on berries, fallen fruit, bulbs and insects which escape out of the forest floor. They defend themselves vigorously when at bay, kicking powerfully in any direction, and striking with wings and beak. Yet they are tamable, and are kept like fowls by the natives of some districts. They are hunted in Australia for the value of their skins from which are made mechanical mats, rugs, feathered ornaments, etc. The nest is a rough structure on the ground in a thicket. The three to six eggs are green, and incubation is done mainly if not exclusively by the cock-bird. Consult Salvatori, ‘Ornithologia della Papuasia’ (Turin 1882): Rothschild, ‘Trans. Zool. Soc. of London’ (1901); Evans, ‘Birds’ (New York 1900).

ERNEST INGERSOLL.

CAST, in the fine arts, is an impression taken by means of wax or plaster of Paris from a hardened cast, whether animate or inanimate. In taking a cast from a living person’s face, it is necessary, first, to anoint the eyebrows and eyelashes, and any hairs about the cheeks and temples, with a little sweet-oil; then to insert two tubes (ciled also) of pasteboard into the nostrils, so that breathing may be performed through them; a handkerchief is then to be tied loosely over the face, and the head sloped backward in an elbow chair or sofa. Powdered and calcined plaster of Paris is then mixed with springy water till the consistence of cream, and poured in between the face and handkerchief to the depth of half an inch. On becoming fixed or hard, it is removed and left to dry. When dried thoroughly it is well soaked with linseed oil, and an impression may then be taken from it, in plaster of Paris or soft clay; the hollow cast being first split longitudinally down the nose, so that the object cast may be more easily removed.

It ought to be observed that all models should be divided into several pieces or joints; thus, in that covering any round body, one side must be covered first with the plaster, and the sides pared with a knife, and smeared with clay, and the remaining part of the object covered with plaster, and a joint will thus be formed between the two parts; for, wherever the mixture of clay and water has been applied with a hair brush, the cast will not adhere, and therefore will be easily separated with the blunt edge of a knife. It is usual also to make small pits or depressions of the size of small buttons, on the edges of the joints of molds so that they may lock together well when added, and thus fit closely.

Plaster casts are varnished by a mixture of soap and white wax in boiling water. A quarter of an ounce of soap is dissolved in a pint of water, and an equal quantity of wax afterward incorporated. The cast is dipped in this liquid, and after drying a week is polished by rubbing with soft linen. The surface is then treated in this manner approaches to the polish of marble. When plaster casts are to be exposed to the weather, their durability is greatly increased by saturating them with linseed oil, with which wax or resin may be combined.

When intended to resemble bronze, a soap is used made of linseed oil and soda, colored by the sulphates of copper and iron. Walls and ceilings are rendered waterproof in the same way.

CAST, or CASTING-LINE, a gut line used in angling, from two to four yards in length, having artificial flies tied on at intervals of about two feet. For trout fishing the line is generally made of braided waterproof silk, and a leader of silkworm gut attached to the end of the line.

CAST IRON, Malleable. Malleable cast iron is a grade of metal which has a special composition, such that when annealed for a continued period of time it becomes malleable, can be bent and twisted. The castings, when taken from the sand of the foundry, are very hard and brittle. The fracture is dead white (the ordinary iron casting appearing gray to black when freshly broken).

The tensile strength of a good malleable casting should run between 42,000 and 48,000 pounds per square inch, though for ordinary purposes 25,000 pounds per square inch is sufficient. Castings have been made running up to 63,000 pounds per square inch, but these would not be soft enough for general use, being better adapted for conveyor chains and castings which must not stretch. The elongation of a malleable casting runs between 3.7 and 4 per cent, measured in two inches. The transverse strength measured by a 1 inch square bar, placed on supports 12 inches apart, and load applied at the centre, should be from 3,000 to 5,000 pounds for high quality material, and at least 2,500 for the ordinary product. The resilience of a malleable casting may be taken as eight times as high as a gray-iron one. Hence the great advantage of using malleable castings to resist shock. In fact where the shocks are light and often repeated, this casting will stand up better than a steel one.

The malleabllization of cast iron has been known since the early part of the 18th century. The first record we have is by Réaumur in 1722. He states that a hard casting, by being embedded in ore and kept at a high temperature for a number of days, changed its structure and became soft and malleable. The process as then practised is still in vogue, and all attempts to hasten the process or modify it have not given continuously good results. The fundamental principle upon which the whole bined carbon in a white casting of a suitable process rests is the conversion of the com-composition to an amorphous form of carbon, which remains in the casting as a mechanical admixture. It is not crystalline like graphite, but in other respects behaves like it, and is determined chemically in the same manner.

To understand this, let us consider the two great divisions of cast iron — the Gray and the White. In the former we have nearly all the carbon present in a mechanical admixture, as graphite flakes situate between the crystals of the iron proper. But little carbon is present in the combined state, and if less than 0.20 per cent, the casting is deemed soft. If the combined carbon is as high as 0.80 per cent, the rest of about 3 per cent being in the form of graphite, the casting will be a hard one. Now in the case of the white irons, the carbon is nearly all combined, and almost no mechanical admixture is present. Hence an exceedingly
CAST IRON

hard material is the result. It is the object of the malleabilizing process to convert this chemically combined carbon in a white iron, or in a hard gray one for that matter, to an amorphous form, to which the name *temper carbon* has been given (from "Temperatur," German for malleable casting). Any graphite present in the original casting is not changed, but with long-continued heat gives an opportunity for the entrance of oxygen, with ruinous results to the casting. Hence the short annealing of gray castings to benefit them, while the white casting can be annealed for six days, and then re-annealed again, without seriously hurting its strength.

There are two tendencies in the malleable casting industry, which result in different grades of metal. In Europe, from whence the process came, and where the iron used are not as pure, the annealing process is carried out longer than here, and hence much of the carbon present is removed from the casting by oxidizing it out. The result is a glassy casting, but with a gray to white fracture (the fracture of a steel however, not of a hard white iron). The castings, moreover, are nearly all very light. In this country, with better irons, we have shortened the anneal to get just the conversion of the carbon, without attempting to burn it out by prolonged annealing, and hence we have a black heart in the casting. This is especially noticeable as we make very heavy work, comparatively speaking. Sections of one inch are common, and even heavier work is done, but with the use of chills in casting them, so that the carbon be surely all combined, and the casting dead white before the annealing is begun. Otherwise, if more than a slight motting is present in the fracture, the casting is sure to come out "rotten" in strength (as it is called) when leaving the anneal. The temperature of the bath of molten metal has an important bearing on this, for with a very hot metal, heavy sections can be cast and still have their fracture white, while the same castings would be gray were the bath of melted molder colder.

Recent developments have brought about a division of the American *black-head* malleable process into the making of very low carbon, soft, but weak castings on the one hand, and medium carbon, strong, but stiff castings on the other. The former is for general use, and the latter for specification work of very high grade.

The contraction of a white casting, as made for malleable purposes is 3/16 inch to 5/16 inch per foot, but in annealing one-half of this is taken up by expansion, and hence the ordinary gray iron shrinkage is allowed for in making the patterns. For special work, however, it will pay to watch the action of the metal in the sand mold, and due allowances should be made in the pattern for abnormal contractions on the part of the casting, so that the dimensions of the annealed casting may come out all right.

As the metal when ready to pour may not always be of the desired temperature (in fact the temperature changes during tapping, going up steadily), it is best to pour the thin castings first, provided the iron be hot enough for this, then the medium weight castings, and finally the thick ones. By this time the metal will be very hot and the danger from excessive mottling avoided. Great care should be exercised to see that patterns are so proportioned that no shrinkage occurs in the interior of the metal. This is certain to take place at abrupt changes of section, at sharp angles and in heavy parts. Hence all sharp junctions on patterns should have fillets, and where great changes of section cannot be avoided, chills should be placed against the work. This will send the shrinkage into the interior of the casting where it will not matter so much.

![Fig. 1.—Longitudinal Section of Air Furnace for Malleable Castings](image-url)
the silicon oftentimes ran as low as 0.28 per cent in a casting and still this was first-rate. The general average, however, for all around medium and fairly heavy work is 0.65 per cent silicon in the casting, which means about 0.85 per cent to 0.90 per cent in the mixture; 0.45 per cent may be considered the lowest range for heavy work, and 1.25 per cent the highest for the lightest of castings.

The phosphorus should not exceed 0.225 per cent, the manganese not over 0.30, the sulphur as low as possible, preferably not over 0.05 in the casting, though in Europe, where the long anneal counteracts this evil, the sulphur goes very high, sometimes even up to 0.40 per cent.

The lower the total carbon, down to 2.75 below when trouble arises, the stronger will be the casting. (The total carbon may be run as low as 2.25, but only with the best of melting and annealing practice.) Hence steel scrap is added to make the metal low in its carbon content. This is a much better plan than to refine the iron in the process to get the carbon low. In general it is best to dump the metal in a mixture and then get it out of the furnace as quickly as possible, in order to get it away from oxidizing influences as quickly as may be. Five to 10 per cent of steel may be added, also malleable scrap, if necessary. In a 10-ton heat the best proportion of the mixture is five tons of pig iron, one ton malleable scrap, 500 pounds steel scrap and the balance the sprues of the previous work. The practical effect of these steel and other additions is about as follows: 100 pounds, wrought iron scrap equal 250 pounds steel, equal 2,000 pounds malleable scrap. Mixtures thus arranged come out about the same in strength, all other things being equal.

Charcoal iron is now being used only where the source of supply is close, and its cost is but a dollar or two over the best "Coke Malleable" or "Bessemer Malleable," as coke irons made specially for the malleable foundry are called (the last named being a Bessemer iron with the phosphorus a little higher than is allowed for steel). It is best to use these classes of "malleable" instead of the so-called "off" pig irons, for they are made with an extra amount of coke, and are much less oxidized than the irons blown under poor furnace conditions.

The mixtures used in the malleable foundry are as follows: Where the cupola is used for malleable castings in addition to making pots for annealing, the regular mixture as used for the air furnace or open hearth furnace must be reduced slightly in silicon, as the cupola burns out less of this element. Hence about 0.25 per cent is to be added to the amount of silicon required in the casting. In the case of the furnaces, about 0.30 per cent to 0.35 per cent must be added. For pots it is advisable to use good pig irons and to utilize salamanders and the large scrap pieces that are unsafe to put into the furnace. The silicon in the pots as cast should be about 0.60 per cent and hence about 0.85 per cent should go into the cupola.

The mixtures for air furnace and the open hearth furnace are about the same. Possibly the air furnace should have a little more silicon, as it is under the influence of the gases from combustion longer. There is also necessary an occasional use of ferrosilicon, especially in the open hearth, as through accident the metal may be badly burnt and the addition of ferrosilicon brings about the proper composition. The metal is then boiled to drive out the excess and to put into castings, but cast into pigs, to be fed subsequently into the regular mixtures in small quantities at a time. About 250 to 500 pounds ferrosilicon is usually all that is necessary for this purpose. The actual amount can be calculated at the time from the supposed loss of silicon in the bath.

Malleable castings are made in the cupola, the air furnace, the open hearth furnace, the electric furnace and in the crucible. The last named process is now only practised in Europe, being too expensive in this country, though turning out a most excellent product. The cupola process makes the poorest castings, as the metal is in contact with the fuel in this method. Hence the absorption of sulphur and oxidizing influences which are partly avoided in other processes. The peculiar constitution of the metal as cast makes it necessary to anneal it at a temperature some 200 degrees F. higher than ordinary air-furnace iron, which means a greater expense for wear and tear on the ovens and annealing pots. This class of castings is therefore only used for the cheaper grades of malleable casting, such as pipe fittings and hardware castings, where great strength is not essential, and which it is had to satisfy the demands made on the work. The selling price is also about half a cent a pound less than the high grade metal.

The bulk of the malleable castings made in this country comes from the air furnace. This is an excellent melting process, can be manipulated easily, is not too expensive, and will probably continue to be the method used in most of our malleable works. The air furnace, as used for malleable purposes is somewhat different than that used for making rolls and gun castings. It is illustrated herewith.

The entire roof can be taken off in sections, called "bungs," so that the sand bottom can be made, and the charge put in. Where more than one heat is made without remaking the bottom, only a few bungs are lifted after the first heat and the furnace is purged quickly, so as to keep it hot as long as possible. Firing is done at one end, and the charge when ready is tapped at one side, or both if two spouts are provided. It is very important to get a heat out quickly, as the metal is continu-
ously oxidizing while in the furnace, after it has reached the proper composition. A 10-ton heat, when poured into small castings often takes three-quarters of an hour to tap, and hence the first iron and the very last may be two different things. Hence the dividing up of the work to get the class of metal best suited to the castings to be made. The amount of coal used to melt in a well-constructed air furnace is four pounds iron to one pound coal. In the case of the cupola, while ordinary gray iron practice requires one pound coal to every eight pounds iron, in malleable work, it takes one pound coke to only four pounds iron, or just the same as good air furnace practice. It is but just to say, however, that in many foundries of the country the air furnaces are so poorly constructed, kept in repair and operated that oftentimes one pound coal melts only two pounds iron.

Bottom is made placing layers of fire sand, that is, sand with about 98 per cent silica, and very free from fluxing impurities, on the brickwork and burning or partly fusing it together. The layers are about one inch thick, and are heat still has to run until ready to tap. After the iron has melted, the slag is skimmed off, and this gives a good chance for refining action, which means the burning out of silicon. The test plug is always taken after skimming, which is often done for the second time. When the heat is tapped, the men take it off in hand ladles, and pour the molds, throwing the iron into them as quickly as possible so that the necessarily small gates do not prevent the metal from filling the molds by chilling and resulting in "short pours."

The open hearth process (see Steel—Crucible Process) is by far the best one in general use, but is confined to those works where great quantities are made year in and year out. Thus there are several works where about 80 tons of castings are made daily, and in which the use of the open hearth is a paying proposition, especially as the same furnace can be used for making acid steel heats in place of malleable cast iron, as desired. The fuel consumption for the open hearth corresponds to one pound coal for six pounds iron melted; showing a considerable economy over repeated until the proper shape is made. It takes from four to five hours to melt a 10-ton heat after this is charged, depending upon the quality of the bituminous coal used, and the condition of the furnace. From 6 to 10 heats can be made on the same bottom, with but little repairing, but the usual run is from two to four. In order to know when the heat is ready, a test plug, so called, is cast. This plug is about of a diameter equal to the heaviest section of the castings to be made. It is about eight inches long, and the mold for it is made by simply pushing the pattern into the sand in a box. The metal is taken from the bath by a small ladle dipped into it as deeply as possible. After pouring, as soon as the iron is set, the plug is grasped with a tongs, is dipped into water to cool it and then broken across. The fracture is observed, and if properly crystalline, and with but little or no motting, the heat is ready to tap. If there is too much motting, that is, too much graphite left, the process is continued to burn out more silicon, and also get the metal hotter, and another test plug taken. Experience will tell just how long a all other methods. The use of a gas producer system, however, where natural gas is not available, makes the installation an elaborate one, and not desirable where the proper help is not available.

In the case of the open hearth, the furnace is always hot, and hence a heat is finished about an hour sooner than in the air furnace. The iron gets hotter, and can be taken out in five-ton ladles to be distributed afterward and as the metal is not as long in contact with the gases as in the air furnace process, it is of better quality. The most economical size of furnace is the 20-ton, with the crane ladle to take off the metal in large quantities, so that tapping is not so long continued a matter as in the air furnace. The latest patented invention to assist in this is the application of two or more spouts to the furnace, so that metal may be taken out at different levels. In this way the surface of the bath, which is punished most by the gases, may be taken off first. Then while this is being poured off, the next part of the heat, now the top, is again taken off, and finally if three spouts are used, the bottom may
be taken out as long as half an hour afterward without any deterioration or change in the metal.

From the foundry the castings, after shaking out the molds, go to the hard tumbling room, where they are freed from the adhering sand. This is done by means of tumbling barrels into which the castings, and a supply of "stars" made of the same hard iron, are placed. Where castings are liable to crack by this tumbling about, sticks of wood are introduced so that as they strike them, no damage is done. Where delicate castings are made, these are pickled in dilute sulphuric or in hydrofluoric acid.

After cleaning the hard castings, they are carefully sorted out, the cracked or otherwise defective pieces thrown out, to go back into the furnace again, and the good ones are sent into the annealing room. Where castings are made which crack as soon as they cool, on account of their shape, such as the hand wheels of freight cars for braking purposes, these while still red hot in the sand, are taken into small ovens where they are kept quite hot for a time, and are then allowed to cool very slowly with the oven. In this way they will not be cracked before going into the annealing ovens. The modern tendency is to introduce the sand blast for cleaning, as this removes every particle of sand from the hard castings. Where the iron has been allowed to get too low in silicon, or "high" as it is called, in contradistinction to "low" iron, where the silicon is too high, and the metal mottled or even gray, the sand is apt to burn on so hard that the tumbling all day does not remove it all. Here the sand blast is excellent.

From the sorting room the castings go to the annealing room, or rather to a part of it in which the packing is done. To anneal the hard castings they are placed into so-called "saggers" or annealing pots. These are simple, box-like shells, with no bottom, about one inch thick, and say 18 inches x 24 inches x 15 inches high. Three or four of these are placed

![Plan of Annealing Oven for Malleable Castings](image_url)

Fig. 4.—Plan of Annealing Oven for Malleable Castings

over each other, and on a "stool" high enough to allow a free circulation of the gases under it. The castings are carefully placed in these pots and packed with "scale" in such a way that when red hot the whole may not settle and warp the work. This scale is puddle scale, hammer scale, or even iron ore. For that matter as the process is more of a conversion of the combined carbon into the "temper carbon" the castings can be packed in fire clay or sand and good results obtained. But the puddle scale seems to give the best results, with greatest cheapness. The flakes that fall from the annealing pots, these lasting only for 7 to 14 heats, can be crushed
and make the finest kind of packing material, being pure oxide of iron, and no further scale than the initial lot need be purchased.

The pots, properly filled, are covered with a "mud" made of the sand sifted off the hard castings mixed with water. The joints of the pots are also carefully daubed up with this mud; the pots are introduced into the oven, either run in by a special carriage in the old style ovens, or lowered in from the crane in the new ovens, the tops of which can be removed. The ovens are now fired and within 36 to 48 hours the full temperature of 1,350 degrees F. in the coldest portion of the coldest pot is reached. This temperature is kept up preferably 60 hours, and the oven then allowed to cool slowly before the pots are withdrawn. The ovens are so constructed that they are heated inside and under the whole bottom, so that a difference of not more than 100 degrees F. throughout the portion filled with work may exist.

After the pots are taken out, they are dumped, the castings taken from the scale and the former sent to the soft tumbling room. Here they are packed with small pieces of air-hydrided steel, or wood and leather, such as old shoes, etc., so that the adhering scale is removed, and a fine coat of graphite is given them. They come out shining black, and can be shipped direct, or else coated with asphalt, as required. Sometimes the castings must be straightened which should always be done cold, either by drop hammer or hydraulic press. Test plugs are usually cast on the important work, so that breaking these off on inspection the quality of the metal in the particular casting is revealed at a glance. Test bars for physical test should also be taken off with the first and last portion of every heat, so that all work from that heat can be traced and its quality known. The test bar has the further advantage of showing up the condition of the furnace, poor working on the part of which is immediately detected by a white rim on the casting.

The production of malleable castings in this country runs up to the enormous figure of 1,000,000 tons annually. In Europe about 75,000 tons are made in the same time. Most of the large companies now make steel castings in addition, as malleable cast iron, though most excellent for shock, is not strong enough to stand under the restrictions that are now put on the structures where this work is used. Thus the 100,000-pound cars now require steel couplers, as the malleable ones tear apart, yet the latter will stand all the bumping that comes along while steel will not. The principal use for malleable castings is for railroad work. Next comes agricultural machinery. After that a great variety of work, such as pipe fittings, hardware, machine parts, chain links, tools, etc. The demand is constantly growing, and while steel was supposed to be replacing the malleable casting, this has not turned out to be the case.

RICHARD MOLDENKE,
Specialist on Metallurgy of Cast Iron and Expert in Malleable Castings.

CAST IRON PIPES. See Pipes.

CAST STEEL, blister steel which has been broken up, fused in a crucible, cast into ingots and rolled. The process of making cast steel was invented by Benjamin Huntsman, of Attercliffe, near Sheffield, in 1770. See Steel.—Open Hearth Manufacture; Steel.—The Bessemer Process; Steel.—The Electroslag Processes of manufacture; Steel—Manufacture of Crucible; Steel—special or Alloy Steels.

CASTAGNO, käs-täń'yô, Andrea del, Italian painter: b. Castagno, Tuscany, about the end of the 14th or beginning of the 15th century; d. Florence, 9 Aug., 1457. Being deprived of his parents, who were extremely poor, he was employed by his uncle to tend cattle in the fields, and in that situation, by his surprising and untutored essays in the art, attracted the notice of Bernardo de Medici, who placed him under the tuition of one of the best masters Florence then afforded. He was greatly influenced by the works of Donatello. At first he painted only in distemper and fresco. His drawing is bold but his color is crude. On the return of Cosimo de Medici he was commissioned to paint portraits of his opponents. These he portrayed hanging by their feet on the walls of the Palazzo de Medici, which won him the nickname of Andrea de Medici. He is also the author of a series of 'Héroïts' and 'Sibyllines' at Leghorn, and also life-size figures of Dante, Petrarch, Boccaccio, Niccolo Ceccianote, founder of the Chartreuse at Florence; Farinata degli Uberti, liberator of his country; Pippo Spano, the conqueror of the Turks, and the fine equestrian statue of Niccolo da Tolentino. In the monastery of Degli Angeli are several religious works, including a crucifixion. Another is at the Santa Maria Novello. Vasari's story concerning the murder of Domenico Veneziiano in order to procure his art of coloring in oils has been discredited, since it has been proved that Domenico survived him by several years and finished his paintings at the Santa Maria before Andrea was called there. Consult the monograph by Waldschmidt (Berlin 1900); Crowe and Cavalcaselle, 'History of Painting in Italy' (Vol. II); Munz, E., 'Histoire de l'art pendant la Renaissance' (Vol. I, 1889).

CASTAGNE, André, än-drä käs-täń, French artist: b. Angoulême 1861. He studied at the Suisse Academy and at Paris, École des Beaux Arts in Paris; he exhibited at the Paris Salon in 1884 and several times in later years. Among his pictures are 'Dante and Beatrice'; 'The Deluge'; 'Portrait of Vicomte de Dampierre'; and 'After the Combat' (in the Peabody Gallery at Baltimore). In 1890 he came to the United States and remained here until 1895. He was director of an art school in Baltimore and in 1891 began the illustrating work by which he is best known to the American public. His first work in this line was 'The Forty Niners' Ball' in the Century Magazine for May 1891; since then he has illustrated for several of the leading magazines; his designs include the pictures of the Texas cowboys in Scribner's Magazine, and the World's Fair drawings and illustrations for 'Polly' in the Century. He illustrated B. I. Wheeler's 'Life of Alexander the Great' (1900). On his return to France he became instructor in the Colarossi Academy and opened a studio in Paris. He published 'Fata
CASTALIA — CASTANOS

Morgana, a novel dealing with the art life of Paris and illustrated by himself (1904). His work is characterized by spirited movement and dramatic feeling. Consult The Critic (Vol. XXIII, 57: The Bookbuyer (XII, 506).

CASTALIA, a celebrated fountain in Greece, the sacred spring of the Delphic oracle, at which all the pilgrims to Apollo's shrine were obliged to purify themselves. It issues from a fissure between two peaked cliffs, which form the summit of a semi-circular range of rocks, anciently called the Phedrades. These immediately adjoin Mount Parnassus, and rise to the height of 2000 feet. The Castalian spring was said to impart poetic inspiration to those who drank of it, but it was only latterly by the Roman poets that it was invested with this attribute. It is now called the Fountain of Saint John, from a small chapel dedicated to Saint John which stands near its source.

CASTALIDES, kás-tál'-dés, the Muses, so called from the fountain Castalia (q.v.), at the foot of Parnassus (q.v.).

CASTALIO, kás-tál-yō, Sébastien, CASTELLIO or CASTELLION, French theologian: b. Dauphiny 1515; d. Basel, 20 Dec. 1563. His original name was Châteillon. Through the influence of Calvin he was made professor of classical literature at Geneva. Having quarreled with the reformer, who caused his banishment in 1544, he repaired to Basel, where he taught the Greek language; but as his stipend did not suffice to support his numerous family, he was compelled to employ part of his time in agricultural labors. His writings include 'De Hæreticis,' a treatise opposing the punishment of heresy by civil authority, a Latin translation of the Bible, the best edition of which is in folio, Basel 1573, and a French translation of the Bible, dedicated to Henry II of France. Consult Buisson, 'Life of Castalio,' Paris 1892). He defended the right of free discussion in a collection of maxims compiled from various sources.

CASTANEA, a trade name for the Brazil-nut and a genuine name for the chestnut (qq.v.).

CASTANETS, small wooden rattles, made in the shape of two bowls or cups, fitted together and tied by a string, and then fastened to the thumbs. The fingers being rapidly struck upon them, a tremulous sound is produced, which marks exactly the measure of the dance. Something similar to this was the krotalon of the ancients, who also made use of small cymbals in their dances and festivals in honor of Bacchus. It is probable, however, that they had their origin in the East, and were brought by the Moors into Spain. Here, too, they received their name castañuelas, from being commonly made of the wood of the chestnut (castano), or from their color. They are still in use in Spain, and here and there in the south of France. The charm of variety has also procured for them a place in ballets and operas.

CASTANHEDA, kás-tän-yä'dā, Fernao Lopes de, Portuguese historian: b. Santarem about 1500; d. Coimbra, 23 March 1559. His father having been appointed to an important post in India, he was taken thither in youth, and was thus led to make the careful and unremitting researches embodied in the 'Historia do descobrimento e conquista da India pelos Portuguezes' (1551-61), a work upon which Camoens drew largely in the course of his epic activity. It has been translated into French, Spanish, Italian and English.

CASTANOS, kás-tañ'-ños, Don Francisco Xavier de, Duke of Bailén, Spanish military officer: b. Madrid, 22 April 1750; d. Madrid, 24 Sept. 1852. Educated in military science in Germany, at the age of 16 he became captain of Grenadiers, of the Savoy Regiment, and distinguished himself in the reconquest of Minorca. On the invasion of the country by Napoleon, he received the command of a division of the Spanish army, and in July 1808 compelled 18,000 French, under General Dupont de l'Etang, to surrender at Bailén, but was in turn defeated by Lannes in November of the same year at Tudela. Under Wellington he served as general of the 4th Spanish corps d'armée, and took part in the battles of Albuera, Salamanca and Vittoria. In 1815 he was placed at the head of the Spanish army for the invasion of France, which was rendered unnecessary by the victory at Waterloo. In 1825 he was called to the State Council, where he became a decided opponent of the Carlist party. He was made Duke of Bailén in 1833 and in 1843 became guardian of the Queen Isabella.