History of Corn Milling:

Handstones, Slave & Cattle Mills.

April 1929

Mc

HISTORY OF CORN MILLING.

IN PREPARATION,

UNIFORM WITH THE PRESENT VOLUME,

BY THE SAME AUTHORS.

VOL. II.—WATER AND WIND MILLS.—The Greek or Norse Mill: The Roman Mill: Floating Mills: Mills of Mediæval Europe: Early British Mills: Domesday Mills: Tide Mills: Post Windmills: Tower Windmills: Horizontal Windmills.

VOL. III.—FEUDAL LAWS AND CUSTOMS OF MILLS.—Compulsory Milling Soke: Its Origin and Incidence: Laws Relating to Ownership: Customs Affecting Millers: Status of Millers: Toll: Offences and Punishments: Pesage or Weighing Tax.

VOL. IV.—SOME FAMOUS FEUDAL MILLS.—Kings' Mills: Ardee, Dublin Castle, Dee Mills Chester, Liverpool. Alienation of Kings' Mills. Monastic Mills: Shrewsbury. Rectorate Mills: Wigan. Civic Mills: London. Rights of Feudal Mills Extinguished by Ratepayers: Leeds, Bradford, Wakefield.

ALSO

THE LAWS, CUSTOMS AND ASSIZES OF BREAD BAKING.

THE WHOLE RICHLY ILLUSTRATED AND REPLETE WITH RECORDS FROM ORIGINAL SOURCES.

Digitized by the Internet Archive
in 2008 with funding from
Microsoft Corporation

http://www.archive.org/details/historyofcornmil01bennuoft

CHARTER OF CECILIA DE RUMELIA, SUPPRESSING THE USE OF QUERNS, A.D. 1150.

From Whitaker's "History of Craven," by permission of Mr. J. Dodgson, Leeds.

See Page 211.

5c.H
B4718h

HISTORY OF CORN MILLING

VOL. I

HANDSTONES, SLAVE & CATTLE MILLS

WITH NUMEROUS ILLUSTRATIONS

BY

RICHARD BENNETT AND JOHN ELTON

374810
27.1.40

LONDON
SIMPKIN, MARSHALL AND COMPANY LTD.

LIVERPOOL
EDWARD HOWELL, CHURCH ST.
1898.

[*All Rights of Translation Reserved*]

PRINTED BY THE NORTHERN PUBLISHING CO., LTD., LIVERPOOL.

TO THE PRESIDENT,

WM. SMITH, ESQ., LANCASTER,

AND MEMBERS OF THE COUNCIL

OF THE

NATIONAL ASSOCIATION

OF

BRITISH AND IRISH MILLERS

TO WHOSE

DIRECTING AND CONSOLIDATING INFLUENCE

DURING RECENT YEARS

BRITISH MILLING IS INDEBTED

FOR MUCH OF ITS HITHERTO

UNPARALLELED PROGRESS AND SUCCESS

THIS WORK

IS RESPECTFULLY DEDICATED

BY THE AUTHORS.

PREFACE.

A FEW words may be appropriate regarding the influences which have prompted, and the principles which have guided, the production of this work.

We had long been impressed by the scantiness of the bibliography of corn milling; and had felt it strange that in this literary age—while, on the one hand, there should be extant various valuable milling works of a technical character, and an excellent milling press—yet that, on the other hand, there should be available no published history, however crude, of the origin and progress of this ancient and important industry.

This strange circumstance is due to no lack of interest. Corn milling possesses a distinctive historical interest over every other manufacturing art known. Without doubt it is the oldest continuously conducted industry of the world. The earliest efforts of primeval man, in the peaceful arts, were directed to pounding, from such grain, nuts and berries as he possessed, a rude kind of meal; while, centuries later, if the irrigation water-driven wheel were one of the first power machines devised by human ingenuity, the water corn mill was its immediate successor. Whether by hand or by power, therefore, corn milling may claim to rank among the first fruits of man's inventive ingenuity.

Nor yet is the lack of published history due to any dearth of records. In mediæval ages circumstances arose which centred upon corn milling, for many a century, an interest that, among all industries, is unique. The ownership and working of corn mills at the birth of feudalism were constituted prerogatives of the rulers of the people. None but they or their nominees could "presume to set up corn mills;" and the law of "milling soke" —the common law of the land by immemorial custom, and older than any English statute—bound the people to support mills thus set up by their lords. From the reign of the Conqueror to the opening of the Victorian era, these owners of exclusive rights, from kings to abbots and squires, have continuously drawn large revenues from corn mills; have tenaciously held to their privileged monopoly of ownership; and, when occasion has arisen, have upheld it by might as well as by legalised right. Records of the craft are thus to be found scattered through charters of kings and barons, customs rolls of mediæval manors, chartularies of monastic houses, muniments of ancient cities, national archives of sovereigns and Parliaments, pleadings and awards in the law courts; and, even, minutes of municipal authorities, who in recent times have raised rates to purchase and extinguish legal milling obligations created by ancient feudalities. Whatever may be urged for or against the exercise of such a privilege (and a good deal is possible either way), the milling archæologist has reason to be grateful for the records of the craft which it has bequeathed; and which at the present day enable us to trace the vicissitudes of milling more perfectly than those of any other of the industries of the world which have neither been repressed by legislation nor hampered by monopoly.

Still, closely, as in the past, the trade has ever been associated with affairs of national concern, and intimately as it must continue to be combined with imperial prosperity in the future, British historians seem consistently to have overlooked its rich store of records, and ignored its national interest and importance;

while even such of our standard county historians who may incidently quote early mediæval milling charters seem, as of one accord, to pass them over in silence without translation or explanation as though trifling matters unworthy of attention.

The literature of other nations is little richer. The classics, it is true, abound in fragmentary allusions to early stone-grinding and mythical theories as to the origin of the process. But it was not till about two centuries ago that even these ancient references were attempted to be gathered together in the monograph of Heringius. In the next century, the treatises of Hoheisel, Ayrer, and Goetius followed on the same limited scope; and none of these works (in which the subject was not brought down to date) appeared out of their Latin editions. Early in the same century the French economic writer, La Mare, and the German chronicler, Beckman, reviewed the topic: the articles of the former being once translated into Italian and the one chapter of the latter into English. Finally the *disjecta membra* of Marquardt, Paulys, etc., completed the brief continental record of the craft.

Since the period of these latter writers, corn milling has undergone that vital revolution of processes which, within comparatively a very few years, has placed the manufacture in the front rank of the scientific industries of the Victorian era. For centuries, millers, accustomed to the click of the wheel and the whirl of the sail, and dreaming of no improvement in their antique machines or methods, seemed to regard the unrelieved monotony of the past as the due and proper condition of affairs at the mill; and appeared well satisfied with their few simple efforts to easily and comfortably keep abreast with the requirements of the times. It is not more than a score of years ago that engineering science broke in upon the seclusion and apathy of, we may say, this forsaken or neglected industry; rollers then rapidly supplanting stones, and milling attaining to a position of scientific and economic efficiency never before

possible. No more essentially critical a revolution occurred when Rome abandoned slave and cattle labour for water power, than when, in recent years, water and wind gave place to steam and electricity, and stones were abandoned in favour of rollers. But so far as we perceive, the history of this great achievement, though technically described in detail in scientific milling treatises and related in more or less fragmentary form in the pages of the contemporary milling press, still remains to be published. And, since in milling as in other matters, there is no finality, and improvements are still emanating from the engineer with whom the future welfare of the trade mainly rests, the prospect ahead is by no means one of apathy or rest: and the miller who shall keep level with the times will not only be constrained to maintain the most perfect machinery for the production of flour, but to rely largely upon commercial knowledge and skill for dealing in the vast markets of the world which influence the present conditions of trade.

The present work is an attempt to collate the scattered muniments of the industry, ancient and modern, and frame them in intelligible form: eventually preparing the way, perhaps, for something better qualified to embody the theme. Whatever its imperfections, it may claim to have suggested a basis for the subject; and arranged its details, out of a chaos of confusion and error, into some definite order with, it is hoped, some approach to accuracy. In the section "Histories of Some Famous Feudal Mills," compiled from original sources hitherto unapproached in the interests of milling, and illustrating the incidence of feudal milling law, seems to be opened out a new and interesting branch of local archæology. The volume now issued deals with the practical foundation of the whole work; reviewing the gradual evolution of all varieties of handstones and labour mills during their use, as premier mills, from the earliest periods to the end of the 4th century; and continuing their history, as secondary mills among primitive

peoples, till the present day. Our chief quoted authorities are necessarily the classics, each of whose salient allusions we have transcribed in the original with its exact reference, as a convenience for future enquirers.

We have to express our sincere thanks to the many friends and correspondents upon whose kindness and courtesy we have relied, either to obtain special information or to facilitate our researches; including, in addition to those specially mentioned in this volume, Dr. Flinders Petrie, Mr. Seton Karr, M.P.; Dr. Garnett, C.B., Mr. C. H. Read, F.S.A., British Museum; Dr. M. Deffner, National Library, Athens; Mr. C. Notara, Athens; Emil Brugsch Bey, Cairo; Mr. W. E. Hoyle, Owens College Library, Manchester; Mr. J. Sampson, University College Library, Liverpool; Mr. G. T. Shaw, Athenæum Library, Liverpool; Mr. T. J. Westropp, R.S.A.I. Library, Dublin; the publishers of the various works acknowledged as the sources of many of our illustrations; and the Councils of the Royal Archæological Society, Royal Society of Antiquaries (Ireland), Cambrian Archæological Society, London and Middlesex Archæological Society, Lancashire and Cheshire Historic Society.

19, Brunswick Street, Liverpool,
March, 1898.

CONTENTS OF VOL. I.

CHAPTER I.

CRUSHERS AND HOLLOWS.

§		Page
1.	Archaic grinding	1
2.	General form and use	3
3.	In Egypt and Greece	9
4.	In Swiss Lake Dwellings	12
5.	British specimens	14
6.	Bullán stones	19
7.	Hollows not corn stones...	23
8.	Grain stones found in tombs	25
9.	Probably tombs of women	25

CHAPTER II.

THE SADDLESTONE.

1.	The first grinding mill	29
2.	Prehistoric Italian	30
3.	Chaldean	33
4.	Of ancient Egypt	36
5.	The "mill" of the Hebrews	55
6.	Of Troy and Athens	57
7.	Grecian cult of the mill	63
8.	In use at Rome	66
9.	Universality of in Europe	67
10.	Specimens from Brittany	67
11.	Specimens from Swiss Lake Dwellings	69
12.	English specimens	70
13.	Welsh specimens	71
14.	Irish specimens	73

§ Page
15. Mexican metata 75
16. In use in America 82
17. ,, Africa 83
18. ,, Asia 86

CHAPTER III.

THE MORTAR.

1. A development of the cup hollow 87
2. Chaldean mortar; the earliest historic grain stone ... 88
3. Egyptian 89
4. Of ancient Hebrews 90
5. Of Greece 91
6. Plautus and Greek mills... 94
7. Terence and Greek mills... 97
8. Rome: institution of trade of pistores 97
9. Classic allusions 99
10. Pliny's descriptions 101
11. Passes from Rome 103
12. Romano-British examples 104
13. Prehistoric British examples 105
14. In use in Africa 110
15. ,, America 112
16. ,, India 113

CHAPTER IV.

ROMAN PROCESSES IN THE MORTAR PERIOD.

1. Comparative efficiency 114
2. Foodstuffs 115
3. Sand and gypsum in flour 117
4. Bolting 120
5. Washing and drying grain 124
6. Parching grain 125

CHAPTER V.

THE QUERN.

1. Identification of Roman 128
2. Earliest allusions to 130
3. Invented by the Volsinians 132
4. Virgil and the quern 133
5. Handmill of the civilised world... 134

§ Page
6. The Roman quern 135
7. Period of introduction into Britain 138
8. 'Mola versatilis' becomes the 'quern' 139
9. System of grooving 139
10. British types 141
11. Decorated with crosses 142
12. Other decorations... 146
13. Pot querns... 148
14. Handles 153
15. Examples found in situ 154
16. Stones and quarries 155
17. Anglo-Saxon and Welsh laws 161
18. Mediæval variations 162
19. The modern quern 165
20. Modern Norwegian 167
21. ,, Scotch 168
22. ,, Irish 175

CHAPTER VI.

THE SLAVE MILL.

1. Period of introduction 177
2. Mills of Rome and Pompeii 178
3. Mediæval specimens 182

CHAPTER VII.

THE CATTLE MILL.

1. Roman 185
2. Scriptural 187
3. Vesta, goddess of ass mills 187
4. Vestalia: "Millers' Feast" 188
5. As depicted by Apuleius... 190
6. Demand for, in Rome 191
7. Census of, in 4th century 194
8. Modern survivals 195

CHAPTER VIII.

THE ROMAN PISTORES.

1. Slaves and criminals 199
2. Journeymen 201
3. Poets and sages 203

§ Page
4. Worthies of the craft 206
5. College of Pistores 208

CHAPTER IX.

MEDIÆVAL SUPPRESSION OF QUERNS.

1. Laws and charters 210
2. Raids and captures 213
3. Paving an abbey parlour with querns 215
4. Tenants with halters round their necks 218
5. Excommunication 219
6. Special licenses to use 220

CHAPTER X.

THE MODERN HANDMILL.

1. A monastic relic 222
2. Modern examples... 223

APPENDIX.

THE CORN-GRINDING TREADMILL.

1. Early prototypes 225
2. Modern introduction 226
3. Practical inefficiency 228

GENERAL INDEX, 231.

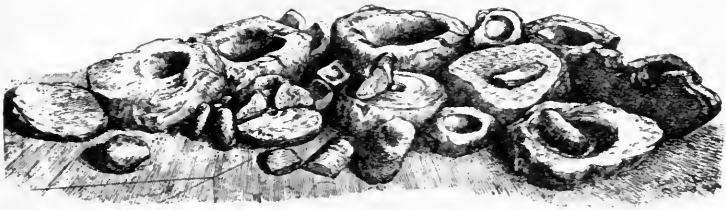
LIST OF ILLUSTRATIONS.

Charter of Cecilia de Rumelia suppressing the use of Querns ... ... FRONTISPIECE.

	Page
Collection of Welsh Stones: Twr Elin. Holyhead ...	*Vignette* 1
Crusher or hammer: Kent's Cave	4
Yosemite Indians making acorn meal	6
Globular crushers: Troy	10
Swiss lake dwellings	13
Cup hollow: Swiss lake dwellings	13
Decorated crusher: North Britain	15
Cup hollow: Salisbury pit dwellings	16
Flint crushers or mullers: Kent	17
Double-hollowed stone: Liverpool	19
St. Bridget's stone: Killinagh	21
St. Columb's stone: Londonderry	22
Cup hollow not a corn stone: Troy	25
Grain stone in a tomb: Thymbra	27
Typical saddlestones	29
Prehistoric saddlestones: Italy	30, 31, 32, 33
Method of using saddlestone	37
Egyptian statuettes: 3rd dynasty: Gizeh	38
of uncertain period: Liverpool ...	39
5th dynasty: portraits: Gizeh ...	41, 42
Florence ...	43
slave: Gizeh	45
6th dynasty: slaves: Gizeh ...	46, 47
c. 1500 B.C., British Museum ...	50

Page
Egyptian toy model: British Museum 48
toy model: Leyden 51
mural sculpture: Bab-el-Molûk 51
triangular saddlestone 52
hieroglyphic inscription: Bab-el-Molûk 53
slotted saddlestone: Naukratis 54
curious muller with handles 54
Greek statuette: Rhodes 48
Samson at the mill: 14th century sketch 56
Stand for the saddlestone 60
The "mill" of Homer: saddlestone: Troy ... 60, 61
Saddlestone: Castle Coz, Brittany 68
Salisbury lake dwellings 70
Cornwall... 70
Anglesea... ... ... 71, 72, 73
Perforated saddlestone: Dublin 74
Mexican metata with muller 75, 76
Muller: Fairmount, Philadelphia 76
Cârved metata 77
Metata: St. Domingo 78
Manchester 78
Mexican painting: use of metata 79
Metata in Mexican bakery 80
houses 81
Modern saddlestone: Chili 82
African woman using saddlestone 83
The modern African stones 83
Modern scene in African village 85
India: curry grinding 86
Egyptian mural sculpture: the mortar 89
varieties of mortars... 90
Pestles and mortars: Troy 92
"Hesiod's mortar" 94
Romano-British mortars: notched 104
carved 104
Mortar found in situ: Holyhead 107
Trough-shaped mortar: Ty Mawr 108
Four-sided mortar: Pen-y-Bonc 108
Pestle: Castle Coz, Brittany 109
Women pounding: Central Africa 110
Transvaal 110
Madagascar 111
Aboriginal American-Indian pestle 112
Indian women pounding rice 113
Egyptian carving: bolting: Bab-el-Molûk 120

Page
"Two women shall be grinding at the mill" 135
Romano-British quern, lower stone, Anglesea 137
upper stone, Cheshire 137
grooved lower stone, British Musm. 140
British quern found in situ, Anglesea 141
Anglo-Saxon quern 142
Cross querns 142, 143, 144
Inscribed cross quern 144
Elementary form of decorated quern, Ireland 146
Decorated varieties, Wales 147
Quern bearing a carved mask, Scotland 147
Perfect Romano-British quern, St. Martin's-le-Grand ... 149
Pot quern, Crosby, Lancashire 150
Fourteenth century pot quern 151
Roman pot quern, grooved, Cheshire 151
Mediæval pot quern, London 151
Perfect pot quern, Rhyddgaer 152
"Finger quern," Dublin 152
Handle projections 153
Hoxay Fort, with querns in situ 155
Fourteenth century sketch: working the quern indoors ... 163
,, out of doors 164
Modern Indian querns 165
Modern Norwegian quern, on stand 167
Scotch quern of the last century 168
Modern Scotch quern, on stand 173
sectional diagram 174
Modern Irish quern: sectional diagram 175
Pompeii slave mills: diagrams 179
views 180, 181
Bars of servants' mill, early Irish 182
Servants' mill: Romano-British, British Museum 183
Orleans 184
The Roman horse mill 186
Statue of Vesta, goddess of the ass mill 188
Pompeii wall painting: "The Millers' Feast" 188
Modern horse mill: diagram 196
German sketch 196
ass mill, German sketch 197
camel mill, Khiva 197
Reputed Roman mill, Lancaster Castle 198
The mediæval handmill 222
A monastic relic, Gloucestershire 223
The corn-grinding treadmill 229
Collection of Welsh stones: Penrhos, Anglesea *Vignette* 230



[Welsh Stones at Twr Elin, Holy Island.—*From a Sketch by Mr. E. W. Cox.*]

HANDSTONES, SLAVE & CATTLE MILLS.

CHAPTER I.

CRUSHERS AND HOLLOWS.

I. CRUSHERS AND HOLLOWS.

1. Archaic Grinding.

A RETROSPECT of the origin of corn milling has ever carried back the mind, whether of classic romancist or modern scientist, to the remotest eras of human existence. Among the ancients, myth and fable attributed to the beneficence of Ceres man's first knowledge of grinding grain. Ovid describes the goddess as providing grain for primeval man in place of the nuts and berries upon which he originally subsisted :—

Fasti, iv., 395.

Messis erat primis virides mortalibus herbæ
Quas tellus nullo sollicitante dabat. . . .
Postmodo glans nata est: bene erat jam glande reperta
Duraque magnificas quercus habebat opes.
Prima Ceres homine ad meliora alimenta vocato,
Mutavit glandes utiliore cibo.

The first food of man was of herbs demanding from him little trouble or care; nuts afterwards; and then were happily discovered the acorns of the magnificent oak. These he used till Ceres, advising him of better food, for acorns beneficially substituted grain.

I. CRUSHERS AND HOLLOWS.

1. Archaic Grinding.

And elsewhere the poet refers again to the time when acorns of the oak formed the great support of life.

Quernaque glans vita est utiliore cibo.[1]

[1] Fasti, i., 676.

Virgil carries the legend a little further and credits Ceres with the invention of ploughing :—

Prima Ceres ferro mortales vertere terram
Instituit, quum jam glandes atque arbuta sacræ
Deficerent sylvæ et victum Dodona negaret.

Georg., i, 147.

'Twas Ceres first taught man with iron to till the ground, what time food of acorns and berries from the sacred woods of Dodona failed.

Pindar alludes to the worship of the goddess among the Greeks and their acknowledgment of her special claim on their devotion :—

Celebratur illic agon Proserpine and Cereris qui vocatur Eleusina: cujus præmium erat mensura hordei.

Olymp, ix., 150.

They celebrated the feast of Proserpine and Ceres whom they called Eleusina, whose offering was a measure of barley.

And Pliny, most practical minded of the quartette, finally lauds the Goddess of the Earth by attributing to her an inception of the art of corn grinding :—

Ceres frumenta instituit: eadem molere et conficere in Attica et alia in Sicilia ob id dea judicata.

Nat. Hist., vii., 57.

Ceres instituted corn, and taught grinding and baking in Attica and in Sicily.

Nor are these reverential recognitions of the beneficence of Ceres altogether to be condemned: their spirit is true in attributing to Nature and the Earth man's instinctive intuition of the food most suitable for his needs, and the process most appropriate for preparing it.

In very much the same vein are the scientific expositions of modern archæology which, cleaving the mist of the primeval world by the keen light of the present century, show us archaic man evincing superiority over the brute creation by exercising his reason in the preparation of an artificial from a natural food. His berries, nuts, acorns and corn were pounded into meal; and his

I. CRUSHERS AND HOLLOWS

invention of the first pounding appliance constituted, without doubt, one of the earliest attempts to devise an instrument useful in the peaceful arts.

1. Archaic Grinding.

While the origin of handstones is of so remote an antiquity, and their use during prehistoric times of so cosmopolitan a character—for in one or other variety their use extended throughout the world—it is to be accounted a more remarkable circumstance still that, during historic ages, the globe had passed through four of the six thousand years of its recorded chronology before any other corn mill than the handstone was known. This extraordinary testimony to the utility of the little contrivances that so long adequately served their purpose, and with which for so many ages the world was well content, has curiously caught the attention of one of the old divines, David Martin, Hugenot translator of the Bible, who founds upon it an argument of the gradual and constant changes always in progress, and the continual extension of human knowledge and skill.*

During this long period the stones underwent various changes; barbaric minds were exercised upon their improvement, and the earliest civilisation introduced novel modifications; but from that period till the Augustine age of Rome the old forms remained unchanged, and the Eternal City finally introduced or popularised the last perfection of which the stones were capable.

2. General Form and Use

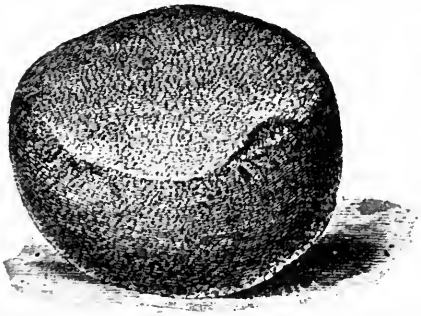
Our knowledge of the corn stones of the Paleolithic period—that distant age in which the geologist ends and the archæologist commences his labours—though not indefinite, is but faint, and is derived from no great abundance of specimens. The caves and pit-dwellings of Europe, the wastes of Asia Minor, the

* Toutes ces inventions nécessaires et trouvées depuis si peu de temps font bien voir que le monde n'est pas éternel, car il ne seroit pas possible que les hommes eussent été, durante toute une éternité, dans une si grossière ignorance. L'Ecrit Sainte: Amsterdam 1702: Judg. xvi., 21

I. CRUSHERS AND HOLLOWS.

2. General Form and Use

wilds of Africa and America, all alike evidence the use of one common type of pounding stone; and, judging of the habits of the primeval world by those of the aborigines of modern uncivilised countries, this type everywhere appears to have been the earliest. The corn, like nuts or berries, was simply pounded by a conveniently shaped stone such as that of the ham-



mer stone, found in Kent's Cave, Torquay, in 1865. This crusher is formed of a pebble of coarse hard red sandstone, the outer form of which is generally retained, though one portion has been so battered away by long usage, that the stone has assumed somewhat of a cheese-like form. Sir John Evans, who includes the implement among stone hammers, believes it may have been used for breaking the bones of animals, in order to extract the marrow: but the stone rather appears as though it had been used as a crusher than a hammer, and its evenly worn surface is scarcely such as would be produced by smashing bones. The relic was discovered in the deposit known as the red cave earth, and beneath an enormous block of limestone. MacEnery mentions, among the objects he discovered, a ball of granite, probably of the same class of implement. Very many prehistoric specimens of similarly shaped globular stones have been found in various localities, all of the same general character, and evidently used as pounders or mullers for crushing foodstuffs, if not grain.

Stone Implts. Evans, 1872, 457.

Ibid, 1897, 244.

I. CRUSHERS AND HOLLOWS.

2. General Form and Use

The customs of barbaric tribes of modern times clearly prove the use of the crusher. The Seneca Indians boil their maize and crush it into a paste between loose stones. The Omahas crush it in depressions in the rocks; while the Oregon Indians parch and pound the capsules of the yellow water lily *(Nuphar advena)* in much the same way as Herodotus states was done in ancient Egypt. "The process of bruising with round stone balls may still be seen among the Indians of the Yosemite Valley: the squaws pounding acorns with round stone mullers on a granite rock, the flat surface of which is worn into holes by the operation." "In the acorn region of California the women take a common boulder for the nether stone, and by use gradually beat in it a cup hollow—a shapeless mortar."

Herod. ii., 92.

Troja: Schliemann, 1875. 570.

Orig. Invent. Mason, 1895. 138.

Acorns remained in use through the classic ages, as Pliny states, and at this period the Gauls and Britons, who lived principally in forest lands, largely consumed herbs, fruits and acorns. "One is indeed led to believe that the religious veneration which these people entertained for the oak had no other origin than this. Acorns were eaten, at least in times of dearth till in the 8th century, when we find in the Regle of St. Chrodegand that by reason of an unfavourable year, the acorns and beech nuts failed." The flour of pounded acorns, though bitter when first made, is easily rendered palatable; and, by the Yosemite Indians, is accounted a very nutritious and fattening food. A modern traveller in the valley describes the operations of sweetening and cooking the flour.

Text: Roman Processes.

Les Arts au Moyen Age. Lacroix, 1871. 113.

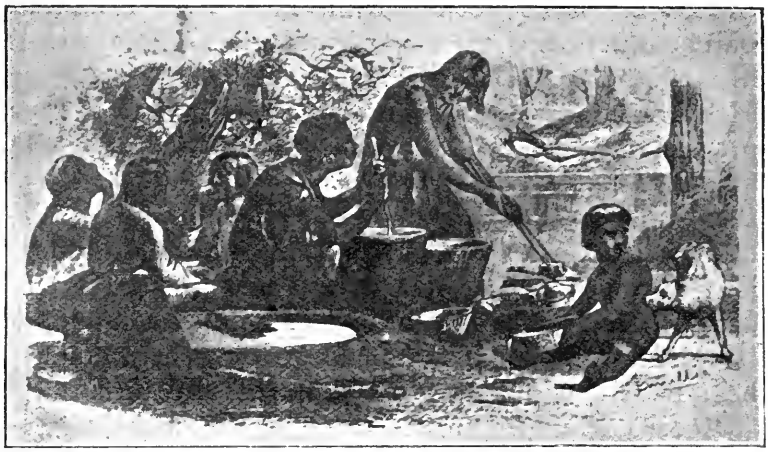
"A fire was burning in the encampment under the cotton trees, and in it were being heated a number of stones of small size. A circular basin about three feet in diameter and very shallow had been carefully made in the fine sand, and in this the acorn flour

Pict. America: New York i. 483.

I. CRUSHERS AND HOLLOWS.

2. General Form and Use

was spread to the depth of three or four inches; the acorns having been dried in the sun, were hulled and pounded between stones, a very fine-looking white flour being thus produced, but very bitter to



the taste and unfit for use until prepared. For this, it is placed in the sand basin as described; conical baskets of very fine osier are made to stand securely by being planted in the sand; they are filled with water from the river and the hot stones are dropped in; in a few moments the strange spectacle is presented of a basket of water boiling violently. This scalding water is poured upon the flour in the sand basin through cedar boughs held fan-wise above it. When the basin is full of mixed boiling water and flour, the former is allowed to subside, draining rapidly off through the sand into the earth. This process is repeated several times until, on tasting, the flour is proved to be sweet, the bitterness having all been carried off by the water. The scalded flour is eaten in this moist state, almost as gruel, being lifted with the fingers out of a bowl; or a variation is made by cooking the mass till it becomes thick, when it is put into small baskets and placed in

I. CRUSHERS AND HOLLOWS.

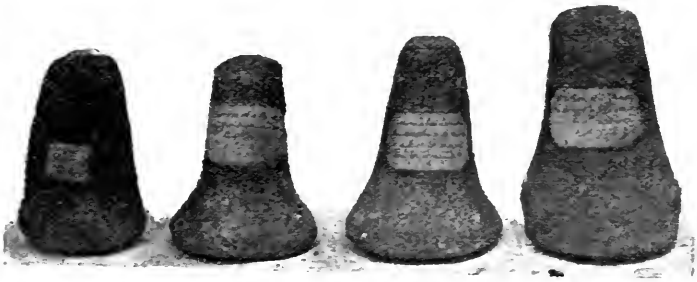
2. General Form and Use

the river to harden, taking the form of our old-fashioned 'turnovers,' and looking really inviting as they lie, white and rounded in the pool at the river side." It was in something the same simple manner that Pliny states amylum to have been prepared from the lighter kinds of wheat; except that in this case it was unground grain and not flour which was soaked and then hardened into cakes in the sun.

Nat. Hist., xviii., 17.

Primarily the crusher would be used on any convenient stone; but so soon as a tribe or family began to settle at or to frequently visit one certain spot, the regular use of the crusher upon the one rock or boulder would naturally ensue; this in time causing a cup hollow to be beaten into the lower stone. The custom remains to the present day. At El Paso, Texas, on the face of a rock near an Indian settlement, Bartlett counted no fewer than 26 such hollows each from 12 to 18 inches deep, and about 6 inches in diameter, all within a few feet of each other, and all evidently beaten into the rock in the process of crushing maize. Prehistoric America has yielded many varieties of crushers, though in some examples the comparative excellence of the workmanship seems

Explorations in Texas, 1854, ii., 370.



to assign them to no extremely distant aboriginal era. The foregoing four examples have been worked in fine granitic rock from Ohio; each of them has been well shaped, and is perfectly flat at the bottom. Four conical specimens from Tobago—the largest

I. CRUSHERS AND HOLLOWS.

2. General Form and Use

of which has been much used—appear in the next illustration. Pounders of somewhat the same shape, but formed of metal, are still in frequent use. Three characteristic specimens of aboriginal pounders are

included in the excellent collection of Mr. H. Stopes, Swanscombe, Kent. One, of fine granite, carefully shaped in trumpet-like form with an expanding pounding base, was obtained from Cincinnati; the other two, both ruder in form, from Rhode Island and Dakota respectively. Various of the public museums of the country contain one or more of these relics. Nearer home, evidence of the same custom of making hollows in the rocks is found in Scotland; where "in many parts, the corn used to be pounded in basins cut in the solid rock near to the cottages, though after the depopulation of the Highlands and the disappearance of the cottages, learned antiquarians ascribed the construction of the basins to the Druids." So writes a well-known archæological friend.

The crusher and cup hollow must have continued in use throughout the Paleolithic and Neolithic ages of stone, surviving into the age of bronze; and certainly were subjected to all the improvement of which barbaric minds were capable. Though one of these rude specimens may now seem so closely to resemble another as to offer no material point of

1. CRUSHERS AND HOLLOWS.

2. General Form and Use

difference, still the apparently trifling variations which a close examination reveals, are undoubtedly to be accounted evidences of the ideas of those who fashioned them, upon the improvement of the appliances, either for greater convenience of use or more efficacious pounding. The awkwardness of using very shallow hollows was, surely, very early noticed, and the inconvenience of pounding on a flat stone was palpable. Crushers for this latter use were variously modified: in some cases one half of the globular stone was flattened on its opposite sides, as at the Swiss Lake Dwellings; in others the stone was fashioned into trumpet-like form with a flat base, as in prehistoric America. The globular crusher also gradually gave way to the oval variety suitable for the deeper cups which came into vogue; and this again was superseded by the pear-shaped stone which both afforded a convenient hold and a rounded base for working. Thus, as the hollow gradually developed into the mortar, so the crusher formed the embryo of the pestle of later ages.

3. Egypt and Greece.

The most ancient known peoples of the world have left us some few evidences of their use of the primitive crusher. In Egypt and Somaliland Mr. Seton Karr courteously informs us he has lately discovered specimens of corn crushers averaging in size, as well as in shape, an orange; though we are aware of no similar discoveries in that earlier home of civilisation, Chaldea and, apparently, the earliest definite historic evidence of their use occurs in ancient Greece.

During Dr. Schliemann's explorations on the sites of Troy, Mycenæ, and other places which flourished in the historic period of ancient Greece, great numbers of globular corn crushers were discovered. Troy is believed to have been destroyed in 1184 B.C., other settlements subsequently being founded on the ruins of the city. "For centuries, houses with

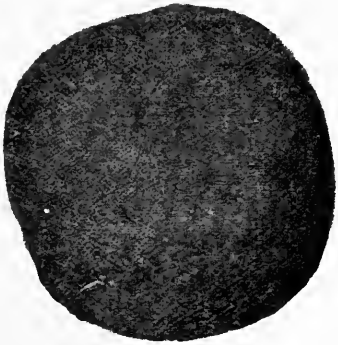
I. CRUSHERS AND HOLLOWS.

3. Egypt and Greece.

walls built of unburnt brick stood upon the mighty heaps of stone belonging to the primitive Trojans. Again, for centuries, houses of stone joined with clay were erected upon the ruins of the houses of brick. For another long period, upon the ruins of these stone houses wooden ones were erected. Finally, upon the charred remains of the last were established the buildings of the Greek colony"—about 700 B.C. "Rudely cut, nearly globular, stone instruments for flour grinding are very numerous in all the four lower prehistoric cities; nay, I do not exaggerate when I affirm that I could have collected thousands of them. They are of basaltic lava, granite, quartz, diorite, porphyry, etc."

Troy, 1875, 175.

Ilios, 1880, 236.



The specimen figured is about four inches in diameter, and is one of a number found at a depth of from 45 to 52 feet below the present surface, apparently among the ruins of Troy itself. A stone about twelve inches in diameter, containing a cup hollow, was found in the same layer of debris; the whole furnishing us with an example of the earliest known corn mill of Greece. In the more recent ruins on the site the stones were still found but in less abundance; a fact suggesting that they were then being discarded for the newer type, the saddlestone.

Troy, 1875 151.

I. CRUSHERS AND HOLLOWS.

3. Egypt and Greece.

Across the Ægean Sea, on the site of Mycenæ, Schliemann discovered many of the same early corn stones. On the site of Tiryns in Argolis, whose mythological history dates further back than that of Troy, "roughly cut but sometimes fairly well polished almost globular stones, which are called corn bruisers, were found in great numbers in the deeper and most ancient settlement under the ruins of the palace;" which was destroyed, as is believed, as early as 1500 B.C. In Thrace also the same stones were found in the ancient tumulus of the Trojan hero Protesilaus, reared on the western shore of the Black Sea.*

Ibid, 80.

Troja, 1884, 80.

A distinct reference to the crushing stones of the Trojan age is made by Virgil. The poet, who lived many centuries after that era, knew both the Roman mortar and the quern, mentioning them both in passages to be quoted in due course; therefore, when he speaks of reducing grain not by either of those appliances but by crushing with a stone, his meaning is perfectly clear. When Æneas drew his seven boats on the Libyan shore and the wearied Trojans sprang to land, Achates struck a spark from a flint

*Dr. Schliemann mentions in his autobiography a curious incident relating to a miller. In 1836, at the age of 14 years, young Schliemann found himself (already fairly efficient in Latin but not yet knowing the language of Homer and Troy, the dream of his childish days) starting life as an apprentice to a grocer in the small town of Fürstenburg in Mecklenburg Strelitz; selling sugar, herrings, soap, potatoes, whisky and similar goods from 5 a.m. to 11 p.m. "Of course I came in contact with only the lowest class of society. But as long as I live I shall not forget the evening when a drunken miller came into the shop. He is named Hermann Niederhöffer, is the son of a protestant clergyman, and had been expelled from college for bad conduct. His father had apprenticed him to a farmer but his conduct was not exemplary, and he was apprenticed to the miller Dettmann, of Gustrow. Dissatisfied with his lot, the young man gave himself up to drink, which, however, did not make him forget his Homer, for, on this evening, he recited to us about a hundred lines of the poet, observing the rhythmic cadence of the verses. Although I did not understand a syllable, the melodious sound of the words made a deep impression upon me, and I wept bitter tears for my unhappy fate. Three times over did I get him to repeat to me those divine verses, rewarding his trouble with three glasses of whisky, which I bought out of the few pence that made up my whole fortune." It may be added that the miller seems to have eventually amended his ways. He remained in the craft ten years; then obtained a minor government appointment, and, says Schliemann, "is living yet." (1880).

Trojans, 1880. intro.

I. CRUSHERS AND HOLLOWS.

3. Egypt and Greece.

and lighted a fire; his companions producing their sea-damaged corn and implements; parching the corn at the fire, and breaking it by a stone:—

Æneid, i. 179.

Tunc Cererem corruptam undis, Cerealia que arma
Expediunt fessi rerum, fruges que receptas
Et torrere parant flammis et frangere saxo.

Yet though Virgil is so explicit, Douglas, in his translation, converts the crushing stone into a quern, an appliance not known for centuries after the age of Troy:—

For skant of vittale
The cornes in quernes of stane they grand:

Trans. L. & C. H. Soc. 1868, 277.

an inconsistency which has already been noted by Dr. Hume, of Liverpool. Virgil mentions the same use of a crushing stone in another connection; the rural peasant now parching the grain, anon breaking it by a stone:—

Georg, i. 267.

Nunc torrete igni fruges, nunc frangite saxo.

4. Swiss Lake Dwellings.

In the prehistoric Swiss Lake dwellings the globular corn crushers were in ordinary use. Dr. Keller, in describing the many specimens found in the course of his investigations, says:—"Following the example of the northern antiquaries, we class as corn crushers and mealing stones certain roundish stones the size of a man's fist, made out of very hard rolled sandstone, and others of granite or quartz rock, with certain hollows and flattened surfaces: the whole of them having been hewn and roughened on two opposite sides by blows with a pointed instrument. They vary in form to some extent: some are like an orange, others like a ball with depressions on the four opposite sides;" as shewn in specimens obtained at Meilen. These stones are generally 3½ inches diameter and 2½ inches thick, and greatly resemble one of the common weapons of the time—the slingstone; still there are readily perceivable points of difference precluding confusion. "The corn crushers only differ from sling-

Lake Dwellings, 1866. i. 27.

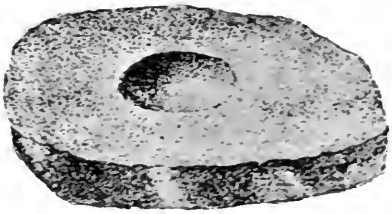
I. CRUSHERS AND HOLLOWS.

4. Swiss Lake Dwellings.

stones by being more spherical in form and by having no groove at the side or edge. The depressions in the sides are wider than in the slingstones, and

made with less care. Some, indeed, consist merely of cylindrical stones, and are only to be recognised as grinding or crushing implements by being truncated above and below, and by the surface being rough; though some specimens have also holes or slight depressions on the two opposite sides to allow of them being held more firmly." These last specimens are identical with the ancient British and French cheese-shaped crushers of the Paleolithic age.

Some doubt might possibly have arisen, Keller observes, as to the accuracy of these stones being considered corn crushers and not ordinary stone hammers for general purposes; but proof of their being used for a specific purpose as pounders was



afforded by the discovery of blocks of sandstone, each containing a circular cavity into which the crushers fitted. These lower stones are very large unworked slabs of sandstone or hard rock tabular

I. CRUSHERS AND HOLLOWS.

4. Swiss Lake Dwellings.

in form. On one of the two sides, and sometimes on both, "roundish holes have been made in the shape of a segment of a sphere, the diameter of which is some inches, while the depth varies from ½ inch to 1¼ inch. The cup, the surface of which was left rough, was destined to receive the grain to be ground or crushed." Each pair of such stones Dr. Keller finally decides on the evidence before him to have formed "a stamping and grinding machine for crushing corn, before the invention of handmills."

5. British Specimens.

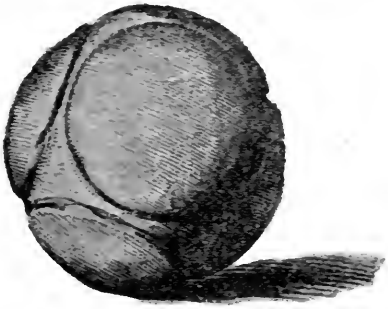
In Great Britain prehistoric globular crushers of the same general character as that of Kent's Cave, already described, are not rare. Unperforated spherical stones, generally about the size of an orange, are found in Scotch tumuli, and though they may scarcely be distinguished from the stone cannon balls which were in use till as late a period as the reign of James VI., still the circumstances under which they occur leave no room to doubt that they were articles held in esteem by the primitive races of Britain, ages before gunpowder was invented. It is, of course, purely conjectural that they were used for crushing grain; but the conjecture is confirmed by other circumstances. Again, they greatly resemble prehistoric slingstones, a point noted by Keller regarding the undoubted corn crushers of the Swiss Lake Dwellings: but the resemblance they bear to the actual grain crushers of prehistoric Denmark is so strong as to demonstrate identity. Occasionally these stones are found decorated with carved circles and other ornaments, as in a specimen found near the Roman road leading from Carlisle to Dumfrieshire. Others, of polished granite, have been discovered in a cairn near Glenquicken, Kircudbrightshire, and in a cist at Cochino, Dumbarton. Similar balls occur among the relics found in the

Prehist. Scot., Wilson, 1851, 138.

I. CRUSHERS AND HOLLOWS.

5. British Specimens.

barrows of Denmark. In the "Report addressed by the Royal Society of Northern Antiquaries to its British and American Members," printed at Copenhagen in 1836, are described a class of



primitive corn crushers of the foregoing type, with an engraving of a rude block of stone containing a cavity, into which the globular crusher fitted. This lower stone somewhat resembles the shallow mortar-like grain-stone found in the pit dwellings of Salisbury, and others described in the present chapter; and similar hollowed basins are common throughout the country. Referring to the Carlisle stone shewn in the illustration, other specimens of which type are extant, it must be admitted, however, that the benefit of carving a grain crusher in the manner shown is not perceivable, and that in such case the actual purpose of the appliance or implement remains open to considerable doubt.

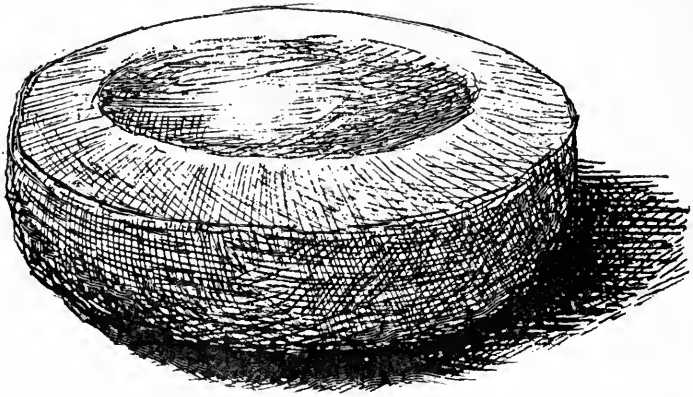
Flint Chips: Stevens: 1870. 62.

In the Highfield pit dwellings near Salisbury, explored in 1866, by Dr. Blackmore, was found (together with a saddlestone, described in the next chapter) a nether grain-stone of a circular or trencher-like form. It somewhat resembles a circular specimen found by Schliemann, at Troy, and happens also to be identical in size, viz., 12 inches diameter. Its central hollow is both shallower and wider, however, than that of the Troy example, as

I. CRUSHERS AND HOLLOWS.

5. British Specimens.

may be perceived from the drawing obligingly supplied by Dr. Blackmore. Both have been used in connection with the usual spherical crusher with its circular rolling motion which, as being distinct



from the purely pounding action, marks the inauguration of a change in the system of grinding. The specimens are thus of an interesting transitional nature—cup hollows, yet used for rolling rather than pounding: the improved motion, in fact, being attempted with the old appliances. Something of the same characteristics appear in a specimen discovered in Anglesea by the Rev. W. W. Williams, and again in one found, with many saddlestones referred to later, by M. Le Men in the subterranean chambers of La Tourelle, Brittany. Two crushers and cups of the French caves are almost identical with stones in use in Siberia for pounding acorns and nuts, and among the natives of Australia for crushing the bulbous root, "belilah," and the roasted bark of trees for food.

Arch. Camb., 1868. 304.

Stone Implts.: Evans, 1872. 219.

In the varied collection of prehistoric stone implements made by Mr. H. Stopes, of Swanscombe, Kent, which differs in arrangement from all others, a number of curious stones are grouped together, some of which may help us to understand

5. British Specimens.

the early processes of pounding. Mr. Stopes has long held the view that a correct tracing of the development of archaic tools and their use may lead to a better understanding of the development of man himself; hence he groups together stones of all ages and all countries. In some of the truly remarkable series thus thrown together may be found a number of pounders, mostly of small size, some of which were probably intended for crushing grain. By the courtesy of Mr. Stopes, who has lent us several specimens, we are enabled to illustrate the extremely uniform character of the ancient British appliances. The group shewn comprises

thirteen examples; all of which, with the exception of the two at the extreme left, were found in the gravels of the Lower Thames Valley, at from 70 to 90 feet O.D. The largest of these is about 8 inches in length, and the smallest 1½ inch. They consist of fairly smooth, rounded nodules of flint, of convenient natural shape for holding in the hand; a blunt base for mulling having been obtained in each case by striking off one end of the stone; otherwise they are entirely unfashioned, and differ considerably from the globular-shaped crushers already described. Of the other two specimens, the larger was found in the Thames Valley in a deposit of brick-earth, at about 60 feet O.D., and

I. CRUSHERS AND HOLLOWS

5. British Specimens.

the smaller in gravel near Orwell Hall, Suffolk. The latter differs from the rest of the number in consisting of a water-worn pebble blunted at one end, and somewhat resembles in its conical form some of the pounders of prehistoric America. Mr. Stopes attaches some importance also to a fossil elephant tooth, contained in his collection, of rather small size, and worn down to a smooth surface, as he considers, possibly by being used as a crusher or muller. It is differently rounded to teeth worn in the natural manner by eating; it quite fits the right hand; and, in those parts which, in use, would come in contact with the hand, is smoother and a little more lustrous than in the other parts below the gum level.

Trans. R. S. A. I. xiii, 446.

Among specimens of stones containing a single hollow were three found in a cist in the pagan cemetery of Drumnakilly, Fermanagh. Each stone measures about 14 by 11 inches, and each of the hollows bears the marks of the cutting tool. Upon the floor of the cist into which these stones were embedded stood, in the usual inverted position, a burial urn, described as "magnificent," containing calcined human bones: the discovery indicating such a connection between cup-hollowed stones and primitive sepulchral rites, as to constitute a tangible clue to the relative antiquity of the stones. At Trewavas Head, Cornwall, are two granitic slabs, each containing a cup hollow of large dimensions. One stone is 4 feet 3½ inches in length with an elliptical artificially cut basin 1 foot 8 inches long and 5 inches deep; the other being 3 feet 9 inches long with a basin 1 foot 9 inches across and 5¾ inches deep. "Residents near the spot can give us no account of these stones; miners refuse to acknowledge them as utensils required in their vocation; to the agriculturists of the present day they would be of no use; and they may very well be classed with the mortars

Arch. Camb.: 1867. 341.

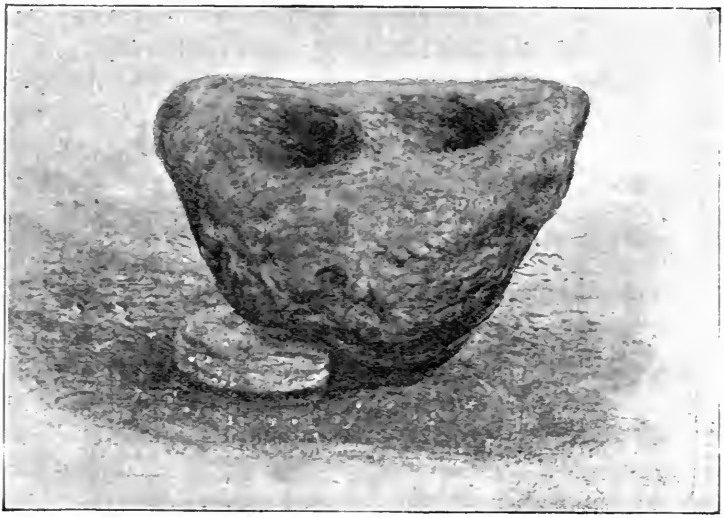
I. CRUSHERS AND HOLLOWS.

5. British Specimens.

used for grinding in primitive times." The basins are most regularly formed and highly worn by friction, and are to be attributed to the later stone age, when much care was exercised in the polishing and finishing of all such implements. "If these relics are to be regarded as ancient vessels for corn crushing, they are perhaps the finest yet known to exist in this country"—a surmise which, after twenty years' discoveries, still seems to hold good.

6. Bullán Stones.

An interesting British specimen of a double cup-hollowed stone, now in the collection of Mr. Bennett, was discovered, about 1870, while excavating the bed of a brook for making the lake in Sefton Park, Liverpool, part of the ancient Forest of Toxteth. The stone is



a rolled boulder of red granite, measuring 1 foot 6 inches by 1 foot. Upon one of its sides, a natural smooth tabular surface, have been cut two hollows; one being circular 8 inches in diameter and 5 inches deep, and the other of oval form about 6 by 5 inches and 4 inches deep. Upon the sides of the cups the tool marks are perfectly clear

I. CRUSHERS AND HOLLOWS.

6. Bullán Stones.

and distinct; but the bottoms of the hollows are worn smooth by use. This, as well as several larger boulders of grey granite, was excavated from drift or clay overlying the bed rock. Mr. E. W. Cox, of Liverpool, to whose archæological zeal we are indebted for the preservation of the relic, states that the brook had cut its way through the boulder clay almost down to the bed-rock; the clay deposits appearing on either bank. The precise circumstances of the discovery are not now ascertainable; but the presumption is that it was not found *in situ* in the clay, since such a circumstance would prove its being carved before it had been deposited in the clay bed by glacial action. The probability is that it was discovered near the margin of the brook, out of the banks of which its original owners had taken it; and that it was fashioned and used on the spot, where also its prehistoric owners finally abandoned it. By its discovery we are placed in possession of a specimen that is not only unique in this part of the country, but that, as the only archaic milling relic of the district, may be regarded as the earliest known corn mill of Liverpool.

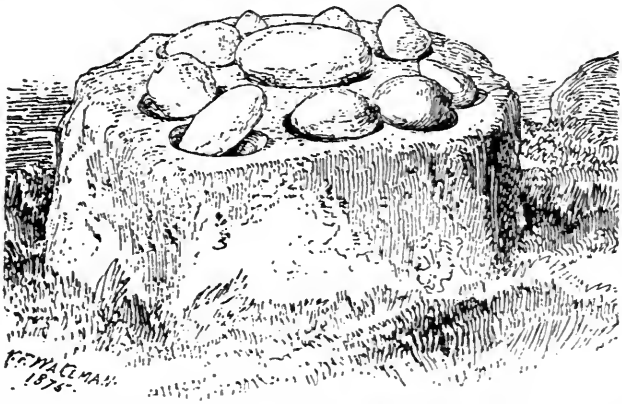
Extremely remarkable amongst stones containing more than a single hollow are the bullán stones of Ireland. That known as St. Bridget's Stone is accounted "one of the most impressive monuments of its curious class remaining in the country." It lies nearly upon the shore of Loch Macnean within a short distance of the ancient parish church of Killinagh; a circular boulder of red sandstone measuring 5 feet 9 inches, as it lies, from east to west and 5 feet 2 inches in the contrary direction. Its rough table-like surface displays nine cavities placed somewhat irregularly, but one being as nearly as possible in the centre of the group. Each of its depressions contains a loose stone of a form nearly

Roy. Soc. Ant. Ireld., xiii. 459.

I. CRUSHERS AND HOLLOWS.

6. Bullán Stones.

filling it, and generally oval in shape. The lithic character of the latter is not uniform, but they are all smooth and of nearly symmetrical contour. Superstition and tradition for centuries have clung round this



curious relic, but neither one nor the other has aided the archæologist in suggesting its origin or purpose. Some explain the mystery of this and similar stones by reference to druidical sacrifices at which it is presumed these rock basins were used for collecting the blood of the victims. But more reasonably, perhaps, in this instance at all events, we may recognise in the relic nothing more than the common mealing stone of the early settlement on the site of Killinagh ; at which, if necessary, eight women could grind together the grain for their families. Such a common mealing centre was maintained in many villages of North American Indians visited by J. D. Hunter, who states that one or two large mortars, the public property of the community, stood out in the open street in the centre of the village for use by the different families in rotation. A more recent American writer illustrates the same custom : "there are numerous examples of apparatus, of the elementary sort, in which the mortar is carved on the surface of a great rock near to some camp ; and thither resorted one family after another to prepare flour."

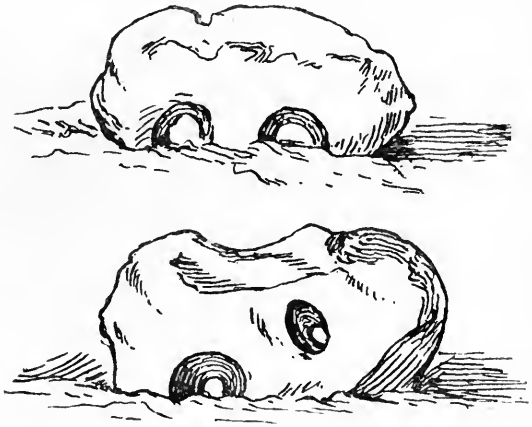
Manners of Ind. Tribes : 269.

Orig. Inventions: Mason : 1895. 139.

I. CRUSHERS AND HOLLOWS.

6. Bullán Stones.

A somewhat similar bullán stone near Bantry is provided with five cavities, each of which also contains an oval-shaped loose stone. The ancient St. Columb's Stone in Londonderry is another example. It is



about three feet in length, and partly embedded upon its side in the ground; upon each side being two elliptical cavities greatly resembling the pair in the Liverpool boulder.

Ordn. Survey Rept, Londonderry, 1837; 26.

"Stones of this description are found in the vicinity of most of the Irish churches and usually bear the name of the founder or patron saint: they are always held sacred, and the rain-water deposited in their hollows is believed to possess a miraculous power in curing various diseases." While possibly they may have been used as grain stones, they may, with equal probability, it is true, be conjectured as sacred relics containing stoups for holding holy water. On the other hand, though stones of the same character are frequently, also, found in ancient churchyards of the Orkneys and Shetlands, the testimony of living witnesses demonstrates that, at least in modern times, they were used for pounding grain. About 100 yards to the south-west of the harbour of Scalasaig, in Colonsay,

I. CRUSHERS AND HOLLOWS.

6. Bullán Stones.

by the side of a main road stands a large earthfast boulder of several tons weight. In the middle of the stone is an artificial round hole, or basin, about 12 inches in depth and the same in width. Alexander M'Neill, a native of the island, and one of the crew of the mail packet, pointed out the stone, stating that in his young days pot barley was made upon it; the grain, with a little water, being put into the hollow and beaten with a hammer having a long handle; the stone standing in the open air and being common to all the neighbourhood, the work being usually done by women. Mrs. Archibald M'Neill, wife of the farmer of Gavard Farm, and a native of the island, also explained the process, having seen her mother use it; Archibald M'Neill, fisherman, of Riskbuie, also remembered his mother and other persons using the stone in Riskbuie burying ground.* "The *knockin' stane* seemed to be unknown as private property, or as a domestic utensil kept inside a house; no one on the island had any knowledge of such a thing, and on making inquiries it was found that the stones were all outside the dwellings." Several persons pointed out various specimens, one man indicating an example which he had made and used himself. To the foregoing account the Rev. R. J. Mapleson, instancing the occurrence of other of these stones, adds: "The people here say they were made and used as mortars to separate the husk from the barley."

Soc. Antiq. Scot. 1881, 133.

7. Cup Hollows which are not Corn Stones.

Just as all globular stones are not corn crushers so, it is necessary to note, all cup hollows in rocks are not grain cups. Within the last quarter of a century, archæologists, mainly on the initiative of Sir J. Simpson, have devoted great attention to the study of hollows, rings and circular perforations in

* Various instances occur of similar stones being found in local churchyards. A small one from Mealista, Lewis, is about 20 inches total length. S. A. Scot. 1878, 32.

I. CRUSHERS AND HOLLOWS.

7. Cup Hollows which are not Corn Stones.

rocks and boulders of prehistoric times; and have decided that they were but symbols or ornamentations, to the purpose of which there is no clue. Frequently resembling grain cups they still are, as a rule, yet readily distinguishable from them. Some are deeply cut and others extremely shallow; some are evidently human handwork, others the presumed result of peculiar weathering of the rock; some are elliptical and others round. At times they are found on the face of vertical slabs of stone in prehistoric burial grounds, as in the Isle of Man; at others they are inscribed on blocks buried in the floors of cists, as in Wales. They occur in Scotland and Ireland upon boulders and flags (without reference to either the form or position of the same), found dotted over the sites of ancient settlements. In Cornwall they are sunk into the flat granitic surfaces of mountain crags, and one, at least, of them "evidently appears to have been cut with a tool." In Lancashire and Yorkshire they abound on the exposed faces of level rocky plateaus on the hills. Some of them may be natural, others artificial; but the only point we are desirous of suggesting is that they were not, necessarily, made nor used for grinding grain.

Arch. Sculptures, Simpson, 1867.

Arch. Camb. 1866, 52. 1867, 150-341.

Roy. Soc. Ant. Ireld., xiii. 283, xviii. 526.

Dolmens of Ireland: Borlase: 1897, ii. 326-663.

Archæologia, xii. 47.

L. & C. H. Soc. 1865, 1. 1866, 257.

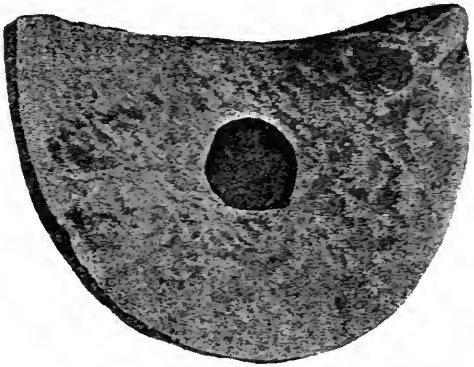
Nor are these hollows the only ones which at times are almost undistinguishable, to the non-observant eye, from grain cups. Dr. Schliemann discovered, at a depth of 40 feet, among the ruins upon the site of Troy, "a prettily carved and very hard piece of limestone in the form of a crescent, with a round hole 1½ in. deep in the centre" greatly resembling the cup hollow slab found by Dr. Keller in the Lake Dwellings. It, however, proved to be merely a stone containing a socket for the pivot on which a door was made to turn, instead of on a hinge, as was common in ancient Egypt, &c. Such stones are

I. CRUSHERS AND HOLLOWS.

used for gate pivots in rural Scotland at the present day, and, says Professor Mitchell, "would certainly be a puzzle if they were not seen in actual use."[1]

7. Cup Hollows which are not Corn Stones.

[1] Past and Present, 1878, 127.



8. Grain Stones Found in Tombs.

The occurrence of grain stones in tombs of prehistoric peoples seems to be no mere matter of accident. In many instances, no doubt, grain stones, already broken and useless, have evidently been used in the construction of cists as ordinary boulders; and, as in the case of the inscribed Irish quern, have occasionally been utilised as memorial stones. But apart from these incidental occurrences —several instances of which will be found quoted in connection with the different classes of grain stones— various discoveries in widely separated places seem to place the fact beyond doubt that corn stones, in sound and serviceable condition, were, frequently, purposely buried with the dead.

9. Probably in Tombs of Women.

It is impossible not to imagine that some definite custom is suggested by the curious fact, and we are led to believe that graves so marked were those of women. Almost the earliest discoveries of this nature occurred in connection with corn stones found in tombs of the Neolithic period in Britain and Denmark. Wilson, who quoted the circumstances, at a loss to account for them ventured upon the suggestion that they might not be corn stones,

Prehist. Scot. 1851, 139.

I. CRUSHERS AND HOLLOWS.

9. Probably in Tombs of Women.

these being "inappropriate articles to accompany the warrior to his final resting place." Still, there was no evidence, direct or indirect, that the tombs in question were those of warriors. And if the warlike spear were appropriate to place beside the brave, why not the corn stone—or later the whorl—to accompany the wife or daughter who had laboured, in homely duties, with these humble articles of utility? In or near early British graves, quern stones occur. One figured by Jewitt was discovered in a Saxon grave mound at King's Newton, and another was found also in a Saxon mound at Westminster. This latter is considerably mutilated, having been burnt during the cremation of the body in its cist. Nothing is more probable than that both of these mounds were graves of women.

Grave Mounds, Jewitt, 1870, 295.

A similar discovery in Scotland by Dr. Bryden forms a suggestive link in the available evidence. The tomb was found on a farm in the Tevrol Valley, seven miles from Hawick. "The body had been cremated in the grave, and the stones enclosing it were blackened and discoloured by the fire: among them the upper stone of a quern was found, though the lower stone could not be traced. Several interesting questions arise—Why was the quern placed in the grave? Was its presence there accidental? Was it thrown in with other stones lying about to help to cover the ashes of the dead? Was it placed there for a purpose? Any supposition but the last is very unlikely; to the survivors, the quern was undoubtedly far too valuable a machine to be loosely lost sight of. Moreover, this is by no means an isolated case. Only a few days prior to the present discovery a somewhat similar one, made at Jedburgh by Mr. Bateman, is sufficient of itself to settle the question. Two graves were discovered only a short distance apart; and in one was found the

Soc. Ant. Scot. 1868, 467.

I. CRUSHERS AND HOLLOWS.

9. Probably in Tombs of Women.

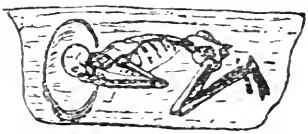
upper and in the other the lower stone of the same quern." Dr. Bryden, who was, we believe, the earliest to note these curious facts, entertained no doubt that, in these cases at all events, the querns had been purposely placed in the graves. But his suggestion that they marked the burial places of grinders of grain must, in order to reach the actual fact, be extended, we believe, to the conjecture that the graves so marked were those of women.

Some further suggestion arises from the burial customs of American aborigines. At Costa Rica and Veragua, the country of the ancient Dorachos, rich in archæological remains, "the tombs of Indians are of two kinds. One consists of flat stones in the fashion of coffins, covered with soil; the contents being earthen vases, rounded agates and small images of birds in stone, eagles most probably, such as are found in Mexico and on the Mosquito shore. The more frequent form, however, is the cairn, a rude heap of pebbles in which we find no eagles and no ornaments; but only one or more stones used for grinding corn"—these probably being the graves of women, and the others those of men.

Voyage of the Herald: Seemann: i. 313.

During excavations on the site of Thymbra, the city mentioned by Homer, Consul Calvert discovered a tomb in which the body (not burnt as was the custom of the Trojans) had been laid to rest on its side,

Ilios, 1880, 713.



with its head pillowed upon an oval-shaped saddle-stone. Grinding stones of this kind were in use in the time of Homer; and though, possibly, this grave may be that of a woman, it is not improbable that, since

I. CRUSHERS AND HOLLOWS.

9. Probably in Tombs of Women.

a stone head-rest for the dead was frequently placed in tombs, as is commonly found to be the case in those of ancient Egypt, no special significance can safely be attached to this particular instance.

In ancient Egypt and Greece, among the many little statuettes found in the tombs, occur figures of women on their knees grinding grain. The nature and object of these memorials are fully considered in the next chapter; and it may here be briefly remarked that they appear to be evidences among civilised nations of a practice prevailing among barbaric tribes, of marking in this appropriate manner the graves of women whose domestic virtues were held in reverent memory.

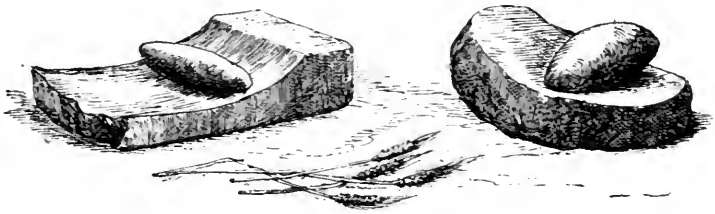
CHAPTER II.

THE SADDLESTONE.

II. THE SADDLE-STONE.

1. The First Grinding Mill.

THE "saddle" corn stone stands pre-eminent among the milling appliances of the world. It was the first contrivance by which grinding—as distinguished from pounding—was actually effected. It has been used throughout the globe; enduring in barbaric ages, surviving in the midst of Grecian and Roman civilisation, and remaining in use still. Not even the common quern possesses this signal distinction; for, extensive as its use has been and is, it seems never to have been known in prehistoric America. The saddlestone, the product of comparative civilisation, derives its name from a resemblance its concave upper surface bears to the seat of a saddle. In this hollow the grain was rubbed or ground by a small stone muller, worked backwards and forwards, but not rolled; by constant wear the original slight concavity was commonly deepened till the stone



assumed the extremely worn appearance seen in many prehistoric British specimens, and, finally, became useless. The general character and shape of the stone are well indicated in the above drawing by

II. THE SADDLE-STONE.

1. The First Grinding Mill.

Mr. E. W. Cox. The operation of grinding by this appliance differs vastly from the rude pounding by the crusher and hollow or their congeners the pestle and mortar. Dr. Schliemann has expressed the opinion that saddlestones, such, for instance, as those he discovered at Troy, were unsuitable for grinding—

Ilios 234.

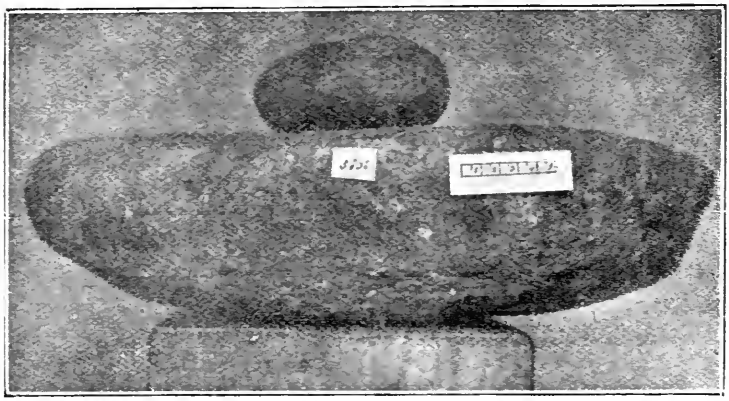
"only a kind of groats could have been made in this way, not flour; and the bruised grain could not have been used for making bread; in Homer we find it used for porridge and also for strewing on roasted meats." However, nothing is more certain than that the Trojans did not live on porridge, but ground grain for making bread or cakes, the grain being reduced on the saddlestone. It is possible to grind with the stone a very fair quality of meal; and, in fact, meal which, according to modern ideas, was "of good quality" has, within the last few years, been ground upon a prehistoric Irish saddle-stone.

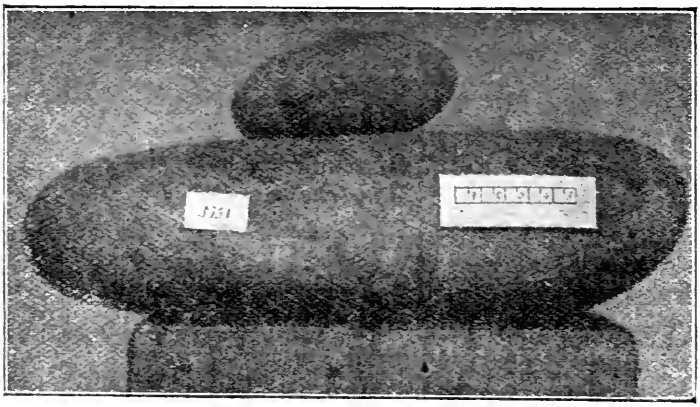
2. Prehistoric Italian.

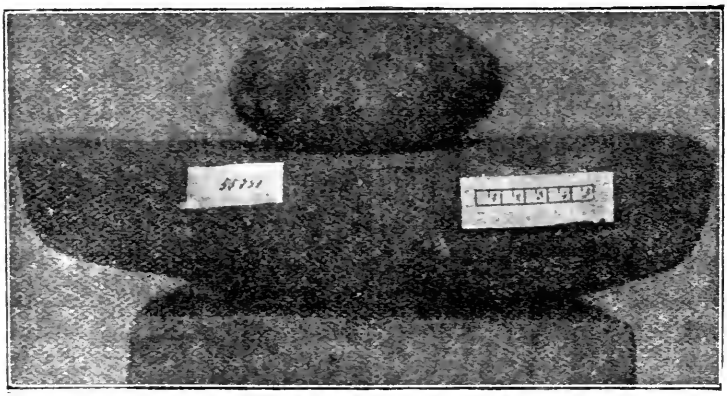
Among prehistoric specimens we may, perhaps, correctly give precedence to examples referred to the stone age of Italy. Several examples of the Neolithic period contained in the Archæological Museum at Rome are represented in the illustrations. The first three waterworn blocks of sandstone are from the Cavern of White Sand, Finalmarina, Genoa.

II.
THE SADDLE-STONE.

2. Prehistoric Italian.

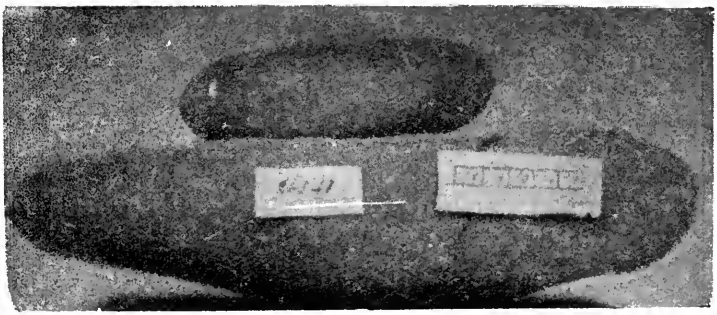


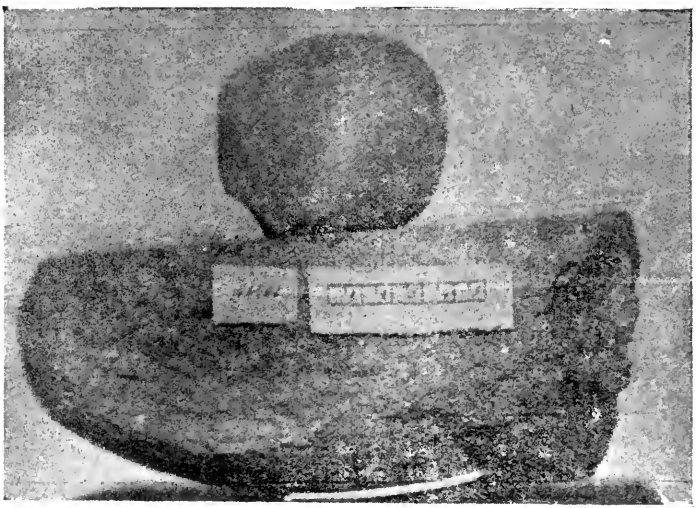


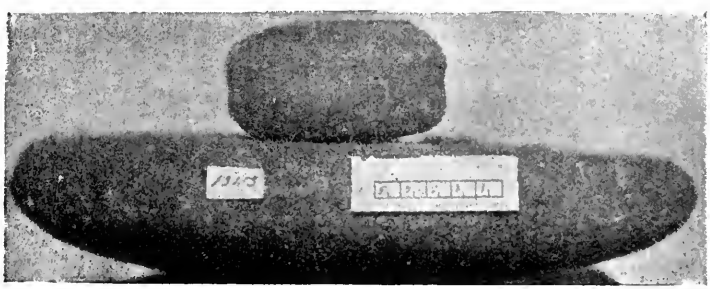


II.
THE SADDLE-STONE.

2. Prehistoric Italian.







II.
THE SADDLE-STONE.

2. Prehistoric Italian.

The next two illustrated are similar boulders from, respectively, Pullera Cavern, near Genoa, and the Valley della Vibrata, Abruzzo. In the bronze age the same character of stones prevailed, as shewn by three specimens in the same museum, which, severally, are from the terramare of Villa Cappella, Mantua; from Gorzano, Modena; and Nizzola, Modena.

3. Chaldea.

Chaldea, the cradle of civilisation and the arts, the centre from which radiated the refinement and splendour of Babylon and Nineveh, Assyria, Egypt, and Persia, possessed as its chief corn-grinding mill the saddlestone. Traces of the appliance, though now difficult to discover, and but scanty when acquired, appear to be sufficiently definite to establish the fact. Chaldea was a region possessed of little or no stone. The builders of the cities of the Plain of Shinar "had brick for stone, and slime had they for mortar." (Gen. xi., 3.) Babylon and Nineveh in all their glory were mainly brick-built cities; their gorgeous palaces, their monumental

II. THE SADDLE-STONE.

3. Chaldea.

records, and their business tablets were all of burnt clay. Gataker, the divine, over two centuries ago, remembering the dearth of stone in Babylon, considered that grinding stones were imported; and commenting upon the passage "they took the young men to grind" (Lament. v., 13), observed that the reading of the text in the Jewish Talmud implied that the men were taken not to grind but "to carry millstones to Babylon, where there was great scarcity of them;" and where, as we know, the basalt of Armenia was commonly imported for the erection of national monoliths. But the dearth of relics of the Chaldean corn stone is not without parallel. Half a century ago Layard stated the early Assyrian monuments furnished few details illustrating the private life and domestic economy of those who raised them; while the only representation of an agricultural implement then found in Assyria or Babylonia was that of a plough.

Nineveh, 1849, ii., c. vi.

Much has since then been done in the exploration of these ancient sites, and within the last few years some few indications of the grinding stone have been found. Professor Maspero, one of the highest modern authorities upon Chaldean and Egyptian exploration, states that in Chaldea the oven for baking bread occupied a corner of the court of every house, and beside it were kept the grinding stones. He does not, indeed, describe the stones, but appears to have none other in view in this connection than the saddlestones, which, as we shall see, were in common use in Egypt. Schliemann, referring to saddlestones found on the site of Troy, states definitely that similar stones, found in "the most ancient ruins in Chaldea," are included in the small Chaldean collection at the Louvre, Paris. We have not been able to trace these identical stones in the

Dawn of Civilisation: 1894, 746.

Tiryns, 1886, 81.

II. THE SADDLE-STONE.

3. Chaldea.

museum, and a distinguished Chaldean archæologist of Paris, from whom we have made inquiries, has also failed to identify them. He writes us—"Among the Chaldean monuments at the Louvre, discovered in the excavations of M. de Sarzec, I cannot find any object which might either be a mill or be referred to milling. There are certainly in the museum a number of blocks of stones of a more or less hard nature, each hollowed out on the upper surface into a very slight circular cavity varying in different specimens from two to six centimetres in depth; three illustrations of which occur in *Découverts en Chaldie* (Comptes Rendus de l'Académie des Inscriptions et Belles-lettres) pl. v. figs. 1 and 2; pl. vi., fig. 4. It is, however, most probable that they were merely sockets of doors in which turned pivots of wood, used instead of hinges." Chaldean saddlestones seem, on the whole, to wait further discoveries; but the prospect is not of so hopeless a character as might be imagined, seeing that the most ancient historical specimen of a corn mill known to be in existence is a mortar recently discovered by M. de Sarzac in Chaldea. Text: Mortars.

Chaldea was eminent for its grain cultivation, and grinding assuredly was abundantly practised. Corn was one of the principal sources of the wealth of the nation. Winnowed grain, and ingot gold, were the main media of barter. In corn the imperial taxes were collected; and great fiscal storehouses of grain, controlled by an army of administrators, were maintained throughout the state. The valleys of the Euphrates and Tigris—now singularly monotonous sandy wastes, depopulated and uncultivated—were, in the time of Queen Semiramis, and many centuries later in the days of Pliny, rich with corn fields and pastures. Herodotus says that of all the lands with which the ancients were acquainted Chaldea, a Clio: i., 193

II. THE SADDLE-STONE.

3. Chaldea.

country of pleasant gardens and palms, rich in corn and wine, was by far the best for the growth of corn, the abundance of which, should he state it, might arouse incredulity. Pliny says that so fertile in corn was the soil of Chaldea, that it yielded fifty, and, indeed, with care, as much as a hundredfold the seed sown; and modern travellers tell us that there is no reason why this favoured region should not again become as rich and fruitful as of yore. Grinding corn was, without doubt, one of the most extensive domestic and state industries of Chaldea. And though specimens of the grinding stones are, as yet, extremely scanty and indefinite, still, at the period when Assyrian history merges into that of Egypt, the next rising centre of civilisation, we find the saddlestone in common use there; and it is difficult therefore not to consider that if early Egypt possessed this superior mill of the world, her more advanced neighbour, Chaldea, also possessed it. "The accounts of the countries about the Euphrates," observes Mitford, "go farther into antiquity than those of any other upon earth; we scarcely know when there was not a large and polished empire there; of other countries which have possessed science, arts, and letters we learn whence such science, arts, and letters came to them; but no trace appears of their existing in any other country prior to their flourishing in Chaldea." And like all other history, the records of milling virtually commence in Chaldea, where, while the rest of the archaic world steeped in barbarism, was using the primitive pounder and rock basin, the saddlestone was evolved and, with other evidences of civilisation, transmitted to Egypt.

Nat. Hist., xviii., 45.

Chaldea: Loftus, 1879, 14.

Hist. ii., 12.

4. In Ancient Egypt.

It was in 1921 B.C. that the patriarch Abraham—himself a Chaldean—migrated to Canaan and opened the history of practical corn milling by directing his

II. THE SADDLE-STONE.

4. In Ancient Egypt.

wife to prepare "fine meal" for the angels (Gen. xviii., 6): woman's special toil at the mill during many succeeding centuries being thus already hers. As to how Sarah performed her task while her angelic visitors rested outside the tent under the tree we need entertain little doubt. The ancient scene has practically been continuously reproduced from the time of Sarah to our own day, as we now see it in

Africa; and no doubt she thus used the grinding stones of her native land Chaldea. In any case she must have seen these in use in Egypt when, a few years earlier, during the famine in Canaan, she and her husband had sojourned there.

Modern explorers have happily afforded us full information of these, the earliest undoubted historical milling stones of the world; small models and statuettes, some of them mere toys, others monumental figures placed in tombs, have been found dating back even earlier than the time of Abraham, and plainly depicting women grinding at the saddle-stone. The reflection of the sage—"Time which antiquates antiquities and hath an art to make dust

II. THE SADDLE-STONE.

4. In Ancient Egypt.

of all things, hath yet spared these minor monuments"—curiously applies to the preservation of these small trifles, which, fragile as they seem, have survived alike the colossal monoliths and the mighty cities of the Assyrian plain.

The relics discovered seem to be very few, all we have been able to trace numbering less than a dozen; of which six are at Gizeh, one at Cairo, one at Florence, one at Berlin, and two in England, though the list may possibly be further extended. These we propose briefly to describe, chiefly by the aid of photographs and information courteously supplied by Emil Brugsh Bey, director of the National Egyptian Museum at Gizeh. Several are older than the time when Sarah ground the fine meal, the others dating not greatly subsequent to her day; and the whole of them exhibiting, with marvellous fidelity of detail, the manner in which the wife of the patriarch, four thousand years ago, performed the now world-old toil of women at the grinding stones.

Four centuries before the period of Abraham, and

II. THE SADDLE-STONE.

4. In Ancient Egypt.

during the 3rd dynasty of the Egyptian kings, or about 2300 B.C., is the period attributed to the oldest known of the statuettes. The figure of the woman is seen in the servile posture—invariable when grinding—of kneeling; the only position, however, in which the full force of the arms and body could be brought to bear upon the heavy and long-sustained work. The statuette, which is of wood and painted, was found near the Pyramids at Dahstour on the Nile, a little to the south of Gizeh; and is preserved in the Gizeh Museum. The saddlestone, upon which the muller is worked backward and forward, is shaped something like a flush-decked boat, bowed fore and aft; and the muller or grinder is flat on the under side: a characteristic which will be noticed in each of the specimens at Gizeh.

A figure grinding at a similarly-shaped stone, recently obtained from Upper Egypt, has courteously been submitted to our inspection by Dr. Forbes, director of the Liverpool Museum, where it will shortly be exhibited. The style of workmanship in this example—which is carefully carved in hard wood—as

II. THE SADDLE-STONE.

4. In Ancient Egypt.

well as the contour of the figure, its condition of finish and its preservation are vastly superior to those of the specimen at Gizeh ; and the hair is shown neatly and closely cut, as in a specimen of the 5th dynasty described below. The muller also differs very greatly from the Gizeh specimens, being a roller, not a flat-bottomed rubber ; and is identical with the muller used down to the present day upon the Mexican metata, and also with that used till the last century in Arabia, as described by Niebuhr—"an oblong hollow stone or trough," the lower stone, on which was used a muller "shaped like a spindle, thick in the middle and pointed at both ends." This Liverpool figure is the only ancient one of which we are aware represented as grinding with such a muller, though we give a later illustration of its use in rolling dough.

Beschr. von Arab : Copenhagen : 1772, 51.

Both of these figures represent the female slave : literally "the maid servant that is *behind* the mill," (Ex. xi., 5). The saddlestone is the only mill which has a relatively front and back part, the only one *behind* which the operator could take her place ; and, therefore, was undoubtedly the mill worked by the Egyptian slave who lost her firstborn in the calamity that afflicted the land. The Biblical text which, thus curiously, enables us to identify the mill, also exhibits the humble social grade of the grinder of grain : the plague afflicting at once "Pharoah that sitteth upon his throne," the highest in the land, and "the maidservant that is behind the mill," the lowest. A model of the period of this Pharoah is illustrated later.

Next in order of date are two handsomely-carved limestone statuettes, inscribed memorial portraits and marks of honour, from the tombs near the Pyramids of Saggarat, on the Nile. Both are of the 5th dynasty, or about 2200 B.C., and are at Gizeh.

II.
THE SADDLE-STONE.

4. In Ancient Egypt.

The inscription upon the base of the first, recording that this is a memorial of Atah Ouyer; the carefully-defined features; the ringletted hair or wig, as was commonly worn under the Old Empire; the fillet of beadwork or snood; all suggest that it is rather a housewife than a slave who is commemorated by the figure; and greatly resemble the same characteristics in the annexed illustration of the head of a full-length

Ancient Egypt: 1894, 213.

II. THE SADDLE-STONE.

4. In Ancient Egypt.

statue of a lady of the Old Empire, at Gizeh, figured by Ermann after Perrot-Chipiez. The second of the monumental pair is inscribed, in hieroglyphics almost

identical with those on the preceeding, to the memory of Ashak. She wears the short wig of the lower classes and a binding fillet. Another view of the same figure is thus given by Professor Maspero:—

II. THE SADDLE-STONE.

4. In Ancient Egypt.

The stones in both these cases are of the ordinary slightly hollow tabular form, not pointed at the ends as in the other instances, and provided at the front with a small cavity, cut for the purpose of receiving the flour as it was ground. The grain, it should be said, was kept in a small heap close at ground, and was placed on the stone for grinding in handfuls as required.

Of the same period is a memorial figure preserved at Florence, the head-dress of which, as illustrated by Maspero, is almost identical with that of Atah

Ouyer. By the courtesy of Dr. Flinders Petrie, we have been favoured, by Mr. W. E. Hoyle, of Owen's College, Manchester, with a photograph of this entire figure.

II. THE SADDLE-STONE.

4. In Ancient Egypt.

Dawn of Civilisation, 1894: 406.

Maspero, referring to monumental figures, evidently portraits, found in Egyptian tombs, clearly enables us, within brief limits, to perceive the purport of these little effigies. "Statuettes were the invariable accessories of the tomb. The artists did not seek to embody, in their ideal, types of beauty; but the models were as nearly as possible likenesses of the deceased. The head had to be the faithful portrait of the individual, and the dress and attitude to be suited to his or her calling. The exigencies of rank clung to the Egyptians in tomb as in temple, wherever these statues were placed; and left the modeller scarcely any liberty to alter anything in the attitude or the likeness. The king or nobleman stands receiving homage; the queen is seated or standing in the same dignity; the poor slave woman is on her knees grinding grain; the slave baker kneads his dough." There is no doubt that the carefully-modelled features of these little effigies are actual likenesses of the deceased; and there seems little question that they rather appear to represent honoured housewives or daughters than slave women. But, in any case, we may perceive here the origin of the custom, which appears to have generally prevailed in many parts of later barbaric Europe, of marking the resting places of women by the symbols of housewifery, the spinning whorl and the corn stone.*

Text: ch. i.

Another limestone statuette, also attributed to the 5th dynasty, from Saggarat, and preserved at Gizeh, represents a young woman with finely marked

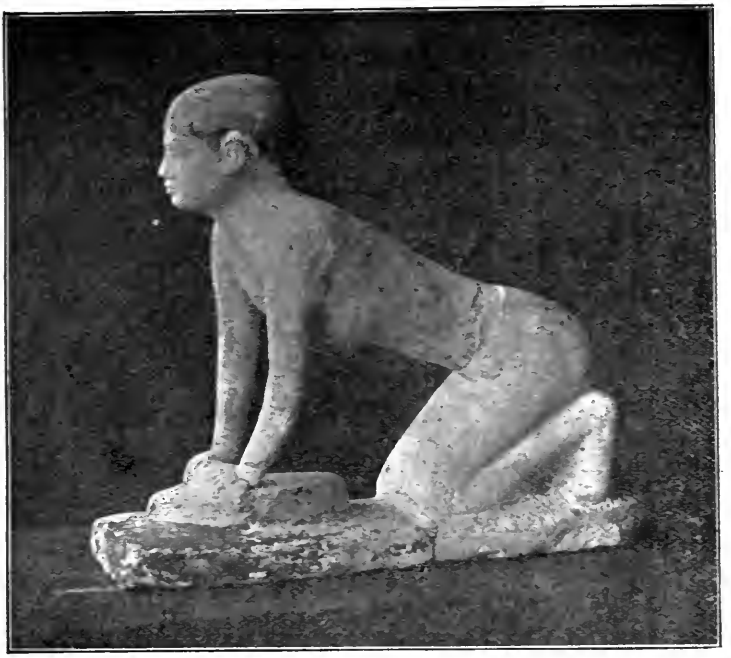
Anct. Hist.: Rollin i. xlj.

Plut. de Pyth. Orac. 401,

* Among the statues of gold consecrated by Crœsus in the Temple of Delphi was that of his female baker. This servant had been importuned to poison the bread which was to be given to him when but heir to the Lydian throne; but the woman warning the prince, the poisoned bread was served with fatal results to others. When Crœsus ascended the throne, 562 B.C., he erected in gratitude to his benefactress this statue to her memory in the Temple of Delphi.—"But it may be said: Could a person of so mean a condition deserve so great an honour? Plutarch answers in the affirmative: and with a much better title, he says, than many of the so-much-vaunted conquerors and heroes, who have acquired their fame only by murder and devastation,"

II.
THE SADDLE-STONE

4. In Ancient Egypt.

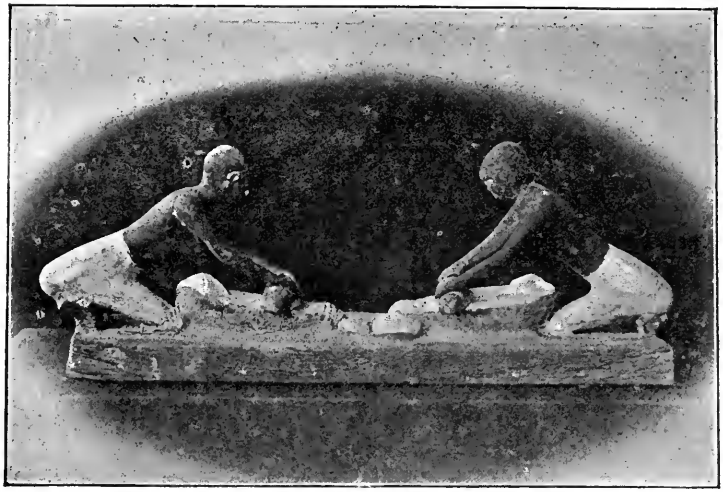


features and closely cut hair, apparently a slave, grinding at a stone of the early pointed form; though, as the pedestal on which the figure kneels seems to be in two parts, it is possible that that part bearing the stone may have been an addition, to supply a part fractured and lost.

Three other models at Gizeh, of the 6th dynasty, the closing period of the Old Empire, represent slaves. They are all of painted wood, and were discovered at Meir, 200 miles south of Cairo. The first represents two women grinding, each with her own saddlestone, the flour as it is produced being pushed forward into the central space between the two stones. The muller in each case is, again, of the oval form flattened on the under side. In the next group are shewn a woman, grinding as before; and a

II.
THE SADDLE-STONE.

4. In Ancient Egypt.



second figure kneeling on one knee before a pile of faggots which are to heat the little circular oven, on the top of which the cakes were baked. The second

of the figures introduces to us the usual difference manifest in the postures assumed for grinding and baking respectively—in the former case kneeling, in the latter kneeling upon one knee only, or standing. The third of the Gizeh figures of the 6th dynasty excellently depicts the distinction. In this case the woman kneels upon one knee only; the dough is in

II.
THE SADDLE-STONE.

4. In Ancient Egypt.

her hands; cakes already made lie beside the stone upon which they have been fashioned; the oven (the clibanus as Pliny terms it) of slabs of stone and covered with a circular baking tablet, is before her. Another almost contemporary figure, figured by Ermann, after Perrot-Chipiez, represents the adoption of the standing posture for baking. In the

Nat. Hist., xviii., 27.

Ancient Egypt. 1894, 190,

II. THE SADDLE-STONE.

4. In Ancient Egypt.

British Museum also is a toy model of an Egyptian house, as ancient as any of the above figures; in which is represented a woman, standing at a table, rolling

dough—"a quiet little doll, which may have amused the children of Egypt in the time of Moses; maintaining her position for forty centuries; and now viewed by the juveniles of a country that

Ancient Egypt: Wilkinson, 1837, ii., 109.

II. THE SADDLE-STONE.

4. In Ancient Egypt.

remained forest and morass, for two thousand years after she was started on her protracted employment." The same erect attitude, at a considerably later date, may also be instanced by a terra-cotta statuette representing a woman kneading dough in a dish: this being of Greek workmanship, of about 560 B.C.; derived from a tomb at Camirus, in Rhodes, and now preserved in the British Museum. In view of the occasional difficulty experienced in distinguishing between representations of grinding or baking, this general rule of the difference in the position of the operator may be found useful; at the same time it is to be remembered that at the present day Mexican women kneel at the metata stone when both grinding the maize and rolling the dough.*

Text: Roman Processes.

Five or six centuries after the ascribed period of the foregoing statuettes at Gizeh, Pharoah's chief baker was imprisoned, as the Talmud states, for imperfectly milling the royal flour, and Joseph became a ruler and administrator of corn supplies in Egypt. The saddlestone still remained in use. Two more centuries pass away, till about 1500 B.C., we read of the affliction that smote Pharaoh's "maid servant that is behind the mill;" and of this approximate period is a small painted wooden figure found in Upper Egypt, and now preserved in the British Museum. This diminutive model, to which we have assigned a period on the valued authority of Mr. Wallis Budge, of the British Museum, though of even more crude workmanship than that of the slave women of the 3rd dynasty, we consider of special interest, in that it depicts the full action of the person grinding; the forward motion of the body, not of the arms alone, being as clearly indicated here as it was perceived by Livingstone in actual practice in

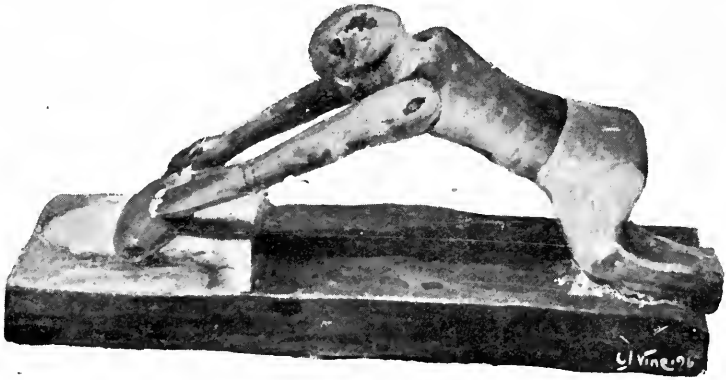
* The Italian Egyptologist, Rossellini, has pictured three figures from the Egyptian tombs standing at flat baking tables; the indications are too indistinct to support the assumption that they are grinding, as is suggested.

Mon. dell Egitto: 1842, ii., pl. 46.

II. THE SADDLE-STONE.

4. In Ancient Egypt.

Central Africa. The woman is at the end of her forward reach, having exerted her whole bodily force upon the heavy task of crushing the grain. This



vigorous action, altogether unnecessary in kneading dough, has been well described by Professor Maspero: "The drudgery of household work fell entirely upon the woman. It was she who made the daily bread. She spread some handfuls of grain upon an oblong slab of stone, slightly hollowed on its upper surface, and proceeded to crush them with a smaller stone like a painter's muller which she moistened from time to time. For an hour or more she laboured so, with her arms, shoulders and loins; in fact, her whole body till the operation was complete."

Dawn of Civilisation: 1894, 320.

Such models as these, destitute of any attempts at elegance or any pretensions as portraits, were not intended as memorials of the lowly female slaves of the mill. They were placed in the tombs of departed kings and nobles, typifying the slaves or "answerers" who should accompany the spirit of the mighty one from earth to the land of shadows, provide all his meals, and answer for him should he be called upon by his deities to perform menial labour. Thus, alike

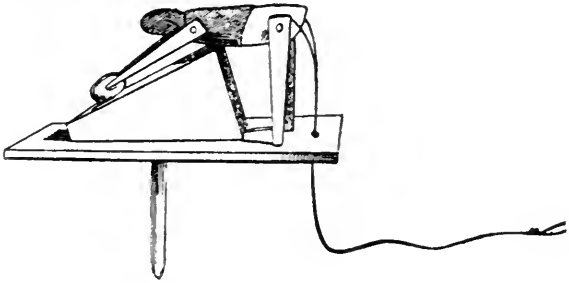
II. THE SADDLE-STONE.

4. In Ancient Egypt.

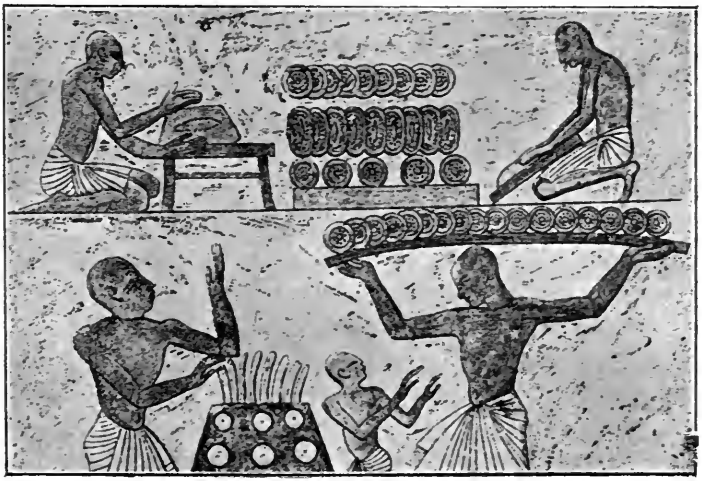
by reverence for the departed which the Christian might emulate, and by gross superstition which a pagan only could entertain, are we now endowed with these little trifles of the carver's art, bringing clearly into the light of to-day the grinding mill of the early world.

Ancient Egypt: 1837, ii., 427.

A third variety of the relic is to be found in the toys of the children of ancient Egypt: one, in the Leyden Museum, figured by Wilkinson, being a crudely-made jointed figure, which by the pulling of a string was made to work backwards and forwards over the grain stone in imitation of the labour of the oft-seen slave.



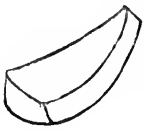
Another phase of Egyptian milling, still by the use of the saddlestone however, appears in one of



II. THE SADDLE-STONE,

4. In Ancient Egypt.

the mural decorations of the tomb of the king, whom some consider to be the Pharoah "who knew not Joseph," at Bab-el-Molûk. The figures, in this case, are understood to be those of men employed in a large state bakery. To the right of the group is the miller grinding upon a triangular-shaped saddle-stone; the apex of which rests upon his knees while the base is upon the ground. Such stones have been discovered by Dr. Flinders Petrie, who, writing from Beni Mazar, Upper Egypt, favours us with an outline sketch shewing their peculiar form. Wilkinson, in 1837, classed the miller in this group as that of a man "making cakes;" but it is demonstrable that he is grinding grain, and is holding the stone in a more convenient or less laborious position than a woman could do; thus, by his greater strength, working with comparatively greater ease. The man who is actually baking the cakes, is represented kneeling at a low table manipulating the dough with his hands, a table of cakes already made standing before him. In the lower group, it may be added, is shewn another baker carrying a tray of cakes to be placed upon the oven which is seen flaming in the foreground.



Ancient Egypt, ii. 384.

Among the hieroglyphic inscriptions on the royal tombs at Bab-el-Molûk appears one containing, among legends of the gods, the first recorded mention of a miller. It states that "the fruit was brought to the [divine] miller, at Heliopolis, that he might grind it." The late Sir Peter Le Page Renouf, President of the Society of Biblical Archæology, one of the most distinguished Egyptologists of the century, favoured us only shortly before his death with the above translation, remarking: "The tombs at Bab-el-Molûk are of the 19th dynasty, but Erman

Ancient Egypt, Erman, 190.

II
THE SADDLE-STONE.

4. In Ancient Egypt.

and his school imagine, on philological grounds, that the tablet itself bearing the inscription is of the oldest period. I am certain that they are wrong. The style is archaic undoubtedly; but this arises from the nature of the compositions, like Pope's imitations of Chaucer and Spenser." Sir Peter remarks that M. Naville gives two translations of the inscription *(Dest. of Mankind)* in the transactions of the Biblical Archæological Society—one in vol. iv. and a corrected one in vol. viii., p. 413—and adds that *sek-tet* is the word in the inscription for [divine] miller, and *nout* for grind; the common words for corn flour being *nut* and *sek-n*; for wheat flour *sek-en-su*; and for barley flour For this elucidation of the inscription we are also indebted to the kind offices of Mr. W. H. Rylands, F.S.A., Secretary of the Society of Biblical Archæology.

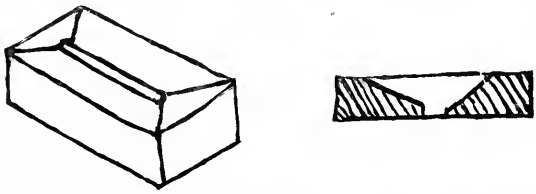
Dr. Flinders Petrie, in the course of excavations conducted under the auspices of the Egyptian Exploration Fund, has discovered stones of the saddle type modified by some peculiar details; which, though of a comparatively late period, may conveniently be described here. At Tel Nebesheh, among the desert swamps of Lake Menelagh, was found in the ruins of a house, of the period of perhaps the last dynasty of the native princes, a piece of a corn rubber made of trachyte. Right-angled pieces of trachyte had often been met with, but their object remained unknown till 1888, when a fragment was discovered at Naukratis marked with a wheel symbolic of motion; this being followed by the discovery at Defeuneh of other pieces, which, says Dr. Petrie, "plainly showed them to be corn

Tanis, 1888, ii. 27.

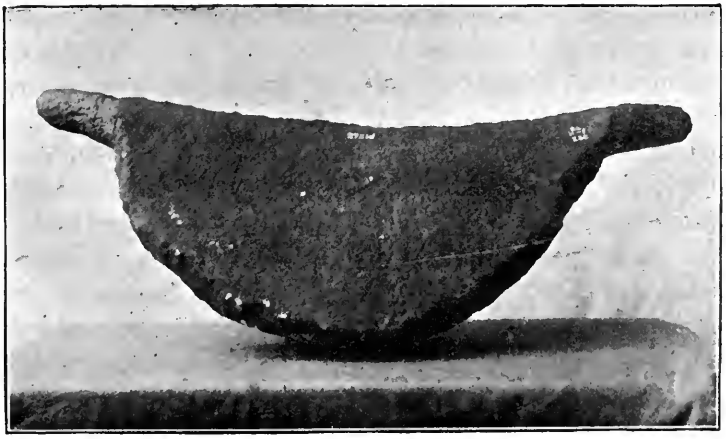
II. THE SADDLE-STONE.

4. In Ancient Egypt.

rubbers." Such a rubber, when complete, consisted of a small flat slab with a slot extending nearly its whole length; the sides of the slot being narrowed together towards the under side; while "out of this slope the corn passed to be rubbed on the slab below." From the outline and sectional sketch



with which Dr. Petrie has favoured us, it would seem that the utensil was made to do duty not only as a muller but as a hopper to contain a small quantity of grain, which it allowed to escape as it moved backwards and forwards on the stone below. The benefit of such an arrangement as this is not very apparent, while its awkwardness is quite evident; and it is certainly a great deviation from the ordinary type of saddlestone prevailing throughout the entire world for many centuries. A further discovery was made beneath the foundation stone of the Great Temendos or public hall of Naukratis in the Delta of the Nile.



II. THE SADDLE-STONE.

4. In Ancient Egypt.

Text: Mortars.

Naukratis, 1884, i. 29.

Here Dr. Petrie found various models of ceremonial vessels which had been placed there at the commencement of the building of the hall, about 620 B.C.; one being of a mortar (mentioned in another chapter), and another of a supposed saddlestone. This was peculiar, inasmuch as its upper stone or rubber was provided with two handles. These, Dr. Petrie states, are usually missing from actual specimens of the stone, presumably having been broken off; though one perfect example he discovered at Tanis and placed in the British Museum. The stone, which is about 15 inches in length, we have photographed. It is a very curious and heavy implement, and if a grain stone seems to be unique.

5. The "mill" of the Hebrews.

Text: Mortars.

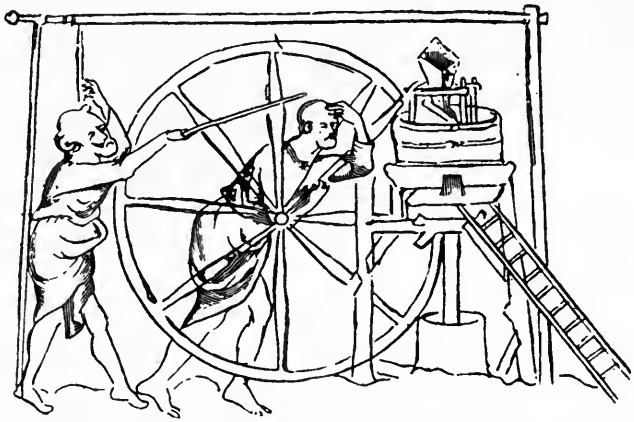
From Egypt we may not indeed clearly trace the use of the saddlestone to the ancient Hebrews, but inferentially the indications appear that they used the Egyptian appliance. We know that in their wanderings the Israelites used the mortar; but the passage which relates the fact states that they also used what the translators term mills—they gathered the manna, which was as coriander seed, and "ground it in mills or beat it in a mortar" (Num. xi., 8). At about the same period, Moses enjoined that no man should take "the upper or the nether millstone to pledge, for he taketh a man's life in pledge" (Deut. xxiv., 6)—a reference more easily applicable to a saddlestone than to a mortar: the quern not yet being known. The same inference is to be drawn from other allusions to two stones forming the mill—"His heart is as hard as the nether millstone" (Job xli., 24): "Take the millstones and grind meal" (Isa. xlvii., 2): "The sound of the millstones" shall be heard no more (Jer. xxv., 10)—these being certainly the saddlestones as of Egypt. Samson, when taken captive about 1115 B.C., "did grind in the prison house;" and various limners from

II. THE SADDLE-STONE.

5. The "mill" of the Hebrews.

early times down to the age of Bartolozzi and Fuseli, have familiarised us with the spectacle of Samson struggling with the handle of a complicated mediæval corn mill. The absurdity of the annexed drawing, taken from a 14th century MS., has been repeatedly

Hist. Eng. People: Green. 1894.



reproduced in modern times; but it is clear that when Samson ground grain he must either have been made to pound it in a mortar or kneel on the ground and monotonously drudge at the saddlestone.

As with the Egyptians and Chaldeans, so with the Hebrews, the task of grinding grain was ever inflicted upon women and slaves. Samuel foretold the gloomy day when the oppressor would take their daughters to be "confectioners and cooks," (I. Sam. viii. 13): and, ages afterwards, Jeremiah enumerated among the sufferings of his people that their foes "took the young men to grind" (Lament. v. 13). Again, Babylon, in her fall, should possess no throne: she should sit in the dust, and, no longer called tender or delicate, should "take the millstone and grind meal" (Isa. xlvii., 2.) Further references in the Old Testament throw no light on the special subject under consideration; but in concluding these allusions to the saddlestones of the Hebrews, it is

II. THE SADDLE-STONE.

5. The "mill" of the Hebrews.

impossible to omit citing the exquisite metaphors which these humble appliances of daily life have furnished to the sacred poets of old—desolation symbolised as the time when the musicians and craftsmen shall be silent, "and the sound of the millstones shall be heard no more" (Jer. xxv., 10, Rev. xviii., 22); and Solomon's allusion, sadly but beautifully typical of death, "the doors shall be shut in the streets when the sound of the grinding is low" (Eccl. xii., 4).

6. Of Troy and Athens.

It was from Egypt that Pythagorus and other philosophers brought the arts and learning of the magi into Greece. "Anciently Egypt was the school of Greece; those who desired to improve in knowledge went to Egypt, and a Greek derived a reputation from the mere circumstance of having been in that polished country." Among other arts and sciences which Greece derived from Egypt is to be accounted the art of grinding by the saddlestone.

Mitford, 1814, ii. 12.

In Argolis, south of Corinth, was the city of Tiryns, a place whose name is accounted of pre-Grecian origin. The city and palace of the mythical King Proitos, here, were destroyed, according to Schliemann, at about 1600-1400 B.C.—from two to four centuries before the destruction of Troy, and at about the date of the captivity of the Jews in Egypt, when, as we know, the saddlestone was in use there. At Tiryns excavations in the lowest strata of the ruins have revealed the same appliance:—"saddlestones of trachyte in the form of a longitudinally-divided egg, such as abound in prehistoric Troy and are common at Mycenæ." At this latter place also specimens are described as "handmills in the form of an egg cut lengthwise, made of trachyte, and about 8 inches long by 5¼ inches broad."

Tiryns, 1886, 80.

Mycenæ, 1878, 77.

It is at about the period of Solomon that the siege of Troy, 1194-1184 B.C., marks the beginning of

II. THE SADDLE-STONE.

6. Of Troy and Athens.

the historic records of the Grecian people: and at this early stage we find the mill of Homer, poetic historian of the siege, to have been the saddlestone. The poet termed the appliance consistently and invariably μύλη, a mill—a machine which reduced, softened, or *mollified* grain. But though he did not describe it as a machine which revolved (like a quern or a modern millstone) and simply spoke of it as "grinding," our English translators, not being greatly skilled in milling arts, have usually disregarded Homer's generic designation, and (knowing that the mill was a handmill), have considered it to be a revolving quern. This appliance, however, was not known in the age of Troy: neither Homer nor Hesiod mention it, nor have its relics ever been discovered on the site of the beleaguered city. Pope's translation of the passages referring to the mill shew the anachronism:—

Odyssey, Bk. vii., 103: Bk. xx., 106.

"Full fifty handmaids from the household train:
Some turn the mill or sift the golden grain."

. . . . .

"An omened voice invites his ravished ear.
—Beneath a pile that close the dome adjoined;
Twelve female slaves the gift of Ceres grind:
Task'd for the royal board to bolt the bran
From the fine flour (the growth of strength of man):
Discharging to the day the labour due.
Now early to repose the rest withdrew.
One maid, unequal to the task assigned,
Still turned the toilsome mill with anxious mind,
And thus in bitterness of soul divined . . ."

Odyss., 1887.

The same error or poetic license occurs in most of our translations, William Morris going so far as to definitely term the mill a "quern." Dr. Hayman, an able commentator, falls into the same misconception:—"μύλη the mill, as extant in the baker's house at Pompeii, is true to the primitive type, as was the quern of our own country." But the Pompeii mill is purely of the model of a large quern. The German

Odyss., 1873.

II. THE SADDLE-STONE.

6. Of Troy and Athens.

critic Crusius sagely doubts whether a quern was meant:—"μύλης, mills turned by hand, or rather mortars in which grain was broken." A literal prose translation is extant, however, giving a correct rendering:—

Lexicon Homeridæ, 1844.

A woman belonging to the mill near where were the mills of the shepherd of the people uttered a good omen: twelve women in all constantly worked at them, making meal of barley and wheat; the rest were sleeping when they had ground their wheat, but she only had not yet ceased for she was the weakest. Stopping the mill she spoke.

Odyss., Anon. Lond., 1823.

In the extensive explorations of Schliemann at the modern Hissarlik, on the site of Troy, great numbers of specimens of the Homeric mill have been discovered. Deep among the debris of the classic city, says the explorer, "the enormous quantities of mills of lava continually brought up give an idea of the number of houses through the ruins of which I daily penetrate. Great numbers of these mills and other stone implements I have placed in niches in the walls in my excavations for the inspection of those admirers of Homer who may visit the plain of Troy." The "mill," he explains, consists of "two pieces of lava about a foot in length, oval on one side and flat on the other, between which the corn was crushed." Both the stones of one mill, however, would not be of the same size, since the grain could not be conveniently rubbed or rolled between two stones of equal length, as each motion of the top stone would necessarily carry a portion of the grain off the bottom one. But as the stones found are of different sizes, it can only be suggested that Schliemann meant to say that the smaller ones were used upon the larger; as, for example, a round stone of 5 inches diameter upon an oval of 12 inches or 14 inches in length. The explorer's description is not nearly so clear as could be wished. His "saddle quern stones" are of one uniform type—

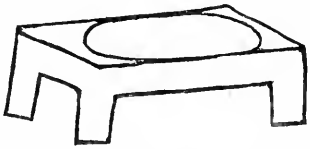
Troy, 1875, 86.

II. THE SADDLE-STONE.

6. Of Troy and Athens.

Ilios, 1880, 234.

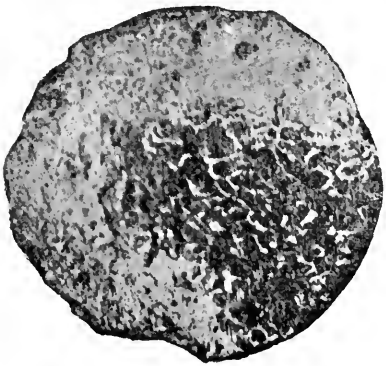
"flat on one side and convex on the other, resembling an egg cut longitudinally through the middle." Large lower stones of this form might, as Dr. Flinders Petrie suggests to us, be placed upon stands



or be bedded in the ground or rested upon the knees of the grinder. However, Schliemann's description is so vague as to suggest that the stones he mentions were but the mullers, and that the lower stones were those of the usual hollowed shape which he seems to indicate by the description—"very long stones, crooked longitudinally in the direction of their length."

Ilios, 234.

Referring now to the specimens—"the saddle-stones, of which the strata of all the prehistoric cities on the site contain many hundreds"—their general form is shewn by two examples from the lowest stratum, that is from the debris of Troy itself. The oval is about 12½in. in length and the circular about 7½in. in diameter, both being of basaltic lava. Similar stones are found cut also from granite and various other rocks, and varying generally in size from 7in. to 14in. in length, though



II.
THE SADDLE-STONE.

6. Of Troy and Athens.

the largest specimens reach 25in. in length. By the discovery of small articles of copper, as nails, brooches, and knives, in the same deposit, these cornstones are shewn to have been in use in the bronze age. Each of the subsequent layers of ruins overlying the debris of Troy was found to contain the same stones; which were, therefore, continuously used on the site from 1184 to about 700 B.C., when the Greek colony settled on the spot. In Mr. Bennett's collection several of the stones obtained from Troy, are identical in form with the ordinary muller or oval upper stone found in Wales, &c., except that they are slightly more concave. They are of trachyte, and nearly uniform in size, being about 9in. in length and 5in. in breadth.

Pursuing his explorations, Schliemann crossed from Asia Minor into Turkey, where, on the south-west shore of the Black Sea, near Bourghaz, is the site of Thracian Chersonesus. Here, as Strabo states, was the tomb of the hero Protesilaus, who led the warriors of Phylacé in Thessaly, against Troy, and was slain in the war. The monumental tumulus reared to his memory still exists, though much reduced in height by centuries of tillage. Dr. Schliemann was prevented by the Turkish authorities

Geogr. xiii., 595.

II. THE SADDLE-STONE.

6. Of Troy and Athens.

Troja 1884, 254.

from excavating the site: but found, on closely searching the surface soil on the mound and in the gardens adjoining, a quantity of relics, including pottery of a style and pattern found nowhere else except in Troy, and saddle cornstones identical with those of the latter city.

Text: Philosophers at Mills.

The saddlestone continued in use at Troy, as we have seen, till about 700 B.C. It was about a century and a half after this date that Pittacus, of Mitylene, philosopher, warrior and king, was celebrated in the song of the woman, as she ground at the mill, in that he too had laboured at the same toil. Plutarch, the Greek sage, in his "Banquet of the Seven Wise Men" (of whom Pittacus was accounted one), imagines the septemvirate in convivial discourse: during which Thales says: "When I was sojourning at Lesbos, I remember hearing my landlady, when busy at her handmill, singing as she worked, 'Grind mill, grind: Pittacus, prince of Mitylene, was also a grinder.'" The old song has been neatly done into modern English:—

L. & C. H.S., 1868, 277.

Grind, grind away, mill,
  Pittacus, too, was a grinder;
Yet Mitylene—his still—
  Suffers his edicts to bind her.
    Grind, grind away, mill.

Pistr. Vet., 1730, 384

There is here no suggestion of the mill *turning:* Plutarch's αλει μύλη αλει, the Latin of Goetius, *Mole mola, mole*, and the English, "Grind mill, grind," are literally identical phrases: and afford no controvertion of our argument that the mill was the saddlestone.

Tiryns, 1886, 80.

Finally, in the ruins of the Acropolis, at Athens, the centre of later Grecian art and culture, the same grinding stone has been discovered; and specimens from the site are mentioned by Schliemann as being included in the collection of antiquities in the Acropolis Museum.

II. THE SADDLE-STONE.

6. Of Troy and Athens.

Thus from the earliest to the latest period of Grecian civilisation the saddlestone remained the premier mill of the age: the most perfect grinding appliance known. Arts and sciences in other directions proceeded apace, but that of corn grinding remained absolutely stationary. At Mitylene—the city commended by the ancients for the stateliness of its buildings, its famous schools and its men of learning—Pittacus, in the time of adversity, laboured at the old mill. The Senate of the Areiopagus was charged by Solon to promote industry, yet that of the lowly millers remained dormant. Pericles and Phidias, culminating the glory of Grecian art, built the magnificent Acropolis, and from beneath it to-day is dug out the world-old humble grinding stone unchanged from the days of Pharoah.

7. Grecian cult of the mill.

One honour Greece did accord to milling—extending to the art a religious cult, more enlarged and sympathetic to the popular mind than the worship of Eleusina (Ceres), or "Mother Earth, "whose bounteous providence in endowing man with a knowledge of cereals, ancient Greece never forgot. The celebration of the Eleusinia of Attica, wherein the fruitfulness of the goddess of the earth was honoured, was not complete without due recognition of the gifts of Proserpine, whom they called Eleusina, and whose offering, as Pindar tells us, was a measure of barley devoted to her altar. But a step further than this cult was that of the art of grinding; an industry placed under the protection of the god Eunostos. He benignly supervised the reduction of all grain into meal, and his little statue placed beside the grinding stones constantly evoked his beneficent patronage for the devout miller. Suidas, the ancient Greek lexicographer, who relates this incident, giving to the god the alternative title Promylius, states distinctly that the statuette was placed *beside*

Text: Pounders.

II. THE SADDLE-STONE.

7. Grecian cult of the mill.

the grinding stones, since, naturally enough, it could not, as he knew, be placed *upon* a saddlestone or mortar: yet from Eustasius, in the 12th century, to the writer of a French milling pamphlet in the 19th, the error is made of stating that it was placed upon the mill—the nature of the latter being altogether forgotten.

Meule de Moulin, 1895, 9.

The last mentioned writer, M. De St. Ours, has endeavoured to trace a representation of the statue, but without success. "No image of this god now exists: Darenburg and Saglio, in their 'Dictionary of Greek and Roman Antiquities,' Mommsen and Marquardt, Preller, Bouché-Leclerq, &c., make no allusion to Eunostos: while Noel, in his 'Mythology,' is the only one who refers to him, doing so on the authority of Suidas and Eustasius. The director of l'Ecole Française at Athens informs me that he also knows of no existing statuette of the god." It is, therefore, of some interest to note the supposed discovery of a representation of Eunostos, in the form of an engraving upon a gem, a century and a half ago. Beckman, whose attention was called to the curiosity by Professor Diez, in the last century, observes that this is the only known example of an antique engraved stone having any reference to milling; though Heyne has stated there is another, which, however, is not described. The gem, discovered by the savant, Gori of Florence, is stated by him to be a red jasper, which had been set in a ring, engraved with the nude figure of a man, who in his left hand holds a sheaf of corn and in his right what is imagined to be a handmill. This machine, so far as may be distinguished (the entire face of the stone being scarcely half-an-inch in area), is shaped like a box or chest—narrow at the top and broad at the bottom. It stands upon a base, from the lower part of which projects a perpendicular pipe, whence meal

Hist. Inv., 1797, i. 231

Soc. Columb. Fiorentina, 1752, ii. 207.

II. THE SADDLE-STONE.

7. Grecian cult of the mill.

appears to be issuing in a stream; and upon the top of the chest seems to be a hopper. From one side of the chest projects a shank which, without much straining of the imagination, may be considered a handle. "Though the engraving is small and conveys very little idea of the internal structure of the mill, one may, however, calculate from it that the roller did not stand perpendicularly like that of our coffee mill, but lay horizontally. On the other side of the mill, and opposite to the shank or handle, there project from the mill two shafts, which Gori considers to represent the besom and shovel used by millers: but these may be parts of the mill itself." We give this account for what it may be considered to be worth, which we believe to be very inconsiderable. The Greek mill was not enclosed in any box or chest, was not worked by a handle at either the top or side, and contained no roller. If the design be intended to represent Eunostos holding a mill it was apparently engraved at a late Roman period when slave and cattle mills were known; and it is either one of these which is intended to be minutely represented, or else it is the equally late small wooden spice mill of Rome, which much resembled the little coffee mill of modern times. M. De St. Ours is willing to attribute to Eunostos a still greater antiquity than that of ancient Greece; possibly that of the primitive Aryan world from whose language etymologists are inclined to derive our common word 'mill.' "In the Museum Guimet is a Hindoo god Yen-nô-guio-djà. The attributes of this god and his name, sounding like that of Eunostos—may not these be considered to assimulate him to the latter; perhaps as his Aryan ancestor?" This speculation, however, is a matter which we willingly leave to the investigation of those Hindoo scholiasts who may perchance be inclined to pursue the esoteric consideration.

Meule de Moulin 10.

II. THE SADDLE-STONE.

8. Of Rome.

From Greece the art of grinding like other arts extended to the shores of Italy. "The identical Greek and Latin words μύλη = *mola* (mill): πτίσσω = *pinso* (to pound) πόλτος = *puls* (porridge) prove that the Græco-Italians used the cereals in the same manner as the inhabitants of the terramare villages—a fact which is not without significance, as, among all Italic settlements, these villages stand in time and space nearest to the Græco-Italic stage of civilisation." They form the connecting link of civilisation between Greece and Rome; and if the mill thus passed from one people to the other, the appliance was still the saddlestone. Specimens of the appliance in the stone and bronze ages of Italy are already illustrated in this chapter. In the later classic period of Rome, though critics may certainly not now find any special allusion by any early writers to the saddlestone,* still, it may clearly be identified by the peculiar designation the Romans gave it—*mola trusatilis*, the thrusting mill. This term distinguished it from the then newly invented revolving quern, which they designated *mola versatilis:* in the former the action being by an alternate backward and forward motion, and in the latter by a continuous circular motion. The consideration of this question may, however, conveniently be referred to the chapter upon querns. There is no doubt the Romans used the saddlestone, and that it remained the best machine for corn grinding, of which they had any knowledge, from even the year 753 B.C., when Rome was founded, to almost the Christian era, when the quern seems to have supplanted it. The Romans, too, were the last civilised nation that used the saddlestone as their premier mill, and at this stage its history as the

Troja, 1884, 46.

Text: Querns.

Hist. Inv. 1797, i. 230.

* "I do not remember any passage in the ancients that mentions this mode of grinding."—*(Beckmann.)*

II. THE SADDLE-STONE.

most advanced type of mill closes. When the Romans discarded it the saddlestone was relegated to a secondary rank, and was used in future by but the ruder peoples of the world.

9. Universality of, in Europe.

The prehistoric remains of almost every race in Europe have been found to abound with relics of the saddlestone. They are discovered in the pit dwellings, hut circles, crannogs and cists of the British Isles: the dolmens and earth forts of France: the sand caves of Italy: the lake dwellings of Switzerland: in Silesia, Saxony and Germany: and also throughout aboriginal Africa and America. Remains of the stone and bronze periods in all these places testify to its extended use. Constructed always on the one plan, individual specimens differ mainly in size. Some in the Grand Ducal Museum at Mecklenberg, the largest of which we have any knowledge, measure from two to three feet in length, and from one to two feet in breath: and examples closely approaching the maximum size have been discovered in Ireland, where Albert Way found specimens varying from 2½ to 3 feet in length; the average ordinary stone being only from 12 inches to 18 inches in length. Some of the more interesting specimens of prehistoric Western Europe may briefly be described: it being, of course, understood that most, if not all of these, are of a very much later period than the prehistoric ages of Greece and Italy, and often may even be no older than the Christian era.

10. Specimens from Brittany.

In the subterranean chambers of La Tourelle, in Brittany, explored about thirty years ago by M. Le Men, were found several saddlestones identical in form with one discovered in Cornwall. They are of granitic rock, and in size average 14 inches by 3½ inches. The fragments of rubbers found with them indicate that they had been of the semi egg-shaped

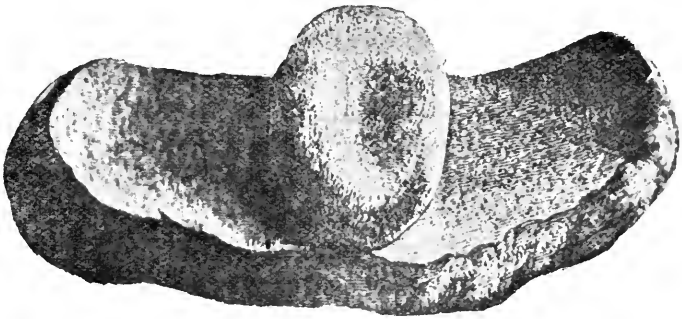
Arch. Camb. 1868, 304.

II. THE SADDLE-STONE,

10. Specimens from Brittany.

form, and had been polished. The whole of the stones were much broken, and, like those in some Cornish settlements, had been subjected to so violent a fire as to be now easily crumbled by the fingers. Upon one of these slabs—on the raised part behind the hollow—was a rude moulding ornamentation. This is the only instance of which we are aware of a European saddlestone being so ornamented; though the peculiarity of carving the raised portion of the stone, that next to the operator when in use, prevailed among the prehistoric natives of Mexico, some of whose metatas are very elaborate specimens of carved work.

Lying off Finisterre is a rocky peninsula 150 feet high, accessible only at low water; upon the summit of which is an anciently impregnable fortress, now called Castel Coz. This prehistoric fastness was a Gaulish oppidum or fortified town, analogous to those described by Cæsar in his *Commentaries*. There still remain within it the foundations of about 150 houses, the whole of which at some ancient period were looted and burnt: the contents of most of the huts having been broken and thrown into



one large chamber, which then was also fired. In this place were discovered in 1870, by M. Le Men, several saddlestones identical with those of Wales. All were of granite, and seven remained entire.

Arch. Camb. 1870, 291.

II. THE SADDLE-STONE.

10. Specimens from Brittany.

Their average measurement was 16 inches by 12, and 7 inches thick. One appeared to be almost a new stone, its upper surface being perfectly flat. Eight oval stones about 12 inches by 7 inches were also found, one side of each being slightly convex like those of Troy; and it was conjectured that these, judging by their small size and light weight, were intended to be held on the knees of the person grinding. About a hundred broken mullers were included in the debris. Some were round and others flat, and they varied from 2 inches to 8 inches diameter; and though these are simply rolled stones collected from the beach, one of them has been worked with considerable care, and greatly resembles the ordinary muller used by painters in the present day for grinding colours.

11. From Swiss Lake Dwellings.

In the lake dwellings of Switzerland, among the primitive forms of crushers used by the earliest settlers, were found also saddlestones of later dwellers on the site. Dr. Keller states that the Swiss stones were used in the same manner as the saddlestones of modern Africa as described by Livingstone, whose sketch he, in fact, uses to illustrate them. Among them were also found grain, and bread baked from wheat or millet. At the settlement of Lake Pfaffikou, which apparently had consisted of a single row of houses, whose ruins were found lying in a row of mounds in the water, the corn stones seem to have been in every house: upon each mound being found both of the stones, lying as if they had sunk together into the water when the settlement was burned down. At the same place were found not only specimens of the well-known "lake cloth," but "what has never been found before, and what could hardly have been expected, the remains of actual embroidery"—relics testifying to the comparative civilisation and the comparative late period of the users of the stones.

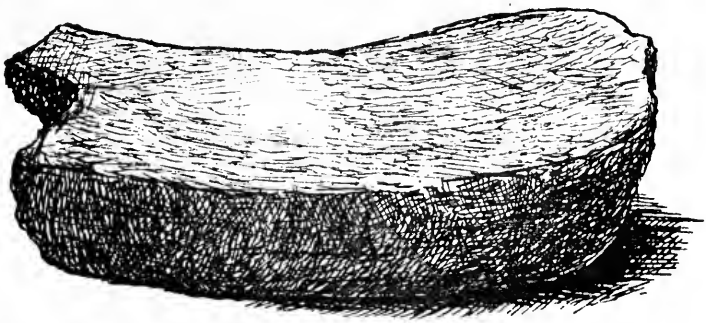
Lake Dwellings: Keller: 1866, 63.

II. THE SADDLE-STONE.

12. English Specimens.

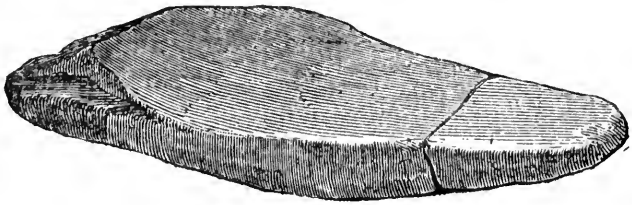
In the British Islands, the saddlestone is found to but a slight extent in England, while in Wales, Scotland, and Ireland specimens abound.

Referring first to England, the most remarkable example known is one from the prehistoric pit dwellings of Wiltshire, now preserved in the Blackmore Museum at Salisbury. When these subterranean habitations were explored by Dr. Blackmore, among the debris were found early globular crushers and a later saddlestone: though the discovery also of a fragment of a revolving quern, of a later period still, indicates that, like most other prehistoric dwellings, the pit habitations were the resort of others than the race who originally constructed them; and, in fact, were inhabited subsequent to the Christian era when the quern seems to have first come into use. The specimen illustrated from a sketch kindly for-



warded to us by Dr. Blackmore, evidences the extremely rude standard of British art at this period. When complete the stone would be nearly 30in. in length. The Blackmore Museum at Salisbury contains also a saddlestone from Anglesea, placed in that

Arch. Camb. 1860, 145.



II. THE SADDLE-STONE.

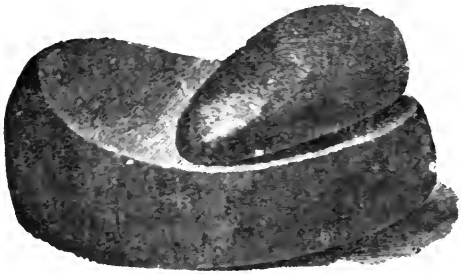
12. English Specimens.

institution by the Rev. E. L. Barnwell on account of its exceedingly close similarity to the Wiltshire example. Another perfect specimen of the same elementary appliance discovered in subterranean explorations at Treveneague, Cornwall, by Mr. Bligh, is 18¼ inches in length; another, almost as perfect, being discovered at Anglesea Abbey, Cambridgeshire.

Trans. Penz. Arch. Soc., 1867.

13. Welsh Specimens.

Wales is peculiarly rich in the more finished varieties of the stone, several interesting examples being included in the collection at the British Museum. An excellent specimen which the Rev. W. Wynn Williams, a considerable collector of these relics, described as the most perfect he had ever seen, is shewn in the illustration. In this instance the



saddle and the muller were found close together built in a modern wall at a prehistoric settlement near the River Brent, in Anglesea. The dimensions are—slabstone, 1 foot 7 inches, 1 foot 1 inch, 8 inches: muller, 1 foot 4½ inches, 3½ inches, 7½ inches. The crusher is tapered at both ends alike, and the slope of the bedstone is very carefully formed: the apparatus being, evidently, one of the latest of its class. The discovery of a specimen of this archaic mill *in situ* is somewhat rare: but in 1868, during an investigation of the circular habitations at Ty Mawr, on Holyhead Island the stones were found in what appeared to be their ordinary

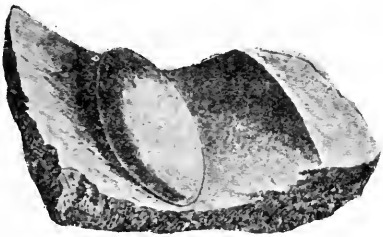
Arch. Camb. 1868, 405.

II. THE SADDLE-STONE.

13. Welsh Specimens.

Arch. Camb. 1868, 404.

place, beside the hearth, in one of the excavated huts: the lower stone being in position, and the rubber lying near it. The former is a slab of coarse-grained sandstone, obtained, apparently, from the millstone-grit rocks near Bodorgan, in Anglesea: and measuring 18¼ inches by 13½ inches, with a greatest thickness of 5 inches.



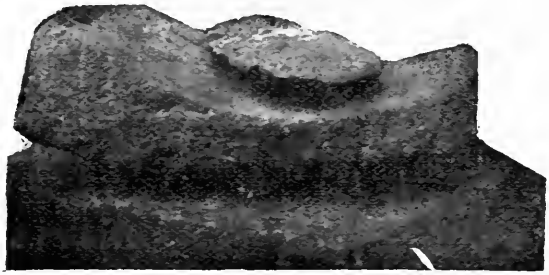
The oval rubber, flat on one side, and convex on the other, measures 12 inches by 5 inches. A specimen described as "a flat rubber," discovered in Anglesea, is remarkable for containing in its surface a cup hollow; the Rev. W. W. Williams, who briefly described the relic, considering that the depression, which is 5 inches in diameter, was used for containing the ground flour or possibly for pounding the grain before grinding. In the interesting collection of Anglesea saddlestones possessed by the Rev. Hugh Pritchard, of Dinam, is a very peculiar example. The slab is hollowed out on both the upper and the lower surfaces: one of the hollows is very considerably worn, the other not quite so much so: and apparently the users, after grinding on one side till the slope became too steep to be convenient, turned the stone over and worked a new hollow on the other side. To Mr. Pritchard, who very kindly permitted us to inspect his collection, archæologists are greatly indebted for the care he has displayed in preserving numerous specimens of local cornstones which have been found in the vicinity of

Arch. Camb. 1862, 157.

II. THE SADDLE-STONE.

13. Welsh Specimens.

his residence. In the possession of Mr. Bennett is a very perfect, and in one respect unique, example, discovered on a farmstead near The Valley, Anglesea; and measuring 18 inches in length by 10 inches in breadth. The curious feature concerning it is a longitudinal hollow on the raised end at the rear,



which might either be used for placing corn or flour in or for holding a roller-shaped muller when the operator wished to lay it out of hand.

14. Irish Specimens.

Ireland also very largely contributes to the national collections of these relics. An account of the first example found there, discovered at Ahavine, six miles from Youghal, in 1856, read in the light of later knowledge possesses considerable interest. Mr. E. Fitzgerald, who, in a communication to the Kilkenny Archæological Society, terms it in the usual lax manner of the period "a quern or Irish handmill," observes—"it is one of a class and example of which I have neither seen nor heard before." The under stone is described as being about 1 foot 6 inches long, 11 inches broad at one end, which is square, and 3 inches at the other end, which is rounded off into a truncated oval form. It is regularly hollowed out lengthwise and sunk in the centre 4 inches. The upper stone is 10½ inches long by 7 inches broad and 5 inches thick. Laid at right angles upon the lower stone, it exactly fits to the curve of the latter; the upper side being somewhat

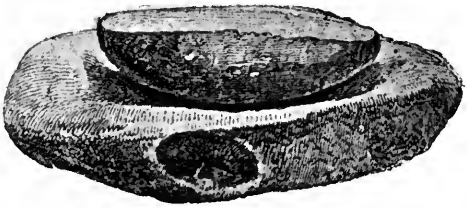
Trans. Kilk. Arch. Soc. iv. 36.

II. THE SADDLE-STONE.

14. Irish Specimens.

rounded off and just suited to the grasp of the hand whilst grinding. Both stones are of hard red sandstone grit. "Contrary to the fashion of all other mills which are worked by a rotatory or circular movement, this must have been worked with a longitudinal or lengthwise motion; which peculiarity speaks much for its primitive origin, as if it preceded the improved or circular movement. Another difference between this quern *(sic)* and those commonly found in Ireland is that the lower stone of the latter (the true quern) is always convexed and the upper concaved to fit on it; whilst the reverse is the case with both upper and lower in the present instance. Both stones were found in cutting a large drain at about eight or ten feet under the surface in a clay soil. Mr. Hall, on whose ground this primitive mill was found, says he ground wheat with it, by way of experiment, well, but of course in a slow manner."

An example included in the collection of the Royal Irish Academy, Dublin, measuring 16 inches by 11 inches, and provided with a rubber 11 inches



Mus. Catalogue: 1857, 104.

long, is remarkable for being pierced with a hole in the side, intended, as Sir W. R. Wilde suggests, for the exit of the meal. We are inclined to believe that this stone was not a corn grinder, but was used, as we shall find the mortar and a variety of querns to have been, for the pounding of vegetables, salads, mashed-meats, and for other similar culinary operations. The quern-like masher was always provided with a spout for the exit of the sap of vegetables, &c.;

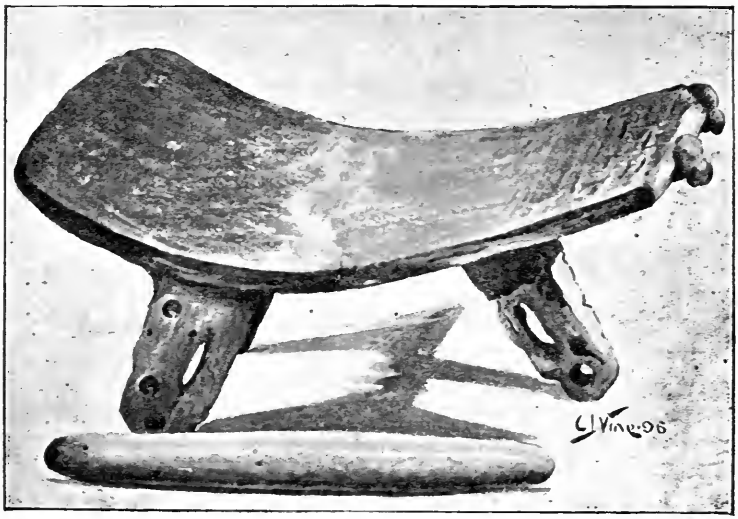
II. THE SADDLE-STONE.

14. Irish Specimens.

and the aperture in the saddlestone, now under notice, seems to have been a similar kind of drain. At all events, as an addition to a grinding stone, such a piercing would be useless: since it either would be large enough for the unground grain to fall through, or sufficiently small to be clogged with the first fine flour that was pressed into it.*

15. The Mexican Metata.

In the prehistoric world across the Atlantic evidences of the saddlestone abound. There, frequently, it was greatly superior in construction and finish to any saddlestone of classic Europe at even its most advanced period. The Mexican metata may be



taken as the most perfect of these transatlantic aboriginal grain stones, the general form of which is shown in the above sketch of one from an interesting collection of these relics contained in the British Museum.

* In the earliest of the Egyptian models of the 3rd dynasty, there appears to be a similar hole in the centre of the stone, but this seems to be merely a defect in the wood of which the article is made.

Text p. 38.

II. THE SADDLE-STONE.

15. The Mexican Metata.

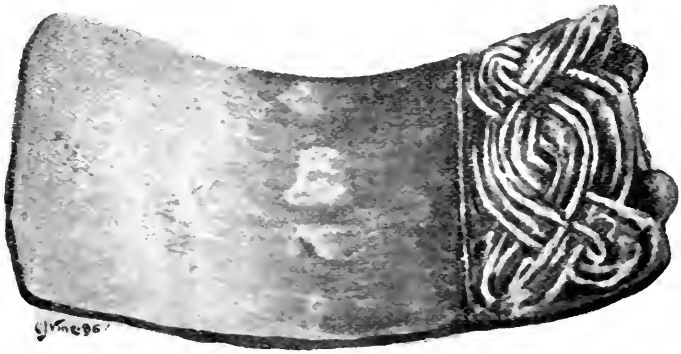
The metata, instead of resting actually upon the ground in either a flat or sloping position, stands upon three legs: the top is a well-defined tabular surface, artistically sloped throughout its length. The whole, though bearing the lightness of aspect of a cast metal utensil, the similarity to which is heightened by its smooth surface and dark colour, is entirely carved from one block of stone. The muller is of the form of a roller, not of the squat half-egg form of the European saddlestone. At the end of the table appear almost invariably two or three bosses, the object of which is not clear. The specimen here shewn is of rather larger dimensions than ordinary:—length 26½ inches, breadth 13 inches, height 8 inches: the muller being 19½ inches long: sufficient for its being grasped at each end outside the width of the table. The action of the grinding process was precisely the same as with the European saddlestone, the maize not being rolled but crushed or rubbed; this being evident from the manner in

which the muller became worn upon one side only, as shewn in the sketch of one of the specimens in the British Museum. A prehistoric example found at Schuylkill Falls, Fairmount Park, Philadelphia, about 9 inches in length, in the possession of Mr. Bennett, is similarily, but less markedly, flattened on one side; while, by an abrasion of one of the ends, it appears also to have been used as a pestle.

II. THE SADDLE-STONE.

15. The Mexican Metata.

It will be remembered that in the subterranean chambers of La Tourelle, Brittany, a saddlestone was found bearing an attempt at ornamentation on the raised part or head of the stone—that placed next to the operator. This solitary crude indication of European ornamentation is represented upon the aboriginal Mexican metatas by carvings, of more or

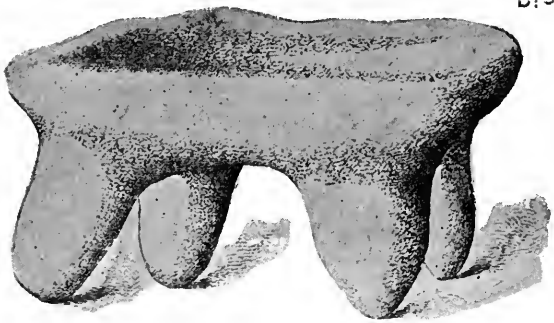


less merit, upon the same part of the stone; the most elaborate examples contained in the Museum being of considerable beauty. These implements have been made entirely by the hammerstone : "even those that are supported on three legs and have their borders ornamented with sculpture are not exceptions ; they are the product of the stone hammer alone, and were wrought out by incessantly pounding one piece of rock with another." Thus, among the unknown people of ancient tropical America the lowly and ungainly grinding stones, for the first time, were made to assume an aspect of elegance. But there, as elsewhere, since varying degrees of civilisation and perfection in the arts prevailed, so varying degrees of excellence in the workmanship of grinding stones were manifested ; and while Mexican skill produced such artistic handiwork as the metatas above described, the ruder ability of races of the north, the west, and the islands was displayed in such rude appliances

Orig. Inv. Mason, 1895, 141.

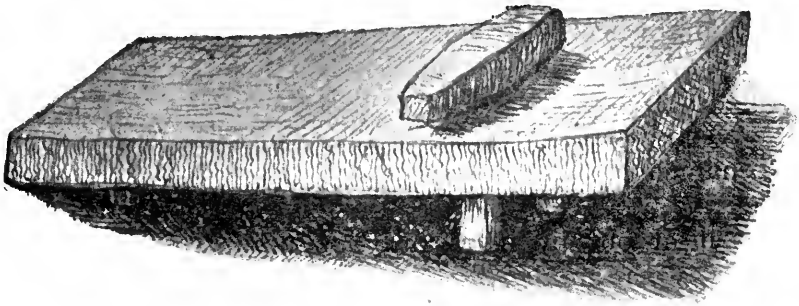
II.
THE SADDLE-STONE.

15. The Mexican Metata.



Flint Chips, Stevens, 1870, 229.

as that of the extinct Caribs of St. Domingo. The above specimen, measuring 8½ inches long by 6¼ inches broad and 4¼ inches high, and standing on four legs, is carved entirely out of one block of stone. Another variety of a much later and simpler type, an example of which is in Peel Park Museum, Manchester, is formed of a slab, in which are set three detached legs; the front one, being the shortest, giving the top the desired oblique slope.



Antiq. Mexico, 1831-48, i., plate 61. v. 97.

Lord Kingsborough's magnificent work on prehistoric Mexico contains, among the reproductions of aboriginal hieroglyphic paintings, that of one preserved among the Selden MSS. in the Bodleian Library at Oxford (Arch. Seld., A. 1., Cat. MSS., Angl. 3134), in which, in a number of scenes, is depicted a Mexican mother educating her daughter year by year. In that in which the years of the girl are notified by thirteen spots marked on the

wall, the woman is seen teaching her the use of the metata. The girl kneels behind the little instrument standing on its three legs, and the mother kneels beside her directing the operation.

II. THE SADDLE-STONE.

15. The Mexican Metata.

In due course the conquest of these primitive people led to the introduction of European wheat: but in the civilisation of the present day Mexico still retains her ancient grain stone: and the traveller may still witness the women of the household, kneeling as of yore, grinding maize and making the popular tortillas—cakes which are said to be "not crisp but soft and leathery," and exceedingly palatable nevertheless. The use of the metata for both grinding maize and making tortillas prevails especially among the peasantry, who live in the primitive style of their forefathers of countless generations. "It is a picturesque sight always, whether the tortilla maker be a wrinkled old grandame or a bright-eyed young lass, to see her kneeding her dough and deftly flattening it into the cakes that she bakes on her earthen oven. The tortilla maker always kneels on the ground, usually outside her front door, and patiently rubs the whole grains of corn, which have previously been soaked in weak lye-water to remove

II. THE SADDLE-STONE.

15. The Mexican Metata.

the hulls, into a fine smooth paste. She has a stone roller, and she begins with about a quart of corn, and mashes and pushes it a little at a time towards the lower edge of her sloping stone table, working it in this way over and over again until it is very fine and smooth. Then she takes a small portion, not larger than a pigeon's egg, in the palm of her left hand and spats it with the ball of her right hand, all the time turning it round and round upon the left with a gentle, graceful sort of a tilt that is almost imperceptible. When the cake is about 4 or 5 inches in diameter she put it on her convex earthen griddle over a handful of charcoal, and bakes it slightly on both sides. She has no implements but her metata, her bit of earthen stove, and her hands: no mill, neither knife nor fork nor spoon. She never sits in any other manner nor moves any faster nor any slower. Her back is as straight as an arrow,

though when she is not kneeling in this indescribable way she is carrying a baby, slung in her rebozo behind her." The group of women shewn in the illustration thus making tortillas on metata

II. THE SADDLE-STONE.

15. The Mexican Metata.

stones, are employed in a public bakery; but the process may also ordinarily be witnessed in private houses.

Dr. O. Mason, in his recent excellent and popular work on American archæology, depicts from a photograph a similar scene in the courtyard of a Mexican mansion: one woman grinding on the metata and the other making tortillas beside her. Orig Inv, 1895, 204.

The travelled Tyror, one of the highest authorities on modern Mexican life and customs, illustrates the use of the same appliance in a more humble sphere by a sketch taken from models made by a native artist; and remarks: "we passed many little houses built of mud bricks; the women on their knees inside hard at work grinding corn [maize] for tortillas." Anahuac, 1861, 173.

II. THE SADDLE-STONE.

16. In use in America.

The actual ancient saddlestone also still remains. In the early part of the last century, a French traveller, quoted by Goetius (1730), described a saddlestone in use in South America, identical with that of Europe and Africa:—

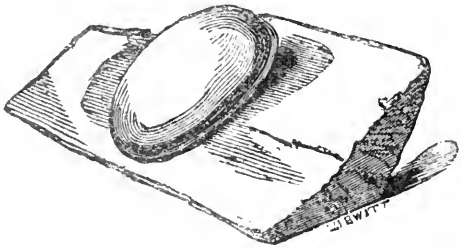
Chili, Perou & Brazil: Frezier: 116.

Pour moudre le mays après qu'il est roti, ils ont, au lieu de moulin, des pierres ovales longues, d'environ deux pieds, sur lesquelles avec une autre pierre longue de 8 à 10 pouces ils l'ecrasent à genoux à force des bras; c'est l'occupation ordinaire des femmes.

To mill the maize after it is roasted they have, instead of a mill, oval stones about two feet in length, upon which, with another stone from 8 inches to 10 inches in length, they crush it by pressure of the arms while kneeling, this being the ordinary occupation of women.

Lanc. and Ches. H. Soc,: 1868, 279.

Dr. Hume, F.S.A., in 1867, described the stone in use in the south of Chili. "Though these stones have been so extensively used in the past, I had arrived at the conclusion that they were now practically obsolete. This, however, is far from being the case. The first I saw in use was in a hut in Araucania; and at my request the Indian woman promptly placed upon it a handful of maize, knelt on the ground at one end of it, and with a rubbing stone converted the grain into coarse meal in a few seconds. I afterwards saw it in use in the market place at Santiago, where a woman was bruising boiled Indian corn somewhat in the

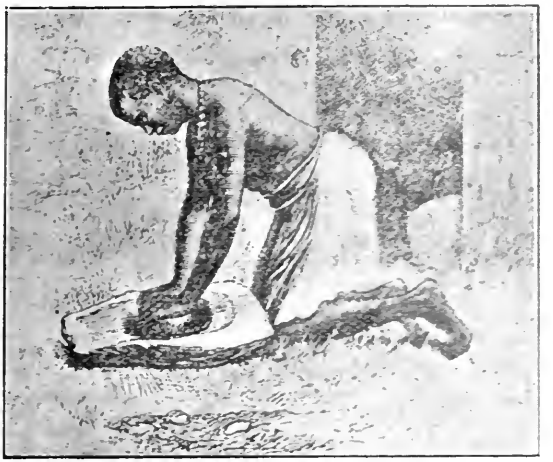


same way as country housewives at home bruise potatoes to mingle with flour for bread. With some difficulty I procured a specimen at Lota, nearly 300 miles south of Valparaiso, and succeeded in bringing it home."

II. THE SADDLE-STONE.

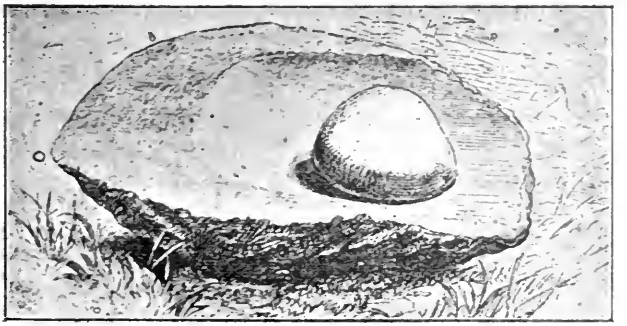
17. In use in Africa.

In modern Africa the saddlestones are described and illustrated by Dr. Livingstone, who rightly conjectures that they may have been the form of mill used by Sarah. His sketch of the negro woman using the



stone exhibits no practical variation whatever from the form of the statuettes of the time of the Pharoahs. "The mill consists of a block of granite, sienite, or even mica schist, 15 to 18 inches square, and 5 or 6 inches thick; with a quartz or other hard rock about

Zambesi: Livingstone, 1865: 544.



the size of half a brick, one side of which has a convex surface, and fits into a concave hollow in the large stationary stone. The woman kneeling grasps

II. THE SADDLE-STONE.

17. In use in Africa.

this upper millstone with both hands, and works it backward and forward in the hollow of the lower stone. The weight of the person is brought to bear on the upper stone, and while it is pressed and pushed backwards and forwards one hand spills, every now and then, a little grain under it: the grain being thus first bruised and then ground. The lower stone is placed on the slope on the ground so that the meal falls on to a skin or mat."

Sources of White Nile: 1841, 142.

Some further details of interest may be gleaned from the observations of the traveller, Werne, in the Soudan. "In the land of Sudan they use for a murtraka a block of granite with a flat upper surface, upon which the grain is placed a handful at a time. A female slave, kneeling, triturates the corn upon it to a meal, with an oval stone, which she holds by both hands. Owing to the sloping position of the granite block, the meal as it is ground runs off (at the forward end), and is received upon a leather or cloth laid under this simple mill. The lower stone is gradually worn into a hollow in the middle by the continual rubbing. This grinding is a very troublesome process, and the arms of the poor creatures condemned to it acquire an unusual form. A slave can only make meal sufficient for one day's consumption for eight persons, if she works from morning to evening; and this quantity is taken as the standard for a day's work." Mungo Park ("who hath no wife to grind his corn") testifies to the same employment of women. Stanley also states: "Emin Pasha set all the women to grind corn" on the arrival of his large retinue; and complains that Casati had thought it necessary to include the stones in his luggage to be carried up hill. Sir Samuel Baker describes the stone under the same designation as Werne—the "moortraka;" stating that when new

In Darkest Africa: 1890, i., 136.

Albert Nyanza: i., 65.

II. THE SADDLE-STONE.

17. In use in Africa.

the lower stone weighs about 40 lbs., but after a month's wear it is generally reduced to half that weight. A very recent traveller, Mr. E. J. Glave, during his "Journey to the Livingstone Tree," photographed a Central African village scene, wherein, in the open street beside a granary, was a

Century Mag. 1896, 776.

woman grinding on a saddlestone precisely as described by Livingstone. The granary in this view is much the same as one of which Stanley gives an illustration: the custom of storing differing from that prevailing in the time of Julius Cæsar:—"it is the custom of the people of Africa to deposit their corn in vaults under ground"—exactly as Diodorus Siculus, in the first century B.C., stated the British were accustomed to do. The Moors of Tangier were seen using these stones in 1823, even though scarcely ten miles distant, at Cape Spartel, was a quarry where for centuries quern stones were derived.

Darkest Africa: i, 320.

Comment. African War: c. 65.

Kilkenny Arch. Soc. iv., 36.

II. THE SADDLE-STONE.

18. In Asia.

Saddlestones worked by rollers are also used for grinding materials for curry in India. But little seems to be known of their use in Asia for grain

crushing generally; and information on the point seems to be a link in a chain of events which might suggest that it was from Asia that the aborigines of America derived their knowledge of the appliance.*

Itinerary: Fynes Morison: iii., 161.

Anct. Stone Implts: 1872, 226.

* A traveller in Ireland, in 1617, describes having seen in Cork "young maides, stark naked, grinding corne with certaine stones to make cakes thereof." The peculiar vague reference to the stones suggests to Sir John Evans (who quotes the passage) that they were something different to the ordinary 17th century quern with which the traveller would be well acquainted; and that, probably they were saddlestones. If so, this is an extremely late and, in fact, the last instance of their use in this kingdom.

CHAPTER III.

THE MORTAR.

III. THE MORTAR

1. A Development of the Cup Hollow.

THE hollow or basin in a fixed rock is, of course, the origin of the portable grain mortar. Its development is aptly illustrated in modern times by the habits of the North American Indians; nomads to whom "a hollow in the surface of a great stationary rock" is but of little use. "Families, or more properly speaking, clans and tribes moved from place to place, and it would be necessary for them to have among their household effects a portable mortar. In the eastern portion of the United States, great numbers of mortars are found that are extremely rude in shape. A piece of granite or sandstone, not over six inches thick and one foot across, was battered into an exceedingly rude outline on the outside, and hollowed out a few inches on the inside. It is just possible also that these rude shallow mortars had basketry hoppers."

Orig. Inv. Mason, 1895, 139.

The first essential of a mortar is that it should be portable, but its great distinction is that it is fashioned into shape not only on the inside but on the outside. As an attempt to shape a stone in this manner marks a dividing line between barbarism and civilisation, it is well to recognise the fact; and classify mortars apart from the barbaric types from which they are derived. However rudely made, a mortar is a properly fashioned vessel within and without: the inside may be little more than a cup hollow and the outside may be very crudely made

III. THE MORTAR

1. A Development of the Cup Hollow.

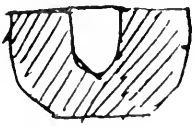
out of a block of wood or boulder stone; but still it is a mortar. Such a barbaric form of the appliance is found at an early period of civilisation to have given way to one of much superior fashion; taller and wider than before, it was a vase in which some elegance of contour and some attempt at ornamentation were introduced, while, to add to its convenience as a portable vessel, handles were applied; the basis being thus established for the handsome mortars of Roman days.

2. A Chaldean Mortar: the earliest known Cornstone.

The earliest historical specimen extant of any grain stone happens to be a Chaldean mortar. It was recently found by the official French explorer, M. de Sarzec, on the site of a royal palace at Tello, and is greatly valued by archæologists on account of an inscription which it bears naming early Chaldean monarchs hitherto unknown. M. de Sarzec not being permitted to take the mortar to France, it remains detained in the museum at Constantinople, where it was inspected and the inscription deciphered by the savant, M. Léon Heuzey, of Paris. This gentleman has kindly favoured us with a communication on the subject, and a sketch; observing that the mortar is the sole relic referable to the earliest period of Chaldean civilisation. It is fully described by him in a paper read before the Académie des Inscriptions et Belles-lettres, in 1894: its special value being stated to consist of the evidence it affords of the genealogy of the archaic Prince Entéména.

Comptes rendus: 1894: Le Patési Entéména.

"It is a sort of mortar of hard stone of a dull green colour, which at first view one would take for the narrow socketted stone of a door pivot. The central



III. THE MORTAR

2. A Chaldean Mortar: the earliest known Cornstone.

cavity is 16 centimetres in circumference and 10 in depth. Nevertheless, the care with which the stone is dressed and trimmed on all sides, and, above all, the position of the inscription which is upon the sides, not the top, of the stone, seem to indicate an article of quite a different nature." The inscription, as deciphered by M. Heuzey distinctly proves its use: it records the dedication to the gods of "this mortar, for bruising grain, which Enannatouma has established for the prolongation of his life"; thus this was without doubt a grain mortar used for the daily crushing of corn, according to the primitive fashion, for the royal table. This, and other of the discoveries of M. de Sarzec, are "monuments of a series of princes whose names carry us back to the 40th century before our era; or, even further still, to the very origin of the ancient civilisation of the East."

3. Egyptian.

Egyptian mural sculptors not rarely illustrate the contemporary use of the mortar. In a scene depicted on the wall of one of the ancient tombs at Assouan,

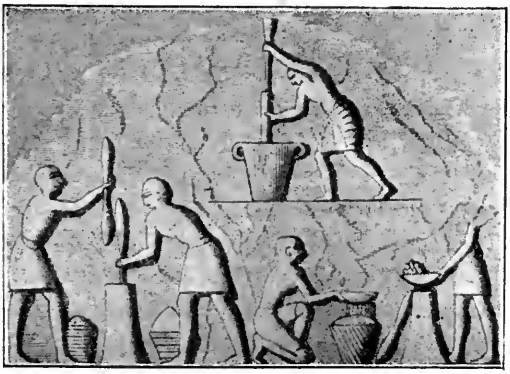
L'Egypte: Paris: 1821, 157.

around a number of figures apparently busily engaged in preparing and serving a banquet, is one pounding in the characteristic large mortar; though

III. THE MORTAR

3. Egyptian.

there is no special indication that it was grain which was treated. These instruments were made of wood for reducing grain, and of stone, often, for mashing vegetables and meats. In a scene, reproduced by Wilkinson, another common variety of mortar is seen: the utensil being considerably improved in shape, and provided with handles at the sides. One man works at this mortar. In the same group is



also seen a mortar worked by two men with the balanced dumb-bell pestle, which they grasp in the middle and beat alternately upon the grain. Such mortars seem to have been identical with some in modern use: consisting of a long narrow tube of wood hollowed to a little more than one-half its depth: and the whole process strongly resembles the operations of the public pounders of Cairo and other places in Egypt at the time Wilkinson wrote; though we find no evidence of their survival to the present time.

Anct. Egypt, 1837, iii. 181.

4. Of the Ancient Hebrews.

The Hebrews, in their wanderings in the desert, 1490 B.C., carried with them their grain mortars; and we are told, regarding the manna, that they "ground it in mills or beat it in a mortar" (Num. xi. 8). Their small appliances were probably similar to those carried about by the North American Indians

III. THE MORTAR

4. Of the Ancient Hebrews.

in modern times. The grain mortar and pestle long remained in use among the Hebrews in Canaan; and, five centuries after the exodus, Solomon declared "though thou shouldst bray [bruise] a fool in a mortar [as] among wheat with a pestle, yet will not his foolishness depart from him" (Prov. xxvii. 22). Dr. Flinders Petrie discovered three small examples of the mortar, each provided with lugs or side handles for convenience of handling, on the site of Hebron, south of Jerusalem; and varying from 4 inches to 7 inches in diameter. He also discovered a model of the same type at Naukratis, in the delta of the Nile: this being one of the ceremonial vessels placed under the foundation stone of the Great Temendos, or public hall, dating from about 600 B.C.: an illustration of which appears in *Naukratis* (I. pl. 26) by the same author.

Tanis, 1888, i. 45.

5. Of Greece.

Text: Roman Processes.

From Egypt the mortar may also be traced westward along the shores of the Mediterranean to Carthage where, as Pliny tells us, Mago described its use about 400 B.C.; and, perhaps, northward to the Gauls whose rude people, Isida, goddess and queen of Egypt during the reign of Herculis, 11th king of the ancient Germans, is traditionally accounted to have taught the arts of milling, of using the mortar, and of cooking bread:—

Regnante Hercule Alemanno, undecim Germanorum rege, Isidem Deam, Reginam Ægypti, in Germaniam venisse et rudem populum artem molendi, pinsendi, panesque coquendi docuisse.

Gall & Troj.: Marius Belgicus lib. ii. (Heringius).

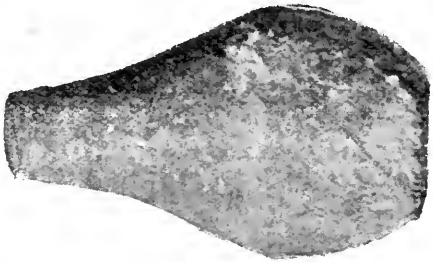
But of a less doubtful character is evidence of the extension of the use of the appliance to early Greece. Two centuries before Solomon alluded to the Hebrew mortar, the destruction of Troy, in 1184 B.C., occurred: and on the site of towns successively built on its ruins at Hissarlik, as already described, Schliemann discovered abundant indications of the ordinary use of the mortar. A pestle of basaltic

III.
THE MORTAR

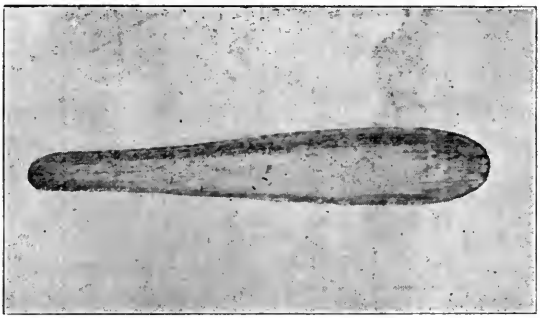
5. Of Greece.

Ilios, 235.

lava found in the lowest stratum of debris, among the ruins of Troy itself, is a pear-shaped pounder of the type already mentioned. Others, however, are

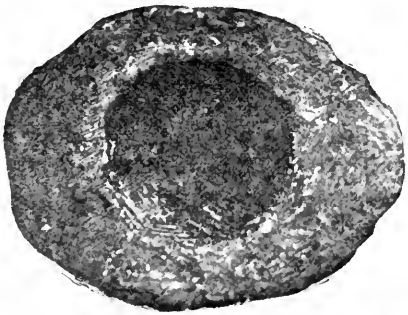


of considerably more slender make, and much smaller in size. One found in the fifth layer of ruins is of diorite, conical in shape, well polished, and with both



ends shewing signs of long usage. Others, too, are so extremely light and slender as to suggest that they were not used for grinding grain, but probably for

Ilios, 234.



III. THE MORTAR

5. Of Greece.

reducing cosmetics or drugs. The general form of the mortar, great numbers of which were found, was extremely primitive and rude: comprising a block of basaltic lava, with a globular hollow upon one of its sides: the entire length of the article being about 10 inches.

Two centuries later than Troy, Hesiod, practically the contemporary of Homer, refers to the mortar; though he does not suggest that it was used for grain. The peasant is advised by the poet as to the equipment of his farmstead:—

Hesiod: Cooke, 1811. ii. 56.

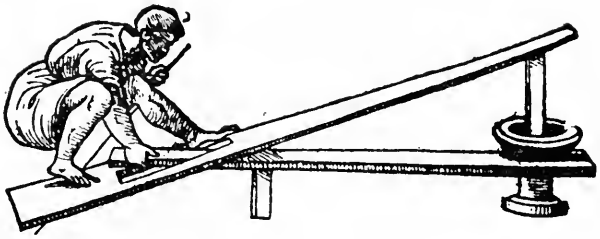
> When the tall forest sheds her foliage round,
> And with autumnal verdure strews the ground
> The bole is incorrupt, the timber good:
> Then whet the sounding axe to fell the wood.
> —Provide a mortar three feet deep and strong,
> Make the pestle three cubits long:
> One foot in length next let the mallet be;
> Ten spans the wain, seven feet the axle tree.

The cutting of the mortar and the construction of the waggon are described in the original even more briefly than in the translation: but the one clear fact discernable is that the mortar was made of wood, as was the ancient Egyptian and as is the modern one of Madagascar. Like these, Hesiod's mortar was a large and cumbrous affair, a yard in depth, and worked with a pestle a yard and a half in length. The translator, Cooke, appends a note to the passage:—"Some think this [mortar] was for the same use as a mill: if so an argument might be brought from the invention of mills for the antiquity of Hesiod, who does not mention a mill in any of his writings." A 16th century edition of Hesiod contains an illustration of the appliance being worked with a beam operated by the feet of a slave. This, of course, is mere conjecture; though some such arrangement really was in operation about nine centuries after the date of Hesiod, as mentioned by Pliny; and a similar method of working a rice

Op. et Dies, Venice, 1537. 113.

III.
THE MORTAR

5. Of Greece.



mill prevails at the present day in some parts of China; as noted shortly.

The Greeks in the mortar period appear to have effected one great revolution in the grinding avocation. Probably by reason of the heavy nature of the work, they seem to have employed men instead of women as pounders, as to some extent the Egyptians had done. But, from whatever cause the change arose, the pursuit of corn grinding among the Greeks, passed almost exclusively to men; and it was they who first gave to these male slaves the name by which millers and bakers alike were subsequently known throughout the civilised world for many centuries. From πτίσσω to crush or pound, the grinding operatives were called "pounders:" a term which, as will be seen, the Romans afterwards adopted, translating it to "pistores;" and which survived in England and elsewhere throughout the middle ages, long after bakers ground grain, and after millers had ceased to pound.*

6. Plautus and Greek mills.

Plautus, the Roman comic poet, writing, between 227 and 184 B.C., various comedies for the entertainment of Rome, localised his scenes in Greece; and frequently mentioned the pounders (or pistores, as he already termed them), the slaves and criminals at the mills, and also the domestic grain-pounding mortar. During the life of Plautus Greek milling was precisely as he described it. Terence, another

De Pistr. Vet. c. 1.

* Goetius and others attempt to attribute the term "pistor" to Hebrew or even Chaldean etymology.

6. Plautus and Greek mills.

Roman playwright (193-159 B.C.), was contemporary with Plautus; and he, too, giving his comedies a Greek setting, alluded to precisely the same condition of affairs at the mills as did Plautus. It becomes necessary to consider that both of these writers strictly depicted in their plays Greek milling customs; since a later writer still, Pliny, definitely states that there were no pounders, or pistors, in Rome till after 168 B.C.; and Roman pistors thus could not be introduced into plays written before that date. But for the distinct statement of Pliny—an authority of great eminence—it might, preferably, be considered that both Plautus and Terence, writing in Rome for Roman audiences, might have been understood to have described Roman customs, as they certainly did steadily aim at suiting their dialogues to the taste and comprehension of Roman citizens. Accepting as correct, however, Pliny's assertion (which is quoted later), we are forced to attribute the milling allusions of the above two early playwrights of Rome to the customs of the Greeks at about the year 200 B.C.

Plautus mentions the mortar. In one favorite play when the miser, Euclio, of Athens, bids his housekeeper as he leaves home to lock up the house and lend nothing to neighbours, she exclaims—

> Cultrum, securim, pistillum, mortarium,
> Quæ utenda vasa semper vicini rogant?

Aulularia: Act. i. sc. 3.

But the knife, hatchet, pestle and mortar; utensils that neighbours are always borrowing?

In another comedy we find evidence that grinding grain in private houses was still the duty of the maid-servant: the Merchant declaring—

> Nihil opus nobis ancilla, nisi quæ texat, quæ molat,
> Lignum cædat, pensum faciat.

Mercator: Act ii., sc. 4.

We need no domestic woman servant, save one who can weave, grind at the mill, chop wood, make yarn, &c.

Frequent allusions to slaves or criminals labouring at mills occur: opulent housekeepers punishing their slaves and servants by sending them to drudge in

III. THE MORTAR

6. Plautus and Greek mills.

the combined mill and bakery (the pistrinum, as the Romans called it) attached to their houses; and criminals being sentenced to penal labour at state mills. Here we find, therefore, the origin in Greece of a custom that prevailed for half-a-dozen subsequent centuries. Milphio, a servant jesting with his fellow, exclaims:

Pœnulus: Act v., sc. 3.

Lachanam vos, quos ego jam detrudam ad molas.
Inde porrò ad puteum, atque ad robusteum codicem.

Get away! I shall shortly send you to the mills, and after that to the dungeon and the oaken log [which was fastened to the feet of a criminal].

Toxilus, a servant, remarking to his friend Sagaristio, that he had not seen him for some time, the latter rejoins he has been engaged with business, whereupon:—

Persa Act i., sc, 1.

To.—Ferreũ fortasse. *Sa.*—Plusculũ annum
Fui præferratus apud molas tribunus vapularis.

Toxilus asks 'In the iron trade line?' Sagaristio, jocularly replying, 'Oh, yes: for over a twelvemonth: and was promoted in irons at the mills as a commanding officer.'

In another scene, Toxilus is himself called *pistrinorum civitas*, 'Thou citizen of the bakeries: thou gaolbird!' Ibid: Act iii., sc. 3.

Another servant, Tranio, is thus warned of the fate which awaits his misdeeds:—

Mostellaria: Act i., sc. 1.

Sané credo Tranio
Quod te in pistrinum scis actutum tradier:
Cis hercle paucas tempestates Tranio,
Augebis ruri numerò genus ferratile.

Really, Tranio, I believe you feel sure you will soon be handed over to the bakery: 'ere long, Tranio, you will be among the iron people in the country.

Simo, an old gentleman of Athens, blaming Pseudolus for not telling him of a secret love affair, receives the reply, "I knew that the pistrinum was at hand if I had told you:" Simo, thereupon rejoining, 'And did you not know that it was just as nigh for you if you kept silent?"

Pseudolus: Act i., sc. 5.

Ps.—Pistrinum in mundo scibam, si id faxem, mihi.
Si.—Non à me scibas pistrinum in mundo tibi
Cum ea mussitabas.

III. THE MORTAR

6. Plautus and Greek mills.

Simo elsewhere marvels why he hesitates to banish Pseudolus to found a penal colony, "to give a name to a colony at the mills:"

> Bene hercle factum, quid ego cesso Pseudolum
> Facere, ut det nomen ad molas coloniam?

Ibid: Act iv., sc. 7.

The poet also alludes to the custom of feeding swine in the bakeries upon bran, the stench of the animals being so great that no one can pass the places:

> Tum pistores scrophi pasci qui alunt furfuri sues,
> Quarum odore præterire nemo pistrinum potest.

Captivi: Act iv., sc. 2.

The personal association of Plautus with the milling trade of Rome may appropriately be mentioned in connection with the Roman pistrina.

7. Terence and Greek mills.

Terence (193-159 B.C.), whose comedies are avowedly based on Greek customs and localised in Greece, introduces in *Andria,* a play which "est tota Græca," Simo, a serious father, who, greatly troubled by Davus, his son's worthy valet, threatens him that if he obey not he shall be whipped and sent to the pistrina for life; declaring that if ever he release him he, himself, will go in his place and grind:—

> Verberibus cæsum te in pistrinum, Dave, dedam usque ad necem:
> Ea lege atque omine, ut, si te inde exemerim, ego pro te molam.

Andria: Act i., 199.

A troublesome son at an annoying crisis, his father, Demea, thinks of sending to work in the domestic pistrinum, where, in milling and cooking bread, he will become smoked and covered with dust and flour:

> Ibi favillæ plena, fumi, ac pollinis
> Coquendo sit faxo, et molendo.

Adelphi: Act iv., 846.

8. Rome: Institution of the trade of Pistors.

It is at this stage that the Romans, who eventually entirely revolutionised mills and milling, first come definitely upon our scene. Of Trojan origin, the Romans derived their early arts and sciences from Greece. "That Æneas came into Italy after the destruction of Troy, and that the founders of Rome were descended from him and his followers, are points of history sufficiently authorised and established." Troy was destroyed in 1184 B.C., and Rome founded

Roman Hist. Hooke, i. 1.

III. THE MORTAR

8. Rome: Institution of the trade of Pistors.

in 753 B.C.; and though till about 200 B.C. we have no actual knowledge of Roman milling, we may safely conclude that, with the Greek saddlestone, the mortar was in use. Pliny (23-79 A.D.), writing about two centuries after Plautus, whose works he of course knew well, describes the introduction of the Greek pounders or pistores into Rome as taking place after the death of the poet who so frequently mentions them :—

Nat. Hist.: xviii. 28.

Pistores Romæ non fuere ad Persicum usque bellum, annis ab Urbe condita super DLXXX. Ipsi panem faciebant Quirites, mulierumque id opus erat, sicut etam nunc in plurimus gentium.—

There were no bakers in Rome till the war with King Perseus [of Macedonia], more than 580 years after the building of the city: the citizens of old time used to bake their own bread; this being a womanly occupation as among many people it is now.

Text, p. 95.

Accepting this statement to be correct, as already suggested, it was thus not till 167 B.C. that on the defeat of Perseus a miserable band of captive Greek "pounders," was led to swell the triumph of Paulus Æmilius on his return to the Capital. Here at once these captives were set to work—as slaves—to pursue their avocation: the pursuit of grinding and baking now being, at Rome, removed from among the occupations of women, and established as a recognised calling for men. Though these craftsmen were called "pounders," or pistores, it was probably not at this late date that pounding in mortars first became known to the Romans. The novelty in connection with the importation of the Greeks lay apparently in the establishment of the trade among men. Pliny goes on to state that "the designation 'pistor' was applied to the person who pounded (pinsebat) the spelt:" and elsewhere adds, "the name of Pilumnus was given to him who invented the pilum or pestle used in the bakery for pounding corn." It would be impossible to discover who this alleged inventor of the Roman pestle

Nat. Hist.: xviii., 3,

III. THE MORTAR

8. Rome: The trade of Pistors.

could be; but there is no doubt about the origin of the name of the noble Roman family Pinso; as to which Pliny observes: "The name of Pinso was derived from *piso*," and, therefore, originated in the pistrina, or combined bakery and mill.

9. Classic allusions.

The earliest Roman writer who mentions the mortar, Plautus, was not only "comicorus facetissimus" who amused the ancient world with his witty comedies; he was also a pistor who had worked at corn mills; where indeed he wrote three of the plays with which, in later and more prosperous days, his actors entertained Rome. Aulus Gellius (117-180 A.D.), the authority for this statement, says that while Plautus laboured at the mills to obtain a livelihood—ob quærendum victum—he wrote, as the recollections of Varro and many others proved, *Saturionem* (the Parasite) and *Addictum* (the Imprisoned Debtor), as well as a third, the name of which Gellius had forgotten.

Noctes Atticæ: Florence, 1513, iii., 3.

Text: pp. 129 203.

Very briefly after Plautus, if not at the same period, flourished Cato (232-147 B.C.), whose only entire work now extant, a treatise on husbandry, contains a passing reference to the pestle shod with iron, fistula ferrata, the nature of which will be seen to be explained two centuries later by Pliny.

De Re Rust., c. x.

Virgil, who lived 70-19 B.C., also mentions the mortar, though in this instance it is used for crushing herbs to make a salad. In the somewhat rare poem, *Moretum* (the salad), the peasant calls to his servant to bring the mortar; he takes the herb and, smartly sprinkling it with water, places it in the stony hollow of the sphere; his left hand holds his rough cloak aside, and with his right he vigorously mills with a pestle the odoriferous garlic:—

Text: p. 133.

Clara famulam poscit mortaria voce . . .
Tingit aqua, lapidisque cavum demittit in orbem . . .
Lœva vestem setosa sub inguina fulcit,
Dextera pistillo primum fragantia mollit
Altra.

Op. Virg.: Manilli, 1783, ii., 50.

III. THE MORTAR

9. Classic allusions.

The mortar had, in fact, been generally used for mashing from very early ages, as it was, indeed, till very modern times.*

Ovid (43 B.C.-14 A.D.) affords us a clear illustration of the use of the mortar for crushing grain in recounting the story of the cause of the adoration of Jupiter Pistor, god of the millers—

Fasti, vi., 347.

Nomine quam pretio celebrator arce Tonantes
Dicam Pistoris quid velit ara Jovis—

I shall relate what means the alter of Jupiter Pistor on the height of the Thunderer: now more glorious in its renown than in actual worth.

Ovid's story, which must be considerably shortened, is that at some mythological period the Capitol was beleaguered by the savage Gauls; and the city, hard pressed for food, appealed to Jupiter. He convened a meeting of the gods, and after hearing their views of the situation dissented from them all.

Text: Cattle Mills: Vestalia.

Addressing Vesta, divine goddess of the bakeries, he said "Do thou, Vesta, so manage that the bread which is scarce in the city shall be thought by the Gauls to be superabundant: desert not thy abode (the bakehouse): whatever unground grain there may be let the hollow machine (the mortar) bruise it:

Quodcumque est solidæ Cereris cava machina frangat:

knead it with the hand: and let the fire bake it upon the hearth." Vesta accomplished her task, and at midnight Jupiter awoke the sleeping city and ordered the garrison to hurl upon the enemy that succour which least of all they could spare. "Sleep departs, and in agitation, by reason of these strange dark sayings, they make enquiries one with another what succour it is

* The Greek comedy writer, Aristophanes, who died about 390 B.C., frequently mentions the mortar and pestle (including 'a great mortar" which was rolled against a door to prevent its being pushed open—*Wasps, Act 1, sc. 2*, and a mortar of porphyry—*Plutus, Act 3, sc. 2*); and refers to one for bruising hemlock to make a drug—*Frogs, Act 1, sc. 2*. He seems also to allude to the saddlestone :—"I am as a freshly cut millstone that will not glide over grain it should crush."—*Wasps, Act 3, sc. 1*.

they would be unwilling, yet were ordered to resign. Lo! it seems to them it is bread. Therefore they hurl down the gifts of Ceres: which, thrown below, rattled over helmets and long bucklers: all hope thus deserts the Gauls that, while bread could be thrown away in such abundance, the city could ever be reduced by famine. They thereupon retire; and for this reason was erected the marble altar to Jupiter the Pistor." This stood in the temple of Jupiter on the Capitol; and here the bakers and millers rendered offerings to the god, invoking his blessing on their affairs. But to return to the mortar; it is evident that the cava machina, the hollow machine, in which Vesta bruised the grain, is to be recognised as this implement.

9. Classic allusions.

Columella, who wrote upon husbandry about the year 42 A.D., refers to the mortar:—

In mortarium novum aut bene emundatum conjicito, pistillis conterito: — Re Rustica, xii., 55.

In a new or well-cleansed mortar [the grain] is thrown and bruised by a pestle.

Lucanus, in the reign of Nero, or about 60 A.D., referring to the origin of the name of the Piso family in more flattering terms than had Pliny, affords other evidence of the mortar:—

Claraque Pisonis tulerit cognomina prima
Humida callosa cum pinseret hordea dextra: — Panegyr, ad Calp. Pisonem, 117.

From the humid, horny right hand that pounded barley, first did illustrious Piso derive the name.*

10. Pliny's descriptions of the appliance and its use.

Pliny (who died in 79 A.D.), the great authority on economic and industrial topics of his age, frequently alludes to the mortar. Still, though it was very commonly used, as he shews, the newer form of

* It is by a comparison with this noble family that Martial honours Seneca:—

Atria Pisonum stabant cum stemmate toto
Et docti Senecæ ter numeranda domus: — Epigr., iv., 40.
Through Piso's stem speaks great nobility
Seneca shews a threefold pedigree:

while it was to the same family, "ad Pisones," that Horace dedicated his "Art of Poetry."

III. THE MORTAR

10. Pliny's descriptions of the appliance and its use.

handmill, the quern, and the great slave and cattle mills, such as those of Pompeii, were already also largely resorted to. At this period, as in ancient times, some mortars were made of wood and some of stone. Zea, for the preparation of alicia, was pounded in wooden mortars, as those of stone, by their hardness, might grate it—"tunditur in pila lignea nam lapidis duritia conteritur." Several variations in the pestle appear. That used with the wooden mortar in the making of alicia from zea was the iron-shod pestle mentioned by Cato; and referred to by Pliny, who also introduces us to this pestle worked by slaves in chains:—"the motive power for raising the above pestle, as is generally known, is supplied by slaves working in chains, the end of the pestle also being enclosed in iron." A further development of the pestle appears in connection with the treatment of spelt, the hardy grain known to the Romans as triticum dicoccum, and to the Greeks as zea, and greatly esteemed by both nations. In a passage of somewhat doubtful import Pliny in this connection observes:—

Nat. Hist., xviii., 29.

Nat. Hist., xviii., 23.

Pistura non omnium facilis. Quippe Etruria spicam farris tosti pisente pilo præferrato, fistula ferrata et stella intus denticulata, ut nisi intenti pisant concidantur grana, ferrumque frangatur. Major pars Italiæ ruido utitur pilo: rotis etiam quas aqua verset obiter, et molat.

All grains are not easily pounded. In Etruria they first parch the spelt in the ear, and then pound it with a pestle shod with iron at the end. The iron is notched at the bottom into sharp ridges like knife-edges radiating in the form of a star: so that if care be not taken in using the pestle, either the grain will be splintered or the edges of the pestle will be broken. In the greater part of Italy is used a roughened pestle, and wheels also that water turns round as it flows along; and so they mill.

The doubt as to Pliny's meaning occurs in the concluding portion of the passage. He may be understood to state either that pestles were driven by water wheels, or else that, while ordinary pestles were used by some people, water wheels driving mills

Text: Roman Water Mills.

III. THE MORTAR

10. Pliny's descriptions of the appliance and its use.

were used by others. The passage which has perplexed many commentators is discussed in another volume: for the present it may be said that if the pestles were driven by water wheels the contrivance for the purpose needed to be very simple. Such devices have been adopted in modern times. A variety of Japanese water mill is constructed with a beam, balanced in the centre, having a pestle at one end: the other end of the beam is actuated by pins projecting from a water wheel; and the pestle is thus raised and depressed, as in an ore mill. In the British Museum is a model of a Chinese rice mill of the same kind, operated, in a manner similar to the imaginary pestle of Hesiod, by the feet of a man; who, with his hands fixed on rails, steps on and off the end of the beam. Another variety of the type was seen near Kashgar, in Central Asia, by the Earl of Dunmore, very recently:—

The Pamirs: 1893, 210.

On the way from Tash-Valyk to Borah-Khitaz, we passed some of the natives of a small village crushing corn, with a very simple, but none the less, ingenious machine worked by water power. The corn is placed in two holes on an elevated platform of rude concrete. Two large wooden arms, with hammer-shaped tops, are fixed in grooves, balanced on end in such a way that when set free their own weight would cause them to fall down: the hammer-ends fitting exactly into the holes containing the corn. A wooden cylinder, with large teeth, something like the barrel of a musical-box, is actuated by water power; and every time one of the teeth comes round to a certain spot, it strikes the end of one of these wooden hammers, giving it a cant upwards. The tooth having thus done its work, revolves, and the wooden-armed hammer falls by its own weight into the hole, and crushes the corn. At the next revolution of the cylinder it is brought up again out of the corn-hole, and is subsequently dropped into it again; and so on. There are two of these wooden arms working alternately.

11. Passes from Rome.

At no distant period after the death of Pliny, Rome seems to have abandoned the mortar, as well as the saddlestone, for the quern. The mortar thereupon fell to the use of less civilised nations: and in the fourth century we find Servius, in his annotation

Text: i, 12.

III. THE MORTAR

11. Passes from Rome.

upon Virgil's reference to grinding stones, thinking so lightly of the old pounding contrivance as to consider it no mill at all :—

Serv. ad Virg. Æn., i. 179.

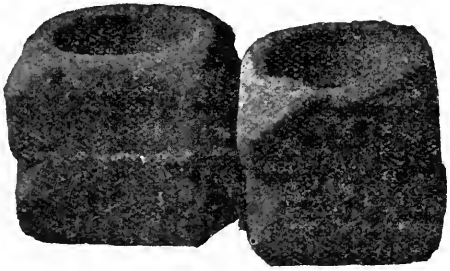
Apud majores nostras molarum non erat usus: frumento torrebant et ea in pilas misa pinsebant: et hoc erat genus molendi:

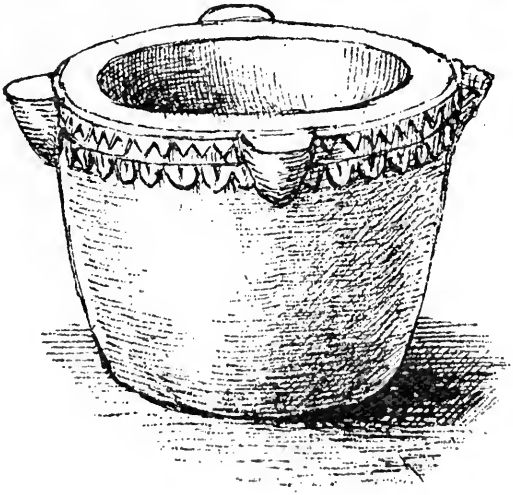
With the greater part of our people there was [anciently] no real milling: the grain was parched and pounded with pestles; and that was their kind of milling.

In parts of Europe and Asia the mortar, together with the saddlestone, lingered for many ages: to be discarded in turn by civilised races, till, to-day, we find it used for grain pounding only by the rudest peoples of the earth.

12. Romano-British.

Mortars rapidly advanced from the rough and crude forms of the primitive specimens, and some of





III. THE MORTAR

12. Romano-British.

the later Roman appliances are extremely elegant examples of stone handiwork. A form met with in Chester and Anglesea specimens contains notches at the angles for facilitating the fixture of the article upon a stand or table: as seen in two Roman specimens obtained from North Wales, and now in the possession of Mr. Bennett. An example of the late Roman era, decorated with a zig-zag and egg-and-dart moulding, and found at Chester, is also illustrated.

13. Prehistoric British.

Among the ancient Britons, as among all other primitive races, the mortar, together with the saddle-stone, was long in general use, and many relics of both appliances still exist. Nearly three centuries before Cæsar landed in Britain, the Greek traveller, Pytheas, had visited this country, and noted the wealth of corn grown. He, probably, did not extend his researches far beyond Kent, but, at all events, saw sufficient in that district to prove that Britain was then a grain growing region; although he was fain to say that the natives threshed or dried the corn in covered barns "because there is so little sun there." A later writer, Diodorus Siculus, who lived in the first century B.C., affords evidence of the same agricultural pursuits of the Britons, who, he says, gathered their harvests by cutting off the ears of corn, and storing them in underground granaries—pit dwellings and subterranean chambers, of which relics still exist in Kent, Essex, and Wiltshire. Julius Cæsar found some parts of the country in a state of comparative civilisation: and, indeed, from his "full but grandiose" account, it appears as though this island, far distant, as in every sense it was, from the academic world, was, to some modified extent, a seat of both learning and the arts. The Druids of early Britain, to whose learning Cæsar alludes, were priests of learning and art, as well as of religion,

De Bell Gall, vi., 12.

III. THE MORTAR

13. Prehistoric British.

and, doubtless, had taught something of one subject and the other to their followers; and we see no reason why, among other useful arts and sciences, a knowledge of the latest improvements in grain grinding should not have been acquired. It is unlikely, however, that the Britons were acquainted with the device of revolving millstones, then of but recent introduction in the capital of the world: and the mortar and saddlestone would, therefore, be in general use. Though in one passage Cæsar says: "in the interior of the country they, for the most part, produce no corn, but live on milk and flesh;" yet it is quite certain that in the more advanced parts of the country molita cibaria, milled or ground food, was used.

Text: Querns.

De Bell Gall, v., 14.

A British mortar of oak, similar to that of ancient Egypt, was discovered in 1831, in Blair Drummond Moss, Scotland. It lay five feet below the surface of the moss, and consisted simply of a portion of the trunk of an oak 19 inches in length and 14 inches in diameter: the centre being hollowed out to form a mortar of about a foot in depth. When compared with other discoveries in the same locality, the circumstances under which it was found, were believed scarcely to permit an escape from the inference that this relic was contemporary with the ancient wooden canoes dug up in the Forth and Clyde district, and with the oaken burial cists which have been found alike in Scotland, England, and Denmark. Exploration of the so-called Pict Houses of Scotland have not infrequently revealed the mortar; but as these are sometimes found in conjunction with querns, their chronological value is small; for it is difficult to consider that these places, like the cave dwellings, have not been inhabited by successive races of people.

Prehist. Scot.: Wilson, 1851, 152.

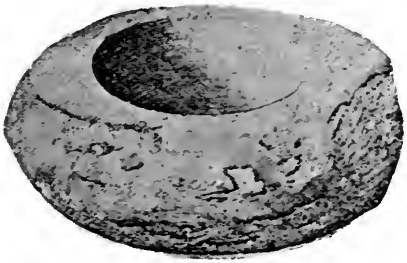
Soc. Antiq. Scot.: 1851, 267.

An interesting discovery of a mortar, in situ, was made by the Hon. W. Owen Stanley, in 1878, during the exploration of a British burial ground, at Porth

13. Prehistoric British.

Dafarch, Holyhead Island. Numerous mounds, containing cists in which were the usual cinerary urns, were found on the site. One of these, on being opened, proved to be the remains of a hut which had been converted into a tomb. The stone coffin, says Mr. Stanley, had been built straight across the old doorway of the disused dwelling-house: beyond it, and within the hut, was a mortar

Arch. Camb., 1878, 22.



supported on a pedestal of stones; and among the debris and black soil inside the implement was a fragment of Roman Samian ware, bearing a design representing prancing horses. The discovery of this ware and of articles of bronze and iron, in conjunction with the evidences of cremation, points definitely to the pre-Christian Roman period, while the but partial extent to which cremation had been carried out, indicates the later portion of that era.* The hut, at some period antecedent to the interment, had been abandoned, and become covered with drift sand which had accumulated to the depth of six feet: when, evidently, the burials had been made by a race of people who knew nothing of the habitations concealed beneath the sward of their cemetery. Within the hut also was a fireplace, with heating stones

* "Among the Romans," says Pliny, "the burning of the body after death is not a very ancient usage. Formerly they interred it; but after it had been discovered, in the foreign wars, that bodies which had been buried were sometimes disinterred, the custom of cremation was adopted. The word 'sepultus' applies to any mode of disposing of the dead body: while 'humatus' is applicable only when it is deposited in the earth." The practice of cremation was discontinued by the Romans in the 4th century.

Nat. Hist., vii, 55.

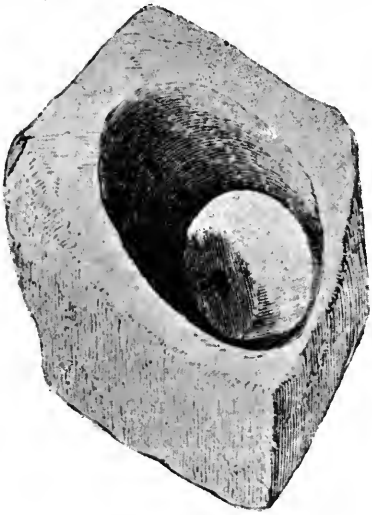
III. THE MORTAR

13. Prehistoric British.

intact; and a stone table which (like that whereon Virgil's peasant stood the lamp as he ground at the quern) was affixed to the wall of the domicile.

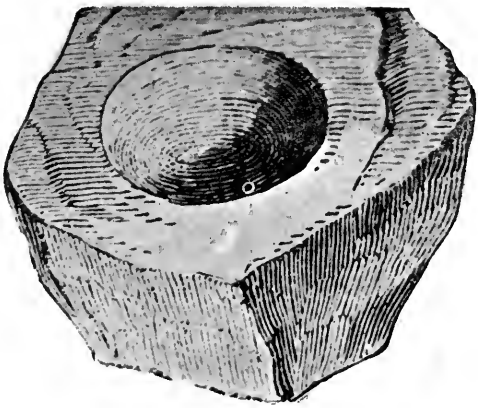
Stone Implts.: Evans, 1897, 253.

At Ty Mawr, Holyhead, in 1868, was discovered a trough-shaped mortar of whinstone, containing a cylindrical rubber, upon the opposite sides of which were slight depressions facilitating its being held



Arch. Camb., 1868, 409.

conveniently. A somewhat similar four-sided mortar was unearthed at Pen-y-Bonc, in the same county, measuring about 10 inches across, and with a muller of 4½ inches in diameter.



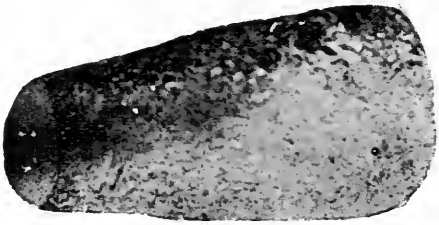
III. THE MORTAR

13. Prehistoric British.

Grain pestles are tolerably common. Near the hut habitations at Holyhead was found a club-shaped pestle, 11 inches in length, greatly resembling one in the Edinburgh Museum, which was found with celts in a Scotch prehistoric cairn. But one of the most notable discoveries of prehistoric pestles was made at Castel Coz, Brittany, where, among the saddlestones already illustrated, were found many pestles of various shapes. In the main, they may all be said to be formed of straight long stones obtained on the sea shore, varying from four to eight inches in length; some being rounded and others flat in section. At the extremities they were

Arch. Camb., 1868, 417.

Arch. Camb., 1870, 300,



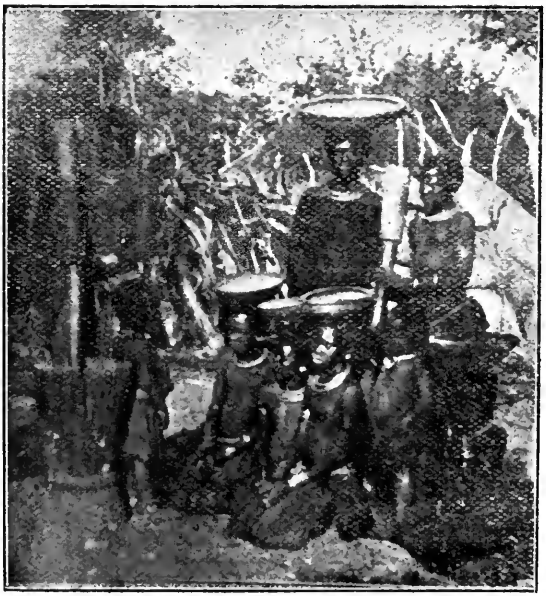
all marked with traces of percussion. Some bore on each side, towards the upper end, little hollows intended to receive the thumb and fingers when the instrument was in use; in one specimen the cavities were replaced by a pattern of dotted *pointillé* work forming a rough surface. The articles are somewhat similar in their extreme lightness to one of the patterns found at Troy, and scarcely appear to have been corn crushers: but to have been used for mulling paint or cosmetics on small slabs or in minute mortars. Both of these are very commonly discovered, the former being not more than three inches in length, while the latter have been found in Wales not more than two inches in diameter. At all events the whole of these trifling articles must be excluded from the category of the necessarily heavy appliances required for pounding corn.

III. THE MORTAR

14. In Africa.

Turning to other continents, we find African folk-lore preserving dim traditions of mortars of wood

being used among the ancient aborigines. In negro legends, still in existence, occur such passages as—



III. THE MORTAR

14. In Africa.

"Lend me an adze that I may cut a great piece of wood to mend the grain mortar *(mtondo):*" and "They fell over the *mtondo* belonging to his mother:" *mtondo* being noted as "a large mortar cut out of a solid log, and used for pounding grain."

Contemp. Review, Sep. 1896.

The same instrument is in use there still. Lieut. Mage, in his "Journey to the Niger," illustrates the use of the appliance by two women for pounding millet: also the method of working it with one hand by one woman. At the present day the pestle and mortar are seen in use in the Transvaal, women once more conducting the pounding and carrying, while warriors stand by looking placidly on the scene. In Madagascar, mortars with similar long and heavy pestles, are worked by women for pounding rice.

Illtd. Travels: 1863, ii., 292.

Black and White Mag., Jan. 1897.

III. THE MORTAR

14. In Africa.

Zambesi, 542.

Livingstone, besides describing the saddlestone of the Central Africans, describes also their mortar. "The corn is pounded in a large wooden mortar, like the ancient Egyptian one, with a pestle 6 feet long and 4 inches thick. The pounding is performed by two or three women at one mortar. The measured thuds of their vigorous work are associations inseparable from a prosperous African village. By the operation of pounding with the aid of a little water, the hard outside husk of the grain is removed, and the corn made fit for the millstone."

15. In America

Flint Chips: Stevens, 227.

Orig. Inv., 1895, 198.

In America and the West Indies aboriginal mortars and pestles are abundantly found. Carved specimens, representing grotesque human figures, have been discovered in St. Domingo: and on the Pacific Coast, from Alaska to the Mexican States, ancient specimens, carved with considerable care, are not uncommon. The natives of the coast of California and the Santa Barbara Islands were great manufacturers of mortars and pestles, and very often the surface of the instruments found there are covered with hundreds of little pitted marks, showing where the blows of the makers had struck. A curious specimen of an American Indian pestle of

sandstone, now in the possession of Mr. Bennett, is furnished with a rounded handle, while the lower part, instead of being globular or cylindrical, is flattened obliquely on opposite sides, in somewhat the same manner as the pounders of Troy. The women of the Seneca Indians use wooden mortars

Jour Arch. Asoc. vii. 83.

III. THE MORTAR

15. In America

and long pestles identical with those depicted in the sculptures of ancient Egypt: the mortar, about two feet in diameter, being roughly hewn out of a trunk of a tree, and the pestle, about four feet long, being held by the narrow stem in the middle of its length. The Pawnee women use precisely the same appliances, of which the American writer, Schoolcraft, has given several illustrations in his "Archives of Aboriginal Knowledge." An ancient custom of working has been seen to be reproduced by the Pennacooks, of New Hampshire; the pestle being suspended from the overhanging bough of a tree, which, by its pliancy, serves as a spring to assist in raising the pounder after each downward stroke.

Travels in N. America: Murray, i., 314.

16. In India.

In India, also, may be seen women conducting the operation of rice-pounding, two or more working at one mortar.*

* The above illustration and that at the conclusion of chapter ii. are from recent photographs supplied to us by Messrs. Hind and Lund, milling engineers, Preston.

CHAPTER IV.

ROMAN PROCESSES IN THE MORTAR PERIOD.

IV. ROMAN PROCESSES.

1. Comparative efficiency.

THE present is an opportune period for reverting to the general subject of hand-milling processes as conducted and brought to a comparatively high state of efficiency by the Romans in the Christian era. At this time, when the use of the mortar and saddle-stone was declining, and the quern was opening out a new era in the milling world, Roman writers, especially Pliny, afford us a wide insight into the condition of affairs before the introduction of water mills. As the period was transitional with regard to its mills, so was it with respect to its foodstuffs; and with respect to the methods by which—as though animated by a spirit of unrest and dissatisfaction with the then crude processes—the Romans, on the brink of the great discovery of power mills, experimented in every direction to secure the most efficacious method of reducing their abundant grain. Pliny, our chief authority, died A.D. 79, but his expositions frequently date back to an earlier age, being commonly those of authors who had written on the subject: and refer also to practices prevailing in other countries of which he himself had gained information. The whole subject may, however, be considered in the aggregate as illustrative of the milling resources of Rome and the world during the century before, and the century after, Christ.

IV. ROMAN PROCESSES.

2. Foodstuffs.

Though wheat of several varieties was produced in abundance the ancient food of flour of acorns and other nuts still survived in some places though not to any extent in Rome. Pliny states that there were thirteen varieties of these glandes or nuts, including acorns, beech nuts and hard kernel fruits of all kinds. "It is a well-known fact that acorns at this very day constitute the wealth of many nations, and that too even in these times of peace. Sometimes when there is a scarcity of corn they are dried and ground, the meal being used for making a kind of bread. Even in the present time, in the provinces of Spain, we find the acorn (which is thought to be the sweeter when roasted on the ashes) introduced at table in the second course." The nutritive qualities of the chestnut also were doubtless not overlooked, and chesnut flour and bread are likely to have been then in far more common use than, in some places, they are at the present day.*

Nat. Hist.: xvi. 6.

Text: chap. i.

The cereals included winter grains, wheat, spelt and barley; and summer grains, millet, panic, sesame; with which were used beans, pease, &c. "Several kinds of bread are made from millet, but very little from panic":—a coarse grain, deriving its name from the panicule or down appearing upon it. "Of all these grains barley is the lightest, its weight rarely exceeding 15 lbs. to the modius, while that of the bean is 22 lbs.; spelt is much heavier than barley, and wheat heavier than spelt. In Egypt they make a meal of olyra, a third variety of corn that grows there. The Gauls have also a kind of spelt peculiar to that country, which they call brace.† This grain,

Nat. Hist.: xviii. 9, 10, 11, 12. passim.

* Chestnut flour is an important article of diet in some parts of Italy and Austria and the region of the Apennines. The chestnuts are carefully dried, and then ground into flour, which is made into cakes, &c. This flour is certainly calculated to become a suitable food, as it is easily digestible; and, on analysis by Professor Church, has been found to contain over 40 per cent. of nutritious matters soluble in pure water.

Milling: L'pool: Jan., 1897.

† A variety probably of the triticum hibernum of Linnæus, with white grains: the white wheat of the French, from which the ancient Gauls made their malt; hence the French word 'braser' to brew.

Pliny: Bostock: iv. 24.

IV. ROMAN PROCESSES.

2. Foodstuffs.

which is known to us as sandala, is of remarkable whiteness, and yields nearly 4 lbs. more bread to the modius than any other kind of spelt."

Re Rustica, i. 1.

Of Italian wheat Varro, who lived a century earlier than Pliny, had spoken with enthusiasm—"What corn shall I compare with that of Campania, what wheat with that of Apulia? Is not Italy so well planted that it looks like a garden?" Pliny follows in the same strain of admiration:—"There are numerous kinds of wheat, but for my part I can compare none to that of Italy, either for whiteness or weight, qualities for which it is particularly distinguished; indeed, it is only to the produce of the more mountainous parts of Italy that foreign wheats can be compared. Among the foreign wheats, the Greek variety of Bœotia occupies the first rank, that of Sicily the second, and that of Africa the third; though the wheats of Thrace, Syria, and, more recently, of Egypt used to hold the third rank for weight. . . . Greece held the Pontic wheat also in high esteem, but this has not reached Italy yet. But of all varieties of grain, the Greeks gave preference to the kind called dracontian, strangia, and selinusium. . . . Such, at all events, were the opinions generally entertained in the reign of Alexander the Great, when Greece, at the height of her glory, was the most powerful country in the world. Still, nearly one hundred and forty-four years before the death of that prince, we find the Greek poet Sophocles, in his tragedy of *Triptolemus*, praising the corn of Italy before all others:

Nat. Hist.: xviii. 12.

> 'Favoured Italy grows white with hoary wheat.'

And it is this whiteness that is still one of the peculiar merits of Italian wheat: a circumstance which makes me the more surprised to find that none of the Greek writers of a later period have made any reference to it."

IV. ROMAN PROCESSES.

2. Foodstuffs.

Though, therefore, acorns and beans were consumed on the verge of civilisation in times of dearth, Rome, in the age of Pliny, was rich in wheat, barley and rye, of high quality, and admirably calculated to evoke the utmost efforts of the age to render milling as perfectly adapted as possible to the production of the finest flour. It is quite true that as "Verrius [V. Flaccus, who lived only a few years before Pliny] states for three hundred years the Romans made use of no other meal than that of corn:" but that age of boiled grains, of porridge and frumity, had now quite passed away: and fine bread in almost innumerable variety not only graced the tables of patricians but also filled the boards of humble plebeians.

3. Sand and Gypsum in Flour.

The use of loose stones driven by hand naturally had always led to the grinding away of the stones and the mixture of grit with the flour. Theoretically, of course, grinding stones should never actually touch each other nor wear one another away, but with mere loose handstones this perfection was an impossibility. The consequent mixture of sand with the flour had certainly not been relished in Egypt, where, according to the Talmud, it was specially because of the discovery of "stone grits in the bread of the King" that Pharoah's chief baker found himself in prison in company with Joseph. The excessively worn condition of the teeth of even royal Egyptian mummies (as of those of the Esquimaux of our own day) is attributed by Egyptologists to the consumption of bread thus mixed with grit from millstones. But centuries later the commonalty, unlike kings, seem to have been tolerably well used to sand in their flour.

Talmud: Polano: 1889, 83.

In this connection, however, a curious misunderstanding seems to have arisen as to the quality of the Roman bread:—"It is surprising to find the

Pliny: Bostock: iv. 37.

IV. ROMAN PROCESSES.

3. Sand and Gypsum in Flour.

Romans not only kneading their bread with sea-water, but putting into it pounded bricks, chalk, and sand." The observation occurs in relation to an account given by Pliny of a certain process of pounding which we are about to reproduce. But Pliny distinctly prefaces his account with the remark that he quotes it from Mago: not offering it as a statement of what was done in Rome in his own time:—

Nat. Hist.: xviii. 23.

De ipsa ratione pisendi Magonis proponetur sententia.

Of that kind of pounding described by Mago, the following is a statement.

Mago, who is here mentioned, was the brother of Hannibal of Carthage, who, about 413 B.C., or about four centuries before Pliny's day, had written twenty-eight books in the Punic tongue upon husbandry. These works, as Varro tells us, Casius Dionysius had translated into Greek, and, doubtless, from this ancient source Pliny obtained his account of Carthaginian milling: which, in any case, is not to be confused with any process adopted in Rome in the Christian era. Mago's method of grinding is thus described:—"He says that the wheat should be steeped in water, cleaned,* dried in the sun, and then pounded with the pestle: and the same plan should be adopted with barley (though 20 sextars of barley only require two sextars of water). When lentils are used they should be first parched and then either lightly pounded with the bran; or else a piece of unbaked brick, and half a modius of sand should be added to every 20 sextars of lentils." The addition of sand was intended to facilitate the grinding, not to ensure its being eaten with the flour: and, doubtless, the Carthaginians as

De Re Rust. i. 1.

* Translators are not agreed as to the word here rendered, by Bostock and Riley, as 'cleaned.' Beckman observes, 'I do not think the word evalli ought to be translated into 'winnow,' as Saumaise says (*Excercitat, Plinianæ*, p. 907); but agree with Gesner, that it signifies to free corn from the husk; in this case by pounding, the process being more easy then than after soaking."

Hist. Inv., 1797, i. 258.

IV. ROMAN PROCESSES.

3. Sand and Gypsum in Flour.

little liked the mixture as did Pharoah. Among Pliny's eulogies of bread made from wheat—"bread of the very finest quality"—not the least is the fact that it is sine pondere, without heaviness, not oppressive; and while the Romans could be so particularly fastidious as is here suggested, they are not likely to have consumed more than they could help of sand ground from millstones or bricks. In fact, we know they were at great pains by repeated boltings to free their flour from the unwelcome result of imperfect methods of grinding.* As to the addition of salt to flour—a practice which ordinarily prevails at the present day—though the Romans regarded salt with special veneration as the emblem of friendship and other virtues, and though they anciently propitiated their gods with choice offerings of salted cake, there is no reason for imagining they ever added salt to their flour to such an extent as to render the bread specially salty to the taste.

Nat. Hist.: xviii., 20,

Text: Bolting.

Pliny does indeed tell us of an Italian custom of mixing chalk with alicia meal for the purpose of whitening it and causing it to bake "short"; but this, he says, is "a most singular fact," and

Nat. Hist., xviii. 29.

* In much later days the usual troublesome consequences of hand grinding still prevailed. Petrarch, in the 14th century, writing of the hardships of his devoted humble friend, who worked in the fields from morning till night, and led a life of poverty, remarks that "her food was black bread frequently full of sand." In recent times Sir Samuel Baker, describing the use of saddle-stones in Central Africa, particularly notices the wearing away of the stones, and declares "I must have swallowed a good sized millstone since I have been in Africa." The evil was not even confined to handmills. "The fine sand rubbed off millstones," says a German writer of the last century, "is a secret poison, which we would consider to guard against were we not highly neglectful of our health. In one year a ton of sand, which is baked with flour, is rubbed off from a pair of millstones. If a mill grind in a year only 4,385 bushels, and we allow no more than twelve bushels to one person per annum, he swallows in a mouth about half a pound, and in a year about 6 lbs. of pulverised sandstone: which in the course of a long life will mount to upwards of 3 cwt." Still this alarming calculation must proceed on the supposition that the mill in grinding 4,385 bushels wore away one ton, or 2,240 lbs of the millstones: that is at the rate of about ½ lb. of stone for every bushel ground. This is surely scarcely likely to have been the case, and the victims to the wear of millstones could not appear after all to have eaten sand to the extent imagined; as, perhaps, indeed, might be considered self-evident by their attaining "long life."

Albert Nyanza, i. 65.

Orig. Inv.: Beckman: 1797, i. 98.

IV. ROMAN PROCESSES.

3. Sand and Gypsum in Flour.

evidently, from his point of view, an impropriety:—"The meal is sifted into first, seconds, and thirds: but none of these have that whiteness for which the alicia is so distinguished. Accordingly—a most singular fact—chalk is mixed with the meal, which, upon being well incorporated with it, adds very materially to both the whiteness and the shortness, teneritatem, of the mixture. This chalk is found between Puteoli and Naples, upon a hill called Leucogæum (from the Greek, meaning 'white earth'); and there is still in existence a decree of the late Emperor Augustus which orders a sum of twenty thousand sesterces to be paid annually from his exchequer to the people of Naples for the lease of this hill. His motive for paying this rent, he stated, was the fact that the people of Campania had alleged that it was impossible to make their alicia without the help of this mineral." So far as the people of Campania were concerned, the practice of adulteration is proved; and it was therefore not for the benefit of the citizens of Rome that Augustus leased a chalk hill on behalf of the bakers. It should be said that Pliny considered alicia "a most delightful and most wholesome food, incontestably conferring upon Italy the highest credit": and said "the delicacy is, no doubt, also prepared in Egypt, but this is of very inferior quality and not worth notice."

4. Bolting.

Text: Mortars.

The value of sifting, in any case, would early become self-evident. An Egyptian carving in the tombs of Bab-el-Molûk, already illustrated, shews us not only pounders at work, but one of their number definitely engaged in sifting the grain. In

IV. ROMAN PROCESSES.

4. Bolting.

Text: Saddlestones, p. 58.

ancient Greece, though according to Pope Homer says the maids "sifted the golden grain" at the palace of Alcinous, the original text does not bear out the poetic assumption of the translation, and refers, indeed, not at all to grinding or sifting, but to weaving.* Still there is no doubt that the Greeks, like earlier nations, did ordinarily sift fine meal from coarse.

In the earliest Biblical reference to the grinding of grain occurs the expression "fine meal" (Gen. xviii., 6). The term referred generally to the meal or flour of wheat, which would usually be sieved. It is interesting to observe that the word used in the original Hebrew קֶמַח is indicative both of fine flour and meal; being used in the above passage and in Isia. xlvii., 2.

It is evident that fine meal or flour might be produced by the grinding operation alone. Everything would depend upon the manner in which the operation was performed. The women, no doubt, conducted the process with varying degrees of skill and zeal. One would reduce the grain carefully and thoroughly, devoting adequate time and pains to bringing about the best and smoothest flour; while another might hastily and perfunctorily get through the tedious task as rudely and rapidly as possible: producing merely a coarse irregularly ground meal. Here would be perceived a distinction between flour and fine flour, though both were produced by the same single operation of grinding. But the greatest care would usually be exercised with regard to the finest grain, wheat: hence wheaten flour and fine

* Dr. Hayman observes that the simile used by Homer illustrates a rapid motion in working, combined with a fixed position: "the way in which the leaves of the poplar tremble and shew both sides, yet without quitting their hold on the bough, is meant": this being understood to indicate weaving—not sifting. Butcher and Lang translate: "Some of the handmaids grind the yellow grain on the millstone; and others weave webb and turn the yarn as they sit, restless as the leaves of the poplar tree."

Odyss.: 1873, vii. 105.

Odyss.: 1879, vii. 105.

4. Bolting.

flour, in the Old Testament, appear interchangeable terms for the one article. For instance, it was directed that the unleavened cakes used at the consecration of priests should be of "wheaten flour" (Ex. xxix., 2): while among the duties set forth for the Levites to observe was the charge of the "fine flour for meat offerings and for the unleavened cakes" (1. Chron. xxiii., 29). So far as Biblical evidence goes we may, in short, be justified in considering "fine flour" to be well-ground wheaten flour after being put through the best process of bolting or sieving of which the Hebrews had any knowledge. It was fine flour—wheaten flour—which, in the solemn meat offerings in the Temple, were to be devoted to the service of God: and while such offerings were strictly enjoined, it is impossible to imagine any devotee presenting, as his rendering of the term, rye or barley meal, or anything but the best flour he could obtain, sieved wheaten flour. "When anyone will offer a meat offering it shall be of fine flour" (Lev. ii., 1): "the fine flour for the meat offering and the unleavened cakes" (1. Chron. xxiii., 29): "a meat offering with oil to temper with the fine flour" (Ezek. xlvi., 14). Even in the case of a man, "if he be poor," the offering was still of fine flour, though in reduced quantity (Lev. v., 11: xiv., 21: Nu. viii., 8): while, again, the meat offering of Aaron's sons should be of fine flour (Lev. vi., 20). For all these important ceremonials wheat flour was the only adequate offering: and that it really was bolted wheat flour seems apparent. Apart from the subject of offerings, there are various other references to fine flour, attributing to it a degree of preciousness that would very imperfectly be applicable to rye or barley meal.*

* For the elucidation of the original Hebrew quoted in the foregoing, we are indebted to the courtesy of the Rev. S. Friedeberg, Liverpool.

IV. ROMAN PROCESSES.

4. Bolting.

In Rome, shortly before the Christian era, Virgil describes the peasant in *Moretus* sifting his meal;[1] and towards the close of the first century, A.D., sieving, then a very ordinary process, is frequently mentioned by Pliny: the aim now being not merely to eliminate the sand resulting from grinding, but to produce distinct grades of flour. There were various kinds of sieves. "The Gauls were the first to employ the horse-hair bolter; the Spaniards make their sieves and meal dressers of flax and linen, and the Egyptians of papyrus and rushes." The value of bolting is illustrated by the remark:—"the excellence of the finest kinds of bread depends principally on the goodness of the wheat and the fineness of the bolter." Pliny mentions several applications of the process, one of the most interesting being that for making spurious African alicia.

[1] Text: Querns.

Nat. Hist.: xviii. 27, 28.

Pisunt cum arena, et sic quoque difficulter deterunt utriculos, sitque dimidia nudi mensura. Posteaque gypsi pars quarta inspargitur, atque ut cohœsit, farinario cribo succernunt. Quæ in eo remansit, exceptitia appellatur, et grandissima est. Rursus quæ transit, arctiore cernitur, et secundaria vocatur. Item cribararia, quæ simili modo in tertio remansit cribro angustissimo et tantm arenas transmittente.

Nat. Hist.: xviii. 29.

They pound the grain with sand: and the husks are thus, though with difficulty, removed; the grain being then only one half its former measure. Subsequently gypsum in the proportion of one fourth of the quantity of meal is spread among it, and, when the whole is thoroughly mixed, the bolting of the flour follows. What first remains in the sieve is the refuse, and is called the excepted or rejected part of the grist, and exceedingly coarse it is. Afterwards that which has passed through the sieve is sifted again, and the finer product is called seconds. The cribaria, or pure sieved flour, is that which, in a similar way, is passed through a sieve of the most perfect fineness. In this general manner are the sands eliminated.

As to the method of sifting wheat, Pliny says:—From one modius of the grain there should be extracted four sextars of bolted flour, half a modius of white meal, four sextars of coarse meal, and four sextars of bran:—a specification which illustrates the completeness with which grading was carried

Nat. Hist., xviii., 20.

IV. ROMAN PROCESSES.

4. Bolting.

out, and the full knowledge of fine flour, fine and coarse meal, seconds, and bran which the Romans possessed. Increased price, due to bolting, is also suggested by our author, who observes, "when the prices of grain are moderate, meal sells at forty ases the modius, bolted wheaten flour at eight ases more, and bolted flour of winter wheat at sixteen ases more." In Pliny's term 'flos' or 'flower,' *i.e.*, the produce of the best winter wheat, we may note the origin of our English word "flour."*

5. Washing and drying grain.

Among the Romans the process of washing wheat and other grain, was followed by drying it in the sun previous to grinding. Pliny frequently mentions sun drying before grinding. Of sesame, a white grain, for instance, he says:—"sesame should be first steeped in warm water, and then laid out to dry, after which it should be rubbed out briskly, and then thrown into cold water, so that the chaff may be disengaged by floating to the surface; and the grain should afterwards be spread in the sun to dry." Drying in the sun was also the usual preliminary to storing, and seems to have been universally adopted later throughout Europe.†

Nat. Hist., xviii, 23.

The grain was ordinarily moistened with fresh or salt water before being ground, as in one of the methods of adulteration described by Pliny:—"They

* The original word "flower," as applied to ground wheat, is said to have prevailed in the north of England till about 1609, still we have observed it in a milling deed at Clithero Castle, entitled "Farm of a toll called Flower Toll," dated 1660. But it was already practically obsolete when, in 1560, the Geneva Bible appeared, containing the word 'flour;' not to mention 1611, when the Authorised Version was issued with the same word 'flour' again in use. This modern form of the word seems however, to be of ancient origin. The 14th century customs of London, cited in *Liber Albus*, contain an enactment prohibiting bakers from selling brown flour for making best cakes, or in any other way misrepresenting the quality of their flour; and though this is compiled in Anglo-Norman, the one word in question is not written 'fleur' or 'fleur de farine,' but 'flour,' the ordinary popular designation of the article at the time:—Nulle pestour qi fait payn tourte vend sa *flour* as kens pur pastes faire, neu altre manere oustee la *floure* au perille qappent.

† Olaus Magnus describes the system in operation among the nations of Northern Europe:—Diebus calidissimus servente sole, pannos instar velorum navalium, ac desuper torrendam frugem diebus sex, vel pluribus ac pauciorib. juxta solis ardorem imponunt. Deinde eam purgatam in quercinis repositoriis

De Gent Septen: 1567, lib. xiii.

IV. ROMAN PROCESSES.

5. Washing and drying grain.

pick out the whitest and largest grains of wheat and parboil them in earthern pots: after which they dry them in the sun till the grains have regained their original size: then they are lightly sprinkled with water and ground in a mill: rursusque leviter aspersa molis frangunt." Salt water was occasionally employed for the purpose. "The wheat of Clusium and Arretium, if converted as much as possible into fine flour, will yield to the modius 16 lbs. of white bread, and three pounds of seconds, with half a modius of bran. The differences depend very materially upon discrimination in the grinding, molæ discrimine hoc constat: when the grain is ground quite dry, it produces the more meal: when sprinkled with salt water it yields the whiter flour, though, at the same time, more bran."

Nat. Hist., xviii., 29.

6. Parching grain.

With this concluding era of the ancient system of grinding, we perceive still to be actively employed, in various methods as best adapted to the variety of grain to be reduced, the ancient preliminary of parching. Pliny, in passages to be quoted shortly, tells us that the hard husked grains, such as spelt and millet, with lentils and leguminous foods generally, were parched; whilst wheat and barley were reduced without undergoing that process. Varro, about a century earlier than Pliny, had mentioned wheat being parched and ground in the

collocant, vel in farinam redactam simili custodia servant, multosque in annos sic torrefacta, integritate salva perdurat. Attamen si molita farina non sit, sed fruges, expedit ut interim soli objiciatur semel in anno retorrenda: eoque modo nova fruges tosta, poterit illi, ne deficiat quoties opus fuerit, sagaciter commisceri. Farina in quercinis vasis, aut cupis forti ligneorum malleorum impulsu intrusa, locus sicco reposita, sine quacunq. vermium corrosione pluribus annis durare solet.

On very hot days the heat of the sun is utilised. The grain is laid on cloths like the sails of ships for six days, or more or less according to the heat of the sun. After being cleaned it is gathered into oaken repositories, or is reduced to flour and then garnered. When so dried it will keep sweet for several years. Nevertheless, if the grain has not been reduced to flour, it will be necessary once a year to re-torrefy it in the sun, care being taken, as often as this is done, to diligently mingle the grain together. Flour packed and beaten down in oaken chests or cases of strong wood and stored in a dry place will keep free from any vermin for many years.

IV. ROMAN PROCESSES.

6. Parching grain.

Re Rustica, i., 63, 69.

Text: chap. i.

bakery: frumentum in pistrino pisatur ac torreatur: and that suitable winter food was parched in the bakery and readily cooked: messum far promendum hieme in pistrino ad torrendum, quod ad cibatum expeditum esse velis. Two of Virgil's allusions to parching grain have already been incidentally quoted. Ovid, referring to the Vestalia, says peasants in former times used to parch their spelt in ovens, and hence arose the rites of Vesta, goddess of the kilns:—

Text: Vestalia: Cattle Mills, Fasti, vi., 345.

> Sola prius furnis torrebant farra coloni:
> Et fornicali sunt sua sacra deæ.

The custom of parching was, indeed, as old as the mortar. When the manna was discontinued, the Israelites "did eat of the old corn and parched corn" (Josh. v., 11): one of the offerings comprised "green ears of corn dried by the fire, even corn beaten out of full ears" (Levit. ii., 14): Boaz presented parched corn to Ruth: and Jesse sent an ephah of the same to his son in the camp of Saul.

Like many other processes the parching was, no doubt, always conducted very much in the same manner. The Biblical dried corn beaten out of the full ear, and the spelt, which Pliny says is "parched by the fire" and is "parched in the ear," were, probably, subjected to the same simple operation as grain, in the 18th century, in the remote parts of Scotland and Ireland. "A woman sitting down in the field takes a handful of corn, holding it by the stalks in the left hand, and sets fire to the ears, which are presently in a flame. She has a stick in her right hand, which she wields very dexterously, beating off the grain at the very instant when the husk is quite burned: for if she misses that she must use the kiln. But experience has taught her the art to perfection: and the grain may be so dressed, winnowed, ground, and baked within an hour after reaping." This was the 'graddan' process,

Nat. Hist., xviii., 10, 23.

Western Islands: Martin: 1703, 204.

6. Parching grain.

said to be so termed from 'grad,' signifying quick: in allusion to the necessity of speedy watchfulness in breaking off the grain at the right moment. A variation in Scotland, known as the 'burstin' process, consisted in drying the corn to the point of roasting, in a kettle over a fire, or among hot stones on the ground. This ultimately supplanted the former system about a century ago. "In the island of Rum, where there is not a single mill, all the molinary operations are done at home. The corn is graddaned or burnt out of the ear, instead of being threshed. This is performed in two ways: first, after cutting off the ears and drying them in a kiln, they are fired on a floor; the grain, then as black as coal, being picked out of the ash. The other is the more expeditious, for the whole sheaf is burnt: but this is a most ruinous practice, and, in some places, has been widely prohibited."

Past in Present: Mitchell: 1878, 46.

Lond. Mag., 1774, 333.

CHAPTER V.

THE QUERN.

V. THE QUERN.

1. Identification of the Roman.

THE quern, an Italian contrivance apparently not known till about 2,000 years ago, constituted the earliest complete grinding machine; the first in which the parts were combined into a perfect mechansim; and from its advent corn milling was no longer conducted by mere loose stones. The quern is distinguished from the more primitive corn stones primarily by its circular motion: the upper stone revolving upon or with a pin upon the lower. It is already stated that as we consider the Romans distinguished the saddlestone, with its direct backward and forward action, by the term 'mola trusatilis,' the thrusting mill, so we conceive they characterised the rotating quern by the designation 'mola versatilis,' the revolving mill. The distinction seems not to have been observed by archæologists; and, indeed, much confusion in both ancient and modern times has arisen from the saddlestone not being included among Roman milling appliances, and from both of the above terms being consequently regarded as applying to one form of mill, and that the quern. Before the invention of the quern there was but one 'mill' (mola) known to the Romans, the saddlestone: the mortar not being called mola, but simply 'mortarium,' and the earlier pounders merely 'saxa' or stones. When the quern, a new type of 'mill,' was introduced, it became necessary to distinguish it from the old

Text: Saddlestones, p. 66.

V. THE QUERN.

1. Identification of the Roman.

appliance: hence seem to have arisen the designations 'mola trusatilis' for the old direct thrusting saddlestone, and 'mola versatilis' for the new revolving quern; and it is the fact that at the period when the quern was coming into use, these two designations were duly employed by Roman writers; Cato, for instance, mentioning the former and Varro the latter.

Text: p. 131.

Before describing the quern, it is necessary to assist in its identification by some little reference to one or two of the more prominent instances of the confusion that has prevailed on the point; and we may commence with the writer whose error seems to lie at the root of the trouble. This is Aulus Gellius, who flourished about 150 A.D.: a writer not of the first rank of classic authorities, and in this case a misleading guide. In the passage already mentioned with reference to Plautus labouring at the mills, about 200 B.C., Gellius remarks:—ad circumnagendas molas quæ trusatiles appellantur, operam pistori locasset: at the revolving mills, which are called trusatile mills, he placed himself at the labours of the bakers.* In stating that revolving mills were called trusatile mills, Gellius, who lived over three centuries after the time he speaks of, seems to be in error.

Text: Mortars: p. 99.

Various late writers have seriously discussed the question as to the difference between the trusatile and the versatile mill. Hoheisel (*De Mol. Man. Vet.* 1728 i., 4) and Goetius (*De Pistr. Vet.* 1730 i., 13) have followed the earlier Heringius in the conjecture: altogether failing to identify the 'trusatile mill' the ancient saddlestone, but succeeding in

* Sed enim Saturionem et Addictum et tertiam quendam cuius nunc mihi nomen non suppetit, in pistrino eum scripsisse Varro et plerique alii memoriæ tradiderunt, quam pecunia omni quam in operis artificum scæniorum pepenerat in mercationibus perdita inops Romam ridisset, et ob quærendum victum ad circumnagendas molas quæ trusatiles appellantur, operam pistori locasset.

Noctes Atticæ: Florence, 1513, iii., 3.

V. THE QUERN.

1. Identification of the Roman.

recognising the 'versatile mill' as the quern which, of course, was common enough in their own day :—

De Molend: Heringius: 1663, v., 102.

Molam vero versatilem judico quæ non trusa manibus sed circumnacta versatur, quam propterea Virgilius in Moreto opus versatile adpellet.

The versatile mill I judge to be not that which is thrust, but made to turn round by hand: such a mill as that which Virgil in Moretus calls a versatile utensil.

This seems to be a sound decision. In fact, Virgil's distinct application of this term to a quern, shortly to be quoted, forms the earliest definite clue we possess as to the true meaning of 'mola versatilis.' Yet, notwithstanding this we find Gabriel Brotier, in the 18th century, in his annotations upon Pliny, conjecturing that the mola versatilis which that author mentions, was a revolving grindstone for sharpening knives and ploughshares :—Quarum circumnactur cultri ac novaculæ acuuntur. The same idea is pursued in one of our standard dictionaries of antiquities; wherein not only are the revolving mills of Pompeii (mere huge querns) called molæ trusatiles, *i.e.*, thrusting mills: but the quern itself, the actual mola versatilis of Virgil, Pliny, Livy, and others, is said to be probably a grindstone for sharpening tools, but might be a corn mill.

Brotier's Pliny, xxvi.

Grk. & Rom. Antiqs.: 1884: 428, 429.

These perpetuated errors may, however, be avoided by the insertion of the saddlestone among Roman handmills; a definite meaning being thus gained for 'mola trusatilis;' while the designation, 'mola versatilis,' is left free to apply to the revolving quern.

2. Earliest allusions to.

From the foregoing it will be evident that the quern is to be ranked as the product of the civilisation of the Roman age, probably not earlier than the 2nd century B.C. This view rests upon the facts that it is not till about that time that the quern is heard of: that it is then found in existence in Italy, and that subsequently it is found throughout the hemisphere.

V. THE QUERN.

2. Earliest allusions to.

Moreover, so far as we are aware, among the thousands of relics of the older pounders, saddlestones and mortars discovered over the greater portion of this side of the globe, no undisputed fragment of a quern older than about a century B.C. has ever been found. Querns are, indeed, discovered in many prehistoric and pre-Christian settlements throughout Europe; still, as has often been proved, these settlements have been inhabited through a long series of ages by successive races; and if the earliest settlers left there the pagan pounder and saddlestone, it seems to have been the latest dwellers who, in Christian times, left the quern. A further consideration appears in the fact that while what handmills there were abound in the ancient writings; no early Greek writer mentions the quern, and no Roman writer, till about 200 B.C., mentions a revolving mill. The earliest allusion to such a contrivance seems to be made by Cato (232-147 B.C.), who includes, among farming effects, the ass mill and the trusatile mill:—molas asinarias unas et trusatilis unas: the latter being the saddlestone, and the former a revolving quern driven by an ass. Varro (116-27 B.C.), who also speaks of ass mills, mentions a certain "mill" as being superior to the trapetium for bruising olives; and it is evident from the remarks of the later Columella upon this mill (as quoted shortly) that it was either a handquern or an ass mill. Thus, practically, before we obtain any actual indication of the handquern being in existence, evidence of the ass-driven quern mill appears. Still, the latter was, perhaps, a development of the former; there is little doubt that it was with comparatively small stones, capable of being turned by hand, that rotatory motion was first attempted, and that its success led to ideas of enlarging the mill and obtaining increased power by employing animal labour. The

Re Rustica, x., 4: xi., 4.

Re Rustica, i., 19: i., 55.

Text: p. 135.

V. THE QUERN.

2. Earliest allusions to.

occurrence of ass mills in the time of Cato, or about 200 B.C., is, therefore, inferential evidence of the contemporary existence of the hand quern. It seems then to have been of but recent introduction.

3. Invented by the Volsinians.

Varro (116-27 B.C.), as Pliny says, makes the important statement that "revolving millstones were invented by the Volsinians," to which Pliny adds the remark, "among prodigious things we find millstones that move spontaneously:"—Molas versatiles* Volsiniis inventas, aliquas et sponte molas invenimus in prodigiis. Beyond this bare remark nothing is known as to the place of origin of the quern, or the ingenious people who devised the idea of abolishing the alternating action of the saddlestone for the continuous revolution of the quern. It was this simple change, however, which revolutionised classic milling, just as it remained the essential principle of every later form of mill down to the rollers of our own day. The Volsinians, credited with the invention of so notable and radical an improvement, were citizens of Volsinii, one of the most powerful of the cities of Etruria, which at the close of a series of severe conflicts with Rome, was captured and destroyed about 280 B.C. The subjugated people were highly civilised as compared with their conquerors; and the latter, who entertained a vast and almost superstitious veneration for them, were wont to credit them with more wonders than even the quern stone, which turned spontaneously, as Pliny had heard. The Volsinians were permitted to erect a new Volsinii at the foot of the hill whereon stood their destroyed city. Here (on the site of the modern Bolsena) they continued vassals of Rome;

Nat. Hist.: xxxvi. 29

* Bostock and Riley translate 'molas versatiles,' in this passage, merely as millstones, causing the passage to read "molar stones for grinding are found at Volsini," and omitting all consideration of the qualifying term indicating motion, which it is needless to say, could not apply to rocks in quarries.

V. THE QUERN

and here may have invented the revolving hand quern, if not the ass mill, which, at about this time, first appeared in Roman literature.

3. Invented by the Volsinians.

The honour attributed by Varro and Pliny to the Volsinians, seems to be somewhat overclouded by a statement of Pomponius Sabinus, who refers the invention of the quern to Cappadocia. Sabinus flourished at as late a period as 1450; and the remark in question occurs in his commentary upon Virgil who, as will be seen, mentions the quern. In one comprehensive assertion he remarks:—Usus molarum ad manum in Cappadocia inventus: inde inventus usus earum ad ventum et ad equos: The use of handmills was invented in Cappadocia, where also were invented the windmill and the horse mill. Sabinus seems not to produce the slightest authority for the statement, and its evident inaccuracy (which is discussed in another volume) is apparent from the declaration that windmills also were invented in Cappadocia. His term 'handmills' refers, of course, to the quern so well known in his own day.

Virg. Op. Comment; 1544.

Text: Windmills.

4. Virgil and the quern.

Virgil (70-19 B.C.), actually the contemporary of Varro, distinctly refers to the quern. In *Moretum*, we have had the peasant depicted pounding a salad in a mortar: after that task is accomplished he grinds grain in a quern:—

Text: Mortars.

Fusus erat terra frumenti pauper acervus;
Hinc sibi depromit, quantum mensura patebat,
Quæ bis in octavas excurrit pondere libras.
Inde abit, adsistique molæ: parvaque tabella,
Quam fixam paries illos servabat in usus,
Lumina fida locat: geminos tunc veste lacertos
Liberat, et cinctus villosæ tergore capræ,
Præverrit cauda silices graniumque molarum.
Advocat inde manus operi, partibus utrinque:
Læva ministerio, dextra est intenta labori:
Hæc rotat assiduis gyris et concitat orbem.
Tunsa Ceres rapido filicum decurrit ab ictu.
Interdum fessæ succedit læva sorori,
Alternatque vices. Modo rustica carmina cantat,
Agrestique suum solatur voce laborem.

. . . .

Op. Virg. Manilli: 1783, ii, 50.

V. THE QUERN.

4. Virgil and the quern.

Postquam implevit opus justum versatile finem:
Transfert inde manu fusas in cribra farines,
Et quatit. At remanent summo purgamina dorso:
Subsidit sincera foraminibusque liquatur
Emundata Ceres.

Upon the floor of the cottage is piled a little heap of grain: and hence he takes a measureful of twice eight pounds in weight to supply the mill. Upon a small table, fixed upon a trestle, he places the trusty light. Baring both his arms from their coarse vestment, and girding his cloak of rough goatskin round his waist, with the skirt he brushes the stones of the flour-dusted mill. The labour begun, both hands share in the toil; the left supplies the grain, the right assiduously turns the circling orb. Ground by the repeated shock, the fine film of flour flies from the crushing stones. Ofttimes his sister with her left hand shares the weary toil, and alternately thus they work: as meanwhile he, with rustic song, the task beguiles. . . . The revolving work being now fully completed, the meal to the handsieve is transferred and bolted till only the true pure flour remains.

Georg. i., 275: Beroaldi, 1529.

Virgil, elsewhere, refers also to the dressing of quern stones. The peasant goes to market with his ass, laden with oil or apples, and returns home with the revolving chiselled or cut stone: lapidemque revertens incusum. The word 'incusum' literally conveys the idea of a continual beating or picking or hammering into shape, as a blacksmith works iron at the incus or anvil. Servius, the ancient commentator of Virgil, has annotated the passage:—manuale molam cudendo asperatum, the handmill sharply or distinctly cut. Virgil's reference was thus, apparently, not merely to a quarried millstone, but to one that had been dressed—either picked or grooved—and fashioned for use. His allusion to asses carrying produce to market and returning laden with millstones (querns), we, this year, observed literally endorsed by a similar custom prevailing at Tangiers.

5. The handmill of the civilised world.

We may now pass to a description of the quern known to the Romans—the perfected handmill of the civilised world in the Christian era—the familiar machine which, about the year 30 A.D., rendered realistic the warning, "Two women shall be grinding at the mill: the one shall be taken and the other shall

V.
THE QUERN.

5. The handmill of the civilised world.

The Roller Mill, Buffalo, N. Y.

be left"*—the useful appliance which endured two thousand years in the homes of the people of Europe, Asia and part of Africa; but apparently never reached America or Australiasia, which the Romans never knew.

6. The Roman quern.

Text: p. 131.

Early in the Christian era the quern was in common use in Rome. About the year 42 A.D. Columella enables us to identify the "mola"—which Varro about a century and a half earlier had preferred for crushing olives—as a quern. This "mola," says Columella, is preferable to the trapetum (a mill with vertical stones, something like a modern cement mill), since it possesses a contrivance for adjusting the bruising stone to the exact size of the olives, and enables the flesh of the fruit to be crushed without

* It will be noted that in this passage (Matt, xxiv., 41) the original reads, "Two shall be grinding," the word "women," in accordance with the known custom, having been supplied by the translators. On the other hand, the similar expression in the preceding verse, "Then shall two be in the field: the one shall be taken and the other left," has, on the contrary, been left in its original vagueness to apply to either men or women. The early 14th century Wyckliff translation adopts "quern" for "mill" in the passage—"Tweine wymmen schulen ben gryndynge in o querne, oon schal be taken and the tother lefte,"

V. THE QUERN.

6. The Roman quern.

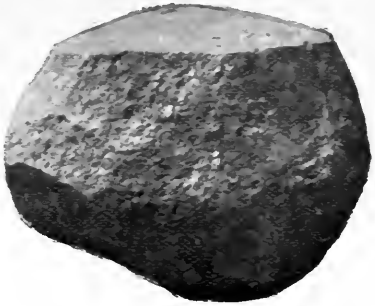
the stones being broken and the oil deteriorated:—Molæ quam facillimam patiuntur administrationem: quoniam pro magnitudine baccarum vel submitti vel etiam elevari possunt, ne nucleus qui saporem olei vitiat, confringatur. The arrangement for raising and depressing the upper stone was characteristic of a quern; and though Columella says the trapetum was susceptible of a similar arrangement, he proves that the olive "mola" was a quern. This inference has, indeed, already been made by Rich, who also describes and illustrates the trapetum.

Re Rustica, xii., 50.

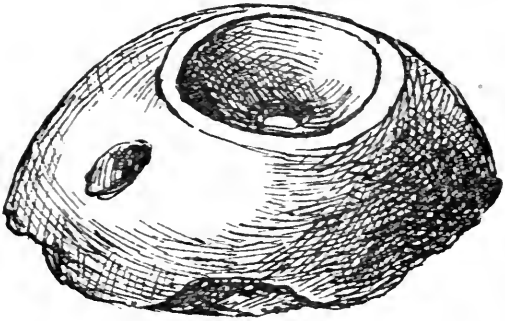
Greek and Roman Antiq., 430, 682.

In describing the ancient quern it is necessary to utilise illustrations of specimens found in Britain. Relics veritably found in or near Rome appear to be exceedingly scarce. Doubtless the old stones were rarely, if ever, preserved; and in later times if even their remains were unearthed among architectural ruins, they have been rarely, if ever, collected. Still, since we find everywhere where Roman influence and customs penetrated, the quern of the early period to be of the one invariable type; and, further, as this is in principle identical with the large slave mill of Pompeii (modelled from the quern), there is no doubt that the one type of this machine everywhere originally prevailed. The early quern differed from the modern in appearing somewhat globular in form. The crude idea seems to have been that the ground flour must be provided with a downward flow to enable it to fall from the stones; hence the lower stone was made almost conical in form, as seen in the slave mills of Pompeii. As the true principles of the working of the appliance became recognised, however, the stones seem to have been gradually flattened. The extreme conical form of the lower was reduced to a slight convexity, as seen in a Roman specimen from North Wales included in the collection of Mr. Bennett, Later still even this

6. The Roman quern.



moderate tapering of the surface disappeared, and a great proportion of our early querns are found with the grinding surface perfectly flat. The upper stone, originally sharply convex inside, to fit on the lower, of course went through mutations corresponding to those of the lower, till its grinding surface, ungrooved and merely roughened by the texture of the stone, was also perfectly flat. The numerous relics of this form of quern found throughout the ancient Roman world may be illustrated by two specimens preserved in the Museum at Chester; both being upper stones



showing the central aperture or hopper for the supply of grain, and the small drilled hole at the side for the insertion of the handle. In a perfect specimen of such an upper stone as the above has been, found in a bog near Kilkishen and now in the collection of Mr. Bennett, the lower face of the stone is not grooved, and is almost, if not quite,

V. THE QUERN.

6. The Roman quern.

flat. As usual in these local specimens, it is of yellow grit, and measures 7 inches high and 10½ inches in diameter. The stone is drilled through at the top into a kind of funnel: the grain being placed in this as in a hopper, and percolating thence gradually as the upper stone was revolved, into the space between: the meal, on being ground, escaping, in due course, from between the edges.

7. Period of introduction into Britain.

The approximate period of the introduction of the quern into Britain evidently appears, from what has already been stated, to have been not earlier than the Roman occupation; and thus as the period of early implements is ordinarily recognised by the discovery of bronze or iron weapons, so may the era of certain British settlements be decided by reference to their querns. Owing to the lax manner in which the term 'quern' has in modern times been caused to include any kind of ancient grain stone, it is frequently impossible to discover from the descriptions afforded, whether in any certain prehistoric excavation it may be a quern, an earlier saddlestone, or a still earlier crusher which has been so found. But in cases where there is no such doubt, it seems to be evident that settlements, huts, forts, or graves in which veritable quern stones are discovered are not earlier than the Roman period, and may be considerably later.

Brit. Asstn. Rep 1896, 656.

The exploration of the British Lake Dwellings at Glastonbury, now proceeding, may perhaps afford some tangible evidence on this novel point. Among numerous relics of iron, glass, pottery, &c., discovered there, were the wooden handle of a quern, stones of querns, and also the earlier saddlestone. From sketches kindly made for us by Mr. A. Bulleid, secretary of the Exploration Committee, the identity of the querns in this case is fully established; and according to our theory, therefore, the settlement was inhabited after the Roman occupation.

7. Period of introduction into Britain.

The Roman legions who accompanied Julius Cæsar to Britain doubtless carried some form of mealing stone with them. As this event took place about the time when Virgil describes the quern in use in the cottage of the peasant, the mills of Cæsar's troops may have been querns. At all events, the soldiers led by later emperors are proved to have been provided with them, fragments being still found in various parts of the kingdom. One bearing the well-marked radial grooves, discovered on the line of the Roman wall, near Camelon, now preserved in the Scotch Museum, is encircled by an iron band with a loop attached, possibly used for turning the upper stone instead of a handle; and an engraving of a similar specimen appears in Stuart's *Caledonia Romana*, pl. xiii.

Prehist. Scot.: Wilson, 1851, 152.

8. The 'mola versatilis' becomes the 'quern.'

With the spread of the quern to Britain, Gaul, and Europe generally, the ancient Roman name of the appliance, 'mola versatilis,' gave way to the universally popular designation, 'quern.' This term was anciently the Teutonic equivalent of the Latin 'mola,' and meant, like it, a mill, which at that time among the northern races was of course either a saddlestone or a quern. The word extended throughout the continent, appearing as cweorn (Anglo-Saxon), kweern (Dutch), quirn (Old High German), kvern (Icelandic), qvarn (Swedish), qvœrn (Danish), &c. These modifications of the one radical term exist at the present time, and, as in the case of the Anglo-Saxons, may possibly be traced back in the literature or laws of most nations to about a thousand years ago. The Saxons, indeed, used the term 'quern' in preference to 'mola' to mean a water mill: thus occur 'cwyrn-burne,' a millstream; 'cweorn-bill,' a mill pick; 'cweorn-teth,' mill cogs.

9. System of grooving.

An early and notable improvement was the grooving of the grinding faces. The edges of the

V. THE QUERN.

9. System of grooving.

grooves were now made to effect the grinding, while their hollows secured free transit of the meal to the rim of the stones; and, though the true methodical system of furrowing was not fully developed till water mills came into use, still numerous specimens of British querns prove that in these early hand-machines grooving was regularly and thoroughly, if rudely, adopted. A typical specimen of this class of quern, included in the Anglo-Roman collection at the British Museum, is an upper stone, measuring

about 20 inches in diameter: its lower face being very regularly grooved in sections of five furrows each, though not quite so clearly cut as the drawing suggests; the countersunk hollow for the reception of the rynd (used to support the spindle), being also provided in an extremely perfect fashion.

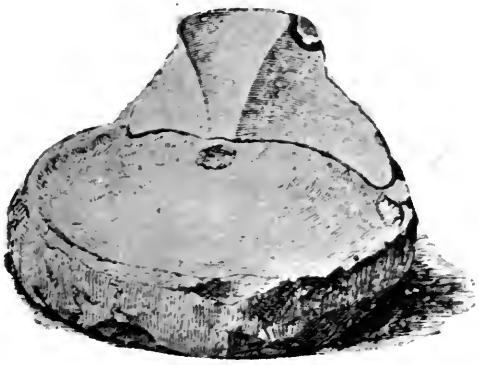
10. British types.

Illustrative of the gradual flattening of the shape of the stones is a specimen found at Truen, Cornwall, which embodies the rudiments of the best characteristics of modern millstones. This example, now in the museum of the Penzance Archæological Society, was discovered in the excavation of a circular entrenchment, lying near a pavement of broad unhewn stones. The interesting point in connection with it is that (as in modern millstones) the stones approach each other only at their circumference, so that when mounted they would only grind near the edges. In the centre of the faces of the stones was provided, beneath the exit from the hopper, the open annular space which in modern times was known as the 'bosom.' The grain being first received in this space was gradually drawn towards the circumference by the revolution of the top stone, being by degrees first crushed, and then ground and ejected from the mill.

Arch. Camb., 1857, 365.

An interesting specimen of a transitional type was discovered in situ in one of the chambers of the British settlement at Porth Dafarch, Anglesea. The lower stone was found fixed to the floor, apparently in its original position where it was last used in the dwelling, and a portion of the upper stone was lying in the debris near it. In this fragment is perceived

Arch. Camb., 1878, 31.



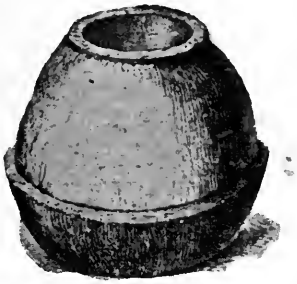
V. THE QUERN.

10. British types.

a segment of the deep hopper. By a bronze brooch discovered near the dwelling the specimen is ascribed to the later Romano-British period.

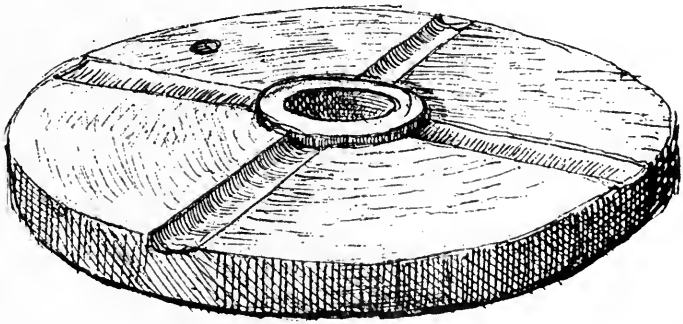
L. & C. Hist. Soc., 1848, pl, p. 53.

A common form of Anglo-Saxon quern is of the type of an example found near Wigan in cutting the Liverpool and Bury railway: the handle (usually absent from the relics) being still left in its small socket, which, in our illustration, is on the right hand side of the stone.



11. Decorated with crosses.

One of the earliest forms of ornamentation was a cross carved on the top of the upper stone. An extremely elementary instance of this decoration appears upon one found in cutting the Barton section of the Manchester Ship Canal, and preserved at



Owens College. Though the slightly-raised moulding surrounding the mouth of the hopper is fairly well cut, the cross markings are mere roughly-incised groovings, not so clearly marked as in the drawing.

V. THE QUERN.

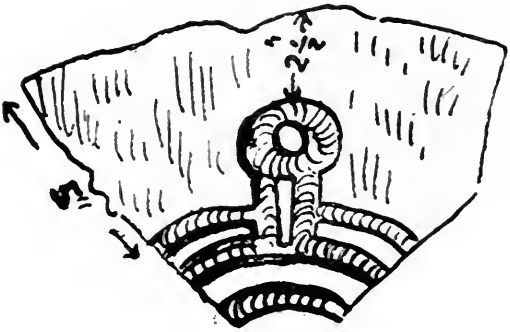
11. Decorated with crosses

The same primitive form of cross appears also upon a specimen found in the crannogs of Drumgay Lake, Enniskillen.[1] Later querns so marked are popularly known as "church querns," and considerable care and taste have often been devoted to the carving of the sacred symbol upon them. An excellent specimen,

[1] Trans. R.S.A.I, xi., 310.

carved in high relief, is in the museum of the Royal Irish Academy, Dublin, from whose excellent catalogue, by Sir W. R. Wilde, this illustration is taken. Near the socket for the handle is a curious small slot, of the purpose of which we are unaware; the same peculiarity appearing in a fragment of a ridged quern recently found in county Clare, as shewn in a sketch forwarded to us by Mr. T. J. Westropp, librarian of the R.S.A., Ireland. This specimen, which was

R.S.A.I., 1895, 179.



V. THE QUERN.

11. Decorated with crosses.

recently found by Mr. Westropp at a farmer's house, was considered by Dr. Munro, of Edinburgh, and Professor Boyd-Dawkins to be an unusually interesting and early example of the Irish quern. An extremely curious instance of this style of decoration appears in an example provided with holes for two handles, discovered at Rathlin; small crosses and

Trans. Lond. & Midd. A. S., iv., 124.

interlacing knots covering the entire face of the top stone. Various modifications of the cross are illustrated upon examples of querns found in Ireland, where this style of decoration appears to have been extremely frequent. A quern found at Clonmacnoise,

R.S.A.I., xi., 559, xii., 205, 322.

R.S.A.I., iii., 296.

11. Decorated with crosses.

bearing an elaborate carving, which at one side is of classic design and at the other of considerably ruder pattern, is remarkable for an incised cross and the inscription "Sechnasach." This stone is thought by Dr. Petrie to have been utilised as a monument and inscribed with the name of the deceased, whom he considers probably to be "the priest of Durrow," whose death is recorded in the year 928.

Eccl. Hist. Ireld., 342.

Despite the popular belief in the ecclesiastical origin of cross querns, some Irish archæologists are of opinion that many of the crosses found on querns are identical with those common pagan representations of a cross which are found in various parts of the world; and that the querns in question are, therefore, of older date than the introduction of Christianity into these islands in the fifth century. Still, it is not unlikely that a later and Christian origin of these carvings upon the treasured handmills of old may be adduced. It appears to have been a quern so marked, to which Adomnan, abbot of Iona (679-704) refers in his life of St. Columba, in mentioning a cross upon a grinding stone—in molare lapide; for at that date there were no millstones sufficiently large to serve as the base for supporting an actual monolithic cross, unless a very small one indeed. The saint is stated to have himself worked with the quern when studying with St. Finian: every night it fell to his share to grind the corn; and so expeditiously was his task always accomplished that his companions used to allege he had the assistance of an angel in turning the stone. Querns in monasteries and convents were, of course, very ordinary appliances: and were there frequently regarded with feelings of veneration as well by the religious recluse as by the rural peasant who, at a distance, emulated his philosophy and devotion. Sometimes the toil of grinding with the quern was one of the self-imposed

V. THE QUERN.

11. Decorated with crosses.

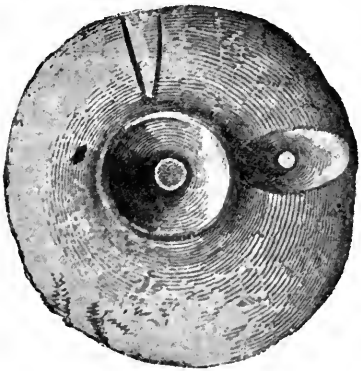
tasks of penance which saints, monks and nuns gladly endured. St. Germain, Bishop of Paris, never ate bread not made from wheat ground by himself. Saint Radegunda (c. 550), in her convent, loved to keep beside her souvenirs of her home, including a quern; and regularly ground the grain for her own bread. At Poitiers are still shewn as relics some fragments of the stone thus turned for years by the pious queen and saint: of whom her irate husband, King Clotaire, had once declared "C'est une nonne, non une reine," which indeed was true. But whatever be their origin many of the crosses on mediæval querns are probably, however, mere conventional ornaments considered appropriate to the stones by religious sentiment and long custom.

Hist.: Vie. Pr. Fr., d'Aussy, 1792, i., 66.

Hist. Fr.: Durny: 1888, i., 118.

12. Other decorations.

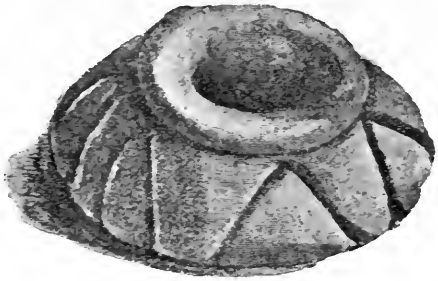
Other forms of ornamentation than the cross are found. One of the earliest attempts at decoration is shewn in an Irish specimen, in which the rim of the hopper, and a hollow surrounding the socket, are rudely moulded. From this elementary form of artistic ornamentation, however, the appliance very early



emerged. A Welsh specimen, found at Rhyddgaer, Anglesea, bears a zig-zag pattern: the hopper and, indeed, the entire fashion of the stone, being also very primitive. Another found in the same locality

Arch. Camb., 1861, 38.

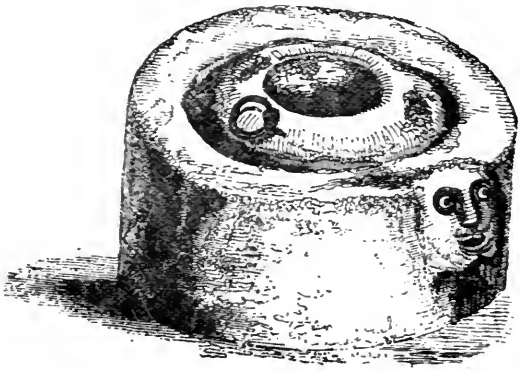
12. Other decorations.



is richly decorated with a volute carving, while the hopper is shaped with considerable elegance. Other rare forms of ornamentation appear in a specimen

found near Stranraer, and upon a stone of mica shist found at Roy Bridge, Inverness, carved with a tribrach. One of unusually large size, found at

Soc. Antiq. Scot.: 1873, 173, 1886-7, 16.



V. THE QUERN.

12. Other decorations.

Prehist. Scot.: Wilson, 152.

Gladsmuir, East Lothian, is decorated with a mask. It is a pot quern which had been turned by two handles; but these have disappeared, and the iron ring is merely an addition by a modern owner, who used to tether his horse to the stone at a farmhouse.

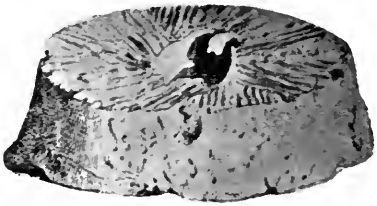
13. Pot querns.

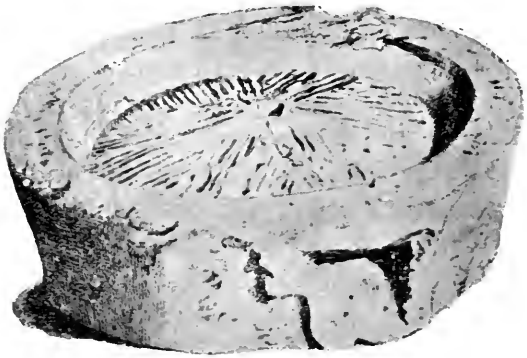
The above specimen differs from all the preceding examples, being of the type described by the popular term 'pot-quern.' Instead of the lower stone being a solid block it is a hollow pan, and the top stone rests within it; the grain being ground between the faces and not the sides of the stones. At the end of the operation, the top stone being lifted off, the meal was swept out by way of a spout cut in the lower stone; at least, it does not appear that the quern could itself eject the meal from the spout during the process of grinding. In the ordinary variety of quern, it will be remembered, the meal was ejected from between the edges of the stones as they revolved.

Lond. & Midd. A. S., iv., 124.

A specimen discovered about forty years ago at St. Martin's-le-Grand, London, is believed to be the most perfect example of a Romano-British quern still existing. In the illustrations are shewn severally the upper stone (reversed), the lower stone, and the complete machine; the grooved inner surfaces of both stones, and the slight convexity of the lower and concavity of the upper, being apparent. This quern was fitted with two handles, so that it might be worked by one or two persons. The pivoting of the upper stone upon the lower was very simply arranged. A pin of wood stood in the hole in the centre of the lower stone, the top of the pin or spindle being fitted to the upper stone. The latter was pierced by the circular boring—the hopper; and in order to fit the top of the spindle within this hole or hopper, and yet to allow a passage for the grain, a block of wood bridged across underneath the hopper, leaving a little space on either side of it for the grain to

13.
Pot querns.





percolate through. This bridge of wood was termed the rynd. In later specimens the rynd was made of iron, and upon the under side of many upper stones may be perceived the sunken slot or bed into which the iron rynd was fitted; the large stone in the British Museum, already illustrated, being a very clear example. The top of the

V. THE QUERN.

13. Pot querns.

spindle was fitted into the rynd; and thus the top stone would always be maintained at a uniform fixed distance from the lower, and the quern would always grind the same uniform coarse or fine quality of meal, as the case might be. But a simple method of adjusting the stones for grinding to any degree of fineness was provided by a small piece of leather or wood of any desired thickness fixed in the socket of the rynd—*i.e.*, on the top of the spindle. Thus a thick wad would raise the upper stone and widen the space between it and the lower, producing coarse grinding; while a thin wad, by bringing the stones closer together, would produce fine grinding. Though effectual, this method of adjustment was still troublesome, as it involved the lifting off of the top stone to make a change in the quality of the grinding; and it is alone in obviating this difficulty that the querns of modern times can be considered to evince any single item of improvement upon the Roman machine above described. The method of adjustment explained in connection with this pot-quern was of course the same in all other early varieties of the instrument.

Text: Modern querns.

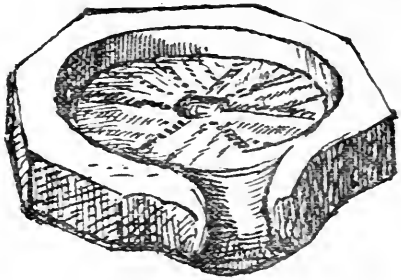
The lower stone of a specimen, similar to the foregoing, was long preserved at the Poplars Farm,

13.
Pot querns.

Sefton, near Liverpool, and is now in the possession of Mr. Gregson, of Crosby. An extremely elegant

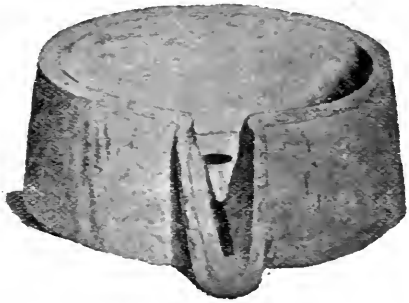
Hist. Eng. Peop. Green, 1892.

example of a 14th century pot quern bears a Gothic decoration of somewhat an ecclesiastical character. Two other examples are illustrated, in which the capacious spout is not bridged across as in the above specimens: one being a Roman stone discovered at Chester, and now in the Museum in that city; and



the other a mediæval relic unearthed in London some years ago, and apparently devoid of the grooving shewn in the Chester stone. Contrasting with the

Lond. & Midd. A. S., iv., 124.

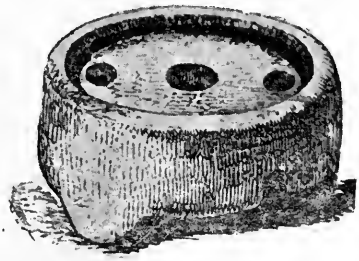


V. THE QUERN.

13. Pot querns.

foregoing wide-spouted specimens, are some provided with but a very small aperture, as in a complete quern found at Rhyddgaer, Anglesea. It has a large and well-formed hopper, while a moulding decorates the rim of each stone: and is evidently a well-finished article of a comparatively late period. The

mask quern already illustrated has a similar small aperture. An altogether smaller variety of pot quern is an Irish specimen, included in a large collection at the museum at Dublin, in which the top stone is



provided with two holes for the insertion of the fingers in turning, in lieu of handles: such small querns sometimes measuring no more than 9½ inches in diameter and 4 inches high.

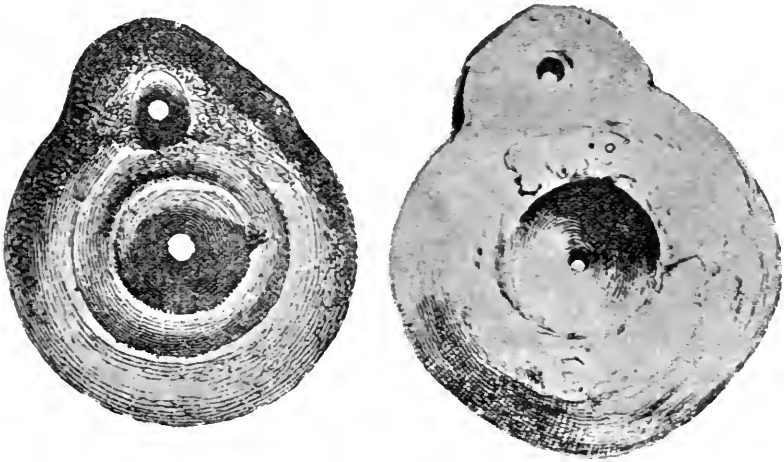
It is not certain, however, that any of the spouted pot querns were used for grinding grain: the flour could scarcely be ejected from such small spouts, as,

for example, the last specimen contains: while the large open spout of the other varieties would scarcely be needed to be made of such a size for the process; unless, as we have suggested, the meal which gathered round the inside of the lower stone were, from time to time, swept out through the spout by the operator, who would be compelled to first take off the top stone for the purpose. Very possibly querns of this type were used in much the same way as the mortars of Aristophanes and Virgil (and also the saddlestone containing a spout already illustrated), viz.: for mashing grapes and other fruits, vegetables for salads, or meats for soups.

13. Pot querns.

In the early globular quern the handle projects upwards from a hole in the body of the stone. In the flat varieties the handle is placed on a projection made specially for the purpose; and a

14. Handles.



Scotch specimen has been discovered in which, though this projection is provided, it is not socketted, and a slight grooving round the neck of the projection suggests that the stone was drawn round by a thong or withy attached to it. Three-handled querns also were ordinary. One of the largest specimens

R.S.A.L., xxi., 675.

Soc. Antiq. Scot.: 1863, 36.

V. THE QUERN.

14. Handles.

found in the Irish crannogs (at Lisnacroghera, Antrim), 22 inches in diameter, was thus turned; and a Scotch specimen, 20 inches in diameter, found at Canobie, Dumfries, was turned also by three handles.

15. Examples found in situ.

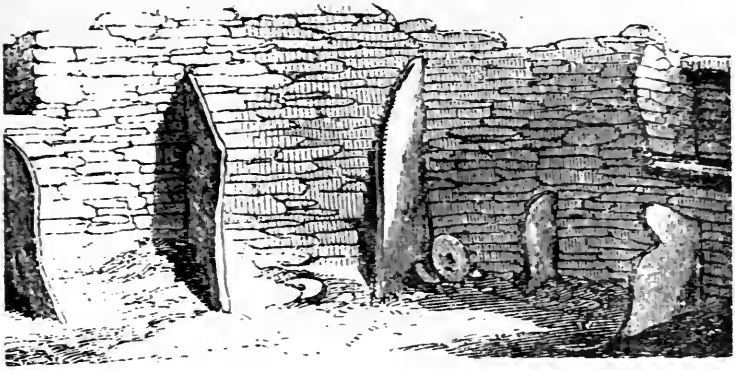
Querns are occasionally discovered in situ in British settlements, these occurrences seeming to mark the period of their use as later than the Christian era. An instance of such a discovery has already been cited at Porth Dafarch, North Wales. In Anglesea, a district specially rich in relics of all varieties of ancient corn stones, on a settlement consisting of circular huts being explored in 1851, among the foundations of one of the houses were found the upper and lower stones of a quern, the latter in the position in which, as the discoverers considered, the appliance had ordinarily been used; another quern, still unfinished and bearing the marks of the chisel, with other similar relics being discovered in close proximity in the settlement, which bore ample traces of having been destroyed by fire. During excavations at a crannog at Lochlee, Scotland, various querns were discovered, only one of which was quite circular, the majority being more or less of an elongated form, evidently due merely to rude workmanship: some lying among debris not far from the site of the ancient fireplaces in their original positions. Several querns apparently in situ were found in a circular fort near the Bay of Hoxay, South Ronaldshay. Round the inner circumference of the stone wall, buttresses had been formed of upright flagstones placed at intervals of six feet apart; and in the recesses formed by these were dug up several querns with a pestle and a mortar. It was considered that these appliances lay in their original positions in the fort, and they were there replaced as shewn in the sketch. The fort was believed to be of pre-Roman

Text: p. 141.

Arch. Camb., 1852, 209.

Soc. Antiq. Scot.: 1878, 209.

Prehist. Scot.: Wilson, 1851, 425.



15. Examples found in situ.

antiquity; but the presence of the querns suggests that it was occupied at some period after the Roman invasion.

16. Stones and quarries.

Stones for use by hand were, of course, anciently selected from any suitable local rock, or from boulders exposed on the surface of the ground or on the sea-shore. The same practice prevailed in later eras, when the quern was the principal mill of the world: any convenient rock, whether sandstone, grit, trachyte, trap, granite, or other variety being adopted for the purpose. Querns are found constructed of all these materials, often fashioned on the spot where the quarry or boulder existed, and used in localities closely adjoining. Originally the Romans, like other people, seem to have used all varieties of native rock. Ovid speaks of millstones "rough as pumice," testifying to the use of the local porous volcanic tufa; and Pliny records the use of the same "porous" variety. According to Pliny, the hard fine grained quartzite of Volsinii (where the quern was invented) would be the material of which querns were first made; but, generally, though the same authority speaks of milling-stones and greatly praises those of Italy, he does not afford much information as to their nature. In the region of Volsinii, not more than sixty miles from Rome,

Text: Cattle Mills.

Text: Querns, p. 132.

V. THE QUERN.

16. Stones and quarries.

the hills abound with stone suitable for milling purposes—a quartzite rock, very hard and of close texture. Pliny, referring to this or some unknown district in Italy, speaks with pride of the milling-stone of his native land, but fails to express its exact nature :—

Nat. Hist.: xxxvi. 30.

Numquam hic utilior quam in Italia gignitur: lapisque non saxum est.

Nowhere is better milling stone found than in Italy: proper, suitable stone, that is to say, not any kind of rock.

Generally speaking, he says :—"Some milling-stones are softer than others, and admit of being smoothed with the whetstone, when they resemble serpentine rock in their markings. There is no more durable stone than the millstone, for generally other stone changes by the action of heat, cold and rain, or deteriorates by the action of the moon (which the milling-stone does not). Some people call the milling-stone pyrites, as it has a great affinity to fire (this being of a flinty nature); another is a more porous variety (the pumice-like volcanic lava): and there are various methods of melting these stones." Virgil uses the term 'siliceous stone' in connection with the quern, this being apparently quartzite rock like that of Volsinii; and Ausonius in the fourth century adopts the generic word 'stone.'

From these early sources little practical knowledge on the whole is to be gained. Still what is lacking may be obtained from the evidence of the stones themselves. Thus, among the specimens we have figured, the neolithic specimens of Italy are of sandstone; the ordinary pounders and saddles of quartz, granite, sandstone or any boulder stone; the mills of Pompeii of volcanic tufa; British querns of all varieties of local stone.

According to Strabo and Posidonius, millstone quarries existed anciently in Magnesia (near Smyrna), in Macedonia, and in Britain at Mona or Anglesea,

16. Stones and quarries.

This latter place remained noted for its millstones through the middle ages. A Welsh millstone was bought for Dublin Castle mills in 1314;* and Fuller mentions in his *Worthies* (1662) that "excellent millstones are made on the island." Quarries, mentioned by Pausonius at the Island of Nesis near Naples, "where abundant millstones are quarried the workers selling large numbers to the neighbouring countries," are found to have been quarries of basalt.

But Rome, in the age of querns, achieved a triumph in the use of the precise stone which up to recent times remained the finest material for millstones known to Europe. This, derived from the famous quarries at Andernach, on the Rhine, the Romans used very extensively for both querns and water mills, and popularised its adoption in every country whither their influence extended. Many ancient specimens of querns of the Roman type, including some of the finest examples, found in England and France, are constructed of stone imported from Andernach: probably the articles themselves having been manufactured there. Thorold Rogers observes: "Professor Phillips informs me that millstones have been imported into England as far back as the Roman occupation, from a quarry of volcanic rock at Andernach; the formation may be detected by the existence of a certain mineral called hayune, crystals of which are interspersed in the stone: and which though found apparently in Vesuvian and other Italian eruptive rocks is, when discovered in millstones in England, positive evidence of their Andernach formation." The conglomerate "pudding stone" of which in modern times Shetland

Text: Slave Mills: Britain.

Hist. Agr. & Prices, i., 504.

* The late keeper of these royal mills, Nicholas de Balscote, in his account rendered to the Irish Exchequer in March of that year, debits Edward II. with, among other things, a sum of 28/9 expended in "a Welsh millstone, uno molari Wallensi, for the said mills"; as recorded in another volume, and it was no doubt a matter of satisfaction to Nicholas that, almost on the eve of the battle of Bannockburn, Edward despatched a writ for payment.

Text: Dublin Castle Mills.

V. THE QUERN.

16. Stones and quarries.

querns are occasionally made, is believed to have been used in the Roman period: some specimens of the kind having been discovered at a reputed camp of the Cæsars at Abbeville and one or two other places in France.

Quarries from which quern stones have anciently been extensively obtained still exist, and the discovery of such a quarry in Brittany incidently serves to dissipate one of the so-called Druidical traditions respecting alleged sacrificial rock-basins already mentioned. "On the roadside, all the way between Guerande and Saillé, there is a hill of granite called Cramaguer: upon the sides of which are numerous hollow basins with an opening on one side; similar to many others one meets with in Brittany, which are described as sacrificial basins for receiving the blood of the victims, the opening at the side being intended to cause it to run off. But these basins prove to be the hollows left in the rocks by the quarrying of quernstones. In one of them was found a quern ready to be raised, but for some reason abandoned. The opening at the side of the basin in which the stone lay, was evidently intended for the purpose of introducing wedges below the quern to raise it. One or two similar relics were found at a quarry near St. Sebastian: and, fortunately so, since they shew how the ancient Gaulois quarried his quernstone."

Text: Crushers pp. 8, 21.

Soc. Antiq. Scot.: 1875, 147.

An ancient Scotch quern quarry evidences the manner in which the early Briton achieved the same end. At Heisgeir, North Uist, is a sea-beaten, rocky promontory in a small creek, where scores of the native querns, known as abrachs, have been quarried. "The original surface of the rock is cut away, and the size of each quern cut, and the marks of the tools used, are visible. Querns are there in all stages of progress: some had been just begun,

Soc. Antiq. Scot.: 1868, 282., Alex. Carmichael.

16. Stones and quarries.

and the marking on the rock could only be faintly traced: others had been half-cut and then abandoned: while in not a few cases the stones had broken as they were being separated from the rock, and had been left. Yet these quern quarries cannot have been worked for many long years." The abrach querns in question were never grooved, but merely dressed somewhat smooth; and as the tradition is, were provided with a good grinding surface by the simple expedient of placing them for a time in a stream of water. "At first sight this may seem absurd, but I believe it to be substantially correct. If the stone be minutely examined the composition will be found to contain hard and soft matter in equal proportions: and on such a stone being placed under a waterfall the water would, in time, wash away the soft matter and leave the hard gritty particles on the surface intact." Abrach stones with surfaces of this character have been used in modern times, and may be worked for many years without roughening:—"I have seen one which I was assured had not been roughened within the last 70 or 80 years, although it had always been worked during that time." An ancient abrach stone found at Benbecula near Bailevanaich, North Scotland, lying near a cross paved in a footwalk on the site of an ancient monastery, was fitted up, provided with a handle and duly set to work "after having lain buried in the sandhill probably for centuries." The peculiar term 'abrach,' applied to these kind of stones, has reference not to their nature or quality, but to their supposed place of origin, the term 'abrach,' or, more correctly, 'aberach,' indicating an origin in Lochaber; though, curiously enough, the stone from which abrach querns were made is not found at Lochaber. As a rule the abrach was smaller than the ordinary quernstone.

V. THE QUERN.

16. Stones and quarries.

Illustrative of the wide variety of British rocks used may be mentioned a specimen found near a burial mound at Cunningsborough, Scotland, cut from talc and studded with garnets too minute, no doubt (except the few which are said to be as large as beans), for making even prehistoric jewels. "The comparatively soft matrix of the talc in which the garnets are imbedded supplies a firm setting. The garnets themselves are hard, crystalline, sharp-cornered and keen-edged. Thus the fitness of the stone for grinding purposes is secured, the inequality between the hard garnet and the soft talc maintaining a rough surface. The garnets vary in size from that of a pin point to that of a common bean; and thus when the edges of the large dodecahedral crystals were rubbed off, the surface would present others equally well fitted to do the grinding; under a lense the small garnets are seen to have their edges still keen and clear." With this quern, it may be mentioned, were found a saddlestone and a quantity of charred wheat. Another curious variation exists in a quern cut from syenite, discovered near Merkle Loch, Aberdeen. In this specimen hard quartz particles are commingled with the soft rock, so that such a stone would require little dressing, and on being treated in the abrach fashion beneath a stream of water, the softer portion of the surface would be washed away; the hard particles, resembling grains of boiled rice, remaining bestrewed over the grinding face.

Soc. Antiq. Scot.: 1881, 244.

Ibid: 1874, 219.

In the excavation of a so-called Pict House, in a mound at Kettleburn, Caithness, was found a block of sandstone illustrating the ancient method of making the top stone of a quern. The article having been left unfinished, it was apparent that the cutting or boring had proceeded from each side of the stone until the holes had nearly met.

Ibid: 1851-4, 267.

V. THE QUERN.

17. Anglo-Saxon and Welsh laws.

Long after the introduction of water mills in Britain the quern held its ground in public favour not only in the huts of the poor, but in the palaces of kings. In the various voluminous codes of Saxon laws there seems to be, however, but one reference to its use, this appearing in one of the earliest of the codes, that of Ethelbert, of about the year 565. The allusion once more brings into view the humble slave woman labouring, as of old, at the mill :—

Leges Ang.-Sax.: Wilkins, 1721: 3.

Si quis cum regis ancilla virgine concubuerit L solidis emendet: si ea molens serva sit XXV solidos emendet.

If any one molest a maid servant of the King he shall pay 50 shillings amends; or if she be the maid who grinds at the mill, he shall pay 25 shillings.

In the mountainous regions of Wales the quern, during those unsettled times, remained in even more ordinary use than in England: and various references to it occur in the ancient Laws and Institutes of Wales, codified in the early part of the tenth century by Howel Dda, and in force till the conquest of Wales by Edward I. The Venedotian code of North Wales contains an enumeration of "the officers of the court by custom and usage," including servants of various kinds, ranging in rank from the Land-Maer to the Chief of Song and the laundress; among the most lowly of them being again the "baking woman," or the maid of the mill. The quern is mentioned in the law with respect to divorce. When the parties are separated their property shall be fairly divided between them, as the sheep to the husband, and the goats to the wife; the riddle to the husband, and the sieve to the wife; the "barn and all the corn above ground, with one of the cats, to the husband;" and "as much meal as she can carry between her arms and knees from the store-room into the house, to the wife." The only possessions which were so subdivided as to be made useless were the bedclothing and the domestic quern: "the

Anct. Laws and Institutes, 1841, xxxi.

Ibid: Book ii., c. i.

V. THE QUERN.

17. Anglo-Saxon and Welsh laws.

clothes that are over them belong to the wife; the clothes that are under them to the husband;" and "the husband is to have the upper stone of the quern and the wife the lower;" so that neither had a complete bed nor mill: an evident discouragement to the breaking up of these ancient households. In the same code "Iorwerth, son of Madoc, son of Raawd, saw it expedient to write here the worth of buildings and furniture;" thus endowing posterity with a very interesting legal assessment of a vast variety of articles and commodities: and added the proviso that "everything the worth of which is not fixed by the law is to be appraised." Fortunately querns were not among the omissions. "The value of a quern shed is fourpence;" the quern itself is also declared to be worth fourpence, namely, "twopence for the lower stone and twopence for the upper."*

Ibid, bk. iii. c. xxi.

18. Mediæval variations.

Through the middle ages the quern largely continued in use all over Europe, despite the oppressive laws which generally prohibited its use. At times the appliance was so increased in size and bulk that a new contrivance had to be devised for working it. By this arrangement a long upright bar was fixed to the upper stone, while its upper end loosely passed through a hole in a beam in the ceiling of the cottage; so that one or two persons could swing round the bar and, so, the stone with less fatigue than the use of the ordinary short handle involved.

* For purposes of comparison it may be stated that the code includes in its schedules of legal valuation—'The worth of a mill is one pound,' apparently inclusive of hurst, stones and fittings. This sum is the quoted value of 'a buffalo horn for a chief huntsman,' and of 'a robe if it belongs to a king'; the latter a sumptuous garment contrasting with a mere 'town-made coat,' the legal value of which is twenty-four pence. In another passage the details of mill fittings are assessed:—'For the house 30d.; the timber 30d.; the mill irons [the 'ferramenta' of Roman, Salic and other laws] 60d.; each stone 30d.' The Dimetian Code of North Wales also contains the entry:—'A mill [the hurst only] is six score pence in value, and the fittings are to be appraised.' The silver penny was the only coin of the Saxons; shillings and pounds being but money of account. Five Saxon pence made a 'schilling,' and forty of the latter a pound. The sum of 400 pounds was the legacy King Alfred bequeathed to his daughter.

Ibid: Book ii., c. xxxv.

18. Mediæval variations.

A sketch of the process indoors, taken from a German illustrated MS. of the 14th century and reproduced in the *Archæological Journal*, depicts two elegantly attired ladies engaged in the household

task of working a quern fitted up in this way. At such heavy machines as these, no doubt, the voluntary aid of the sprite, Robin Goodfellow, if not misdirected, would not be altogether unwelcomed by the fair millers :—

> 'Are you not he
> That fright the maids of the villag'ry,
> Skim milk, and sometimes labour at the quern
> And bootless make the breathless housewife churn ?'
>
> *Midsummer Night's Dream.*

Heavy and oppressive, under any circumstances, to operate, the quern, not, perhaps, too severely, was occasionally known under the stigma of the mill of blood. At Nemours "there were within the city walls ten or twelve mills of blood:"—x vel xij molendina sanguinis. It was so called, Carpentier who quotes the term considers, by reason of the labour of working it, and the oppression by which its mediæval users were daily harassed by the law. An early 14th century MS. sketch shews

Hist. Eng. Peop. Green, 1892, 489.

V.
THE QUERN.

18. Mediæval variations.

such a contrivance placed out of doors, much resembling a modern Scotch appliance shewn in a later illustration.

Text: p. 168.

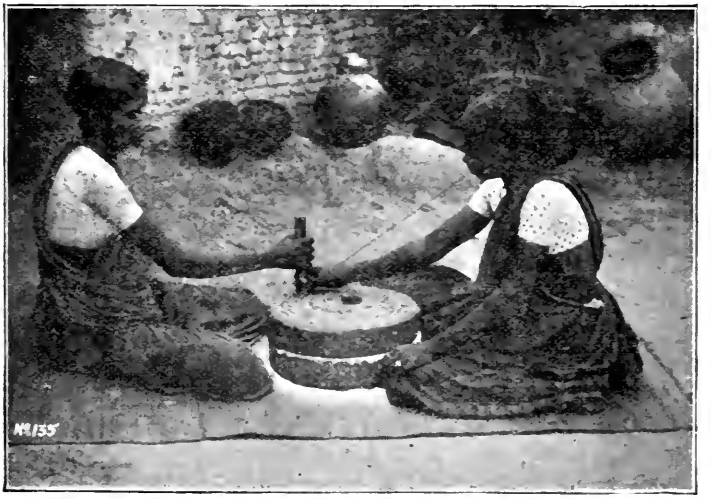
19. Modern.

Of all the ancient handstones, the quern—the product of a high state of civilisation—proved the only one to survive among civilised nations. Perhaps every country in the old world has used, or still uses, the Roman quern. On the other hand it is a curious fact that in the transatlantic world, and in Africa (except in the northern part) where the influence of the ancient civilisation of the West never extended, the quern seems not to have been adopted. When the western hemisphere was discovered it was the water mill not the quern which was introduced there; and that part of the globe thus seems to have passed direct from the use of the pounder and saddlestone to the power mill. So far as we perceive no authentic discoveries of aboriginal querns in those continents are recorded: still the matter is sufficiently curious to be freely left open for further investigation.*

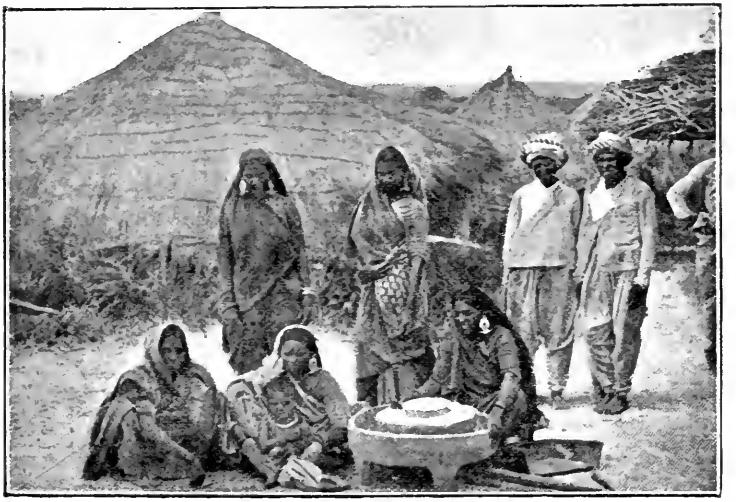
* The American archæologist, Mason, has adopted the suggestion that "it is extremely probable that the first continuous motion was employed in connection with the grinding of corn" (*Soc. of Arts*, 1892, xl. 186); but there is no evidence that this was so; and certainly fires must have been used long before the day of the quern.

In Europe and Asia the quern is still in common use. It is found abundantly in China and Japan. In India the ancient method of working prevails; the quern

19. Modern.



being placed on a cloth spread on the ground to catch the flour as it flies from the edges of the stones; while the later fashion of standing the stones within a



V. THE QUERN.

19. Modern.

circular casing of wood is also largely adopted. A specimen of this kind included in the collection of Mr. Bennett is remarkable for the manner in which the stones are adjusted to produce fine or coarse grinding at pleasure. Unlike the adjustment of the Roman quern by means of a wad as already described, the modern Indian method is precisely as the modern Scotch, the ancient necessity of lifting off the top stone to adjust it being altogether avoided. In Palestine, Persia, etc., the quern is also well known. In modern Egypt, Lane, describing the equipment of the little mud hovel, schedules the scanty resources of the place as "a mat or two, a few earthen vessels and a quern to grind corn." In the Arabian deserts the hum of the quern at village and camp during the evening and often far into the night, strangely greets the Western traveller's ear. An Eastern MS. preserved by Col. Leake, describing the miseries of the Greeks of the Morea, says "at night they turn the handmill and weep, singing lamentations for the dead while they grind their wheat." In short, in almost every country in Europe the quern is found either as an article of antiquity or an existing implement; while we may trace its ancient or modern use throughout the hemisphere, from Japan to Ireland, and from Norway to Ceylon; save in Africa, where it seems only to have been known along the Mediterranean coast anciently open to the influence of Rome.

Text: p. 148.

Text: Modern Scotch quern.

Mod. Egypt, 1828, i., 26.

As a rule the modern quern is found to be a distinctly inferior appliance to that of the days of the Cæsars; this, of course, being due to its being no longer the most perfect mill of the world, and being relegated to a mere minor position as a secondary appliance for rough grinding alone. Indeed the debased appliance only survives in secluded rural districts where labour is rude and art at a premium,

19. Modern.

and where the great consideration influencing the manufacture is cheapness. The only particular in which it may be considered to excel the ancient Roman machine is comprised in a modification of the arrangement of the spindle, as described in connection with the modern quern of Scotland.

20. Modern Norwegian.

A Norwegian example, in the possession of Mr. Bennett, is an excellent illustration of the extreme rudeness of the appliance at the present day. It stands upon a rudely-made table about a yard high. A square frame, enclosing the top of the table, contains a loose circular casing surrounding the stones; the flour being removed from this by sweeping it at intervals round to the front right-hand

corner where, through a hole in the table, it falls into a drawer. This quern was in ordinary daily use at a secluded farmside cottage close to Drontheim in the summer of 1897, when it was obtained by Mr. Bennett.

V.
THE QUERN.

21. Modern Scotch.

Johnson's Tour in Hebrides.

A little more than a century ago the quern was in common use in Scotland and Ireland. "In Skye and Raasa, when the water mills are too far distant, the housewives grind their oats with a quern." Possibly this reference by Dr. Johnson may have aroused in the metropolis some interest in the subject, as in the same year one of the popular magazines printed a detailed description, with an illustration, depicting the process. The sketch shews two Scotch women working a quern placed on a cloth on the ground: the quern being supplied with a

London Mag., 1774, 333.

long stick for a handle which, after the ancient fashion, is attached to the bough of a tree. They are singing, after the time-honoured custom of the maids of Mitylene; "the island ladies being as merry at

Text: p. 62.

21. Modern Scotch.

their work of grinding as were those of the days of Aristophanes. [Or rather of the still earlier days of Pittacus: Aristophanes apparently making no allusion to the custom of singing.] The subject of their song is sometimes panegyric and sometimes love: often a ballad rehearsal of the deeds of ancient heroes of the North, and all the tunes are slow and melancholy. But singing at the quern is almost out of date since the introduction of the water mills; for the laird can oblige his tenants, as in England, to make use of that more expeditious kind of grinding, and empowers his miller to search out and break any querns he can find as machines that defraud him of his toll. This method of grinding is very tedious, for it employs two pair of hands four hours to grind only a single bushel of corn." The cost of a Scotch quern was then about 14s. A description of the almost obsolete procedure in Skye, is given by a later writer. "When the fields were ripe in autumn the family could easily supply oaten meal for their porridge in little more than an hour. They cut a few sheaves of standing corn, which were taken to a convenient spot not far from the dwelling, where a flat stone had been laid for the operation. Placing the sheaves near the stones, the woman taking in her left hand a part of the sheaf, set fire to the ears, which were allowed to burn till the grain fell upon the stone. In her other hand she held a stick, with which she kept constantly beating the blazing straw to shake off any part of the grain which did not fall. The grain was then collected and winnowed, and ground in a quern, an appliance generally about 26 inches in diameter, fixed upon a frame of wood. It is remarkable how rarely the remnants of these old querns are now to be met with, either in Skye or the Hebrides. When we consider that almost every family had its quern, the stones of these primitive

Soc. Antiq. Scot.: 1880, 143.

V. THE QUERN.

21. Modern Scotch.

grinders might be expected to be numerous, but, in reality, the contrary is the case. Certainly collectors of curiosities have taken many of them away, but this does not account altogether for their scarcity." No doubt the old stones have usually been cast aside or broken up, or, as in Wales, used for building purposes; as, though of great archæological interest, they have been in all ages the world over.

Lond. & Midd. A. S., iv., 124, Rev. J. Graves.

"Even in highly civilised and cultivated districts," observes a sympathetic writer who closely follows the expressions of Dr. Hume, "tradition points back with certainty and with interest to the time when the quern was a familiar article of household furniture. Many a hoary-headed swain will tell of the good old time when a sheaf of oats was cut from the ridge in a harvest morning: was threshed, winnowed, dried, ground, and made into porridge in ample time for the breakfast of the reapers. Very often one quern served several families, and although the owner might chance to be in the poorest circumstances, yet no charge was ever made for the use of the machine, such an act being considered unlucky. It is difficult to determine the age of many of the stones now in actual use, inasmuch as they have been handed down from mother to daughter for generations. Ill fortune is believed to ensue if the quern be sold, and the good woman of the house is ever reluctant to part with her heirloom, even though offered for it much more than its intrinsic value."

"The cronach stills the dowie heart,
The jurran stills the bairnie;
But the music for the hungry waine
Is the grinding o' the quernie."—*Jamieson.*

L. & C. H. S., i., 36

"The generation is scarcely passed away," said Dr. Hume, in 1848, "that saw the quern in current use in the purely Saxon districts of the lowlands of Scotland and the North of Ireland. Among the

21. Modern Scotch.

Celtic population we find it still in use. The Highlanders use it in Scotland; the Irish in Kerry, Connaught, and a few other places; nor is it quite extinct though, perhaps, less known in Wales. The antiquary, Mr. H. Gaskell Sutton, recorded that in 1841 he had witnessed the quern in operation in County Clare, at the house of a clergyman, by whom it was always employed to grind the first of the harvest produce; being worked by women, who accompanied their toil by chanting extempore complementary verses in allusion to the master and mistress and the household." In 1882, the Rev. G. Hall stated—"Handmills are still in common use in Shetland and the Hebrides: being made and sold for from 3s. 6d. to 5s. each. I have one also that was in daily use up to the early part of this century, by Mr. Ellwood, a statesman (yeoman farmer), near Castle Carrock, Cumberland, and is still capable of doing its work. I have heard of a farmer, also within living memory, using one at Stapleton." In the Islands of Colonsay and Oransay, North Scotland, querns are stated to have been used till about 1850 for making barley flour, though oatmeal was ground at a water mill. For the grinding of oats or wheat, the quern had long been out of use; and during the famine of 1845-46 on a supply of Indian corn being sent to the starving islanders at a time when, owing to a long-continued drought, there was a lack of water to drive the only available water mill, recourse was had to querns; which, however, there was considerable trouble to find the required number to reduce the grain. A sufficient number was found, however, to tide over the difficulty till the rains came. The fact of oatmeal being ground at water mills while querns were used for barley may be explained, with reference to Ireland, in a passage in a MS. letter of Dr. Donovan, dated

Cumb. & West. A. S., vi., 475.

Soc. Antiq. Scot.: 1881, 135.

V. THE QUERN.

21. Modern Scotch.

1838, forwarded to us by Dr. Fraser, of Dublin. Donovan, one of the most celebrated of Irish archæologists, says:—"The bro or quern is universally used in Achill and certain other places. It could grind wheat and barley very well, but there is no wheat there. It could not, however, shell oats, and, therefore, oatmeal made by it is black and disagreeable. But the natives of these wild mountains use no meal of any description, excepting at Easter and Christmas, and are entirely supported by the potato."*

The Scotch quern of the present day is illustrated by a specimen presented to the Edinburgh Museum of Antiquities, by Professor Mitchell. "I found it as it stands in the island of North Yell. I was hospitably entertained in the cottage at which it was bought, and ate some bread made from meal which it had ground. Two specimens of the meal which had that day been manufactured by it are now in the museum with the quern; two being taken, because the machine is capable of grinding fine and coarse." Mitchell states that in the Shetlands, Orkneys and Hebrides, in Sutherland, Ross and Inverness, such querns had been seen by him by the hundred, and might be counted by the thousand, in districts where watermills and ready means of transit were lacking. The appliance being used entirely by poor cottars in the secluded districts was necessarily constructed at a cheap rate; the average price being no more than from 3s. 6d. to 5s., the precise cost already

Past in Present: Mitchell, 1876-8, 33.

* Sir W. R. Wilde refers to a similar partial return to the use of the quern in Ireland: "During the famine period many of the handmills, which had long been given up, were again employed, particularly in the hilly districts, or where the ordinary water mills were not accessible. So late as the summer of 1853, I purchased a quern I found at work in the neighbourhood of Clifden, Connemara."

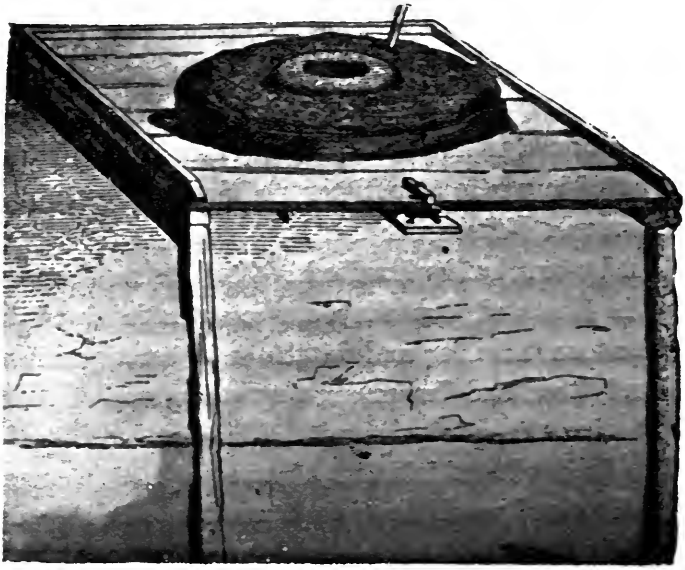
Cat Dub. Mm., 108.

In 1294, the inhabitants of Parma had similarly harked back to querns as well as horse mills, when drought had rendered their water mills idle: molendina de brachiis et equis propter defectum aquarum et canalium facta fuerunt per civitatem.—*Du Cange.*

21. Modern Scotch.

quoted from the Rev. G. Hall. Though of so rude a form as to be vastly inferior in point of workmanship to innumerable ancient examples, it is yet marked by the introduction of a thoroughly efficient and simple improvement upon the old system of adjustment for either coarse or fine grinding.

The quern usually stands in a niche of the porch of the cottage upon a bench constructed for the purpose. The lower stone, left very much in the rough underneath, is bedded in clay so that a level grinding surface may be obtained; and the hole for the

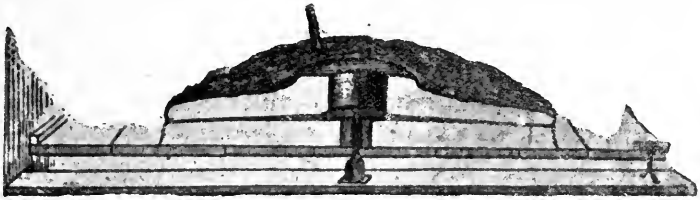


spindle, no longer a mere socket but a perforation passing entirely through the stone, is tightly fitted with a block of wood, also perforated, serving for a bearing for the spindle which passes through it and below the stone and rests on a narrow board beneath. The top stone, as usual, rests by means of its wooden rynd upon the top of the spindle. The adjustment for coarse or fine grinding is secured by raising or depressing the spindle (and so the top stone) from

V. THE QUERN.

21. Modern Scotch.

below; precisely as was done on a much larger scale in modern water and wind-mills by the action of the "bridge-tree." The spindle stands upon the narrow board or bridge tree, one end of which rests loosely on a recess in the wall behind the table; the other end being held up by a string doubly twisted,



which passes through a hole in the front of the table, and is secured by an oblong wooden button. The board or bridge tree thus supports the weight of the upper stone. By turning the oblong button the string is either twisted and shortened, or untwisted and lengthened; the bridge tree being thus raised or lowered, and with it of course the upper stone: any degree of grading being thus easily obtainable without the ancient trouble of lifting off from time to time the upper stone. The handle is of wood, fixed as usual in the top stone and the meal issues from between the edges of the stones.

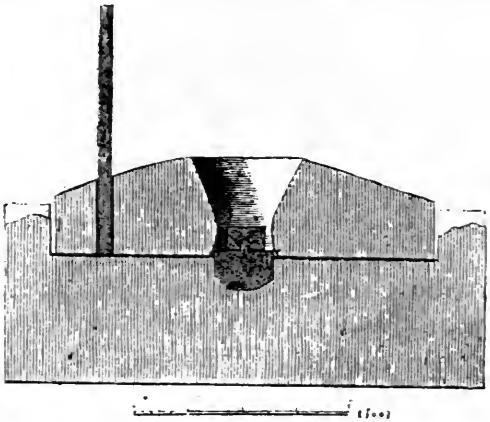
"I may be wrong," concludes Professor Mitchell, "but it seems to me that I have not been describing a contemptible piece of machinery exhibiting no skill or ingenuity in its construction. The ends, it is true, are attained by means which are very simple, but that of itself does not give inferiority to the contrivance. It is true, also, that the hand of man is left to move that which elsewhere, in what we call the centres of progress, is moved by water or steam. But are there no circumstances in which this may be the outcome rather of wisdom than of ignorance or stupidity?"

V. THE QUERN.

22. Modern Irish.

In 1850 a quern, used till then in the cabin of a peasant of Kilkenny, was presented by the Kilkenny Archæological Society to the Archæological Institute of London. This specimen instances another of the modern modifications in the arrangement of the spindle. The stones are nearly two feet in diameter.

Arch. Journal, vii., 393.



In the centre hole in the lower stone is inserted, and firmly wedged, a block of oak, from which projects upwards above the stone the pin, or spindle, also of oak. Across the bottom of the hopper in the top stone is fixed the bridge-piece, or rynd, of oak, in the centre of which is a socket; and in this the top of the spindle fits loosely. The advantage of the arrangement over the ancient system appears to be that the top stone revolves freely upon the pin and does not carry the latter round with it. This being so, there is slightly less friction in the working: as (in the case of the ancient quern) the pin revolving in the hole in the lower stone would doubtless tend to become clogged from time to time by the accumulation of meal which fell into its bearings. The advantage gained would be inconsiderable, however. The space between the stones is adjusted in the ancient fashion by a wad or wedge inserted in the upper stone on the top of the

V. THE QUERN.

22. Modern Irish.

spindle: and in this respect the Irish example is destitute of the great improvement noted in the modern Scotch quern. The flour issued from a spout in the lower stone and the machine was driven by two handles.

The march of improvement in the last few years has rapidly thinned the number of British querns in use; and milled flour from Liverpool or Minneapolis shortly promises to become even less of a curiosity in the retired home of the quern than the old handmill itself. In the days of compulsory suit and service to manorial mills, British cottagers fought sturdily to preserve the ancient domestic appliance: but now, when milling soke is abolished and permission to use the quern is free as air, it is no longer required, and virtually only exists as a relic of antiquity in the cabinets of the curious.

Text: chap. ix.

CHAPTER VI.

THE SLAVE MILL.

VI. SLAVE MILL.

1. Period of introduction.

THE mills now pre-eminently known as slave and cattle mills were revolving machines, of the type of the quern, which seem to have come into use in Rome soon after the invention of that appliance. Since from the earliest periods, saddlestones and mortars had been operated by slaves and criminals, it must have been regarded as a very ordinary transition indeed, when revolving mills were adopted, to transfer those menial labourers to the new appliances: thus no doubt slaves worked revolving mills before cattle were added to the available motive power. Plautus, about 200 B.C., frequently refers to the labour of slaves and criminals at mills; and though it is probable that he thus refers merely to the saddlestones, yet, as in one passage he also alludes to an ass mill or a horse mill, possibly the penal mills he mentions may have been revolving mills actually driven by slaves and not cattle. Cato, at about the same period, and Varro a century later, are also quoted as alluding to the ass mill; and these three authors seem to precede any who indicate either querns or other revolving mills turned by slaves. Still, though these early allusions to revolving mills refer to cattle mills, and though at this period (and later) the records of the two classes are very closely interwoven, it seems reasonable to consider that slave mills preceded cattle mills: and on this hypothesis we may consider slave mills first.

Text: Mortars: p. 96.

Text: Cattle Mills.

Text: Querns: p. 131.

VI. SLAVE MILL.

2. Mills of Rome and Pompeii.

At Pompeii, destroyed in 79 A.D.—Pliny, the elder, our frequently-quoted authority on milling matters, losing his life in venturing too near to the scene of its destruction—were discovered about a century and a half ago the several slave mills which now constitute our principal evidence of the nature and method of construction of the mills of that ancient period. These were doubtless of the type of the slave mills in use at Rome at the opening of the Christian era and long afterwards. Water milling was slowly coming into operation at the date of the destruction of Pompeii; but even had this city escaped ruin, as it was short of water power for mill driving, it is probable that these appliances would have long remained in use. Rome, unlike Pompeii, was not devoid of water power, as natural and artificial water courses abounded; and, therefore, was not actually compelled to use labour mills. Still she chose to do so for nearly four centuries yet to come; and, long after water milling was possible, slave labour, cheap and abundant, was employed at the State mills and at the private trading pistrina which already were extending throughout the city.

The illustration gives the general exterior aspect of the mill, with the upper stone entirely hiding the lower from view except at its bottom rim: the diagram shewing the shape of the conical lower and the peculiar manner in which the upper was hollowed below to fit upon it, and above to serve as a hopper. The lower stone, from its resemblance to those used for goals on race courses, or any conical stone, was termed the "meta": and the upper, from its cup-like form, the "catillus."* The latter was made

Rich: 1884, 421.

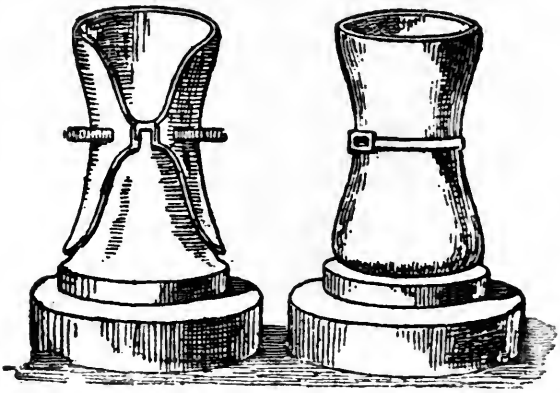
De Pistr. Vet.: cap. iii. § xv.

* It is stated that "before the discovery of the mills at Pompeii, by which the real form of a Roman mill has been ascertained, it was the common notion that the upper stone was the meta and the lower the catillus: an error which is still left uncorrected even in our best dictionaries." Pompeii was discovered in 1748: yet Goetius, in 1730, correctly names the stones, referring also back to the Roman jurist Paulus:—Est autem meta inferior pars molæ, catillus superior.

VI.
SLAVE MILL.

2. Mills of Rome and Pompeii.

Greek and Roman Antiq., Rich: 429.



to revolve by pressure upon bars projecting from its side: the slaves, as they pressed forward the bars, walking round the mill as in the working of a ship's capstan. The upper stone did not rest on the lower, but was borne up by a spindle fixed into the latter: the top of the spindle resting in an iron rynd as already explained with respect to querns: except that the rynd in this case was an iron plate containing a socket for the spindle in the centre and four perforated holes for the passage of the grain. The grain, being placed in the revolving hopper, gradually percolated to the top of the meta, and then passing downward was ground between the stones; falling from beneath the lower edge of the catillus into a groove sunk round the base of the meta, where doubtless it was confined by a circular wooden casing. This type of mill must even then have been extremely primitive; and though Pompeii was by no means a city lacking in knowledge of science and art, it almost appears that here once more, as in ancient Greece, we find amid evidences of abundant refinement and progress, old-fashioned mills remaining still in use. The early idea evidenced in the construction of querns—that a direct downward flow must be provided for the grain and meal in the mill—being

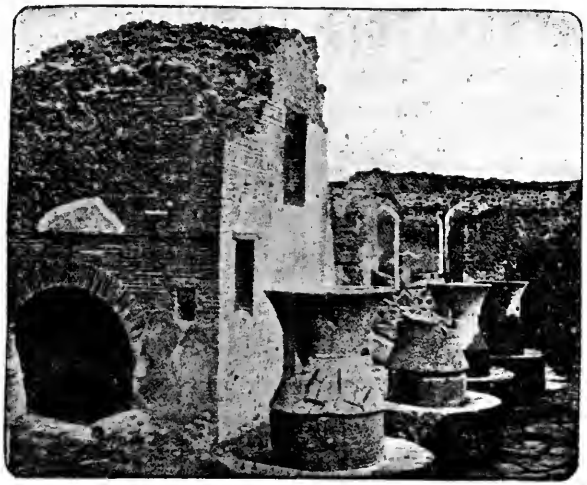
Greeks and Romans: Guhl and Koner: 521.

VI. SLAVE MILL.

2. Mills of Rome and Pompeii.

reproduced in these huge elaborations of the quern, the principle of their construction is, therefore, older than the date of the first flattish quern which ejected the meal by centrifugal force generated by the revolution of the stone. Again, the hopper, which might have been readily and simply constructed of wicker-work or wood, is not only cut out of stone, but is part of the catillus itself: this latter being thus not only needlessly troublesome and costly to make, but excessively heavy to drive; the mill comparing very unfavourably in this respect with a Romano-British example described later. Clearly, at Pompeii, milling resources, though apparently the best that the world knew, were behind the advancement of the age: as, in fact, they everywhere consistently remained for centuries to come.

The four Pompeii mills in the illustrations, standing as discovered on their original sites—as after many enquiries, on the spot and at Naples, we have been



informed—are placed in what is considered to have been a public pistrinum, situated near the house of Sallustius. The circular base of each is five feet in

VI. SLAVE MILL.

2. Mills of Rome and Pompeii.

diameter, and one foot in height; the meta, one-half of which is concealed from view, is about two feet high, and the catillus the same. It is evident, from their close proximity to each other and to the wall of the bakery, that there was no room for them to be driven by asses, and none too much for the perambulations of slaves. Upon the nearest and furthest of the mills in the view may be perceived the solid side-lugs in which were inserted the handle bars.* The

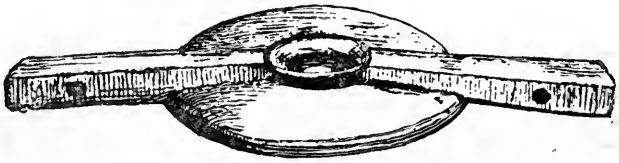
material is the coarse porous volcanic tufa, common to the district. Mills similar to those of Pompeii, stated to have been discovered in excavations at Mount St. Geneviève, Paris, and placed in the Carnivalet Museum, are probably of the type of those found in Dorsetshire and at Orleans, described in the next paragraph. Specimens of the true Pompeii type, both as to size and make, appear, so far as we have been able to discover by enquiries at Rome and Naples, to be absolutely unknown; the originals, therefore, being relics that seem unique.

* We are indebted to the courtesy of Messrs. Joseph Baker and Sons, engineers, City Road, London, for permission to reproduce from their copyright catalogue these two views, together with the Indian scene engraving on page 165.

VI. SLAVE MILL.

3. Mediæval specimens.

After the abolition of slavery in Rome the mill, driven no longer by slaves, but by free servants of low degree, became common throughout Europe, under the designation, mola servaria, the servants' mill. An early British variety of the type is comprised in a relic discovered in 1835 in a bog, 16 feet below the surface, at Derryboy, Killyman, and now preserved in the Archæological Museum at Dublin.



Made entirely of fir wood, it originally formed a cap or cover, measuring 13 by 10 inches, fixed to the flat top stone of the mill: the driving bars being fastened to it.

Cat. Wilde: 207.

The largest and most perfect example of Roman type yet discovered in Great Britain, found at Ham near Poole, is now in the British Museum. It consists of the conical meta, surmounted by the hollow catillus, as in the Pompeii mills. Each of the stones is a foot in height, and the grinding edge two feet in diameter: the whole weighing nearly 3 cwt. The material is a hard grit rock, considered to be from the well-known ancient quarrying district of Andernach on the Rhine, whence, apparently, the appliance was imported. Like the Pompeii mills, it was driven by bars inserted in lugs on its sides, between which is an aperture apparently for inserting a bar to lift off the top stone when necessary. The great improvement evident in this mill, as compared with those of Pompeii, is the absence of the heavy stone hopper: a very small cavity serving the purpose of the ancient type, though, probably, it has been surmounted by a light wooden basin.

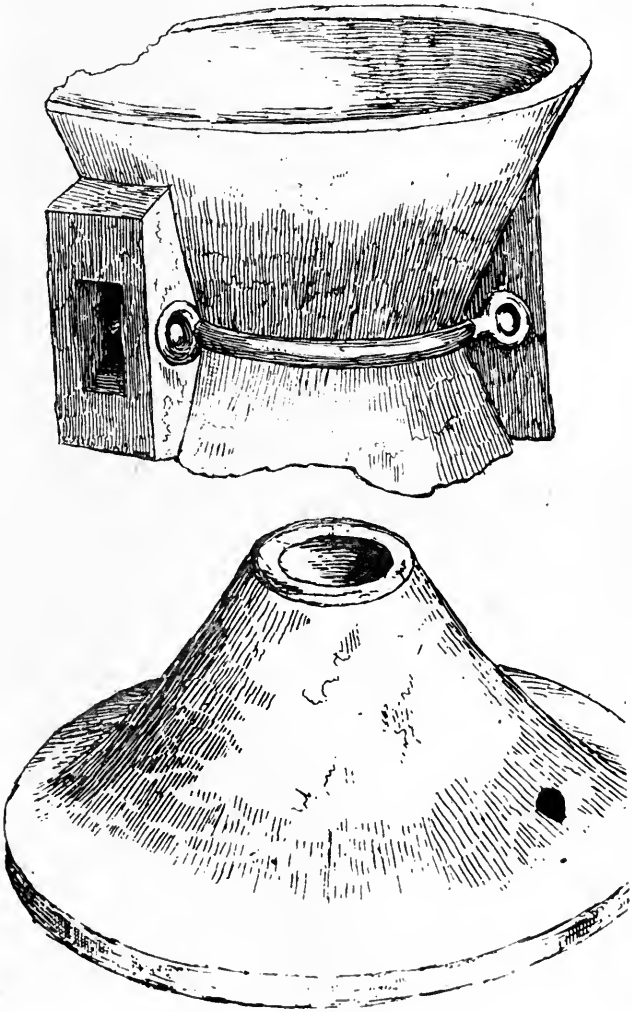
3. Mediæval specimens.

VI. SLAVE MILL.

3. Mediæval specimens.

Collect. Antiq. 1857, 26.

A somewhat similar, but less perfect, example of the Roman type was found at a considerable depth in an ancient cemetery at Orleans. It is constructed of the same Andernach volcanic rock, and is of the same size as the British specimen; but differs from it in being driven by handle bars fixed in the centre of the top stone, and by bearing at the top the cumbrous heavy stone hopper, as in the mills of Pompeii.



CHAPTER VII.

THE CATTLE MILL.

VII. CATTLE MILL

1. Roman.

THOUGH it was not till the abolition of slavery in the 4th century that cattle mills were largely adopted in Rome, still it is evident that they had been in partial operation perhaps six centuries before. Cato (232-147 B.C.) and Varro (116-27 B.C.) both mention them. Plautus, contemporary with Cato, does not quite overlook them :—in a jest Libanus, having mounted the shoulders of his friend, declares "uphill with the spur will I drive my steed," adding "I shall deliver you to the pistors that you may there suffer as you run."

Text: Querns, p. 131.

Nam jam calcari quadrupedem agitabo advorsum clivum,
Tum postea ad pistores dabo ut ibi cruciere currens.

Asinaria, Act iii., sc. 3.

Long after this period, in the year 37 A.D., cattle mills were so numerous that, as Suetonius tells us, when in that year Caligula alienated considerable treasure and requisitioned the horses and asses of the mills to transport it, the city was reduced by their loss to the verge of famine.

There was originally no practical difference of construction between the cattle and the slave mill; the same huge lower meta and upper catillus, as in the mills of Pompeii, being characteristic features of both : and it is probable that these elementary types of stones existed for a considerable period. About the year 20 B.C. Vetruvius had described the new Roman water mill, but he made

Text: Roman Water Mills.

VII. CATTLE MILL

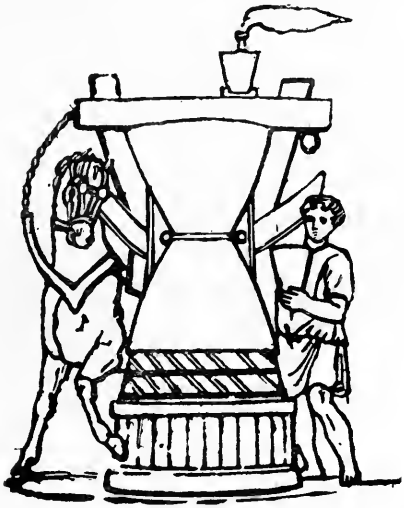
1. Roman.

Text: p. 136.

no allusion to any alteration in the shape of the stones. The quern of the period also was made with stones like those of the Pompeii mills: and it seems as though the tall steep stones endured at Rome so long as the cattle mills with which we are now concerned were retained in use, that is till towards the close of the 4th century.

Usually these heavy and lumbersome contrivances were driven by sorry creatures indeed, and it is greatly to be feared that the heroic design of a horse mill upon

Grk. & Rom. Antiqs.: Rich, 429.



one of the carved marbles of the Vatican was a great contrast to the actual fact. The ordinary beast for mill-driving was the ass; the mill itself being more commonly known as 'mola asinarium' than 'mola jumentaria,' this latter being but a general term from 'jumentum,' any labouring beast. The humble inseparable companion of the miller, the ass, no doubt, shared the good fortune, such as it was, of its driver or master, as well as the hardships and privations of his lot; but it must be said that on the whole the latter seem to have predominated. The weary hopeless labour is well suggested in an ancient

VII. CATTLE MILL

1. Roman.

apostrophe by a slave bidding farewell to the mill and welcoming the ass that was to succeed to the toil :—Labora aselle quomodo laboravi et proderit tibi : Work on poor little ass as I have worked, and that shall suffice thee.

2. Scriptural.

The cattle mill was by degrees adopted throughout the civilised world. In the Holy Land, during the life of Christ, the ass mill was in common use, and most of the references to mill stones in the New Testament allude to it. The warning words, "It were better that a mill stone were hanged about his neck," are not indeed explicit on the point in the authorised version ; but in the Hebrew original it is an ass mill stone which is distinctly indicated. The Nuremburg Latin Bible of 1482 adheres closely to the original—suspendatur mola asinaria in collo : the Geneva Bible of 1560 contains a marginal note—"the word signifieth a great millstone which an asse turneth:" while the Revised Version of 1881 adopts the rendering "great mill stone," and, adds the note, "a mill stone turned by an ass." *

3. Vesta, goddess of ass mills.

Text: Mortars, p. 100.

In connection with the ass mill, comes specially into notice the Roman cult of the mills. As the ancient Greeks worshipped Eleusina, so the Romans paid divine honours to Vesta, patron saint of the ass, and goddess of the ovens and the mills. In her temple hard by Janiculum where the water mills of Rome at a later period were established, the sacred fire burned constantly before her altar ; which was unmarked by any statue though elsewhere many were erected in her honour. Upon the carved design of a horse mill at the Vatican, already illustrated,

* Gregory of Tours (c. 570) thus records the martyrdom of one of the early Christians:—Eo tempore Quirinus Sistiensis ecclesiæ sacerdos gloriosum pro Christi nomine martyrium tulit, quem ligato ad collum molari saxo in fluminis gurgitem sævitia impulit paganorum. At this time, Quirinus, priest of the church of St. Sithin, suffered a glorious martyrdom for the name of Christ: for with a millstone bound round his neck, he was brutally thrown, by the pagans, into the current of the stream. Hist. Francor, i., 29.

VII. CATTLE MILL

3. Vesta, goddess of ass mills.

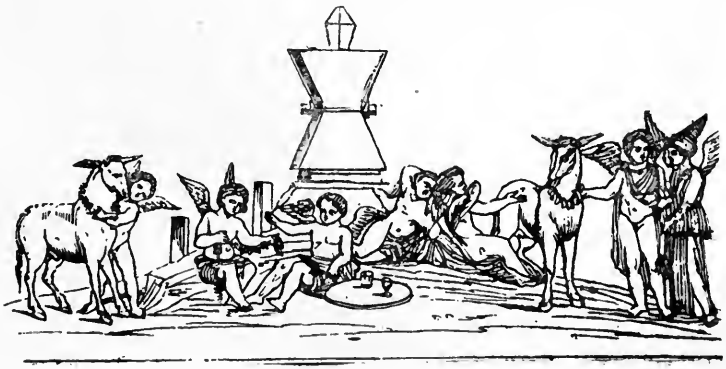
appears on the top of the mill a lamp, placed there in honour of Vesta; just as formerly among the Greeks the statue of Eunostis was placed beside the saddlestone.

Text: Saddlestones, p. 63.

Smith's Classic, Dicty: 1887, 206.

4. The Millers' Feast.

Every year, on the 9th of June, were celebrated the Vestalia, one of the great sacred festivals of the Roman year, and foremost among the celebrations of the day were the festivities of the millers. As elegantly described by the poet and limned by the artist, the Millers' Feast was a charming episode of



Mus. Bourb. vi. tav. 51.

4. The Millers' Feast.

Arcadian life, when all the world seemed youthful and full of ease and joy. A wall-painting still existing at Pompeii, allegorically depicting the millers in the enjoyment of their annual holiday, seems to enshrine an apotheosis of the humble members of the craft and their faithful companions, the donkeys. The little ass, the lowly beast which, as Ovid says, on work days turned the millstones rough as pumice :—

Et quæ pumiceas versat asella molas : Fasti, vi., 318.

the ass, sacred to Vesta on that eventful day, was fêted, caressed and adorned :—

Quem tu, diva, memor de pane monilibus ornas : Ibid, vi., 347.
Cessat opus, vacuæ conticuere molæ :

Him dost thou now, O Godess, in memory adorn with necklets of loaves, what time the mill stones in idleness are hushed :

Ecce, coronatis panis dependet asellis Ibid, vi., 311.
Et velant scabras florea serta molas :

Behold garlands of bread pendant upon the asses, and wreaths of flowers covering the rough mill stones.

While the asses thus rested beside the idle mill, the millers were regaled upon bread, salt, vegetables, and fish, gaily served on earthenware dishes. Early on the day of the feast a procession wended its way through the thronging city towards the temple of the goddess : the asses the cynosure of all eyes, and the millers the heroes of the occasion. Abundant offerings being presented to the attendant vestals by women, who alone were allowed to approach, the procession retired; and, finally, mingled prayers, sacrifices and games closed the day. Crowds of citizens other than millers, attended the rites of the temple; and it was indeed while returning from witnessing this very feast that Ovid "in coming along the new street which is now joined to the Forum of Rome," spied the matron of noble mien who so strongly attracted his artistic eye, walking barefooted homewards through the marshy ground. The day after the Vestalia, 'as the Dolphin rose in

VII. CATTLE MILL

4. The Millers' Feast.

the twilight sky,' the great festival closed: the donkeys were divested of their trappings of wreaths and garlands, the mills were put in order, and once more the ordinary routine of "life's dull round" around the revolving millstones began: and when next we hear of decorative garlands of loaves pendant round the neck, they are not symbols of honour gracing Roman asses, but marks of disgrace hanging upon the breasts of defaulting British bakers.

5. Depicted by Apuleius.

But from the realm of poetry let us turn to the matter-of-fact region severely portrayed by Apuleius, about 170 A.D., in his fable of the ass. There was a certain mill where "the woman yoked an ox to the mill and ground not only for herself but for her neighbours, and so made money by grinding barley;" but it was not at this small and cosy establishment that the asinine biographer was employed. That in which his lot was cast is graphically portrayed as an extremely different place:—

Metam: vii., 142.

Ibid: ix., 173.

> A good many beasts were employed there in turning various mill stones, and that, not only by day, but all night long; for the mill was always going. . . . I was fastened up to turn what seemed to me the largest millstone of all, and with my head covered [blindfolded as the horse in a previous illustration]. I was put upon a little path, in the form of a circle, in which I was to go round and round perpetually. . . . Several men, armed with sticks, showered storms of blows upon me. . . . The day was near its end and I was very tired, when they loosed the rush ropes that fastened me to the mill and led me to the manger. I neglected the food to observe, with a sort of pleasure, the economy of our detestable work place. . . . How shall I describe my brute companions? What worn-out old mules and geldings! How they hung their heads at the manger as they chewed the heaps of straw! Their necks were covered with putrid sores; through their gaping nostrils they coughed incessantly; their chests were raw from the friction of the rush rope; their flanks lay open to the bone with continual cudgeling; their hoofs were lengthened to an extraordinary degree by dint of walking in the mill-round; their hides were rough with mange!

Text: Roman Pistores ch. viii.

Apuleius flourished in the latter half of the second century, and to about this period may be ascribed the state of affairs he so realistically describes.

VII
CATTLE MILL

5. Depicted by Apuleius.

There is no doubt that many a pistrinum of the period, decorated with its sculptured sign of an ass turning a mill—as that yet to be seen at Pompeii—was on the whole accurately depicted by the cynical romancist: for his contemporaries knew these places as well as he.

Juvenal, about half a century before Apuleius wrote the marvellous *Golden Ass,* had afforded much the same testimony of the wretched state of the animals that drove mills. Remarking upon the poor quality of certain beasts, which he says were forced to change their owners at small prices, and—slow of foot and galled in the neck—to draw carts, he sarcastically winds up the list of their imperfections by remarking that in fact they were only fit to turn the mill of Nepos, the baker:—

Sat.: viii., 67.

Dominos pretiis mutare jubentur
Exiguis, trito ducunt epiredia collo
Seguipedes dignique molam versare Nepotis.

In a similar strain of misery is portrayed by Perotti (1430-1480) the fable of the millhorse: "an unhappy courser, whilom famed in Olympian race but now employed in mean occupation at a mill, mingling tears with the water he drinks in the intervals of labour; gazing upon a troupe in the fields outside, free from thraldom and gambolling in pleasure." Within a couple of centuries after the date of Apuleius, there is, however, every reason to consider that his portrayal of a mill, regarded as a realistic picture, had become practically obsolete.

6. Demand for, in Rome.

While the combined systems of slave and cattle mills prevailed in Rome, the daily free food supply to the citizens had been increasing in extent by leaps and bounds; and for over three centuries many thousands of citizens were daily fed at the expense of the State. The well-informed and reliable La Mare, quoting from various of the Roman writers, calculates that in the time of the Republic

VII. CATTLE MILL

6. Demand for, in Rome.

the recipients had numbered 60,000 persons: Julius Cæsar augmented the number to 320,000, but afterwards reduced it to 150,000; Augustus distributed to 200,000; Nero added 10,000 more; Hadrian included the children of the poor (boys to 18 years and girls to 14 years of age); till eventually, under Severus, the distribution was calculated to amount to 75,000 bushels of grain per day, and under Constantine to eight million bushels per annum, each bushel being of the weight of 20 lbs. of 12 oz. each. Sixty years later, under the conjoint emperors Honorius and Arcadius, the free distribution attained proportions even huger still. "For the convenience of the lazy plebians the monthly distributions of corn had been converted into a daily allowance of bread; a great number of ovens [pistrina] were constructed and maintained at the public expense; and, at the appointed hour, each citizen who was furnished with a ticket, ascended the flight of steps which had been assigned to his peculiar quarter or division of the city, and received either as a gift or at a very low price a loaf of bread of the weight of three lbs. for the use of his family."

Traité de la Pol: Paris, 1705: Liv. iiij., tit 4, cap (2).

Decline and Fall: Gibbon, ch. xxxi.

At the close of the 4th century we find the State corn mills scattered all over the city; criminals and cattle in vast numbers (as slavery had lately been abolished) grinding flour wholesale to produce the vast output that daily, under any circumstances, had to be maintained to supply the enormous civic dole. The manifold evils of the system, though fully recognised, were perforce retained; and the city was crowded with thousands of loafing idlers who, ere long, saw the tottering Roman empire, already sub-divided, entirely broken up by the Goths. In the meantime Rome ruthlessly exacted her yearly tribute of corn from her every province in Europe and Asia; and flotillas of grain ships from almost every sea of the

Text: p. 199.

VII. CATTLE MILL

6. Demand for, in Rome.

known world crowded the harbour of Ostia, the Liverpool of Roman Italy.* In patrician mills, long before in the time of Pliny, so great was the magnificence of the nobles and so lavish their display of wealth, that even the walls of millhouses were painted, and the grain pestles decorated by engraving. In the State mills, no such absurdity was perpetrated; they were well-built, carefully equipped and stringently managed establishments: the usual orderly and business-like habits of the Romans being, without doubt, systematically observed upon so vital a matter as the provision of the food supply of the people. The mill, for instance, upon which was affixed the memorial tablet bearing the subjoined inscription, was certainly not a place like the mill of Apuleius, of which the State might well have been ashamed:—

Molas propter annonam publicam a veteribus institutas; reformatas et instrumento pistorio exornatas, ad annonæ publicæ coctionem pistoribus tradidit. Epigraphie Romaine: Cagnat: viii. 8480.

Mills of the anciently established food supply of the city: restored and fitted with plant and devoted to the manufacture of public bread by the pistors.

* Ostia, founded at the mouth of the Tiber by Ancus Martius, as mentioned by Livy, as the port of Rome, is now a ruin three miles distant from the coast, owing to the receding of the sea. The emperor Claudius caused it to be abandoned, and built a new harbour "at Ostia," as Pliny says, but actually a short distance away at Portus Romanus or Portus Augusti. During this work Claudius caused to be sunk, presumably as a bar to the encroaching sands, a large vessel which had brought an obelisk to Rome from Alexandria. Pliny (speaking of fir trees and masts) refers to this vessel. "There was a fir, too, that was particularly admired when it formed the mast of the ship which brought the obelisk from Egypt, by order of Caligula. It is beyond all doubt that there has been seen nothing on the sea more wonderful than this ship: 120,000 modii of lentils formed its ballast, and the length of it took up the greater part of the left side of the harbour at Ostia. It was sunk at that spot by order of Claudius, and upon it three embankments, each as high as a tower, were erected with cement which the same vessel had conveyed from Puteoli." Nat. Hist.: xvi. 76: xxvi., 14. The name of the port is scarcely mentioned in the modern works which have popularised Roman archæology, though an interesting view of the present desolation of the site is given in Liddell's *Rome* (1885, p 64). Yet its story is one of uncommon interest. Abandoned two score years before Pompeii was destroyed, it perished as absolutely as that buried city, and, like it, has but lately been recovered by the spade. Its ruins emphasize the already well-known extent and importance of the Roman grain trade. Two-thirds of the total number of buildings whose ruins remain were warehouses: its neighbour is the ruinous port 'Centum Cellæ,' or the hundred cells or stores; and here were the riverside warehouses where were provisionally stored consignments of grain till they could be forwarded to the capital. Rome and Pompeii: Boissier, 1896, c.v.

VII. CATTLE MILL

7. Census of, in the 4th century.

Grevius: Thes. Ant. Romæ: xviii., 260.

Towards the close of the 4th century Sextus Festus compiled his topography of Rome, *De Regionibus Urbis Romæ,* in which, among other things he enumerated the mills in each one of the fourteen wards of the city. Following Sextus, later topographers as Pub. Victoris, Onuph. Panvinius, Pancirollus and others, made similar returns: and their several lists, so far as mills are concerned, were tabulated and compared by Goetius. His schedule is incomplete, however, as regards the list of Sextus, and in subjoining it we, therefore, quote also Boissard upon that point:—

Wards of City.	Boissard (*Topog. Rom., 1627*).	Goetius (*De Pistr. Vet., 1750*).			
	Sextus.	Sextus.	Victor.	Ganv.	Pancir.
1	12	12	20	12	20
2	23	22	12	23	12
3	13	23	12	23	16
4	23	23	12	24	12
5	22	27	12	22	15
6	23	23	12	23	16
7	17	27	16	17	15
8	30		20	30	20
9	32		20	32	20
10	12		20	12	20
11	12		12	12	15
12	25		20	25	20
13	30		20	30	20
14	32		22	32	22
Totals	306	157	230	317	243

Of the total number varying from 230 to 317 most were cattle and penal mills of the State: some were trade establishments like that of Apuleuis owned by a woman and grinding for hire; some were private bakeries attached to the houses of nobles: and some few were water mills, then (judging by the laws of Honorius and Arcadius in the year 398) newly established. It has been assumed that the great majority if not all the number were water mills, but as discussed in another volume in connection with the

7. Census of, in the 4th century.

introduction of water milling into Rome, the evidences in no way bear out the conjecture. On the other hand while the circumstances would suggest that the many mills scattered at random through the streets of the city were not water mills, it is in definite evidence that at about this period most, if not all, the water mills of Rome were established across the Tiber, at the foot of Mount Janiculum, in District No. 14; which was really the great milling centre of the city in the declining days of the Empire.

8. Modern survivals.

In the horse and ass mill generally adopted in Europe, the original conical stones gave place (no doubt soon after water milling had introduced comparatively flat stones) to those ordinarily known in modern times. One or two passing references only to the later history of the mill need be cited. At Dunstable Abbey, in 1295, an English monk attempted to introduce a new and improved horse mill with the unfortunate result recorded in the Coucher Book of the establishment :—

Eodem anno fecit frater Johannes carpentarius novum molendinum novæ structuræ et hacteuus inaudite, promittens quod per unum equum tantum trahi posset: sed eum ipsum molendinum perfectum esset et molere deberet, quatnor equi fortes vix poterant illud movere: et propterea est amotum et vetus molendinum equitum est resumptum.

Annales Dunstaplia: 402.

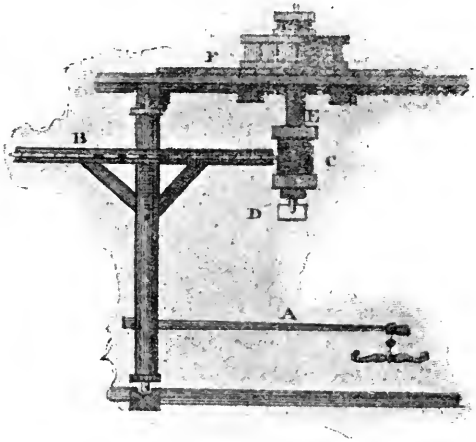
This year brother John, the carpenter, made a new mill constructed upon principles hitherto unknown, promising that one horse should be able to turn it; but when it was made and should have ground, four strong horses could scarcely move it; and so it was removed and the use of the old horse mill resumed.

Throughout mediæval times the horse mill was practically identical in construction with the wind or water mill. The simple driving gear placed in the lowest story of the building comprised an upright shaft, revolved by the traction of one or more asses or horses harnessed to shafts: attached to the shaft and near the ceiling, a large horizontal toothed wheel actuated one or more spindle wheels connected with

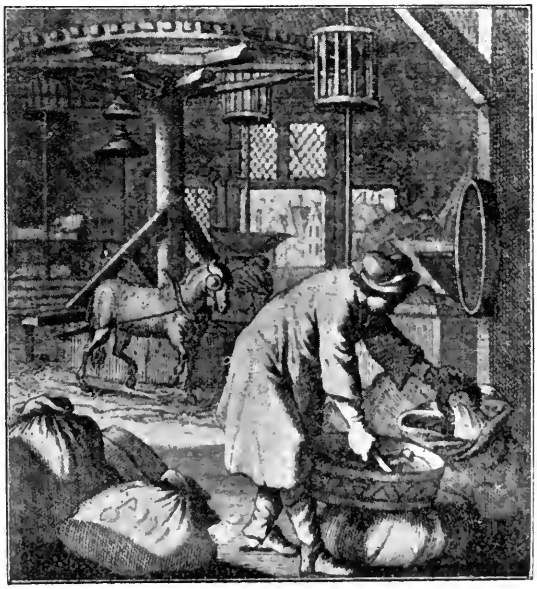
VII. CATTLE MILL

8. Modern survivals.

the stones, which were placed above. In the diagram are shewn—A the driving shaft, B driving wheel, C spindle wheel, E pivot passing through the lower,



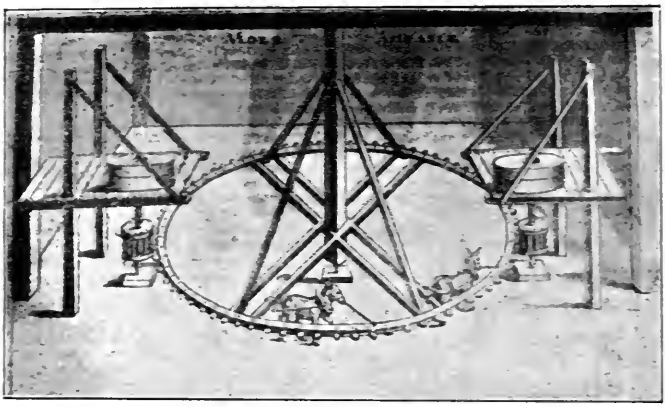
but fixed to the upper, stone, both of which are enclosed in the casing F. A general view of the interior of this portion of the mill, taken from the



VII. CATTLE MILL

8. Modern survivals.

German in 1698, shews three spindles working three pair of stones, all driven by the one blindfold horse. A curious mill drawn by two asses, shewn in a 16th century German engraving, appears to be more



fanciful than real. A curious Asiatic variation of the mill was recently noticed near Khiva.

The horse or ass mill of ordinary type was greatly esteemed by mediæval mill-owners, being free from the frequent inconveniences attending windmills during calms, and water mills during droughts, floods and frosts. The horse mill was always workable at such crises, and few milling establishments of any consequence were without one. The same legal privileges attached to the ownership of these as to that of any other corn mills, and the same penalties attached to their illegal erection by persons not holding milling rights; a case in point being incidently quoted in another

Text: Milling Soke.

Text: ch. ix.

VII. CATTLE MILL

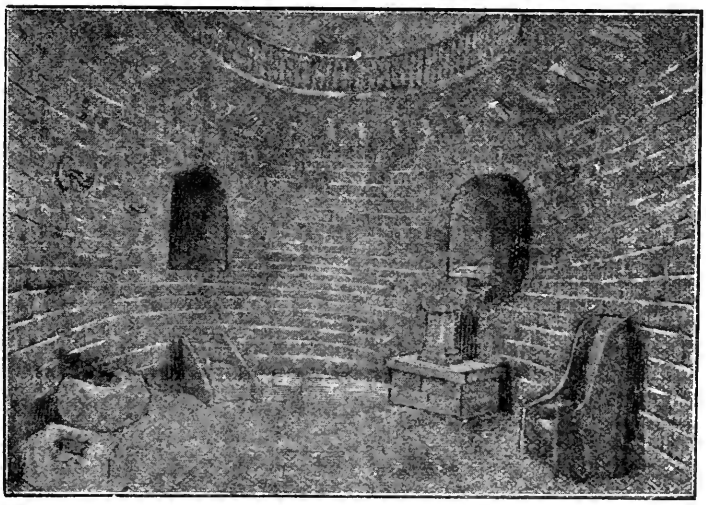
8. Modern survivals.

chapter in connection with the abbey of St. Alban's, Cirencester.* In the 16th and 17th centuries, when popular hostility to the exclusive milling privileges of manorial lords was at its height throughout England, it was a horse mill that the discontented burgesses usually set up in defiance of the watermill or windmill of the lord: hence it figures very frequently in the innumerable disputes and actions at law which mark that critical period in the history of milling. Many typical records of such popular rebellions in England against the privileges or "soke rights" of manorial mills appear in another volume of this work.

Text: Mediæval Mills.

* At Lancaster Castle, in "Hadrian's Tower," said to be built by order of that emperor in the year 124, is a reputed Roman horse mill. The tower is circular, with walls eight feet thick, and the alleged mill consists of the dungeon-like chamber in the base. It is stated that "the lower storey was

Guide L. Castle, 1896, 38.



used in Roman times as a mill in which the corn was ground for the garrison, and in the time of John of Gaunt as a bakery, and called 'the oven'." Mr. E. W. Cox, who has favoured us with the above sketch, referring, in an able paper on the archæology of Lancaster Castle, to the tower, expresses the opinion that the character of the stone-work evidences not a Roman but a Norman origin. It is somewhat unlikely that this place was built for milling purposes, and if ever it were so used, we agree with Mr. Cox, that it was in Norman, not Roman, times.

L. & C., H. S. 1896-97.

CHAPTER VIII.

THE ROMAN PISTORES.

VIII. ROMAN PISTORES.

1. Slaves and criminals.

THE slaves who drove the mills of Rome appear to have been the very dregs of the people, and, if we are to credit Apuleius (of about 170 A.D.), were shockingly treated. The poet who wrote the autobiography of an ass that, among other of its adventures through the world, worked at a corn mill, places his asinine hero in a situation for reflecting upon the horrible condition of affairs which surround it in the mill. Being released from the shaft to eat its provender it gazes philosophically round the place: and having criticised its fellow brutes surveys the working slaves and criminals :—

Text: Cattle Mills: p. 190.

> Ye Gods, what a set of men I saw! Their skins were seamed all over with marks of the lash; their scarred backs were shaded rather than covered with tattered frocks: some wore only aprons: all were so poorly clothed that their skin was visible through the rents in their rags! Their foreheads were branded with letters: their heads were half-shaved: they had irons on their legs: they were hideously sallow: their eyes were bleared, sore, and raw, from the smoke of the ovens: they were covered with flour as athletes with dust!

Metam, ix. 173.

Some exaggeration there may be in this painfully realistic scene, yet it leaves a gruesome impression on the mind that unless it were literally based on fact and somewhat represented the actual state of affairs—a matter quite within common public knowledge at the time—the entire sketch would have been long since laughed out of the world as a palpable absurdity. To the miseries which Apuleius enumerates may be added the fact mentioned by other writers,

VIII. ROMAN PISTORES.

1. Slaves and criminals.

that slaves working at the mills wore yokes or collars of wood of such a size that the hand could not be put to the mouth, lest any hungry wretch should eat the grain it was his business to grind.

Text: Mortars, p. 102.

Pliny, a century earlier than Apuleius, has told us of slaves working at pounding pestles "in chains, as is generally known;" and the Roman mill is said to have borne the repute of being the recognised slave market of the city.* At the same time there is no special reason for considering that slaves of the mill were in any worse plight than other slaves; and though Pliny's pounders were in chains and the criminals of Apuleius were branded, so also were the agricultural labourers on the Quintian meadows, where erstwhile Cincinnatus was ploughing when messengers brought him news of his elevation to the dictatorship:—"these same lands at the present day being tilled by slaves, whose legs are in chains, by malefactors, and men with a branded face."

Nat. Hist., xviii., 4.

Various references to slave mills occuring in the classics and merely demonstrating that such mills existed, need not be recapitulated here: many of them, as well as similar allusions to cattle mills, may be found quoted by Heringius (*De. Mol. Vet:* 1663: q. iv.)

The most interesting matter in connection with slavery at Roman mills is of course its abolition, when towards the close of the 4th century the Emperor Constantine embracing Christianity slavery was practically at an end; and forced labour at the mills was thenceforth confined to criminals. Ausonius, who lived at the close of the century, definitely states that the practice of causing mills to be driven by men (*i.e.*, other than criminals) had ceased: a law of Valentinian and Valens, in 364, directs the committal of state offenders to the mills; and a little later it

Meule de Moulin: St. Ours: 7.

* On a été jusqu' à dire qu' elle servait comme d'autel à la vente des esclaves.

VIII. ROMAN PISTORES.

1. Slaves and criminals.

2. Journeymen.

was ordered by Honorius and Arcadius that any menial obtaining by fraud more than his due share of the free bread supply should be sent to the mills.

Though till towards the close of the 4th century slaves and criminals figured so prominently in connection with Roman mills, yet they did but constitute a portion of the milling fraternity. In private bakeries attached to the great houses, and in public trading establishments, were very many men, perfectly free, working voluntarily at their ordinary trade, and comprising the nucleus of the future artisans and tradesmen of the milling world. Still the ancient disdain cast upon grinders of grain, whether Egyptian female slaves or Greek pounders, clung even yet to the rank and file of the craft. Rome had not been accustomed to honour tradesmen and artisans very highly; and perhaps no body of working men came in for a greater share of her patrician contempt than did the unfortunate pistores. The long association of their trade with women servants, slaves and criminals was not readily forgotten, and its followers were held to be men of extremely low social degree. So emphatic was public opinion—or rather patrician opinion—on the matter that for any man of eminence to be known to have been a pistor, or to be descended from a pistor, was accounted a most discreditable circumstance.

The mighty Octavius Augustus, who died 14 A.D., suffered under the misfortune of being reputed to be the son of a pistor; and, worse still, this seems to have actually been the fact. It was of no consequence that, as Minutius Felix shrewdly remarked, Octavius was a man of the stamp of Plautus who had worked at mills: being one of the pistors first, but one of the sages afterwards:—Octavius homo Plautinæ prosapiæ ut pistorum præcipimus ita

VIII. ROMAN PISTORES.

2. Journeymen.

Donatus ap. Heringius, q. i. ii.

postremus philosophorum. So serious a matter was the reputed low birth of the emperor, that Virgil (who was ever admitted to the closest intimacy with him) once ran great risk of losing the imperial favour by an audacious joke alluding to the circumstance. The poet having rendered some service to the Master of the Horse was rewarded, by order of the emperor, with a daily gift of bread: a donation which Virgil did not greatly esteem, as it undoubtedly carried with it the suggestion that bread was particularly grateful to members of his profession. A second service, however, was rewarded by the emperor paying Virgil the dubious compliment of ordering the embarassing gift of loaves to be doubled. The poet obliged the Master of the Horse no more; and not long afterwards found an opportunity for expressing his mind on the matter. The emperor and his court discussing questions of ancestry, Virgil (having, with politic skill, obtained leave to speak freely) declared that Augustus must be a baker or the son of a baker. "Why so?" demanded the astounded emperor. "Because, sire," said Virgil, "you so naturally take to rewarding people with gifts of bread." Fortunately Augustus took the joke kindly; and good naturedly declared that henceforth the poet should be rewarded not by a baker, but by a magnanimous king—deinceps non à pistore sed à rege magnanimo dona feres. Augustus, however, had more to bear on this sore point than Virgil's gentle joke. Suetonius states that Mark Antony treated the emperor's ancestry with open contempt; while Cassius of Parma roundly declared that the emperor was but a lump of dough from the bakery.

About 70 years after the death of Octavius, one of Martial's sallies of wit is directed against an advocate now retained at high fees and lavishing

money in all directions, but formerly nothing but a lowly pistor :—

VIII. ROMAN PISTORES

2. Journeymen.

Pistor qui fueras diu, Cypere,
Nunc causas agis et ducenta quæris;
Sed consumis et usque mutuaris.
A pistore, Cypere, non recedis
Et panem facis et facis farinem.

Epygr. viii., 16.

Long you baked and no one wondered,
Now you plead and ask two hundred:
Still you waste and still you borrow,
And that, Cyperus, proves our sorrow.
A baker still, though somewhat musty,
Bread you bake and still are dusty.—*Elphinston.*

3. Poets and sages.

Notwithstanding the lowly status of the working pistor, various Romans of eminence are found at this period following the example of Pittacus and Cleanthus, and labouring at mills. At about 200 B.C., Plautus has been seen inaugurating the milling labours of Roman poets; and in the Augustan age, toiling in the pristina was the lot of poverty-stricken bards and famishing philosophers whose names gild the memory of their brilliant period. As Raderus stoutly says—"it was the scandalous custom of the Romans to deny relief to the poverty of men of genius and good birth; so much so that they were constrained to hire themselves out to labour as pistors."* Truly, in the liability to earn a livelihood, as well as in the liability to serve the ordinary duties of citizens, whether at Rome or elsewhere, "poets enjoy no prerogative of immunity," as one of the old Roman laws declares; and these ancients wits and sages felt the force of the truth, and of the public ridicule which their poverty was considered to justly evoke. Virgil's self-esteem was sorely wounded by the emperor's kindly-meant gifts of bread: but he was no more sensitive to ridicule, on the score of poverty, than his brother bards. The satirical poets, in fact, appear to have been fond of recurring to the absorbing topic.

Codicis, Justn & Just, lib. x. tit. 53.

* Erat enim omnino accusanda Romanorum indoles, quod ingenuorum hominum indigentia suppetias ferre renuerit, eosque pistori locare operas passi fuerunt.

Ap. Martial Epi., i. 26.

VIII. ROMAN PISTORES.

3. Poets and sages.

Horace, prince of Roman lyric poetry (64-9 B.C.), does not fail to smartly satirise the very unfortunate reputation of his versifying brethren; all citizens, he declares, dreading to allow poets to obtain any information of their affairs, since they would be sure to make songs of it for the amusement of old women at the water tanks, and boys at the bakehouses:—Quodcumque semel chartis illeverit, omnis gestiet a furno redeuntis scire lacuque et anus et pueros. Martial (about 90 A.D.), whose complaints of poverty are incessant, launches into trenchant epigram on the rich men of Rome who allow poets to starve under threadbare cloaks, while jockeys are clothed in purple array; and Juvenal (contemporary with Martial) informs us how the neglected bards secure a living: celebrated poets, he says, struggle to keep small baths in the paltry little town of Gabii, or to conduct bakehouses in Rome:—Cum jam celebres notique poetæ balneolum Gabiis, Romæ conducere furnos temptarent. To the ordinary hardships of this condign fate the modern Heringius adds one other:—"Their vile hard drudgery did not cease even on public holidays; they were compelled to work on days when by law labour was prohibited: nevertheless the hard times forced them to do this and, for small reward, to lose all their leisure and freedom."*

Serm: i. 4. 37.

Epygr. x. 75.

Satyr. vii. 3.

De Mol. Vet. 1663.

*Virgil, who admits that "even on holy days divine and human laws permit the performance of some works," does not include grinding corn among them:—"No religion hath forbidden us on such days to clear the water channels, fence round the corn, lay snares for the birds, fire the thorns or wash the sheep: and often the peasant (on a holy day) loads the ribs of his sluggish ass with oil or common apples, and on his return brings a cut millstone or a mass of black pitch."

Text: Querns, p. 134.

Quippe etiam festis quædam exercere diebus
Fas et jura sinunt: rivos deducere nulla
Religio vetuit, segeti prætendere sepem,
Insidias avibus moliri, incendere vepres, etc.

Georg. i., 268.

Columella (about 42 A.D.) however, comprises grinding or rather pounding grain—far pinsere—among the works of necessity which might be performed on holy days. About a century later the ass of Apuleius is found at a mill which was "always kept going" grinding on hire.

Re Rustica, lib. ii.

Text: p. 190.

3. Poets and sages.

There need, we think be little doubt that nothing but necessity or the pursuit of regular business ever led poet or philosopher to labour at corn mills. At the period under notice grinding was generally ranked as a kind of casual relief open to any unskilled labourer in distress who could persuade a master pistor to employ him : and it seems to have been in this capacity that the poets and other literati were usually employed, if, indeed, they did not open pistrina of their own, as Juvenal says they did. Still much argument has been wasted on the speculation that these men entered mills after they had become famous, voluntarily and for the pure pleasure of the thing. Goetius, in a special chapter, 'Philosophi in Pistrino Laborantes,' broaches a theory, which Plutarch is supposed to have entertained, that Pittacus and the rest of the famous early millers adopted the work merely as a pleasant relaxation. Anxious to disassociate his heroes from the ranks of the common people, Goetius observes :

De Pistr. Vet. 1730, iv. § xvi.

The statement handed down to us from antiquity gains strength, that princes and poets would hardly have voluntarily suffered such labour if service in milling were a kind of penal servitude. Thus, by the light of this fact we may clearly perceive a dividing line between what were the labours of ordinary servants and those of convicts. Probably those princes, magnates, sages and poets, who ground grain at handmills may have chosen such labour partly for bodily exercise and partly for mental relaxation: the more so that those, who really were bound by the hard law of poverty to the toil, might, seeing them voluntarily submit to the same task, recognise that though laboriously yet not discreditably were they employed."

This is not likely to have been the general rule. As a matter of choice it is difficult to imagine anyone voluntarily choosing the hard and dusty indoor occupation of the pistor as a means of relaxation or as an employment conducive to health. At all events it was not so with regard to Martial and his complaining poetical colleagues. And against any such fanciful theory of men already eminent whether as

VIII. ROMAN PISTORES.

3. Poets and sages.

Text: pp. 99, 129.

kings, sages, or comic poets, seeking physical exercise or mental relaxation at corn mills, we need after all only remember the stern words of Aulus Gellius regarding Plautus, that the poet hired himself to the bakers "to obtain the necessaries of life."

4. Worthies of the craft.

The employment of journeymen and casuals presupposes the existence of another class of pistores, the millowners and employers. There is every evidence that in this branch of the trade Rome possessed many men of position and importance who ground grain for hire and baked fancy bread for the better class of citizens. The avocation had existed as a trade even in ancient Greece, whose pistores are mentioned by Aristophanes (c. 400 B.C.),* long before Rome had annexed thence the band of pistores who founded the trade in the Eternal City. There was abundant scope for private enterprise in this direction, and, in fact, many of the mills we shortly after find scattered through every quarter of the city were private establishments owned by free citizens.

Traces of a few of these worthies of the craft still remain. In Pompeii is the monumental inscription:—

Inscrip. pariet. Pomp.: 875.

C. Julivm Polybivm vir studiosvs et pistor:

To Caius Julius Polybius, a learned man and a pistor:

and close by are inscribed, upon the pistrina they once owned, the names of Caius Callustius and Pacuvius Proculus pistores, and evidently men of substance. In Rome, again, one of the most remarkable of the ancient works of art referring to milling is the tomb of Eurysaces, the pistor, and his wife, who are believed to have lived under the

* In one comedy, a jovial old man reminds his frolicsome comrade of the distant time when they once went to rob the bakers of little loaves quite hot (*Wasps*, Act i., sc. 3). In another, one of the characters declares "I am a man who would rob the bakers sooner than that you should lack even little cakes," (*Chevaliers*, Act ii., sc. 3). In a third, it may be mentioned, the bakers' wives appear as the archaic representatives of the whilom wives of Billingsgate:—"Do not give way to your anger; is it proper that men of repute should fight like bakers' wives?" (*Frogs*, Act iii., sc. 2).

4. Worthies of the craft.

Republic, and who certainly were neither slaves nor victims of poverty. The tomb, which was discovered in 1838, is to be seen near the Porta Maggiore. Upon it is the somewhat defaced inscription:—

Est hoc monimentvm Marcii Vergilii Evrysaces pistoris redemptoris apparitoris.

This is the monument of Marcus Virgilius Eurysaces, pistor, buyer of grain, and beadle.

The meaning of the last word has been somewhat disputed, but it is generally agreed to be as here translated; and it indicates that Eurysaces was not only a miller, baker and grain merchant, but held some office in the city as that of steward or inspector, probably over the trade; and was evidently a citizen of position. Near the monument were found two statues, which had originally been placed upon the tomb, representing Eurysaces and Atistia—femina optima: his most excellent wife—whose ashes are stated to be interred within the mill. The figure of the miller is that of a man of an imposing yet kindly presence whose face is impressed with thought; his wife appearing as a portly dame with large languishing eyes. Three large and artistically carved bas-reliefs on the tomb represent various episodes in the busy life of the erstwhile miller and grain merchant. A slave with an account book is receiving sacks of grain: Eurysaces himself is in business conference with three persons, one of whom seems to be a master and the others servants: an ass mill is rapidly grinding, a slave with a whip keeping the animal in motion. The second carving shows the meal being carried to the sieve: a customer buying and paying for flour: grain being pounded in a mortar: four bakers preparing dough on a table near an oven, as Eurysaces stands by expounding the procedure. In the third bas-relief is depicted the weighing of bread on a huge balance in view of the three personages already mentioned, one of whom may be the

Meule de Moulin, Paris, 1895, 32.

VIII. ROMAN PISTORES.

4. Worthies of the craft.

prefectus annonæ or civic official having supervision over the public bread supply. This exceedingly interesting monument, the principal characteristics of which are so closely retained despite the rough treatment to which at some period it has been subjected, is very fully described in the *Bulletin de l'Institut de corresp. archéol. de Rome,* 1838.

5. Collegium Pistorum.

The beginning of the second century, A.D., paradoxically introduces us at once to the lowest degradation and the highest honour of the milling craft in Rome. Its degradation we have seen: its honour was comprised in the establishment of the College of Pistores—the first incorporated company of bakers or millers—by the emperor Trajan, between the years 98 and 117. The incorporation, therefore, had taken place about half-a-century before Apuleius described the shocking condition of the slaves in the mill of *The Golden Ass:* but it was assuredly not among slaves and criminals such as he described that the college was created; nor was their condition affected by it. The moving spirits in such a matter were, no doubt, citizens of standing and repute, men of the stamp of Virgilius Eurysaces; though he, beadle or apparitor as he was, lived at least a century before its establishment, and if he had exercised any supervision over the trade, had not done so in connection with the college. Practically little has come down to us of the circumstances which led to the formation of the company. It is stated:—

Text: p. 191.

See also Hist. Rom. Aur. Victor, 1829, i., 265.

Ut panis ingenti urbem colentium multitudini abunde suppeditaret, nec deficerit unquam, repertum a Trajano firmatumque Pistorum Collegium. Qua ratione et populo R. universo et peregrinis optimus imperator prospexit, quorum plerique pane a propola vitam tolerabant.

In order that a numerous people might be abundantly supplied with provisions, there was established by the emperor Trajan a College of Pistores; this most excellent emperor having regard to the Roman people at large, as well as strangers, the great part of whom were obtaining bread from retailers.

VIII. ROMAN PISTORES.

5. Collegium Pistorum.

Hadrian, the successor of Trajan, appears to have rendered substantial service to the college; and two centuries after his death, which took place in the year 161, the company erected to his memory a monument at, or near, his tomb, overlooking the water mills of Janiculum; an illustration of which appears in another volume. This event, as well as the enactment of various laws affecting members of the college, occurred at a period when water-milling was coming into vogue, when a new state of affairs in connection with the conditions of the trade was arising, and when the labouring pistores, whose condition we are now primarily considering, had been absorbed into an evidently extensive association of water millers established upon the foundation of Trajan's college. The whole of these matters, dating from about the middle of the 4th century, are, therefore, considered in connection with "Roman Water Mills."

CHAPTER IX.

MEDIÆVAL SUPPRESSION OF QUERNS.

IX. SUPPRESSION OF QUERNS.

1. Laws and charters.

A PASSING allusion has already been made, respecting querns and horsemills, to the feudal law of Milling Soke by which great landowners were endowed with the sole right of building and working mills upon their own estates. Early manorial lords in granting charters to their tenants ordinarily stipulated for a reservation of all milling rights and privileges to themselves; compelling tenants to attend the mills they erected and prohibiting the use of domestic querns. Similarly, when in pursuance of the piety of the age, religious houses were endowed with gifts of mills—favorite forms of donation in those days—the charters or grants invested the monks with a sole right of grinding corn for the manor or district; and, again, prohibited the use of handmills. One of the earliest purely milling documents extant is a charter of this latter character, granted about the year 1150 to the monks of Embsay Priory, Yorkshire, by Cecilia de Rumelia, lady of the manor of Silsden; endowing the priory with the mill of Silsden and all its privileges, and prohibiting the use of handmills. From a fac-simile of the document given by the learned Dr. Whitaker in his *History of Craven* (1812-163), which we are permitted to reproduce, we have made a literal transcript and translation of what Whitaker, in another instance quoted later, terms "a mixture of bad Latin very circumstantial and curious";—

See Frontispiece.

IX. SUPPRESSION OF QUERNS.

1. Laws and charters.

In nomine Domino et Patre suo. T. Archiepiscopo Eboraco et omnibus Christi fidelibus presentibus et futuris Cecilia de Rumelio salutat in Domino. Sciantis me dedisse et concessisse et presenti carta confirmasse Deo et Beatæ Mariæ et Sancto Cuthberto Emesai et canonicos ibidem Deo servientibus, molendinum de Sighelesden cum omni moltura ejusdem villæ et opere molendini quod me debebatur et cum omnibus libertatibus et liberis consuetudinibus quod ego habui in predicto molendino, sine alioque retenenito in liberam puram et perpetuam helemosinam. Ita scit quod alium molendinum ab alioque hominum sine voluntate et concessum canonicorum in eadem villa ne fiat. Hæc ne manu mola habeantur. Siquis autem de predicta villa renuerit venire ad predictum molendinum ego et heredes mei compellemus eum illud seguire: ita quod si repertus fuisset nemenis ab alio molendino saccus et bladus erunt canonicorum et equus et forisfactura erunt mea et heredum meorum. His testibus Rainero dapifer Ihone constabulus Hugo capellanus Waltero picot Willielmo Reginaldo.

In the name of the Lord and His Father. T. Archbishop of York and all his faithful people in Christ, present and future, Cecilia de Rumelia salutes in the Lord. Let it be known that I have given and conceded, and by this present charter confirmed to God and the Blessed Mary, and St. Cuthbert of Embsay and the canons, servants of God, there, the mill of Silsden; with all the multure of the said town and all milling services that were due to me, and all liberties and free customs which I have had in connection with the said mill; without any reservation, and in free pure and perpetual alms. Wherefore no other mill by any other man may be made in the said town save by the will and concession of the said canons. Nor may they [the townsmen] have handmills. If, nevertheless, any one of the said town shall refuse to come to the said mill I, and my heirs, shall compel him to follow [attend] it: and if any be found attending another mill, the sack and corn shall be the canons', and the horse [carrying the same] as well as the penalty, shall be to me and my heirs. Witnesses to these:—Rainald the steward, John the constable, Hugh the chaplain, Walter the painter, William and Reginald.*

* In connection with the tragic death of the son of Cecilia, who was drawn by a dog into the river Wharf at Bolton and drowned, the lady determined to build a memorial priory there—

"Let there be
In Bolton on the field of Wharff
A stately priory;"

transferring thither the priory from Embsay, which became the nucleus of the later Bolton Abbey. The tradition affords the theme of Wordsworth's tender poem—

"What is good for a bootless bene
When prayer is of no avail?"

and of Rogers' delicate verse—

"At Embsay rang the matin bells."

The transfer of Embsay priory to Bolton taking place in 1154, establishes the date of the milling charter as about 1150

IX. SUPPRESSION OF QUERNS.

1. Laws and charters.

An instance of another nature occurs in a confirmation of the customs of the king's mills of Dee at Chester, by Edward III., in 1356. These are designated "Customs of the mill of Dee, used from a time when memory runneth not to the contrary:" and one of them stipulates "No one in the said city shall have handmills to the prejudice of the said mills:"—Consuetudines molendinos de Dee usitat a tempore cuius contrarium memoria non existat: Nullus de civitate predicta habet molas manuales in p'iudice dcō molend.

Harl MSS., 2081, 168.

The manorial laws, which established such rights, are older than the English statutes, and were anciently matters of common, not statute, law. But in the 'Anomalous Laws of Wales,' ascribed to the 10th century, occurs the dictum that a manorial lord owns "the toll of his mills:" this being the earliest British enunciation of a custom which, at the close of the 11th century, was in full force throughout the kingdom. And a Scotch statute passed at Berwick-on-Tweed, by Alexander III., in 1283, enacted:—

Anct. Laws and Institutes: bk. ix. ch. 23.

Regiam Magest: 1609. 269.

(xix.) Noe man sall presume to grind qukeit [wheat], maishlock [barley ?] or rye in hand mylne, excepte he be compelled by storme or be in lacke of mills quhilk soulde grinde the samen. Gif a man grindes at hand mylnes he sall gif the threlling multure. Gif anie man contraveins this our proclamation he shall tyne [forfeit] his milne perpetuallie.

(xlii.) It is statute that na man sall have bot twa pair of mylnes [querns] and he quha hes mae sall be depryved therof for ane yeare and ane day.

This translation, in the vernacular of 1609—of more antique appearance now than the older Latin text—are the veritable words which, many a time and oft, must have struck dismay to the heart of the rustic caught using the little free mill at home, or, perhaps, even owning two of them. At the time this edict was originally issued, a popular stanza (rendered into "intelligible English" by a modern archæologist) declared:—

IX. SUPPRESSION OF QUERNS.

1. Laws and charters.

"An Act they framed 'gainst the poor man's mill—
The only hopper the poor can fill:
Of rye, oats, barley, they did him mulct
And ground him with want and sore insult."

The incidence of this peculiar law refers specially to the subject of water and wind mills, in which connection it is fully considered in another volume; but at present it is of interest as the originating cause of the wholesale suppression of querns which, in a greater or lesser degree, prevailed in Europe from the 11th to the 18th century.

Roy. Soc. Ant. Ireld.: v. 352.

Text: Milling Customs: Soke.

2. Raids and captures.

The earliest Soke conflicts raged round the primitive querns of cottagers: their use of the little appliances being necessarily strictly forbidden in every manor in which the privileges of a soke mill were maintained. Dr. Hume, F.S.A., who devoted considerable attention to the study of querns, remarks with perfect accuracy that "within a certain district, call the Soken, everyone was obliged to grind and pay the usual toll to the lord's mill:" but erroneously makes the deduction that "this law did not prevent anyone from grinding at home for family use." That, on the contrary, the law did prohibit the use of querns (except upon those manors where compulsory milling-soke had never been enforced or had been allowed to lapse) is only too evident: though the fact is of far too diffuse a character to be enlarged upon in connection with the present subject. Nor is Dr. Hume quite correct in his explanation of the notorious conflicts which did occur:—"To secure the entire trade, and literally draw grist to the mill, the millers waged a war of extermination against querns: some were purchased and some obtained sureptitously: in every case the pair was destroyed by the breaking of the upper stone, and numerous fragments may still be found upon the surface of the ground or dug up in the neighbourhood of old watermills and windmills."

L. & C. H S. Trans: 1848, 38.

IX. SUPPRESSION OF QUERNS.

2. Raids and captures.

It was, however, not the millers but their manorial lords who exercised this high-handed conduct; and their proceedings were by no means done by stealth or by resort to the purchase of the objectionable stones. In the exercise of his jurisdiction as lord of the manor and owner of its milling rights, the manorial land owner—whether king, priest or squire—was invested with full legal power for enforcing the manorial law against querns; and it was he or his bailiff who publicly, in broad daylight, invaded villages and searched cottages; authoritatively capturing querns, sometimes without resistance, sometimes after tough forays against the owners. Openly were carried off the stones to the manor house, the abbey, or the mill; where their fragments were utilised mayhap to decorate the mill-field, mayhap to pave the parlour floor of an irate abbot who loved to walk upon them, mayhap to be knelt upon by their unlucky owners (as at one abbey they did with halters round their necks in token of submission) as they pleaded pardon for their misdemeanour. And if in such expeditions the lord were routed he appealed to the courts and the law stepped in to his aid. All of this, in every aspect, is a very different matter indeed from millers secretly stealing or covertly purchasing querns in order to furtively destroy them.

By such means as the foregoing, querns in large numbers were constantly destroyed; so much so that at the present day, among all the specimens which throughout the Continent have been dug from the ground, very few are complete, while most of them exhibit the clearest indications of having been purposely broken. These raids on the private property of lowly people must have been tinged with more than a semblance of cruelty. In districts where milling soke was not enforced, the quern was

IX. SUPPRESSION OF QUERNS.

2. Raids and captures.

a prized possession handed down from mother to daughter generation after generation; a cherished heirloom not to be parted with in times of even the direst necessity. Small wonder was it then that their capture—in order to maintain the lord's feudal tax on bread—aroused embittered feelings and prompted ceaseless rebellions among suffering tenantries. Perhaps never before nor since did old custom and personal sentiment so strongly rebel against the march of an improvement that was destined to sweep both custom and sentiment entirely away.

3. Paving an abbey parlour with querns.

Among the many recorded contests for the suppression of handmills, is conspicious a prolonged conflict at St. Alban's Abbey, Cirencester—an affair of which the monks themselves, in their chartulary, have furnished a particular account. The conflict began in 1274 and endured many years; and though we can but summarise the story, yet as related in full by Walsingham, a monk of the foundation of St. Albans, it is well worth elaboration. The abbot, being lord of the manor, and owning milling rights over the entire town, began by compelling the burgesses to deliver up to him their handmills. To appease their wroth he agreed that his miller should solemnly take oath to be honest; and that, in case of any doubt arising at any time as to the immaculate integrity of the said miller in the matter of taking toll or delivering the due quantity of flour, an immediate inquest on the matter should be held in the manorial court before twelve jurors. From which it seems that the townsmen had some ground of complaint against the abbot's miller. This arrangement appears to have been amicably maintained for half-a-century, when, once more, the townsmen rebelled; this time turning the tables on the abbot by attacking him, besieging the abbey with

Chron. Monast. St. Alb.: Gesta. Abbatum: i. 323-423., ii. 149-326.

IX. SUPPRESSION OF QUERNS.

3. Paving an abbey parlour with querns.

perfect success, and extracting from their lord a charter of liberties; but, after all, failing to induce him to insert in the same a clause freeing them from compulsory grinding at the abbey mill. However, nothing daunted, they immediately set up their querns again (about eighty in all); and six or seven years elapsed before the abbot, who quietly bided his time, found it feasible to respond. At length a descent was made in force upon the town, houses were searched and handmills confiscated; the stones being carried off in number to the abbey, where the imperturbable abbot gravely paved the floor of his private parlour with them, in testimony of the thorough subjugation of his foe. He and his successors walked over this paved floor for another half-a-century, till 1381; when, during Watt Tyler's rebellion, the townsmen again mustered courage and again attacked the abbey. Gaining access they tore up the precious parlour floor, and breaking the recovered stones into pieces, distributed the fragments among the whole of the tenants of the abbey as symbols of war. But their triumph was short lived; for what the abbot could not achieve by physical force he accomplished by the strong arm of the law. His bailiffs having made a certain raid on the town and carried away more querns; the burgesses, unluckily for themselves invoking the aid of the law, brought an action against him at Cirencester Assizes, as, no doubt, the abbot desired.

At the trial the plaintiffs alleged that at different times the abbot's bailiffs had broken into their houses and carried away and destroyed their private millstones: against which the abbot's simple defence was justification, he being lord of the manor, and the complainants being legally bound to grind at the abbey mill. This really was the fact, and the justices had no option but to formally decide that the matter

IX. SUPPRESSION OF QUERNS.

3. Paving an abbey parlour with querns.

depended upon the tenure of the plaintiffs as tenants of the abbey, and that they must come to terms with the defendant, the abbot. Accordingly, ere-long, twenty of the crestfallen townsmen executed a deed on behalf of themselves and the whole of the town which lay within the abbot's manor; admitting that they had made a false complaint against the lord the abbot, and agreeing to pay him, in recompense, a fine of one hundred marks (£66 13s. 4d.), and to grind their corn at the abbey mill.* The monastic scribe who thus recorded the subjection of the townsmen, has been careful to note in the margin of his report that the bailiff really had no right to break querns belonging to those burgesses who were

Trans. Brist. & Gloutr. A. Soc. ix. 309.

* It may conveniently be here stated that over a century later the abbot of St. Alban's, Cirencester, suppressed an illicit horse mill, set up in the town by one John de Chertsey. The abbot's constable adopted the usual expedient of seizing the stones: the miller happening to be away from home at the time. However, John's wife, equal to the emergency, with a number of irate housewives, her neighbours, followed and assaulted the unlucky constable; recaptured the stones and, unmolested, conveyed them home in triumph. The abbot thereupon calmly took the usual "further proceedings" in court; and in due course John appeared at the abbey, fell on his knees before his ecclesiastical landlord, and begged for permission to use the mill only just for grinding oats. But the abbot was as adamant and refused, and the horse mill was perforce dismantled and abolished.

It was at St. Alban's also that was executed the unfortunate priest and follower of Wycliff, John Ball, whose perversion was considered to be made clear by the warning words he wrote to the Commons of Essex anent "John the miller." More than one version of the enigmatical letter, said to be written by him, is extant: but mainly they are identical, and Ball, captured at Coventry and duly convicted of treason, was sent to St. Albans and there hanged. The most authoritative version of his letter is given by the monk, Walsingham:—

"John Schep, som tyme Seynt Marie prest of York and nowe of Colchestre greteth welle John Nameless and Johan the Mullere and Johan Cartere and biddeth hem that thei ware of gyle in borugh and stondeth togiddir in Goddis name: and biddeth Peres Plouyman go to his werke and chastise well Hobbe the robber, and taketh with you Johan Trewman and alle his felaws:—

Johan the Muller hath ygrownde smal smal smal:
The Kyngis sone of hevene shalle pay for alle.
Be ware or ye be wo
Knoweth youre frende fro youre foo."

Another version of the curosity is thus quoted:

"John Balle, Seynte Marye priest, greteth wele alle maner men and byddes them in the name of the Trinite, Fadur and Sone and Holy Gost stand manlye togedyr in trewthe and helpe trewthe, and trewthe shal helpe yowe. Jakke Mylner asket help to turne hys mylne aright. He hath grounden smal smal: the Kings son of heven he sall paie for alle. Luke thy mylne go aryght with the four sayles and the post stand in steadfastnesse. With ryght and with myght, with skill and with wylle, let myght help ryght, and skylle go before myght; then goth our mylne aryght. And if myght go before ryght and wylle before skylle then is our mylne mys [put] aryght."

IX. SUPPRESSION OF QUERNS.

customary tenants—the deduction, from this private reflection of the cloister after the event, being that, so far as those tenants were concerned, the bailiff, after all, had acted illegally. Customary tenants were those whose holdings were based upon special customs set forth in their leases: and clearly in this instance they were declared to be free to grind where they pleased; the abbot having thus no right to seize their querns. Those against whom he had the right were the so-called free tenants not holding their lands or tenements under any such exceptional terms; and it is more than probable that the freedom of the former class evoked the jealousy of the latter, and led to the long-sustained, but utterly hopeless, conflict which ensued.

3. Paving an abbey parlour with querns.

4. Tenants with halters round their necks.

Vale Royal Abbey, Cheshire, owned the multure or milling rights of the neighbouring town of Dernhall by charter granted in 1299 by Edward I., and till 1329 appears to have peaceably exercised it; all the townsmen grinding at the abbey mill. In that year, however, a considerable rebellion against the compulsion arose in the town, the burgesses coming out in arms to resist the officials from the abbey who, of course, were bent upon capturing the querns. The erring burgesses were eventually brought to their senses as to the hopelessness of such a struggle, and in due course a number of them were led before the abbot in his court in the monastery, with straw halters round their necks—multi eorum in eadem curiæ fenia ducti—formally tendering their humble submission to the laws of the mill. Ten of the most rebellious, Henry son of Roger Pynperpoint, John son of Richard Parker, John Christian, Robert Janecok, Warren Horne, William Horne, Gesse Dony, Adam Lychekyn, Robert Holden, and Robert his brother, were sentenced to forfeit their goods and cattle to the abbot; while the rest of the offenders

Harl MSS., 2064, 251.

Ormerod's Cheshire, ii., 168.

IX. SUPPRESSION OF QUERNS.

were paraded before their lord and received his full pardon in solemn assembly, in the presence of Thomas de Erdeswyke, seneschal of the abbey, Thomas de Oldyngton and Randle Oldyngton his son, sergeant of the peace: on which occasion the abbot graciously of his own good will, "misericordia motus," returned to them £6 out of a sum of £10 which the poor wretches had collected to offer as atonement for their transgression.*

4. Tenants with halters round their necks.

In these embittered disputes the clerics had frequent recourse to excommunication, as regards defaults towards mills as well as various other offences against manorial law. In a conflict in 1229 between the prior of Dunstable and his tenants, the latter refusing either to pay tallage (taxes) or to grind at the mills, matters rose to a prodigious height: not only were taxes and tithes withheld, and the corn of the prior trampled down, but the monks were slandered and abused through the country side in the good round set terms of the day. In this dire extremity the clerics solemnly declared that they would publicly excommunicate the whole of the recalcitrants in church, distinctly because, among other things, they would not grind at the priory mill:—Bannum etiam in ecclesia publice proposuerunt quod nullus burgensium moleret ad molendina prioris. Regarding the

5. Excommunication.

Annales de Dunstaplia, iii, 121.

* Of the abbey mills at Dernhall, an interesting reminiscence is to be found in the discovery of the tombstone of Gilbert Soloman during the restoration of Bunbury Church, Cheshire, in 1866. The stone bears a beautifully designed and executed circular-headed floriated cross, bearing the inscription round the sides (so far as could be deciphered):—

Gilbar Salamon ore isi tinc: Pater noster qui es in celo:

recording that Gilbert lies there, and quoting the opening words of the Lord's prayer. Ormerod, who reports the discovery and gives an engraving of the tombstone, makes no conjecture as to the identity of Gilbert, but it is clear that he may be recognised as the original owner of Dernhall mill. The abbey had acquired its rights over the town from the Crown in 1299: but from an earlier extent of its estate, compiled in 1291, it appears that it owned the Dernhall mill then:—"In Dernhall are three mills yeilding £11 13s. 4d. per annum: from which is deducted 20s. per annum which the heirs of Gilbert Salom. have received for several years past." Apparently, therefore, it was from Gilbert that, in consideration of this payment to him and his heirs, the abbey, at about 1285, had acquired the mill round which, half-a-century later, so fierce a conflict and so severe a humiliation of the townsmen occurred.

Ormerod's Chesh., ii., 266, 268.

Ibid, ii., 163.

IX. SUPPRESSION OF QUERNS.

5. Excommunication.

mills the rustics seem to have been brought to their senses by the threat, though they refused to submit to tallage; declaring—se velle potius ad infernum descendre quam in causa tallagii succumbere—they would rather descend to infernum than give way in the matter of taxes. The troubled prior now appealed to the chancellor and chief justice who threatened the townsmen with the terrors of the law, but to no use; whereupon the aid of the bishop of Lincoln was sought, and the whole of the turbulent burgesses were by him solemnly excommunicated. Still it was not till the pacific aid of the archdeacon of Bedford, who acted as mediator between the parties, had been secured that peace prevailed.

A milling compact, again, between the burgesses and the prior of Elgin early in the 14th century (quoted in another volume) was, in the same way sealed by the stipulation that either offender should be compelled, if necessary, by the bishop to observe the agreement "by the aid of every form of ecclesiastical censure."

6. Special licenses to use.

Occasionally we find the use of querns permitted for some particular and extraordinary reason by special arrangement, such exceptions literally proving the ordinary rule for their suppression.

Scotch law during the reign of king William (1165-1214) permitted the burgesses of Edinburgh to use querns; but the royal chamberlain was directed to diligently search "gif any man keeps hand mylnes other nor ane burgess." Richard II. also issued an ordinance permitting any person whose household consumed two bushels of corn per week to keep handmills. The favour would not benefit the poor, none of whose families would consume anything like that quantity of corn in a week or in a month; still it seems to have been one of those wise regulations which at a very early

Reg. Majest. 281.

Lib. Alb.: Riley, lxxiv.

IX. SUPPRESSION OF QUERNS.

6. Special licenses to use.

date freed London from milling soke. In 1359 a license on a smaller scale, included in the records of Waterbeche Manor, Cambridgeshire, recites that—"Rob. le Cooke has license of the Lady (of the manor) to hold one mill manual in his tenement unto his own proper use during his life, provided that no other of Waterbeche shall grind thereat without license of the lady." Robert the cook may have been the baker at the manor house; at all events the grant was purely personal to him.

History of Waterbeche, 1859, 13.

A more generous spirit appears in the bequest of kind-hearted Alice Pechye of Soham, 1525, who directed that her "querne shalbe common to everie poore man who hath neede, and helpinge to the reparacyon of the same;" though it is quite possible the lord of the manor made a tremendous hubbub over the affair, unless he had already given his consent. In 1547 the "Ordinances and Statutes made by the consent of all the inhabitants of the town of Kingsthorpe" for the government of the royal manor and mill there, (apparently held on lease,) included the usual regulations as to tenants being bound to grind at the king's mill; but the proviso was appended—"All thos p'sons that have quernes shal suffer noebody to grynde theirat above a tollfatt uppon payne for euerie tollfatt more than owne at anie tyme iiijd." Here, therefore, handmills were permitted to be used for the benefit of poor folks who ground in very small quantities. A tollfatt, or toll-vat, was a miller's toll dish, and the tollfatt of grain was, of course, the quantity equal to its capacity; but the term, which frequently occurs, was variously and even indiscriminately used, and its precise equivalent seems to be unknown.

East Anglian N. & Q., 1861, 102.

Notes & Queries, sec. 5, vol. ii., p. 410.

Text: Mill toll.

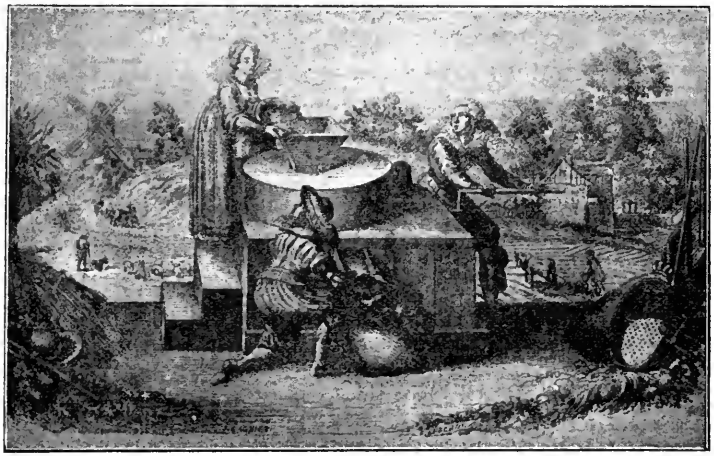
CHAPTER X.

THE MODERN HANDMILL.

X. THE MODERN HANDMILL.

1. A monastic relic.

SUBSEQUENT to the abolition of soke laws various small adaptations of mills for use by hand came into frequent, but not very extensive, use. These contrivances differed from the quern in being provided with simple machinery, such as crank, cogwheels, &c., and were driven from the crank in

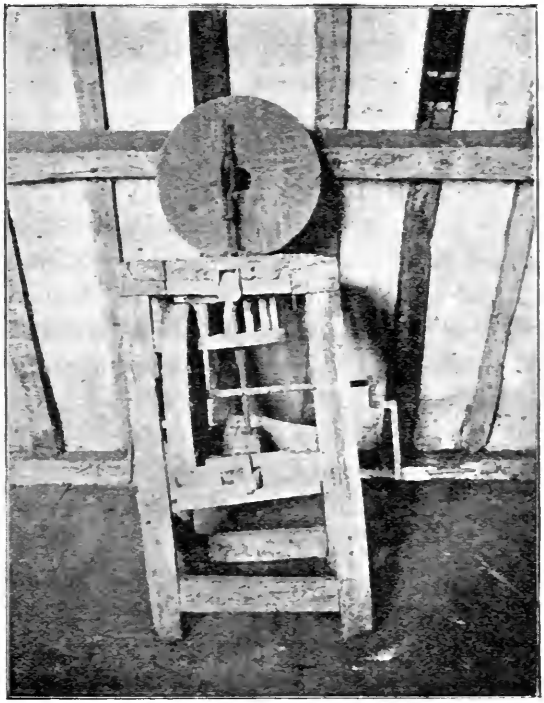


much the same way as was a water mill from the water wheel. One of the most curious examples with which we have met is a neat but cumbrous contrivance preserved at Hazleton Farm, Rodmarton, Gloucestershire; where was formerly a monastery from which the relic is believed to have been derived. Its oaken framing, now in decay, bears marks of carving on each side of the delivery shoot, its

X. THE MODERN HANDMILL.

1. A monastic relic.

machinery being an adaptation of that of the water mill. A crank-handle gives motion to a vertical cogwheel working in an open basket pinion,



mounted on the spindle: which, passing through the lower stone, drives the upper. The latter, a Peak stone, is seen in the illustration reared upright in a position for shewing the grooving.

2. Recent examples.

Emerson (1701-1782), describing a handmill of his own contrivance, calmly observes, "it is a pity some such mills are not made at a cheap rate for the sake of the poor who are much distressed by the roguery of the millers;" but his mill (which is described in *Ency. Brit.* c. 1795) did not survive to effect the contemplated end. A popular writer at this time sarcastically remarks, "there seems a great

London Mag., March, 1758.

X. THE MODERN HANDMILL.

2. Recent examples.

inclination in people to buying their own corn, and grinding it with these new invented handmills, lest they should be poisoned or cheated;" and kindly advises his readers to be in no hurry to purchase while prices are so high, as the article may certainly be found in the market at second-hand rates ere long. But, though numbers of handmills were put before the public at this period, there was never manifested any popular desire to use them.

A variation from the usual type is found in that devised by Mr. Rustall, of Portsmouth; for which the Society of Arts, at the opening of the century, gave a premium of forty guineas. The stones were arranged vertically, and worked without the intervention of cogs: a man and a boy being stated to be able to grind and sift one bushel per hour; while "the housekeeper will have the satisfaction of knowing that his flour is free from adulteration, and its life is as well preserved as if it had been ground in a water mill." Upon the same principle Napoleon I. had made portable mills for the use of his troops in the Russian campaign of 1812: the 'stones' being of cast iron, indented and grooved, and arranged vertically without cogwheels; the corn being conducted to the centre, or eye, by a lateral hopper, and the meal being projected from the edges of the plates as the runner revolved. A specimen of this mill, subsequently obtained in Paris by Sir John Sinclair, and exhibited to the Royal Society of Arts, was considered one of the most useful machines ever submitted to that body. It was then stated that one man could grind with it at the rate of a bushel in two hours, working continuously for eight or ten hours a day; the rate of working being but 20 revolutions a minute, and the labour very light. Mills of this type were advertised for sale as late as 1835.

Edlin's Assize of Brd. 1805, 38.

APPENDIX.

THE TREADMILL.

Appendix. THE TREADMILL.

1. Early prototypes.

THOUGH usually accounted a very modern invention, the corn grinding treadmill has some slight claim to antiquity. The driving of a motor wheel by the feet of men is as old as the days of Vitruvius, who describes a wheel for raising water being turned in this way; while the utilisation of such a wheel for grinding corn is mentioned by Olaus Magnus, in the year 1537, as being in use in Northern Europe. "They use very frequently in the North," he says, "trusatile mills driven by the hand and by the foot, which are very useful for garrisons in sieges; there are also wheels driven by the feet with an extremely rapid motion, which are constructed in fortresses or prisons: but of these kind of mills an inspection would afford a better idea than any written description." Heringius, in 1663, incorrectly considers that the Roman mola trusatilis or the saddlestone was worked by the feet of men; and the statement, though erroneous, serves to suggest that driving a corn mill in this manner was not a novel idea to that author. A writer of the present century, quoted below, states that the Chinese have used a treadmill similar to that of England for many centuries.

Hist. Gent. Septen: xiii., 12.

De Mol. Vet. v. 102.

Appendix. THE TREADMILL.

1. Early prototypes.

Hist. Lond.: Maitland: 1756, 981.

In 1570 a hand and footmill, probably on the model of that mentioned by Magnus in 1537, was established by the Mayor and Corporation of London at Bridewell. "In the time of Queen Elizabeth, about the year 1570, one John Pain, a citizen, invented a mill to grind corn, which he got recommended to the lord mayor for the use of Bridewell. This mill had two conveniences: one being that it would grind a greater quantity considerably than any other mills of that sort could do: and the other that the lame, either in arms or legs, might work at it if they had but the use of either. This mill he shewed to the lord mayor who saw it grind as much corn with the labour of two men as they did then at Bridewell with ten: that is to say—two men with hands, two bushels the hour; or two men with feet, two bushels the hour; if they were lame in their arms then they might earn their livings with their legs, or if lame with their legs then they might earn their livings with their arms. One mill will grind twenty bushels of wheat in a day, so that by computation it was reckoned that one of these would supply 1,000 persons." It does not appear how long this contrivance lasted; and very shortly afterwards the corporation built the city watermills under London Bridge. But John Pain's mill seems to have been invented again, as D'Aussy, as late as 1782, states that, in 1778, a French mechanic, named Berthelot, invented footmills for use by the poor in L'Hôpital de Bicêtre, where they remained in use till 1781.

La Vic. Pr. Fr.: 1815, i., 61.

2. Modern introduction.

The inventor, or adapter, of the modern machine was Mr. Cubitt, engineer, the son of a miller of Lincoln. The earliest reference we find to the machine occurs in 1818, when T. Fowell-Buxton, describes it as in use at Bury St. Edmunds. "The prisoners are employed in making shoes, hats, etc., and in grinding at a mill of peculiar construction,

Prison Discipline 1818, 77-91.

2. Modern introduction.

somewhat similar to a turnspit. The prisoners walk in rows, and the machine is turned rather by their weight than their exercise. The advantage is that no man can avoid his share of labour. The mill is worked by gangs above and below." At Philadelphia prison, also, he remarks, "there is a mill for grinding corn, and another for preparing plaster of paris." Buxton makes no allusion to the inventor; but, in 1822, Thomas Le Breton, governor of Canterbury gaol, ascribes the contrivance to Cubitt.

Defective State of Prisons, London, 1822, 30.

Le Breton dedicates his work upon prison management to the magistrates of Kent: observing—"The recent improvements you have effected in the House of Correction under my charge, and the introduction of the treadwheel discipline mill, for the employment of prisoners—from this I hope you will be pleased to take this book under your charge." Elsewhere he states—"the treadwheel has been considerably improved by Mr. Cubitt, of Ipswich, and, with a little care, may be applied with infinite service: the machine is so well known that a description would be superfluous." It is, however, stated to be "no more than a broad undershot waterwheel of small diameter, moved by the gravity of men who are supported by a handrail in an erect posture, and works effectively and profitably." Le Breton adds that "Mr. Cubitt's treadmill at Bury St. Edmunds has only been worked two years, while the inside treadwheel has long been known at Gloucester gaol, on the London quay, and at various other places; and the Chinese have used an external treadwheel, which is that proposed, for many centuries."

Prison Life, Chesterton, 1856, i., 224.

Thus the mill was evidently in practical use according to Buxton, in 1818; and Cubitt's improved wheel was in operation according to Le Breton, in 1820. A still later writer on the matter says—"The

Appendix. THE TREADMILL.

2. Modern introduction.

treadwheel was the invention of Mr. Cubitt, the engineer of Lowestoft; I received the narration of the circumstance from his own lips." He was the son of the miller at Bacton Wood Mill, Lincolnshire, but adopted engineering as a profession, and attained considerable celebrity. During a professional visit to Bury prison, "twenty years and upwards ago" (*i.e.*, some time before 1836), his attention being directed to the prisoners idling about the yard, he hit on the device of the treadwheel for grinding corn, and the mill was first set up there (evidently about the year 1818), being gradually adopted elsewhere.

3. Its inefficiency.

On Treatment of Female Prisoners London, 1827, 50-57.

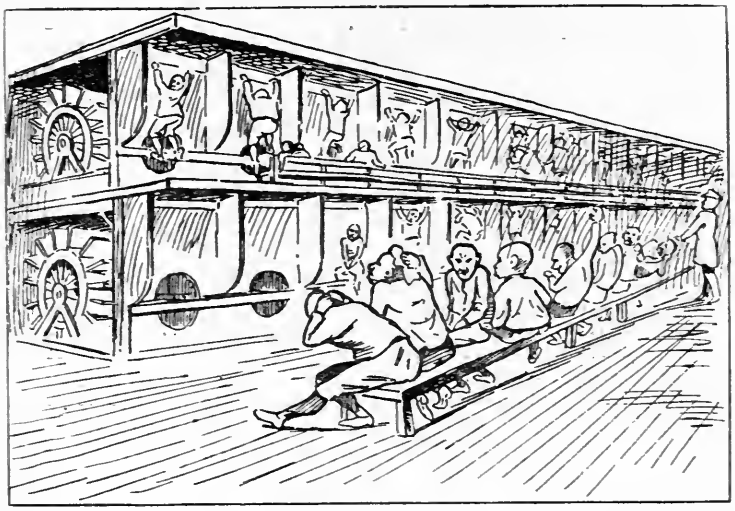
Elizabeth Fry, in 1827, wrote—"It will be found necessary to provide an extra quantity of food for such of the prisoners as are employed in hard labour, and especially on the treadwheel." . . . "The treadwheel and the handmill (which, under some circumstances, is to be preferred) may be found useful for the refractory, the hardened, and the depraved; but this is a discipline which ought to be applied to women only under very watchful care and with strict limitations." For some years the quantum of labour exacted from prisoners on the wheel was extraordinarily excessive. The Prison Discipline Society, a body of philanthropists, "in utter ignorance of the mischief which an excess of such exertion produced, apportioned to each mill 12,000 feet of ascent per day; so injurious was this ratio, that, before the establishment of military prisons, the Royal Artillery abstained from sending any of their men to Coldbath Fields." In due time most authorities had become impressed with the excessive nature of the punishment, and the daily task was reduced by 4,500 feet. On this basis the mill has continued in use in various prisons till the present time; though, on the whole, experience confirms the view officially expressed by

Report on Convict Prisons, Parly. Papers, 1852.

Appendix.
THE TREADMILL.

3. Its inefficiency.

Lieut. Col. Jebb, nearly half a century ago, that in practice it was not economically advantageous. At Walton Gaol, Liverpool, the treadmill is in daily use for disciplinary purposes, being devoted, however, only to pumping water or driving shafting for a workshop. The sketch gives an idea of its



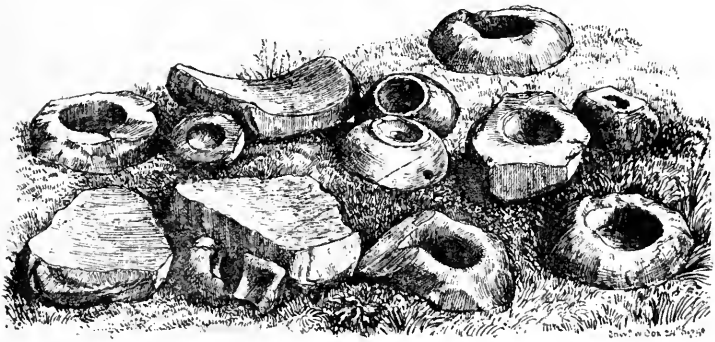
general appearance; but, if this contrivance, which we have been permitted to inspect, be any criterion of the machines at other prisons, it is evident that their cumbrous nature may well tend to their practical inefficiency; a very great proportion of the force applied being absorbed solely in overcoming the inertia of the wheel leaving little available for profitable use. A member of the Preston magistracy has informed us that at Preston (where corn for Walton and other prisons is ground by the treadmill), both foreign and English wheat is used, a proportion of 10 per cent in bran, etc., being removed from the flour; the value of the grinding, as scheduled in the tabulation, given below, being estimated at current local prices.

Appendix.
THE TREADMILL.

3. Its inefficiency.

The reports of the Prisons' Commissioners for 1896, contain the following particulars of working, at those prisons where the mill is still retained for grinding corn :—

	Daily average.	Value of work.
Birmingham	34	£76 18 3
Chelmsford	18	31 7 6
Derby (grinds for Nottingham and Leicester)	$32\frac{168}{312}$	88 8 0
Devizes	$10\frac{121}{312}$	31 13 0
Durham (grinds for this and other prisons)	$58\frac{100}{312}$	153 17 4
Hull	$16\frac{228}{312}$	26 0 0
Leeds	$63\frac{112}{312}$	103 11 9
Lincoln	33	58 0 0
Maidstone	$27\frac{166}{312}$	42 14 0
Manchester (grinds for this and other prisons)	$108\frac{205}{312}$	202 10 0
Northallerton	$26\frac{46}{312}$	16 17 0
Oxford	$3\frac{120}{312}$	9 0 0
Pentonville	$174\frac{213}{312}$	117 5 0
Portsmouth	$25\frac{151}{312}$	15 7 0
Preston (grinds for this and other prisons)	$56\frac{63}{312}$	87 18 11
Reading (hand mills)	$4\frac{77}{312}$	22 1 0
Stafford	36	95 1 4
Swansea	$12\frac{256}{312}$	82 8 11
Wandsworth	$27\frac{31}{312}$	14 15 4
Winchester	$\frac{274}{312}$	0 10 0



[Welsh Stones at Penrhos, Anglesea.—*From a Sketch by Mr. E. W. Cox.*]

GENERAL INDEX.

Page

Abbey, St. Alban's, Cirencester: conflicts with tenants... 215
Vale Royal, Cheshire: conflict with tenants 218
Abolition of slavery at Rome 200
Abrach querns 159
Abraham: Chaldean stones 36
Acorns as breadstuff 1, 2, 5, 115
Acropolis: saddlestones 62
Adjustment of stones: Roman quern 150
modern 174, 175
Pompeii slave mills 179
Admixtures with flour 117, 119
Africa: modern saddlestones... ... ... 84, 119
village grinding centre 85
granaries 85
wooden mortar 110
the quern apparently little known... ... ... 135, 164
Alexander III: law prohibiting querns 212
Alicia: making: adulteration 102, 120, 123
Pliny's eulogy... 120
America: early use of treadmill 227
quern apparently unknown 135, 164
American aborigines: pounders 5, 7
acorn flour 5
mortars and pestles 76, 112
village grinding centre 21
Mexican metata 75
,, painting 79
saddlestones 82
Andernach stones 157, 182, 184
Anglesea: saddlestones 71
mortars and pestles 106, 109
querns 136, 141, 146, 152, 154
quarries 156
Anglo-Roman grain cultivation 105
mortars and pestles 104
querns 137, 139, 140, 142, 146
servants' mill 182
horse mill (reputed) 199
Anglo-Saxon laws 161
quern 142, 150, 163
"Answerers:" Egyptian statuettes 50
Apuleius: the ass mill 190
the slave mill 199
Apulia: wheat 116

Page
Archaic grinding 1
Aristophanes: Greek mortars 100
,, pistores 206
Ass mills 131, 185, 196, 207
Ass of the mill, and Vestalia 189
Assyria: grain and grainstones 33, 35
Athens: saddlestones 62
Augustus (Octavius) leases a chalk hill for bakers 120
descended from a baker 202
Aulus Gellius: mola trusatilis: mola versatilis 129
Plautus at mills 99, 129

Bab-el-Moluk: sculptures at tombs 31
hieroglyphic inscription: earliest mention of a miller 52
Babylonian grainstones 34
Bakery (see Pistrinum)
Bakers: Egyptian statuettes 46
,, toy model 48
,, mural sculpture 31
Greek statuette 48
Bakers' wives (quarrelsome Greek) 206
Baking woman of Crœsus: statuette 44
Baker, Sir S.: African saddlestone 84
grit in flour 119
Barley: Roman 115
Bas-reliefs on tomb of Eurysaces 207
Bantry: bullán stone 22
Beckman: sand from millstones 119
gem engraving of Eunostos 64
Berlin: Egyptian statuette 38
Biblical allusions to saddlestones 40, 55, 56
mortars 90
querns 135
ass mills... 187
Blackmore, Dr.: Salisbury pit dwellings 70
Blair Drummond: oaken mortar 106
Blindfold cattle at mills 186, 190, 196
Boissard: census of Roman mills 194
Bolton Abbey 211
Bolting: Egyptian 120
Grecian: error by Pope 121
Roman 123
Brace, a kind of spelt 115
Bread: Roman varieties 117, 118, 119
,, free supply 192
Breadstuffs: wheat, 115; spelt, 115; millet, 115; olyra, 115; barley, 115
Breadstuffs other than grain 1, 2, 5, 115
Bridge tree of mills 174
British Museum: model, women baking 48
,, woman grinding 49
Mexican metatas 75
Anglo-Roman quern 140
,, servants' mill 182
British saddlestones 70

Page
Bronze age: grainstones (Italy) 33
(Troy) 61
British saddlestones 70
mortars... ... ... 104, 105
querns 138, 141
servants' mill 182
fir cover of servants' mill 181
grain cultivation 105
Brittany: quern quarry 158
saddlestones 68
pestles 109
Brotier: error *re* Roman quern 130
Bullán stones, Liverpool 19
St. Bridget's, Killinagh 20
St. Columb's, Londonderry... 22
Scotch 22
Identical with "knockin stane" 23
Bury (Lancashire): Anglo-Saxon quern 142
"Burstin" process: parching grain 127

Cairo: Egyptian statuettes 38
Callustius, pistor of Pompeii... 206
Cambridge: saddlestones 71
Camel mill: Khiva 197
Camirus, Rhodes: Greek statuette 49
Campania: chalk hill leased for bakers 120
wheat 116
Cappadocia: reputed invention of mills 133
Carthage: sand in flour 118
use of mortar as described by Mago 91, 118
Castel Coz, Brittany: saddlestones... 68
pestles 109
Catillus 178
Cato: ass mills 131
mola trusatilis 131, 177
Cattle mills: of Rome... 185
construction of 185
mentioned by Plautus 185
Roman ass mill 186
Scriptural ass mill 186
Vesta, goddess of 187
"The Millers' Feast"... 188
described by Apuleius 189
cattle blindfold... ... ... 186, 190, 196
Roman demand 191
attempted improvement by a monk 195
modern survivals 195
construction of ,, ... 196
feudal laws 197
Cecilia de Rumelia: milling charter 211
Census of Roman mills 194
Ceres and origin of grinding... ... ... 1, 2
Chained slaves at Roman mills 102
agricultural labourers 199

Page
Chaldea: saddlestones 33
corn cultivation 35
milling history commences 36
inscribed mortar: earliest historical grainstone 88
Chalk in flour 119
Charters prohibiting use of querns 210
Chersonesus in Thrace: pounders 11
Chester: Anglo-Roman querns 137, 151
mortars 104
Customs of Dee mills 212
Chestnuts: flour of 5, 115
Chili: modern saddlestone 82
Church querns 143, 145
Churchyards: hollowed stones found in 22
Clonmacnoise: Irish cross quern 144
Collegium Pistorum, Rome 208
Columella: Roman holy days 204
,, mortars 101
,, querns 131, 135
Comedies of Plautus 95, 99, 129
Aristophanes 169
Company of Pistores, Rome 208
Conflicts with manorial tenants 215
Conglomerate stone ('pudding stone') 157
Constantine: abolition of slavery 200
Cork: supposed last instance of use of saddlestone in Britain... ... 86
Corn: Italian varieties 115
,, treatment of 102, 115-127
Ancient Britain, cultivation 105
storage 105
Modern Africa, storage 85
parching 125
washing, drying, storing 124
See also *Wheat*.
Confiscated by manorial millowners 211
Cornwall: cup-hollow stones... 18
saddlestone 71
Cremation: Greek 27
Roman and British 106
Crœsus: statuette of baking woman 44
Crosby, Liverpool: pot quern 150
Crosses on querns 142, 169
probable origin of 145
Crushers and hollows 1
gradual improvement 9
of Egypt and Somaliland... 9
of Troy 9, 11
of Mycenæ, Tiryns, Chersonesus 11
Swiss Lake Dwellings 12
of Kent's cave 14
of Salisbury pit dwellings 15
of Kent 16
of Cornwall 18
of Fermanagh 18
Bullán stones 19, 20, 22

Page
Crusius: the "mill" of Homer 59
Cubitt: inventor of treadmill for grinding corn 227
Cult of mills 2, 63, 100, 126, 187
Customs of Dee mills, Chester 212

DAHSTOUR: Egyptian statuette 39
Danish crushers 15
Day's work at modern saddlestone 84
Decoration: crushers, pestles 109, 112, 193
Roman mills 193
Mexican metatas 77
querns 142, 146, 151
Diodurus Siculus; British grain 105
Dernhall Mill, Cheshire: conflict with townsmen 218
relic of ancient owner 219
Domestic servants at mills. See *Woman's Work.*
pistrina 96, 97
Dressed quernstone of Virgil 134
Drontheim; modern quern 167
Drudgery of hand grinding 39, 50, 84
Druids: learning and the arts 105
sacrificial rock basins 158
Drying grain 124
Dunmore, Lord: pounding by water, Kashgar 103

EARLY foodstuffs 1, 2, 5
Egypt and Somaliland: crushers 9
Egypt: saddlestones 35
Sarah of Canaan 36
portrait statuettes from tombs 37, 40, 42, 43
slaves statuettes 38, 39, 44, 45, 49, 51
"Maid servant that is behind the mill" 40, 49
mortars and pestles 89
representation of sieving 120
Eleusina 2
Emerson: modern handmills 223
Embsay Priory: milling charter 211
English prehistoric saddlestones 70
Engraved pestles 109
gem: Eunostos, god of Roman mills 63
Ethelbert: law mentioning grinding maid... 161
Eunostos, god of Greek mills 63
Eurysaces, tomb of, at Rome 207
Eustasius: statuette of Eunostos 64
Excommunication of milling absentees 219

FERMANAGH: cup-hollow stones 18
Feudal milling laws 187, 210
Fine flour or meal of Hebrews 37, 121
Flinders-Petrie, Dr.: Egyptian grainstones 52, 53, 91
inscribed quernstone 145
Florence: Egyptian statuette 43

Page
Floss (flour) 124
Flour: admixtures with 117, 119
fine of Hebrews 37, 121
wheaten of Hebrews... 122
derivation of term 124
storing 124
Folk-lore of Africa: mortars... 110
Fort, Romano-British, with querns 154
Gaulish, with mortars 68, 109
Fuller: Anglesea quarries 157
Furrows on early stones 139, 149, 151

GARLANDS of loaves 189, 190
Garnet quernstone 160
Gataker: Babylonian grain stones 34
Gizeh Museum: statuettes from Egyptian tombs 38
Gladsmuir: quern with carved mask 147
Glastonbury excavations 138
Gods of mills 2, 63, 100, 126, 187
Goetius: poets at Roman mills 205
"Golden Ass, The," of Apuleius 190, 199
Gori: gem engraving of Eunostos 64
"Graddan" process of parching 126
Grading flour: Rome 123
adjustment of stones 150, 174, 175, 179
Grain. See *Corn.*
Grainstones found in tombs 25
Grain merchant: V. Eurysaces 207
Grain port of Rome: Ostia 193
Granaries: modern African 85
early British 105
Greece: the "mill" of Homer 58
reputed sifting 121
establishment of trade of pistores 94, 98, 206
neglected condition of milling 63
cult of mills 63
mortars of Aristophanes 100
wives of pistores 206
mortar of Hesiod 93
Troy: crushing stones 10
saddlestones 57
mortars and pestles 91, 109
Tiryns: crushing stones 11
saddlestone 57
Athens: saddlestone 62
Mycenæ: crushing stones 11
saddlestones 57
Mitylene: Pittacus at the mills 62
Rhodes: baking statuette... 49
Grinding stone for knives, mistaken for the quern 130
Grit in flour 117, 119
Grooving 139, 149, 151
Gypsum and sand in flour 117

Page
HADRIAN'S monument erected by pistores ... 209
Halters round necks of mill-bound tenants ... 218
Ham, Dorset: servant mill ... 182
Handle bars: querns ... 142, 153, 163
slave mills ... 181, 182
Handstones: long and cosmopolitan use ... 3
Handmills (modern) ... 223
Hayman, Dr.: the "mill of Homer" ... 58
Greek sieving ... 121
Hebrews: saddlestone "mill" ... 55
mortar ... 90
parched corn ... 126
fine flour ... 121, 122
quern ... 135
See *Biblical Allusions.*
Hebron, site of: mortars ... 91
Heringius: mola trusatilis: mola versatilis ... 129
Herodotus: corn of Chaldea ... 35
Hesiod: Greek mortar ... 93
Heuzey: inscribed Chaldean mortar ... 89
Hieroglyphic inscription: Bab-el-Molûk ... 52
Hissarlik. See *Troy.*
Hollowed stones. See *Crushers.*
not grain stones ... 23, 35
Homer: "mill" ... 58
supposed allusion to sifting ... 121
Hopper: quern... 138, 149, 160, 167, 168, 175
slave and cattle mills ... 179-184
Horace: poets and sages at mills ... 204
Horse mill ... 186, 191, 196
Horses carrying corn, confiscated ... 211
Hoxay fort: querns in situ ... 154
Hume, Dr.: error respecting use of querns ... 213

INDIA: modern saddlestone ... 86
mortar ... 113
querns ... 165
Inscriptions: Chaldean mortar ... 89
Egyptian statuettes ... 41, 42
tombs ... 53
Roman mill ... 193
memorials of worthies ... 206, 207
quernstone ... 144
Irish modern quern ... 175
Iron-shod pestle: Rome ... 99, 102
Iron plates as "stones": modern handmills ... 224
Isida of Egypt: early grinding ... 91
Italy: prehistoric saddlestones ... 30

JANICULUM: milling centre of Rome ... 187, 195, 209
Japan: pounding-mill driven by water ... 103
Journeyman pistores: Rome... 201
Julius Cæsar: corn in Britain ... 106

Page
Jupiter Pistor 100
Juvenal: mill horse 191
poets keeping mills 204

KASHGAR: pounding mill driven by water... 103
Keller, Dr. (*Swiss Lake Dwellings*) 12, 69
Kent: flint crushers 16
Kent's Cave, Torquay: crusher 14
Khiva: camel mill 197
Kilkenny: modern quern 175
Kilkishen: prehistoric quern 137
Killinagh: St. Bridget's Stone 20
Killyman: handle bars 182
Kingsborough, Lord: aboriginal Mexican painting 78
Knocking stone... 23

LANCASTER CASTLE: "Roman mill" 199
La Tourelle, Brittany: saddlestones 67
Laws: Anglo-Saxon and Welsh: querns 161
Welsh: mill toll 213
Scotch: prohibiting querns 212
Licenses to use querns 220
Liverpool: Bullán stone 19
Egyptian statuette 39
Livingstone: modern saddlestone 69, 83
,, mortar 112
Lochlee crannog: querns in situ 154
Londonderry: St. Columb's stone 22
Lucanus: Roman mortar 101

MACEDONIA: trade of pistores 95, 98
Madagascar: modern mortar 111
Mage: modern African mortar 111
Magnus: drying and storing grain 125
mediæval treadmill 226
Mago of Carthage: admixtures with flour... 118
Manchester: American metata 78
cross quern 142
Martial: poets and pistores 203
Martin, Huguenot cleric: use of handstones 3
Martyrdom of St. Quirinus 187
Mashing querns 152
Mask carved upon quern 147
Mason, Dr.: aboriginal grainstones 5, 87
village grinding centres 21
Mexican metata 77, 81
Maspero, Prof.: Chaldean saddlestones 34
portrait statuettes 44
drudgery at handstones 50
Meal: fine of Hebrews 37, 121

Page
Mediæval saddlestones 67
querns 161
slave mills 182
ass mills 196
suppression of querns 210
Meir: Egyptian statuette 45
Meta, the 178
Metata of Mexico 75
ornamentation 77
aboriginal painting 79
in public bakeries 80
in private houses 81
of St. Domingo 78
with detached feet 78
Mexico. See *Metata*.
"Millers' Feast": Vestalia 188
Miller: earliest mention of 52
Milling behind the age 63, 179
"Millstone round the neck" 187
Miraculous millstone 132
Mitchell, Prof.: modern quern 172, 174
Mitylene: grainstones 11, 57
Pittacus labouring at mills 62
Modern crushers and hollows, America 5
saddlestones, Africa 83
,, America 82
mortars, Africa 110
,, America 87
,, India 113
querns: The East 154
,, Norway 167
,, Scotland 168
,, Ireland 175
cattle mills 196
handmills 222
treadmills 226
Mola: nomenclature 62, 66
Mola trusatilis: the saddlestone 66, 128
versatilis: the quern 66, 128
servaria: slave mill 182
asinaria: ass mill 186
jumentaria: cattle mill 186
Monastic handmill 223
querns 146
conflicts for suppression of querns 213
Moon deteriorating millstones 156
Moortraka: African saddlestone 84
Moretum of Virgil 99, 123, 133
Morris, Wm.: Homer's "mill" 58
Mortar, the: origin 87
of wood 102, 106, 110
of porphyry 100
not used for grain 99
Chaldean: earliest historic specimen of a grainstone... ... 88

Page
Mortar of Egypt ... 89
of the Hebrews ... 90
of Greece ... 91
of Rome ... 97
of Britain, ancient ... 104, 105
of Africa, modern ... 110
of America, modern ... 112
of India, modern ... 113
mentioned by Aristophanes ... 100
" by Hesiod ... 93
" by Plautus ... 95
" by other Roman writers ... 99
" Pliny's specifications ... 101

NAPOLEON I.: portable military mill ... 224
Naukratis: ceremonial models of grainstones ... 54, 91
Neolithic grainstones ... 8, 30
Noctes Atticæ: Aulus Gellius ... 99, 129
Nomenclature of mills. See *Mola.*
Norwegian modern quern ... 167
Nuts as a breadstuff ... 5, 115

Oak mortars: prehistoric Scotch ... 106
See also ... 102, 106, 110
Octavius Augustus descended from a pistor ... 202
Odyssey: Greek mills ... 58, 121
Oppidum: Castle Coz: grainstones ... 68, 109
Origin of grinding: traditions ... 2, 91
Orkneys: grainstones in churchyards ... 22
Orleans: prehistoric slave mill ... 184
Ornamentation of grainstones. See *Decoration.*
Ostia: grain port of Rome ... 193
Olyra, an Egyptian grain ... 115
Ovid: early foodstuffs ... 1, 2
Jupiter Pistor ... 100
grinding stones ... 155, 189
Vestalia: "Millers' Feast" ... 189

PAGAN CROSS, the: querns ... 145
Paleolithic grainstones ... 3, 8
Pancirollus: census of Roman mills ... 194
Panvinus: " " ... 194
Parching grain, ancient ... 125
modern ... 126
Parlour floor of abbey paved with querns ... 216
Penal mills ... 95, 177, 199
Pen-y-Bonc: mortar ... 108
Perforated saddlestone ... 74
querns: making ... 160
Petrarch: sand in flour ... 119
Penrhos: Anglesea; collection of stones—*vignette* ... 230

Page
Pestles: varieties 89, 92, 93, 102, 103, 109, 110 113
decorations, Roman 193
,, Breton 109
,, American 112
of Troy 92
Roman, shod with iron 99, 102
modern, worked by water 103
not used for grain 109
Pharoah: "the maid that is *behind* the mill" 40
baker imprisoned for grit in flour 117
Philadelphia: prehistoric pestle 76
Pict House: grainstones 106, 160
Pindar: cult of mills 2
Piso family of Rome 99, 101
Pistores of Greece: institution of the trade 94
transferred to Rome 98
mentioned by Aristophanes 206
Plautus 96
of Rome: Pliny's account of 98
slaves and criminals 199
journeymen 201
poets and sages 203
worthies of the craft 206
College or Company 208
Pistrinum of Greece 96, 97
Rome 199, 209
Pittacus of Mitylene labouring at mills 62
Plautus: Greek pistores 95, 185
labouring at mills 99, 129, 201
origin of grinding 2
Pliny: institution of trade of pistores 98
mortar and its use 101
ironshod pestle 102
slaves in chains 102, 200
pestle possibly driven by water 102
Italian wheat 116
admixtures with flour 117, 119
bolting and grading 123
washing and drying grain 124
parching grain 126
varieties of stones 132, 155
invention of querns 132
Plutarch: song of the woman at the mill 62
Poetic Biblical metaphors 57
Poets and sages labouring at mills 62, 129, 203
Polybium: a worthy of the craft 206
Pompeii: painting, the "Millers' Feast" 188
mill sign 191
slave mills 178
milling behind the age 179
worthes of the craft 206
Pope's allusion to Homer's "mill" 58
Portrait statuettes in Egyptian tombs 40, 44
Porth Dafarch: mortar in situ 106

Page
Posidonius: Anglesea quarries 156
Pot querns 148
not used for grain 152
Pounders. See *Pistores*.
Proculus: pistor of Pompeii 206
"Puddingstone," conglomerate stone 157
Pytheas: corn of ancient Britain 105

QUARRIES and stones 155
of Anglesea 156
of Brittany 158
of Scotland 159
Quern: derivation of term 139
Quern, the: mola versatilis of Rome 128
errors regarding 130
earliest allusions to 131
invented by Volsinians 132
Virgil's "Moretum" 133
of the Christian era 134
"Two women shall be grinding at the mill" 135
of Rome 135
for crushing olives 131, 135
apparently unknown in America and part of Africa ...135, 164
introduction into Britain 138
Saxon water mills, so termed 139
grooving 139
descriptions of specimens 136
found in situ 141, 154
monastic... 145
Anglo-Saxon and Welsh laws respecting 161
mediæval and modern examples 162
adjustment of stones 150, 174, 175
prohibitory laws and charters 210
raids and captures 213
licenses to use 220

RADERUS: Roman poets at mills 203
Raids on tenants using querns 213
Rathlin: cross quern 144
Renouf, Sir P.: Egyptian hieroglyphic inscription 53
Richard II.: grant to use querns 220
Ringed stones 23
Romano-British grainstones. See *Anglo-British*.
Rome: derives milling arts from Greece 66, 94, 98
abandons the saddlestone 66
allusions by early writers 96, 97
supersedes the mortar 103
cult of the mill 100, 126
milling processes 114
slave mills 177
cattle mills 185
condition of slave mills 193

Page
Rome: census of state mills ... 194
pistores ... 199
holydays at mills ... 203
watermills ... 178, 185, 192, 194, 209
Rustall, Mr.: modern handmill ... 224
Rynd, the ... 140, 149, 175

SABINUS: invention of mills ... 133
Saddlestones: mola trusatilis ... 29, 66
pre-eminent mill of world ... 29
efficiency of grinding ... 30, 74
Chaldean and Egyptian specimens ... 33
Egyptian statuettes ... 37
universality of ... 67
average sizes of ... 67
Breton specimens ... 68
specimen worked on both sides ... 72
perforated specimen ... 74
Mexican metatas ... 75
British specimens ... 70
American ,, ... 82
African ,, ... 83
Indian ,, ... 86
African woman's day's work ... 84
Sages and bards at Roman mills ... 203
Saggarat: Egyptian statuettes ... 40
Salisbury pit dwellings: grainstones ... 15, 70
Salt in Roman bread ... 118, 119
Samson grinding at the mill ... 56
Sand and gypsum in flour ... 117
Sandala, a Roman grain ... 116
Santa Barbara Islands: mortars ... 112
Sarah: Chaldean saddlestones ... 37
Sarzec, M. de: Chaldean grainstones ... 38
inscribed Chaldean mortar ... 89
Saxon laws: querns ... 161
Schliemann: reminiscence of a learned miller ... 11
Schoolcraft: discoveries in grainstones ... 59, 91
American mortars ... 113
Scotch modern quern ... 168
statute permitting querns ... 220
,, prohibiting querns ... 212
Sechnesach: inscription upon quern ... 145
Servant mill ... 182
Servius: the mortar not a mill ... 103
Sesame, a Roman grain ... 115
Sextus: census of Roman mills ... 194
Sieves: ancient... ... 123
Sifting and bolting ... 120
allusion by Virgil ... 123, 134
Silsden mill granted to Embsay Priory ... 210
Singing at the mill ... 62, 134, 168
Slaves at mills: Egyptian ... 38, 44, 51

Page
Slaves at mills: Roman, in chains ... 102, 177, 199
depicted by Apuleius ... 199
agricultural labourers in chains ... 200
Slave's farewell to the mill ... 187
Slavery abolished at Rome ... 200
Slave mills of Pompeii and Rome ... 177
meta, catillus and hopper ... 178
British and French specimens ... 184
Society of Arts: premium for modern handmill ... 224
Sockets for hinges, resembling grainstones... 24, 35
Soham, license to use a quern ... 221
Soke of mills ... 197, 210
Soloman: the grain mortar ... 91
Solomon, Gilbert: of Dernhall mill, tomb of ... 219
Songs of the mill ... 62, 134, 168
Sophocles: Italian wheat ... 116
Soudan: model saddlestone ... 84
Spartel Cape: ancient quern quarry ... 85
Spindle arrangements: quern ... 149, 166, 173, 175
Pompeii mills ... 179
Spouted "pot querns" ... 148
probably not used for grain ... 152
St. Alban's Abbey, Cirencester: conflicts with townsmen ... 215
suppression of a horse mill ... 217
John Ball: "John the miller" ... 127
St. Bridget's stone, Killinagh... 20
St. Columb's stone, Londonderry ... 22
St. Columba: legend ... 145
St. Domingo: metata ... 78
carved pestles... 112
St. Martin's-le-Grand: Romano-British quern ... 148
St. Ours, M. de: statuette of Eunostos ... 64
Roman slave mills ... 200
St. Radegunda: convent querns ... 146
Stanley, H. M., Mr.: African women grinding ... 84
Statuettes: Egyptian women grinding ... 37
,, ,, baking ... 47
Greek ,, ,, ... 48
Crœsus' baking woman... 44
Status of domestic operatives at mills 37, 50, 79, 81, 95, 99, 110, 113, 135, 145, 161, 163, 165, 168, 215
trade ... 80, 96, 98, 102, 177, 186, 201
criminals ... 56, 96, 97, 199
Stones and quarries ... 155, 182, 184; 189
deteriorated by the moon ... 156
of cattle mills: shape of ... 185
Stopes, H., Mr.: collection of Kentish crushers ... 8, 16
Storing grain: Olaus Magnus ... 124
Strabo: millstone quarries ... 156
Successive races inhabiting prehistoric dwellings ... 106
Suidas: statuette of Eunostos ... 63
Swine in Roman bakeries ... 97
Swiss Lake Dwellings: grainstones... 12, 69

Page
TALMUD: Babylonian millstone ... 34
imprisonment of Pharoah's baker ... 117
Tangiers: saddlestones ... 85
Terence: Greek mills ... 97
Tiryns: crushers and saddlestones ... 11, 57
Tollfatt or toll-vat ... 221
Tomb of Eurysaces, Rome ... 207
Tombs: grain stones found in ... 25
probably tombs of women... 25
Egyptian statuettes found in ... 37
,, hieroglyphic inscription in ... 52
Greek statuette from ... 48
Gilbert Soloman of Dernhall mill ... 219
Trajan establishes College of Pistores ... 208
Tortillas of Mexico ... 79
Transvaal: modern mortar ... 111
Trapetum: the olive mill ... 136
Treadmill: mediæval prototypes ... 226
modern introduction ... 227
Troy: the "mill" of Homer ... 58
discoveries of grainstones ... 10, 57, 91, 109
"Two women shall be grinding at the mill" ... 134
Twr Elin, Holy Island: collection of grainstones—*vignette* ... 1
Ty Mawr, Holyhead, mortar ... 108
Tyror: Mexican metatas ... 81

VALE ROYAL ABBEY, Cheshire: conflicts with tenants ... 218
Valuation, legal: British quern and mill ... 162
Varro: Italian wheat ... 116
invention of quern ... 132
olive mill ... 135
ass mill ... 131, 177
Vesta, goddess of ass mills ... 100, 126, 188
Vestalia: "Millers' Feast" ... 188
Victoris: census of Roman mills ... 194
Village grinding centres ... 21, 85
Virgil: cult of the mill ... 2
pounding stones of Trojans... 11
mortar ... 99
quern ... 130
millstones ... 134, 189
joke with Octavius Augustus ... 202
Roman holydays ... 204
Volsinian invention of quern ... 134
milling stone ... 132, 155

WALES: Ancient laws and institutes ... 161
millstone for Dublin mills... 157
Walton gaol treadmill ... 229
Washing and drying grain ... 124
Water driving pounding mills ... 102, 103
Waterbeche, Cambridge: license to use a quern ... 221
Waterfalls dressing quernstones ... 159, 160

Page
Watermills of Rome 178, 185, 194, 209
Wear of millstones 85, 117, 119
Werne: African saddlestones 84
West Indian grainstones 78, 112
Wheat of Rome 115
Italy, Greece and Africa 116
See also *Roman Processes.*
Wheaten flour or fine flour 121, 122
Whitaker, Dr.: milling charters 210
Wooden mortars 102, 106, 110
Worthies of the craft 206
Woman's work at the mill 37, 40, 50, 56, 58, 62, 79-86, 95, 110, 113, 135, 161, 163, 165, 168

END OF VOLUME I.

PRINTED BY THE NORTHERN PUBLISHING CO., LTD., LIVERPOOL.

374810

Ec.H
B4718h

Bennett, Richard and Elton, John
History of corn milling.
Vol.1

DATE | NAME OF BORROWER

University of Toronto
Library

DO NOT
REMOVE
THE
CARD
FROM
THIS
POCKET

Acme Library Card Pocket
LOWE-MARTIN CO. LIMITED