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MAN

THE PRIMEVAL SAVAGE

WORTHINGTON G. SMITH

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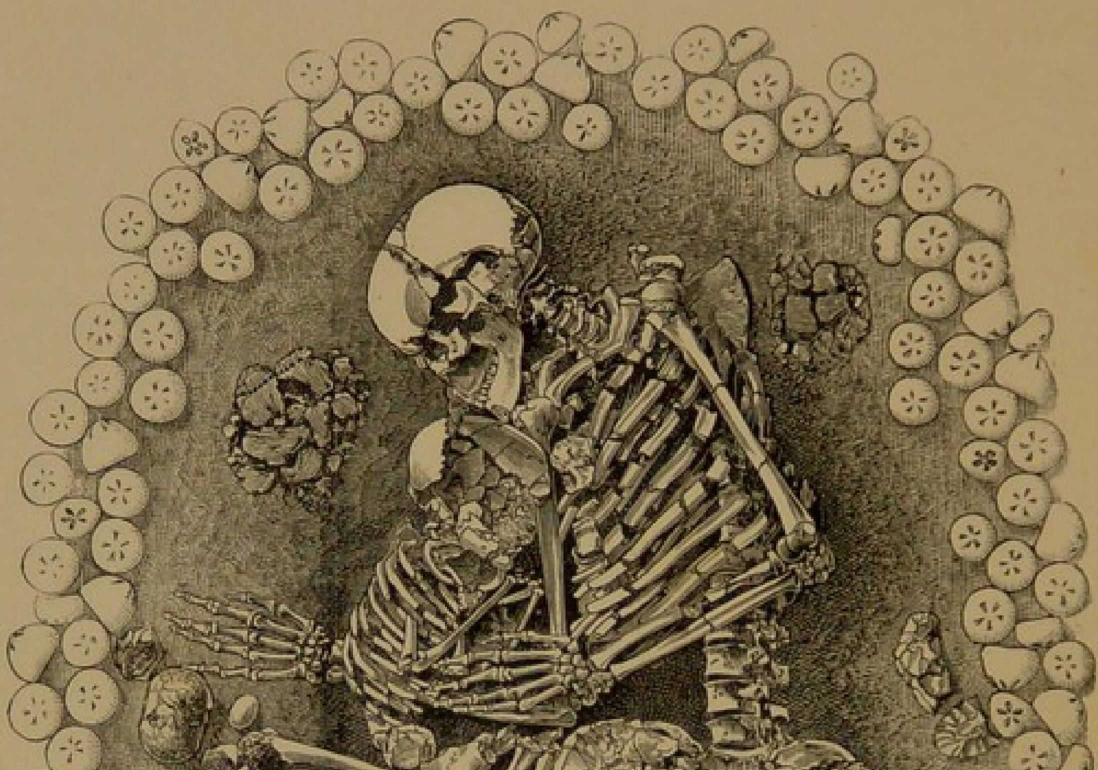
MAN, THE PRIMEVAL SAVAGE



SKELETON OF WOMAN AND CHILD,

From round tumulus, Dunstable Downs.

MAN

THE PRIMEVAL SAVAGE

HIS HAUNTS AND RELICS FROM THE HILL-TOPS OF BEDFORDSHIRE TO BLACKWALL

BY

WORTHINGTON G. SMITH

FELLOW OF THE ANTHROPOLOGICAL INSTITUTE, F.L.S., F.R.S.A., IRELAND

". . . tongues in trees, books in the running brooks,
Sermons in stones, and good in everything."

WITH TWO HUNDRED AND FORTY-TWO ILLUSTRATIONS BY THE AUTHOR

LONDON: EDWARD STANFORD

26 & 27, COCKSPUR STREET, CHARING CROSS, S.W.

1894

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PREFACE

This little book contains an account of the discovery of human-made stone weapons and tools of great antiquity on the highest hill-tops of chalk, capped by stony clay and brick-earth, at Caddington, near Dunstable. It also gives an account of the discovery at the same place of a lake-side living place of primeval man, and states how more than five hundred artificially struck flint flakes or splinters were found and replaced on to the original stone weapons and tools from which they were struck in primeval or Palæolithic times.

The latter part of the book describes some of the relics of primeval man as found on the banks of the Lea, from its source near Dunstable, in Bedfordshire, to London; with a description of a primeval living place or Palæolithic floor at Stoke Newington, London.

No attempt has been made to go deeply into any uncertain branches of the subject, either geological or anthropological. An effort has been made to present, in clear, understandable words, a few results of research into the nature and surroundings of primeval man, as deduced from geological, anthropological, and archæological evidence.

The greater part of the book is entirely new: the latter part, which treats of the relics found in London, has in part been published in the *Journal of the Anthropological Institute.* Some items have appeared in *Nature*, *Natural Science*, and the *Transactions of the Essex Field Club*, or *Essex Naturalist.* To save some of this material from being practically lost, it has (where used) been re-written, with new facts and new illustrations added.

The illustrations of stone implements represent weapons and tools of the oldest, primeval or Palæolithic class, unless otherwise described. All the illustrations are original, or taken from original sources.

W. G. S.

DUNSTABLE.

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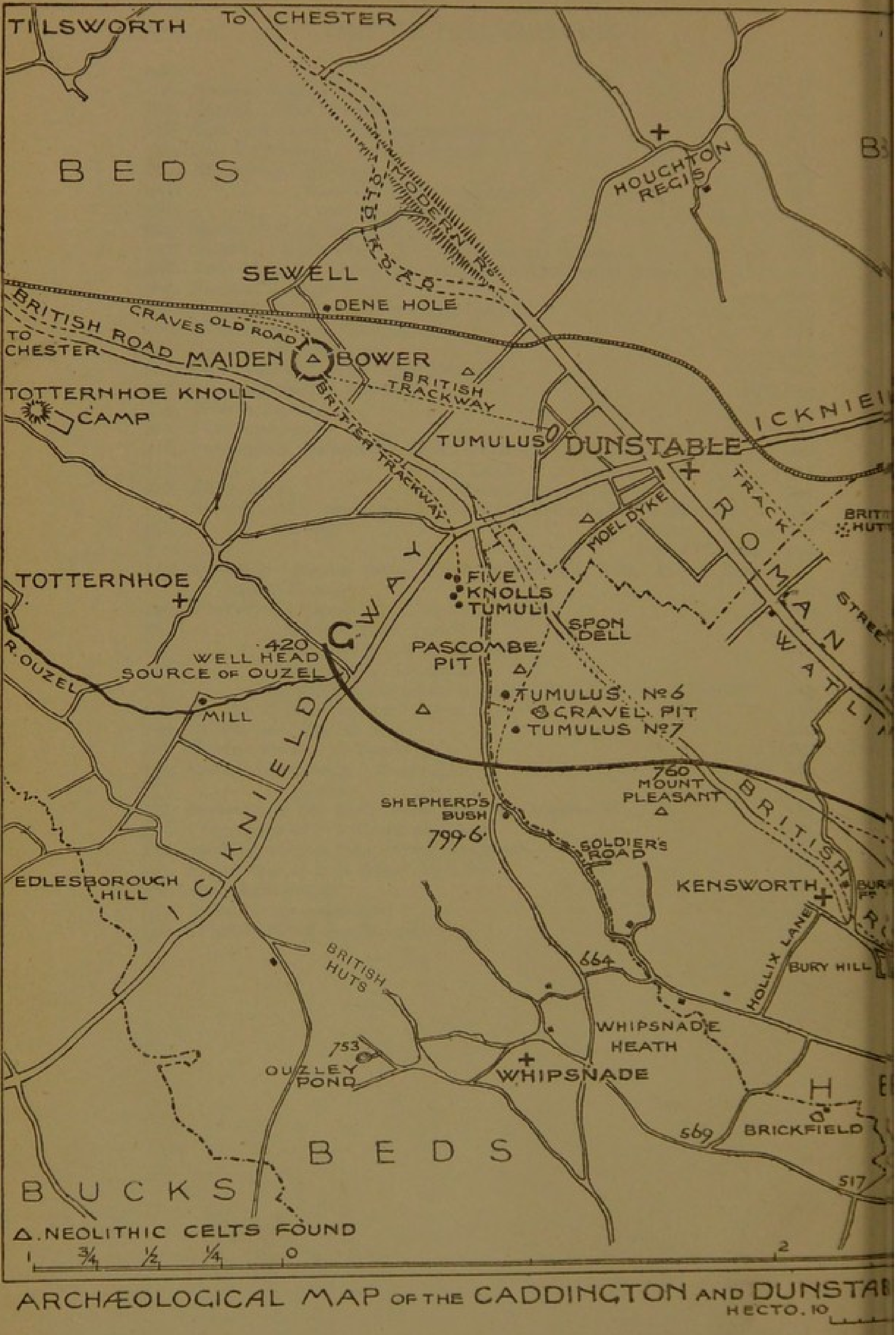
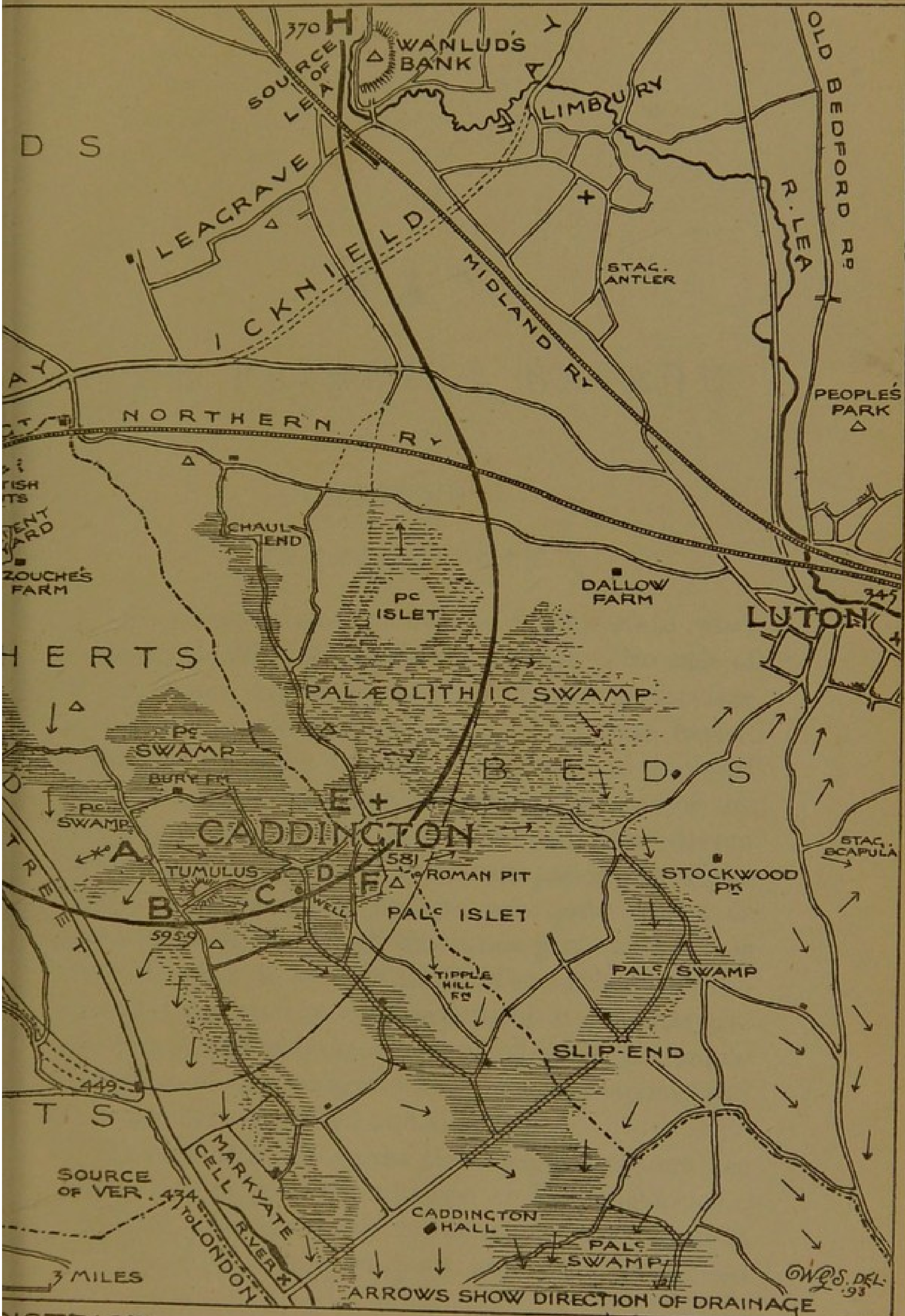


ARCHÆOLOGICAL MAP OF THE CADDINGTON AND DUNSTA

HECTO. 10

The dark line, G—H, shows the line of Section of hills and valleys illustrated in Fig



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MAN

THE PRIMEVAL SAVAGE

CHAPTER I.

INTRODUCTORY.

At the outset it may be well to briefly state what is meant by *Man, the Primeval Savage.* No race of men of whom any historical record whatever survives is referred to under these words. The mere barbarians, the chippers of rude weapons and tools of stone, who lived in North Britain at the time of the Roman conquest,—the men who had been driven north, ages before the Roman occupation, by Kelts from the mainland of Europe, are quite recent as compared with the far-off time when primeval savages lived in what is now Britain. The barbarians who preceded the ancient civilisations of Rome, Assyria, and Egypt are modern as compared with the remote antiquity of the savages whose bones, weapons, and tools are here described and sketched.

The men of whose works these pages treat are the remote human precursors known as Palæolithic men, the men who designed, made, and used the most ancient of all stone weapons and tools recognised as such by antiquaries and anthropologists. Our knowledge of the primeval or Palæolithic savage and his mode of life is at present little better than a shadow. His imperishable weapons and tools of stone are, however, common and well known. The savage himself has vanished, and but few remains of his bony fabric have been found for examination and study. Explorers of the future may discover other bones, and these may possibly give more perfect views of the presence, relationships, origin, and evolution of the primeval savage than are possessed at present.

It is impossible to estimate the antiquity of the human race in years; there are no historical records or dated stone monuments for such a purpose. Primeval man's far removed Neolithic descendants —the *comparatively recent chippers of the newer stone tools*—lived in Egypt and many other places ten thousand or more years ago,—in times long prior to the oldest monument known by date.

In computing the time when the primeval savage first appeared in Europe, one has to deal with what is termed geological time, or time indicated by different natural phenomena,—not time deduced from dated monuments and documents. The dates are determined by geological, astronomical, and mathematical computations.

As I estimate the evidence, man did not live in what is now Britain before what is known as the last great glacial period.

It is, however, highly probable that he lived in Asia and Africa before that period, because the primeval savage is first detected in North-Western Europe as a skilful designer and maker of stone tools. The tools are of different designs, and they were obviously made for different purposes. They indicate provision for a variety of wants and experiences.

It is clear that man must have existed for thousands of years as a being incapable of designing and making stone weapons and tools of geometrically correct form.

Man was already a skilful workman when he arrived at North-Western Europe, at the time when the last series of glaciers was retreating from what is now Britain. The so-called pre-glacial positions and pre-glacial implements of Britain are not accepted as such by me.

The facts as to the last great glacial period and its date may be stated briefly as follows. There are proofs of a far-off time when North-Western Europe possessed a different configuration from now, a time when the country now represented by Great Britain was elevated much more above the level of the sea than it is at present. Great Britain formed part of the mainland of Europe. Ireland was conjoined with England and Scotland, and the land thus conjoined extended into the Atlantic Ocean some three or four hundred miles from where the west coast of Ireland now is, the same land was extended extensively towards the Arctic circle in the north and the Atlantic in the south. The mountains of Scotland and Wales were consequently very much higher than now, and of course farther removed from coast lines. Nearly all the district now represented by Britain was in glacial times covered by an enormous and deep mass of snow and ice, such a mass as is found in Greenland at the present day. This ice sheet, with its glaciers, covered the whole of Northern

Britain to the Midlands. The whole of Northern Ireland was buried under one huge ice mass with slowly moving glaciers at its southern margins. This slowly creeping glacial ice, whilst travelling from the east towards the south-west, gave rise in its course to a vast amount of stiff stony mud or clay, called boulder-clay, because it is often full of large blocks of stone or "boulders." If unusually chalky, it is termed "chalky boulder-clay."

As the evidence regarding the first appearance of the primeval savage in North-Western Europe is to a great extent regulated by the presence of boulder-clay, it may be well to say here that the stones found embedded in this material have been derived from rocks to the north or east, over which the glaciers of old passed, and the clay itself is made up from the old surface material of the district where it is now found. The majority of the stones in the clay have not travelled far, a few only have been brought from long distances. Neither has the clay itself been much moved. Many stones and blocks of chalk rock met with in this clay exhibit glacial scratches and scorings.

Not far from Caddington, near Dunstable, in Bedfordshire, the position with which these pages chiefly deal, there are deposits of this glacial, stony, chalky mud or clay, fifty feet in thickness. In one position there is said to be a hundred feet of this clay or mud. No relics whatever of man occur either in or under it. Human relics occur only on the top. I therefore assume that man did not exist here either before or during the deposition of the clay; he came after the glacial clay was deposited.

The period of great cold, indicated by the presence of boulder-clay, was partly or wholly brought about, according to some astronomers, geologists, and mathematicians, by regularly recurring cosmical phenomena. The date of the last period of great cold has been indicated as about a hundred thousand years ago. Details of these computations are given farther on.

Sometimes a distinct stratum of sand, gravel, and clay is intercalated in the boulder-clay, together with remains of trees, and bones of the great hairy elephant or mammoth, reindeer, and other animals. The presence of these intercalated vegetable and animal remains may possibly indicate an amelioration of climate possibly extending over a very long period of time; in other words, these relics may indicate an inter-glacial period, or a period with a milder climate, which allowed forest trees to grow, and a variety of animals to live upon the surface of the country. No human relics, as I estimate the evidence, have ever been found in these intercalated strata.

High up on the Welsh mountains, and elsewhere capping the boulder-clay, especially where it occurs in low positions, sea-shells and other marine organisms are frequently met with, sometimes in great abundance. The marine shells are such as still exist on our coasts; some, however, are Arctic forms, others again are of species now extinct. These sea-shells seem to show that the land with its embedded relics of the mammoth—but with no human relics—must have descended into the sea after the laying down of the glacial boulder-clay. As the sea-shells and marine deposits now are found at heights of from 200 to nearly 2000 feet above the present level of the sea, it seems to follow that in early post-glacial times certain parts of Britain were submerged in the sea to a depth of at least 2000 feet.

The sea in which Britain was submerged was at first an icy sea, and only the tops of mountains and the higher hills appeared above the surface. The sea probably lifted and floated off the old land ice in the form of blocks and bergs, and warm currents at length raised the temperature.

After the descent of the land into the icy sea, where its surface received deposits of sea organisms, there are proofs of a gradual re-elevation—with interruptions—of Western Europe, and the gradual readvent of a more genial climate. The land was not elevated high enough for the reproduction of extensive ice-fields, fringed with enormous glaciers, as in glacial times. The part of Europe now represented by Britain was once more conjoined with that part of Europe now known as Northern France. The Thames, Ouse, Humber, Rhine, Elbe, and other rivers were tributaries to a great river which emptied itself into the North Sea, on a coast line which then existed north of where the Shetland Islands now are, to which northern position the land that is now Scotland at that time extended. The present English Channel was represented by a river which flowed towards the Atlantic midway between Cornwall and the north coast of Brittany and Normandy, and emptied itself into the sea at a point more than 200 miles west of where the Land's End now is. A tributary of this river ran from the west towards the east, a relic of which river remains to us in the present Solent Sea. The land then was higher than now, and the rivers ran in the London district a hundred feet above their present level. The rivers were rapid, less deep than now, and in some instances ten times as broad.

It is known that the rivers under description were broad and ran at great heights, by the deposits of river gravel, sand, brick earth, and fresh-water shells, which occur in terraces on the hill-sides bordering the Thames valley. In these deposits of gravel, sand, and brick earth, relics of the primeval human savage first appear. In some positions these relics are comparatively abundant, not on the surface, but embedded amongst the constituent stones of the gravel and sand, or fixed in the brick earth a hundred or more feet above the present river level.

At the time of the deposit of these river gravels, sands, and earths, as the evidence is interpreted by the majority of competent men of science, Man the primeval savage first appeared in Britain. He wandered into what is now Great Britain from the mainland of Europe. With him the mammoth, or great hairy elephant returned, accompanied by the rhinoceros, the lion, the hyæna, and the remarkable series of animals, — some of which are now extinct, — enumerated farther on. Man therefore first appeared in Britain some time after the re-elevation of the land, after the deep submergence which followed the glacial period of a hundred thousand years ago.

It is obvious that the primeval savage could not have lived here, when the land was deeply covered with ice and snow, or when it was under the sea. He came when the newly elevated land surface had become suitable for his mode of life. He *might*, of course, have lived here *before* the last glacial period, or in a milder *intercalated* period ; but (as I estimate the evidence) there is nothing to indicate his presence in undisturbed pre-glacial, glacial, or so-called inter-glacial deposits. Man therefore was, as regards Britain, post-glacial in his appearance, but, as already said, it is in the highest degree probable—indeed quite certain—that he was for ages pre-glacial in warmer climates at the time when North-Western Europe was under ice or under the sea. The pre-glacial or post-glacial age of man is only of *local significance.*

Great cosmical changes have taken place since man's first advent in Europe; for instance, the length of the day was less then than now, owing to the greater energy of the rotation of the earth on its axis.

Sir Robert S. Ball says in *The Story of the Heavens*, p. 449: "Ten thousand years ago the diameter of the sun was four hundred miles greater than it is to-day." The present decreased diameter being due to the radiation of heat and the shrinkage of the sun's substance. "When man first trod the earth," says Sir Robert S. Ball, "it would seem that the sun must have been many hundreds, perhaps many thousands, of miles greater than it is at this time."

Superficial deposits and geological sections prove that no true Palæolithic savages have inhabited this country since the conformation of Europe has been as it now is. At some period prior to the formation of the English Channel and the separation of Great Britain from the Continent of Europe, this country appears to have been, as regards man, temporarily depopulated. Other human races than Palæolithic, or most ancient workers of stone—or primeval—Mesolithic, or intermediate, and Neolithic, or the newer races of stone-chippers, reached Britain in later times not by land, but by crossing the sea on rafts from what is now France and Belgium.

From what direction Palæolithic man came, when he first reached this country, no one certainly knows; he could not have come from the north, north-east, or north-west, or west, or south-west. He probably came from the south or south-east, but his original home or starting-place is unknown. What direction he took when he finally left Western Europe is unknown. Why he left no one knows, beyond the surmise that this part of the world in some way became unsuitable for him. He went to some more suitable position, and became the progenitor of Mesolithic, Neolithic, and other races. Descendants of Palæolithic men through the Mesolithic and Neolithic series, of course exist at the present day, but which modern race is nearest to the oldest race is open to question. Individuals with skulls of the earliest or Canstadt type, are not uncommon in various parts of Europe, including London. The possessors of such skulls are not mentally inferior to the owners of typical modern skulls.

The earliest men may have reached what is now Britain from the direction of Africa, Palestine, or India, and may have retired in the same direction, for South-Eastern Europe, and neighbouring positions in Asia and Africa are strewn with early man's implements of stone.

At this point it may be well to briefly describe and illustrate a few of the instruments made by the earliest races of men as found in India. The tools are of Palæolithic or primeval type, and probably of Palæolithic age. They are found in the Madras and other Presidencies of India in laterite or quartzite formations, sometimes on the surface, at other times at various depths to ten feet. The colour of the implements is generally a beautiful red. This colour is, however, only superficial, as in some examples the colour within, as seen in broken specimens, is somewhat pale grey. The external colour is derived from the coloured matrix in which for ages the implements have been embedded, just as some grey flints in England have been coloured reddish-brown by being washed out of chalk and embedded for ages in ferruginous clay.

The most massive human-made stone implement of which I have any record is now in the Government Central Museum at Madras. It is made of quartzite, measures $9\frac{3}{4}$ by $5\frac{3}{4}$ inches, and weighs 6 lbs. 4 oz. In Fig. 1 this tool is engraved from a drawing kindly forwarded to me by Dr. George Bidie. The cord-like band towards the top of the implement is a vein of white quartz. Another very heavy implement, formerly in my own collection but now in the British Museum, Bloomsbury, is also a tool of quartzite from Madras, procured for me by the aid of Dr. Bidie. It measures $9\frac{3}{4}$ by $5\frac{3}{8}$ inches, and weighs 4 lbs. $7\frac{3}{4}$ oz. It is illustrated in Fig. 2. Two other implements from Madras, formerly in my collection but now in the British Museum, are illustrated in Figs. 3 and 4. The first is made of opaque quartz; it is white in colour, clouded with buff; the other is still more remarkable, and perhaps unique in its material; it is made of white crystalline quartz, and is translucent in all the thinner parts when held to the light.

I have a rude tool of quartzite from Madras, made from a single ponderous outside flake, which weighs 3 lbs. 13 oz. The single blow, which was sufficient to detach such a large splinter from a

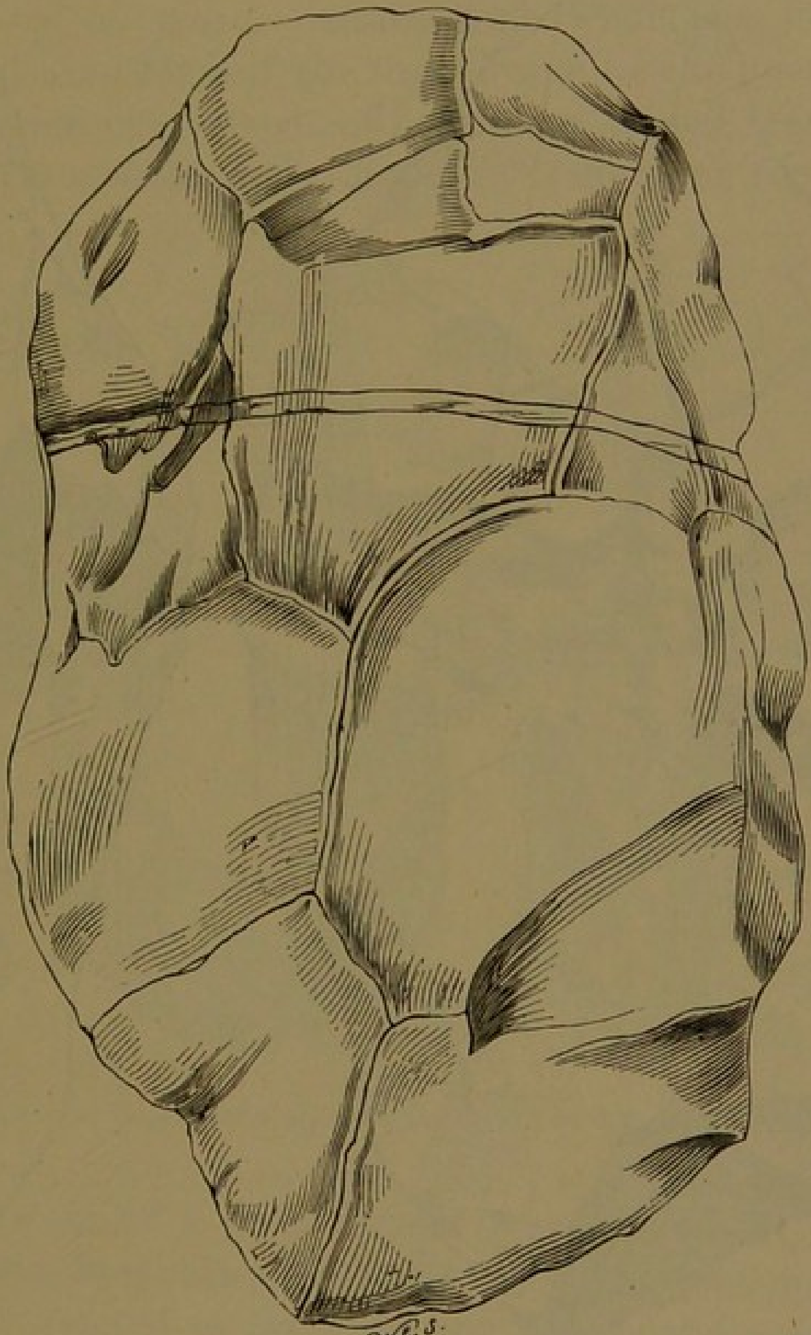


FIG. 1.—Quartzite implement, Madras. Half scale.

block of quartzite, must have been delivered with terrific force.

The Madras implements here mentioned were all found by natives at a place near Tirupati, a town eighty-three miles from Madras, and a station on

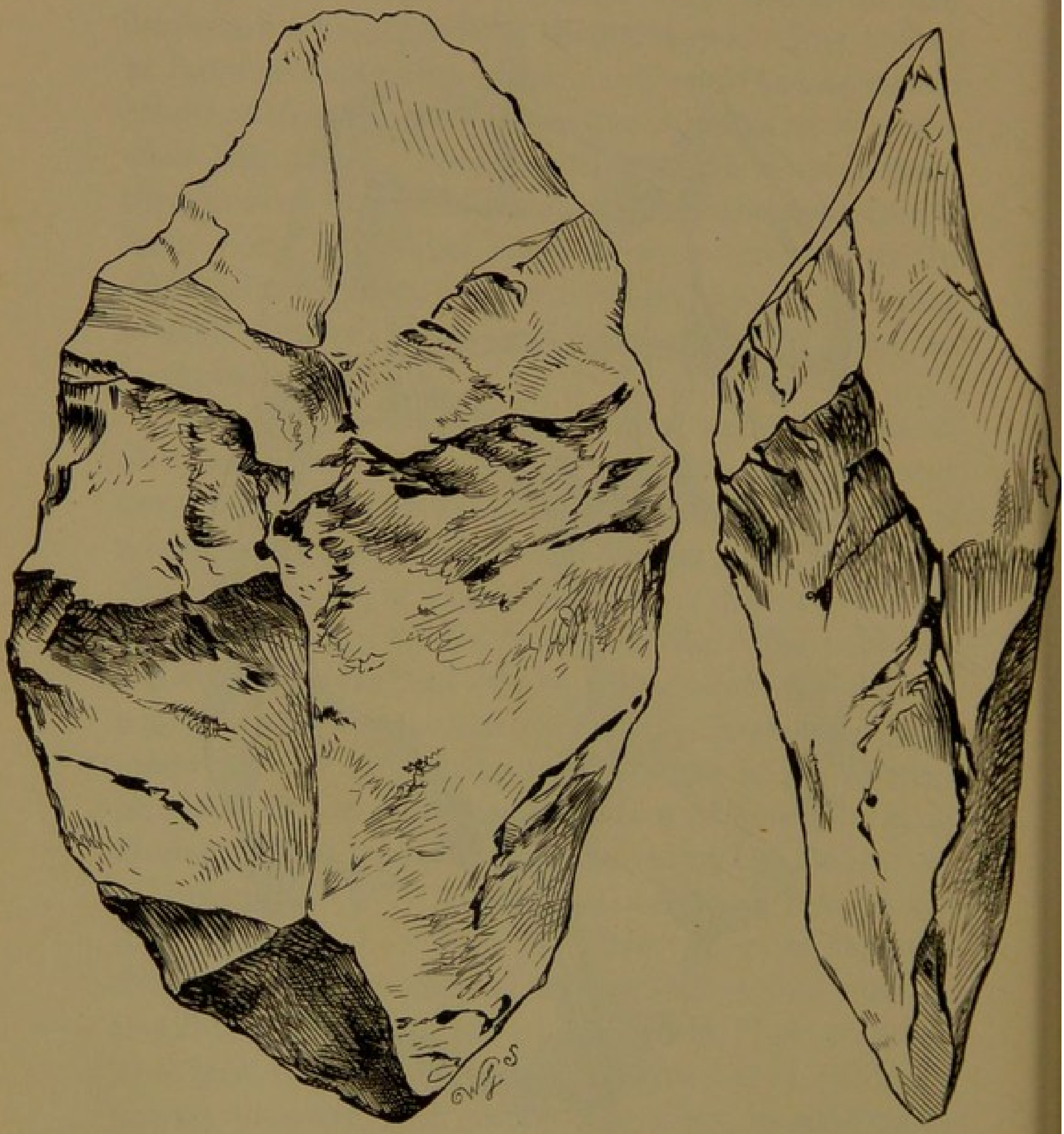


FIG. 2.—Quartzite implement, Madras. Half scale.

the North-Western line of railway from Madras to Bombay. The place is sometimes entered as Tripetty on maps.

As to the makers of the oldest class of primeval implements, whilst it is certain that modern men are the descendants of the primeval savages of old, it is by no means certain from what less human animal than himself the first savage race of men was descended or evolved. The human animal seems to have been, from early times, a "leader," or top of a

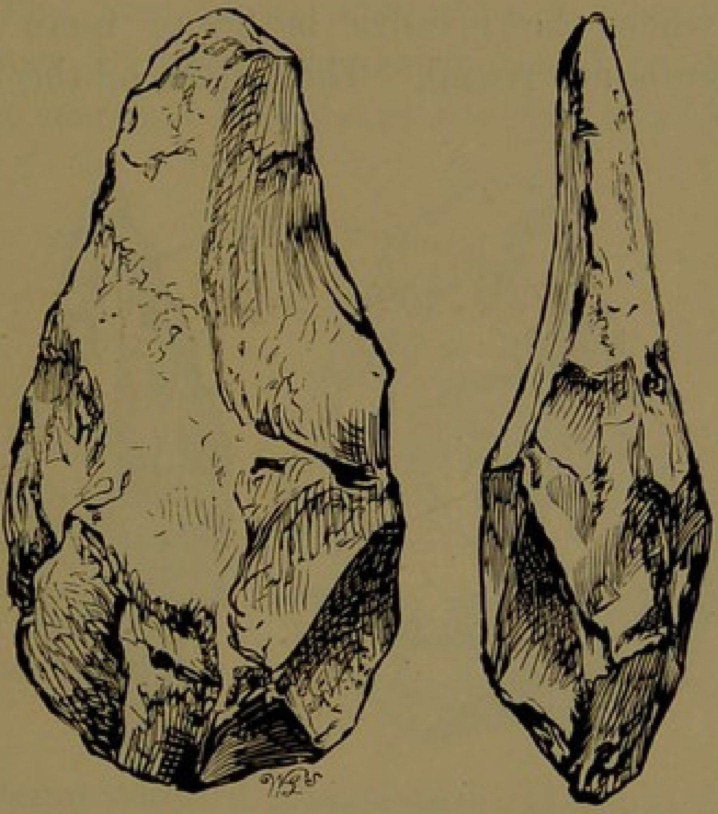


FIG. 3.—Implement of opaque white quartz, Madras. Half scale.

main stem of a genealogical tree, from which stem, on lower branches, apes have arisen. In this manner man is related to the apes, but not (as the evidence presents itself to me) by direct ascent from any known ape of to-day.

Something may be learned of the physical aspect of primeval man by a study of his fragmentary bones, as found in the gravel, sand, and clay deposits of rivers and caves, in company with his weapons and tools of stone.

Of the osseous remains, the skull is the chief and most instructive. Skulls vary greatly in form, some being very much longer in proportion to the breadth than others. A skull is said to be dolichocephalic or long when its breadth, as compared with its length, is 72 or less to 100; and brachycephalic or broad, when the breadth is 80 or more to 100. Some skulls are round. The angles of the face, the

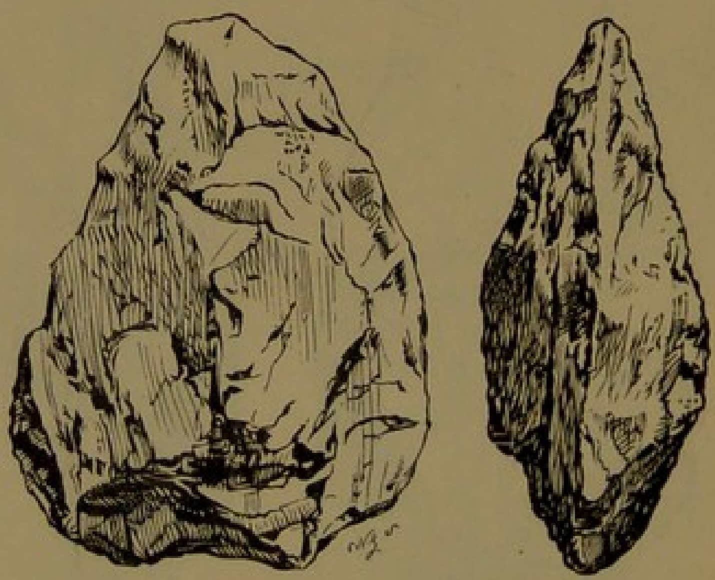


FIG. 4.—Implement of crystalline quartz, Madras. Half scale.

shape of the eye-orbits, and the form of the lower jaw and chin vary greatly.

The oldest known race of Palæolithic savages has been termed the Canstadt race, so named from a cranium found in 1700 by Duke Eberhard of Wurtemberg at Canstadt, near Stuttgart; this skull fragment remained undescribed for 135 years. Its contour, reduced from the illustration published by Messrs. Fraipont & Lohest, is shown in Fig. 5.

A second skull, of a like class, was found with the entire skeleton, in 1857, in a limestone cave in the Neanderthal, near Hochdal, between Dusseldorf and Elberfeld. The Neanderthal remains were not at first regarded as human. Dr. Schaaffhausen, who originally described the bones, says, that the extraordinary form of the skull is due to a natural conformation known to exist in the most barbarous races. The Neanderthal calvarium is now perfectly well known by casts, illustrations, and descriptions. A plaster cast may be seen in the gallery of Geology

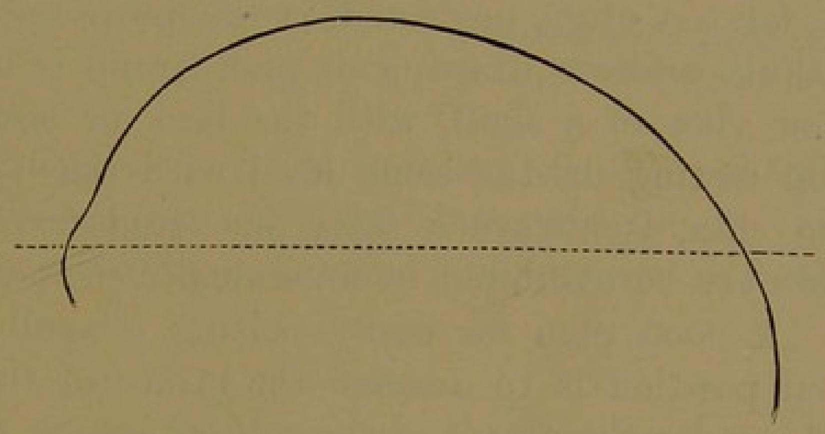


FIG. 5.—Contour of Canstadt cranium. One-third scale.

and Palæontology at the British Museum (Natural History), Cromwell Road, London. By the courtesy of Dr. Henry Woodward, the casts of this and of the Engis skull were removed from the cases, so that new camera-lucida drawings might be made for this work.

In making drawings or taking photographs of skulls, it is most necessary that the different views should be taken on exactly the same level, or the front will not agree with the side. The point of sight should also be exactly level with the centre of the eye-orbits. If this rule is not observed, there will either be too much or too little forehead. Some views of the Neanderthal calvarium err in both the points just mentioned; in fact, this relic has sometimes been drawn so much below a proper point of sight that little but eye-ridges is seen. Another most necessary rule is, that the spectator or camera should be at a proper distance from the object to be copied, otherwise the skull will be distorted. If the camera is placed too near the eye-orbits, the ridges become exaggerated, and the body of the skull behind is made much too small. Still another point, far too often neglected, is the proper poising of a skull before a drawing or photograph is made. A front view of a skull, with the back or occipital portion resting on the same level with the bottom of the chin, is always a false one; and no skulls should ever be exhibited in museums in such a position. A good plan for easily poising a skull in a natural position is to arrange the orifice of the ear exactly under the centre of the coronal suture, at the point where the coronal is touched by the sagittal suture. When skulls are fragmentary, difficulties of course arise, but with a knowledge of what perfect skulls are, it is never difficult to poise a skull fragment in a true and proper manner.

In preparing the outlines of skulls which follow, the rules just mentioned have been observed, and the prism of the camera-lucida has, in each instance, been placed at two feet from the skull drawn.

All the drawings of skulls here given have been photographically reproduced from camera-lucida drawings to one-third of the natural size. Illustrations of the front and side of the Neanderthal skull are given in Figs. 6 and 7. It will be at once observed that considerably more of the forehead or frontal bone is seen in the front view than commonly appears in illustrations of this fragment, and that the bones near the junctions of the malar bones with the eye-ridges do not project so inordinately beyond the temporal bones as sometimes shown in distorted illustrations. Two oblique views of the same calvarium are given in Figs. 8 and 9, and a view, as seen from below, in Fig. 10.

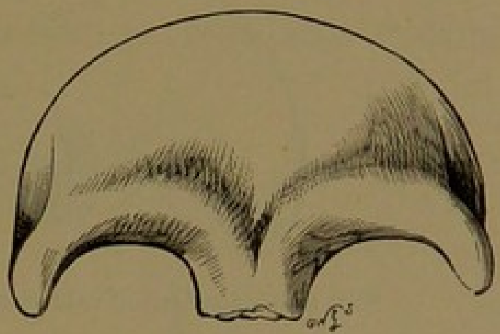


FIG. 6.—Neanderthal calvarium, front. One-third scale.

The approach to a so-called ape-like character, the enormously developed brow-ridges, the great posterior development, and the depressed forehead

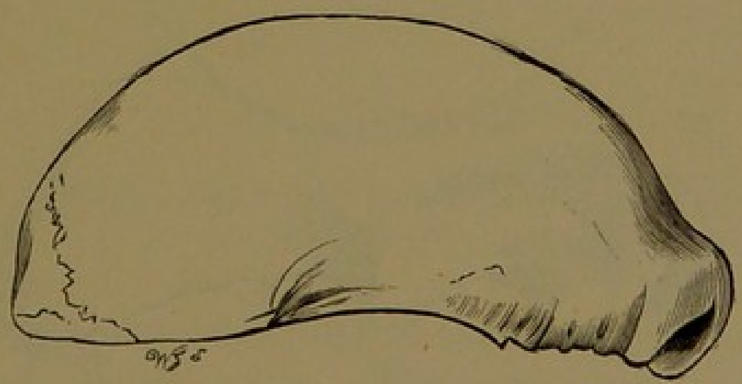


FIG. 7.—Neanderthal calvarium, right side. One-third scale.

or frontal bone, can be clearly seen in these illustrations. Professor Huxley writes: "In no sense can the Neanderthal bones be regarded as the remains of a human being intermediate between man and apes. At most, they demonstrate the existence of a man whose skull may be said to revert somewhat towards the pithecoid type—just as a carrier, or a pouter, or a tumbler, may sometimes put on

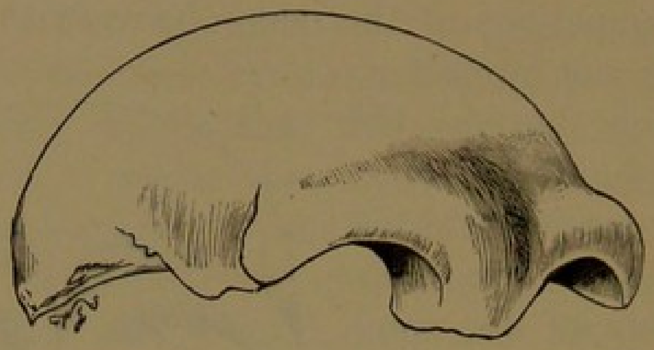


FIG. 8.—Neanderthal calvarium, oblique view. One-third scale.

the plumage of its primitive stock, the *Columba livia*."

Considerable doubts as to age and character were originally attached to the Neanderthal bones. It was not considered proved that the original

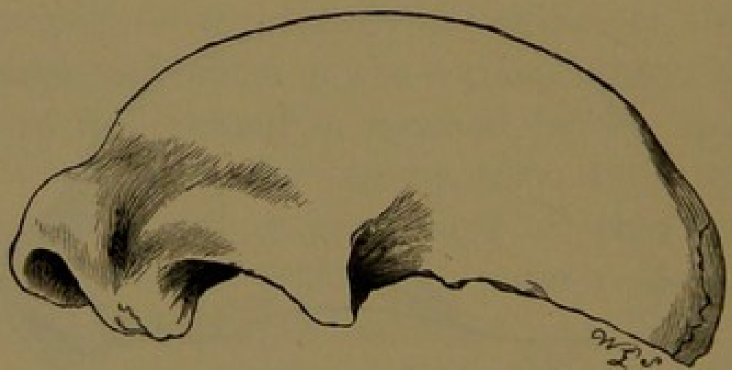


FIG. 9.—Neanderthal calvarium, oblique view. One-third scale.

owner was really a man of Palæolithic age, and if Palæolithic, it was suggested that the skull might have belonged to a deformed person, and might show a mere individual peculiarity, rather than a racial character.

The more recent discoveries at Gibraltar, and in the valley of the Neander, and the discovery by MM. Fraipont and Lohest of two skeletons at the mouth of a cave on the banks of the Orneau, in the commune of Spy, in the Belgian province of Namur, are most remarkable and important. The discovery at Spy seems to set at rest any doubts

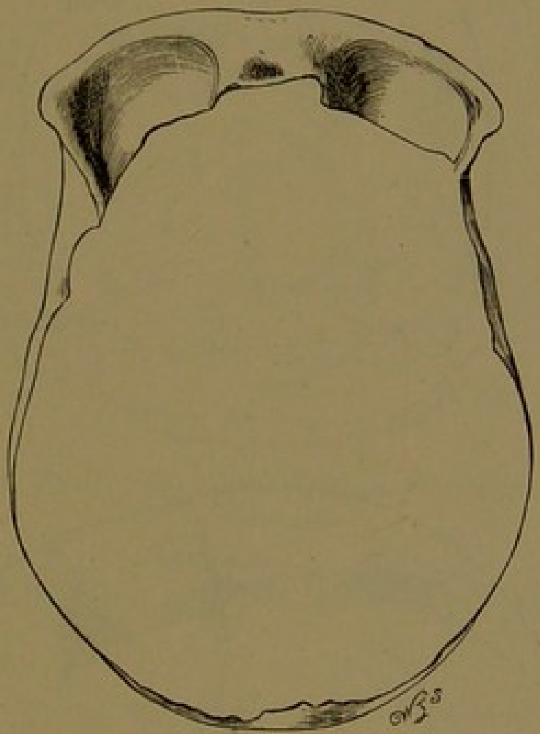


FIG. 10.—Neanderthal calvarium, seen from below. One-third scale.

as to the extreme antiquity of the Canstadt, Neanderthal, and similar relics. The paper which records the Spy discovery is a most elaborate one of 170 pages, illustrated with numerous wood engravings and photographs. It is published in the *Archives de Biologie*, Ghent, 1887. The essay is entitled *La Race Humaine de Neanderthal ou de Canstadt en Belgique*, par Julien Fraipont et Max Lohest. The human relics were found in the bottom stratum of a limestone cave, in company with Palæolithic implements, and remains of *Hyæna crocuta, Rhinoceros tichorinus* and *Elephas primigenius.* The accompanying illustrations are reproduced to scale from

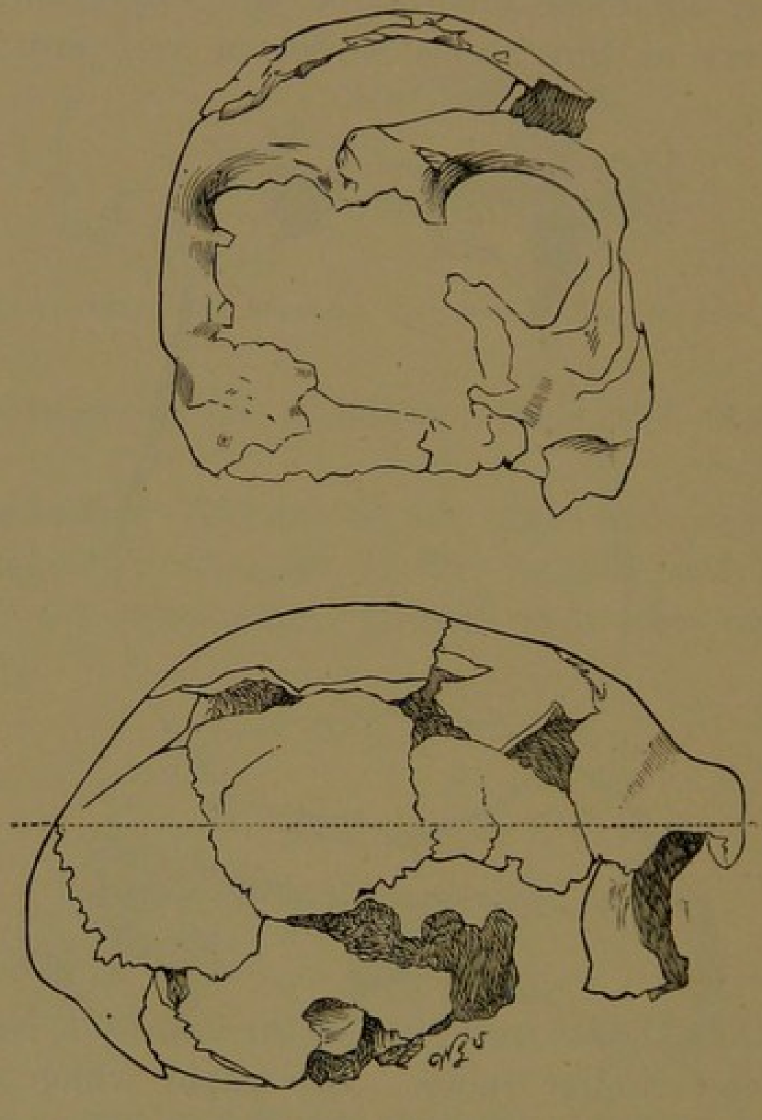


FIG. 11.—Front and side view of skull of Spy skeleton, No. 1. One-third scale.

the original photographs. Fig. 11 shows the front and side view of the skull of skeleton No. 1. Fig. 12 shows the skull as seen from above. It is long and low, or flat, with a cephalic index of 70, *i.e.*, 100 parts long and 70 broad. Such skulls are

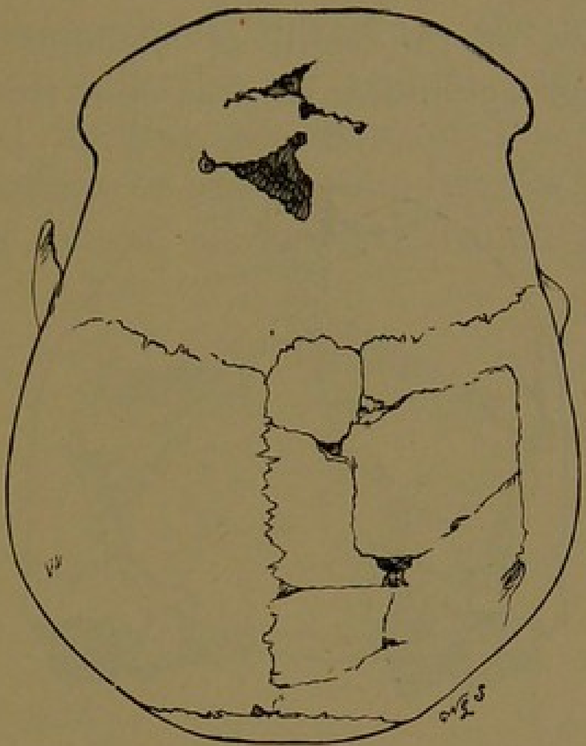


FIG. 12.—Skull of Spy skeleton, No. 1, seen from above. One-third scale.

technically known as *platidolichocephalic*, or a

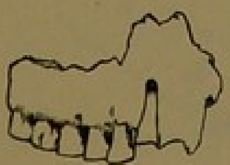


FIG. 13.—Part of upper jaw, Spy skeleton, No. 1. One-third scale.

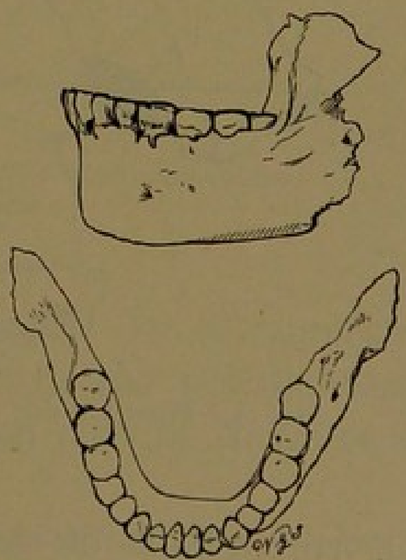


FIG. 14.—Two views of lower jaw, Spy skeleton, No. 1. One-third scale.

broad form of dolichocephalic. Part of the upper jaw is illustrated in Fig. 13, and two views of the lower jaw in Fig. 14.

Two views of the skull of skeleton No. 2 are given in Fig. 15, and a view as seen from above in

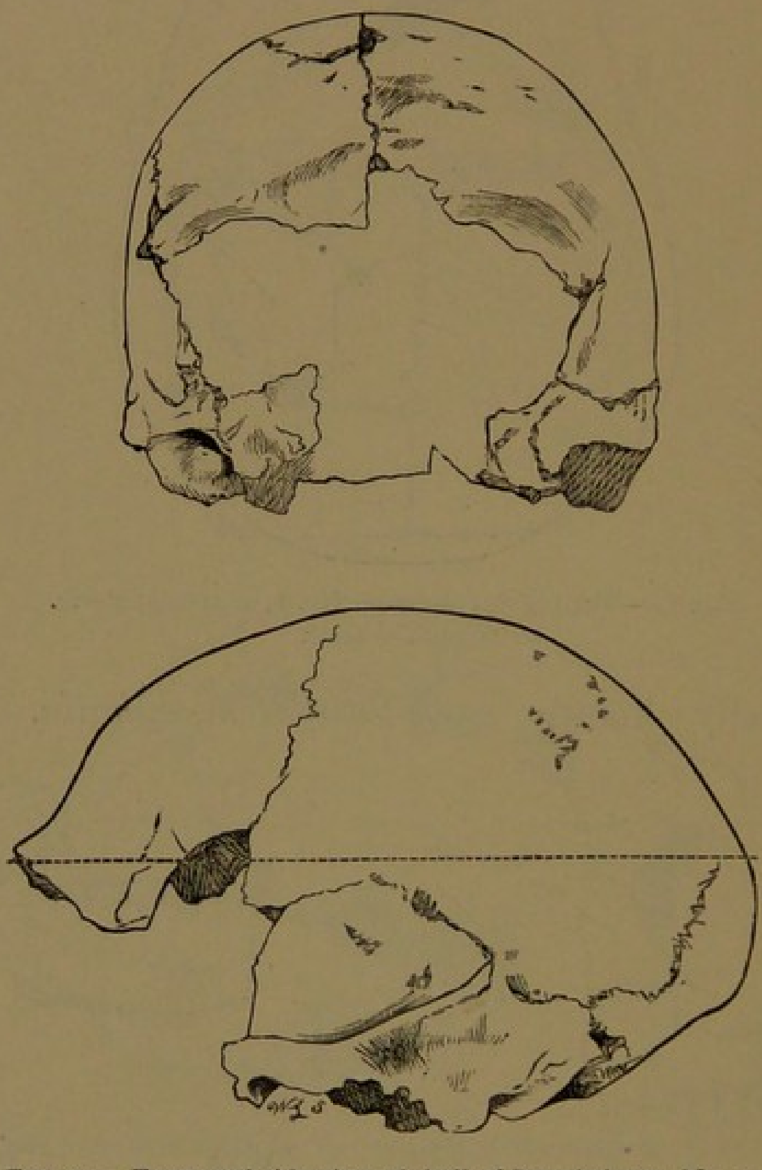


FIG. 15.—Front and side view of skull of Spy skeleton, No. 2. One-third scale.

Fig. 16. Skulls of this class are technically called *subplatidolichocephalic*, *i.e.*, a somewhat broad form of true dolichocephalic. This skull has an index of 74.8.

If a vertical section is made exactly through the front of a lower human jaw, either modern or even of Neolithic age, exactly between the incisor teeth, two minute tubercles or genial elevations will be detected towards the base of the bone. The upper elevation is the *genio-hyoglossus* tubercle, to which a muscle is attached, which greatly aids

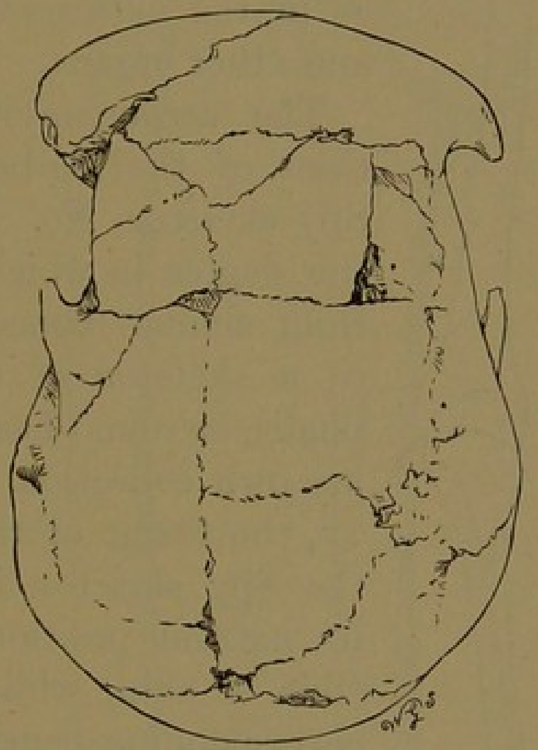


FIG. 16.—Skull of Spy skeleton, No. 2, seen from above. One-third scale.

the movements of the tongue. It is remarkable that this tubercle is absent in the gorilla, orang, chimpanzee, and in the human jaws of Naulette and Spy.

Great importance has been attached to the absence of this tubercle in the jaws of the most ancient race of men and the larger apes. The fact has been adduced as giving distinct evidence of defective speech in early man. It has been assumed, from its absence, that primeval man could probably only jabber in the style of an ape. The absence of the tubercle is certainly remarkable, and obviously points in the direction named; but the faculty of intelligent speech in man must be looked for in the structure of the brain, as well as in the nature of the larynx and other organs.

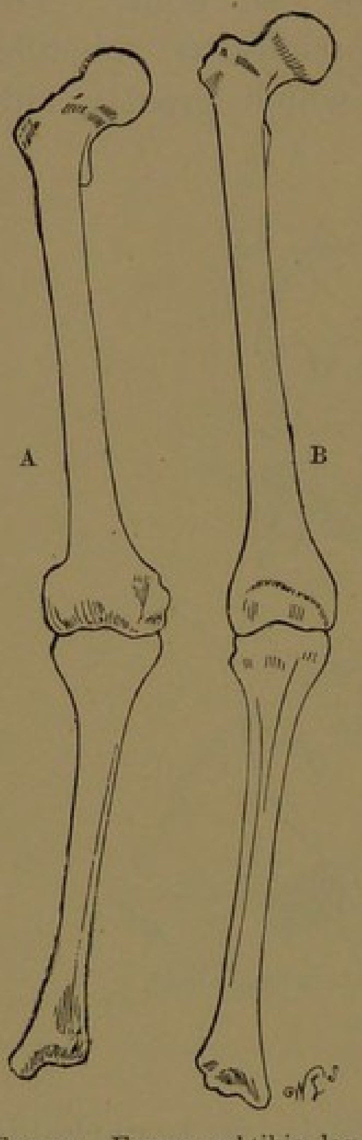


FIG. 17.—Femur and tibia, leg-bones of Spy skeleton, No. 1, A, and similar bones of an ancient Kelt, B. One-eighth scale.

The accompanying illustrations of the leg-bones of the Spy skeleton, No. 1, will show the degree in which they differ from similar bones, belonging to a skeleton of a brachycephalic, or round-headed Kelt, in my own collection. At A, Fig. 17, the femur or thigh-bone of the Spy skeleton is placed in its natural position above the tibia or shin, whilst at B two corresponding bones of a Kelt, or ancient Briton, are placed in a similar natural position. The illustration is one-eighth natural size.

In Fig. 18, a femur of the Spy skeleton is illustrated to a larger scale, viz., one quarter natural size, and beside it is placed a Keltic bone in precisely the same position. The curved shaft of the Spy bone, with its peculiar form at its attachment to the hip and knee, are very marked.

In Fig. 19, a shin-bone of the Spy skeleton is illustrated to one quarter natural size at A, and a Keltic

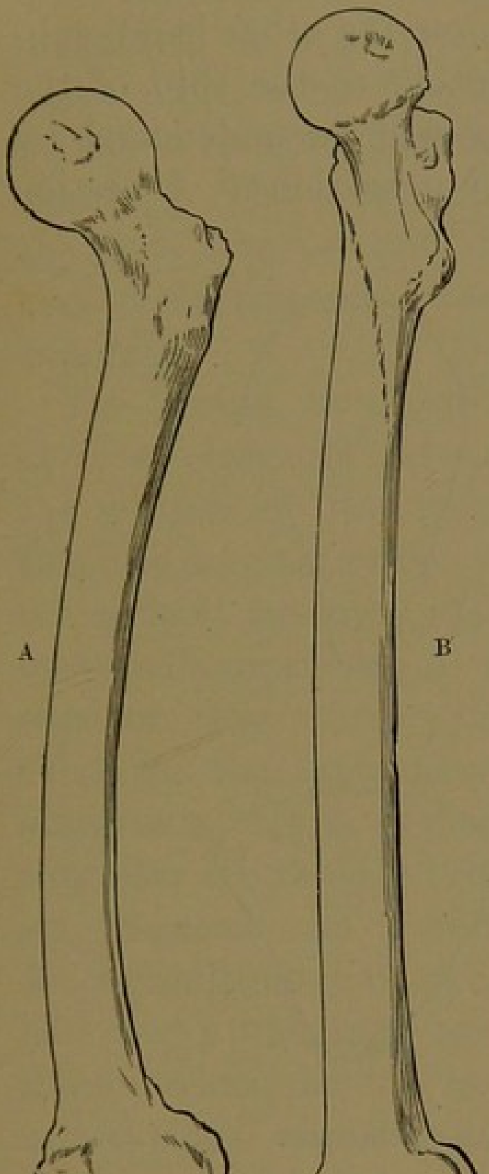


FIG. 18.—Femur or thigh-bone of Spy skeleton, No. 1, A, and similar bone of an ancient Kelt, B. One-fourth scale.

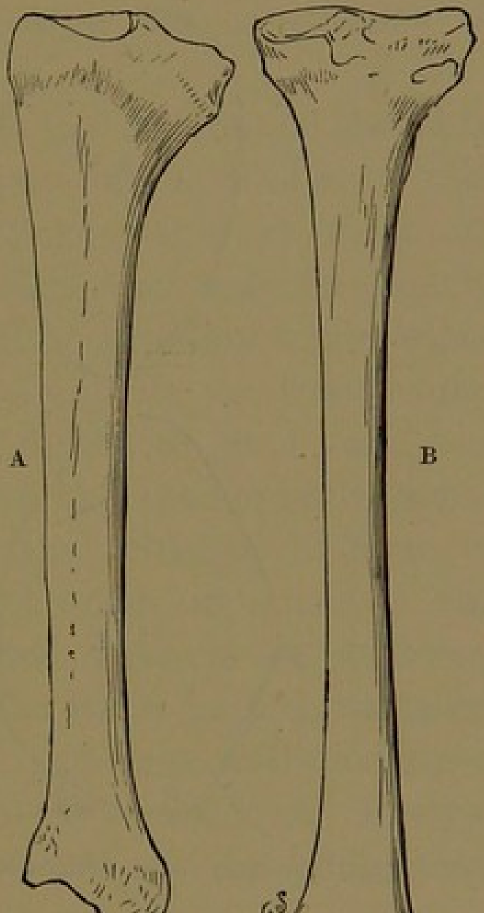


FIG. 19.—Tibia or shin-bone of Spy skeleton, No. 1, A, and a similar bone of an ancient Kelt. One-fourth scale.

shin at B. The difference in length, circumference, and general form of the two bones is remarkable.

The shin-bone of the Palæolithic man of Spy, as seen in transverse section through the middle of the shaft, is not in the least platycnemic—that is, broad or flattened at the sides and furnished with a sharp frontal crest or ridge,—it is, on the other hand, subround, and approaches in contour to the shin of the gorilla. The forms of tibiæ will be understood by reference to the accompanying sections. A section

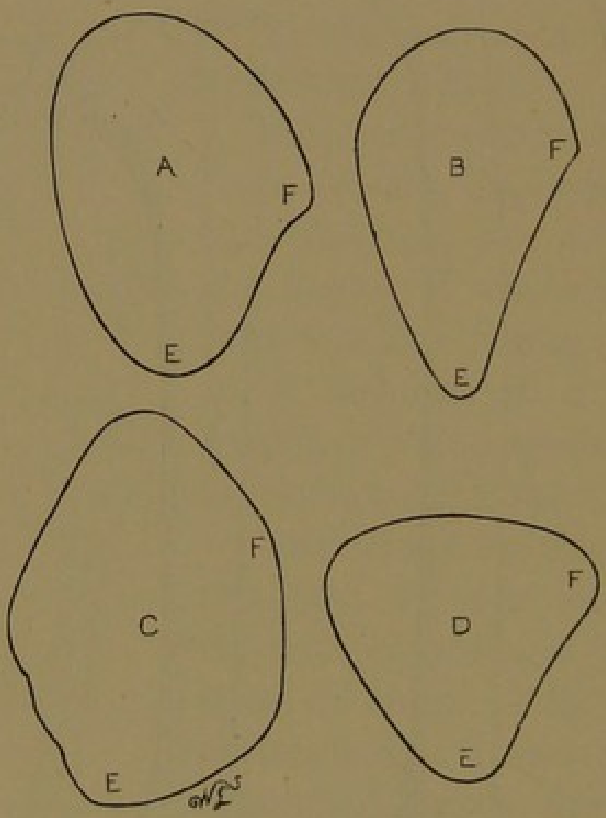


FIG. 20.—Transverse sections of tibiæ or shin-bones. Natural size.

through the shin-bone of one of the Spy skeletons is shown natural size at A, Fig. 20; a section through the platycnemic shin of an Anglo-Saxon, from an example in my own collection, is seen at B; and through the shin of an adult male gorilla, sent to this country by Du Chaillu, and now in the British Museum, Cromwell Road, at C. At D is shown a similar section taken through the shin of a thirteenth-century Cistercian ecclesiastic, whose skeleton I saw exhumed at Strata Florida Abbey in Cardiganshire. The unusually rounded edges of this tibia are remarkable. The platycnemic shape, which is sometimes much more developed than in the section B, is said to be brought about by the use of the legs in running. The comparative roundness of the shin of the Spy man, A, and of the ecclesiastic, D, shows that their original owners were not accustomed to running.

The gorilla, as shown by the section of the shin at C, is obviously no runner, but a climber, whilst the section of the Anglo-Saxon shin at B, shows that the original owner probably not only frequently ran to save his own life, but commonly made other men and women run to save theirs; the front knife-edge or crest of the shin is shown at E, and the ridge for the attachment of the interosseous membrane at F. It is probable that changes of form of this class are rapidly brought about in bones of the leg, especially in bare-footed runners or athletes. An agricultural labourer, who wears high-lows laced half way up his legs, would not have well-developed tibiæ, because he has no calves to his legs. Platycnemic shins are not uncommon in persons living at the present time.

The thigh-bone in different races of men also varies in section. A section through the middle of the thigh of one of the Spy skeletons is shown in Fig. 21, A; a similar section through the thigh of an Anglo-Saxon in my own collection at B; and a section through the Cistercian ecclesiastic's thigh at C. It will be observed that the thigh-bones of the two bad walkers, A and C, approach each other in form, whilst the good runner differs from both; D is the front of the bone.

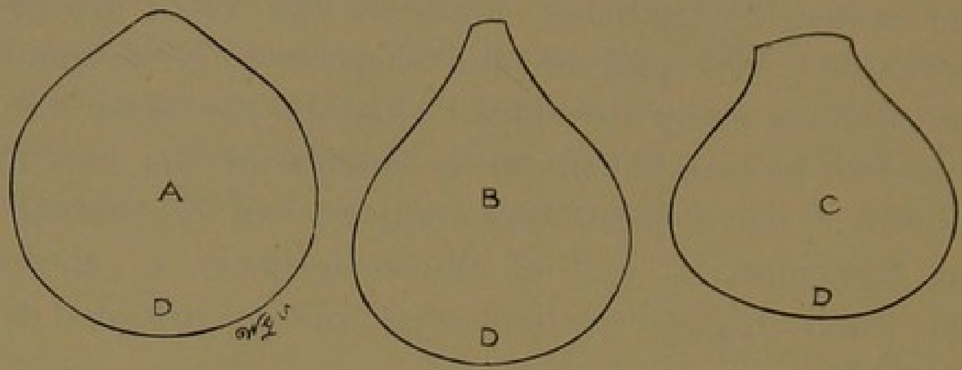


FIG. 21.—Transverse sections of femora or thigh-bones. Natural size.

In reference to the Spy skeletons, MM. Fraipont and Lohest say:—

"To sum up, we consider ourselves to be in a position to say that, having regard merely to the anatomical structure of the man of Spy, he possessed a greater number of pithecoid characters than any other race of mankind.

"The other, and much more numerous characters of the skull, of the trunk, and of the limbs, seem to be all human. Between the man of Spy and an existing anthropoid ape there lies an abyss.

"The distance which separates the man of Spy from the modern anthropoid ape is undoubtedly enormous; between the man of Spy and the *Dryopithecus* it is a little less. But we must be permitted to point out, that if the man of the later Quaternary age is the stock whence existing races have sprung, he has travelled a very long way.

"From the data now obtained, it is permissible to believe that we shall be able to pursue the ancestral type of men, and the anthropoid apes still farther, perhaps as far as the Eocene, and even beyond."

Professor Huxley, writing in the *Nineteenth Century* for November 1890, on the *Aryan Question and Pre-historic Man*, refers to the Spy skeletons as follows :—

"The anatomical characters of the skeletons bear out conclusions which are not flattering to the appearance of the owners. They were short of stature but powerfully built, with strong, curiously curved thigh-bones, the lower ends of which are so fashioned that they must have walked with a bend at the knees. Their long, depressed skulls had very strong brow-ridges; their lower jaws, of brutal depth and solidity, sloped away from the teeth downwards and backwards, in consequence of the absence of that especially characteristic feature of the higher type of man, the chin prominence. Thus these skulls are not only eminently 'Neanderthaloid,' but they supply the proof, that the parts wanting in the original specimen harmonised in lowness of type with the rest." And again, "After all due limitations, they give us some, however dim, insight into the rate of evolution of the human species, and indicate that it has not taken place at a much faster or slower pace than that of other mammalia; and if that is so, we are warranted in the supposition that the genus *Homo*, if not the species which the courtesy or the irony of naturalists has dubbed *sapiens*, was represented in Pliocene, or even in Miocene times. But I do not know by what osteological peculiarities it could be determined whether the Pliocene or Miocene man was sufficiently sapient to speak or not; and whether or not he answered to the definition 'rational animal' in any higher sense than a dog or an ape does."

Farther on in the same article Professor Huxley refers to the origin and birthplace of the primeval human savage in the following terms:—

"There is no reason to suppose that the genus *Homo* was confined to Europe in the Pleistocene age; it is much more probable that this, like other mammalian genera of that period, was spread over a large extent of the surface of the globe. At that time, in fact, the climate of regions nearer the equator must have been far more favourable to the human species; and it is possible that, under such conditions, it may have attained a higher development than in the north. As to where the genus *Homo* originated, it is impossible to form even a probable guess. During the Miocene epoch, one region of the present temperate zones would serve as well as another; and the abyss of time between the period at which North Europe was first covered with ice, when savages pursued mammoths and scratched their portraits with sharp stones in Central France, and the present day, ever widens as we learn more about the events which bridge it."

Low in type as were the Canstadt savages, yet some modern skulls closely approach the same type in all three characters, viz., projecting brow-ridges, depressed forehead, and posterior development. The physiological differences, if any, indicated by dolichocephalic and brachycephalic skulls are not known.

The second oldest race of men, often incorrectly referred to as of Palæolithic age, are known as belonging to the Cro-Magnon or Engis type, the first name being in more general use. Professor Boyd Dawkins, Sir John Lubbock, and others, doubt the Palæolithic age of the relic known as the Engis skull; and the skulls of Cro-Magnon in the Dordogne "have," says Sir John

Lubbock, "been referred, though scarcely perhaps on sufficient ground, to the Reindeer period."

The Engis skull is undoubtedly of great antiquity,

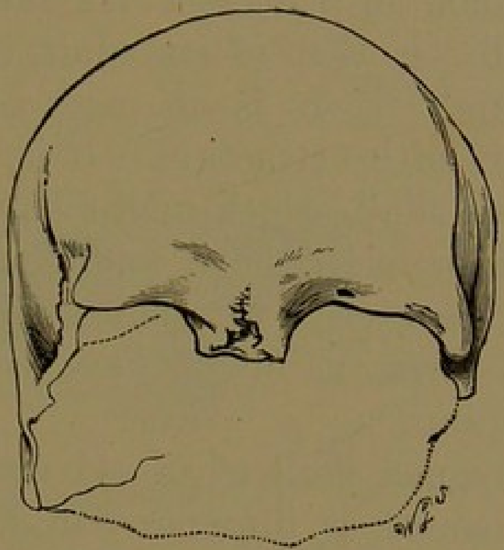


FIG. 22.—Engis cranium, front. One-third scale.

and has been many times illustrated. A plaster cast of it may be seen in the gallery of Geology and

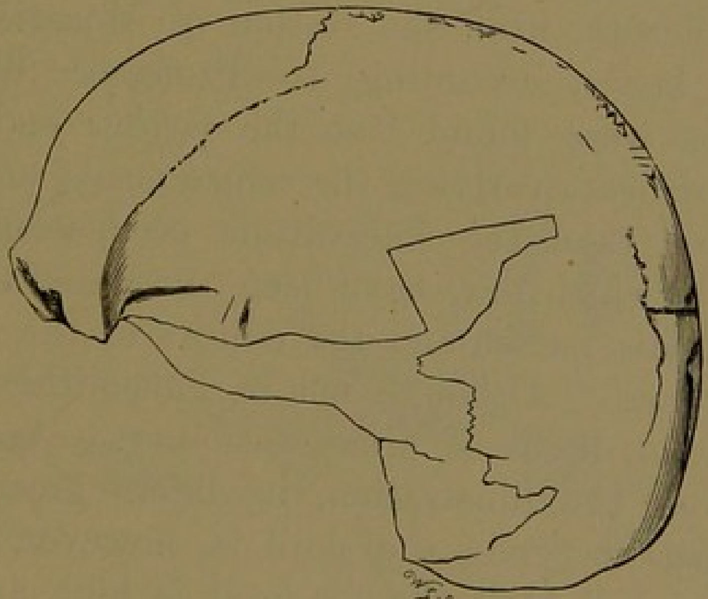


FIG. 23.—Engis cranium, side. One-third scale.

Palæontology at the British Museum, Cromwell Road. A front view taken from this cast is given in Fig. 22, and the side in Fig. 23.

As in the Neanderthal calvarium, the face-bones and lower jaw are missing. A mere glance at the cast or at these outlines is quite sufficient to confirm the opinion of Professor Huxley, who writes that the skull "is that of an adult, if not middle-aged man," and "there is no mark of degradation about any part of its structure. It is, in fact, a fair average human skull, which might have belonged to a philosopher, or might have contained the thoughtless brains of a savage." Sir John Lubbock well says, "As regards form, it might have been that of a modern European."

The Cro-Magnon skull of an old man, from which the type is named, is illustrated in Fig. 24, photographically reduced to scale from the *Histoire générale des Races Humaines*, by A. de Quatrefages. The skeleton to which this skull belonged was found in the rock-shelter of Cro-Magnon, in the valley of the Vezère, near the station of Moustier. The human bones, according to Professor W. Boyd Dawkins, were found "at the farther end of the cave in *débris* overlying the refuse heaps, and therefore later than the Palæolithic occupation of the cavern, to which they have been considered to belong by M. Louis Lartet and the editors of the *Reliquiæ Aquitanicæ*." Although not of Palæolithic age, the skull is no doubt of great antiquity. As will be seen from the illustration, it differs greatly from the Canstadt type: the skull is, however, long, or dolichocephalic, but the forehead is high and beautifully arched, and the powerful jaw has a prominent and not receding chin. The eye-orbits are remarkably square, in the style of the Neolithic giants found at Mentone. The original owner of the skull, unlike the Canstadt men, was tall. There is a cast of this skull in the British Museum, Bloomsbury.

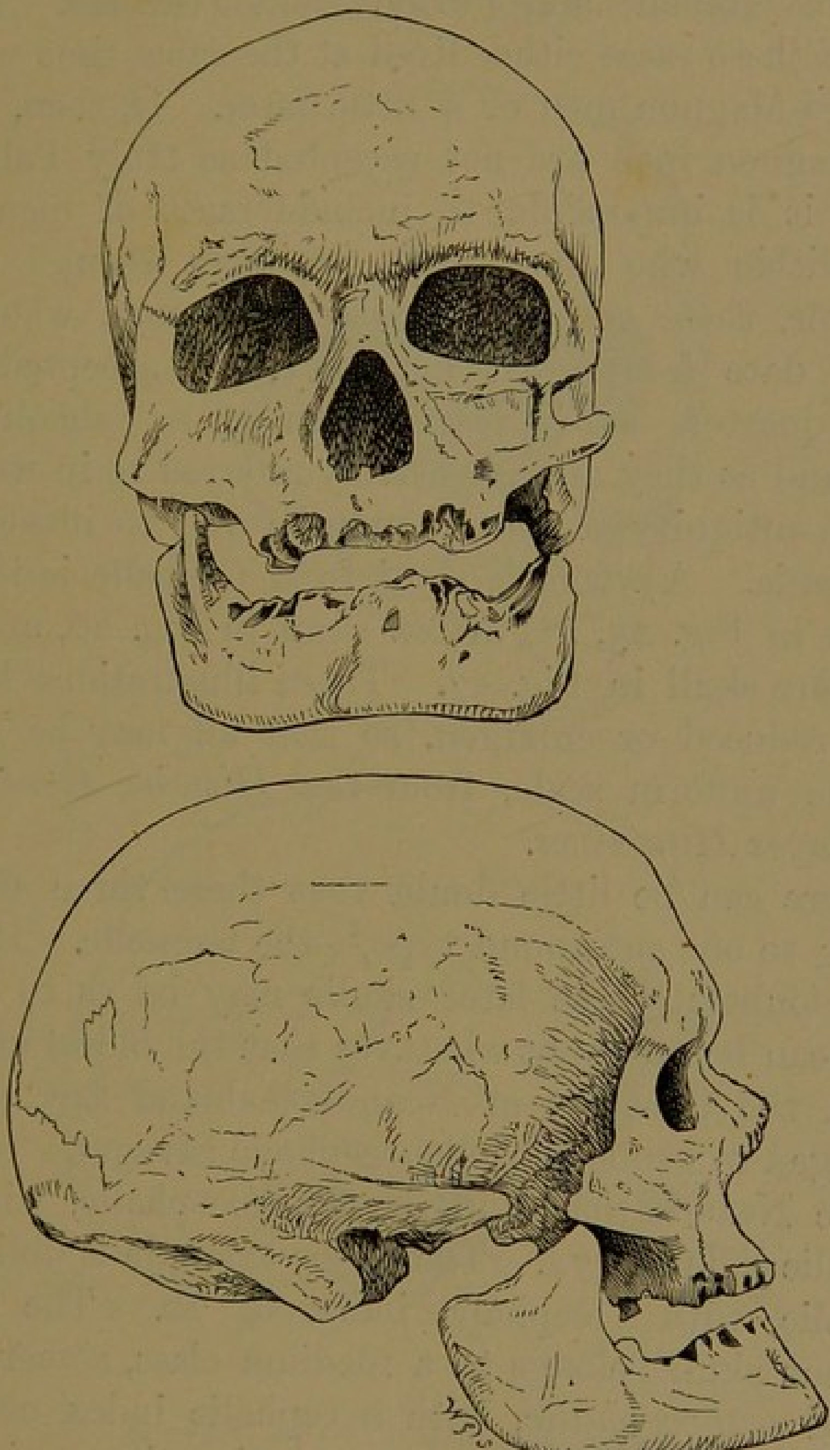


FIG. 24.—Front and side, Cro-Magnon skull. One-third scale.

Some Neolithic and indeed modern skulls agree with the Cro-Magnon examples.

Two other races are accepted as of Palæolithic age by some Continental anthropologists; these are the races of Grenelle and Furfooz, and Truchère. The men of these races either lived at the same time with the Cro-Magnon men or a little later. If, then, the Cro-Magnon men are not accepted as truly Palæolithic, it is impossible to include races of men as Palæolithic who lived with or after them. As, however, these contemporary or later men, who no doubt date from great antiquity, are accepted in some quarters as representatives of a Palæolithic race, and as they are extensively referred to in works on the antiquity of man, it may be well to illustrate the crania. A woman's skull from Grenelle is illustrated in Fig. 25, a Furfooz skull in Fig. 26, and a Truchère skull in Fig. 27. These illustrations have been reduced or enlarged, so that all may be seen to one uniform scale, from the *Histoire Générale des Races Humaines.*

There can be little doubt that these three skulls belong to one sub-round type,—the Grenelle. However doubtful these later skulls may be as to age, there can be no doubt whatever that the oldest of the series, the Canstadt or Neanderthal and Spy, once belonged to primeval dolichocephalic savages.

The Neanderthal skull is dolichocephalic, with a cephalic index of 72. The Engis example is dolichocephalic, with a cephalic index of 70. The Cro-Magnon skull belongs to a medium class, sometimes named *orthocephalic*, with a cephalic index of 75. The Grenelle skull is brachycephalic, with an index of 85. The Furfooz crania vary from brachycephalic, with an index of 85, to the medium series, as in the example illustrated, with an index of 75. The

Truchère cranium is brachycephalic, with a cephalic index of 85.

It will be noticed that in the series of skulls

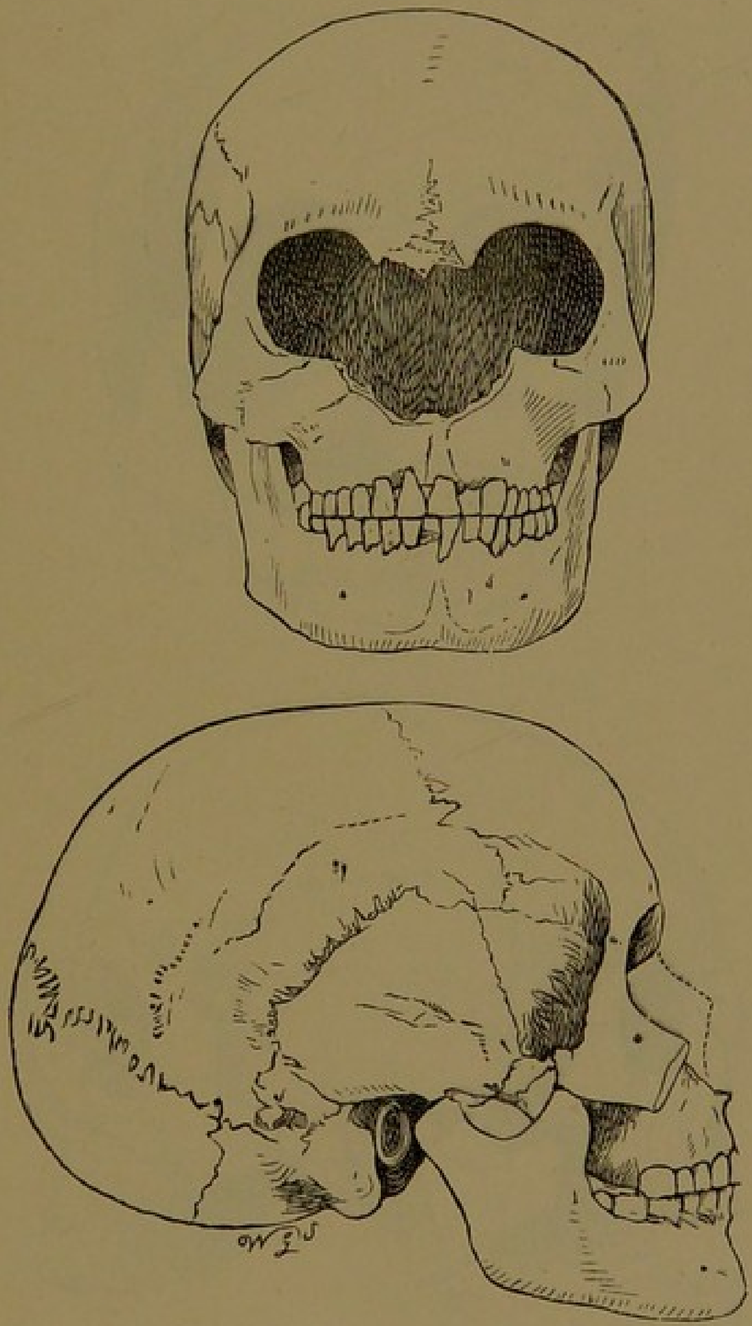


FIG. 25.—Front and side, Grenelle skull. One-third scale.

illustrated the development has been from the long or dolichocephalic, through the medium, orthocephalic, to the short or brachycephalic. Other and minor points of difference may be noticed in the illustrations.

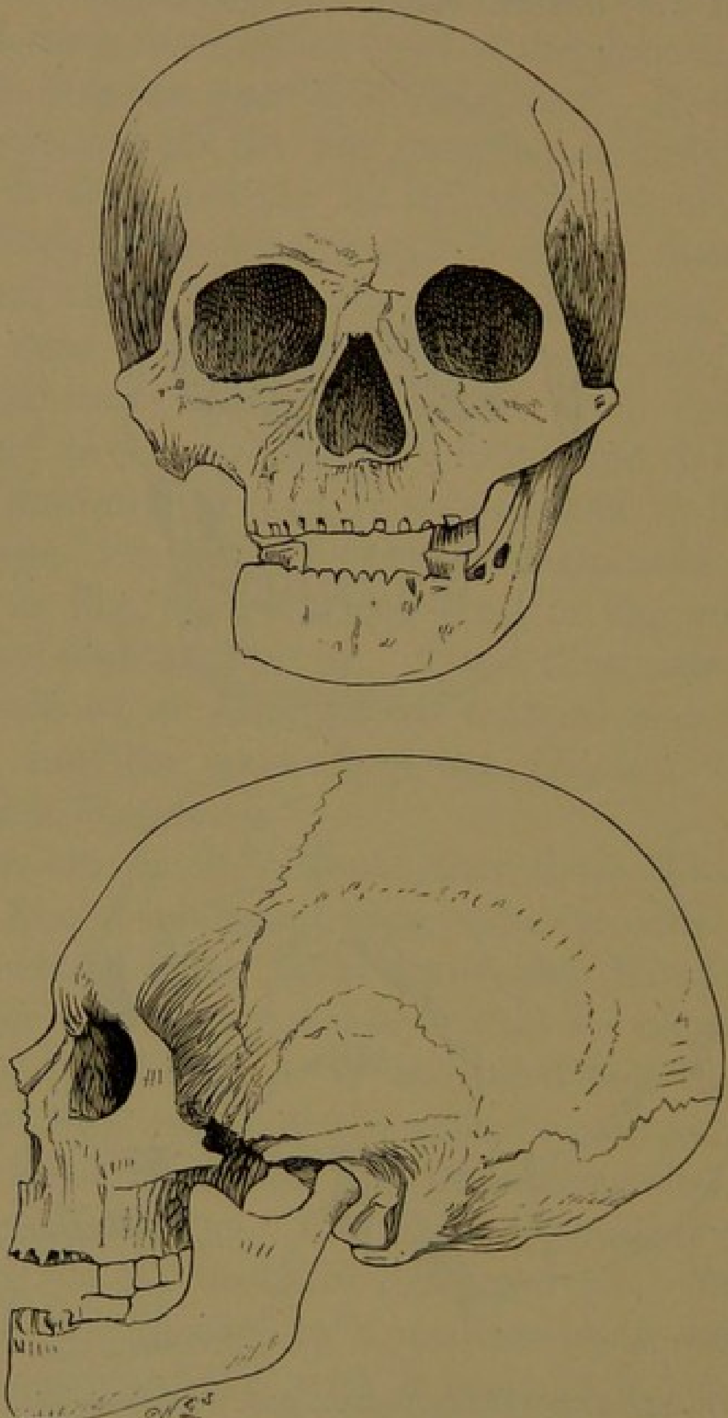


FIG. 26.—Front and side, Furfooz skull. One-third scale.

None of the skulls here mentioned demand any special notice except the Neanderthal and Spy examples.

All the others could be very easily matched with modern skulls. They are all good, capacious specimens, and quite up to the average human standard.

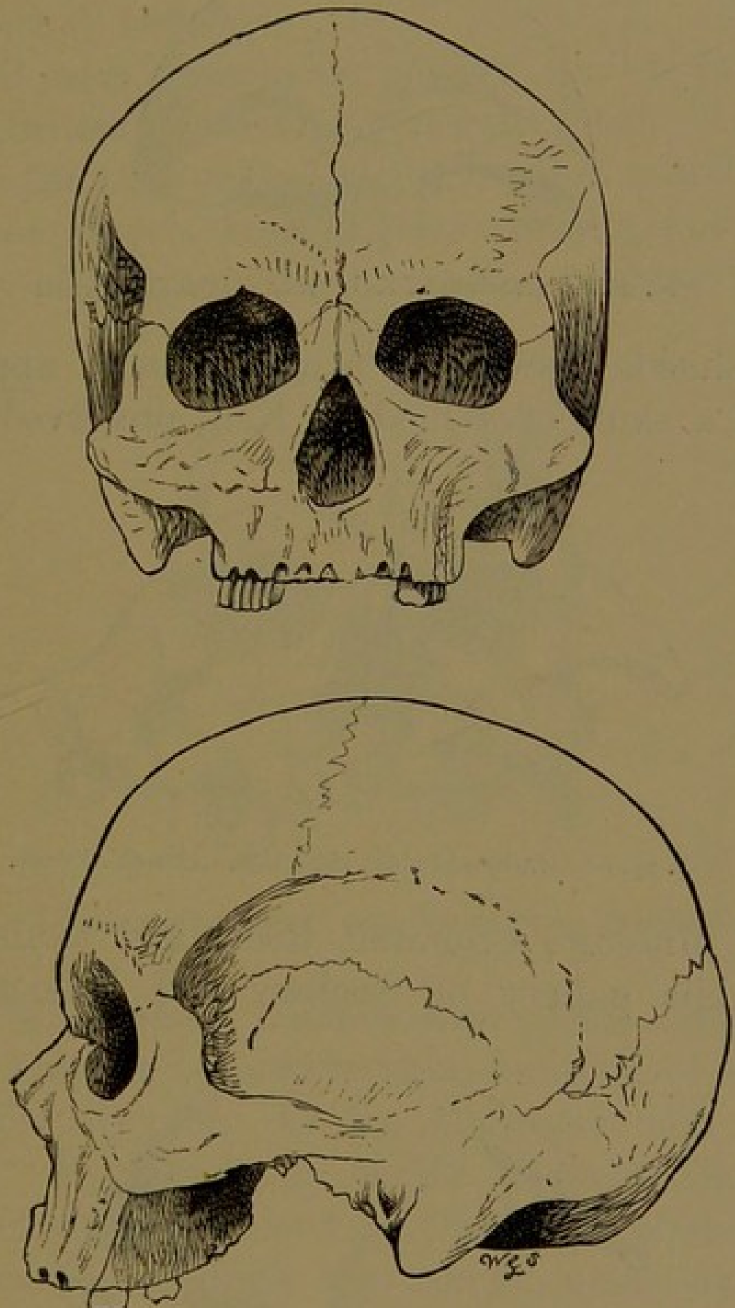


FIG. 27.—Front and side, Truchère skull. One-third scale.

With the Neanderthal and Spy examples the case is different, but some modern skulls closely approach even these, in so-called ape-like characters. As an illustration of this fact, I have, by the courtesy of Dr. Henry Woodward, been allowed to make a

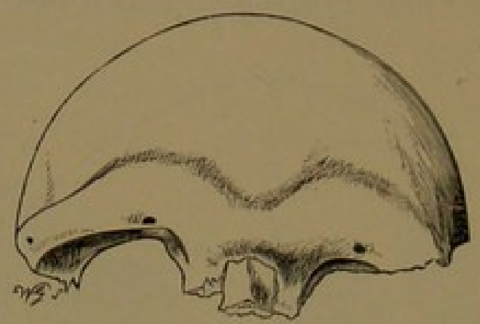


FIG. 28.—Calvarium of Kelt, front. One-third scale.

camera-lucida drawing of a calvarium or upper portion of a skull of a modern Kelt, preserved in the

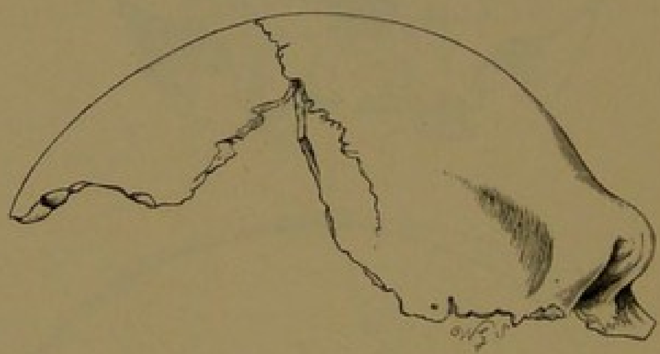


FIG. 29.—Calvarium of Kelt, right side. One-third scale.

British Museum, Cromwell Road, and exhibited in the public gallery of Geology and Palæontology.

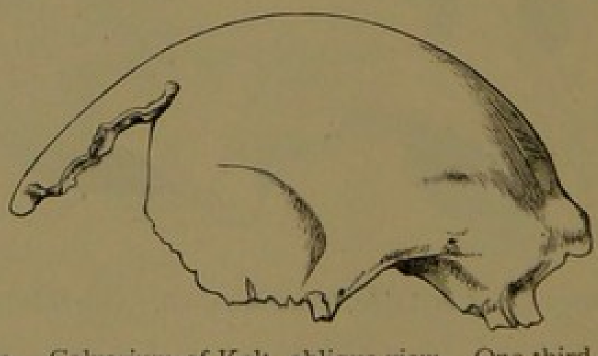


FIG. 30.—Calvarium of Kelt, oblique view. One-third scale.

In Figs. 28, 29, and 30, front, side, and oblique views of this calvarium are given. The skull came from an ancient burial-place at Manor Hamilton, Sligo, Ireland, in 1864, and was presented to the British Museum by the late Sir Richard Owen, K.C.B. The contours may be compared with those of Canstadt, Neanderthal, and Spy.

A still more remarkable modern skull is preserved in the British Museum, Cromwell Road, and exhibited in the Osteological Gallery. It is a Melanesian skull from Jervis Island, Torres Straits, and is one of forty-nine crania sent to this country by the

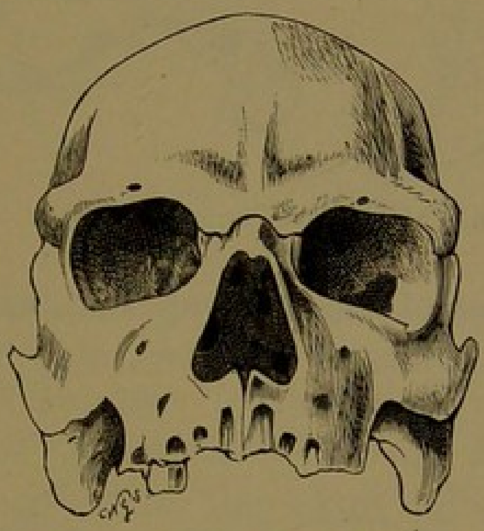


FIG. 31.—Skull of Melanesian, Torres Straits, front. One-third scale.

Rev. S. MacFarlane, a missionary. The examples are skulls obtained by native skull-hunters, of enemies from the adjoining Banks, Mulgrave, and Dauan Islands. By permission of Mr. Oldfield Thomas, I have engraved four views of this skull, photographically reproduced from my camera-lucida drawings. In Figs. 31, 32, and 33, front, side, and oblique views are given for comparison with the crania of Neanderthal, Spy, and Sligo. The British Museum label describes the skull as the lowest and most simian or ape-like of recent date that has yet been discovered.

Its dolichocephalic character is very striking, as seen from above, Fig. 34. Its cephalic index is only 61.9.

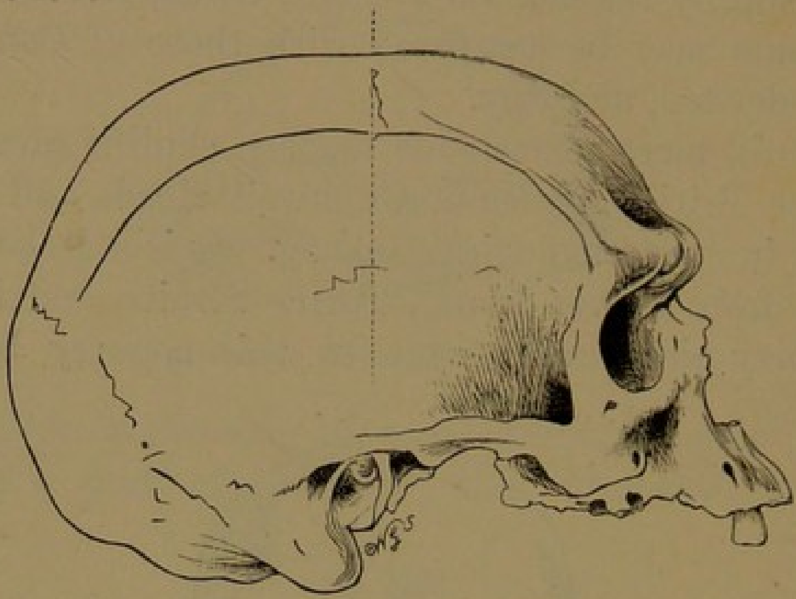


FIG. 32.—Skull of Melanesian, Torres Straits, side. One-third scale.

The narrowness of the skull, as seen behind the broad, low, squarish orbits of the eyes, may be noted in the

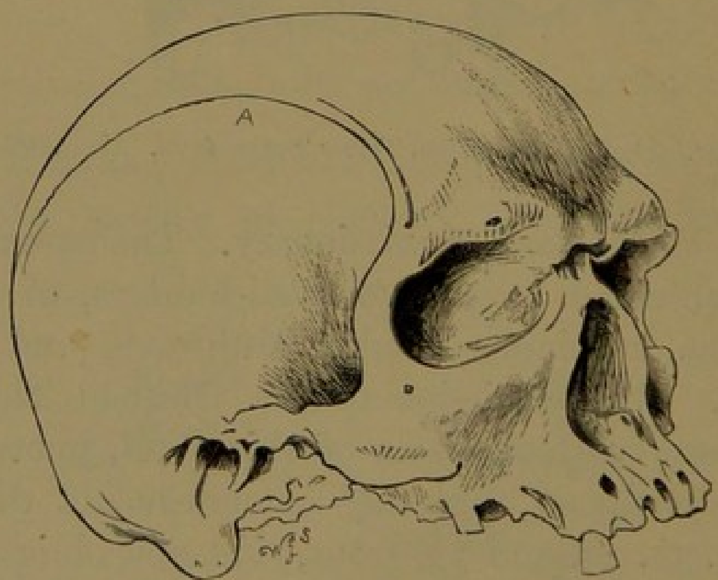


FIG. 33.—Skull of Melanesian, Torres Straits, oblique view. One-third scale.

front view; the projecting brow-ridges, especially over the nasal bones, and the strong development of the temporal ridge, as seen at A, in the side and oblique views.

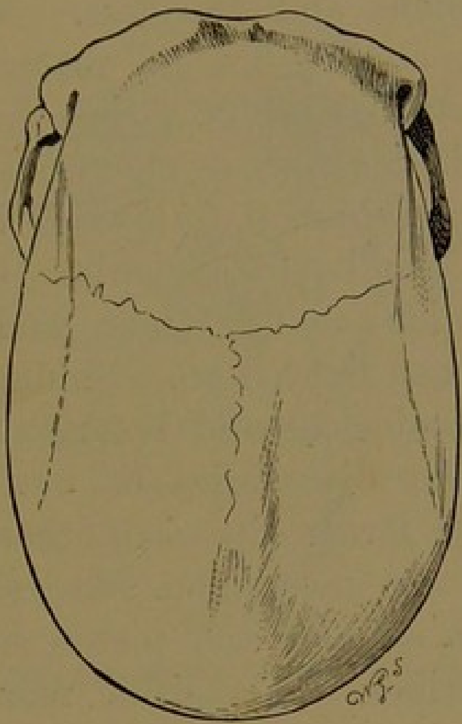


FIG. 34.—Skull of Melanesian, Torres Straits, seen from above. One-third scale.

Mr. Oldfield Thomas, in describing this skull in the *Journal of the Anthropological Institute*, vol. xiv. p. 335, says: "In this skull all the marks of degradism are present in an exaggerated degree," and it "may be taken as a type of the lowest and most simian human cranium likely to occur at the present day, and one whose like it may become more and more impossible to obtain in the future, owing to the steady admixture of all the lower negroid races with people springing from the higher Caucasian and Mongoloid stocks."

No living member of the ape tribe can, as I think, be looked upon as a near relative of primeval man, neither can the most physically degraded races of modern men be considered closely related to modern apes, although man is a highly variable animal, not only in the form of his skull, but in the relative length of his arms and legs in reference to his trunk, and in his colour and hairiness. It unfortunately happens that, at present, no material is to hand which satisfactorily bridges over the physical and mental gulf which separates man from the ape. That remains of lower human forms will some day come to hand there can be little doubt. Certain links in the chain which connect man and extinct apes have not yet been lighted on. Similar links in other chains, both zoological and botanical, have not yet been found, but discoveries of new species which connect distinct forms with each other, and old forms with new, are not uncommon. Certain intermediate forms amongst animals and plants show a tendency to become extinct. Palæolithic man is himself as extinct as his immediate precursors. Man's nearest ally, if ally it may be called, is probably not the coarse and heavy gorilla, but rather one of the more delicate and refined apes, in the style of the chimpanzee.

By the courtesy of the officers of the British Museum, I have been allowed to sketch with the camera-lucida a skull of a male chimpanzee on the same plane and at the same distance from the eye-orbits as the human skulls. A glance at the front, side, and oblique views, as illustrated in Figs. 35, 36, and 37, will give a better idea of the abyss between the lowest man and one of the higher apes than any number of words. The chimpanzee skull illustrated belongs to *Anthropopithicus troglodytes*, Gm.; it was sent to the British Museum by the late Dr. Emin Pasha, from the Albert Nyanza district. An examination of the skeletons of infant chimpanzees in the public gallery of the British Museum, shows

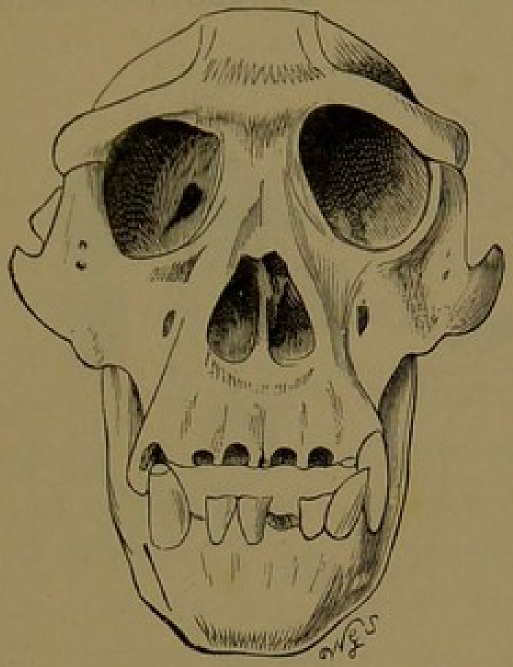


FIG. 35.—Skull of Chimpanzee, front. One-third scale.

well that young examples are very human in appearance. The frontal bone or forehead is in

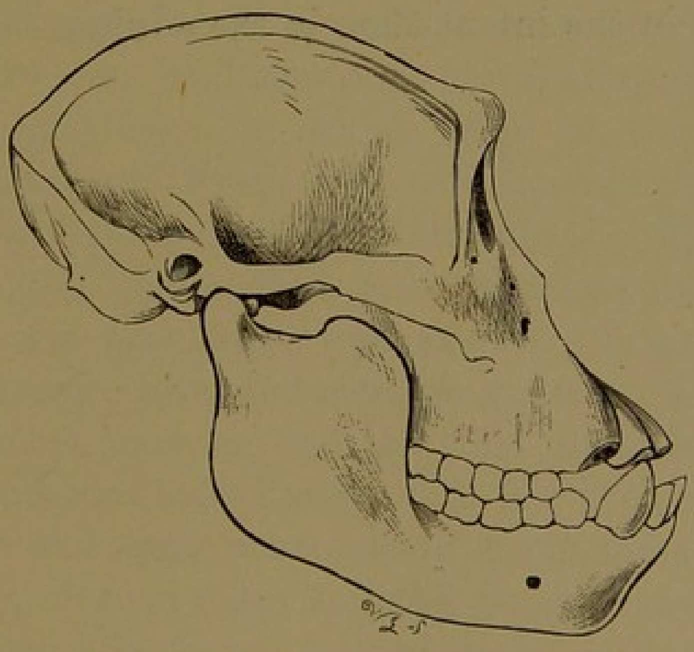


FIG. 36.—Skull of Chimpanzee, side. One-third scale.

infancy much higher and much more human-looking than at maturity; the head is much broader and bigger in proportion to the face and lower jaw;

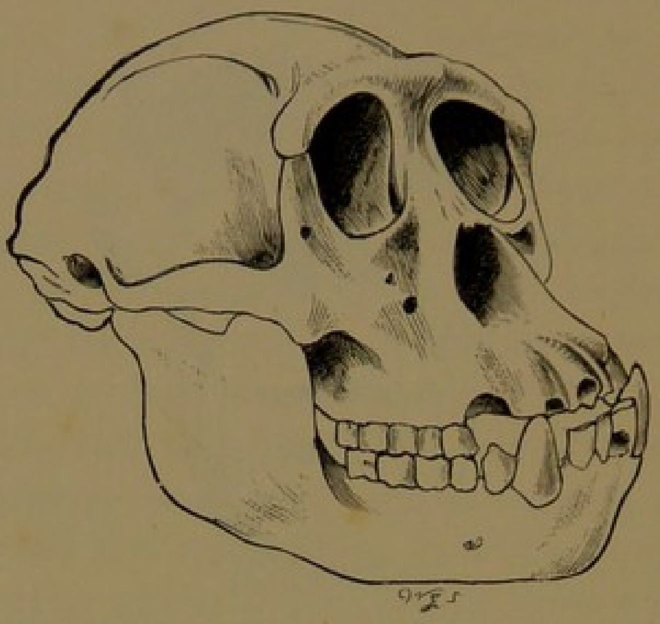


FIG. 37.—Skull of Chimpanzee, oblique view. One-third scale.

the temporal ridge is hardly, if at all, visible, and the lower jaw is very much smaller in reference to the skull in the infant than in the adult.

CHAPTER II.

PRIMEVAL MAN.

In the introductory remarks a few outlines are given of the antiquity, geographical environment, and bones of primeval man, chiefly as found in North-Western Europe. In succeeding chapters some of these outlines are taken separately and filled in with fuller details; but before these details are approached, it may be well to say what kind of animal the oldest primeval man really was, and how, as I think, he probably lived, acted, and died.

The materials for some deductions are meagre, but probability can be balanced against improbability. The geological age, in which some of the earliest primeval savages lived, with the land outlines and elevations of the period, are well known. The larger animals and plants that were contemporary with the men are also fairly well known. Some of the earliest human ideas and acts are known. The ideas and acts that were beyond the then infantile human powers are also well known. A few broken skulls, with leg and arm bones, have been rescued from the drifts of river-sides and the floors of caves, and similar deposits have yielded large collections of weapons and tools.

What modern savages are, alive and dead, is well known; many of the surroundings, acts, and thoughts of these savages are known. By putting known facts together, and by assuming that our savage precursors of far-off times had ideas not very unlike those of savages of recent times, it is perhaps possible to galvanise the fragmentary bones of the primeval savage into temporary life.

At the time when the earliest known race of men approached what is now Great Britain, the climate was probably not unlike the climate of to-day, varying only in its more equable, genial, and continental character. Britain formed part of the Continent, and much of the ground now under the sea was then dry land. The high and cold positions to the North of England, judging by the absence of stone weapons and tools, were seldom reached by the primeval savage. As a rule, primeval man kept near to the margins of the wide and shallow rivers and brooks of the south; sometimes he lived on moderate elevations.

The plants which surrounded the primeval savage were the plants with which we are all familiar as the native wild plants of the present day. A few Alpine species, however, grew on the higher or colder positions to the north, and a few southern forms in the south. The whole country was of course more marshy and much more covered with forest and bush.

The larger animals, exclusive of man, were very different from the animals now commonly found in Britain. The land being continuous with the Continent of Europe, certain northern animals strayed to these parts from the north, whilst a series of southern animals reached here by land and water from

Southern Europe, Asia, and Africa. Very few of the smaller animal companions of man are known; their bones have probably nearly all fallen into dust and decay, and perished with the comparatively small and soft bones of man himself. Workmen seldom look for or preserve small bones: they look upon the bones of largest size as of greatest value, although small bones are now of much greater value from an educational point of view.

The fossil bones found associated with the stone implements of primeval man show that the following animals, amongst many others, were man's companions:—The hippopotamus, mammoth, elephant, rhinoceros, lion, wild cat, bear, hyæna, ox, bison, and wild horse; the latter perhaps then faintly striped like a zebra. The hippopotamus reached what is now the Thames by rivers and the seashore from Africa; not being a flesh-eating animal, it would not be much dreaded by its human companions; the old bulls would, however, sometimes scatter human companies. Neither would the hairy mammoth and the straight-tusked elephant molest the men further than by an occasional charge from a furious old bull. The rhinoceros was doubtlessly a dangerous animal, and no man would dare to face it. Men, horses, oxen, deer, would all give a wide berth to the different species of rhinoceros; doubtlessly men, women, and children, as well as other animals, were often mauled, ripped, and killed by them. The stealthy and terrible lion, silent and swift of foot, together with the spiteful and ferocious wild cat, would always strike terror into the heart of the primeval savage. The bears would occasionally stray from their dens and attack wild horses, wild oxen, and deer. The formidable grisly bear would doubtlessly sometimes attack the human families. The cowardly and terrible hyæna would frequently chase or pounce on men, women, and children, as well as on wild horses and oxen; it would at times stealthily discover, bite, tear, and kill members of the human family at night. Packs of wolves, famished with hunger, would make short work of old men, women, and children. The fox lived in the woods, whilst the roe, the red deer, the reindeer, and the gigantic Irish elk would frequently be seen in glades and open places. An ape lived in the forest. Voles, beavers, and otters frequented the rivers.

It does not follow that all these animals lived in one district, or that all were present during the entire time that man existed as a primeval savage. Man himself was not everywhere in North-Western Europe. Wherever primeval man was, the animals here mentioned at one time or other shared the soil with him. Some animals preferred the cold of winter, others the heat of summer. Man had no summer or winter migration.

The interest in all other animals completely palls before the presence of man himself. Amongst all the other living creatures, what kind of man was the earliest human savage?

Let us suppose that it is night, and that we have reached, under the cover of darkness, a haunt of primeval savages. The nocturnal sounds are strange and startling; we hear the terrific snorting, blowing, and splashing of herds of hippopotami as they wade and walk through the water of the Thames and Lea, or crash through the bracken and bush of the river banks; we hear the trumpeting and blowing of elephants, and the roaring, snorting, and grunting of the rhinoceros. The roar of the lion, the devilish howling cry of the wild cat and the hyæna, the growl of the bear, the roar of the bull, the howl of the wolf, the bellowing of the stag, the bark of the fox, the neighing of the wild horse, and the chattering of the ape are heard.

But of all the sounds in which we are interested, none equals in interest and importance the voice of man himself. Man's voice at that time was probably not an articulate voice, but a jabber, a shout, a roar. A shriek or groan of pain is heard, a shout of alarm, or a roar of fury. Loud hilarious sounds as of strange laughing are heard, and quick, jabbering, threatening sounds of quarrelling. Coughing is heard, but no sound of fear, or hate, or love is expressed in articulate words.

If we imagine the darkness to have lifted, we see the men and women standing about or crouching—many carrying bones and stone tools—near fires. There is one central fire and several minor fires bounding the fringe of the human haunt. The fires are kindled from sparks (derived from the concussion of flints), applied to dry grass. Some of the men and women are feeding the flames with ferns, twigs, tree-branches, and logs. Other men and women are seen sitting or lying about in dens or hovels formed of tree-branches and stones, or resting under bushes, trees, fallen trunks, or natural sheltering banks of earth. Hairy children are seen running about or crawling on all fours. Bones, some with half-putrid meat attached, are seen strewn about in all directions.

The human creatures differ in aspect from the generality of men, women, and children of the present day; they are somewhat shorter in stature, bigger in belly, broader in the back, and less upright. They have but little calf to the legs. The females are considerably shorter than the males; they bear children in their early youth, and cease to grow. All are naked, or only slightly protected with ill-dried skins. They are much more hairy than human creatures of the present time, especially the old males and the children. In this character they resemble the present race of hairy Ainos of the northern islands of the Japan Archipelago. The hair is long and straight, not curly, the colour probably bright chestnut-red, and the skin copper-colour. The heads are long and flat, and the features perhaps somewhat unpleasing. The foreheads recede, the large, bushy, red eyebrows meet over the nose, the brows are heavy and deeply overshadow the eyes beneath. The beards, whiskers, and moustaches vary in style and extent, as such appendages vary now. Many of the women have whiskers, beards, and moustaches.

> "You should be women,
> And yet your beards forbid me to interpret
> That you are so."

The noses are large and flat, with big nostrils. The teeth project slightly in a muzzle-like fashion; the lower jaws are massive and powerful, and the chins slightly recede. The ears are slightly pointed, and generally without lobes at the base. Such ladies as possess lobes probably have them pierced, and a small feather (the forerunner of the earring) is pushed through the orifice. The pointed ear, like the depressed forehead and projecting muzzle, still survives. A sketch of an ear, possessed by one of my neighbours at Dunstable, is here appended, Fig. 38, drawn from the life, and reduced to one-half the natural size. Ears of this kind are not always on the same plane with the side of the head; some are seen standing out at right angles on the same plane with the face.

Fig. 38.—Modern ear. Half scale.

The human creatures are seen to be exchanging ideas by sounds and signs,—not by true speech; by chattering, jabbering, shouting, howling, yelling, and by monosyllabic spluttering, sometimes by hilarious shouting (not true laughter), stentorian barking or screaming, or by the production of semi-musical cadences. They are also expressing their thoughts by movements of the eyes, eyelids, and mouth, by grimacing and by gestures made by body, arms, and legs. The men and women have gestures and sounds sufficient for their wants. At a signal of danger they point and imitate the roar of the lion, the growl of the bear, or the bellowing of the elk. Some of the female adults are seen to be nursing or suckling hairy infants. Some of the older and feebler males and females are seen walking with branches or sticks hacked from trees. Some, especially the young people and children, are full of vivacity and frolic, others are in ill-health, burnt with fever or wheezing and coughing with colds. Many are seen sitting on their haunches, motionless for long periods of time, as if in deep contemplation, but no prolonged attention is really given to anything. Some are more bestial, dirty, and parasite-infested than others;

decency—or what is now termed decency—is unknown; some are clean, others very dirty, perhaps with bloody stains round the mouth and on the hands. Being social animals, some aid others in a slight degree; they perhaps lift a fallen friend, extract a thorn, temporarily look after an orphan, or perhaps aid in catching parasites. If, however, friends get badly hurt by beasts of prey or by accident, such injured companions are hunted away or killed as soon as possible. Fever patients, consumptives, the blind, the half-blind, and fractious children are driven off and killed, for the earliest human savages probably possessed but scant sympathy for either pleasure or pain in their fellows. Primeval man doubtlessly resented the groaning of the sick and injured, and the wailing of the infant. He did not bury his dead, and our remote precursors probably paid no more attention to a dead human being than a dog now pays to the dead body of a fellow-dog. Death was not foreseen or understood. A dead man was merely a man lying down who did not, could not, or would not get up again. His carcass was left for wolves and hyænas.

As far as life was understood, everything that moved was alive. A man would therefore growl at his own intruding shadow or his own reflection in the water. He would shout in a threatening manner at thunder or lightning, at a sudden unwelcome burst of hot sunshine or a gust of cold wind. He was hardly more an intelligent and understanding observer of the phenomena of nature than a hyæna or horse. If he fell over a branch, he would in revenge hack the branch with his flint implement; if he fell over a stone, he would if possible smash it. Any curiously twisted or contorted branch or twig, any curious stone or fossil, he would pick up, examine, smell, and possibly dread. He would use his feet as well as hands for moving twigs and small branches. Perhaps primeval men set up fetiches in their haunts; they would naturally dread ferocious beasts of prey, and would probably support upon sticks the heads of dead hyænas, lions, bears, and perhaps even the heads of the more murderous men.

Primeval man had no domestic or friendly lower animals as companions; the men had not even tamed each other; the men of old were one with other animals.

Some of the habits of primeval man would be startling to us now. The men lived in companies, and were consequently clannish. Visits from strangers would no doubt be resented; strange visitors would probably run great risk of being knocked on the head.

Infanticide was probably common, too many children would not be wanted, and many more must have been born than could by any possibility subsist or be looked after. All weakly, fretful, or deformed infants would probably be killed, laid aside, or thrown away.

Did any early members of the human family commit suicide? Probably they did; the feeble, the dying, the maimed, the weak-headed, the starving, the jealous would be tired of life; these would throw themselves from heights or into rivers, or stab themselves, or cut their throats with large and keen-edged knives of flint.

Of course there was no marriage, but there was pairing, and it is probable that one male would keep more or less to one female, but only till one birth had taken place. A male might occasionally live with two females, but if so, the females would fight. After one birth there would probably be fresh pairing. This would prevent interbreeding with relatives. The females would prefer the strongest and hairiest males, and the males in turn would select the least hirsute females. The weaker, older, and uglier males would no doubt try to mate with young and playful females, but the latter would resist, run away and hide in the bush. Here they would sometimes fall victims to the bear. Feeble, bald-headed old males would be afraid to follow. At pairing seasons there would be terrific roaring, yelling, biting and fighting amongst the males. The weaker males would be torn and killed and left for the hyænas; the fittest, strongest, and handsomest would survive.

Females being weaker than males, would be more often killed, and so at times become temporarily scarce in some haunts. Sometimes companies of strong males, armed with clubs and weapons of flint, would go to the haunts of strangers, and capture females by force. Raids of this class would lead to terrific battles, and the older and weaker males would be killed, the strongest, best made, and most agile alone would escape and survive. These raids would ultimately benefit the race, as pairing would take place amongst strangers and not be consanguineous. There would, however, be no prohibited relationships in pairing, and no abhorrence would be felt towards acts the thought of which would now fill proper men and women with horror.

The men of old would dream just as we dream now, but the dreams of old would be esteemed as realities.

Dreams would often lead to killing. At pairing times males and females would dream of rivals; such dreams would lead to hostile visits to the rivals dreamed of, and the weaker would fall.

The young people would romp and play, take hands and dance in rings. They would engage in sham fights, and the young males in fun would chase and shout at the young females. They would climb trees and swing from branch to branch, and paddle about and play in the streams. They would play games of throwing stones and sticks.

The primeval men and women would work as well as play. They would continually look after fuel to keep up the fires. All fallen branches and dry vegetable material would be carefully gathered together. The younger and stronger men and women would hack and break off branches. They would not be able to tie up bundles. The older people, who were not strong enough to hack and break, would be made to carry the branches and sticks in their arms. Some of the larger branches would be used for building shelters, sties, hovels, or dens.

Stone-implement making would be a great industry. The old males and females, aided by children, would be despatched to look after suitable blocks of flint, to push such flints out of the chalk, stiff clay, or earth with sticks, and bring them to the human haunt. There, by the fireside, the more skilled and light-handed human creatures would, with anvil, hammer, and punch stones, fabricate pointed stone weapons and keen-edged oval choppers and knives.

Dead examples of wild horses and wild oxen would be sometimes skinned, and the skins used as wrappers by the more powerful males and their favourite females. The preparation of the skins could only have been undertaken by the more intelligent men and women. The inside of each skin would be well scraped free of superfluous flesh with trimmed flints, and then strained, and pulled and pegged out flat on the grass, and dried in the rays of the sun.

Primeval man is commonly described as a hunter of the great hairy mammoth, of the bear and the lion, but it is in the highest degree improbable that the human savage ever hunted animals much larger than the hare, the rabbit, and the rat. Man was probably the hunted rather than the hunter. Outside the human haunt the men would see, hear, and dread the larger carnivorous and herbivorous animals. As a rule, these animals, unless driven by hunger, would not seriously molest the men. Each would keep at a proper distance, and in times of danger the men would take to the trees. It would be useless to take to the water, as most of man's companions would be equally aquatic with himself. No doubt the larger and more ferocious animals would startle smaller ones. These, in attempting to escape, would fall an easy prey to the sticks and stones thrown with the greatest precision by the men, women, and children. The men would frequently find the remains of oxen, horses, and deer naturally dead or newly killed, and only partially consumed by the lions, bears, hyænas, and wolves.

The primeval savage was both herbivorous and carnivorous. He had for food hazel-nuts, beech-nuts, sweet chestnuts, earth-nuts, and acorns. He had crab-apples, wild pears, wild cherries, wild gooseberries, bullaces, sorbs, sloes, blackberries, yew-berries, hips and haws, watercress, fungi, the larger and softer leaf-buds, *Nostoc* (the vegetable substance called "fallen stars" by country-folk), the fleshy, juicy, asparagus-like rhizomes or subterranean stems of the *Labiatæ* and like plants, as well as other delicacies of the vegetable kingdom. He had birds' eggs, young birds, and the honey and honeycomb of wild bees. He had newts, snails, and frogs,—the two latter delicacies are still highly esteemed in Normandy and Brittany. He had fish, dead and alive, and fresh-water mussels; he could easily catch fish with his hands, and paddle and dive for and trap them. By the seaside he would have fish, mollusca, and seaweed. He would have many of the larger birds and small mammals, which he could easily secure by throwing stones and sticks, or by setting simple snares. He would have the snake, the slow-worm, and the crayfish. He would have various grubs and insects, the large larvæ of beetles, and various caterpillars. The taste for caterpillars still survives in China, where they are sold in dried bundles in the markets. A chief and highly nourishing object of food would doubtlessly be bones smashed up into a stiff gritty paste.

A fact of great importance is this,—primeval man would not be particular about having his flesh food over-fresh. He would constantly find it in a dead state, and if semi-putrid he would relish it none the less,—the taste for high or half-putrid game still survives. If driven by hunger and hard pressed, he would perhaps sometimes eat his weaker friends or children. The larger animals in a weak and dying state would no doubt be much sought for; when these were not forthcoming, dead and half-rotten examples would be made to suffice. An unpleasant odour would not be objected to; it is not objected to now in many Continental hotels.

Scouts would be sent out to search for dead and dying animals. When found, they would be carried to the human haunt; such as were too large would be hacked to pieces with stone tools and sticks, and the limbs taken home separately. The heads of animals would be hacked and torn off, the skulls split open with ponderous stone axes, and the soft and tasty brains eaten on the spot. The old people, being toothless or nearly so, would be glad of a meal of this kind: they would not be able to chew tough meat. The old men and women would pull out the larger bones from dead animals, smash off the knobby ends, push out the marrow with a stick on to a large leaf, and eat it as one would now swallow an extra large oyster. The viscera of half-dead animals would be torn out, and the warm blood sucked from the abdominal cavity. If other animals were not to hand, the brains, marrow, and blood of other human beings would doubtlessly be used as food.

It would not be safe to take meals outside the human haunt; the scouts would drag stores of animal food to the camping-place. Here, seated round blazing fires, the primeval savages would eat their meat, vegetables, and fruit. As the men possessed no pots, they would walk to the nearest brook for water wherewith to quench their thirst; the primeval men would indeed always live close to a water supply. If they possessed vessels for holding liquids, such vessels might be bladders or stomachs, or rude blocks of wood hollowed out with flint tools into bowl shape. Broken and trimmed skulls would be used as vessels; human skulls, with the face and occipital bones broken off, would make good drinking-bowls. From such vessels water, blood, or blood and water, would be quaffed.

The savages sat huddled close together round their fires with fruits, bones, and half-putrid flesh. We can imagine these men of old twitching the skin of their shoulders, brows, and muzzles, as they were annoyed or bitten by flies or other insects. We can imagine the large human nostrils, indicative of keen scent, giving rapidly repeated sniffs at the foul meat before it was consumed; the bad odour of the meat, and the various other disgusting odours belonging to a haunt of savages, being not in the least disapproved. In those times the olfactory nerves had not been injured by tobacco and snuff. We can imagine the dirty mouths frothing with excitement and epicurean delight, and the display of the canine teeth as the savoury morsels brought home for consumption were quickly eaten. Then, as now, quarrels would sometimes arise over meals. Some one would snatch away a nice piece of liver from some one else, or some old man would take away a bone from a child, or some cause of disagreement would arise, and a horrible noisy fight would certainly ensue.

Man at that time was not a *degraded* animal, for he had never been higher; he was therefore an exalted animal, and, low as we esteem him now, he yet represented the highest stage of development of the animal kingdom of his time.

CHAPTER III.

CADDINGTON.

THE chief interest of this book is centered in, and close to, a small village named Caddington, near Dunstable.

Caddington, the Cadendone of Domesday Book, and of the *Annales Prioratus de Dunstaplia*, A.D. 1249, is a village situated on a hill on the border line of Hertfordshire and Bedfordshire. The modern name is corrupted, the older one correctly indicates the position. Cadendone or Caddingdon would mean the hill-meadow of Cedd or Ceadda. This Ceadda may perhaps be identified with the Bishop of the Mercians or East Saxons and of London in the seventh century, mentioned by Bede under A.D. 653. Cedd, says Bede, "built churches in several places, ordaining priests and deacons to assist him in the work of faith." No church is mentioned in Domesday Book under Cadendone, but we read, "The Canons of St. Paul's, London, held Cadendone," and "Leuinus held this manor of King Edward." Leuinus is given as Lewinus for the holder of the manor of Kensworth, a village not far from Caddington, and referred to farther on in this book. The uncommon name of Lewin is still local.

Caddington, the site of my discovery of an undisturbed living and working place of primeval man, is thirty miles north of London, three miles south-east of Dunstable, and two miles south-west of Luton Some of the brick-earth pits, mentioned in the following pages, are in Bedfordshire, others are in Hertfordshire. The excavations specially made for me, and under my direction and supervision, are in Hertfordshire, half a mile west of the village of Caddington, close to and south of the road to Dunstable, and near the brickmakers' cottages. At about 150 or 170 yards nearer Dunstable than this pit and cottages, on the north side of and close to the road,—in "Windmill Field,"—is a large Saxon tumulus, which stands as a landmark to the position here described. The tumulus,—see accompanying map,—is not marked on the large-scale Ordnance maps. I have found fragments of Saxon pottery close to and upon this mound, and the antiquity of the structure is shown by the Dunstable road being cut through the south side of it. A windmill at one time stood upon the tumulus.

Caddington stands upon chalk rock, capped with brick-earth and gravel. The clay is used for brick-making, and the brickyards near the village are from 550 feet to 595 feet above the Ordnance datum. At one-third of a mile south-west of the village, in a disused brickyard and at a height of 524 feet, is a well, where water is reached at 145 feet: after heavy and continuous rains water has been rarely reached at 109 feet. At Caddington Green, at a height of 581 feet, there is another well with a depth of 184 feet, the water-line being commonly reached at 160 feet. These figures indicate the level of permanent saturation of the chalk at Caddington.

At $1\frac{3}{4}$ miles to the south, at Markyate Street, is the source of the river Ver, at a level of 434 feet above the Ordnance datum. The village of Markyate Street gradually descends towards the south from 443 feet to 409 feet; the wells here range in depth from about 21 feet to 15 feet, and when water is abundant, it can be dipped from the surface in the wells without drawing.

In very rainy seasons water sometimes bubbles out by the high-road to the west of Caddington, near the "Packhorse" inn at Kensworth Lynch, at 449 feet; this water flows direct into the Ver.

A comparison of the water-level of the Caddington wells with the level of the source of the Ver shows that the stratification of the chalk in this direction is probably almost horizontal, but with a slight dip towards the east, where the Lea rises at Leagrave, at 370 feet.

The heights show that the Caddington brickyards stand on a hill-top from 110 feet to 175 feet above the present permanent water-line.

The pits are two miles from the Lea,—here a mere brook on the north-east, and the same distance from the mere drain which forms the source of the Ver on the south.

All the villages, watercourses, and brickyards are shown on the map accompanying this book, and the contour of the country is shown in the sections Figs. 39 and 40. The dotted line above the section in Fig. 39 shows the probable former line of the brick-earth before denudation. The existing deposits of brick-earth are shaded. Nearly the whole depth of the valley has been excavated since the brick-earth was laid.

In Fig. 40 a section of Caddington Hill is given

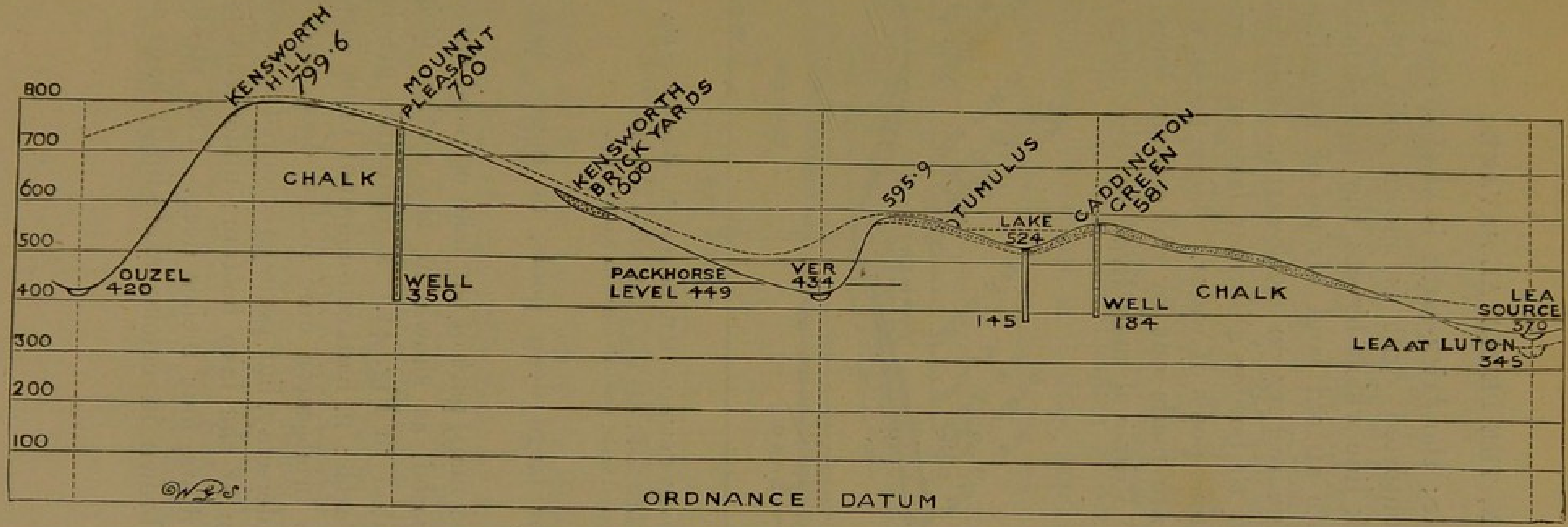


FIG. 39.—Section through Caddington and Kensworth Hills, and through the Valleys of the Ouzel, Ver, and Lea, facing south. See line G, H, on map.

Horizontal scale, one inch to a mile.

Vertical scale, one-fourth inch to a hundred feet.

to a larger scale; the brick-earth is shaded and the capping of contorted drift is shown solid black. The thick black line which bisects the dotted brick-earth represents an old land surface of Palæolithic or primeval age resting on brick-earth. This land surface is seen to border a former lake or a series of large confluent pools of water. These pools, with their outlets, are made out by the contour lines of the district. Primeval man lived by the sides of

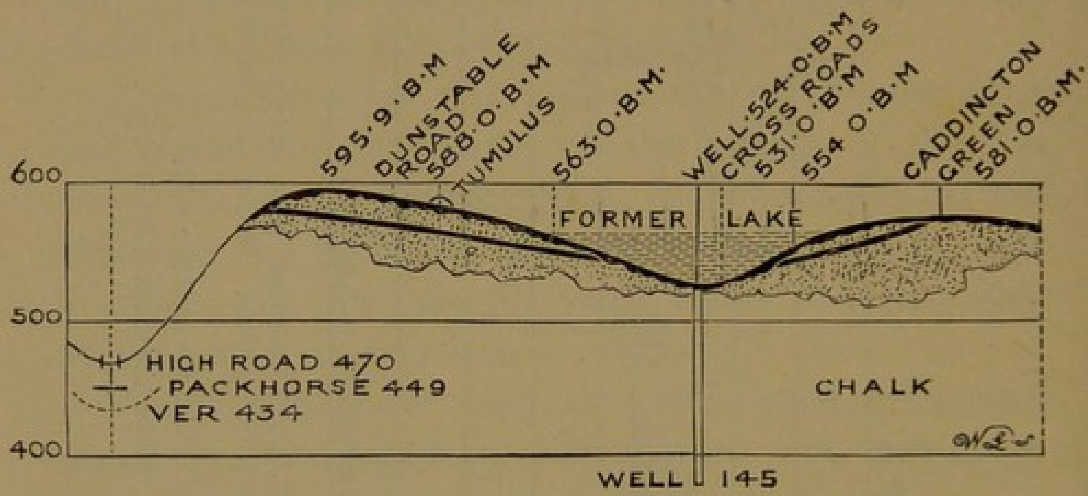


FIG. 40.—Section through Caddington Hill, facing south, enlarged from Fig. 39.
Horizontal scale, two and a half inches to a mile.
Vertical scale, one-half inch to a hundred feet.

these lakes or large deep pools, or meres, ponds, and bogs.

In pit E (see map) part of the lake or pond bottom has been exposed, as shown in the section facing north, illustrated in Fig. 41. A represents greyish-brown brick-earth; B, nankeen-coloured brick-earth; C, grey-white brick-earth nine inches deep, and resembling boulder-clay, but perhaps coloured by decaying vegetation at the lake bottom; under this is a dark seam of flints, four inches deep. This stratum is very deep brown in colour, exceedingly hard and compact, full of stones naturally concreted together, and amongst them a few ochreous, abraded, and white, sharp Palæolithic flakes. This horizontal stratum of flints rests on dark brown brick-earth, containing large white-coated flints, broken and unbroken.

The surface water on the east of Caddington finds its way into the Lea near Luton, at about 345 feet.

All the surface water of Caddington Hill, therefore, finds its way into the Thames either by the Ver, which joins the Colne at Colney Street, between St. Albans and Radleet, and so to the Thames near

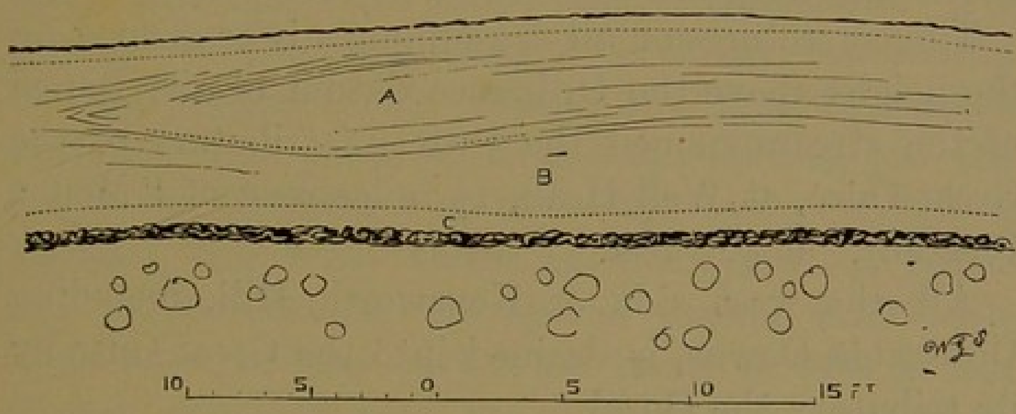


FIG. 41.—Section in pit E, facing north, showing bottom of lake of Palæolithic age.

Staines, or by the Lea, which reaches the Thames near Blackwall.

At two miles from Caddington, on an opposite hill to the west, near Kensworth, at the position marked "Mount Pleasant," on the large-scale Ordnance map, and at a height of 760 feet above the Ordnance datum, I have found upon the surface a Palæolithic implement, a core and a few flakes—all ochreous and almost unabraded. There are deposits of brick-earth and gravel at and near Kensworth agreeing with those of Caddington; these deposits, however, are seldom exposed.

There is a well at "Mount Pleasant," in which the water-line was not reached at the time of making—so the well-sinker has informed me—till a depth of 350 feet had been excavated. This shows a level of permanent saturation of the chalk at Kensworth Hill at 410 feet above the Ordnance datum, a level virtually the same with that of Caddington. The well at Mr. Hopkins' farm, Kensworth, is a little more than 200 feet deep, and Mr. Fossey's well at Downs Farm is also 200 feet. Both these positions are 600 feet above the Ordnance datum. The Dunstable wells are from 60 to 70 feet deep.

The correctness of all these figures is confirmed by the height above the Ordnance datum of the source of the stream named the Ouzel, a tributary of the Great Ouze, at Well Head, 1½ miles west of "Mount Pleasant," at 420 feet.

All the west side of Kensworth Hill, including Dunstable Downs, is drained into the Great Ouze by its tributary the Ouzel.

CHAPTER IV.

GEOLOGY OF THE CADDINGTON POSITION.

VERY few antiquaries or geologists would expect to find traces of primeval man at Caddington, or on the other hill-tops east and west of Dunstable. The geology of the hill district is chiefly represented by the Upper Chalk, nearly 400 feet in surface altitude. The chalk at Kensworth Hill is 500 feet above the Greensand on the south-east of Leighton Buzzard, five miles across the valley to the north-west of Kensworth. In special places, chalk-with-flints and red clay-with-flints occur *in situ* at the surface, together with deposits of large extent of brick-earth mixed with Tertiary *remainé* and red clay. In some positions, vast numbers of Tertiary pebbles occur, which have been washed into the brick-earth from an old land surface. None of the clay, even to its base, where it is in contact with the chalk, is in a pure state; all is mixed, and almost inextricably involved, crumpled, squeezed, and cracked. Sometimes large blocks of flint, derived from the red clay or chalk, prevail; at other times, thin grey seams of boulder-clay, fine crumbly chalk, or small pebble-like bodies of hard clay.

No Reading or Tertiary beds now occur *in situ*, the clays are made up of Reading and other Tertiary beds: they are Tertiary *remainé*.

Boulder-clay occurs in many places in the district, as on the hill-sides near Luton, and in the Ouzel valley at Heath, near Leighton Buzzard, at which latter place it is from twelve to fifty feet deep. Boulder-clay can be readily examined in a clay-pit at Heath, 1½ miles north of Leighton Buzzard, at the corner of the Clipstone road. It varies in depth according to the position excavated. The clay rests on the Upper Greensand, which is horizontal; the hillock of clay has a surface altitude of forty feet, and the excavations are made till the Greensand is reached. Flints, chalk, limestone, sandstone, quartz, quartzite, *Belemnites*, *Gryphæa*, &c., are abundant in it, with seams of Greensand of various colours. The boulder-clay is 100 feet above the river Ouzel close by. Boulder-clay does not occur on the greater heights near Caddington; where the Palæolithic implements are found, it has been denuded in past times. The boulder-clay occurs up to 500 feet at Luton; it is white and chalky, and in places contains very large blocks of flint derived from the chalk. I have seen but little glacial scratching, and that only doubtfully, on the crusts of a few flints. The chalk in the boulder-clay is too soft and friable for the preservation of scratches. I have seen no hard chalk with glacial scratches after the style of the familiar material of Finchley. I have found a fine large example of *Gryphæa* on the surface, on the north-east side of Kensworth Hill, facing and near Caddington Hill, at a height of 600 feet, or a few feet higher than the implementiferous positions at Caddington. Relics, such as *Gryphæa dilatata*, Sow., and *G. incurva*, Sow., with *Belemnites* from the boulder-clay, are common in the valley gravels near Luton, where rolled and ochreous and unrolled Palæolithic flakes also occur.

From a deposit of gravel at Toddington, Major W. C. Cooper, F.S.A., of Toddington Manor, has a good red-tinted example of *Pectunculus glycimeris*, Linn., kindly named for me by Dr. Henry Woodward, apparently from the Crag. From the same gravel Major Cooper also has a patella from one of the hind-legs of *Cervus elaphus*, L., named by the late Sir Richard Owen.

Toddington is 478 feet above the Ordnance datum. On the west side of the town, the gravel is full of fossils and diverse minerals: the fossils are mostly from the Oolite. On the east side of the town, the gravel is smaller, and the fossils very scarce and imperfect. Major Cooper has kindly furnished the following provisional and imperfect list of some of the rocks met with by himself in the western gravels of Toddington :—

Basalt, abundant.
Porphyry, several varieties.
Trap.*
Granite, three or four varieties.
Slate, rare.
Silurian.*
Millstone Grit.*
Old Red Sandstone.*
Coal, small rectangular piece.
Coal Measures, three water-worn pieces of Lepidodendron stem.
New Red Sandstone.*
Derbyshire Encrinite Limestone.
Lias Rock.
Oolite, abundant.
Coral Rag, good examples.
Tufa.
Lydian stone, with quartz.

Red Sandstone, with quartz.
Ironstone from Greensand.
Flint, abundant.

The names marked with an asterisk are not certain : the sand stones are not easily classified.

The surface drifts on the hills are involved and variously and irregularly spread. The broken-up and redistributed material from the red clay-with-flints and chalk-with-flints, more or less mixed with a drift containing a large number of black Lower Tertiary pebbles, is the prevailing surface material. Sometimes this deposit rests directly on the chalk, at other times it surmounts the brick-earth which interposes between the superficial drift and the chalk. The surface drift is commonly no more than a foot in depth, whilst the brick-earth is often fifty or more feet. Sometimes a stratum of gravel or very stony clay occurs between the pebbly drift of the surface and the brick-earth. At other times this brown stony clay is intercalated between different deposits of brick-earth. In some positions the brick-earth appears to be water-laid, in others not. The upper deposits often resemble contorted masses of half-frozen mud and stones, pushed into an old water-laid and perhaps frozen surface of brick-earth. Long sub-cylindrical flints are often fixed vertically in the top chocolate-coloured, tenacious, crumpled clay drift.

The accompanying illustrations will give a better idea than long descriptions of the Caddington excavations. The engravings have all been produced from drawings made to scale in the pits, and in most instances photographs have been taken of the sections illustrated.

Fig. 42 is taken from a measured drawing and photograph; the excavation faced the north in brickfield D. The shaded parts at A, A, were not excavated when the engraving was made. The section shows an ancient chalk valley, filled in with water-laid brick-earth. The chalk is fifty feet from the present surface. The manner in which the brick-earth has been washed into the valley is shown by the curved lines. This valley, which is serpentine on plan, as if made by a brook, has been followed in its curved course, and dug out by the brickmakers for the clay; B, D, represents light nankeen-coloured clay; C is dark clay; the rest is buff-brown clay or brick-earth. At E large flints occur, but in this

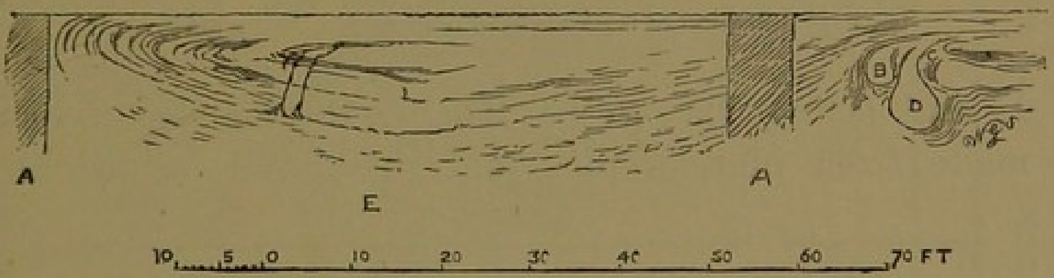


FIG. 42.—Section through a chalk valley filled with water-laid brick-earth in brickfield D, facing north.

section no human work has been found, although a few flakes occur in the brick-earth of an adjoining pit.

A detail of part of this section is shown to a larger scale in Fig. 43.

The section shown in Fig. 44 faces the east, and is taken from the same field as the last. The upper portion is contorted red clay pushed into truly water-laid brick-earth. Both these upper deposits contain small stones only. No implements have been found; a few small Palæolithic flakes have, however, been met with.

A good and characteristic section of drift clay and brick-earth is shown in Fig. 45, taken in pit

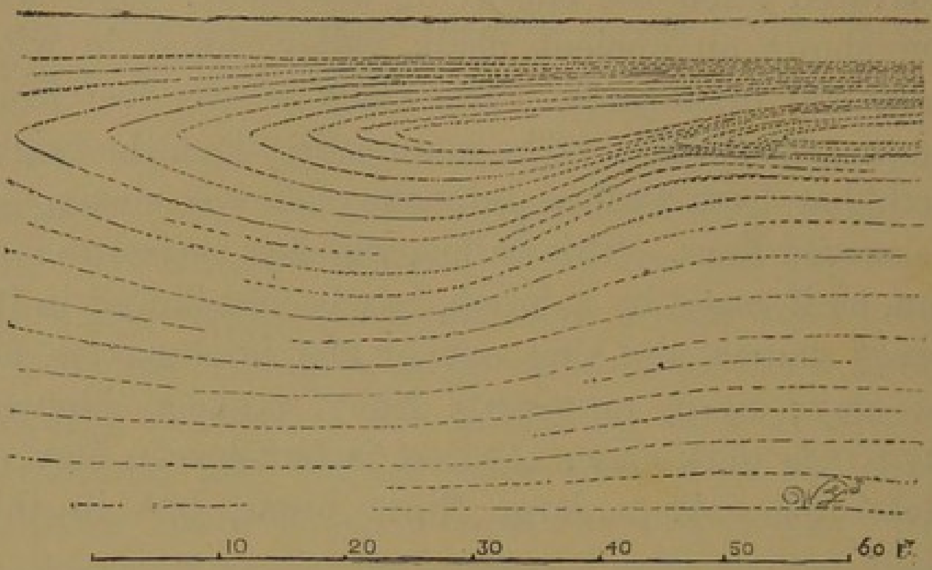


FIG. 43.—Section of brick-earth in brickfield D, facing north.

A, and facing the west. The engraving has been made from photographs, and the details added in

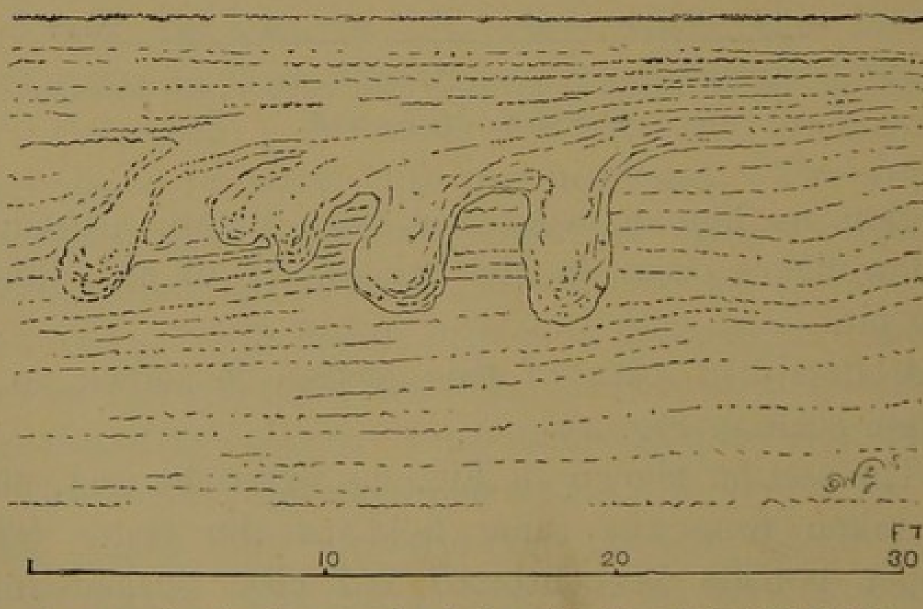


FIG. 44.—Section of contorted red clay and brick-earth in brickfield D, facing east.

the pit. The excavation is twenty feet or more in depth. Beneath the surface material at A, is

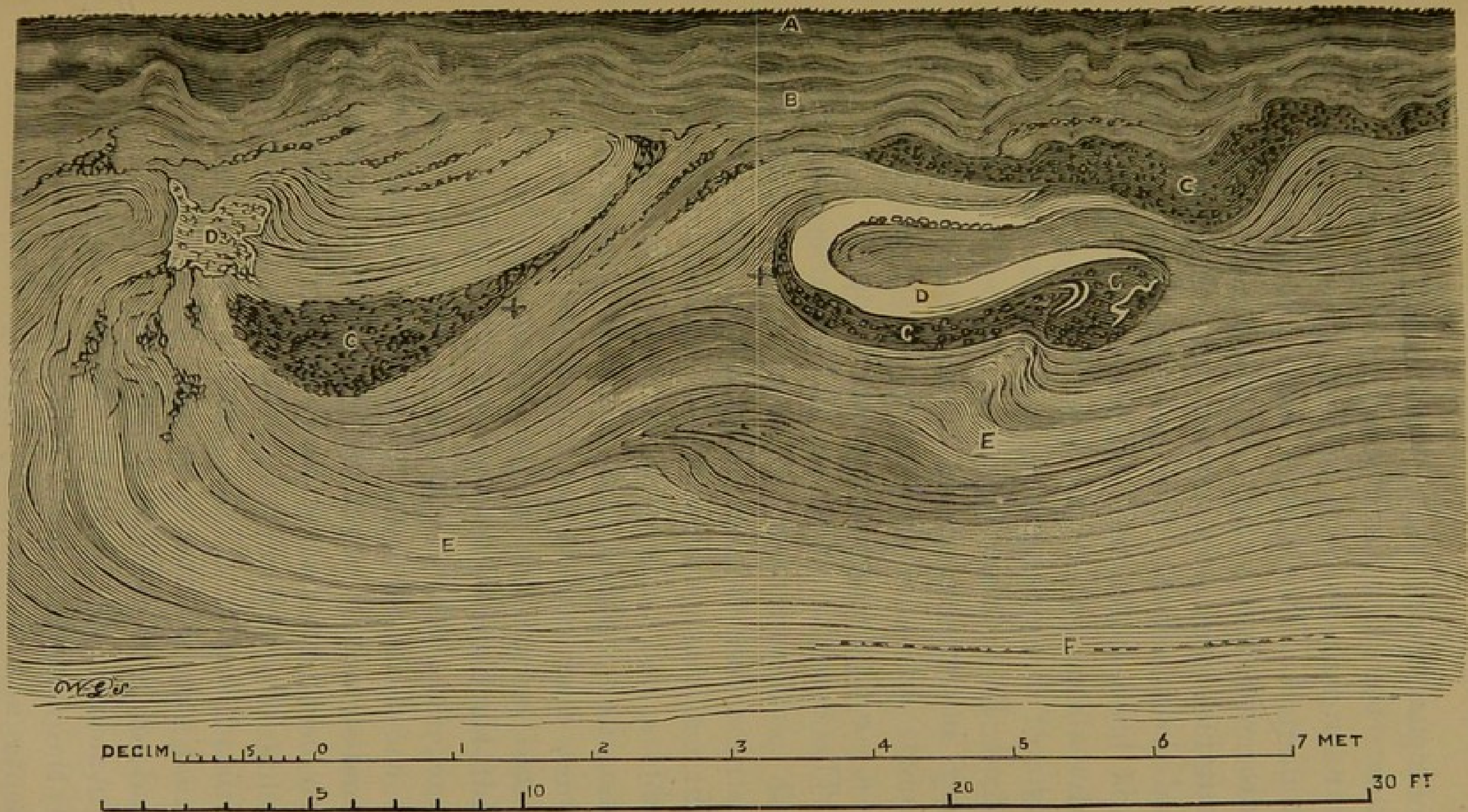


FIG. 45.—Section in clay-pit A, facing west.

ochreous brown clay with small pebbles at B; under the clay, and contorted in a remarkable manner, are deposits of flint gravel or stony clay at C, C, C. This gravel, which is intercalated with pale white-grey clay or boulder-clay at D, D, contains large sub-angular whitish-ochreous flints, and oval whitish flint pebbles, large and small; E is brick-earth and red clay variously mixed and intercalated; at F are faint traces of an old land surface on brick-earth. On this surface, keen-edged Palæolithic flakes occur. This section is very instructive, as it clearly shows the former violent action of rushing water or half-frozen mud in a position which is now a hill-top.

The constituent stones of the surface material of this section consist of many black, often highly lustrous, flint pebbles, abundant examples of tabular flint, a few examples of Lydian stone, quartz pebbles, and broken fragments of crystalline quartz, quartzite pebbles, and pieces of indurated sandstone, iron sandstone, nodules of limonite,—a hydrated sesquioxide of iron,—iron ore, sarsen stones and Hertfordshire conglomerate "plum-pudding" stone,—the latter both in a broken condition and in the form of rounded pebbles; a few slightly abraded, deeply ochreous or chocolate-coloured flints also occur in the surface deposit. Neolithic implements of black lustrous flint are common on the surface, and over the section illustrated I have found part of the rider-stone of a Roman quern, made of Hertfordshire conglomerate.

Amongst the chocolate and orange-coloured flints of the surface deposit, ochreous Palæolithic implements and flakes rarely occur. The coloration of the brownish and yellowish stones shows them all to have once belonged to an ochreous or brown drift. They ultimately become whitish by weathering.

Fossil *Echini*, and a few other fossils belonging to the Chalk, are not uncommon in the surface material.

The tenacious stony clay at C contains slightly abraded cream-coloured or cream-brownish Palæolithic implements and flakes, not always in a horizontal position, but fixed at various angles, and sometimes in a perpendicular position. The two crosses show where I have taken Palæolithic relics from the exposed surface of the cutting. A good section, and the best I have seen exposed, is illustrated in Fig. 46. The surface material shown at A agrees with the same material described under the last section, Fig. 45; B is red-brown, tenacious, drift clay; C, D, E, is sub-angular gravel, which with the clay above, and with which it is intercalated, has ploughed its way through F, G, H, I, and K. The gravel C contains brown ochreous, slightly abraded Palæolithic implements and flakes; F is grey-whitish clay or boulder-clay; G, gravel with porcellaneous whitish or creamy lustrous unabraded Palæolithic implements and flakes, capable of replacement; H, stiff reddish-brown clay with implements and flakes similar with G; I, gravel or stony clay same as G; J, J, Palæolithic floor resting on and surmounted by brick-earth at K. Artificially raised heaps of flints are shown at L, M, N, brought by hand in Palæolithic times from the red clay-with-flints or chalk-with-flints, and piled up for flaking into implements. Three large heaps of this class were found when this excavation was made; each heap was about nine feet in diameter, portions only of smaller heaps are seen

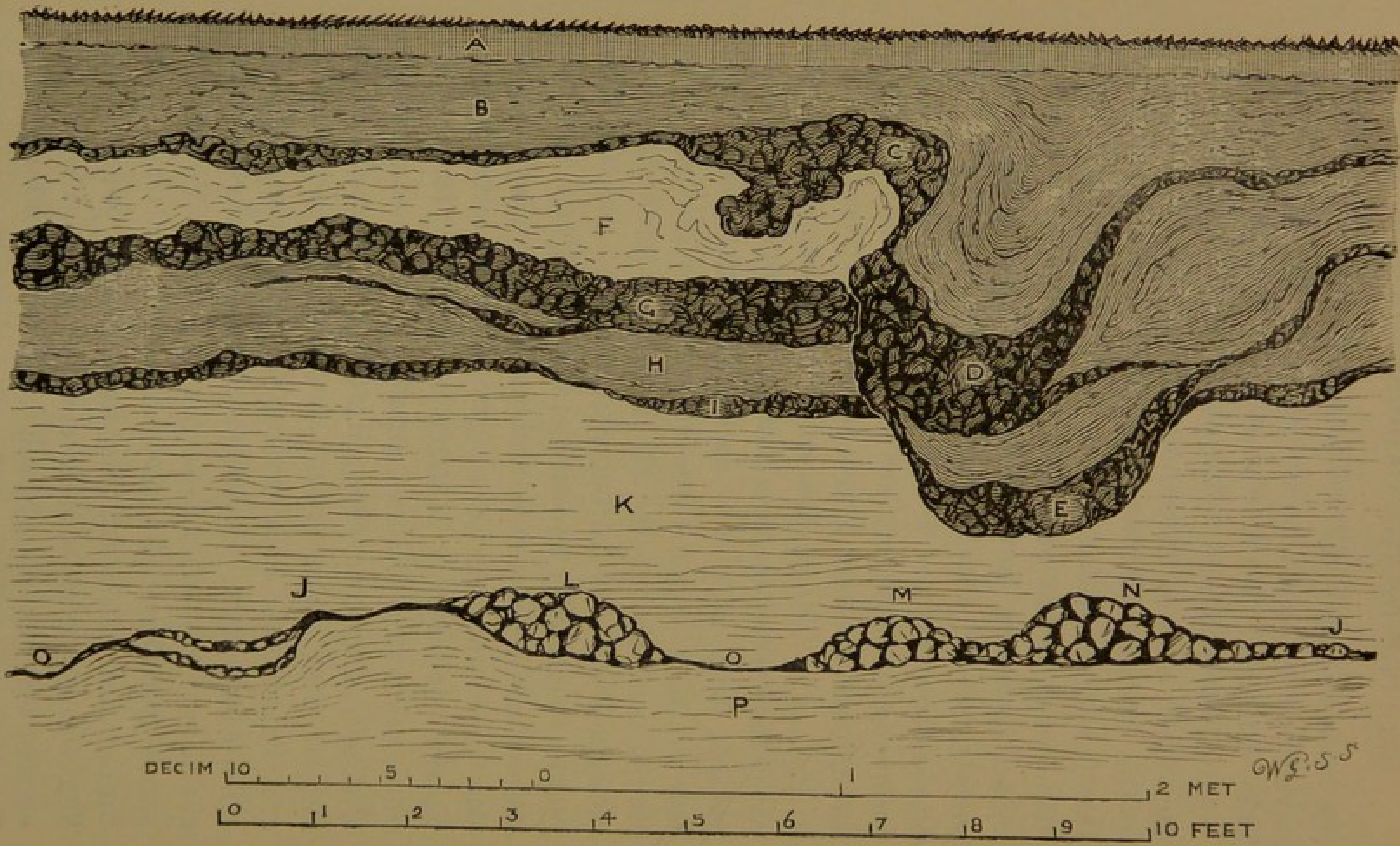


FIG. 46.—Section through the Palæolithic floor surmounted by brick-earth and red clay drift in brickfield C, facing south.

in the illustration ; O, O, Palæolithic floor with sharp-edged flakes.

As I have replaced some of the flakes on to other flakes, or on to the cores from which the flakes were originally struck from deposits G and H, it is obvious that this material can only have been slightly moved.

The flints found on the old Palæolithic land surface at J, J, have never been moved. At the time of its deposition the water-laid Tertiary clay *remainé* at K covered the relics so slowly and gently that nothing was moved. I have replaced more than 500 flakes either on to other flakes or on to implements and cores from the line J, J.

Flints are not natural to the line J, J, in the brick-earth. The nature of the heaps shows them to have been artificially piled. Not a trace of iron sandstone was found in any of these heaps, an extremely common stone in the clay-with-flints near Whipsnade. Artificial flakes were found round the heaps in hundreds, together with implements, cores, punches, and other objects.

The section illustrated in Fig. 47 is one-half the scale of Fig. 46, and represents part of the same face as the last after about 4 or 5 feet of the facing had been removed. In making the new face the whole of the contorted portion seen on the right of Fig. 46 fell bodily in one unbroken mass of a ton or more in weight into the pit. The Palæolithic floor at about 6 feet from the surface is duplicated near K, and the superimposed water-laid brick-earth is more or less horizontally stratified at F, G, H. Part of an artificially transported heap of stones is seen on the left at J. The flat foreground forms part of the Palæolithic floor itself, horizontally exposed. It was by carefully exposing this floor as a horizontal stratum that the heaps of flints were first seen to be of artificial origin. A few small pieces of chalk were found on the floor, probably brought by accident in Palæolithic times with the big flints from the red clay-with-flints or chalk-with-flints. The engraving is taken from photographs, the details added in the pit.

In some positions the Palæolithic floor is 13 or more

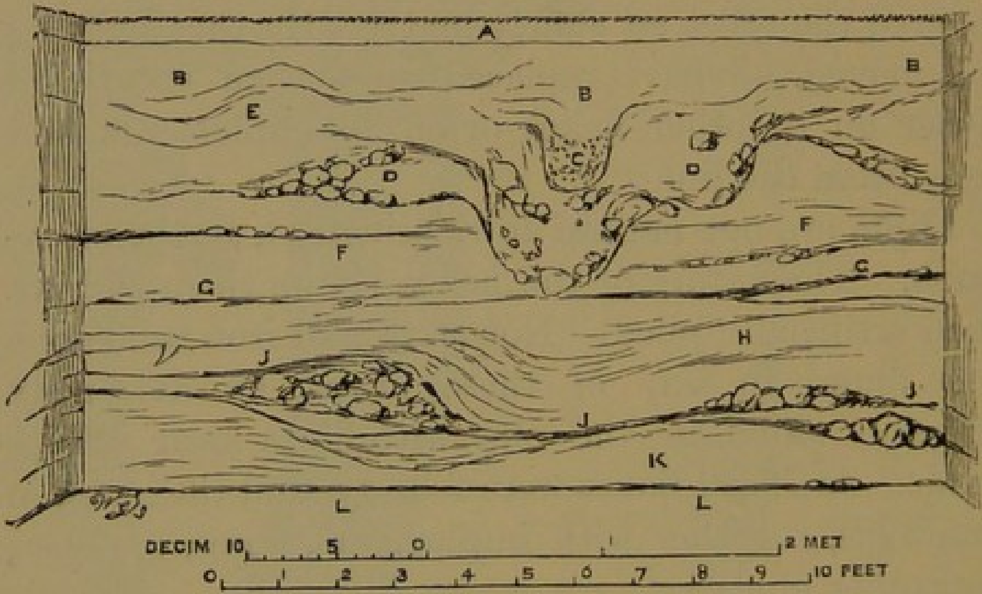


FIG. 47.—Section of same face as shown in Fig. 46, after 4 or 5 feet had been removed.

feet beneath the surface, as in pit C, shown in Fig. 48, taken from a photograph, the measurements taken in the pit. The section faces the north. The usual surface material is shown at A; red-brown drift clay at B; C, C, C, red-brown sub-angular gravel, with slightly abraded ochreous Palæolithic implements and flakes; D, brick-earth; E, E, Palæolithic floor with sharp-edged implements and flakes descending to 13 feet 6 inches beneath surface; F, brick-earth.

A remarkable section of a Palæolithic land surface, as illustrated in Fig. 49 ; it was exposed in the summer of 1890. The old land surface at A, A, was seen to have been once full of narrow vertical fissures, made perhaps by the sun during a hot summer. After the fissures had been formed, and whilst they were still gaping open, 18 inches of watery brick-earth, perhaps brought down by a heavy storm of rain, filled up the fissures, covered up the old surface, and formed the new surface where shown at B, B.

The drift clay and gravel shown in these sections,

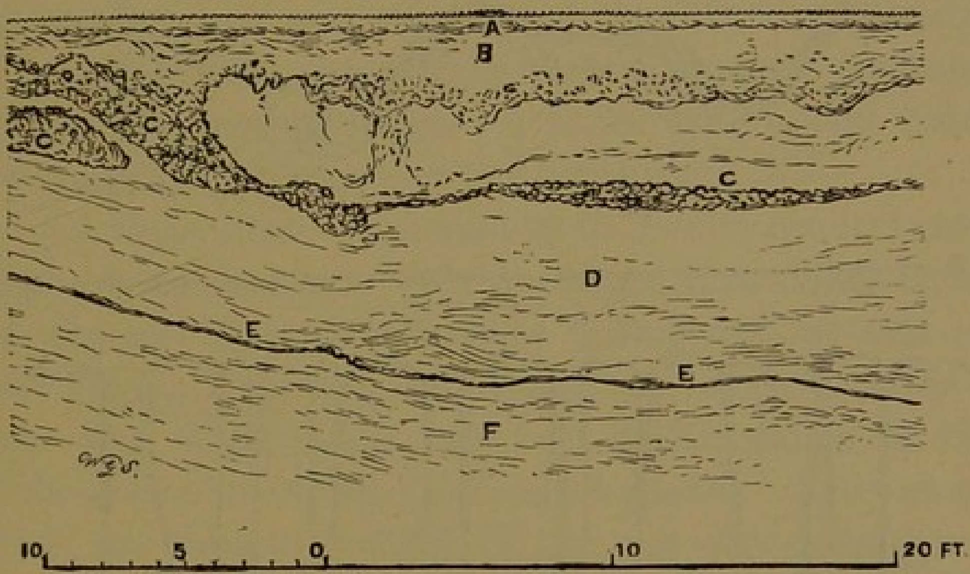


FIG. 48.—Deep section in pit C, facing north.

with the contained implements and flakes, is probably an early deposit of post-glacial times. The clay or loam rarely varies from highly tenacious to tenacious sandy, and the flints and implements vary from almost unrolled to considerably rolled. In colour the clay and gravel flints vary from white to creamy-white, or mottled as in tortoise-shell, indigo and white, yellow, ochreous, or deep chocolate-brown. The colour varies according to the nature and colour of the matrix.

In some places Palæolithic implements appear to be abundant in the upper clay and gravel; in such places I have seldom seen the material thrown down without finding human work. Comparatively few implements have, however, come to hand, owing to the very small amount of excavated material at present examined by me. The stones in the stiff clay, whether implements or natural stones, are some-

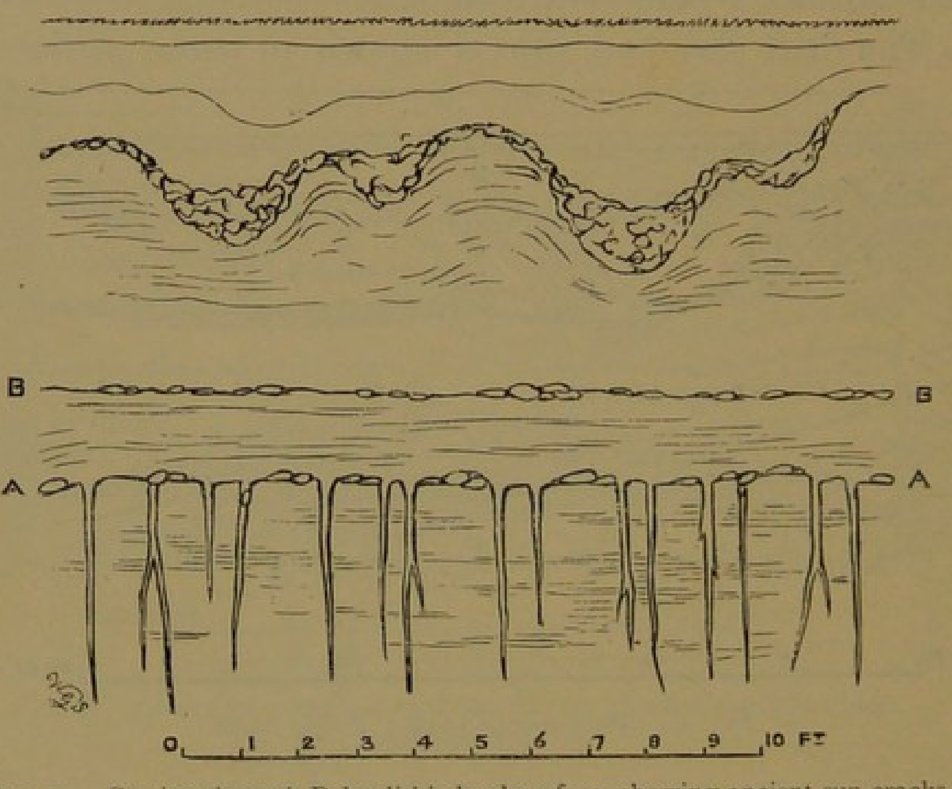


FIG. 49.—Section through Palæolithic land surface, showing ancient sun cracks.

times almost naturally cemented together by the brown, highly tenacious material in which they are embedded. It is split by the excavators with iron wedges.

The Palæolithic implements from the old living place are as sharp edged as when first made. Extremely few of the Palæolithic flakes from this land surface resemble in colour the lustreless indigo-blackish flakes found by my friend, Mr. F. C. J. Spurrell, at Crayford; my examples are nearly all lustrous, and never ochreous.

The old land surface does not occur everywhere on the hill-tops; in many places, as over the deeper valleys, it has been denuded away. It cannot be detected in all the pits at Caddington, as the upper deposit of brick-earth, at the time of its deposition in some places, considerably disturbed it. Neither does the old land surface, when found, invariably furnish Palæolithic implements and flakes. The human relics occur in patches; they are exceedingly abundant here and there, and then suddenly cease. The stone relics are obviously on certain positions where the men of primeval times were in the habit of congregating together and working.

No Palæolithic implements or flakes occur below the old land surface. No implements or flakes occur in the red clay-with-flints as it is found *in situ* on the chalk; they are only found in red clay after it has been wasted and relaid as drift. Some of the Palæolithic men of Caddington made their stone tools on the old surface of the red clay-with-flints, as others did on the old brick-earth surface. The implements in the red clay drift are "derived" from an old red clay surface.

Green-coated flints I have nowhere seen in the district; they may however occur. The chalk itself is very seldom reached. The reason for this is that the pits almost always contain water, often many feet deep, so that even horses are sometimes drowned in it. After heavy rains the water frequently pours in torrents into the excavations.

Red clay-with-flints *in situ* is irregularly spread near Caddington, Kensworth, and Whipsnade. It is commonly a foot or two in thickness, but at Whipsnade Heath it has a varying depth of many feet; it contains flints of large size, large blocks of iron-sandstone, often tabular, pieces of soft red friable sandstone, &c. On the road to Shortgrove Farm there is a block of local indurated sandstone, which measures 1 foot 10 inches by 1 foot 7 inches; there is another block in the road behind Shortgrove Farm, which measures 1 foot 5 inches by 1 foot 4 inches, and a third large block at the same place, which measures 3 feet 3 inches by 2 feet 10 inches by 1 foot 6 inches.

As the valleys are gradually approached from the hill-tops, the drifts, the brick-earth, and the red clay-with-flints *in situ* become thinner and thinner, till at last the chalk is reached and forms the surface. The junction of the red clay and brick-earth with the chalk is seen in the section illustrated in Fig. 50, taken in pit B, facing the west. At this position, true chalk-with-flints does not occur, the chalk near this excavation being almost, but not entirely, without flints; the greater part of the flint-bearing portion of the chalk and red clay has been denuded off. The red clay, as a consequence, as shown in Fig. 50, is in a practically flintless condition. At Whipsnade Heath, where the very large blocks of flint occur in the red clay, the ground is from 6 feet to 55 feet higher than at pit B at Caddington. No human work can possibly occur in this red clay when *in situ*, as it is merely a changed condition of the chalk itself. Sometimes relics from Tertiary clay are found near the surface in the red clay.

One of the difficulties, at times almost insuperable, of investigating the nature of the Palæolithic floor in pit C at Caddington has been caused by the constant presence of water. The pit is seldom, even in the driest seasons, without water; this water has prevented me from ever seeing some parts of the old land surface, and it precludes excavation. After heavy rains the water in the pit increases in volume, and the Palæolithic floor as exposed by me has often been submerged for weeks, or even months together. During the extraordinary drought of 1893, some of the pits became dry; they must have been originally dug out in a very dry season. The accompanying

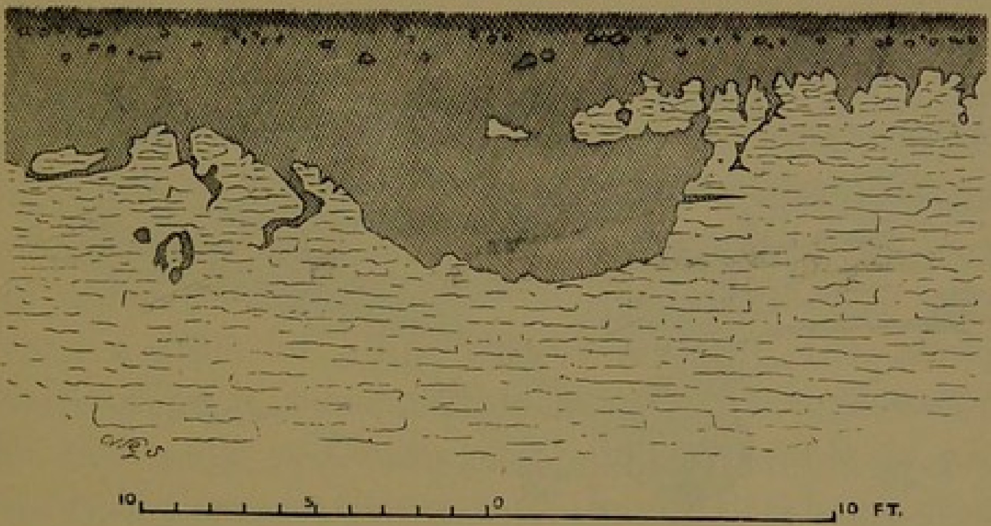


FIG. 50.—Section showing contact of red clay and brick-earth with chalk.

illustration, Fig. 51, drawn from a photograph, shows pit C in what was believed at the time to be its dryest condition after long drought, but during 1893 all the water temporarily vanished. The horizontal lines seen above the water-line show the usual height of the water, which is really a modern representative of the lake of Palæolithic times. The cottagers who at present live near this pond *have no wells;* they, like the Palæolithic men of old, depend upon the pond for their water supply.

The Caddington, Kensworth, and Dunstable valleys are dry chalk valleys. The clays and drifts were possibly continuous over these valleys in early post-Tertiary times, as the surface deposits more or less agree on the hill-tops on both sides of the valleys, but all the valley excavation probably did not take place either in Quaternary or even Tertiary times. The initial configuration of the present valleys probably dates from Cretaceous times, when the chalk as an undulated mass, and still soft, was newly lifted from the sea. No doubt glaciers and slowly-moving

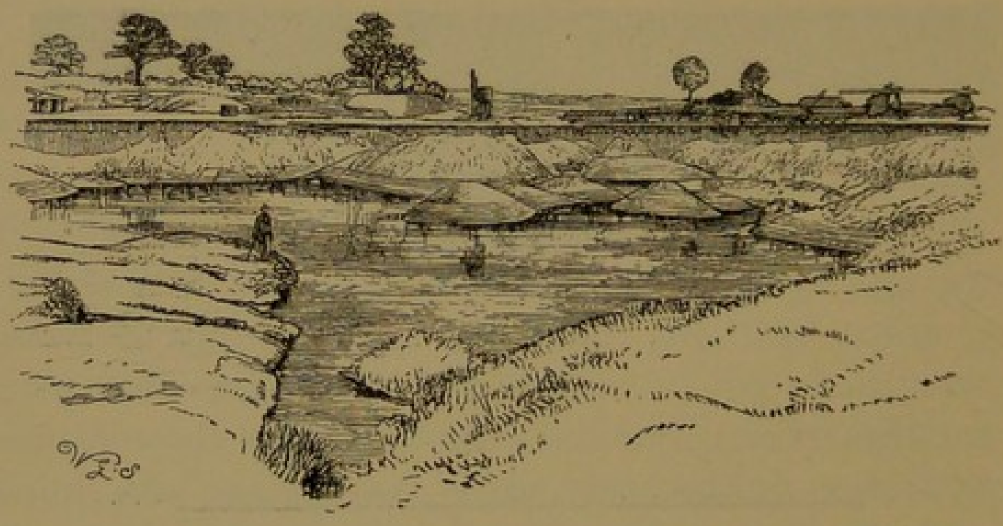


FIG. 51.—View in clay-pit C, showing permanent water.

frozen mud further deepened the valleys. The submergence of the land after the glacial period again deepened them. Alterations, too, have of course been made by the rains of the recent tens of thousands of years, and the denudation of the chalk since Palæolithic times. It is certain, too, that water continues to deepen the valleys now, for the upper chalk is highly porous and full of springs near the level of permanent saturation shown in Figs. 39 and 40. Water holding carbon di-oxide in solution, derived from the air, or possibly from decaying vegetation, dissolves the carbonate of lime, leaving behind only the insoluble material and the stones. This process goes on, not only on and near the surface, but sometimes deep in the chalk, as the sections in chalk-pits in this district continually show. The weak places beneath the surface frequently occasion a lowering of the ground, so that the valleys are even now being gradually deepened, not only from the surface (by denudation) but from below.

In the *Transactions of the Hertfordshire Natural History Society*, vol. i. p. 60, an analysis of chalk-water, as found at Bourne End, Berkhampstead, is given by Professor Attfield, F.R.S. He reports that it is the ordinary chalk-water of the district, and it contains, per gallon, 12 grains of chalk, 4 grains of similar calcareous matter, formed of equal parts of chlorides, nitrates, and sulphates; a little more than a grain of saline substances, and the merest trace of organic matter. The water which flows out of the chalk at Caddington and Dunstable is probably of the same nature with that of Berkhampstead, as the positions are not far removed from each other, on the same series of chalk hills.

A rough idea may be obtained of the amount of chalk which is being constantly removed from the interior of the hills, when it is borne in mind that the large towns of Luton and Dunstable, as well as the villages on the hills and at the base of the hills, are supplied with water by tapping the chalk, either in the form of deep excavations for water-works, or by wells sunk into the chalk. Added to this artificial tapping, we must include the natural outflow from the chalk into the streams. At a very moderate computation of flow from one position only, viz., ten quarts a minute, we get 1,316,500 gallons a year, and there are many such natural outflows, which seldom or never cease running. It has been computed that 450,000 tons of chalk and other matter are carried annually into the Thames from the tributaries which drain the country on the north and south of its course. The Lea and Ver streams, with which we are now specially concerned, contribute the chalk from the eastern Dunstable hills.

In Palæolithic times, the land surface in the Lea valley was probably not greatly higher above the Ordnance datum than at present, and the Caddington and Kensworth hills were drained into very wide, and perhaps comparatively shallow, morass-like waterways over flattish undulating expanses of country, with wide and shallow slow-moving rivers.

As enormous quantities of brick-earth and stones must have been washed down from the hill-tops and higher grounds, and carried into the chalk valleys below on the way towards the sea, it follows that Tertiary stones and ochreous flints should be met with at the lowest levels on the chalk surface. Such is really the case, but relics of clay and drift are now very rare in the chalk valleys. As a consequence, Palæolithic relics are, of course, much rarer, although it is a fact that my first finding of ochreous Palæolithic flakes on the surface of a chalk valley led me to look for finished Palæolithic tools on the hill-tops.

Drifts, as laid down by the present river system of Britain, are necessarily not present on the high positions of Caddington, or the adjoining heights at Slip-End, Kensworth, or Whipsnade, although the river drifts belonging to the valleys of the Ver, Lea, and Ouze, a few or many miles off, necessarily contain, as derived stones, many of the Tertiary and other stones and fossils, including Palæolithic implements and flakes belonging to the high positions. The valleys contain the sweepings of the hills.

A few years ago pebbly gravel, naturally mixed with the broken and abraded waste gravel of the red clay-with-flints and chalk-with-flints, was dug on Dunstable Downs for the repair of the local roads. The old Dunstable gravel-pits, now disused and grass-grown, may still be seen at a quarter of a mile south-west from Downs Farm, on the east side of the footpath. The "Dunstable gravel," which rests on the chalk, is in some places six or more feet in depth.

There are both natural and artificial depressions with ponds on the hill-tops at Caddington, Kensworth, and Whipsnade; these ponds are on brick-earth, or the equally tenacious red clay-with-flints; both clays being able to more or less permanently hold up all rain-water and surface drainage, the deeper ponds are never, even in the hottest and driest summers, without water. The permanence of the water in some of the hill-ponds, as at Ouzley Pond, a quarter of a mile west of Whipsnade, and 753 feet above the Ordnance datum, illustrated from a photograph in Fig. 52, is shown by the constant presence of certain wild plants, as *Potamogeton natans*, L., *Ranunculus aquatilis*, L., *Lemna minor*, L., *Poa fluitans*, Scop., *Juncus communis*, Mey., and other water-loving plants. Tritons, water-beetles, and other aquatic animals are always abundant, but no fish occur; in the summer dragon-flies are to be seen darting over the water.

The brickmakers of the Dunstable hill district never use the tenacious red-brown drift clay for bricks, they invariably use the paler coloured brick-earths; they moreover very carefully select the places belonging to this clay where few or no stones occur. This being the case, it will be understood that there is but a poor chance of finding Palæolithic implements, either in the brown tenacious stony drift or the brick-earth beneath, unless excavations are specially made for the person who wishes to secure

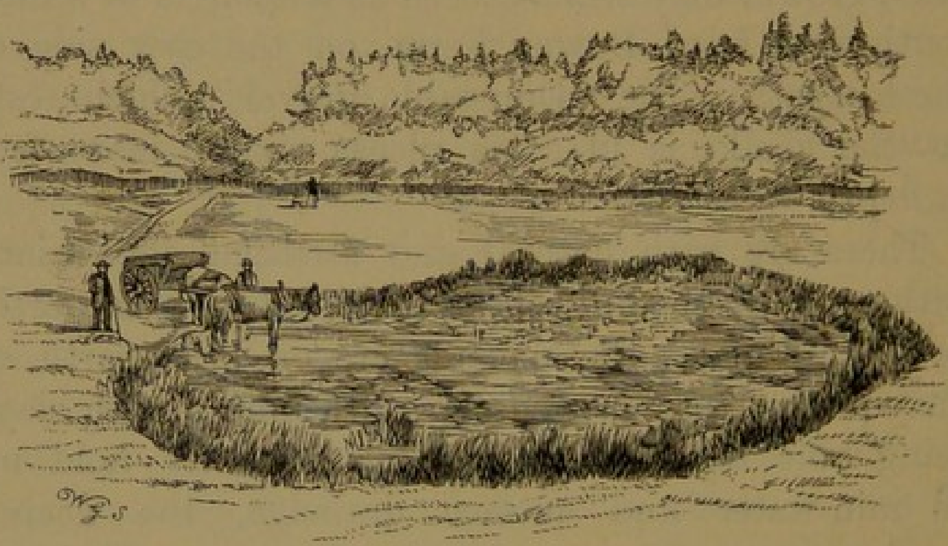


FIG. 52.—Ouzley Pond, Whipsnade.

the implements. The part of the brick-earth which includes the implementiferous positions of the Palæolithic floor is specially avoided by the brickmakers, for not only do stones spoil the bricks if incorporated with the clay, but the men have long known and dreaded the thin keen-edged artificially struck flakes, which suddenly cut their fingers to the bone.

Suitable spots by the water's edge on the Palæolithic floor were selected by the men of old for piling up flints for tool-making purposes. It is at these spots that the sharp thin flakes occur in hundreds, together with implements finished and unfinished. It is curious that, perhaps only some four or five yards off, and on the same old land surface, not a single worked stone or flake can be met with.

Some of the stones found in the Caddington brown drift exhibit possible glacial scratches, as illustrated in Fig. 53. I have not met with similar scratches over any human-made work, and in the example illustrated it will be observed that a scratch stops suddenly at A, at an artificially-flaked surface, showing that the scratching must be older than the Palæolithic flaking. Similar scratches occur on the crust of some of the natural unworked ochreous stones, and on the crust of some of the keen-edged implements, but I have nowhere, either at Caddington or in any part of the Thames valley, seen a presumed true glacial scratch over an artificially-worked surface.

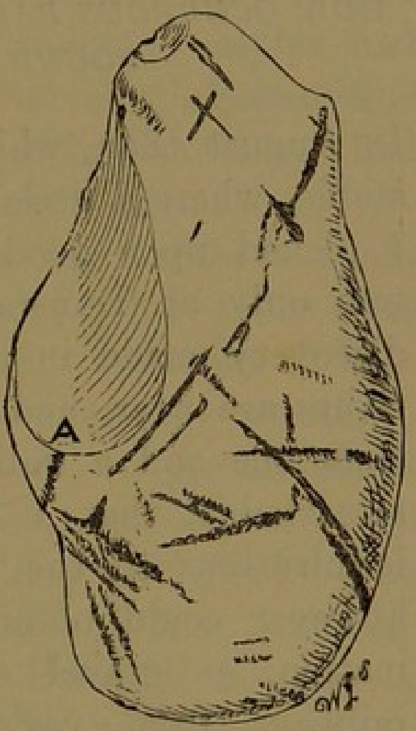


FIG. 53.—Flint from the drift, with presumed glacial striæ on crust.

Many of the implements and flakes—in fact, nearly all—from the red clay drift are profusely covered with slight superficial scratches, but these scratches are common on the stones of valley gravels, and are not glacial. No superficial scratches occur on the worked surfaces of the flints from the Palæolithic floor: they are, without exception, perfectly smooth.

CHAPTER V.

HOW OCHREOUS PALÆOLITHIC IMPLEMENTS WERE FOUND NEAR DUNSTABLE.

In August 1884, whilst walking in a road at Dunstable, where a little gravel had been thrown down, I picked up a good ochreous Palæolithic flake. I was only at Dunstable for a single day, but the discovery made in a pure chalk district, where no rivers are near, and where the smallest brooks are from one and a half to four miles off, seemed so remarkable, that I preserved the flake and made inquiries as to the origin of the gravel patch. I however could obtain no reliable or definite information, as gravel was sometimes brought by the railways from various places, some near, others distant.

Next year I removed from London to Dunstable, but it was not till the following year, 1886, that I found four other Palæolithic flakes in the Dunstable district—a sharp grey flake in the river gravel at Luton, and a sharp faintly ochreous flake in the river gravel at Leagrave, three miles north-east of Dunstable. In the same year I found an abraded deeply ochreous flake in the river gravel at Harpenden, nine miles to the south-east of Dunstable, and another ochreous flake in the river gravel at Wheathampsted, eleven miles off in the same direction.

All these positions are in the Lea Valley, and close to the river.

In this year, 1886, I found a grey unabraded Palæolithic implement, and a large number of grey unabraded Palæolithic flakes, many *in situ* in the grey stratum, at the top of the red gravel of Wheathampsted. My quest at this time was, however, for the original home of the slightly abraded deeply ochreous flakes. The sharp examples had obviously not been much moved since Palæolithic times, whilst the older and ochreous ones had clearly been carried by water from a distance.

Next year, 1887, whilst walking across a chalk field near Maiden Bower, one and a half miles west of Dunstable, I picked up another ochreous Palæolithic flake. This discovery was very puzzling, as there were no gravelled roads or gravel heaps anywhere near, but other ochreous stones were very thinly sprinkled over the chalk field. The London and North-Western Railway line, connecting Dunstable with Leighton Buzzard, is only a quarter of a mile north of this position, and on walking towards the railway, I noticed that the line was being newly ballasted with gravel. I thereupon walked on to the line and asked the men whence the gravel came; they replied from Stratford, near London; a place where I had often found Palæolithic implements in gravel. I now erroneously assumed that the newly-found ochreous flake was a Stratford example.

On the evening of the 12th June 1888, whilst walking over a newly-harrowed field, one and a half miles north of Dunstable, near Houghton Regis, I picked up the basal part of an abraded dull whitish-ochreous ovate Palæolithic implement, Fig. 54. The discovery was so unexpected and startling, at such a place, that I too hastily threw the stone away again into the field, concluding it to be a deceptive natural form. On second thoughts, however, I returned to the spot, and in the dusk sought again for, and at last re-found the discarded stone. I now clearly saw that it was really the basal half of a genuine, flat, ovate Palæolithic implement.

A few days after this discovery, on the 18th June

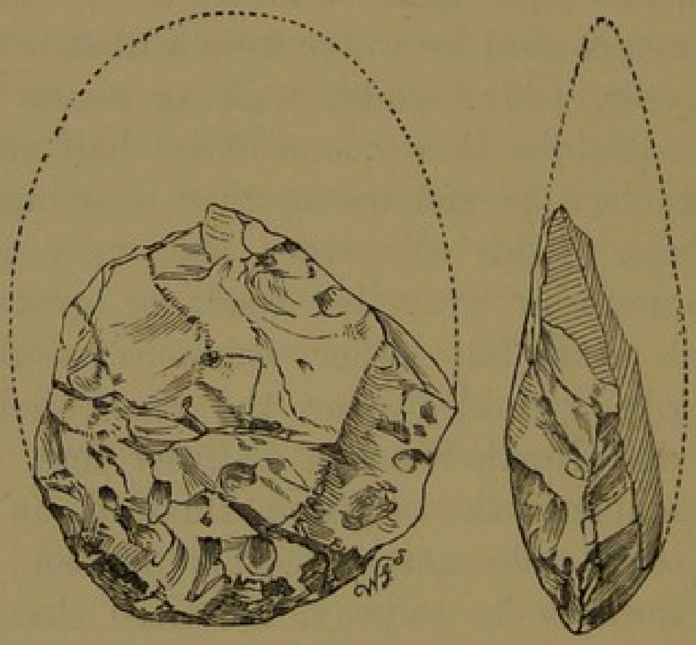


FIG. 54.—Broken implement, Houghton Regis. Half scale.

1888, I was returning in the evening from an entirely unsuccessful search for other ochreous implements or flakes in the same field at Houghton Regis, when, on passing the back of the new Grammar Schools at Dunstable, I observed some newly-laid-out gravelled roads by the Dog-Kennel field. It is the custom at Dunstable to procure large flints from excavations in the red clay-with-flints, and to break up these large stones for road ballast. Implements, I knew, could not possibly exist in this material, but notwithstanding its known barrenness, I have invariably looked over it whenever seen. I therefore carefully examined the gravel behind the schools, and, to my great surprise, found two ochreous slightly abraded Palæolithic implements. Further and prolonged search on succeeding evenings produced three more implements of the same class, colour, and condition, with a few ochreous Palæolithic flakes.

A new and somewhat serious difficulty now presented itself, for on making inquiries of the road-maker, he informed me that the gravel had been brought from different places, some being from the red clay-with-flints, other from river valley excavations. One place, Linslade, was eight miles to the north-west, in the valley of the Ouzel, a tributary of the Great Ouze; other places were at great elevations on the hill-tops at Kensworth, two miles to the south-east—Whipsnade, two and a half miles to the south, and Caddington, three miles to the south-east. Each of these localities represented several excavations, sometimes a mile or more apart. I was obliged, therefore, to repeatedly visit all the excavations mentioned, and a year passed before I at last found the position, which was to me the most unexpected, and which at the same time has proved the most productive, viz., Caddington.

In June 1889, exactly a year after the discovery in the road behind the schools, I found a small dull whitish-ochreous, faintly white-pencilled, slightly abraded Palæolithic implement *in situ*, in clay-pit A, at Caddington, illustrated in Fig. 55. It was embedded in the tenacious red-brown clay drift, which there sometimes surmounts the brick-earth.

The implement was identical in mineral condition with the examples found behind the schools at Dunstable. On questioning the foreman of the brick-yard, he informed me that no flints from that pit had ever been sent to Dunstable, but that flints from another Caddington pit, B on map, had really been bought for the roads near the Dunstable Grammar Schools.

On visiting pit B, the foreman remembered flints being sent to Dunstable from his pit, but I also learned that no more digging would be done there

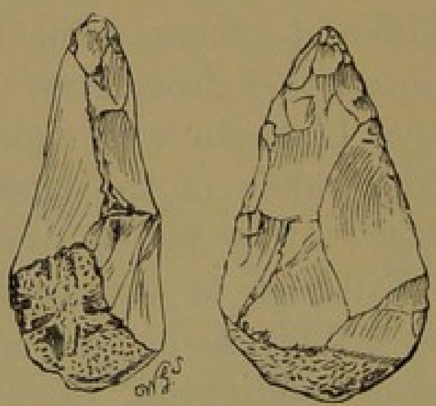


FIG. 55.—First implement found *in situ*, Caddington. Half scale.

till the following winter, and the pit then was virtually destitute of stones. The foreman referred me to a third pit, C on map, whence flints had also been sent to Dunstable. On looking over the pits B and C, I found a few ochreous Palæolithic flakes, chiefly in C, but no implements.

I now anxiously awaited the winter's digging in pit B, but when the winter arrived the brickyard was abandoned, the excavations filled in, and the place ploughed up and planted with corn. I however lighted on a few more ochreous flakes on the disturbed surface.

There are four other brickyards at Caddington in addition to the three mentioned, with a few outlying yards. These were in 1889 all thoroughly and repeatedly examined by me. I also repeatedly examined the excavations at Slip-End, 1½ miles south-east of Caddington, and 1¾ miles south of Luton; and whenever and wherever a hole was dug or grave made in the churchyard or cemetery, I was usually upon the spot to note the nature of the ochreous excavated material.

The result to the end of 1893 is, that I have found in the tenacious red-brown drift of Caddington and Slip-End about thirty ochreous slightly abraded Palæolithic implements, and a large number of flakes and cores.

From the slightly abraded condition of the ochreous human relics, it is obvious that, high-level implements as they are, they have all been derived from some still higher position, of which but few traces are now visible.

These *ochreous* implements probably were made in very remote times by river-sides or lake-sides. The water must have drained elevations which have now vanished, and the hill-tops of the Dunstable district of the present time must represent the valleys of the old time. The water from the hills now passes off into mere field-drains.

CHAPTER VI.

THE OCHREOUS PALÆOLITHIC IMPLEMENTS.

The implements from the upper brown stony clay, named for convenience "ochreous," differ considerably in colour; they vary—yellow, rusty-brown, deep chocolate-brown, reddish-brown beautifully speckled and spotted with yellow, or speckled and streaked whitish, a few are creamy or ochreous-whitish. All are slightly abraded, some more abraded than others. It is possible that all the Caddington implements described in this book may be of identical age, the abrasion of the uppermost examples being due to some movement in Palæolithic times, and the ochreous coloration to the deep brown matrix in which the examples found in the dark brown clay have been embedded.

There is, however, *a difference in the nature of the tools*, for I have found several well-made and elegant scrapers amongst the implements in the brick-earth of the Palæolithic floor, whereas I have as yet met with no true scraper amongst the ochreous tools.

Both the well-known types of implements occur in the brown stony clay, the pointed, of which an example is illustrated in Fig. 56, and the ovate, as illustrated in Fig. 57. An ovato-acuminate example is illustrated in Fig. 58; it was found *in situ* in a seam of brown stony clay at a depth of 16 feet. The tool illustrated in Fig. 59 was found with and close

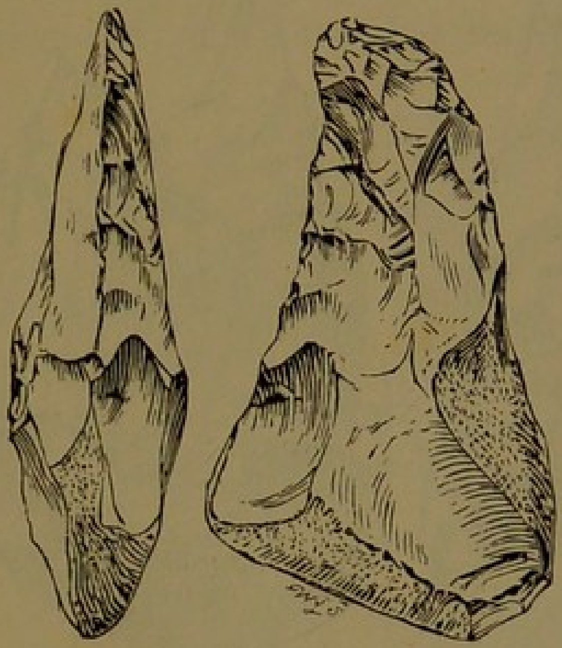


FIG. 56.—Implement, Caddington. Half scale.

to the last. It is interesting as being an artificially pointed nodule of flint. The unworked butt end of

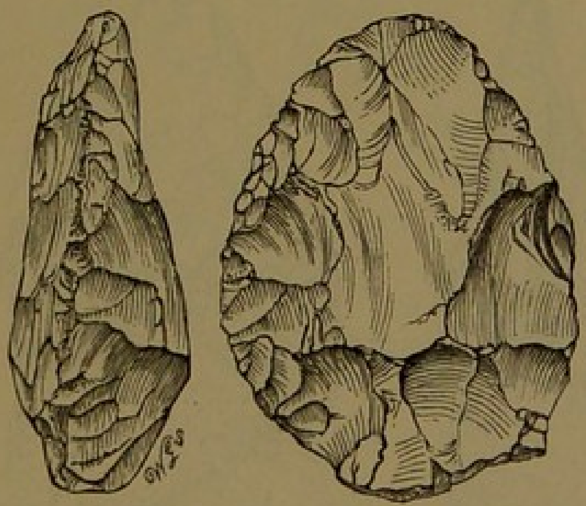


FIG. 57.—Implement, Caddington. Half scale.

the implement is very convenient for holding in the hand; such forms occur in all implementiferous gravels, and I have others from Caddington.

An ovate implement from the stony clay of

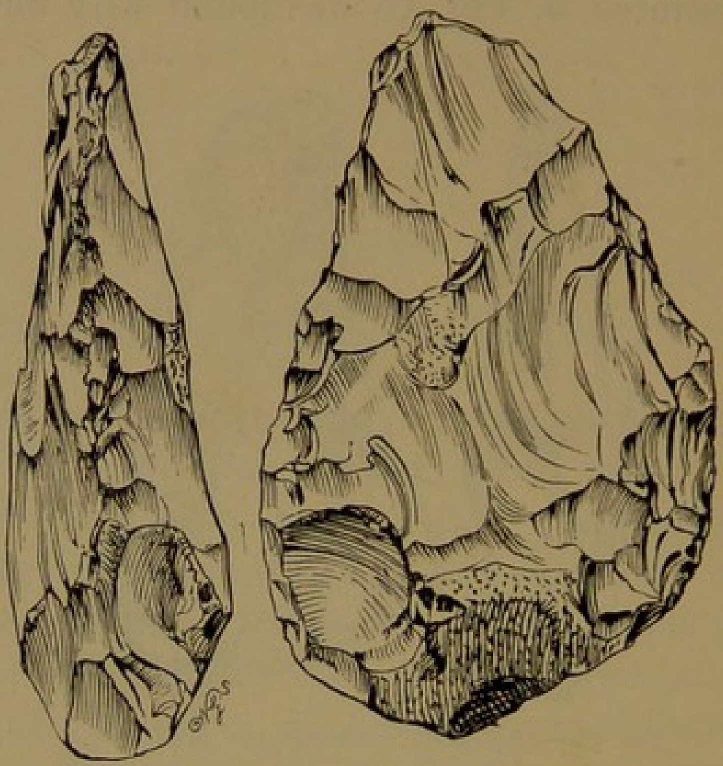


FIG. 58.—Implement, Caddington. Half scale.

Slip End, near Luton, is illustrated in Fig. 60.

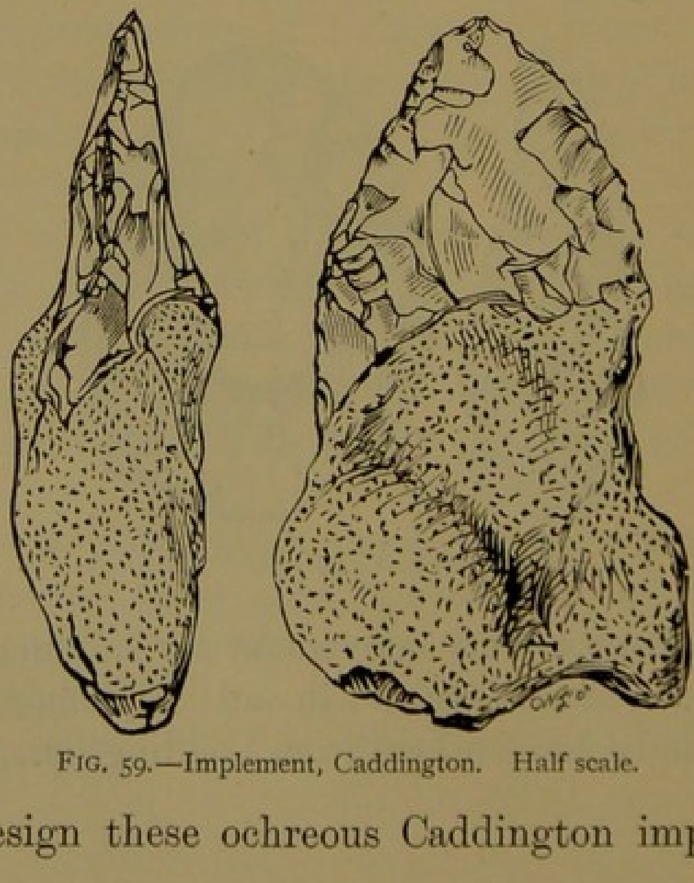


FIG. 59.—Implement, Caddington. Half scale.

In design these ochreous Caddington implements in no way differ from the ordinary Palæolithic implements of our river valleys. The geometrical accuracy of form and the flaking are alike excellent. On the average they are somewhat small in size, and

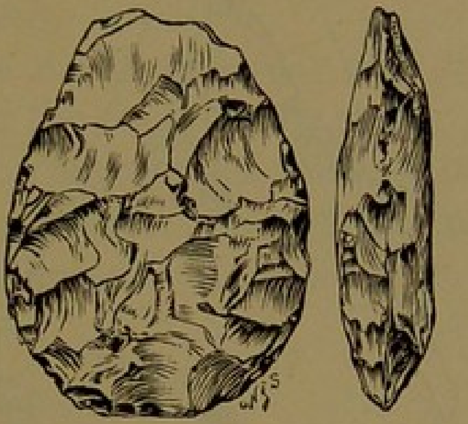


FIG. 60.—Implement, Slip End, Luton. Half scale.

not in the slightest degree ruder than the usual familiar river drift examples.

In Fig. 61 a whitish-ochreous rude pointed implement is illustrated, which may have possibly been

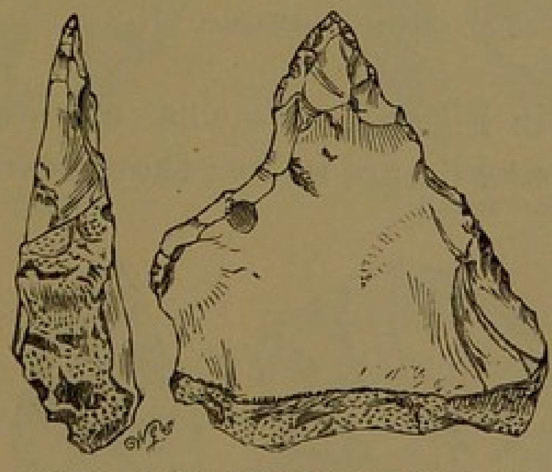


FIG. 61.—Borer, Caddington. Half scale.

devised for a drill or borer: similar forms are not uncommon in valley gravels.

Another example, made by the mere pointing of a natural tabular piece of flint, is shown in Fig. 62; the dotted line indicates the original shape of the stone.

The curious and somewhat rare chipped nodules of flint also occur; a deep brown ochreous example

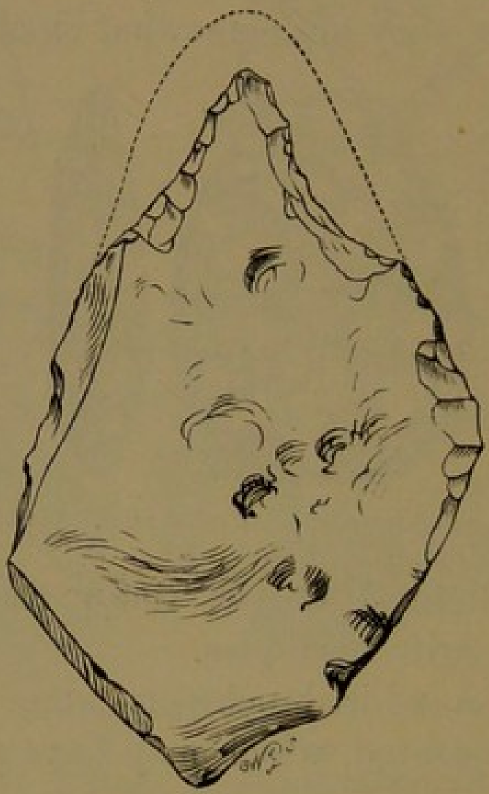


FIG. 62.—Borer, Caddington. Half scale.

is illustrated in Fig. 63. To what use stones of this nature were put I do not know; they greatly resemble

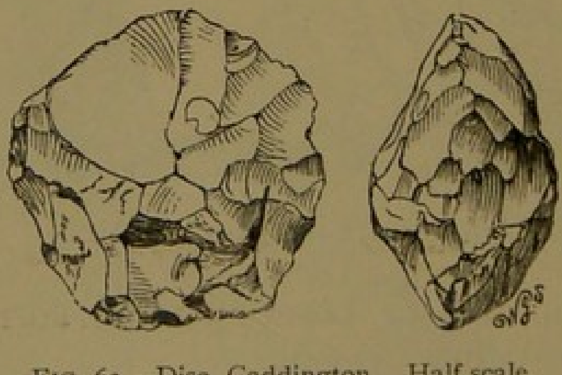


FIG. 63.—Disc, Caddington. Half scale.

in design and size the doubtful "throw stones" of Neolithic times.

I have once or twice met with the little tools known as "fabricators;" they resemble Neolithic fabricators, but are rougher in workmanship. The example illustrated in Fig. 64 I found *in situ* in the brown stony clay.

It is almost needless to say that cores and flakes are frequent in the deep brown clay.

On May 15, 1889, whilst walking over a cornfield on one of the highest parts of Dunstable Downs, near "Mount Pleasant," Kensworth, at 760 feet above

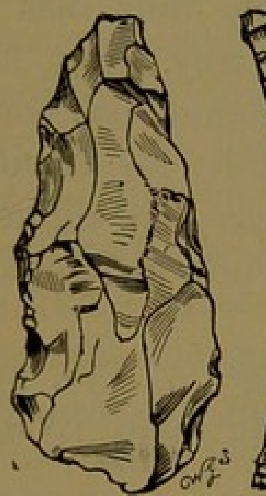


FIG. 64.—Fabricator, Caddington. Half scale.

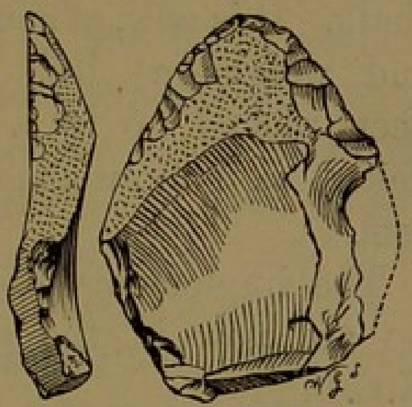


FIG. 65.—Implement, Mount Pleasant, Kensworth. Half scale.

the Ordnance datum, I picked up upon the surface a neatly made, but slightly broken, thin, brownish-ochreous unabraded trimmed flake, of the so-called "Cave" type, as illustrated in Fig. 65. It was amongst the stones of the broken up and relaid red clay-with-flints, mingled with Lower Tertiary pebbles and quartz and quartzite blocks. This drift, I believe, here covers brick-earth, for although there are no excavations, I have sometimes seen stony clay and traces of brick-earth turned up in the fields after extra deep ploughing. Further searching in this field produced two or three sharp ochreous flakes and a large abraded deeply ochreous flint block, from which several flakes had been struck in Palæolithic times. Ochreous flints are thinly scattered over all the fields near "Mount Pleasant," till the greatest height in this part of the country is reached, viz., 799 feet 6 inches, on the Whipsnade Road, at 1¾ miles south of Dunstable.

As in all other Palæolithic deposits, numerous trial stones, failures, and abortions are met with amongst the ochreous stones at Caddington. One of these, which I have preserved, is a massive flint cast of a large oyster, *Inoceramus Cuvieri*, Sby., from the chalk. It is now, of course, deeply cinnamon-ochreous, and weighs 2¼ lbs. It is remarkable for having been picked up by a Palæolithic man and slightly flaked, as if in an attempt to turn it into a chopping tool.

The implements illustrated in Figs. 57, 58, and 60 are now in the collection of Sir John Evans, K.C.B.

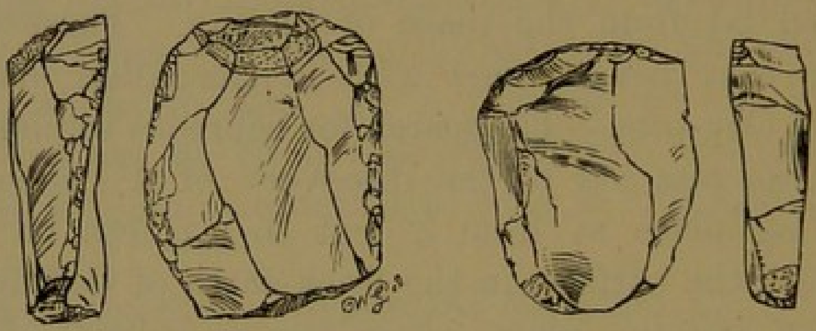
CHAPTER VII.

HOW THE PALÆOLITHIC FLOOR WAS FOUND.

WHILST searching for the ochreous implements, I several times lighted on white, grey, or indigo-blotted sharp-edged flakes, which, from their perfectly unabraded condition, obviously never could have been moved far from the place of finding. These sharp flakes were usually met with in the fallen material in the clay-pits. The search for ochreous implements in these pits led to the discovery of a Palæolithic working place at from 4 feet to 13 feet or more beneath the surface, in the brick-earth of Caddington Hill, a working place where every artificial chip of flint found is as sharp as a knife, and where every flake rests in the precise place where it originally fell from the hands and stone-hammers of the primeval workers in flint.

In May 1889, whilst making an examination of the exposed vertical bank of clay-pit C—the pit in which all the discoveries of real importance have since been made—I noticed indications of a horizontal streak in the brick-earth, at about six feet from the surface. Here and there I observed a stone embedded in the streak, and at one place I noticed a small half-exposed flint projecting from the face of the excavation. I removed the stone and found it to be a sharp and beautifully made indigo-blackish scraper, Fig. 66. I immediately remembered that I already possessed an almost identical scraper, Fig. 67, found on a heap of brick-earth at Caddington two years before,—May 1887. Both examples are slightly clouded and spotted with white. Not suspecting the Palæolithic age of either of these examples, I placed both in my Neolithic collection. I thought it so utterly impossible that any human work could be found out of the stony clay above, that I concluded a Neolithic scraper had fallen down a crack from the surface.

Soon, however, I found several artificially struck



FIGS. 66, 67.—Scrapers, Caddington. Half scale.

flakes in the same thin seam or streak of brick-earth, and it became impossible for me to retain any belief in a number of Neolithic flakes having fallen down vertical cracks.

On June 27, 1889, whilst looking over the clay in pit F, by Buncer's farm, on the south of the village of Caddington, I saw projecting from a mass of brick-earth, which had just fallen from the side of the pit, a beautifully made ovate Palæolithic implement with an ochreous crust—perfect, pale indigo-whitish in colour, lustrous, and as sharp as a knife, Fig. 68.

I was greatly surprised, but at last saw that, deep underneath the brown tenacious drift clay with its ochreous and abraded implements, lay a thin stratum of Palæolithic implements and flakes of—to me—vastly greater interest than the apparently older ones above.

I now upon careful searching began to find keen-edged flakes in all the pits, but owing to the small amount of digging for clay, repeated and pertinacious visits to the Caddington and Slip End excavations only resulted in the acquisition of about a hundred flakes during the next nine months.

At length, after six years had nearly passed from

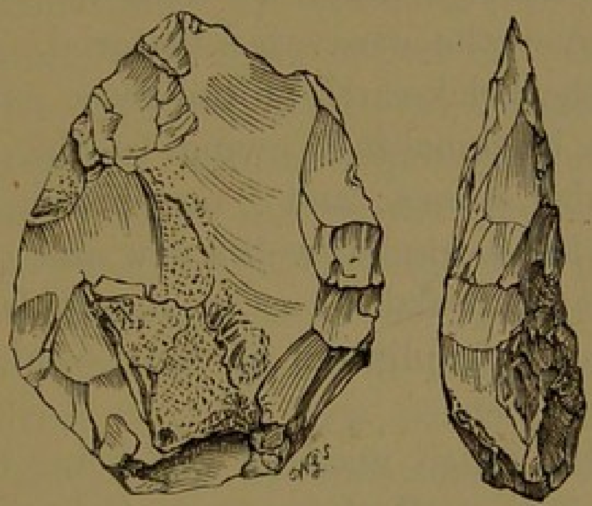


FIG. 68.—Implement, Caddington. Half scale.

the date of my first discovery at Dunstable, a really good result was secured.

At the end of March 1890, I was returning to Dunstable in the evening from Caddington village after an afternoon's search. I had this day found nothing whatever in the pits south of Caddington. I hesitated in the village, uncertain whether to walk straight home over the fields, or pay one more visit to pit C and return by road. I fortunately decided on another visit to pit C. Some digging, on the north and west sides of and close to the brickmakers' cottages, had been done since my last visit, and the moment I entered the excavation I saw many flakes in the newly disturbed brick-earth; some of these were white, others mottled white and indigo, a few grey, and one or two almost black, but all were thin and as keen-edged as knives. So exceedingly sharp and thin were these flakes, that I cut my fingers with their edges in removing them in the dusk from the brick-earth. Darkness came on, and I was obliged to leave the section practically unexamined. Early the next morning I was again in the pit, and set a man to clear the vertical face, and turn over the excavated material. I was now told that the brick-earth at the place examined was useless for brickmaking, owing to the presence of the embedded stones; and I now heard, for the first time, that the workmen well knew and dreaded the seam with sharp flakes, as in manipulating it the thin keen-edged splinters of flint would often cut their fingers open.

Whilst the fallen material was being turned over I found in it a small sharp ovate Palæolithic implement, a rude unfinished tongue-shaped implement, and numerous flakes and cores. Upon subsequent days I found a second sub-triangular, pointed, sharp-edged implement, a rude trimmed flake, and many simple flakes and cores.

The fact of the greatest importance which presented itself was, that all the artificially struck flakes, cores, and implements (except a few deep brown examples, which had accidentally dropped from the stony clay above) had come from one very thin, and in some places almost invisible line, best seen on the west side of the pit. I saw that this line represented a Palæolithic land surface and working and living place, similar with the one previously discovered by me at Stoke Newington Common, London, and described and illustrated in the *Journal of the Anthropological Institute*, "A Palæolithic Floor at North-East London," vol. xiii., 1884, p. 357. Nearly every stone taken from this thin line showed human work, and the flints which did not exhibit flaking had obviously been brought to the spot by human hands in Palæolithic times, for the larger blocks of stone on the land surface of brick-earth were flints, which had been taken out of chalk-with-flints or red clay-with-flints with chalk or red clay still in their hollows. The presence of the still adherent chalk on flints embedded in brick-earth proved that the flints had been either taken out of the chalk by hand, or torn out by water. The slow solution of the chalk in the formation of red clay-with-flints had not taken place. Several small pieces of chalk were free on the Palæolithic floor. A few blocks exhibited possible glacial scratches on their crust. As the fact was certain that a genuine Palæolithic working site had been lighted upon, I asked and obtained permission of the owner, Mr. G. Bunn, brick merchant, of Luton, to allow me to dig in the pit.

The finished implements and flakes invariably occur in a distinct gently undulating stratum. From four to seven feet is a common depth. The line of stones and artificially formed flints represents a surface which at one time bordered several comparatively small confluent lakes or ponds, as shown on the plan, and in the section in Fig. 40.

The clay in which the tools are embedded is in most places highly tenacious. It requires strong men, with pickaxes and crowbars, to bring down the upper drift with the stony clay and brick-earth beneath. When the flints first come from the clay and brick-earth, they are so tenaciously encrusted that no fingers, however strong, can effectually get them clean. So highly tenacious is some of the material, that during my excavations I was obliged to have the stones picked out and thrown into tubs of water. After well soaking, boys were employed to vigorously scrub all the stones extracted, so that I might sort the natural from the artificial. Many flakes, and no doubt some implements, were never recovered, many doubtlessly still exist in the heaps in pit C. Occasionally large lumps of clay would fall from the facings; nothing could be done at the time of falling with these sticky lumps, as they could neither be chopped with spades or divided with picks. Some were allowed to weather, and these on naturally splitting in the sun sometimes produced flakes; but others, although the greatest care was taken to preserve as much material as possible, doubtlessly got covered up or wheeled away. Some of the blocks of clay in drying became almost as hard as brick or stone. On several occasions the side of the excavation fell in, and tons of material had to be wheeled away and dug over and sorted and re-sorted. Even during this sorting and re-sorting, it was quite impossible to recover all the stones, owing to the nature of the sticky brick-earth. Sometimes after heavy rains the water would percolate through the facing and submerge for days, or even weeks or months, the horizontally exposed stratum of the Palæolithic floor. When this unwelcome water at length subsided, it was a difficult and highly dirty job to recontinue the excavations with success.

CHAPTER VIII.

THE PALÆOLITHIC FLOOR.

I.—Implements.

THE WHITE, LUSTROUS, SHARP-EDGED IMPLEMENTS.

The porcellaneous white implements, flakes, and cores are found in the stratum marked G, H, I, in Fig. 46, and at C on Fig. 47. All the relics from this stratum are identical in age with the implements found on the true Palæolithic floor, J, J, Fig. 46, and J, J, Fig. 47. The white and grey or marbled implements differ only in their position in the brick-earth. In the section of the pit exposed by me, the white implements were from one to three feet above the true Palæolithic floor. It would seem that in very remote times slowly moving water brought down and gently covered up this floor with clay mud. This deposit no sooner hardened than the Palæolithic men again lived upon its new-made surface, and there manufactured a fresh series of tools.

The descent of the red-brown stony clay finally drove the Palæolithic people away from the position.

The white or whitish tools seldom vary in colour in the direction of the uppermost ochreous slightly abraded examples, but they frequently show traces of the grey or indigo marbled tints, found amongst the tools on the true Palæolithic floor below. The white colour is due to the decomposition of the surface of the flint brought about by water and the matrix in which the tools happen to have been embedded.

A lustrous ivory-white sharp-edged implement is illustrated in Fig. 69. It is ovate in form, with a

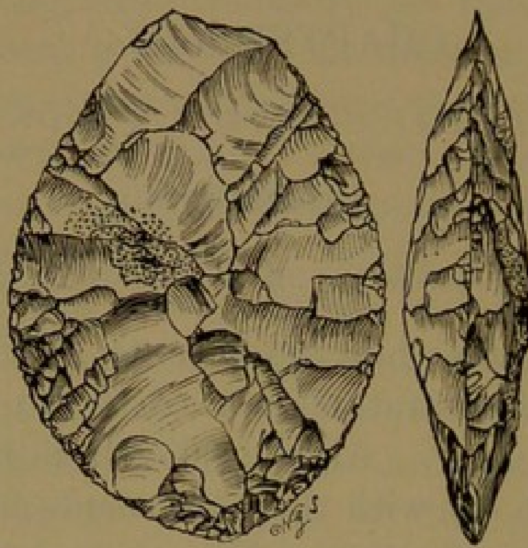


FIG. 69.—Implement, Caddington. Half scale.

sharp cutting edge all round. It is beautifully and skilfully made, with a considerable amount of geometrical correctness. It was found *in situ* at a depth of five feet from the surface.

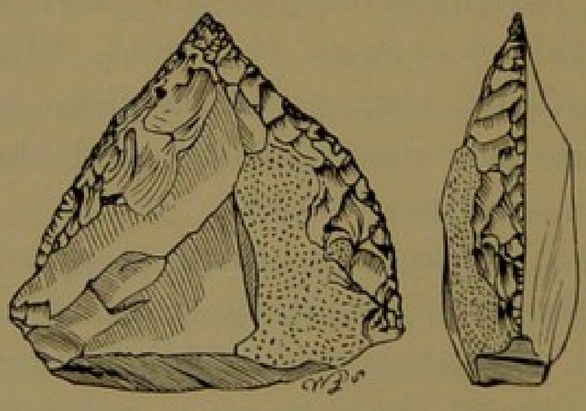


FIG. 70.—Implement, Caddington. Half scale.

The beautifully executed implement, technically called a trimmed flake, illustrated in Fig. 70, conclusively shows the period to which the tools found on the Palæolithic floor at Caddington belong, viz., that of the older caverns, as that of Le Moustier, Peyzac, Dordogne, and of the brick-earth of High Lodge, Mildenhall, Suffolk. It will be observed, by the edge view, that all the trimming or secondary work is confined to one face. The face on which the cone of percussion occurs is quite plain.

A Palæolithic scraper is illustrated in Fig. 71.

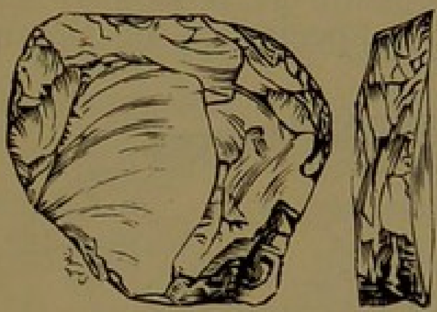


FIG. 71.—Scraper, Caddington. Half scale.

This little tool, grey-white in colour, is made with great skill and accuracy, and like the last was found *in situ*. It is characteristic of the Palæolithic floor.

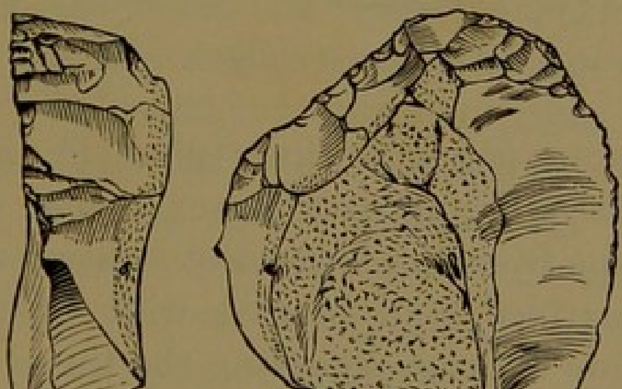


FIG. 72.—Scraper, Caddington. Half scale.

A second sharp-edged but heavier scraper is shown in Fig. 72. It is milk-white in colour and sub-lustrous. A beautifully made and much larger instrument, frequently termed a side-scraper, is illustrated in Fig. 73. It is white, sharp, and highly lustrous. It was found *in situ* at 16 feet.

I have replaced some of the white flakes on to white cores or other white flakes, but the success in this direction, with white examples, cannot be compared with the results with the tinted flakes from the true floor below. This is possibly because I have found fewer specimens in the upper stratum.

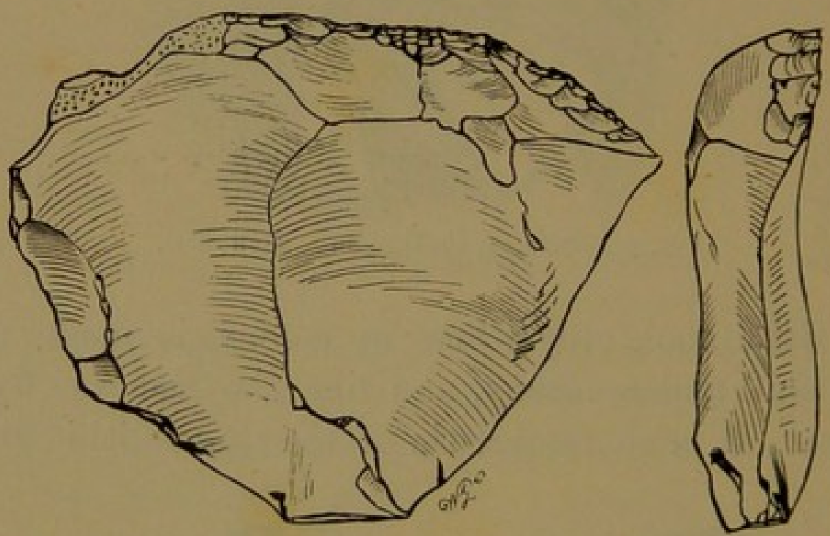


FIG. 73.—Side-scraper, Caddington. Half scale.

I have seen no actual working place in the deposit which produces the upper white examples. A few of the specimens from the lowermost stratum are white, or white marbled, and blotted with indigo. The remarks made later on regarding the tinted examples found on the lower stratum apply with equal force to the white specimens sometimes found a foot or two above them. The two strata probably coalesce, and form one stratum at no great distance from the excavations made by me.

THE GREY OR INDIGO-VARIEGATED SHARP-EDGED IMPLEMENTS.

These are the implements found on the true Palæolithic floor, or old land surface. The stone tools from this stratum vary in colour from whitish-grey to dark grey, grey indigo, or indigo-blackish. Sometimes they are milk-white, more or less lined, blotted, or clouded with pale or dark indigo. Others somewhat resemble tortoise-shell in colour, light or dark, a few are semi-transparent. Nearly all the examples are lustrous. A few are lustreless and light or dark grey in colour. None, however, quite resemble in colour the examples found and replaced by my friend Mr. F. C. J. Spurrell at Crayford in Kent. The Caddington men also differed from the Kentish men in their *method* of flaking, for I have found no collections of flakes capable of being built up into very large blocks, as in Mr. Spurrell's examples.

Both the familiar kinds of implements, pointed and ovate, are found on the Palæolithic floor at Caddington. The tools vary, thin and thick, just as ordinary Palæolithic implements from other positions vary. Most of the Caddington examples are somewhat small in size, although large forms have been met with. A few are very small, and a limited number take curious and erratic forms. Some examples were apparently broken in the course of manufacture, others are obvious failures. It seems probable that many of the implements were carried away by the makers from the spot lighted upon by me for use elsewhere. I have evidence that in one case it must have been so, for I have the chief flakes struck off in the manufacture of an implement, but the implement itself was not with the flakes. My group-find includes broken, unsatisfactory, or unfinished implements, pieces, cores, hammer-stones, punches, and a vast number of flakes. With these are beautifully made and perfect implements. Near the tools and flakes were collections of natural flints,—many of these were large blocks which had been apparently tested for flaking purposes. Large partially flaked blocks were common, but sometimes so massive and heavy, that they could not be conveniently taken away by hand. Some weighed ten, twenty, or even thirty pounds. Certain of the larger blocks had been artificially quartered or crushed in Palæolithic times. I have preserved a few examples of moderate size, which were transferred to my residence in a cart.

A somewhat large subtriangular whitish-grey implement is illustrated in Fig. 74. It was found *in situ* at a depth of 11 feet, and weighs 1 lb. 1½ oz. The natural whitish-ochreous crust of the flint is exhibited at the butt. The small flake marked with a cross was found near the implement and is now replaced.

A small pointed implement is illustrated in Fig. 75; the colour is white, faintly tinted with grey. It was found *in situ* at four feet from the surface.

A beautifully made ovate example is illustrated in Fig. 76. It has a cutting edge all round, and is made from a tabular piece of thickly crusted ochreous flint. The crust is flaked all over on both sides, an unusual occurrence. The edge view shows how the softer crust has been flaked away, in order to get at the harder material within, for the cutting edge. The flaked part at the edge is dull blackish indigo in colour.

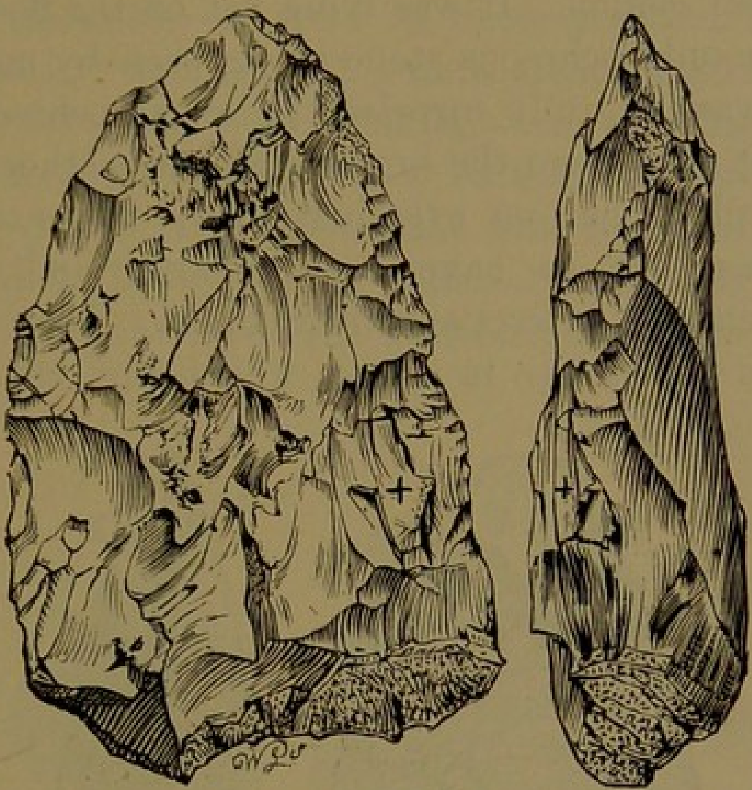


FIG. 74.—Implement, Caddington. Half scale.

The implement illustrated in Fig. 77 is one of

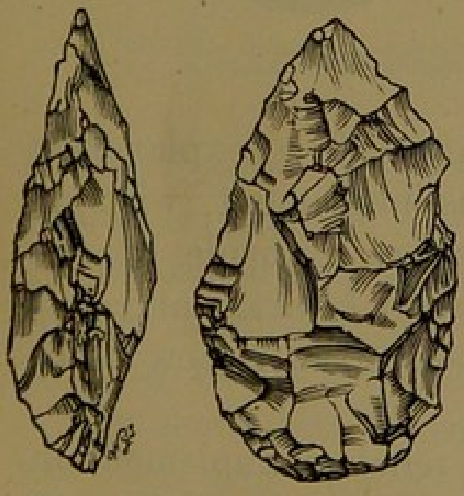


FIG. 75.—Implement, Caddington. Half scale.

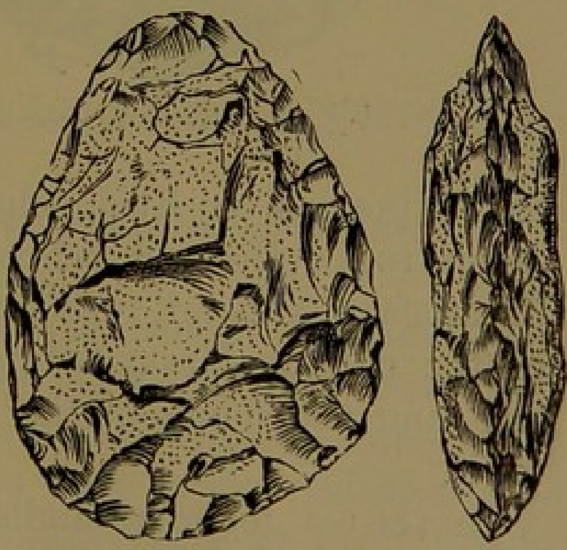


FIG. 76.—Implement, Caddington. Half scale.

the ochreous slightly abraded examples peculiar to the brown stony clay, but it was seen by me *in situ* on the Palæolithic floor, the butt end projecting from a vertical section. It was lying flat on the floor, and it is the only ochreous stone as yet seen by me upon it. I was naturally surprised to see an ochreous implement away from the brown clay and so thoroughly out of place, but on examination the upper cutting end was seen to have been reflaked and a new point made in later Palæolithic times. The re-made point is pure white in colour, whilst the rest of the

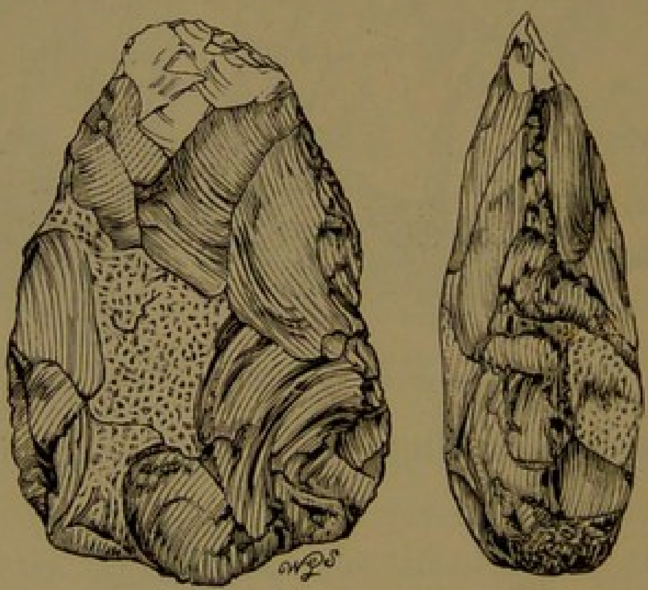


FIG. 77.—Re-pointed implement, Caddington. Half scale.

flaked portion is livid ochreous. The explanation seems to be that an ochreous implement, with an unsatisfactory point, was found ready made by one of the old inhabitants of the brick-earth land surface, and the finder of the tool flaked a new point to it.

In 1881 I found a similar reflaked implement in the gravel of Kempston, near Bedford. The difference in the two periods of flaking, as shown by the colour in this example, is very distinct; B, B, shows the older flaking; C, C, the size of the original implement; D, D, the newer flaking; E, a recent fracture; F, the thickness of crust of decomposition formed since the last flaking. This implement, illustrated in Fig. 78, is now in the British Museum, Bloomsbury.

An excellent example of a Palæolithic implement re-worked in a later Palæolithic time is given by Mr. John Allen Brown as an illustration to his paper on the "Continuity of the Palæolithic and Neolithic

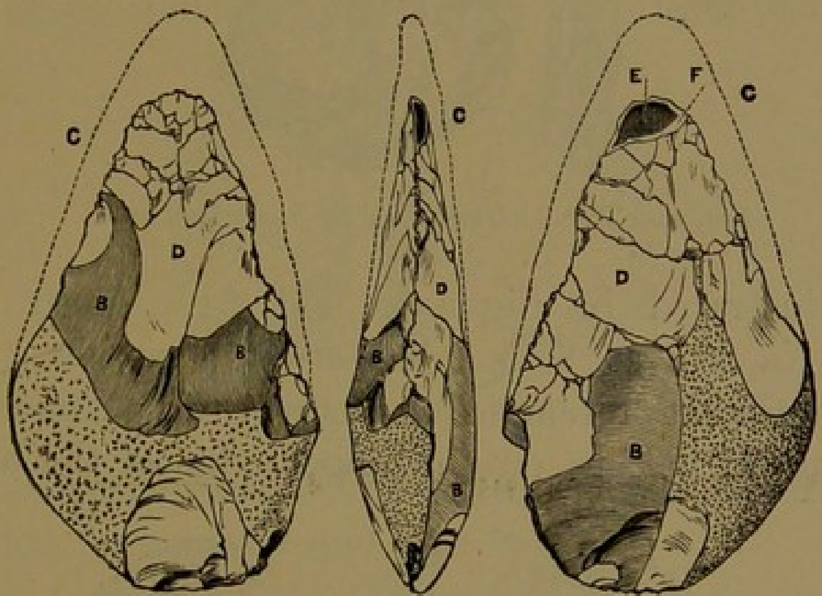


FIG. 78.—Repointed implement, Kempston, Bedford. Half scale.

Periods" (*Journal Anthropological Institute*, vol. xxii. pl. 1, Fig. 4).

The re-pointing of old implements reminds one of the hammering of old plate armour into new forms, as commonly practised in mediæval times.

The smallness, elegance, and fineness of some of the tools from the Palæolithic floor at Caddington is illustrated in the thin finely made lustrous implement, with a broken point, illustrated in Fig. 79. It resembles a lance-head, and was found *in* *situ* at 12 feet beneath the surface. The colour is blackish-indigo, slightly whitish-clouded and speckled with whitish spots.

Two beautiful little ovate tools made from flakes

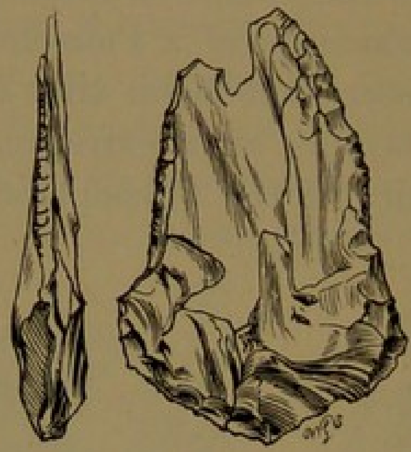


FIG. 79.—Thin implement, Caddington. Half scale.

are illustrated in Figs. 80 and 81. Both were found *in situ* at 10 feet beneath the surface. Fig. 80 somewhat resembles a scraper in outline, but the careful flaking, on the upper edge of the other-

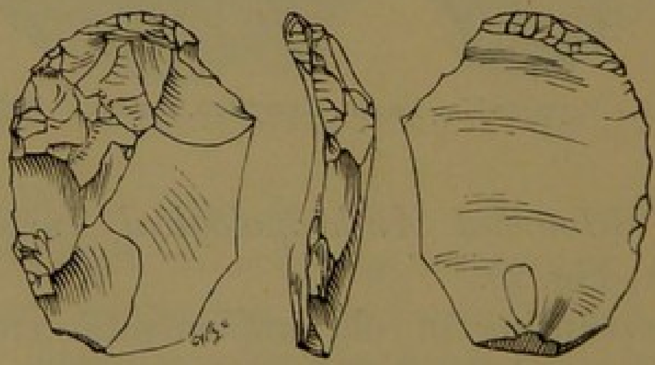


FIG. 80.—Small scraper-like implement, Caddington. Half scale.

wise plain side, shows that it was not designed for a scraper. It is whitish-grey in colour. Fig. 81 is also somewhat scraper-shaped, but the flaking on both sides of one edge shows it to be a form of knife. The colour is milk-white.

An examination of the figures of implements from the Palæolithic floor here given, will show that the tools are in no way ruder than the best made Palæolithic implements found in caves. They are geometrically correct in outline, beautifully and often minutely flaked, and sometimes very thin.

The scraper was well known to the Palæolithic men of Caddington, as several specimens have been lighted on in a very limited area. These scrapers are not rude and coarse, but light and beautifully made. The small delicate implements and light scrapers

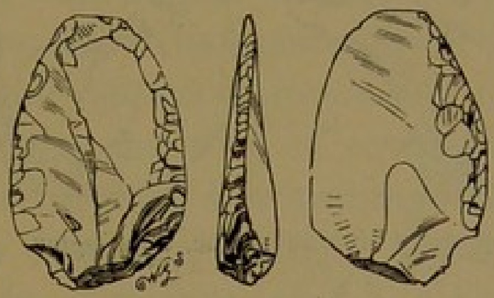


FIG. 81.—Small scraper-like knife, Caddington. Half scale.

were obviously made by skilled makers, after long practice, for superior and neat work.

RUDE IMPLEMENTS AND ERRATIC FORMS.

Amongst the more finished implements found upon the Palæolithic floor several tools of unusual form have come to hand. I have not classed or numbered these as genuine implements, although they have been obviously designed as tools of some kind. Two of these rude instruments are illustrated in Figs. 82 and 83. The first and larger example is made from a nodule of flint; it is worked on both sides to give it a sharp point and one cutting edge; the smooth nodular ochreous base can be conveniently held in the hand; the artificially worked part is lustrous and dull indigo-grey in colour; the weight is 12½ oz.

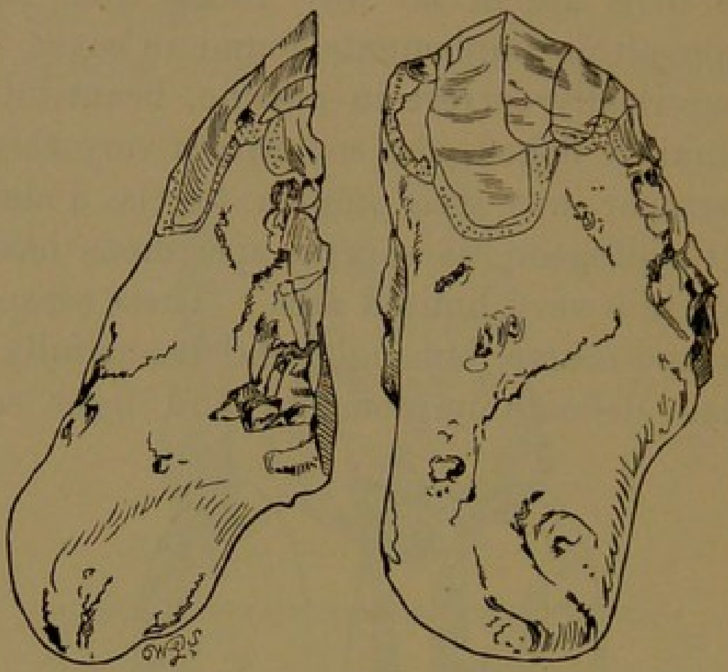


FIG. 82.—Implement of erratic shape, Caddington. Half scale.

The smaller implement, Fig. 83, belongs to the same class as the larger; it is made from a natural

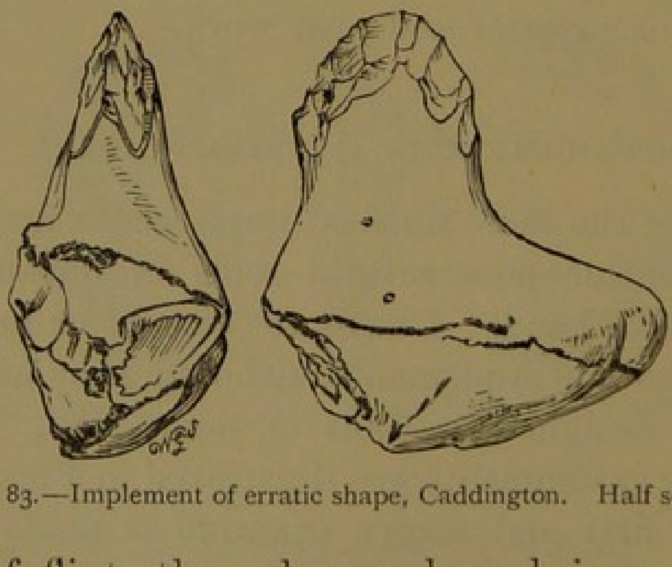


FIG. 83.—Implement of erratic shape, Caddington. Half scale.

nodule of flint, the ochreous base being very convenient for handling; the apex is worked on both sides, and presents a semicircular cutting edge; this part is grey and lustrous. Both these tools were found *in situ*, and near each other, at a depth of eight feet.

Several other rude tools of a make-shift class have been found, such as tabular pieces of flint with a more or less worked, cutting, or scraping edge or point. Some of the coarser examples, which have presented the least amount of artificial work, have not been preserved.

HAMMER-STONES, PUNCHES, FLAKES, CORES, ETC.

Amongst the implements and flakes found upon the Palæolithic floor were hammer-stones, punches, and many other rude stones suitable for hammering or crushing. A large number of oval pebbles of flint were also present, but a searching examination of these failed to detect in a single example any abrasion at the ends. No flints that had been artificially made globular were found.

The stones used for hammering were apparently natural blocks of flint of a size and shape suitable for the hand. It is probable that but few natural blocks would be found quite suitable for hammering without some little trimming, and the examples found were all more or less flaked for convenience of handling, and for the presentation of a suitable surface for impact. These hammer-stones were most difficult to find, owing to the abraded portion being quite hidden at the time of finding by the tenacious clay.

The specimen illustrated in Fig. 84 is a good example; the natural block of flint has been truncated at the base, and a large flake four inches long has been struck from the part where the palm of the hand would presumably be for convenience in use.

The stone fits easily into the hand, and the central part of the exposed surface is deeply bruised and battered by use; the bark is ochreous, the flaked portions indigo-grey. There is not the slightest doubt in my mind as to the true nature of these hammer-stones, as the battered part is confined to one position, and is as distinct from the other part of

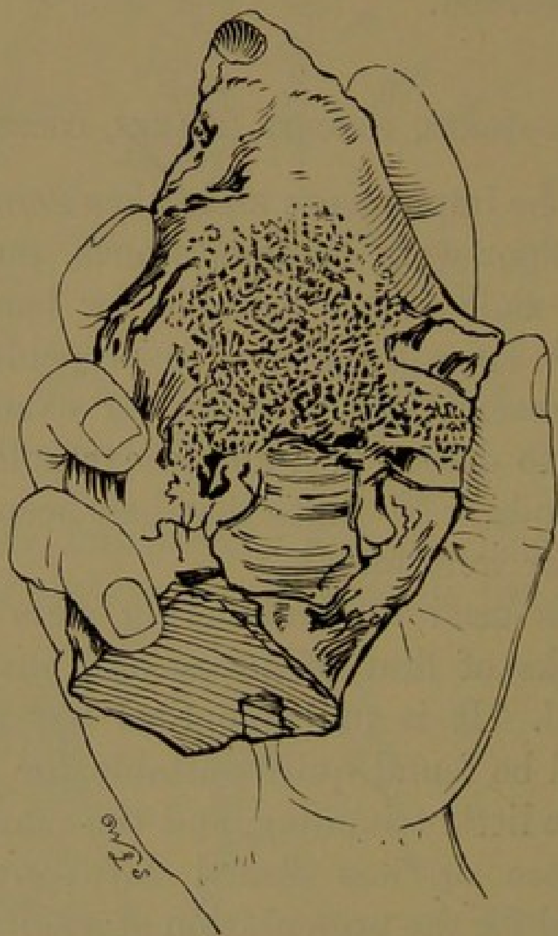


FIG. 84.—Mode of holding hammer-stone, Caddington. Half scale.

the flint as in the best examples of Neolithic mullers. No such abraded stones were found away from the flaking places.

A good number of bark-covered, roundish, natural flints appear to have been used for hammering, judging by the more prominent parts of such flints being splintered. An example of a pear-shaped hammer-stone or punch is shown in Fig. 85, where two of the more prominent angles are splintered. Some splintered stones of this class have weighed five or six pounds.

Certain other of the largest blocks of flint appear to have been used as anvils, but as the bruising upon them has been slight, and the weight of the stones great, none have been preserved.

Associated with the hammer-stones were numerous

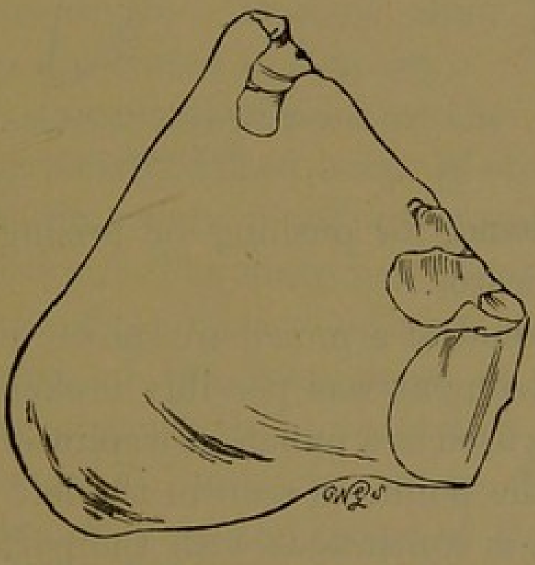


FIG. 85.—Rude hammer-stone, Caddington. Half scale.

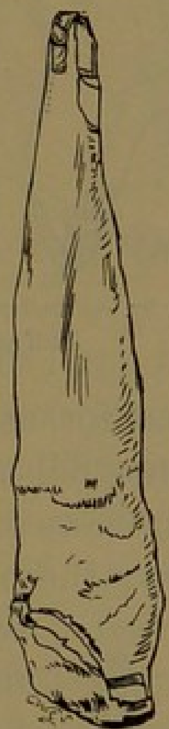


FIG. 86.—Punch, Caddington. Half scale.

examples of what I class as punches or rude fabricators. These are natural, rudely cylindrical pieces of flint, of which Fig. 86 may be considered a good type. The pointed end has been splintered by punching or flaking, whilst the hammer-stone has been used at the thicker end.

Two other less symmetrical examples are shown in Fig. 87.

The largest examples of this class have weighed a pound or more.

A curved specimen is shown in Fig. 88, well

FIG. 87.—Punches, Caddington. Half scale.

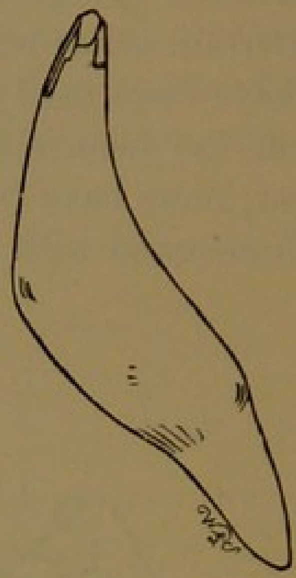


FIG. 88.—Punch, Caddington. Half scale.

adapted for use in the hand, for pushing or prising off minor flakes as a fabricator.

Two views of the point end of a punch are shown in Fig. 89; the perfect instrument was possibly broken whilst being used as a punch, as a splinter flake from the point, as seen in the left-hand figure, is continuous with the part which severed the punch.

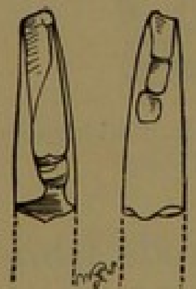


FIG. 89.—Broken punch, Caddington. Half scale.

The cylindrical flints with splintered ends were found only at the working spots on the Palæolithic floor. Cylindrical flints are frequent elsewhere in the gravel, but with both ends intact.

It is almost needless to say that flakes and cores were present on the Palæolithic floor in large numbers. The flakes occurred in great profusion, some very large, others very small.

The flint cores relatively corresponded in number with the flakes. Many of the former were far too large and rude to be conveniently carried away by hand, so they were left in the pits. Many very large blocks of flint were intact, perhaps with the loss of only one or two artificial flakes—these were considered unworthy of preservation. A considerable number of typical examples of moderate size have been preserved. One of these is illustrated in Fig. 90.

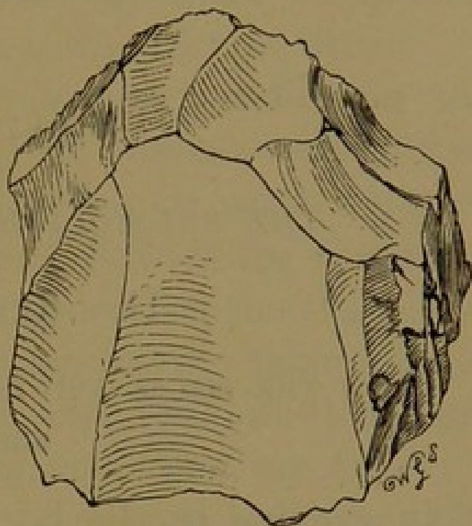


FIG. 90.—Core, Caddington. Half scale.

In several places near the artificially raised heaps of stones, certain large blocks of flint were found in a smashed or quartered condition. The flints had been crushed by impact with one of the more ponderous natural blocks of flint, and some of the free pieces of the smashed specimens were generally more or less flaked. They had been taken up and tried as to their capabilities for good flaking. As the pieces of these large blocks, crushed in Palæolithic times, were always capable of replacement, they are described in the next chapter.

Amongst the objects on the Palæolithic floor a beautiful quartzite pebble with quartz veins was found, coloured red by being embedded in a red matrix. It was possibly found by some Palæolithic man of old, and carried home as a pretty object.

The originals of Figs. 69, 71, 76, and 81 are now in the collection of Sir John Evans, K.C.B.

CHAPTER IX.

THE PALÆOLITHIC FLOOR—(continued).

II.—Replacements.

HOW THE PIECES AND FLAKES WERE CONJOINED AND REPLACED.

One evening in the beginning of April 1890 I was looking over some keen-edged flakes, just extracted from pit c, when I noticed that one very small sharp flake, which had become almost porcelain-white with age, could be replaced on to a second small sharp white flake. This fact gave me the first certain assurance that I had really lighted upon the actual spot at Caddington where implements had been manufactured in Palæolithic times. Soon after this I replaced one or two other flakes. I now carefully dated every sharp flake, as soon as found, with small figures in oil colour, and systematically arranged every flake and core, according to its colour and markings. The flakes and blocks I dealt with at length numbered 2259; these stones occupied tables all round, and in the centre of two rooms. The flakes and cores I laid out on pieces of thin wood of uniform size, 1 foot 2 inches by 10 inches, so that I could conveniently move them in small groups as required, from one room, or from one part of a room, to another. Every flake had the bulb of percussion placed downwards. I kept the stones on the tables for more than three years, and during that time I examined and re-examined the stones almost daily. I looked at them as a relief from other work, and at times when I was tired.

Not only did I keep my selected stones on the tables for this length of time, but I kept a vast number of blocks, rude pieces, and flakes on certain undisturbed grassy places in the brickfields for the same three years. I managed to remember the shape and markings of not only every one of the thousands of flakes upon my tables, but also the hundreds left upon the grass. Whilst working upon my tables, I sometimes suddenly remembered one or more like examples on the grass, and at an early opportunity fetched them from Caddington.

It was necessary to keep the conjoined examples separate from the free flakes, as the joints of many of the reattached specimens are practically invisible. In one or two cases, however, the joints are distinctly visible, owing to the conjoined specimens being in a different mineral condition.

During the first summer I fixed the flints together with gum-arabic, but this material was not sufficiently adhesive for stone, as some of the replaced examples separated again. I therefore soaked all the specimens apart again in water, and once again re-attached them with shellac dissolved in spirit.

In making up some of the blocks of conjoined flakes, it often happened that one or more interior pieces would be missing. In some cases these missing pieces were never found, but in other instances, even after the lapse of months, or even more than a year, a missing piece would come to light on the

Palæolithic floor. Before newly-found flakes of this class could be put "home," it was of course necessary to separate the pieces of the parent block again in spirit.

The flakes which now form the conjoined groups were not necessarily all found together. In some instances the individual flakes were found many feet, or even yards apart, on the Palæolithic floor.

It is remarkable that some of the cores found by me are of a certain colour, or naturally marked in some peculiar way, and that no flakes of a similar colour or marking have been found. I assume that the flakes were struck off these cores for some special purpose, and carried to some other position not lighted on by me. Again, some flakes are of a peculiar colour, or naturally marked in a special way quite distinct from any core; these flakes, I suppose, must have been struck off elsewhere, and brought to the spot examined by me.

It is certain that I have not replaced all the flakes in my collection that are capable of replacement. One reason for this is, that many flakes are very different in colour and marking on one side from what they are on the other, and it is difficult to always remember the markings on both sides. Another reason is, that the time at my disposal for such work has not been *unlimited.*

IMPLEMENTS BROKEN IN PALÆOLITHIC TIMES, THE PIECES RECOVERED AND REJOINED.

During the examination of the Palæolithic floor numerous broken implements were found, but in the majority of cases the pieces could not be conjoined.

It would be a natural act for a man in possession of a newly-broken implement to angrily throw the pieces away in different directions. Whether the pieces of broken implements found by me were so thrown away by the makers and users it is impossible to say, but it is a fact that the pieces of implements which have been conjoined have in every instance been found at considerable distances apart.

An implement found in two pieces, and afterwards

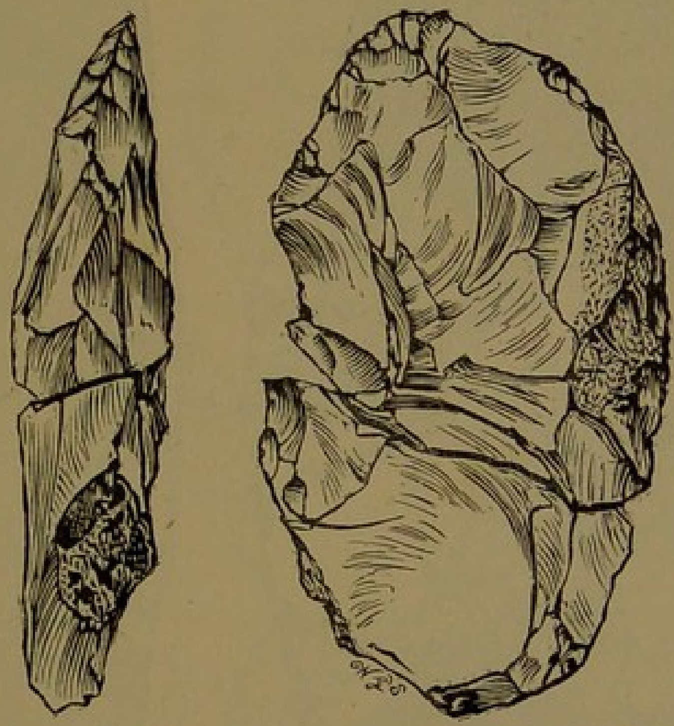


FIG. 91.—Implement broken in Palæolithic times, the pieces found and replaced, Caddington. Half scale.

conjoined, is illustrated in Fig. 91. It was found in pit C, the basal part in July 1890, and the upper part many feet away on the 30th August in the same year. The colour is creamy-white, boldly blotched with greyish indigo. Both pieces are lustrous, and in an identical mineral condition. The weight is 9½ oz.

A larger example is illustrated in Fig. 92. The two pieces were found 10 feet beneath the surface, and, like the last, far apart in pit C. The basal part was found on 23rd May 1890, and the upper portion five days afterwards. The two pieces are in a different mineral condition, the lower portion being lustrous white, faintly shaded with grey, whilst the upper part is somewhat dark, grey-brownish, and

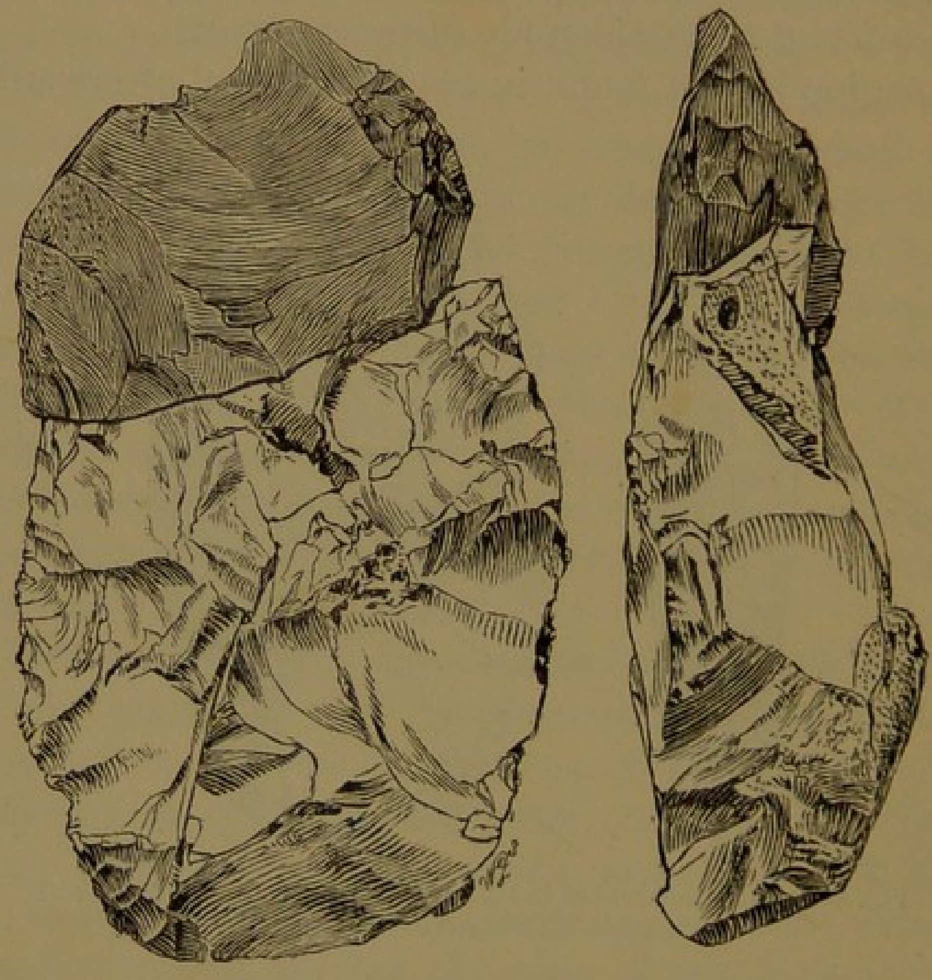


FIG. 92.—Implement broken in Palæolithic times, the pieces found and replaced, Caddington. Half scale.

lustrous. It is curious that the maker of the tool continued to flake the lower half after the implement had been broken in two, as if in an attempt to make a perfect implement from the large basal portion. This flaking is on the side not shown in the illustration; it was not proceeded with to completion, and

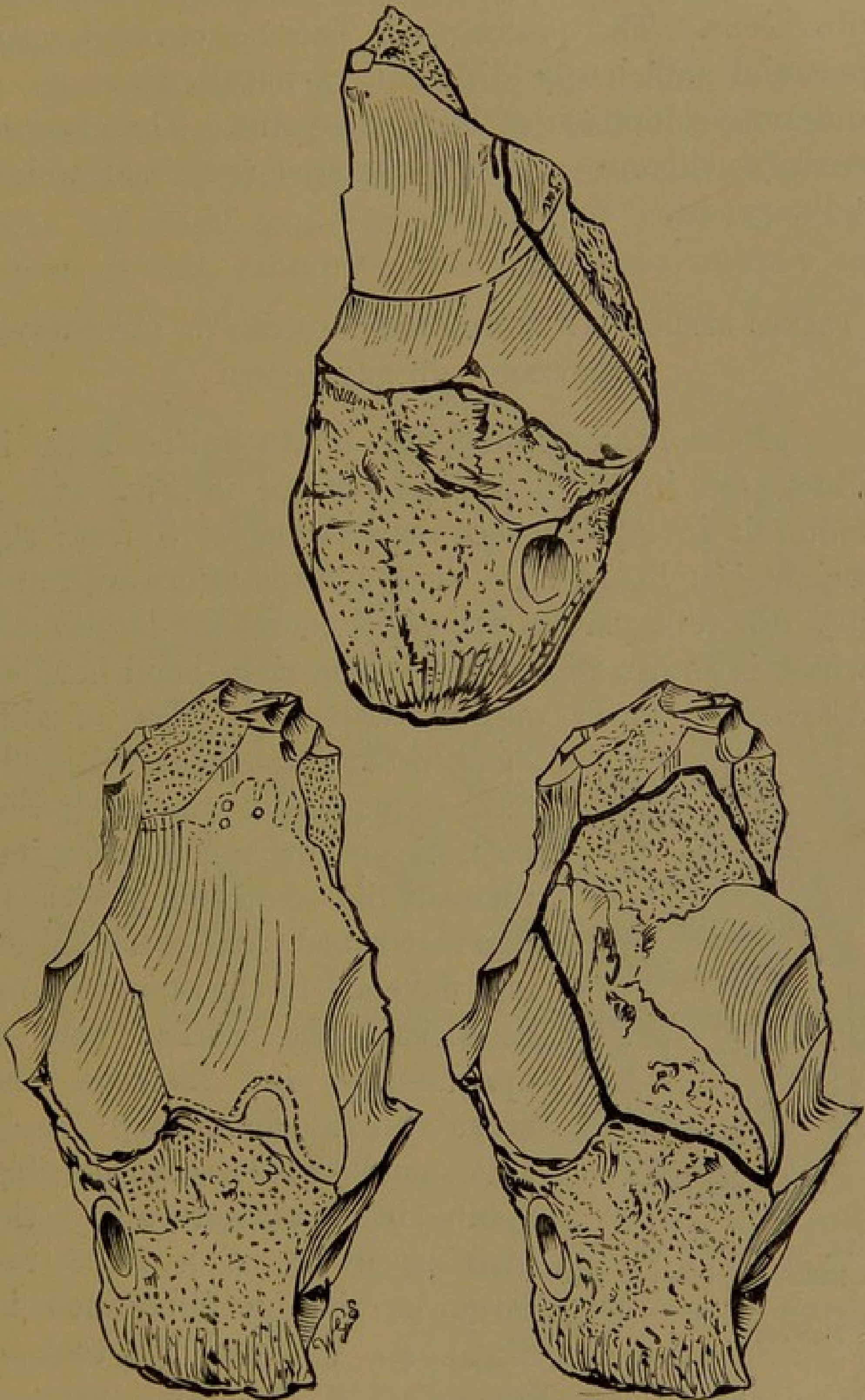


FIG. 93.—Implement in an initial condition with one flake replaced, Caddington. Half scale.

the two pieces were probably thrown away in different directions. The pieces then became covered with material sufficiently different in nature to cause a different coloration of butt and point. The crust is creamy-ochreous. The two pieces conjoined weigh 1 lb. 12¾ oz.

FLAKES STRUCK OFF IN THE MANUFACTURE OF IMPLEMENTS RECOVERED AND REATTACHED.

A Palæolithic implement in an initial state is illustrated in the left-hand outline in Fig. 93. I found it in April 1890, at a depth of 8 feet; the weight is 1 lb. 10 oz. Four months afterwards, and in a different part of the pit, I found the large flake which is shown reattached in the right-hand outline. Above the lower outlines is a side view of this blocked-out implement, with the flake shown as conjoined. It will be noticed how much more implement-like the stone is without the reattached flake. The block and flake are in the same mineral condition; the worked part is opaque-grey and lustrous, the crust whitish-ochreous.

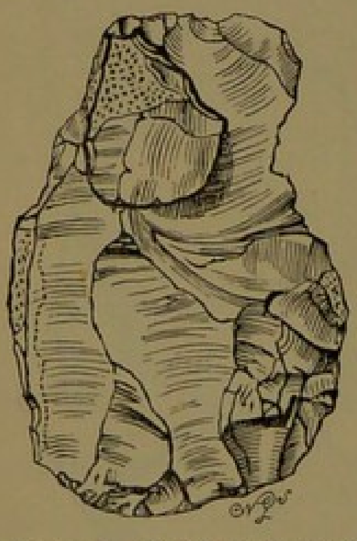


FIG. 94.—Small unfinished implement, with one flake replaced, Caddington. Half scale.

A small implement, possibly spoilt in manufacture by the striking away of a flake too large in size, is illustrated in Fig. 94. I found the tool in May 1890. In November of the same year, I lighted upon the flake which fits on to the top of the tool, as shown in the illustration. The colour of the worked part is dove-greyish, and sub-lustrous.

An implement in an initial condition, more advanced towards completion, but undoubtedly spoilt in course of manufacture, is illustrated in Fig. 95. The left-hand and central outlines show the two sides of this example; the right-hand outline exhibits one edge. The left-hand outline shows a

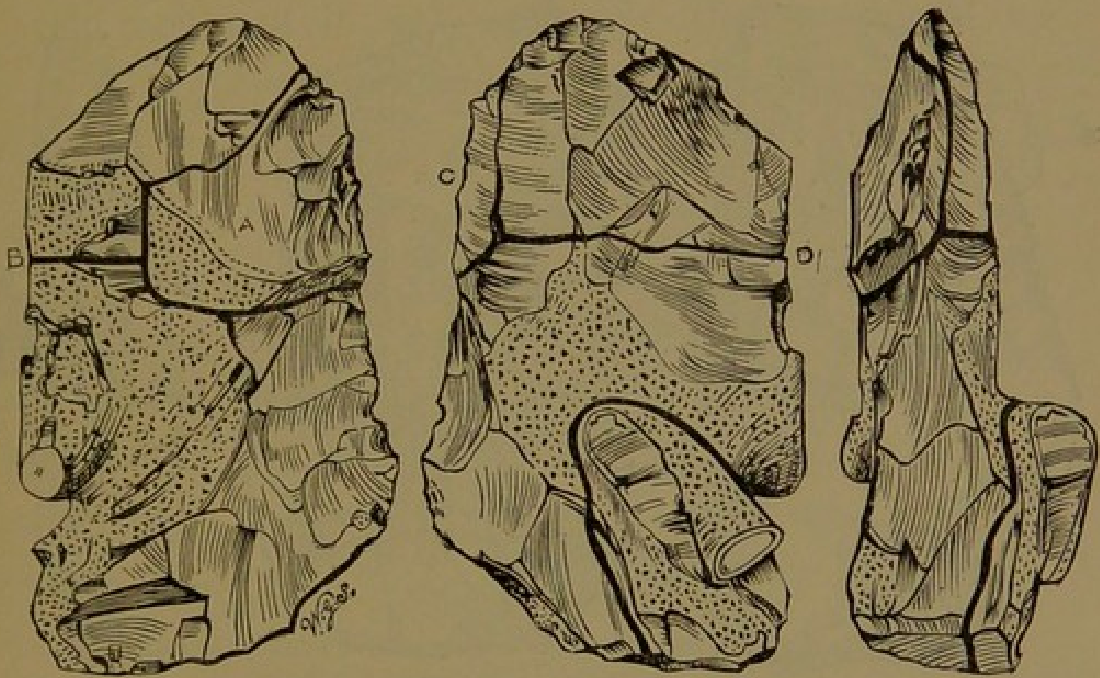


FIG. 95.—Unfinished broken implement, conjoined, with flakes replaced, Caddington. Half scale.

large flake replaced at A; after this flake was struck off in course of manufacture, the unfinished implement was accidentally broken in two, as shown by the line at B. The other side of the stone is shown in the central figure, with the edge of the reattached flake at C, and the fracture which severed the stone at D. The joints are again shown in the edge view of the stone in the right-hand outline. In fashioning the tool, the

Palæolithic flint chipper noticed the very inconvenient projection shown at the right of base in the right-hand figure. This projection he most dexterously and correctly flaked off, as shown by the dark line to the left; this piece I fortunately found and reattached. The pieces were all found in May 1890, and they all agree in condition, except the notable piece at the base, which was found at a dis-

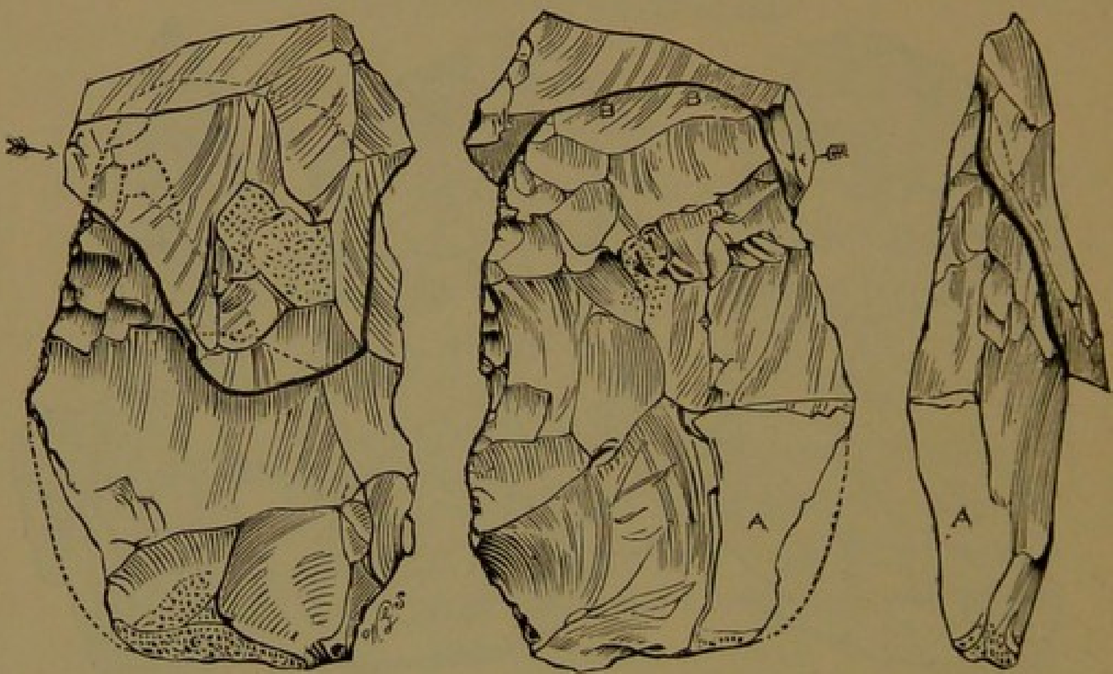


FIG. 96.—Finished implement, with one large flake replaced, Caddington. Half scale.

tance; this has a much more ochreous-tinted bark than the remainder of the tool; the worked part throughout is dove colour and lustrous.

The two sides and edge of a completed implement are shown in Fig. 96, but by an unfortunate touch from a small pick, used by a boy who was assisting me at the time of finding, a small piece of the tool was struck off from one face at A, and sent flying into a large pool of water. This piece it was impossible to recover. The tool was found on the 2nd May 1891. On comparing the implement with flakes of the same colour already in my possession, I found it possible to replace a large flake on the bank, as shown in the left-hand figure. The two arrows show the position of the bulb of percussion, and the direction of the blow which set the large flake free in Palæolithic times. This blow was of great importance to the maker of the tool, and it was necessary that it should be

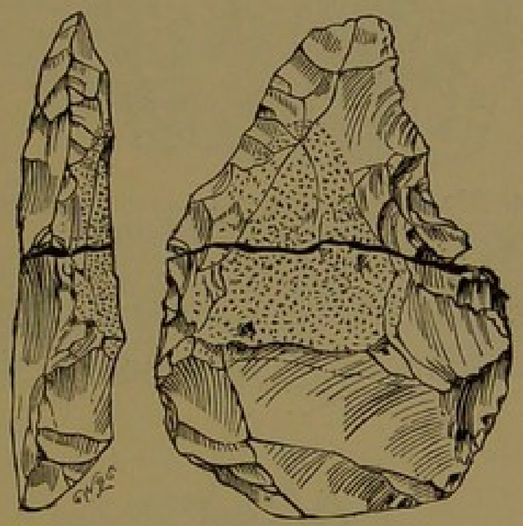


FIG. 97.—Finished implement, broken in Palæolithic times, both pieces found and conjoined, Caddington. Half scale.

delivered with the most perfect precision: the freeing of this flake determined the form of the upper knife edge of the tool, as seen at B, B, in the central figure. The colour of the worked part of this implement is greyish-white and lustrous, the recently broken part at A is nearly black.

A perfect implement, broken in two (probably by use) in Palæolithic times is illustrated in Fig. 97. I consider this tool may have been broken in two by use, as the implement was quite finished before it was broken. The two pieces were found on the Palæolithic floor about three feet apart, and they are in a slightly different mineral condition. The reverse side of this conjoined implement is

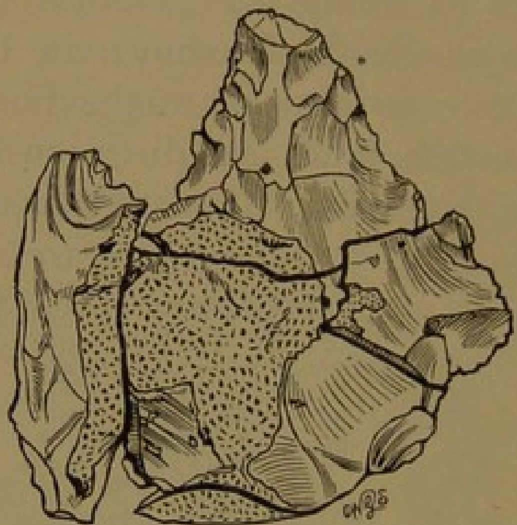


FIG. 98.—Other side of implement, Fig. 97, with three flakes replaced, Caddington. Half scale.

shown in Fig. 98, where a large flake may be seen reattached to one edge, a smaller flake towards

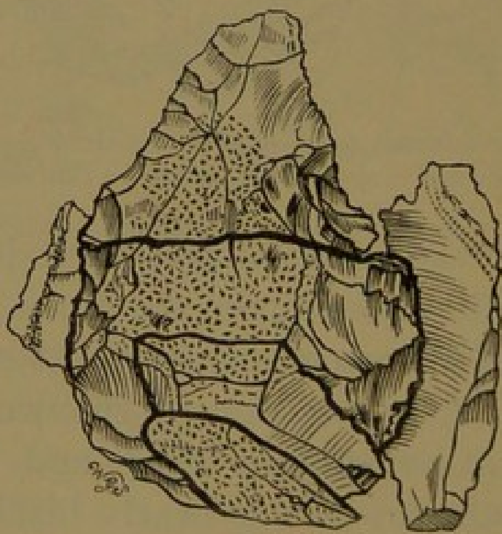


FIG. 99.—Implement, Fig. 97, with a fourth flake replaced, Caddington. Half scale.

the other edge, and a small flake at the base. I have also reattached a flake to the other side of this implement, as shown in Fig. 99. The two main pieces which form this tool were found on the same day, the 14th April 1892; the conjoined flakes were found during the same month and the

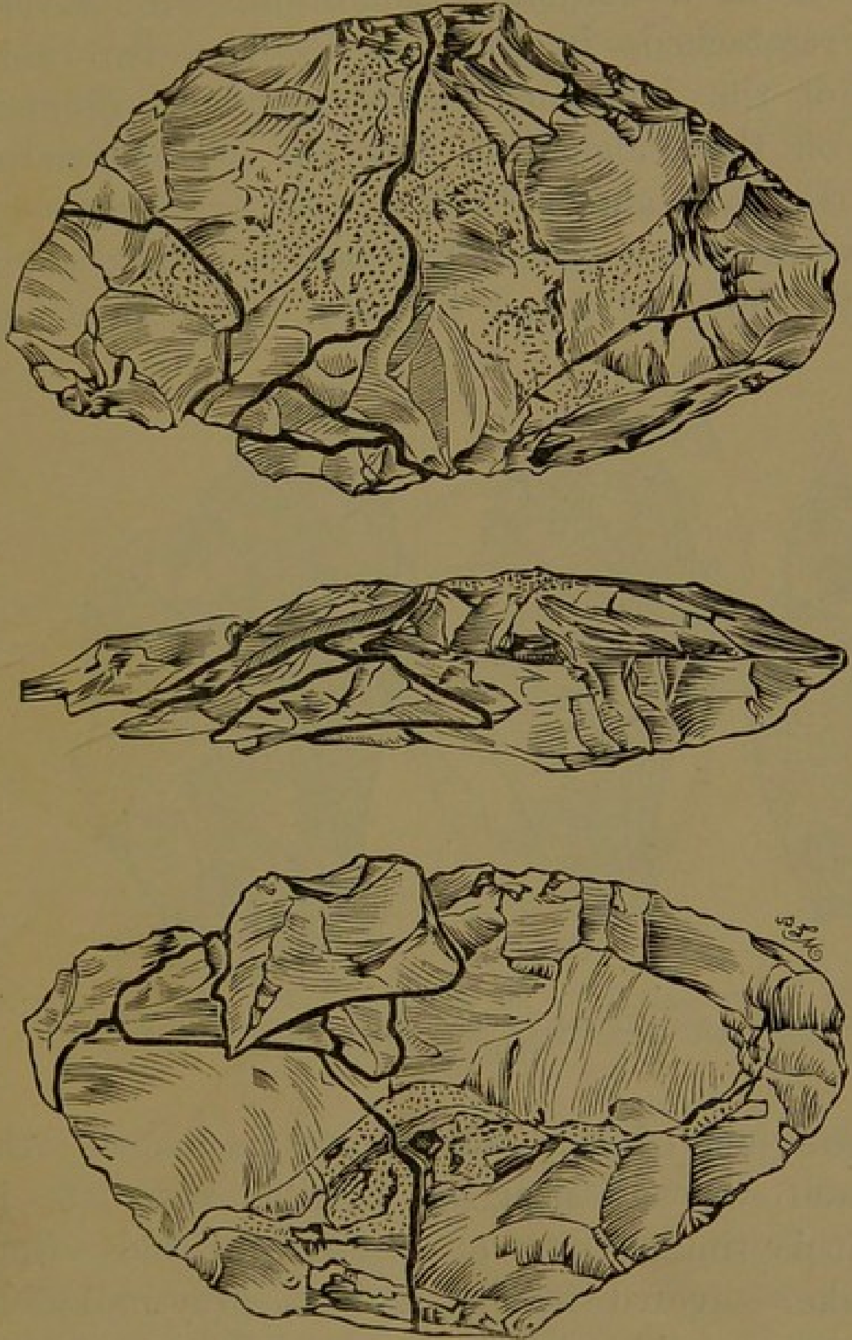


FIG. 100.—Implement broken in Palæolithic times, both pieces—with several of the original flakes—found and conjoined, Caddington. Half scale.

month following. The worked part of this example is in colour dull grey-indigo or indigo washed with whitish, and whitish-speckled and lustrous; the crust is ochreous, but more ochreous-ferruginous in tint on the crust of the piece which forms the upper part of the tool.

An implement broken in two in Palæolithic times is shown in a conjoined condition, with several flakes reattached, in Fig. 100. The two chief pieces of the implement were found in different places on the Palæolithic floor, as exposed in pit C, on the 23rd and 28th May 1890, respectively; all the reattached pieces but one were also found in May; one was found in July. Two sides and

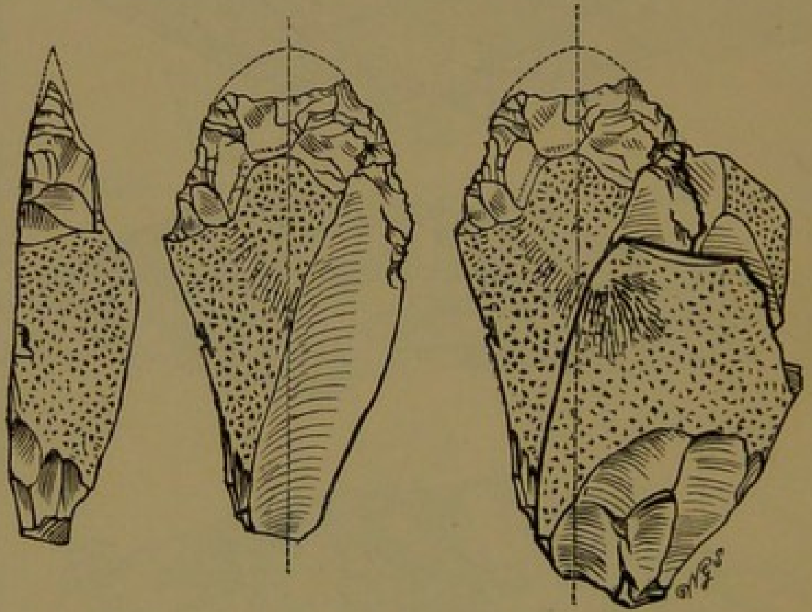


FIG. 101.—Small trimmed flake, with other flakes conjoined, Caddington. Half scale.

an edge view of this implement are shown; the tool itself was as near as possible complete in Palæolithic times, when an unfortunate blow from the maker severed it. It is dark grey-indigo in colour on the side shown in the left-hand figure, and whitish-indigo and lustrous on the right; the crust is whitish-ochreous, and the weight with reattached flakes 1 lb. 12¾ oz.

In Fig. 101, two views, in the left-hand and central figures, are given of a small trimmed flake. The cutting end of this tool, shown by the dotted lines, was broken away, probably by use in Palæolithic times. In the right-hand outline a recovered flake, broken in Palæolithic times, is seen reattached to this tool; this piece was found a month before the tool itself. When the little instrument is turned over, as shown on the right of Fig. 102, it will be seen that another flake has

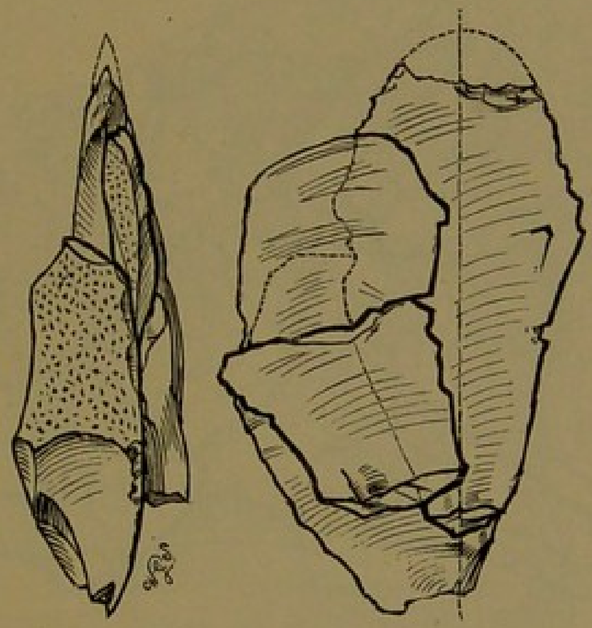
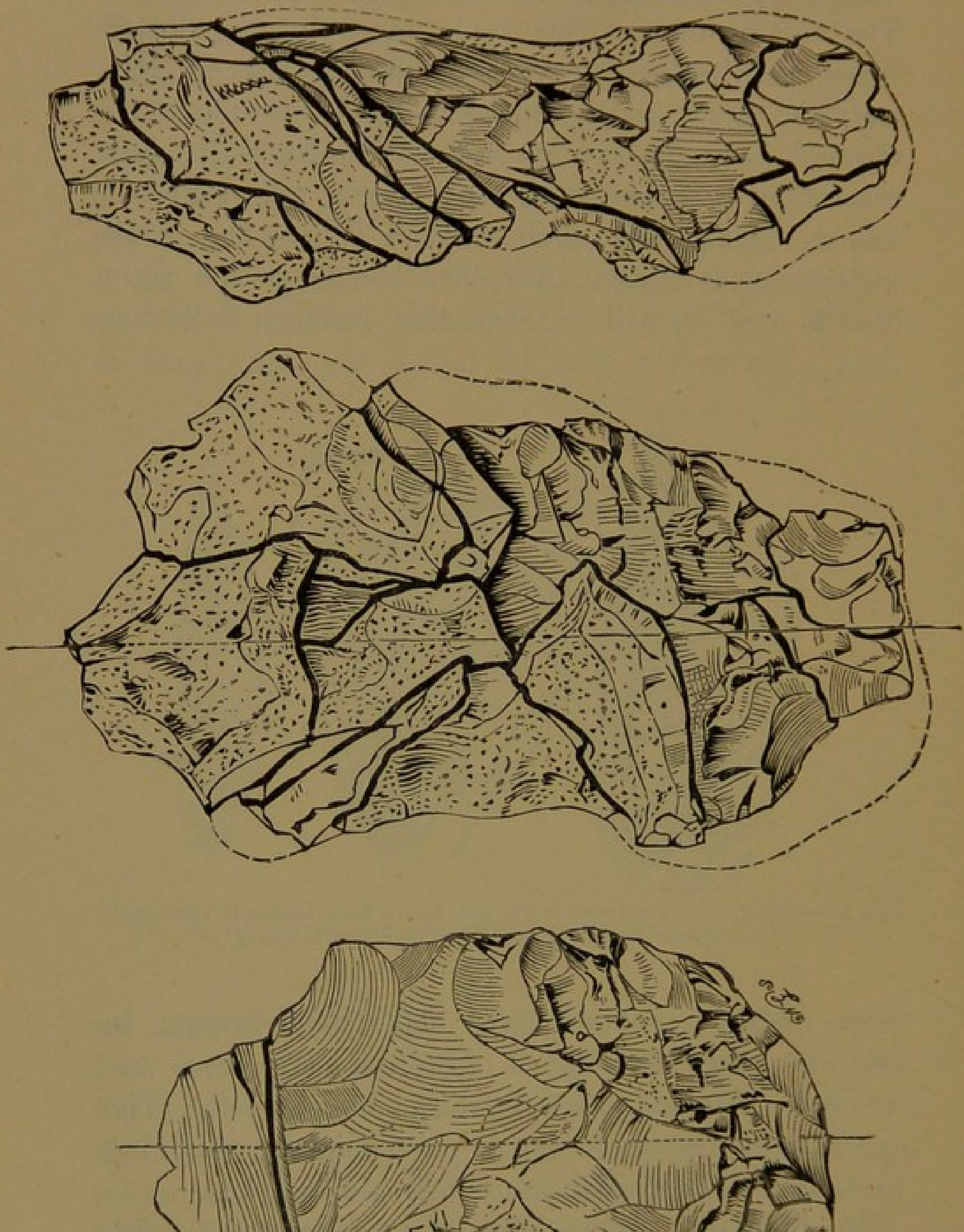


FIG. 102.—Back of tool illustrated in Fig. 101, with a flake, broken in Palæolithic times, conjoined and replaced, Caddington. Half scale.

been replaced behind; this flake was broken in two in Palæolithic times; both pieces were recovered. An edge-view is shown on the left. The constituent pieces are dove-grey slightly inclining to indigo, with whitish mottlings and lustrous.

In Fig. 103 three views of an implement, with numerous flakes reattached, are given. The implement appears to have been on the point of completion when it was ruined by an unfortunate



blow. The illustration on the left shows one side of the implement with a large piece broken from the upper cutting edge; this piece was never recovered. In this condition the implement weighed

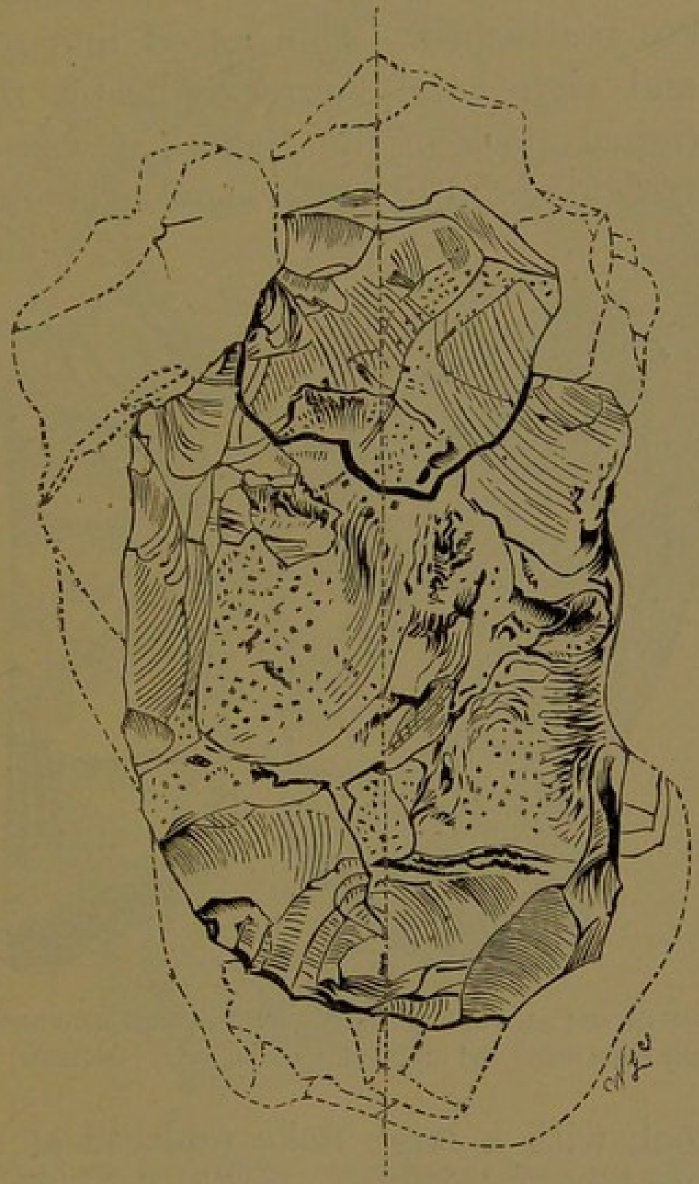


FIG. 104.—Another view of implement illustrated in Fig. 103, Caddington. Half scale.

1 lb. $3\frac{1}{4}$ oz. It was found on the 10th April 1890. The flakes were found at different times, and in different positions, on the Palæolithic floor up to November in the same year. The implement and

flakes all came from an eight-feet stratum. The central outline shows the same face of the instrument as illustrated in the left-hand outline, with numerous flakes reattached. The right-hand outline shows one of the edges of the implement as seen with flakes reattached. The dotted line round the central and right-hand figures indicates the shape of the original block of flint before it was taken in hand for flaking. Fig. 104 shows the other side

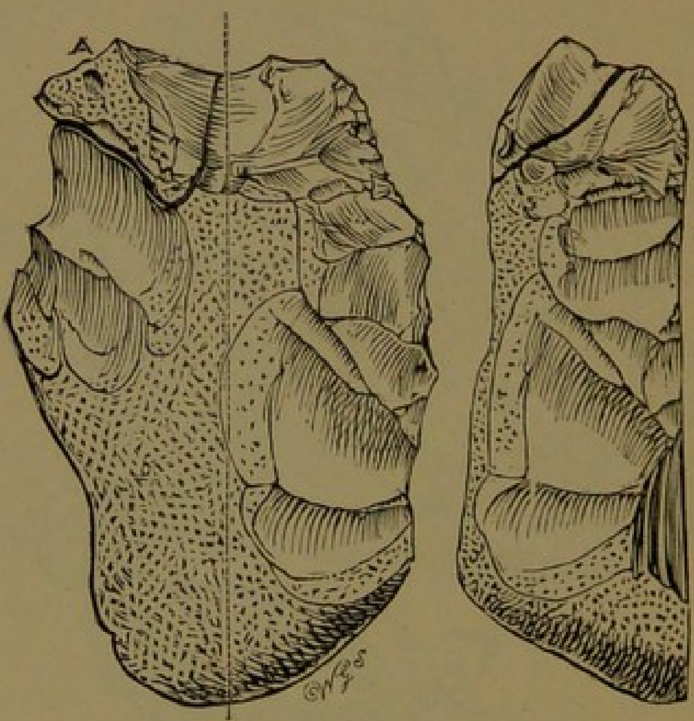


FIG. 105.—Face and edge of implement spoilt by detachment of flake at A, the flake found and replaced, Caddington. Half scale.

of this tool, with a large flake replaced at the top; the blow which originally set this flake free spoilt the implement. The worked portions of this example are livid dove-grey in colour and lustrous, the crust varies from whitish-ochreous to ochreous. The crust of the different reattached flakes varies considerably in depth of ochreous colour.

Fig. 105 illustrates a trimmed flake, an implement made from a large flake and worked on one face only, the other being left perfectly flat. In finishing this implement—as in the last—an ill-directed blow from the maker spoilt the upper part, and so ruined the

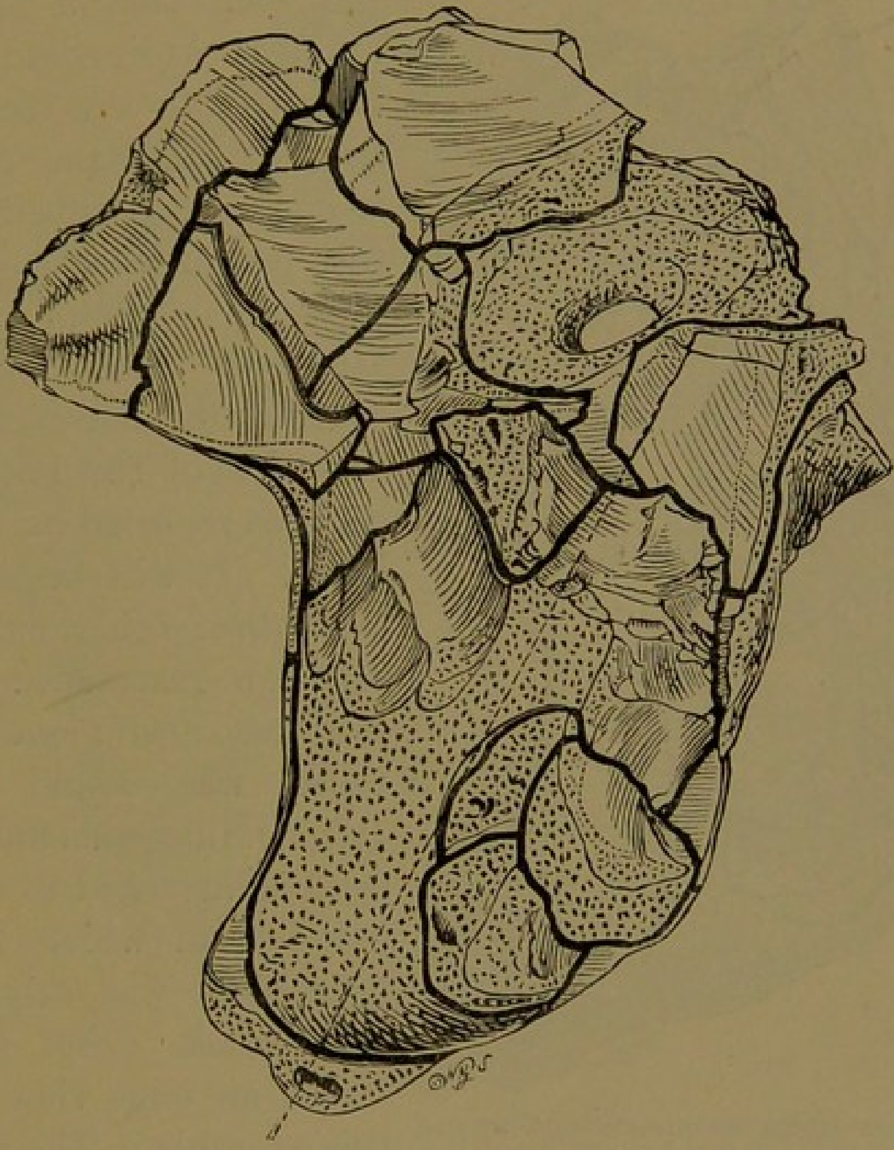


FIG. 106.—Large block of flint with implement illustrated in Fig. 105, and numerous flakes reattached, Caddington. Half scale.

tool; this blow set free the flake at A, and destroyed the upper cutting edge. The flake A, which caused the mischief, was recovered, and is shown as replaced. This tool was found in May 1890. Later in the same month, and in June, the large original block of flint from which this trimmed flake was struck was found in two pieces. The two pieces were conjoined and the tool reattached. When the three pieces were joined, it was seen that a flake found in April could be fitted on to the block. In Fig. 106 the tool is shown reattached to the parent block with numerous flakes reattached. The dotted central line shows the direction of the implement as replaced on the block. It will be seen that three other flakes are now reattached to the tool itself; one of these was found in July. Numerous flakes are also attached to the block from which the implement was originally struck. Fig. 107 shows an edge view of this example. The implement is seen on edge towards the bottom of the left-hand side, and the parent flint (in two pieces) on the right. The same subject is further illustrated in Fig. 108, where the back of the conjoined mass is shown. Here it will be noticed that a natural hole goes through the

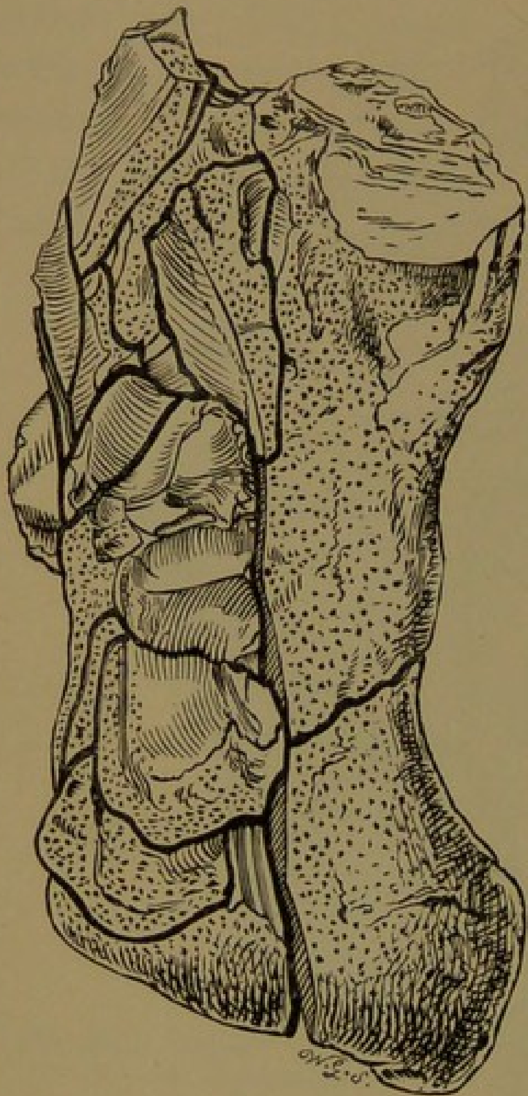


FIG. 107.—Edge view of implement illustrated in Fig. 105, reattached to the large block of flint from which it was originally struck, with numerous flakes reattached, Caddington. Half scale.

original flint towards the top at the left, and a large flake, found in August, is shown on the top right. The fixing of this flake served to hide the joints of several other reattached flakes; these are

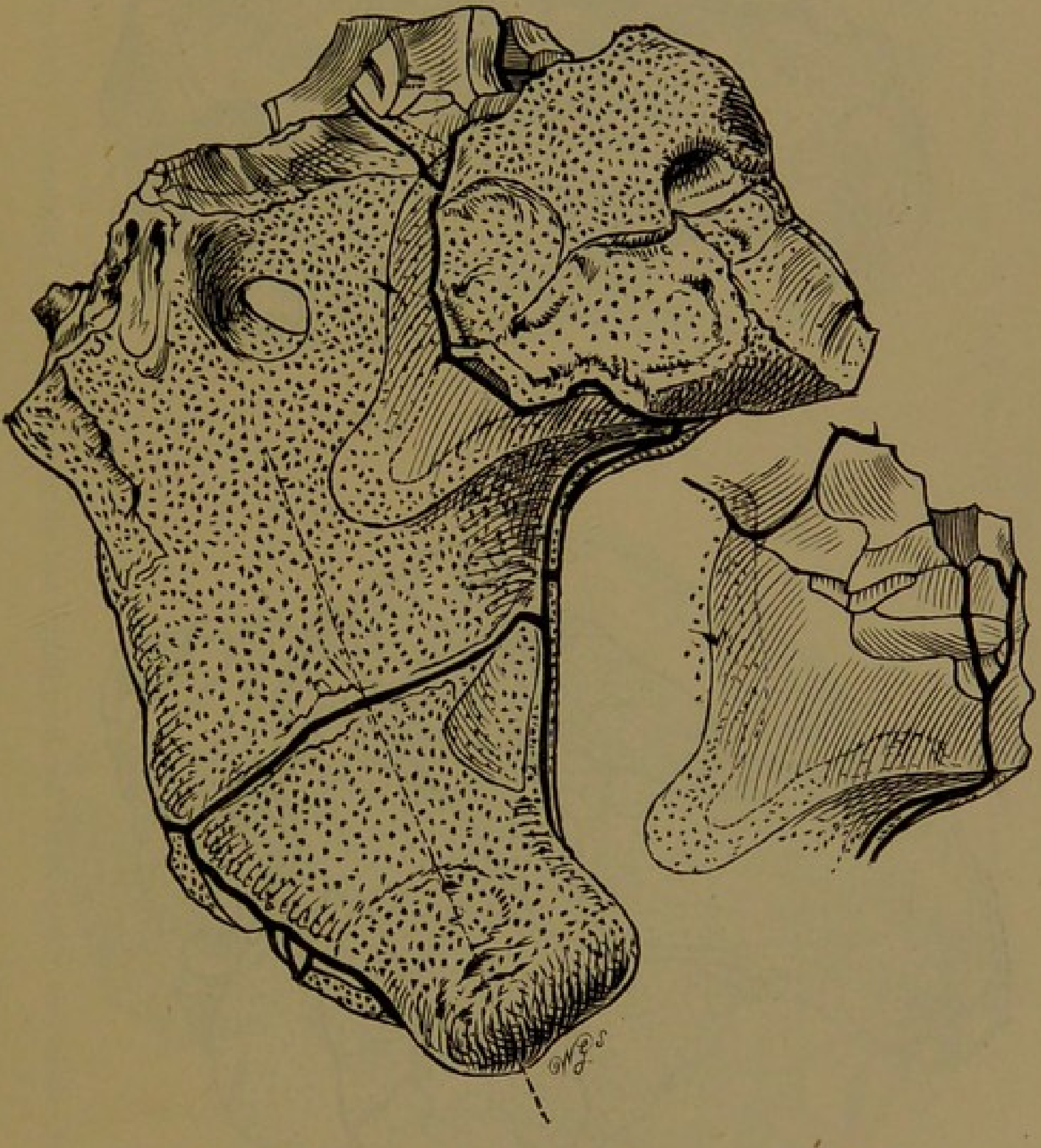


FIG. 108.—Back of large block of flint on which the implement illustrated in Fig. 105 has been fixed, Caddington. Half scale.

shown in the supplementary illustration on the right-hand side. The worked part of this mass of flint is slate colour, varying paler, and lustrous. It is curious that one flake, owing to a difference in the matrix in which it was accidentally embedded, has become lustrous and white. The crust

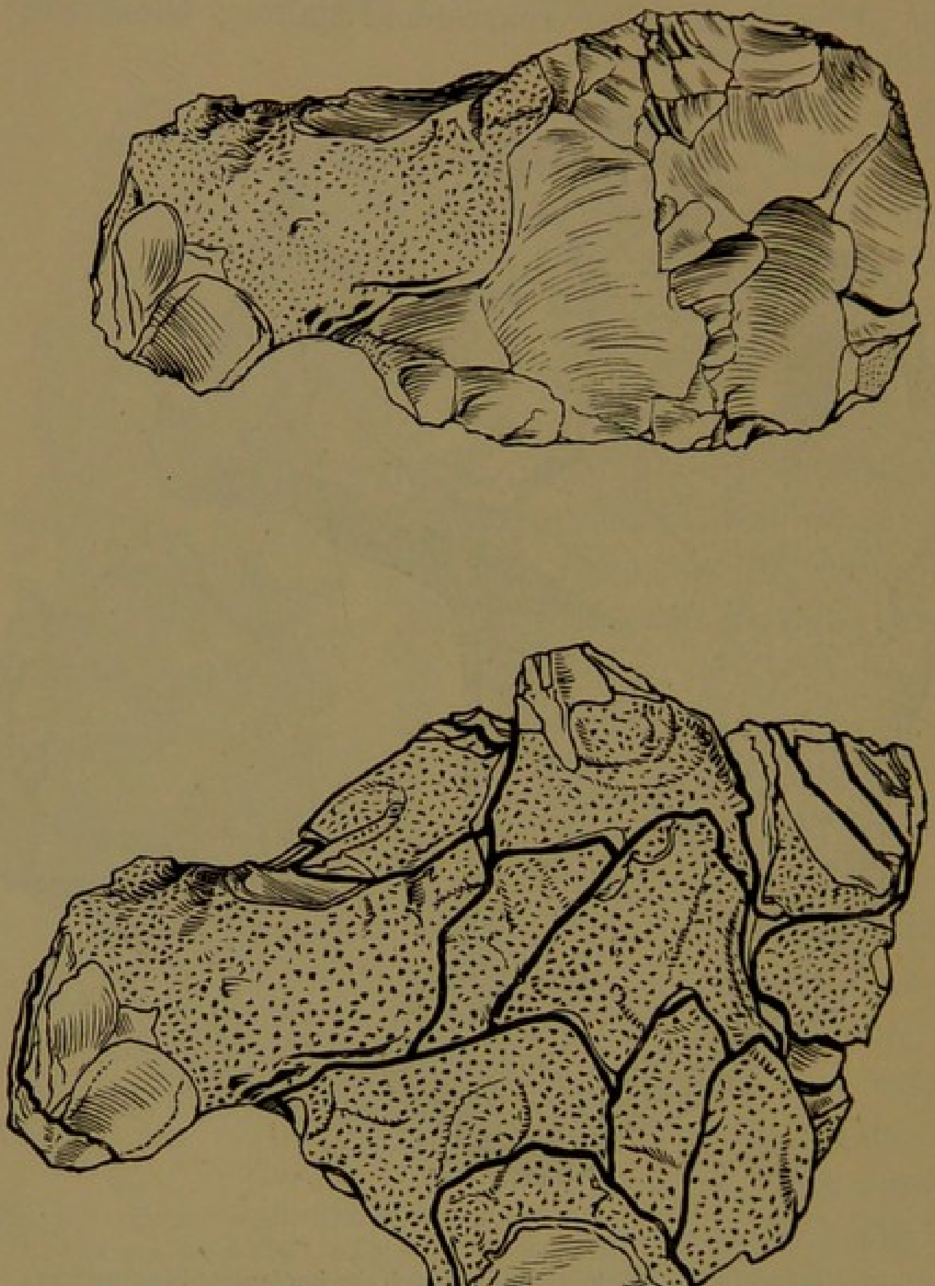


FIG. 109.—Side view of implement, free from flakes, and with flakes reattached, Caddington. Half scale.

is ochreous. The weight of the conjoined group is 3 lbs. $5\frac{3}{4}$ oz.

In the next illustrations a single unfinished implement with replacements is represented. In Figs. 109 and 110, the left-hand outlines represent the two

FIG. 110.—Other side of implement illustrated in Fig. 109, free from flakes, and with flakes reattached, Caddington. Half scale.

sides of the implement, whilst in Figs. 111 and 112, the left-hand outlines represent the two edges. In each of the four illustrations the right-hand figures represent the tool which is illustrated on the left, but with flakes conjoined. All the lower part of this implement was quite finished in Palæolithic times, but the upper or point end was apparently left incomplete. It is, however, just possible that

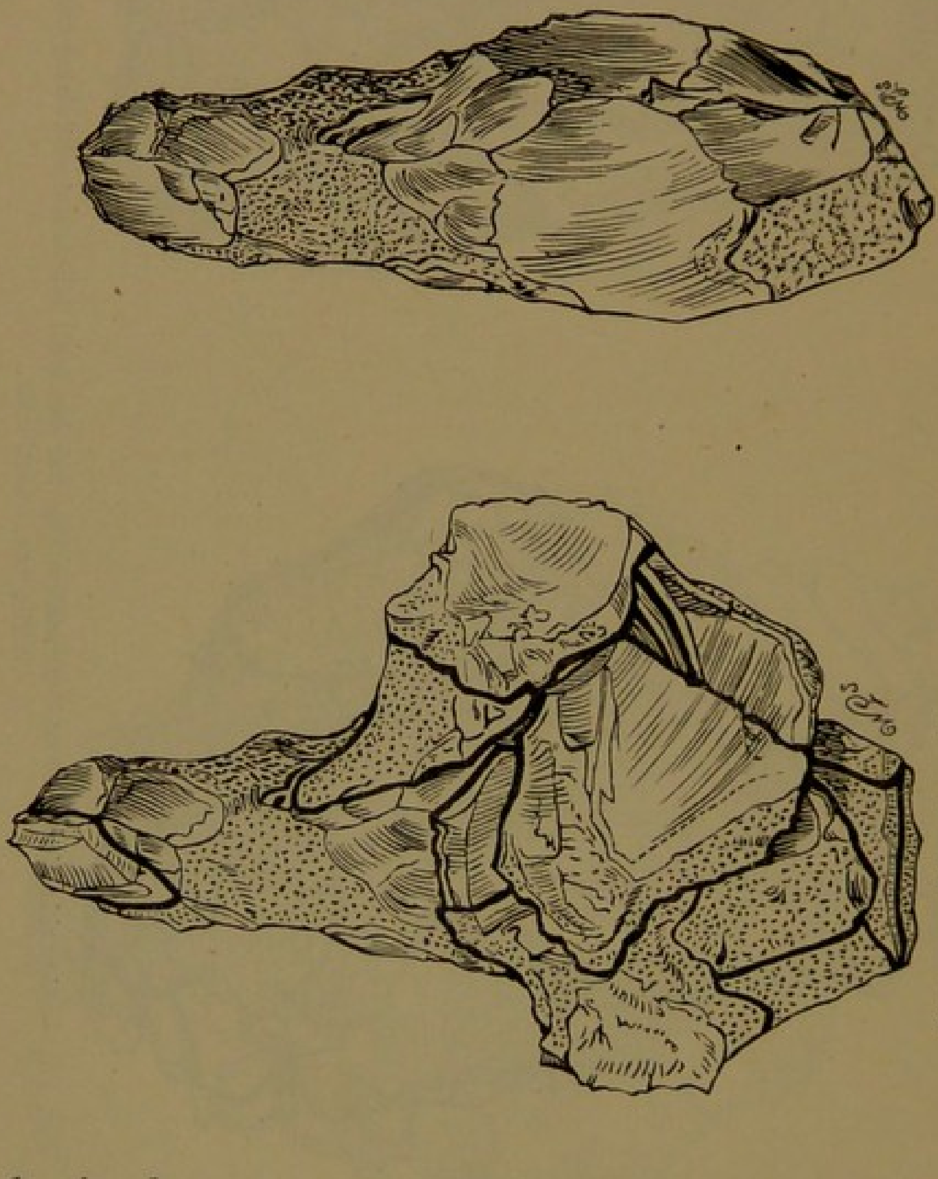


FIG. 111.—Edge view of implement illustrated in Figs. 109 and 110, free from flakes, and with flakes reattached, Caddington. Half scale.

the implement may have been designed for use as a chopping tool, the lower part and sides, as seen in the illustrations, having been intended for use in cutting or chopping, and the upper part designed for use as a kind of handle. If so, the tool may have been a rude chopper or cutting club, and is complete. The tool itself was found on the Palæolithic floor in pit C in March 1892, whilst the flakes now conjoined were found in its immediate vicinity during March, April, and May of the same

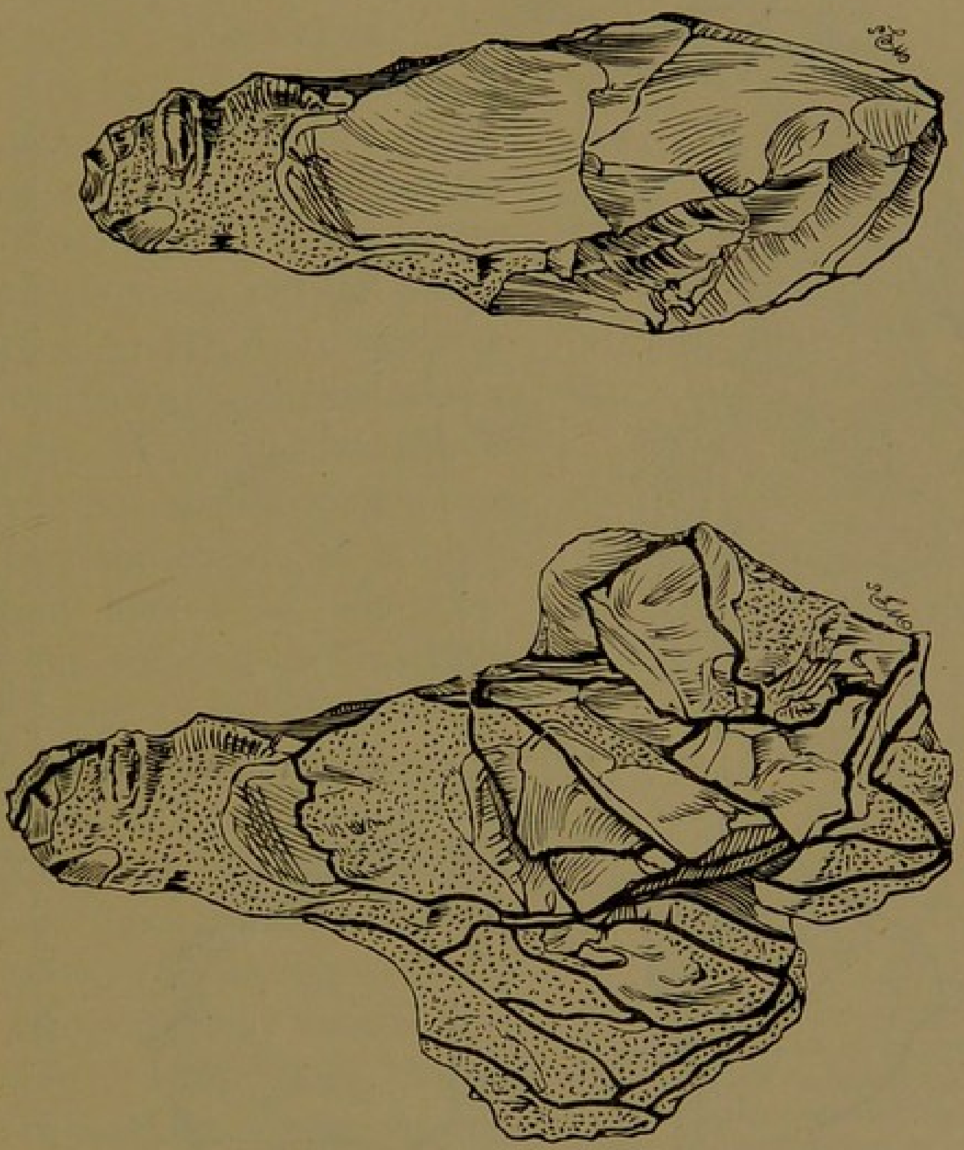


FIG. 112.—Other edge of implement illustrated in Figs. 109, 110, and 111, free from flakes, and with flakes reattached, Caddington. Half scale.

year. A large number of the flakes which were struck from the original block of flint were found, and, as now replaced, they give a good idea of the size and shape of the block of stone which was taken in hand by the man of primeval times for flaking into an implement. The colour of the worked parts

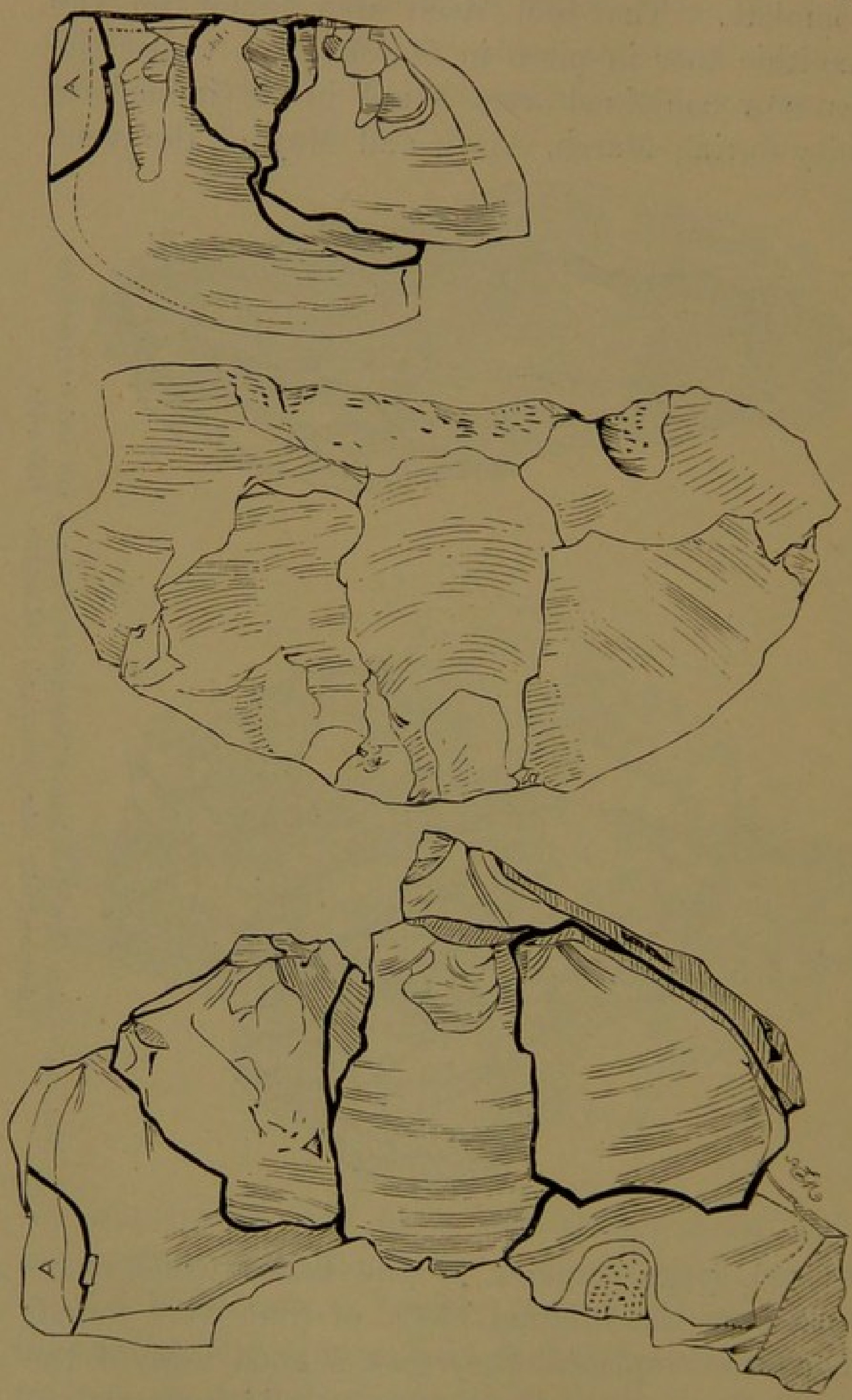


FIG. 113.—Conjoined flakes from the two sides of an implement, the implement itself represented by a plaster core in centre, not found, Caddington. Half scale.

is indigo-grey, light or dark, and lustrous. The crust is biscuit colour, varying to full ochreous. The individual flakes vary considerably in colour as regards their ochreous staining, on account of a slight variation in the nature of the matrix in which they were accidentally embedded. The weight of the conjoined mass is 2 lbs. $12\frac{3}{4}$ oz.

In Fig. 113 two groups of conjoined flakes are shown on the right and left of the illustration. That on the left consists of ten pieces, that on the right of three. The two upper flakes at A, A, join. When the two masses are put together, or *closed* like the covers of a book, and looked at edgeways, they are seen as illustrated in Fig. 114. The junction line of the two blocks is seen at A. It is obvious from this illustration that the piece of flint which is missing from between the two conjoined masses must have resembled in shape a Palæolithic implement. The form, as seen on edge, is indicated by the horizontal shading. When plaster of Paris is poured in between the two conjoined masses a core results, as illustrated in the central thin outline of Fig. 113. This core is no other than a fac-simile of a somewhat large

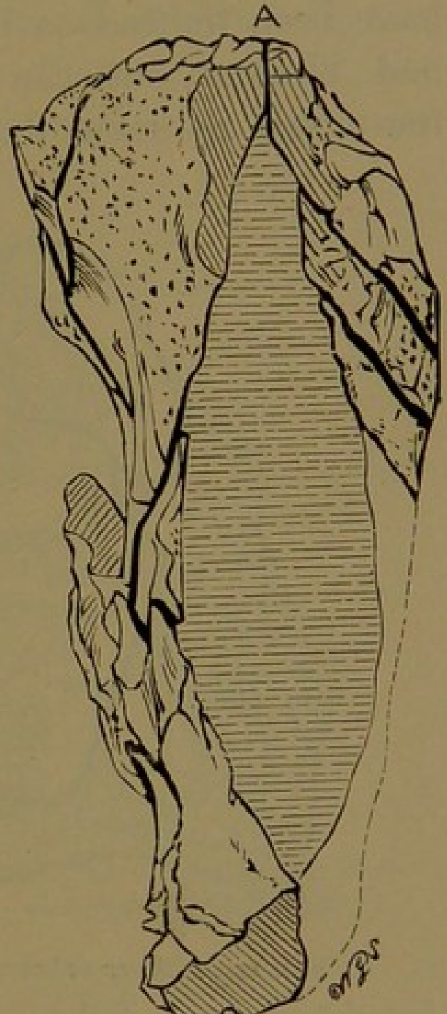


FIG. 114.—Conjoined flakes, from the two sides of an implement, seen on edge; the implement itself, indicated by horizontal shading, not found, Caddington. Half scale.

chopper-like flint implement with an upper knife-edge, but only roughly blocked into shape. Whether the implement was ever finished by the necessary secondary chipping or not, it is impossible to say, as neither the implement itself or the minor flakes have been lighted on by me. The maker, after he had blocked out the tool, might have walked a few steps in some direction not yet excavated to

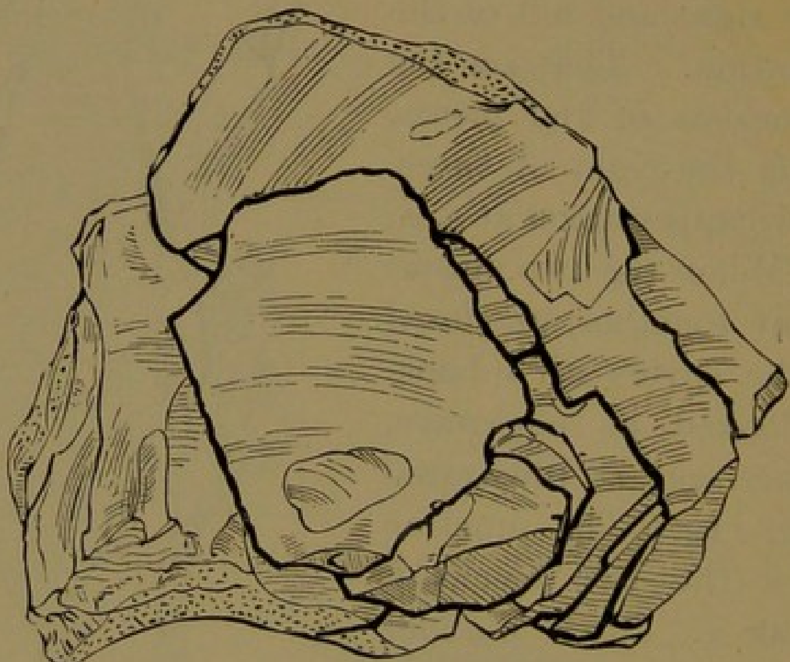


FIG. 115.—Eleven flakes conjoined, Caddington. Half scale.

finish it. The constituent flakes were found in proximity with each other during April, May, and June 1890. The flaked portion of these blocks is whitish dove colour and lustrous, the crust whitish ochreous.

A block of eleven conjoined flakes is represented in Fig. 115; the constituent flakes were met with at various times from May to November 1890. A single flake of this mass was, however, found in the pit amongst grass and weeds in December 1891. It had probably lain on the brick-earth surface for a year, or perhaps two years, as not only the crust but the artificial facets were grown over with a minute carbonaceous lichen, *Verrucaria nigrescens*, Pers., when found. The artificial surfaces of the eleven flakes are white with a shade of indigo, extensively clouded with dark indigo-grey, the crust

FIG. 116.—Two flakes (the upper one broken in Palæolithic times) *in situ*, and attached by the original brick-earth, Caddington. Half scale.

is whitish-ochreous. The eleven flakes as conjoined weigh 1 lb. 8½ oz.

Amongst the flakes preserved by me *in situ*, or more or less covered with the original brick-earth, is the interesting group of two illustrated in Fig. 116. The lower flake, seen on the right of the illustration, is still fixed to the upper flake with the original brick-earth, whilst the upper flake is broken in two, the breakage dating from Palæolithic times. The flake must have been broken upon the old land surface, either by the tread of a man or some other animal, or by a heavy weight falling upon or being placed over it in Palæolithic times. This example, and all the other examples with the original brick-earth still attached, have been dipped by me into thin hot gelatine, to prevent the clay from falling to pieces in the process of drying, and to keep the examples in their original positions.

I have found and conjoined many flakes that were *accidentally broken* in Palæolithic times from Caddington.

It appears to have been the habit of the Caddington men to "quarter" or smash some of the larger flints before flaking was commenced. Of course it is common to see flints naturally fall into pieces, as they are taken from the "chalk-with-flints" or "red clay-with-flints," but I do not refer to such natural breakages at the time of excavation. I refer only to artificially smashed flints lying flat on the Palæolithic floor, the pieces more or less distant from each other, and with clay, and sometimes stones, between the pieces. During my exploration I have found many very large flints artificially smashed, but I have not preserved them, partly on account of their size and weight, but chiefly because the pieces showed no cones of percussion, and therefore the proof of their artificial breakage might be considered by some persons as wanting.

In Fig. 117 I have engraved the only large flint of this nature that I have preserved. I have kept this quartered example because the Palæolithic man who smashed it afterwards picked up one or two of the pieces and commenced flaking them. It will be seen that a heavy blow has smashed the large flint into five or six pieces. It will also be noticed that the lower piece is the most shapable; this piece was picked up for flaking, and it is curious that I found the single good flake, A, two months before I found the pieces

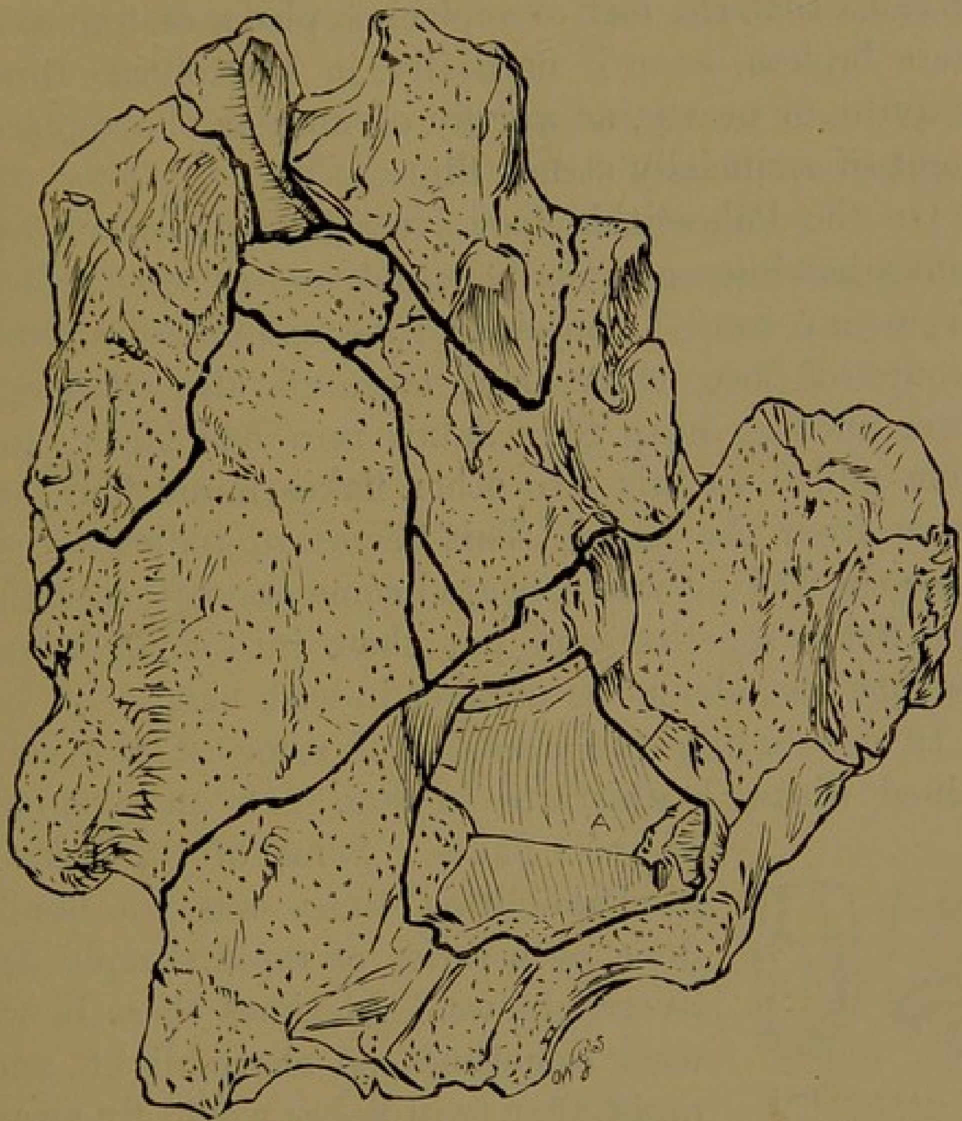


FIG. 117.—Conjoined quartered block, Caddington. Half scale.

of the mother-block from which it was struck. The constituent pieces were some little distance apart, and were found from April to December 1890. The flaked parts are indigo-grey variegated, and the crust ochreous. Some of the pieces differ slightly in mineral condition from others. The weight of the stone as conjoined is 3 lbs. 12½ oz.; its comparative lightness and smallness were additional inducements for its preservation. No rejoined blocks of this class have been counted amongst replacements, but it is obvious that the feat of replacing pieces of flint that were broken, even if naturally, in Palæolithic times is quite, or nearly, as worthy of note as the replacement of artificially struck flints.

On the Palæolithic floor several heaps occurred of somewhat large artificially struck and selected flakes. From one heap I conjoined nine examples in three groups of two, three, and four. I also conjoined from another heap four flakes into one block, and then added to this two other flakes found four feet away from the heap. This seems to indicate that after the flaking was executed some one gathered the best flakes together and put them into small heaps. Twenty was about the number in each heap.

In concluding the account of some of the conjoined flints, I illustrate in Fig. 118 an example of twin flakes. Some of the flaking in Palæolithic times was no doubt done by a series of rapid sharply delivered blows. At times these blows were sometimes so sharp, light, and rapid, that twin flakes would fly away still attached to each other from the mother-block. The left-hand illustration of Fig. 118 shows the bulb side of twins of this class; the two flakes have never yet been freed at the point A. One flake at the point B had its bulb broken off at the time of flaking. The right-hand figure shows the other side of these

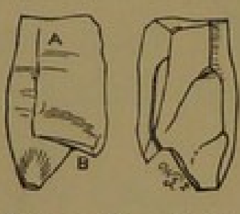


FIG. 118.—Twin flakes, not quite separated, Caddington. Half scale.

attached flakes. This little example is one proof of the gentle manner in which the Palæolithic floor was originally covered over with water holding fine clay in suspension. A slight tap or a fall would instantly separate these two flakes, yet they have quietly remained, held together with the slenderest possible attachment, for at least fifty thousand years.

As my Caddington reattachments number over five hundred, it will be perceived that the examples described only form a portion of the whole.

The originals of the replacements illustrated in Figs. 91, 92, 96, 97, 98, 99, 100, 101, and 102 are now in the collection of Sir John Evans, K.C.B.

CHAPTER X.

THE CADDINGTON POSITION IN PALÆOLITHIC TIMES.

At the time when the Palæolithic men lived by the lake-side and ponds of Caddington, the position was then, as now, a chalk hill covered with brick-earth. The level of the living place, as proved by the sections already described, was from four to thirteen feet lower than the modern living surface. Chalk-with-flints, red clay-with-flints, and boulder-clay existed on *higher* ground, now denuded off, near by. The boulder-clay also existed in the valleys as now.

At the present time there is very little chalk-with-flints or red clay-with-flints at or very near Caddington; there is only a trace of chalk-with-flints, at the highest position in the Caddington district, viz., 595 feet. That boulder-clay, chalk-with-flints, and red clay-with-flints did exist somewhere near the lake of old is proved, not only by the artificially raised heaps of large flints found on the Palæolithic floor, but by the numerous stones, pieces of chalk, seams of boulder-clay, &c., carried by water or in mud, which are now found in some of the material above the floor and sometimes at the present ground surface.

Red clay-with-flints is excellently seen at Whipsnade, three miles south-west from Caddington; and at one side of Whipsnade Heath, at a height of 601 feet, flints are found in the red clay exactly agreeing with the slight traces as seen at Caddington, at a height of 595 feet. As these figures show a difference of six feet only, we may reasonably assume that the line of deposit of chalk-with-flints was originally the same on the two adjoining hills of Caddington and Kensworth.

There is a deep deposit of red clay-with-flints at Whipsnade Heath, at 650 feet. At Red Hill, a quarter of a mile south-east from Whipsnade Church, there is red clay-with-flints at 658 feet. There is also well-developed red clay-with-flints by Ouzley Pond, half a mile west of Whipsnade, at 753 feet.

If similar deposits once existed on the adjoining hill of Caddington, from 50 to over 150 feet must have been denuded away. That chalk-with-flints and red clay-with-flints did once extensively exist at Caddington, is again proved by the blocks of flint which are now found in the brick-earth with chalk or red clay in their hollows.

Enormous quantities of large flints have been dug for road-making purposes from the red clay in the three fields to the north of Landpark Wood, Whipsnade, at heights ranging from 650 feet to 750 feet.

If these greater heights once existed at Caddington, the drainage water from them would naturally form the pools in the valley where the lake-side men lived. These men knew where to find large flints in the chalk or red clay. The flints were probably exposed somewhere not far from the settlement.

On the greater heights, however, other and possibly more ancient races of men must have once lived, for their ochreous tools are common in the drifted material which covers the settlement of the lake-side dwellers to a depth of thirteen feet.

The slight abrasion, the absence of scrapers, and the deep ochreous or chocolate colour of the implements from the higher levels, may indicate a greater antiquity; but no antiquity whatever is indicated beyond the antiquity of the older river-drift tools.

At the time when the lake-side settlement existed, the water-side could not have been the lowest dry ground in the district. The present contours indicate several outlets for the old water; the chief of these drained into lower ground in the direction of where the Ver now rises. Nearly all the hill drainage of Caddington in Palæolithic times found its way into the valley in which the Roman road from London to Chester now runs. This road is made in the bottom of a valley which probably existed in an initial condition at the time of the original upheaval of the chalk from the sea.

The west side of Whipsnade Hill is drained into a dry chalk valley, from one part of which the Ouzel, a tributary of the Great Ouse, now rises. The eastern declivity of Caddington Hill is drained into the valley of the Lea not far from its source.

The two accompanying illustrations, taken from photographs, show the present contours of the country; both views are looking into the same dry valley—deepened since the upheaval of the chalk through Tertiary, Quaternary or Palæolithic, to recent times. This valley now forms a kind of pass for the Great North Road.

The view looking north, Fig. 119, is taken from Blows Downs, at the point where the footpath turns off from the Downs into the fields by Dame Ellen's Wood (and so to Caddington), shown by two crossed arrows near the centre of map, at about 100 feet above the dry valley. The view is looking towards Dunstable, Leighton Buzzard, and Hockliffe, and shows the estuary-like character of the perfectly dry valley, bounded by chalk hills on the east and west, and more or less capped with brick-earth and drift.

On the hill at the left are the five knolls, Keltic tumuli, on Dunstable Downs, at about 100 feet above the valley. Near the right may be seen a

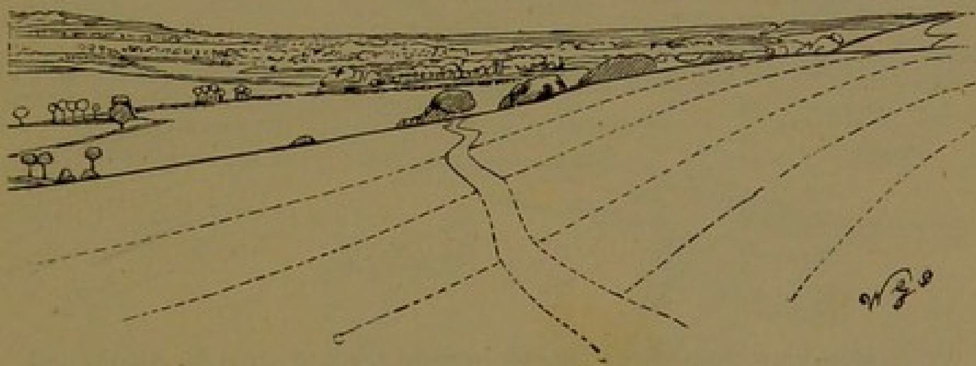


FIG. 119.—View from Blows Downs, looking north towards Dunstable, in the dry valley.

nick on the high ground in the distance; this is a deep chalk cutting, through which the Great North Road passes on its way to Chester. The hills and valleys are very striking when seen on the spot, but much less so in the accompanying outlines, taken from photographs without the slightest exaggeration.

The view looking south, Fig. 120, is taken from the same position as the last, but looking towards St. Albans and London. It shows the same valley; the river Ver rises as an insignificant brook or drain in this valley, but the outline does not include it.

Its rise is a mile nearer St. Albans (Ver-lam) than the buildings (the "Horse and Jockey" Inn) seen at the sharp bend in the serpentine road. This road, though apparently *rising* in the picture, really *falls* towards the valley of the Ver. The high-road in the valley can be distinguished by a somewhat darker line. The border of Little John's Wood is seen on the top left.

An idea of the conformation of this dry valley, running north and south, may be obtained from Fig. 121, engraved from a photograph taken in Mr. G. H. White's brickfield at Caddington—field B on map.

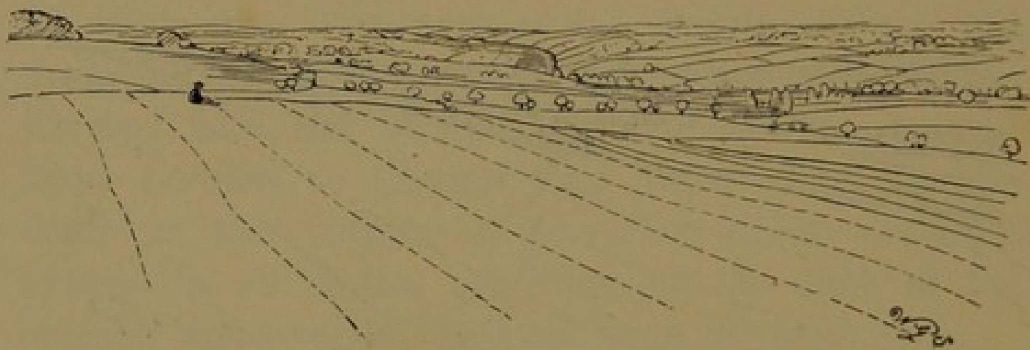


FIG. 120.—View from Blows Downs, looking south towards St. Albans and London in the dry valley.

The view is looking westward over the Watling Street valley, towards Kensworth Hill. In the foreground is one of the implementiferous clay-pits. The Roman road, running in a straight line in the usual Roman fashion, is indicated by the telegraph poles in the valley.

If one may judge of what probably happened in Palæolithic times by what occurs now, a good illustration is afforded by the descent of water at the present time after heavy rains in the Caddington district. At half a mile west of Caddington is Bury Farm: at three-quarters of a mile south, Piper's

Farm; the places are exactly a mile apart, and the fall of the ground between the two places is 110 feet. I once saw, after a heavy storm, water rushing down the lane between these two farms as a deep stream. This water often carries large stones considerable distances, and sometimes runs rapidly into the clay-pits, as if from overcharged rivulets. The name of a farm close by, "Tipple Hill," marked on map, indicates the nature of the ground.

At the present day, after continuous and heavy

FIG. 121.—View of the dry valley, looking west towards Kensworth from Caddington Hill. From a photograph taken in Mr. G. H. White's pit.

rains, the top of Caddington Hill sometimes presents considerable stretches of water; the field where the well is marked, near pit D, is always submerged in wet weather. These submerged places indicate the position of the lake of old times, and the Caddington brickmakers are credited with being always successful in their search for clay, by noticing where the extra wet places are after storms of rain; these places indicate good impervious clay beneath. The close tenacious soil is one cause of the torrents. Serious floods constantly occur in the towns at the base of the hills at the present day. Dunstable is frequently flooded. The year 1828 is known as the year of the "great flood" at Luton, when, on July 8th, many basements and cellars were full to the ceiling-line and above: this flood washed down walls between adjoining cellars, and some persons are reported to have been imprisoned by the waters for forty-eight hours.

The lower places on Caddington Hill are sometimes indicated by an accumulation of snow, as well as by rain-water. On Good Friday, 1878, the snow lay so deep in the roads close to pit C,—the site of my chief discoveries,—that a woman, while walking towards Luton, was lost and frozen to death in the drift there accumulated. After the snow had melted away, the dead body was found a few yards east of the brickmakers' cottages. In Fig. 122 I have engraved, from a photograph, the position where the body was found. The view is looking west towards the cottages by pit C, and the site is marked by a cross cut in the turf, and a second cross cut in a tree-stump by the villagers. One or both of these crosses have been recut, by the Caddington villagers, every year from 1878 to now, 1893.

In Palæolithic times, then, the Caddington position was situated on the side, and towards the foot of a gently sloping hill. The slope was flattish, near where Caddington itself now is, and on this flattish boggy and swampy part small lakes or large confluent ponds were formed; these ponds were fed by rain-water from the higher positions close by, and the valley, where the Great North Road now is, was not nearly so deep as at present. Palæolithic men lived for convenience near the water-side, and doubtlessly roamed over the country.

The evidence of the tools seems to indicate that these men went away suddenly, and left their weapons and tools, finished and unfinished, as they were in the act of making and using them. Possibly the men were terrified by some unusually violent storm,

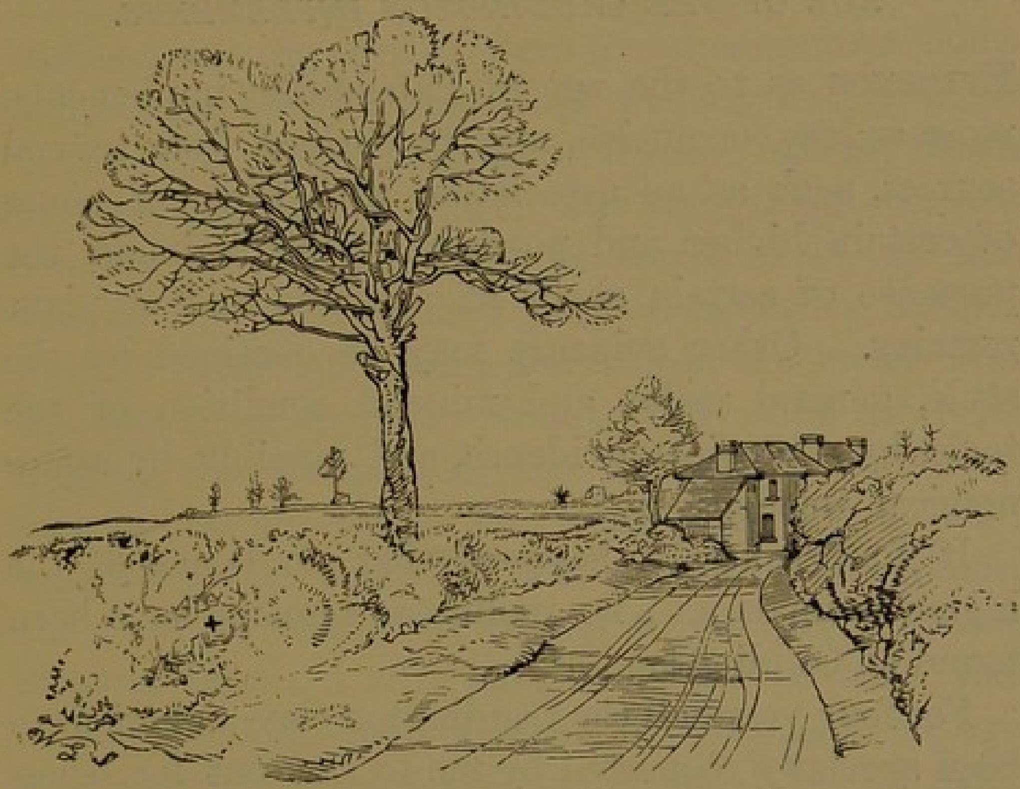


FIG. 122.—Site of woman's death at Caddington.

which brought wind, rain, and deep flooding. It seems obvious that the cause of the departure must have had to do with the covering up of the settlement with water, clay, and stones. The primeval men of North-Western Europe may have been quickly and extensively destroyed by some fatal pestilence in the style of the "Black Death" of the time of Edward III., and the gentle covering of the human relics may have been an after event.

CHAPTER XI.

AGE OF THE CADDINGTON IMPLEMENTS.

Evidence as to the age of Palæolithic implements, more or less conclusive, may be derived from several sources, such as an association with them of bones of certain higher and possibly extinct animals, the presence of certain shells of mollusca and of plant remains. Other evidence may be obtained by the style, general make, and mineral condition of the tools, by geological evidence, and possibly by astronomical calculations.

It unfortunately happens that no bones of the higher animals and no molluscan remains have been found at Caddington.

For four years all the Caddington clay-diggers have been specially requested by me to look out for bones and small shells, but with no result. Repeated interviews held by me with diggers, old and young, during this period, have ended in the positive statement, that no bones whatever have ever been seen or heard of in any of the Caddington pits. There was a possible faint trace of the animals of old in a discovery made in the early part of 1892. Whilst some men were digging in pit C, at the place where the Palæolithic floor is thirteen feet beneath the surface, the men met with some teeth which they declared were horse's teeth. The teeth were brought to the surface and placed on the grass by the side of the pit, where, according to the statement of the men, they fell into pieces and were blown away.

I have evidence of animal relics in brick-earth on the hill at Round Green, three miles to the north-east of Caddington, at a height of 533 feet—the lowest height at Caddington being 531 feet. Here, in a stratum of brick-earth about ten or twelve feet beneath the surface, were found numerous bones and antlers, possibly associated with keen-edged flakes in the style of the Caddington flakes. All my efforts to recover the bones failed; they were taken away by a workman who could not be traced. On my first visit to the pit, I secured part of an antler, a small piece of fossil bone, and a few flakes, the latter from the bottom of the pit. Immediately after my visit digging was abandoned, the pit partially filled in, and no new pits dug. The antler and flint flakes I sent on to Dr. (now Sir John) Evans, who reported the piece of antler to belong to red deer, *Cervus elephus*, Linn. I still have the piece of bone, but, although undoubtedly fossil and of Palæolithic age, it is not in a recognisable condition. As the flakes were found by me at the bottom of the pit, and as Neolithic flakes are common on the surface above, there was a doubt as to their Palæolithic age. After many visits to the discarded and partially filled-in pit, I at last had the satisfaction, by digging, of finding a good somewhat large Palæolithic flake *in situ*, with a good cone of percussion on one side and numerous facets on the other. The flake is creamy white and almost unabraded: it was six feet beneath the surface.

The Lea, a mere runlet, is three-quarters of a mile to the west of Round Green, but the brickfield is 178 feet above the stream. The stream is not connected in any way with the material on the hill-top, and chalky boulder-clay occurs between the two.

Antlers of the red deer have also been found in the valley gravels at Biscott, near the windmill, and at the foot of Caddington Hill, near Luton. The red deer, which has also occurred at Toddington, near Dunstable, is one of the oldest as well as one of the newest associates of man, so that unfortunately nothing definite as to the age of the human relics can be derived from its remains.

Remains of the mammoth, *Elephas primigenius*, Blum., have been met with in teeth and tusks found in the valley of the Ouzel, close to Leighton Buzzard, nine miles to the north-west of Caddington.

There can be little doubt that the other animals associated with primeval man at Caddington were similar with those found in the valley of the Lea, and in the valley of the Thames, near London, as given in Chapter XV., G; but whether any of the animals at Caddington belonged to the older, or wholly to the newer series, there is no evidence at present forthcoming from bones.

As no fresh-water shells have been found, we are without their climatic and other evidence. The evidence of the shells found in the Lea valley, near London, is given in Chapter XV., H.

In approaching the evidence for age, as derived from the style and mineral condition of the tools found at Caddington, it must be borne in mind that there are two series of tools, the ochreous or chocolate examples found in the upper red clay drift, and the sharp non-ochreous tools found below the drift on the Palæolithic floor.

The style and mineral condition show the ochreous tools to be probably the older, and older than the oldest cave tools. There is less artistic skill and precision of make, and less fineness, in the ochreous tools. There are no small scrapers amongst them.

The ochreous implements do not differ in the slightest degree in design from the ordinary Palæolithic tools found in the drift gravels on the terraces of the Thames; the style therefore of the Caddington examples shows them to be no older than the older Palæolithic implements found in the Thames valley.

It must be remembered that mere rudeness of make in an individual implement does not necessarily indicate extra antiquity, as rude "make-shifts" occur in company with better made instruments in all gravel deposits and caves. Extra antiquity can only be accepted when deduced from style, when every implement, without exception, in any given deposit is unusually rude. If only a single finely-made implement occurs amongst rude examples, it of course proves that some of the men had reached the point of culture indicated by that superior implement.

The sharp-edged implements from the Palæolithic floor at Caddington do not differ in style from the implements found by me on the Palæolithic floor at Stoke Newington and described in Chapter xv. Their style shows them to be without doubt of the same age as the sharp-edged Stoke Newington and High Lodge implements, and of implements found in the cave of Le Moustier. The Le Moustier implements are the oldest of the cave series, but far less old than implements found in the older river gravels.

The mineral condition of the tools found on the Palæolithic floor at Caddington is obviously due to the matrix in which they have been embedded, and there is no evidence from colour alone that one series of tools at Caddington is older than the other. The ochreous brown tools could never have derived their colour from the much paler brick-earth. Most of the ochreous tools are slightly abraded, and this abrasion proves them to have been moved by water or mud from a necessarily somewhat higher to a lower position. In this movement the flakes struck from the tools in course of manufacture became distributed in the red mud. I have not found it possible to replace one ochreous flake on to another.

The implements found in the dry valleys near Caddington represent the sweepings of the hills, and probably belong to more than one Palæolithic period.

Although the geological evidence cannot give the age of the Caddington implements in years, it can prove that the implements are older than some geological phenomena and younger than others. All the implements are older than the time of deposition of the upper contorted drift, for the sharp implements on the Palæolithic floor are deeply buried under it, and the ochreous examples have been brought from a higher to a lower position by the movement of the ochreous material in which they are now embedded. All the implements are, therefore, older than the period of cold represented by the deposition of the contorted drift.

On the other hand, it is not probable that any of the ochreous implements are so old as the deposition of the boulder-clay, for none are found in or covered by undisturbed boulder-clay. Boulder-clay was once deposited on Caddington Hill at a higher level than the position of the Palæolithic floor, but it was nearly all denuded off or swept lower down the hill before the makers of Palæolithic implements appeared upon the scene.

If Palæolithic implements should at some time be found at Caddington under re-laid boulder-clay, it would not prove the glacial age of the implements, any more than the finding of them in Tertiary clay *remainé* proves them to be glacial or pre-glacial. It is quite conceivable that Palæolithic implements may exist somewhere in the Caddington district under re-laid boulder-clay, for some of this material has been moved down the hills in post-Palæolithic times by sub-aëreal denudation. The former presence of boulder-clay high on the hills is proved by a clay-stained *Gryphæa* being found at 600 feet, or some few feet higher than the Palæolithic floor.

If Croll's theory in reference to the eccentricity of the earth's orbit is accepted, an approximation in years may be arrived at as to the age of the Caddington implements. Professor G. H. Darwin states in *Nature*, vol. xlv. p. 291, that he considers "our knowledge of the planetary movements is sufficient to enable us to say," that the interval between one glacial period and the next "may be something comparable with 200,000 years." Professor Darwin asks whether "Leverrier's formulæ for computing the eccentricity of the earth's orbit," taken in connection with Croll's deductions as to the effect of the eccentricity in causing recurrent glacial periods, "may probably be relied on to give at least a rough approximation for about 100,000 years in the past; and if this is so, whether we might not conclude, with fair probability, that the last glacial period occurred about that number of years ago."

The causes of glacial periods, as given in the theory of Adhémar and Croll, is summarised by Professor Darwin as follows:—"It is known that, under the perturbations of Venus and Jupiter, the eccentricity of the earth's orbit varies within certain limits. When the eccentricity is large, and when the precession of the equinoxes brings the perihelion to near the middle of, say, the northern winter, the annual supply of solar heat is so distributed that there will be a glacial period in the northern, and a mild climate in the southern hemisphere. Two or three maxima of glaciation and mildness will usually succeed one another at intervals of 10,500 years, because the eccentricity varies with extreme slowness. When the eccentricity is small as at present" (1892), "a moderate climate will prevail in both hemispheres, whatever be the position of the perihelion."

It is right to say that the theory of Adhémar and Croll is not accepted by all mathematicians and geologists.

The Rev. O. Fisher has calculated from astronomical facts that the deposition of the "trail" probably may be dated at 110,000 years back, during a period of intense cold. He considers that Europe became milder after this time for 80,000 years, or till 30,000 years ago. He considers that intense cold then prevailed once more, and gave origin to the "warp."

If the contorted drift at Caddington represents Professor Darwin's glacial period of 100,000 years ago, and Mr. Fisher's "trail" of 110,000 years ago, it is obvious that the implements now found in that drift must be of greater antiquity, or they could not have been moved by it.

If it represents Mr. Fisher's "warp," then the implements are older than 30,000 years, and younger than 110,000 years.

This latter is my opinion of the age of the implements found at Caddington and London. That man existed in more southern countries than Britain, between the glacial epochs represented by the dates mentioned by Professor Darwin, viz., between 100,000 and 300,000 years ago, seems certain.

On first thoughts, the fact of implements being found on plains on high hill-tops would seem to indicate a greater antiquity for them than the antiquity belonging to implements found low down in the valleys, but on weighing the evidence, little appears to be found to support such a supposition. By natural means implements have been removed from high positions to low.

Before the time of the deposition of the contorted drift of Caddington, man had already designed, not only the pointed and ovate stone implement, but the flat oval knife and the small scraper, the latter tool being so finely and neatly made as not to be distinguished from the best Neolithic work. It is certain that this art was not first acquired in what is now Britain; it was learnt tens of thousands of years previously, probably in what is now Southern Europe and Asia.

Great extra antiquity has of late been claimed for certain Palæolithic implements and scraps of flint found in high positions of the chalk plateau, north of Ightham, in Kent, by Mr. Benjamin Harrison, in a paper published in the *Journal of the Anthropological Institute*, February 1892—"Primitive characters of the flint implements of the chalk plateau of Kent,—

Joseph Prestwich, D.C.L., with notes by Messrs. B. Harrison and De Barri Crawshay." A small collection of the Kentish stones may be seen in the British Museum, Bloomsbury. The implements and pieces of flint agree in style, colour, and mineral condition with the ochreous Caddington examples, and appear to be of identical age. The pieces of stone with bruised and battered edges, which have been claimed as extra old implements, although they exist in thousands on the Kentish hill-tops, are badly represented in this small collection; this is to be regretted, as they are the only objects in dispute. No one doubts the authenticity of the genuine tools and flakes with which they occur, and of these the Museum collection is chiefly made up.

The disputed pieces are such as Figs. 1, 3, 4, 5, 6, 8, and 9, of Plate 19 in Professor Prestwich's paper. Examples of the seven distinct type varieties of scraper in use by Eolithic man would have been very instructive, especially as the oldest river gravels are almost barren of scrapers of any kind.

If Professor Prestwich has proved that the plateau or hill-top implements are older than the age usually fixed for the oldest Palæolithic implements of Britain, then his conclusions must apply with equal force to the age of all those implements now found in river valleys, which from their mineral condition have obviously been derived from the higher grounds.

Man may have rapidly become an expert stone-chipping animal. Cases of comparatively sudden exaltation are found amongst other races of animals and of plants. After a period of exaltation in Palæolithic times, man appears to have remained in a comparatively stationary condition, with few or no new ideas, for a vast period of time. It is certainly remarkable that a man who could chip a stone block so dexterously as to produce a keen straight knife-edge, should never, for tens of centuries, ever think of rubbing that chipped edge on to another stone in an effort to produce a still keener edge. It was in Neolithic times, in a second period of exaltation, that the new idea of the use of a sharpening-stone or hone first occurred to the human animal.

CHAPTER XII.

A DISCOVERY LONG PRIOR TO MINE.

Late in the autumn of 1890, a good whitish-grey, flat, sub-triangular, sharp-edged Palæolithic implement, Fig. 123, was brought to me from Luton, with a few fossils and a number of worthless stones, for sale. The vendor had no knowledge whatever of stone implements. The implement in question probably came originally from the Palæolithic floor at Caddington.

It was picked up in 1830 by a farmer, named William Gutteridge, on the surface of the ground at Dallow Farm, near Luton, the late Mr. Gutteridge's own land. The implement had been preserved by the farmer as one of a series of curious stones, picked up by himself on his own farm. Mr. Gutteridge had affixed a small label to the implement, with locality and date. I soon ascertained the name and date to be correct, from a friend of mine who is a relative of the late William Gutteridge. In 1830, the Gutteridges had held Dallow Farm for over a hundred and fifty years.

Dallow Farm, as the name indicates, is in a valley, that of the Lea, three-quarters of a mile west of Luton. The ground is, I think, about fifty feet above the river, and from 400 to 450 feet above the Ordnance datum, but the heights on the large scale

Ordnance map are here insufficient. I have never myself found a Palæolithic implement in Luton, although I have there picked up a few drift flakes, both ochreous and abraded, and greyish and sharp.

The Dallow Farm implement is of historic interest, as it was found by, and attracted the attention of, Mr. Gutteridge seventeen years before M. Boucher de Perthes published his discoveries in France, 1847, and eleven or twelve years before De Perthes began to notice such objects.

The famous Gray's Inn implement, now in the

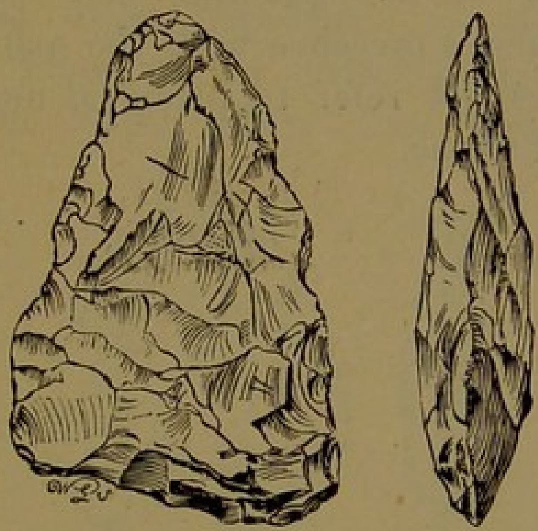


FIG. 123.—Implement found in 1830, Dallow Farm, Luton. Half scale.

British Museum, was found in 1690; Mr. Frere's discoveries were made at Hoxne in 1800; the Dallow Farm implement comes next in 1830; the discoveries of Tournal, De Christol, and Marcel de Serres, 1832; Schmerling, 1833; the Godalming stone implement (Evans, *Stone Implements*, p. 529), about 1842; and Boucher de Perthes, 1841–47.

Mr. William Carruthers, F.R.S., has shown me that the Rev. John Fleming, D.D., in 1824 was prepared to include man as contemporaneous with the mammoth, rhinoceros, hippopotamus, hyæna, &c., in Britain. Dr. Fleming, writing in the *Edinburgh Philosophical Journal*, vol. xi., 1824, says at p. 303, "Man was an inhabitant of this country at the time these animals, now extinct, flourished, his bones and his instruments having been found in similar situations with these remains." Dr. Fleming refers to the "regular stratified clay, sand, gravel, and peat," in the Thames valley. Unfortunately, Dr. Fleming's belief was based on a false foundation, for he accepted a "copper battle-axe" (p. 298), and "a fragment of a sepulchral urn" (p. 301), as evidence of man's presence with the mammoth. Dr. Fleming does not refer to primeval man's weapons and tools of stone.

CHAPTER XIII.

TRACES OF PRIMEVAL MAN ELSEWHERE, NEAR THE LEA, IN SOUTH BEDS AND NORTH HERTS.

WHEN the Dallow Farm implement, described in the last chapter, was brought to me, it reminded me of a flat ovate implement in my collection, which I had found on the surface at Leagrave, near Dunstable, in March 1887. The tool was found

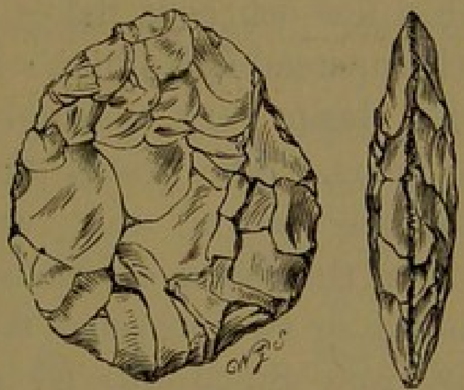


FIG. 124.—Implement of Palæolithic type, Leagrave, near Dunstable. Half scale.

close to the source of the Lea, at 376 feet above the Ordnance datum. Leagrave being a rich Neolithic position, I had placed the tool amongst aberrant forms of Neolithic implements. The accompanying illustration, Fig. 124, shows it to be of Palæolithic type, and to greatly resemble some of the small thin ovate tools met with at Warren Hill, near Mildenhall, Suffolk. It may be of Neolithic age, but I have found Palæolithic flakes, both ochreous and grey, *in situ* in a gravel-pit at Leagrave, at a height of 380 feet. *Belemnites* and *Gryphæa* occur abundantly in this gravel.

Following now the course of the Lea in a south-easterly direction towards London, Harpenden is reached at a distance of eight and a half miles. At this place gravel is sometimes dug to a small extent, and I have found a few ochreous Palæolithic flakes in it. The excavations seen by me have been close to the Lea, at a height of 286 feet, and only a few feet higher than the river close by.

Still nearer London, Wheathampstead is reached, at eleven miles from Dunstable and twenty-five from London. The gravel in the pit near the railway station is 290 feet above the Ordnance datum, and the Lea adjoining is about 264 feet. In this gravel I have met with a few ochreous flakes. At one mile south of Wheathampstead is No-man's-land Common, where gravel has been very sparingly dug for the roads for many years. The gravel-pits are 293 feet above the Ordnance datum, and twenty-nine feet above the Lea. In the coarse ochreous gravel I have only lighted on one or two ochreous flakes.

In 1884, Mr. (now Sir John) Evans showed me a good white ovate Palæolithic implement, one o two which had been found at No-man's-land Common. The implements were found in material bought for Dr. Griffith's garden at Sandridge, close by, in 1874. In December 1886, I visited the No-man's-land pits, and found a rude thick ovate implement *in situ*, illustrated in Fig. 125. The colour of the worked part is dull indigo-grey clouded with white, the crust creamy whitish.

Whilst walking across the common to the pit, I picked up two Neolithic celts; they were close together in the road, where they had been placed with other stones by a road-mender. In August 1891 I found a second Palæolithic implement, also *in situ*, a kind

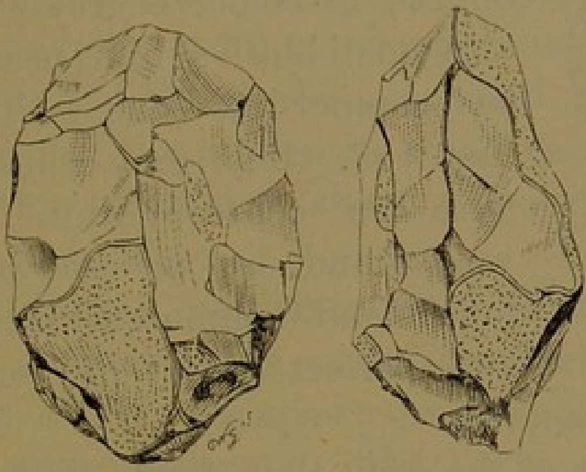


FIG. 125.—Implement, Wheathampstead. Half scale.

of chopping or hacking tool, with one edge worked, and a considerable amount of natural crust left for

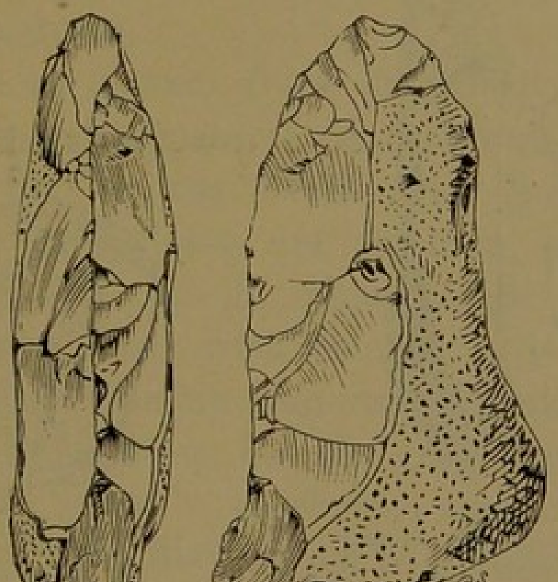


FIG. 126.—Implement, Wheathampstead. Half scale.

the convenient grasp of the hand. This implement is illustrated in Fig. 126. The worked part is grey-white, the crust brown-ochreous.

A singularly small tool, made from a flake, with a bold cone of percussion, is illustrated in Fig. 127. Its weight is exactly two-fifths of an ounce; its colour is grey-whitish.

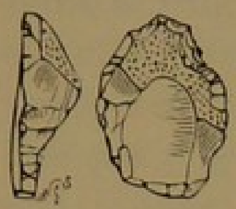


FIG. 127.—Unusually small implement, Wheathampstead. Half scale.

A small block of flint, neatly trimmed to a scraper-like edge, is illustrated in Fig. 128. It is grey-white in colour, with an ochreous-white crust. It was found by me *in situ* at No-man's-land Common, with the beautiful and perfect grey-white scraper illustrated in Fig. 129.

The crust of the grey Palæolithic flints of Wheathampstead is usually ochreous-white, but frequently speckled with superficial black marks. Sometimes

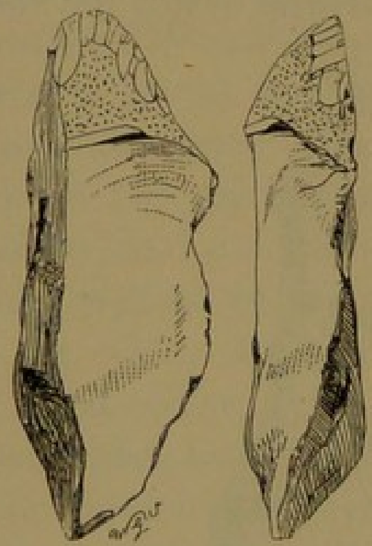


FIG. 128.—Scraper-like tool, Wheathampstead. Half scale.

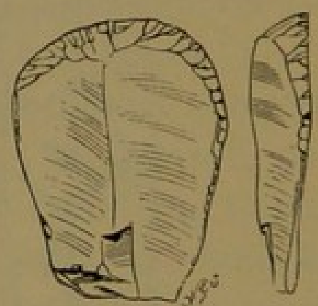


FIG. 129.—Scraper, Wheathampstead. Half scale.

the normally whitish crust is made almost black by these surface stains. The worked parts vary from grey to lustrous white. In addition to implements, cores and flakes are frequent at No-man's-land Common. I have found nearly all my examples *in situ*, or in material just moved. It seems to be, or to have been, the practice at the Common for certain persons to remove the turf and rich surface soil beneath (possibly for garden purposes), and to stop at a gravelly stratum of grey or grey-white stones. It is chiefly at these exposed places that I have raked out the implements and flakes *in situ.* The top of this stratum is about a foot or eighteen inches from the surface.

The whitish-grey implements of No-man's-land Common all come, without exception, from this thin grey stratum, which rests upon a deep deposit of coarse subangular ochreous gravel. The latter gravel contains deeply ochreous abraded flakes, of greater antiquity than the tools here illustrated. In the superficial soil Neolithic implements and flakes are frequent, but these are usually jet black in colour and highly lustrous.

The ochreous flakes, from the deep deposit of subangular gravel, appear to be very rare at Wheathampstead, but in the fields near No-man's-land Common the grey flakes are common, as they are sometimes reached by the plough, and black Neolithic examples occur with them. It is sometimes doubtful whether certain iron-stained field flakes are Neolithic or Palæolithic, but the grey examples from the grey drift beneath the surface soil are certainly not Neolithic; they may belong to a Mesolithic series possessing Palæolithic characters. They are found in the lowest position on No-man's-land Common, in old river sand, at 293 feet. The sand belongs to a now extinct tributary of the Lea, but part of the drainage of this flat district finds its way into the Ver.

Three miles direct east from Wheathampstead Ayot is reached. I have a large Palæolithic flake from the upper drift of the brickfield close to the Ayot railway station, and numerous flakes from the two gravel-pits and the cemetery 1¼ miles to the north, at and near Welwyn: the latter positions are in the valley of the Maran, a tributary of the Lea. I have also seen several small pieces of implements in the broken gravel in the heaps by the roadside in this neighbourhood. Sir John Evans, in *Archæologia*, 1892, has recorded the finding of implements three miles to the north of Welwyn, at Knebworth.

From Ayot, the Lea, in its course towards the Thames, passes on the north side of Hatfield to Hertford and Ware. At Hatfield the gravel is very small, and mixed with loam and sand. Few stones occur so large as an ordinary implement, and I have seen neither tools or flakes. The material, which is close to and on a level with the Lea, seems to be the old river silt and drift. Sir John Evans has recorded the finding of Palæolithic implements at North Mimms, 1¼ miles south of Hatfield.

As long ago as 1878, I recorded in the *Journal of the Anthropological Institute*, vol. viii., 1879, p. 278, the discovery of Palæolithic implements in the gravels of Hertford and Ware. My first finds were made in North London, in gravel brought by the Lea from three large pits near Hertford; two close to and north of the Lea and on both sides of the Beane river, and another at Bengeo, between Hertford and Ware, and half a mile north of a sharp curve in the Lea, at a height of about 130 or 140 feet above the Ordnance datum. The primary finds consisted of a well-made, pointed, bulky implement, now in the collection of Sir John Evans, and the butt of an implement broken in the road. I have several times visited the excavations mentioned, and found them to be implementiferous. Sir John Evans has recorded the finding of Palæolithic implements at Bayford, 1¼ miles south of Hertford. Another gravel pit with implements occurs a mile north-west of Ware and the Lea, and a pit at Amwell, a mile and a half south of Ware, at a height of 181 feet above the Ordnance datum. Gravel from the places just mentioned was brought to London by rail and river in 1878 and succeeding years, and although Palæolithic relics were undoubtedly rare amongst the stones, yet a large number of good flakes and a few examples of a better class were always to be met with. An implement from Ware, found by me in a new road at Tottenham, is in the British Museum, Bloomsbury.

The river Stort joins the Lea at two miles south of Amwell, and Sir John Evans has recorded, (*Ancient Stone Implements of Great Britain*, p. 530) the finding of two implements by Mr. W. H. Penning in the valley of this tributary, at Stocking Pelham, and Bishops Stortford in Herts, and Pesterford Bridge in Essex.

From Amwell the Lea passes near Hoddesden, Broxbourne, and Wormley to Cheshunt and Waltham, on the borders of Middlesex, at 11½ miles from London.

I have repeatedly visited the gravel-pits at Flamstead End, one mile to the west of Cheshunt, and although Palæolithic implements and flakes are no doubt rare, yet I have never visited the excavations without lighting upon cores and flakes, and more rarely implements. The first time I visited the pit near the new river reservoir at Flamstead End, I found two large flakes *in situ;* they were projecting from the face of the pit. The best implement found by me at Cheshunt was a somewhat large, well-made, oblong-ovate tool, now in the collection of Sir John Evans; at subsequent visits, one or two other tools came to hand, with a large collection of flakes.

A small tool, found by me at Flamstead End in 1888, is illustrated in Fig. 130. The worked part

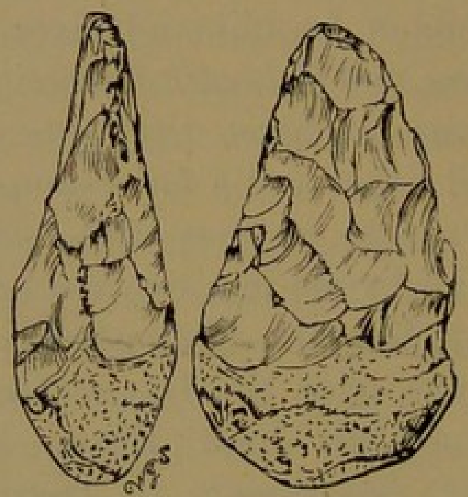


FIG. 130.—Implement, Flamstead End, Cheshunt. Half scale.

is greyish-indigo, lustrous and slightly abraded. The crust is ochreous, with carbonaceous stains on one side. It is now in the collection of Sir John Evans.

The Palæolithic relics from Hertford, Ware, Amwell, and Cheshunt vary in colour from indigo-blackish through grey-brown to ochreous and white. Most of the examples are slightly abraded, a very few are sharp. They are usually stained by the ochreous matrix in which they have been embedded.

CHAPTER XIV.

TRACES OF PRIMEVAL MAN NEAR THE LEA IN MIDDLESEX AND ESSEX, FROM WALTHAM TO TOTTENHAM ON THE BORDER-LINE OF LONDON.

THE river Lea forms the boundary between Middlesex and Essex from Waltham to London, but nearly all the implementiferous gravel and loam is on the Middlesex side of the river till the borders of London are reached, when an equal amount of river drift occurs on both sides.

At two or three miles from Waltham, in a southerly direction towards the Thames, Enfield is reached, where extensive excavations of gravel have been made for many years. Palæolithic implements and flakes are, however, as far as my experience goes, rare. In Fig. 131 is engraved an ochreous abraded implement found by myself, with flakes and cores, at Bush Hill Park, near Enfield, in 1883. It is now in the collection of Sir John Evans.

At Edmonton, seven miles from London, I have found several implements and flakes in the extensively excavated gravel. A rude ochreous and abraded implement, from near Rowan Tree Farm, Lower Edmonton, is illustrated in Fig. 132. Two other implements, found by me between Lower Edmonton and Winchmore Hill, a mile to the west, are in the collections of the British Museum and Sir John Evans respectively.

At Upper Edmonton and Tottenham, at six and five miles from London, I have found many flakes in

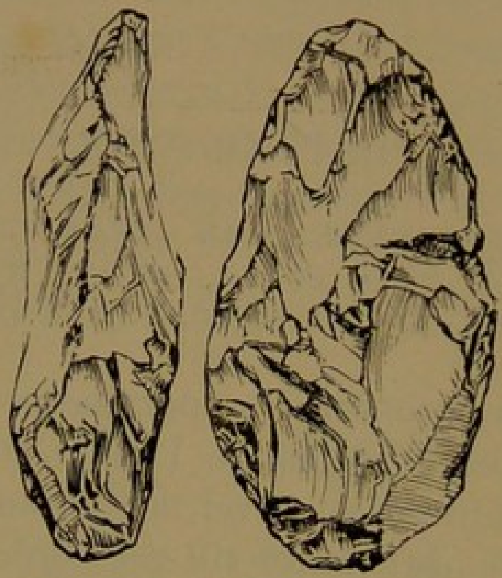


FIG. 131.—Implement, Bush Hill Park, Enfield. Half scale.

the somewhat sparing excavations of gravel. At Tottenham the boundaries of London are fairly

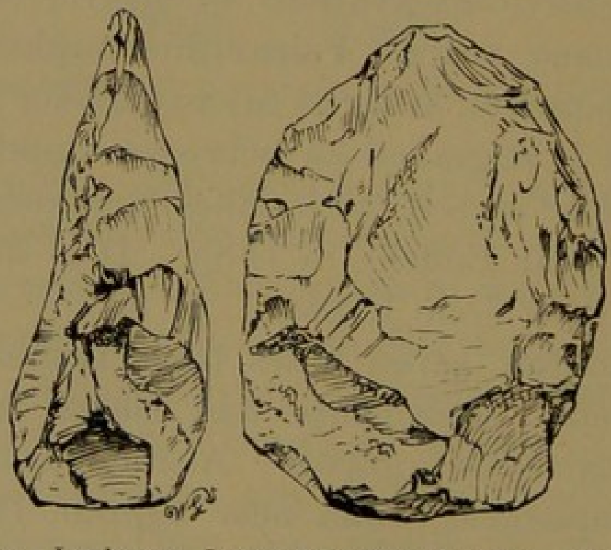


FIG. 132.—Implement, Lower Edmonton, London. Half scale.

reached, and here gravel and loam begins to occur abundantly on both sides of the river.

CHAPTER XV.

TRACES OF PRIMEVAL MAN FROM TOTTENHAM TO THE JUNCTION OF THE LEA WITH THE THAMES AT BLACKWALL.

A.—Preliminary.

My attention was first directed to the implementiferous character of the gravel at North-Eastern London by the description and illustration of two Palæolithic implements given in Sir John Evans's *Ancient Stone Implements of Great Britain*, pp. 523 and 525. The first of these was found by Mr. G. H. Gaviller in gravel dug at Hackney Downs in 1866, and the second was met with in a brick-earth pit at Highbury by the late Mr. Norman Evans in 1868. At a later date, and before I had made any discoveries, Mr. Anscombe had found a rude pointed implement in Dunlace Road, Lower Clapton; this tool is now in the Museum of Practical Geology, Jermyn Street.

On the other side of London, Colonel A. Lane Fox, now Major-General Pitt-Rivers, had found Palæolithic implements at Acton and Ealing, and there of course existed in the British Museum the famous pointed implement found in Gray's Inn Lane, London, at the close of the seventeenth century.

As regards North-Eastern London, no implements were found beyond the three mentioned till my discoveries of 1878, when I found implements all over the north-eastern district. In the paper read by me before the Anthropological Institute on June 25, 1878, and published in February 1879, nearly every implement-bearing position in North-Eastern London is given, as well as the various positions on the Lea from London to Hertford. At the same meeting I exhibited a broken implement and flakes found by myself on the Essex side of the Lea, at West Tilbury and Gray's Thurrock.

Palæolithic implements are very common in the gravel, sand, and loam of all parts of North-Eastern London, on both the east and west sides of the Lea; but the most interesting fact in connection with the stone weapons and tools is that a thin stratum, representing an old land surface of Palæolithic age, is widely spread all over the district. This old surface or Palæolithic floor agrees well with the Palæolithic floor at Caddington, and the tools are identical in style.

I first noticed the thin stratum of flint, in some places full of Palæolithic implements and flakes, in the beginning of 1878, in excavations on the south side of Stoke Newington Common; later in the spring I observed a similar stratum in the fields and market-gardens on the north side of the Common (now all built over), and eventually in many other places for three or four miles to the north, south, and west from this centre.

In 1878, however, the exposed sections were insufficient to demonstrate for certain that a thin stratum of worked flints of Palæolithic age was spread for several miles a few feet beneath the present surface; indeed, the evidence was not complete till 1883, that this stratum existed on both sides of the Lea at North-Eastern London. Excavations were not numerous, and it was only by keeping a record of the exposed surface of every drain, house foundation, pit, &c., during these five years that the fact was proved that such a stratum really existed. Some difficulty was also experienced in demonstrating the presence of contorted drift over the floor, as the ground had been so greatly disturbed by market-gardening and brick-making, that it was only in certain favourable positions, where the original undisturbed surface of the ground could be lighted on, that undoubted contorted drift could be clearly seen.

The fact has, however, now been proved beyond dispute that the whole of the Palæolithic floor of North-Eastern London is, unless it has been artificially disturbed in modern times, covered with contorted implementiferous drift—probably belonging to the last geological period of great cold—exactly in the style of the Palæolithic floor and its superimposed drift at Caddington.

B.—Sections.

In describing the Palæolithic floor as found in London, I will first indicate its extent and nature as shown by sections, next describe the stone implements, and finally enumerate the fossil bones, shells, and vegetable remains.

A small portion of North-Eastern London is engraved to the scale of one inch to a mile in Fig. 133. The area includes Stamford Hill and Tottenham in Middlesex, and Higham Hill, Walthamstow, Woodford, Snaresbrook, Wanstead, and Barking Side in Essex. The dotted lines show the distribution of the river

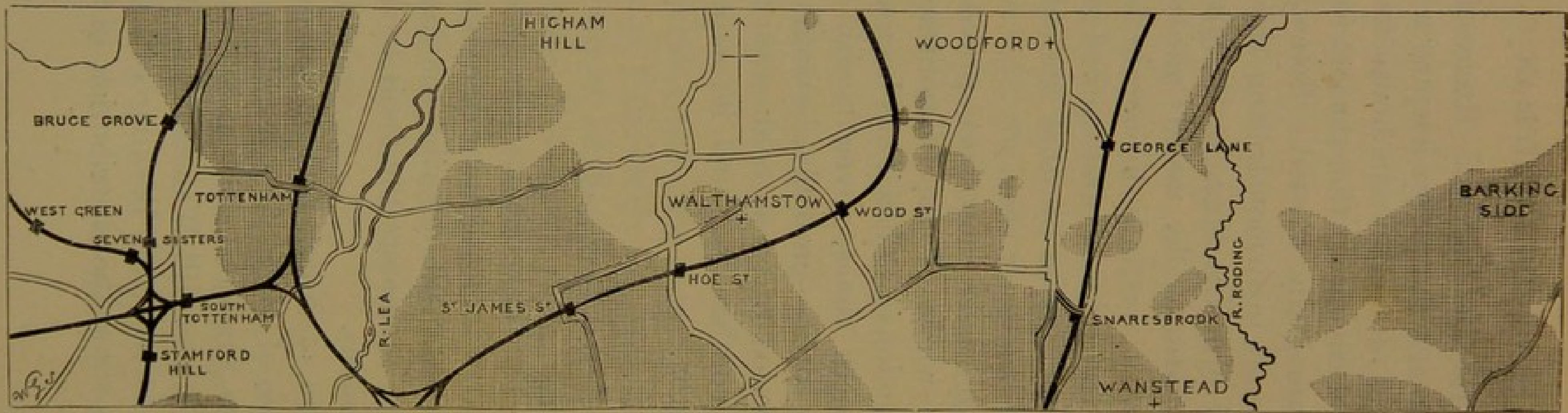


FIG. 1.

FIG. 133.—Map of North-East London, showing distribution of gravel and brick-earth in the valleys of the Lea and Roding.

Scale, one inch to a mile.

gravel in regard to the river Lea on the left, and the Roding on the right. The gravel banks on both sides of the two rivers were continuous in Palæolithic times, but part of the material has since been removed by denudation. Fig. 134 in the upper figure shows a section to the same horizontal scale, looking north; the vertical scale is 800 feet to the inch. The black portions on the more elevated parts show the implementiferous gravels, and the black below the Ordnance datum line (below the rivers) is the lower gravel found at these positions. The figures indicate the heights above the mean sea-level: B is London clay, on which the gravels rest; C, the Woolwich and Reading beds; D, Thanet sand; E, Chalk; F, Upper Greensand; G, Gault. At the bottom left is an enlarged section through the valley of the Lea, drawn to a horizontal scale of three inches to the mile and a vertical scale of 320 feet to an inch, in order to more clearly show the gravels as they rest on the London clay, whilst on the bottom right is an enlarged section through the valley of the Roding, drawn to the same scale as the last. The plan and sections are founded, by permission of Mr. William Whitaker, on the admirable geological model of London in the Museum of Practical Geology in Jermyn Street. The Palæolithic floor at North-East London is generally found on the top of the river gravel, and just beneath the contorted drift. Its position is indicated on the accompanying section, Fig. 135, drawn to a horizontal scale of two inches to the mile, and a vertical scale of 100 feet to an inch. It is taken looking north from Stoke Newington Common, Middlesex, on the west, to the south of Walnut Tree House, Moyer's Lane, Leyton, Essex, on the east. These places are dis-

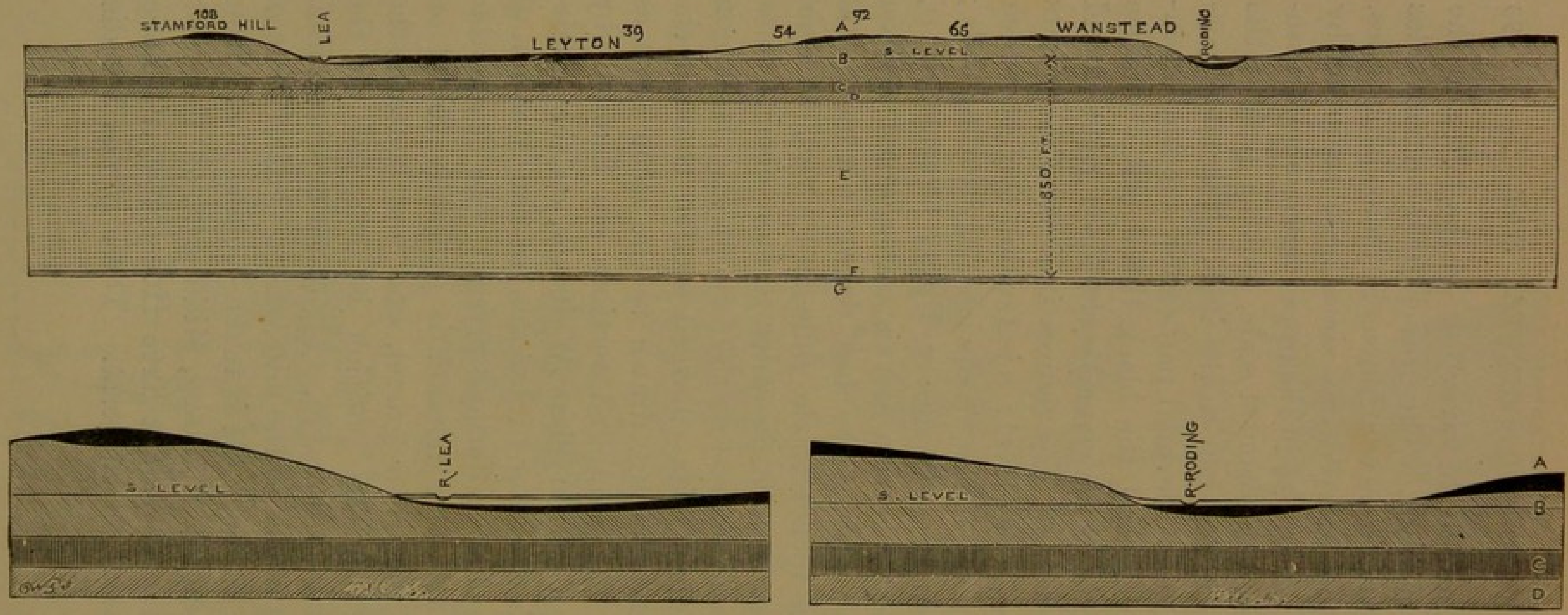


FIG. 134.—Upper figure, section of North-East London, across the Lea and Roding.
Horizontal scale, one inch to a mile, vertical scale 800 feet to one inch.

Bottom left, section through the valley of the Lea. Bottom right, section through the valley of the Roding.
Horizontal scale, three inches to one mile, vertical scale, 320 feet to one inch.

tinctly marked on Stanford's Library Map of London, on the lower parts of Sheets 3 and 4. The maps may be purchased geologically coloured, showing the drift deposits.

The extreme left of the section shows Stoke Newington Common, 85 feet above the Ordnance datum (with the adjoining Hackney Brook, whose surface, before it was recently obliterated, was 68 feet above the Ordnance datum), dropping into the Lea valley, the surface of the river on this line being 20 feet above the Ordnance datum. On the right the section gradually rises to the Leyton side of the Lea, crossing the Fillibrook stream. The stream at this point, now obliterated, is 44 feet above the Ordnance datum, and the adjoining Moyer's Lane is 56 feet.

The diagonal shading at the bottom of the section shows the London clay, the vertical shading above indicates the river gravel. The heavy black line on the top of this gravel shows the line of the Palæolithic floor on both sides of the Lea, and the uppermost line shows the line of contorted drift surmounted by surface soil. Undoubtedly the Palæolithic floor and the contorted drift at one time extended to a much greater distance over the valley of the Lea, as indicated by the heavy dotted line and the fine line above. At the time when the Palæolithic men lived on this old land surface the river was probably some twenty feet higher than now, as indicated by the dotted curve; the valley at that time, therefore, was much flatter and more marshy, and being flat, the river was of necessity constantly, within definite limits, changing its bed. The excavation of the last twenty feet of the Lea valley has been made since the upper contorted drift was deposited over the Palæolithic floor. Very little denudation has, however, taken place in recent times, for Neolithic celts, and even Roman remains, are found in the alluvial flats at D, D.

At the points A and B the contorted drift has been denuded off the Palæolithic floor, and at these special points the floor crops up on the surface. At these positions, therefore, perfectly unabraded Palæolithic implements and flakes (which have never been moved unless in agricultural operations) may be found, as are the Palæolithic implements of chert at Bois du Rocher, near Dinan, in Brittany. It must, therefore, never be too hastily assumed that because Palæolithic implements are sometimes found in an unabraded state on a modern land surface, that they were actually made upon the surface as we now see it. The surroundings of every such position must be carefully noted. At the point C, and at other well-defined distant points from the Lea and Thames, the thin stratum identified as the Palæolithic floor ceases. The men of old perhaps had a reason for keeping within a moderate distance of the streams.

The Palæolithic floor on the Essex side of the Lea has been, to a very great extent, pushed away by the advancing contorted drift, or denuded away since Palæolithic times. I have only seen it on the east side of Leyton Street and near Walnut Tree House. On the Middlesex side of the Lea the floor is of great extent. I have seen it at London Fields, and south of and at Kingsland, it also exists in the City at about 70 feet above the Ordnance datum. It is well seen at Highbury, whence the first implement was obtained by the late Mr. Norman Evans; at Shacklewell, South Hornsey, some parts of Abney Park Cemetery, Stamford Hill, and Stoke Newington Common. I have seen traces of it in many other surrounding places, and I believe, in short, that it extended by outliers over the greater part of East Middlesex into Herts as far as Hertford and Ware, and with other outliers as far off as Luton, Dunstable, Caddington, and Hitchin, and possibly in patches on both sides of the Thames, from London towards the Nore on the east, and towards Oxford on the west.

It is a curious fact that the superimposed contorted drift is also implementiferous; the implements in this material are all more or less abraded, some very much so, and many are whitish or mottled in colour from long contact with the tenacious clay. The implements from the contorted drift have been brought from the north, from Bush Hill Park and Forty Hill, Enfield, at 129 feet; from Hertford at 132 feet, from Ware at 145 feet, from Amwell at 181 feet, from Caddington at 560 feet, and from near Dunstable at 800 feet. After the great heights of Caddington and Dunstable, the ground falls again to the north and in other directions; but it must be remembered that the Caddington implements from the upper contorted drift *are abraded*, which shows that they too must have been moved from still greater heights which do not now exist. In London these implements are deposited at a level of 85 feet, or even lower. They have been carried for thirty miles with a fall of at least 700 feet.

At Ealing Dean, on the west, certain of the implements have been carried down into the valley from the heights to the north of 164 feet, at which elevation I have found them.

When the Shacklewell gravel was referred to by

Mr. (now Sir John) Evans—*Ancient Stone Implements*, p. 523—he wrote that it rested on the slopes of the Hackney Brook, and from the knowledge of its position to be obtained at that time, he was quite justified in the supposition. When I first found implements in the sand close to this brook, I too thought that the implements really belonged to its valley. But when at length the brook was quite obliterated, and speculating builders dug foundations for new villas in the middle of its bed, it was clear that the brook had merely excavated its way through the gravels of the Lea and Thames.

On a section being made through the brook, the Palæolithic floor was seen in section on both sides, as at E, Fig. 135. I have seen a similar section across the Fillibrook stream, as at F, Fig. 135. These brooks, although they now probably follow some ancient depression in the London clay beneath, are quite modern in comparison with the Palæolithic floor and its implements.

It is not a little curious that although our existing brooks are of comparatively modern date, yet it has not been uncommon at North-East London to see sections of brooks of Palæolithic age exposed; these ancient watercourses became filled with sand and mud, and then covered with contorted drift at the close of the Palæolithic period. An experienced eye can detect the probable position of such obliterated underground brooks at the present day, by noticing certain slight continuous depressions in the present ground surface. An underground bed of a Palæolithic brook exists in Bayston Road, close to West Hackney Church, High Street, Stoke Newington. At the present day it may be seen that the houses in Bayston Road very

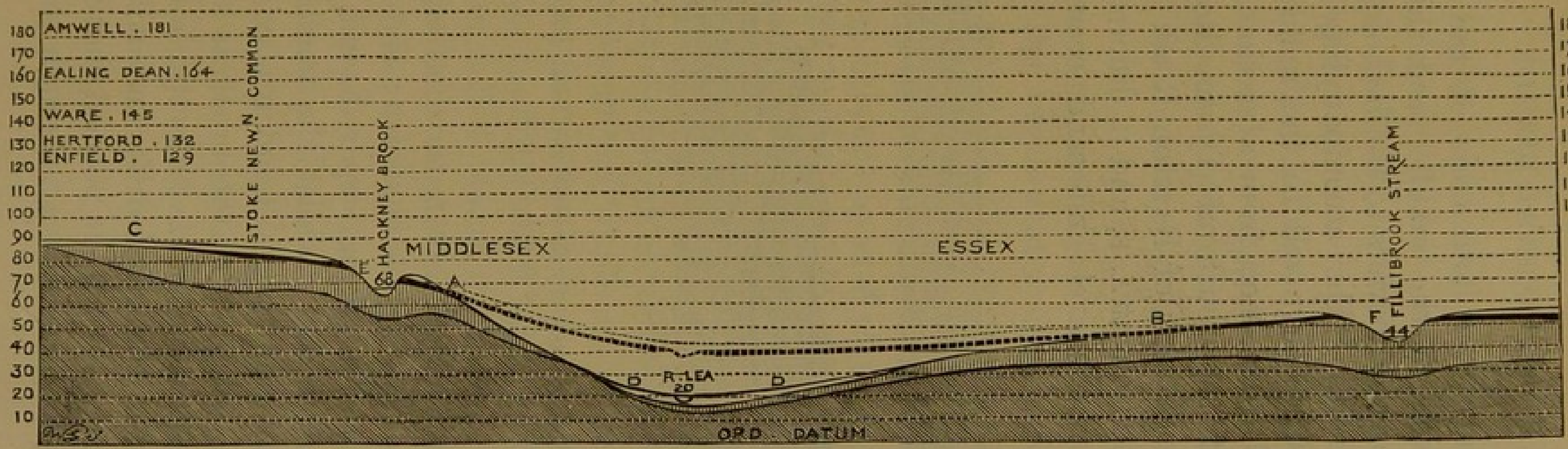


FIG. 135.—Section through the valley of the Lea, showing probable position of the Palæolithic floor prior to the deepening of valley.

Horizontal scale, two inches to one mile.

Vertical scale, 100 feet to one inch.

gradually descend from both ends of the road to a slight depression in the middle, and this slight depression in the road answers to the bed of a Palæolithic brook beneath. The accompanying illustratration, Fig. 136, is engraved to the scale of one-sixth of an inch to a foot from a section exposed during 1883, at the south of Tyssen Road, and immediately on the west of Bayston Road. At the base of the illustration, at A, B, and C, different strata of implementiferous gravel and sand occur: these

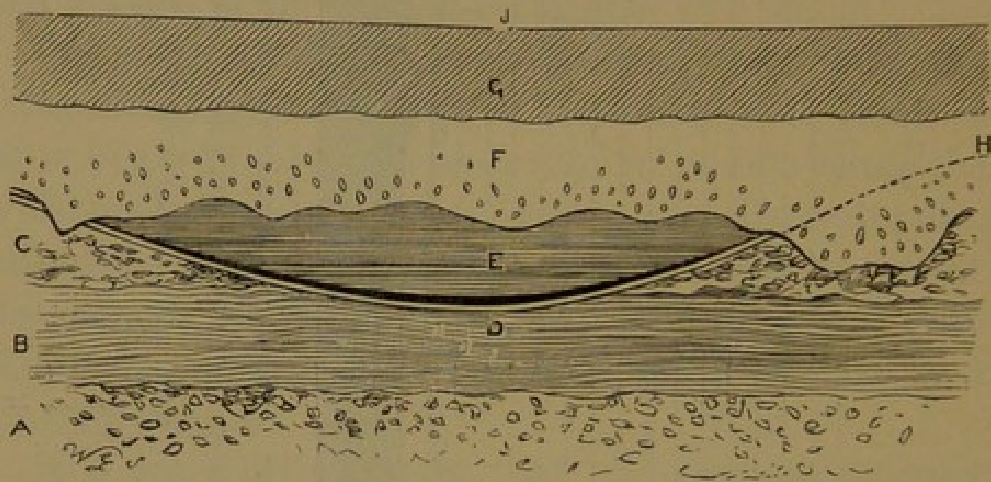


FIG. 136.—Section through brook of Palæolithic age, Stoke Newington. Scale, one-sixth of an inch to a foot.

are described farther on. At D the bottom of the obliterated Palæolithic brook is shown; the stratum at the bottom of the brook is deep red sand, derived from the red gravel at D; whilst the narrow black seam which is superimposed is London clay incorporated with sand. The bed of the brook at E is filled with fine sand, stratified and perfectly horizontal. Above this, at F, is contorted drift, and at the top, at G, surface *humus*. It will be noticed that the contorted drift has ploughed its way through the brook and its banks, which had been previously filled up with fine sand. A few yards off, in the direction of H, the bank of the brook was again exposed, untouched by contorted drift, and on this bank a beautiful unabraded Palæolithic implement was found, with numerous keen-edged flakes. The point J is the lowest part of Bayston Road to this day. At this position the London clay is about 27 feet from the surface.

London clay comes to the surface close by and towards the north-west; nothing is more common than to see seams and rolled blocks of this clay in the sand and gravel, and also in the upper contorted drift; sometimes implements and flakes may be found sticking in this transported clay.

In 1882, whilst watching some excavations in the sand on the north side of Stoke Newington Common, I noticed that numerous balls, apparently of sand, almost spherical in shape, rolled from the tops of the heaps to the bottom as the sand was thrown from the barrows of the workmen. The spheres of sand were about four inches in diameter; some were slightly oval. On breaking them open, they were found to consist of rolled blocks of London clay coated with sand: the balls were laminated, as if the masses had increased in size whilst rolling, and between the laminæ were distinct remains of leaves as of grass. I preserved some of these puzzling balls of clay for a short time, but in drying they broke up into laminæ and dust, and so perished. I have now no doubt that these objects were formed in the same manner as the mud-balls described by Prof. G. H. Darwin in *Nature*, vol. xxvii. p. 507. Prof. Darwin states that mud-balls were naturally formed at Bromley, Kent, after a violent storm of rain, probably by pellets of mud being washed down a hillside and rolling as they went; whether accompanied by the melting of snow, Mr. Darwin was unable to remember. The higher grounds near Stoke Newington Common are now coated with London clay much as they were in Palæolithic times, and if we imagine a violent storm of rain after the breaking up of a frost, pieces of clay might readily be set free and rolled on to the Palæolithic sands of Stoke Newington, and such balls would doubtlessly catch up fragments of vegetation on their way.

Spherical balls of mud may not be infrequent after storms of rain and wind, but I have only once observed their occurrence. This was at Kensworth, near Dunstable, in the summer of 1892, after a sudden very heavy thunderstorm with rain and violent wind, which was immediately preceded by very hot dry weather. The day after the storm I walked on to the fields near Kensworth to look over the surface stones, thinking they would be clean after the previous day's storm. I then found several spherical balls of mud in a farmer's road across a field, and in one stubble-field I noticed a great many. Unfortunately the day had been again very hot, and the sun had cracked most of the balls into two or three pieces, and more or less ruined others, so that it was difficult to pick them up without further breaking them, and equally difficult to carry the more perfect examples a couple of miles without damaging them. I, however, managed to get a few perfect balls home; these would doubtlessly soon have fallen into fragments if left to dry. I however preserved them by dipping them into somewhat strong warm dissolved gelatine. Several balls at once fell to pieces, but three fortunately held together and dried in a satisfactory manner, although no doubt they still remain friable. In Fig. 137 the three preserved examples are illustrated to one-half the actual size. They exactly agree in nature with the balls of clay as found by me on the Palæolithic floor at Stoke Newington, and it is only reasonable to conclude that the two series of balls were naturally and similarly produced. The mud-balls were formed

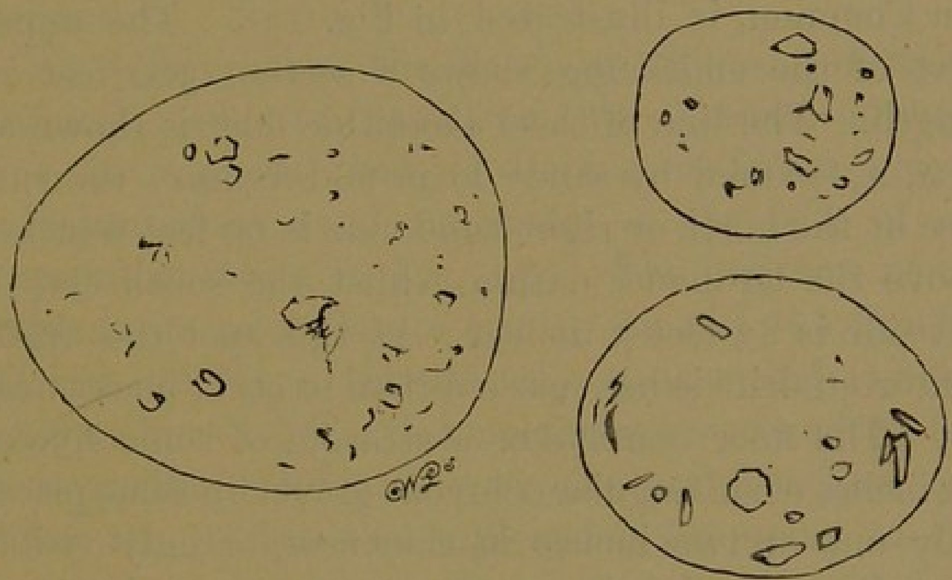


FIG. 137.—Mud-balls formed by rain and wind, Kensworth. Half scale.

at Kensworth on a perfectly level road and field: the particles of earth, vegetable matter, and small stones must have been whirled round, with great downward force and velocity, by the wind.

The best section of the Palæolithic floor at Stoke Newington was exposed during the digging for the foundations of the houses in Alkham, Kyverdale, Osbaldeston, and Fountaine Roads. The digging on this ground was continued for five years, from 1878 to 1883, and the various excavations showed that, about four feet from the surface, there was at this position an immense accumulation of Palæolithic implements, including pointed and oval weapons and tools, large numbers of scrapers, hammer and anvil stones, flakes and cores; most of the weapons and tools being as perfect and keen-edged as on the day they were made.

A section through the gardens between Alkham and Kyverdale Roads, bounded on the north by Cazenove Road and on the south by Stoke Newington Common, is illustrated in Fig. 138. The upper part of the engraving shows a section 300 feet in length. The line of the Palæolithic floor is shown at A, A, A, covered by sandy loam and *humus;* the surface at the north or right-hand side is 90 feet 6 inches above the Ordnance datum, whilst the south end of left side is 83 feet 3 inches. At this spot the upper contorted drift is less marked than in other places near by. The floor consists of a stratum of some five or six inches of subangular ochreous gravel, in some places only one or two inches in thickness, or only visible as a line of slightly contrasted colour. Amongst the flints, which have grey or bright ochreous crusts, are pieces of sandstone, Hertfordshire conglomerate, quartzite, white quartz, Lydian stone, and pieces of other rocks, but none of the very large blocks of stone so often described as belonging to the Thames valley drift at London. A few broken bones, broken antlers, teeth, pieces of chalk and driftwood occur, and amongst these objects and rolled and water-worn stones and pebbles, the black, lustrous, sharp-edged implements are found. In Abney Park Cemetery, not far from the entrance gates in the High Street, Stoke Newington, the same floor is seen in section in the graves, generally at about 12 feet from the surface, whilst a short distance farther, in a southerly direction towards the Thames, the depth drops to 20 feet, and even 30 feet. In the latter positions the superimposed material has been deposited by the Thames, — whose northern banks are now nearly four miles off,—and not by the Lea. Some 25 feet of surface material had therefore been denuded off the Stoke Newington Common and Lower Clapton positions before the upper contorted drift was deposited.

At 8 feet below the floor, at Stoke Newington Common, and 12 feet from the present ground-line, is a second bed of implementiferous gravel, surmounted by sand, as shown at the base of the upper illustration in Fig. 138. The majority of the implements belonging to this stratum of the London district are found between the 50-feet and 100-feet contour lines of the Ordnance maps; 70 and 75 feet is a prolific height. Above the 100-feet line, and below the 50-feet, the implements belonging to this stratum are somewhat rare.

To more clearly show the nature of the floor, 60 feet of the upper illustration, Fig. 138 (where marked), is engraved below to a larger scale: B is the 12-feet gravel, containing rolled fossil bones and abraded Palæolithic implements; C is fine buff-coloured sand, often full of fossil shells of land and fresh-water mollusca; D, D, D, is the floor with its numerous unabraded weapons, tools, flakes, &c. At the part illustrated the floor happens to be in duplicate. After the men had made tools where the lower D's occur, a slight flood of water covered the stones with a thin coating of sand: the men then

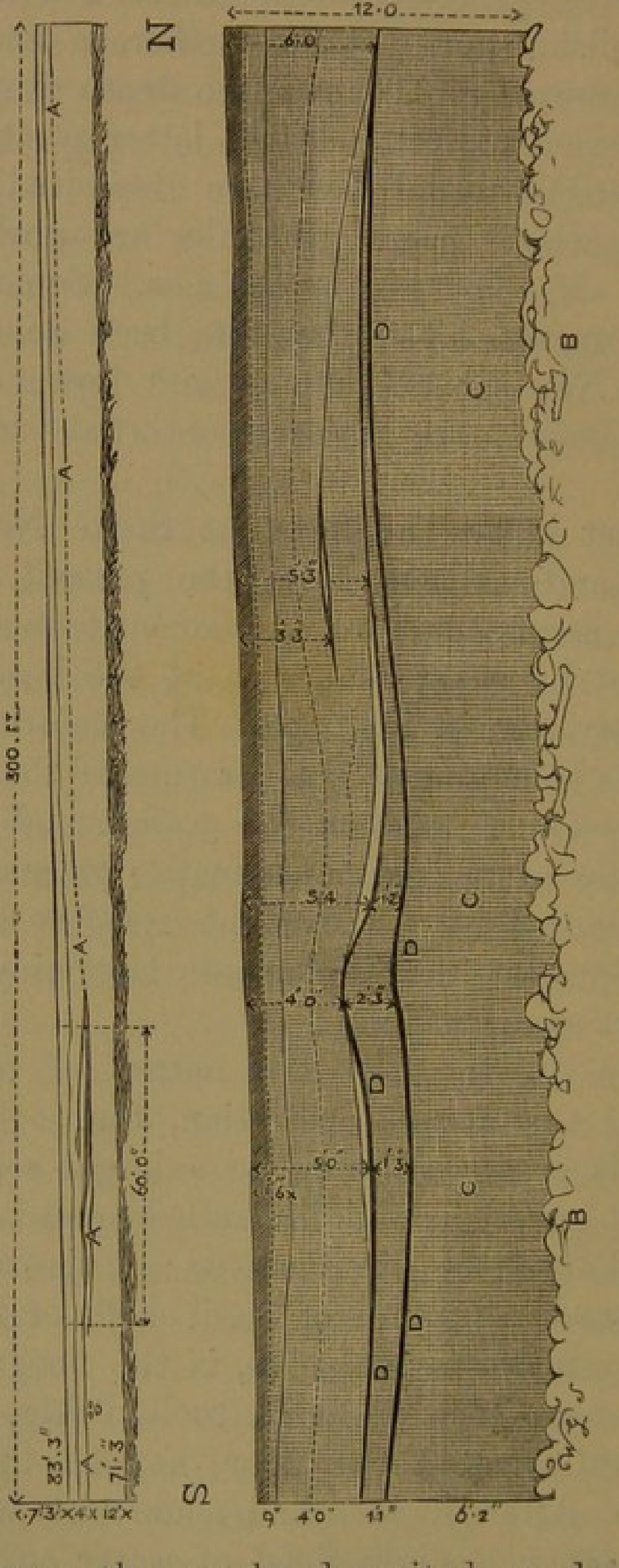


FIG. 138.—Section to scale of Palæolithic floor, north of Stoke Newington Common.

walked over the newly deposited sand and made other tools on the new floor. The old land surface at Caddington is in places duplicated in a precisely similar manner. The two white streaks on the top of the upper floor are London clay mixed with sand. Above the floor is sandy loam and loamy sand, distinctly non-water-laid, and slightly waved or contorted drift; this upper drift is often full of pebbles placed at diverse angles; on the top of all is surface-soil, containing implements of possible Mesolithic age, Neolithic implements, British and Saxon pottery, bone tools, Roman and mediæval coins, and objects of recent date.

The non-water-laid covering mass has disturbed the floor in several places, ploughed it up, and sometimes pushed underneath it. The undulation and contortion of the upper drift material seem to show that it was laid down by moving ice or frozen mud from the north. The abraded and whitened implements and flakes, sometimes found embedded at all angles in the upper contorted drift, were, no doubt, caught up from old exposed land surfaces, and carried southwards by slowly-moving half-frozen mud. No true Palæolithic implements are found in the *humus* above this drift, and they never occur on the surface unless the superimposed material has been naturally or artificially removed. The upper contorted drift seals up all the relics of Palæolithic age, and as far as the evidence found at North-East London and Caddington goes, Palæolithic man retired in front of the advancing contorted drift. I have seen no evidence that the genuine Palæolithic savage ever returned on to the new surface made by this material. A race of Mesolithic men may have inhabited Britain at a later date, but the evidence of the contorted drift, as well as the immense deposits of stalagmite in some caves, seem to indicate that this part of Europe was, as far as the human animal is concerned, temporarily depopulated, perhaps, as I have suggested for Caddington, by a pestilence resembling the "Black Death."

In Fig. 139 is a measured section through the Palæolithic floor, facing west on the other side of the section illustrated in Fig. 138; the floor is seen at from 3 feet 6 inches to 4 feet 10 inches beneath the surface; muddy upper contorted drift with a few

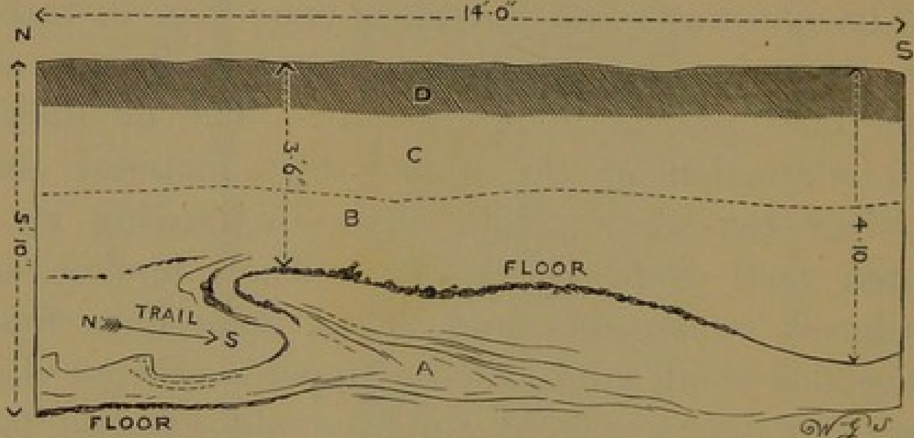


FIG. 139.—Section to scale of part of Palæolithic floor at Stoke Newington, with contorted drift pushing under and upheaving the floor.

stones is present at B and C; D is *humus*. In the direction of the arrow from north to south the contorted drift is seen pushing under and upheaving the floor with its implements; the Hackney Brook is towards the south, and a flooded brook to the south would hardly upheave the floor from the north; A is a mass of London clay and sand, brought from a distance, and pushed under the floor by the advancing contorted drift from the north. Where the floor has been crumpled and disturbed, the implements show a very slight amount of abrasion ; where the floor is unmoved and covered by the stratified

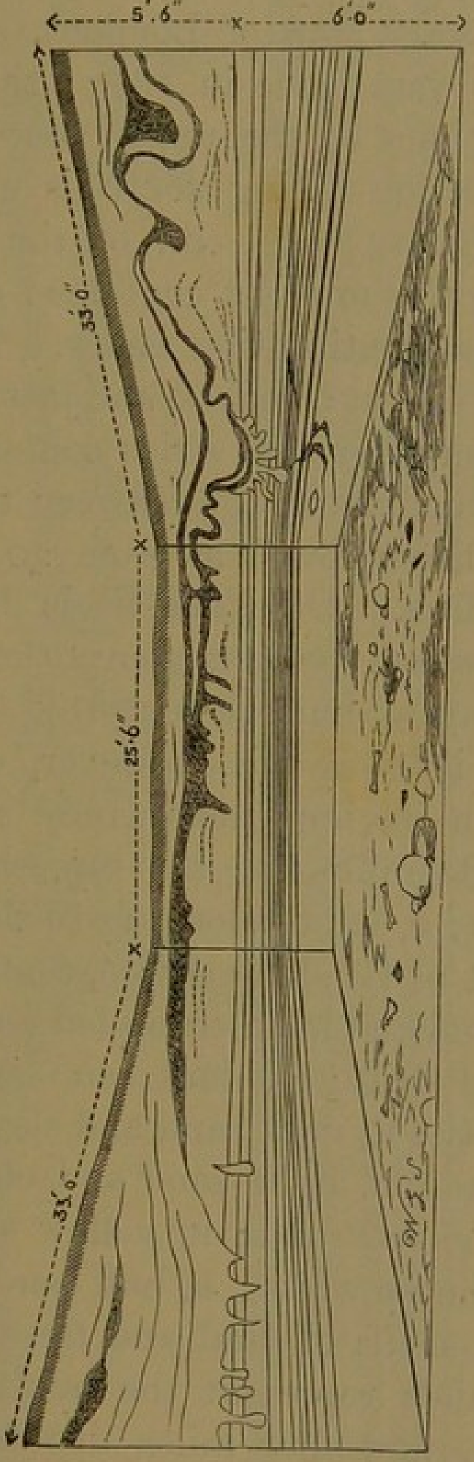


FIG. 140.—Sand-pit east of Stoke Newington Common, showing the contorted drift over the stratified implementiferous sands.

sand or mud of the Lea or Thames, the tools and flakes are all as sharp as on the day they were made.

Very near the sections already illustrated, viz., at 270 yards west by north from Clapton Railway Station, and just south of Caroline Street (marked on Stanford's Library Map of London), one or two other excavations were made in 1883; these showed characteristic sections of the upper contorted drift. In Fig. 140 a section facing south is engraved to scale, and in Fig. 141 the end of the section is further enlarged, to show the contorted drift above and the horizontal stratification below. The section shows a depth of 11 feet 6 inches, and just reaches the top of the stratum of gravel, which contains abraded implements intermediate in age between those of the floor above and those found at from 20 feet to 30 feet from the surface. The Palæolithic floor on Fig. 139, if present, would be just above the horizontal bands of stratification, but the contorted drift at this spot has swept it away; it, however, occurs in a perfect state with its implements only a few yards to the south. Beginning at the top, the reference letter R is *humus;* Q, mud belonging to the contorted drift; P, a pocket of London clay; O, contorted drift; N, Palæolithic sand and loam crumpled and disturbed by the contorted drift; M, dark sand and clay; L, light sand and clay; K, dark sand and clay; J, yellow sand; I, red sand; H, light sand and clay; G, dark sand and clay; F, red sand; E, yellow sand; D, red sand; C, sand almost white; B, buff sand, sometimes full of the fossil shells of land and fresh-water mollusca. These sands represent the sandy margin of the old Thames, now four miles distant from this spot.

The bed of gravel marked A on Fig. 136, and A on Fig. 141, is found at North-East London at an average depth of 12 feet, and descends to 20 feet, and

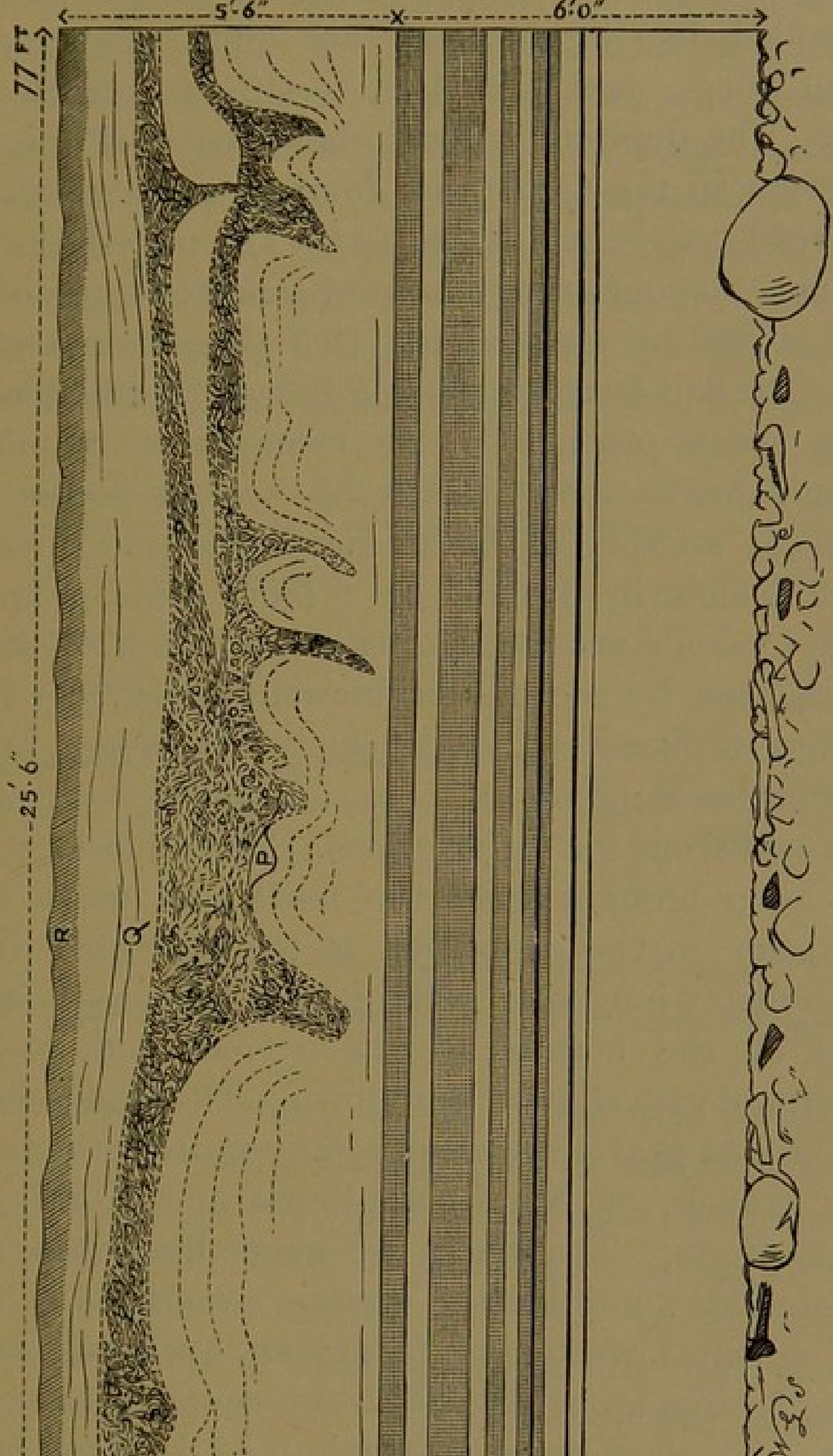


FIG. 141.—Part of sand-pit illustrated in Fig. 140, further enlarged.

even 30 feet; this drift contains, chiefly in its upper parts, lustrous subabraded implements of medium age. All the tools have been more or less moved and rolled by water; none are quite unabraded; broken bones, tusks, antlers, teeth, and driftwood occur. The deposit has been described by Professor Prestwich in the *Quarterly Journal of the Geological Society*, 1855, vol. xi. p. 107. The material is remarkable for containing blocks of sandstone, probably never moved by water alone; that these stones were pushed by half-frozen mud, or fell from floating blocks of ice, seems probable. One example at Stamford Hill measured 1 foot 5 inches, by 1 foot 4 inches, by 9 inches; another at Stoke Newington measured 1 foot 6 inches, by 1 foot, by 1 foot; some of these blocks of sandstone exhibit striæ. A block of white quartz, seen by me at Shacklewell, measured 1 foot 2 inches in diameter. At Hackney I have seen sandstone blocks weighing 2, 3, 4, and even 5 cwts. each, excavated from the lower gravel. These blocks must have been brought from the north and north-west long prior to the deposition of the contorted drift, and probably long after certain other immense blocks, found at the bottom of the 20-feet and 30-feet deposits of gravel, were laid down. The stones forming the Lea gravel are chiefly derived from the high-level gravels of North Middlesex and North and South Herts. The flints are generally subangular and abraded; hornblendic granite sometimes occurs, with silicified wood; white quartz, quartzite, sandstone, Lydian stone, Hertfordshire conglomerate, and various fossils derived from the Chalk, Greensand, London clay, and other deposits. Generally in the deepest pits the third, and, as I believe, the oldest class of Palæolithic implements is found: the examples are not sharp, like the implements from the floor, or slightly abraded and lustrous, like the implements found on the top of the 12-feet stratum at Stoke Newington Common; they are, on the contrary, greatly abraded, rude in make, and deeply ochreous or brown in colour. None of the implements in the two first positions, unless "derived," are ochreous.

An instructive section was exposed in 1882 near Creighton Road, a short distance to the east of Stoke Newington Common, as illustrated in Fig. 142:

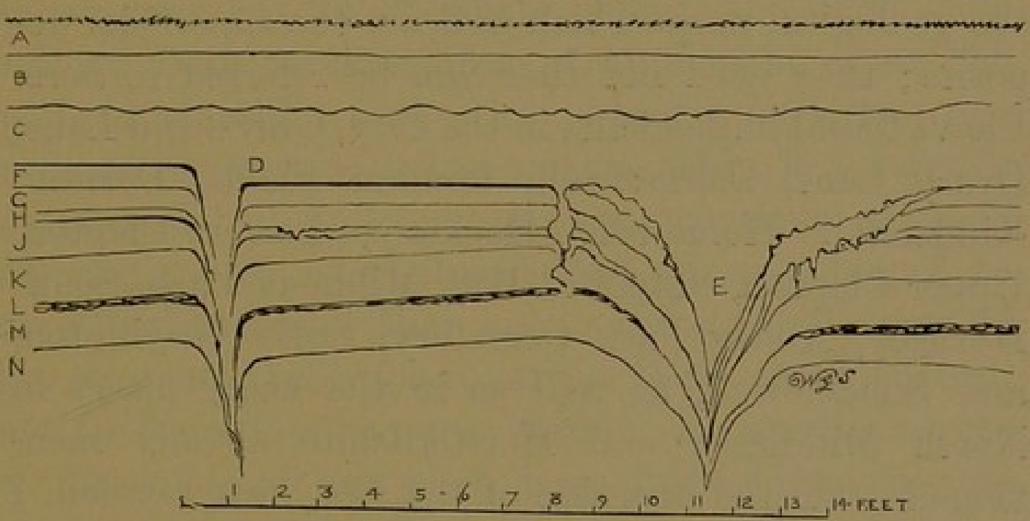


FIG. 142.—Section near Creighton Road, Stoke Newington, looking east.

A is *humus*; B, contorted drift; C, buff sand tinted with London clay and whitish or grey at the bottom, and in the fissure at the left of illustration; at D a slight but remarkable fault of four inches is shown: this fault, perhaps an ancient sun crack, in the style of those met with at Caddington (see Fig. 49), is obviously older than the deposition of the contorted drift; E is very stiff hard reddish-brown clay, surmounted by buff sand: the basal material at E is a forerunner of the contorted drift above, which has travelled in a south-westerly from a north-easterly direction; this forerunner became covered with buff sand before the uniform deposition of the contorted drift at this place; F, buff sand; G, buff sand and loam; H, red sand; J, buff sand; K, sand and loam; L, Palæolithic floor in and on a thin red sandy stratum; four implements and numerous flakes were found on this line; M, buff sand and loam; N, buff sand. It will be observed that the Palæolithic floor became slightly faulted, and ploughed through after five sandy strata had been gently water-laid upon it.

The disposition of the river gravels is shown on the geological maps which indicate the superficial deposits; they need not therefore be referred to here. I have found implements in the City, Gray's Inn Lane, Drury Lane, Clerkenwell, London Fields, Dalston, Kingsland, Homerton, Hackney, Lower Clapton, Upper Clapton, Stamford Hill, Mildmay Park, South Hornsey, Abney Park Cemetery, Stoke Newington, and Shacklewell, as well as in the many places in North Middlesex and Hertfordshire already mentioned. On the east side of the Lea, near London, I have found implements at Plaistow, Stratford, Leyton, Leytonstone, Wanstead, Walthamstow, Highham Hill, West Ham, Forest Gate, and Upton. Leaving the Lea valley for the valley of the closely adjoining Roding, farther east, I may add Barking, East Ham, and Ilford, and still farther east Rainham, Gray's Thurrock, Little Thurrock, Tilbury, Mucking, Orsett, Southend, and other places. All these localities were first lighted on by myself, for no implements had been traced with any certainty, even to either the Lea or Roding, till I found them *in situ*.

C.—Stone Weapons and Tools—The Most Ancient Implements.

The most ancient implements are undoubtedly found at North-East London, at the bottom of the excavations, amongst coarse gravel and very large stones, at a depth varying from twelve to forty feet, resting on London clay.

The oldest implements are known at once by their great amount of abrasion, their grey-brown, deep brown-ochreous, or chocolate colour, and their rude make. Both familiar forms of implement occur, the pointed club-like form with a heavy butt, and the rude ovate or oval. The workmanship is generally coarse and bad, and the tools are sometimes so much abraded, as to have almost lost all resemblance to true implements. They are in the style of some of the sea-tossed tools found on the beach at Hill Head, not far from Southampton Water. No small scrapers or fine tools of any class have been found by me amongst these rude, abraded, chocolate-ochreous tools. An illustration of a dark-brown ovate, highly abraded tool of the oldest class, found in the valley of the Lea at Leyton in Essex, is given in Fig. 143.

It is easy to prove that these deep brown implements had already attained enormous antiquity at the time when tools of lesser age were made and deposited in the same river gravels in which these older ones are now found. In Fig. 144 an example found by me at Canterbury is engraved, the specimen is now in the collection of Sir John Evans. The tool is greatly abraded, dull, and deeply ochreous, and belongs to the oldest class. The majority of the implements found at Canterbury are but slightly

FIG. 143.—Implement of oldest class, Leyton, Essex. Half scale.

abraded, they are lustrous and usually non-ochreous.

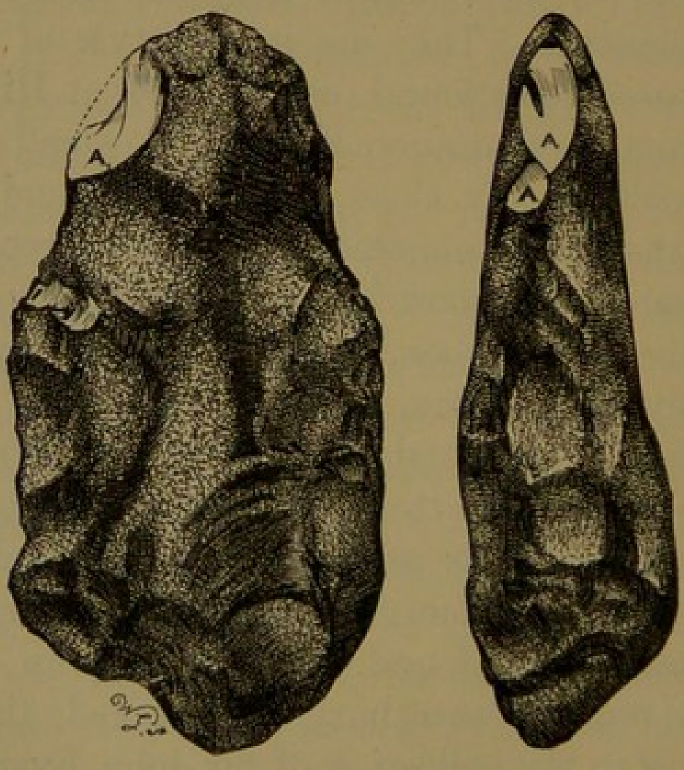


FIG. 144.—Implement of oldest class, Canterbury. Half scale.

The chipped parts shown at A, A, were accidentally detached at the time when the implementiferous gravels of Canterbury were laid down; these chipped parts are lustrous and non-ochreous. The injured parts are of the same age as the commoner Palæolithic implements of Canterbury and London. Some of the tabular pieces of ochreous flint, with lighter coloured battered edges, found on the plateau near Ightham, in Kent, agree perfectly with the mineral condition of the tool here illustrated. If the rule of colour, amount of abrasion, and style of design can be depended upon, none of the ochreous tabular flints of Ightham, whether natural or artificial, are older than this tool, and the work on the edge of the Kentish tools is far less old; the work on the battered Ightham edges is indeed only as old as the newer work at A, A, in Fig. 144. Some of the Ightham examples, and some of the battered edges, are no doubt human in origin, but the oldest can be no older (as I think) than tools of the class here illustrated, and the chipping of the majority (when human) far less old. Tabular pieces of flint with battered edges are common in all implementiferous gravels; they occur with the better classes of tools, and as the better class of tool occurs with the Ightham tabular examples, it is obvious that the makers of the Kentish plateau implements could do far better work than the mere battering of edges, when so inclined.

A second deeply ochreous and greatly abraded implement of the oldest class from Canterbury, is illustrated in Fig. 145; the original is now in the British Museum.

Implements of the greatest antiquity are sometimes found in the upper contorted drift, but as the contents of this material at London represent the ancient draggings of the hills and plains of Bedfordshire, Hertfordshire, Middlesex, and Essex, it is obvious that Palæolithic implements of various ages, but nothing newer than Palæolithic, may occur in it. Most of the tools in the contorted drift near London agree with the ochreous pointed and ovate tools already described as belonging to the contorted drift

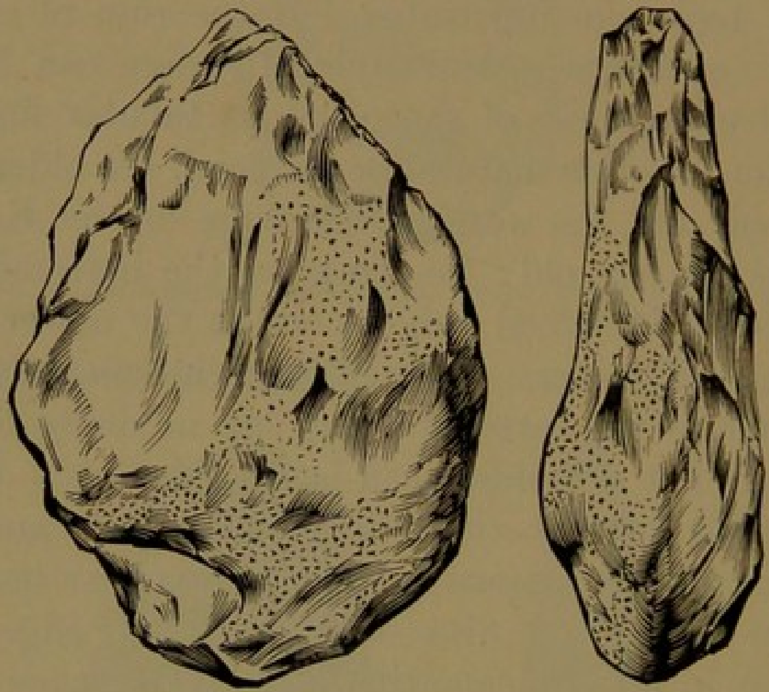


FIG. 145.—Implement of oldest class, Canterbury. Half scale.

of the hill-tops at Caddington, and considered by me to be amongst the implements of greatest antiquity as found in this country up to the present.

A remarkable wedge-like tool, found by me in the contorted upper drift of Stoke Newington Common, is illustrated in Fig. 146. The weight of this somewhat massive tool is 1 lb. 13¾ oz.; it is now in the British Museum.

IMPLEMENTS OF MEDIUM AGE.

About twelve feet from the surface, at North-East London, the top of a stratum, containing Palæolithic implements less in age than the ochreous implements found at the base of the deepest excavations as just described, is commonly reached. This is the stratum B, B, on Fig. 138. The constituent stones agree with

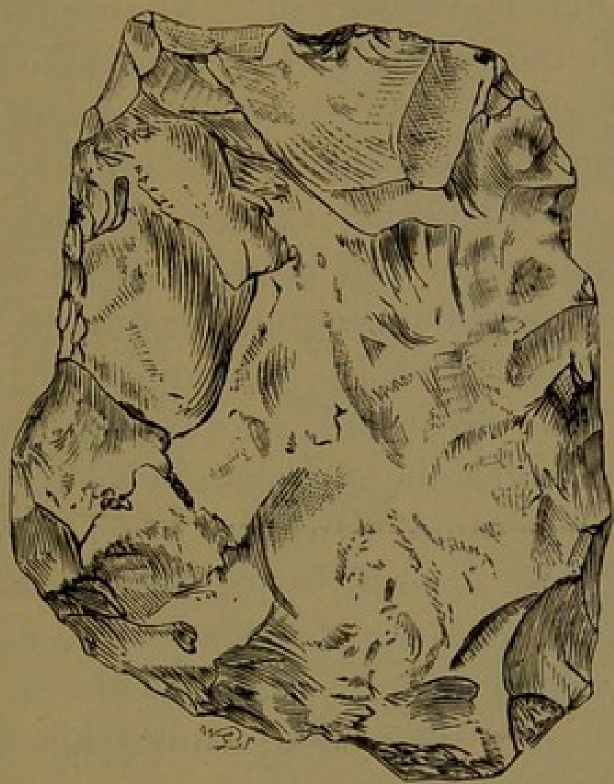


FIG. 146.—Wedge-like tool from contorted drift, Stoke Newington. Half scale.

those found on the Palæolithic floor eight feet above B, B, but the blocks of flints are, on the average, considerably larger. The gravel is subangular, somewhat abraded and lustrous, and the naturally broken flints are not ochreous. Broken bones, tusks, antlers, and teeth occur, but they are rare, and generally fragmentary. A set of fossil shells, agreeing with the list given later on, occurs in the sandy seams, but shells generally are much rarer than on the floor above.

In the 12-feet gravel a series of implements occurs intermediate in age between the ochreous tools below and the keen-edged tools on the Palæolithic floor above. Although the 12-feet tools are doubtlessly older than those belonging to the Palæolithic floor, yet I am not inclined to think that the difference in age is very great. Additional antiquity is, however, indicated by the mineral condition of the flint of which they are made, as well as by the nature, design, and make of the implements themselves. I consider the 12-feet implements to be also intermediate in age between the ochreous and the sharp-edged Caddington examples. On the Palæolithic floor at Stoke Newington, all the implements as a rule are small, many exceedingly small, and scrapers are as abundant as are Neolithic scrapers in any British camp. In the 12-feet stratum the implements are generally considerably larger than those found on the floor above, and scrapers are rare. The horse-shoe scraper of Neolithic form is exceedingly rare in the 12-feet stratum; this fact agrees exactly with what has been noted at Caddington. All the weapons and tools, as a rule, are highly lustrous and somewhat abraded. The work upon them is of a higher class than the flaking exhibited upon the ochreous tools, yet, though excellent, it is not nearly so fine as some of the elaborate work on the tools from the Palæolithic floor above; the very fine and neat secondary chipping, as found on the latter tools, is unknown in the 12-feet series.

Both forms of implement occur, the pointed and ovate. Very rarely an implement occurs of axe form with a rude chisel-edge. A massive pointed implement, found by me in gravel excavated at Lower

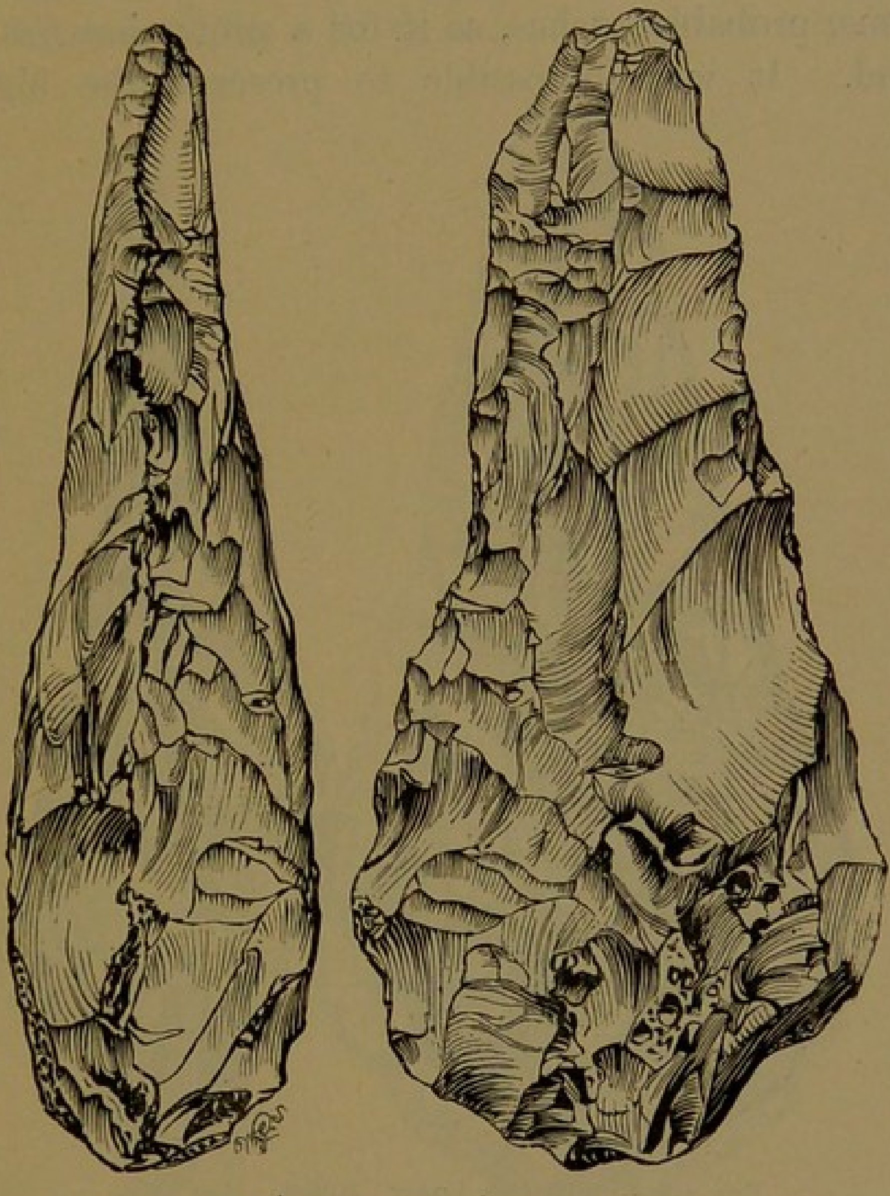


FIG. 147.—Massive implement, Lower Clapton. Half scale.

Clapton, and now in the collection of Sir John Evans, is illustrated in Fig. 147. It could be used as a formidable club as well as for piercing.

It is certain that the butt-end of heavy pointed implements was frequently used for hammering: the results of repeated battering at the butt is not uncommon amongst certain classes of implements. I have an implement from Bedford which had the butt-end when first found wrapped round with herbaceous stems, probably rushes, as if for a protection for the hand. It was impossible to preserve the highly

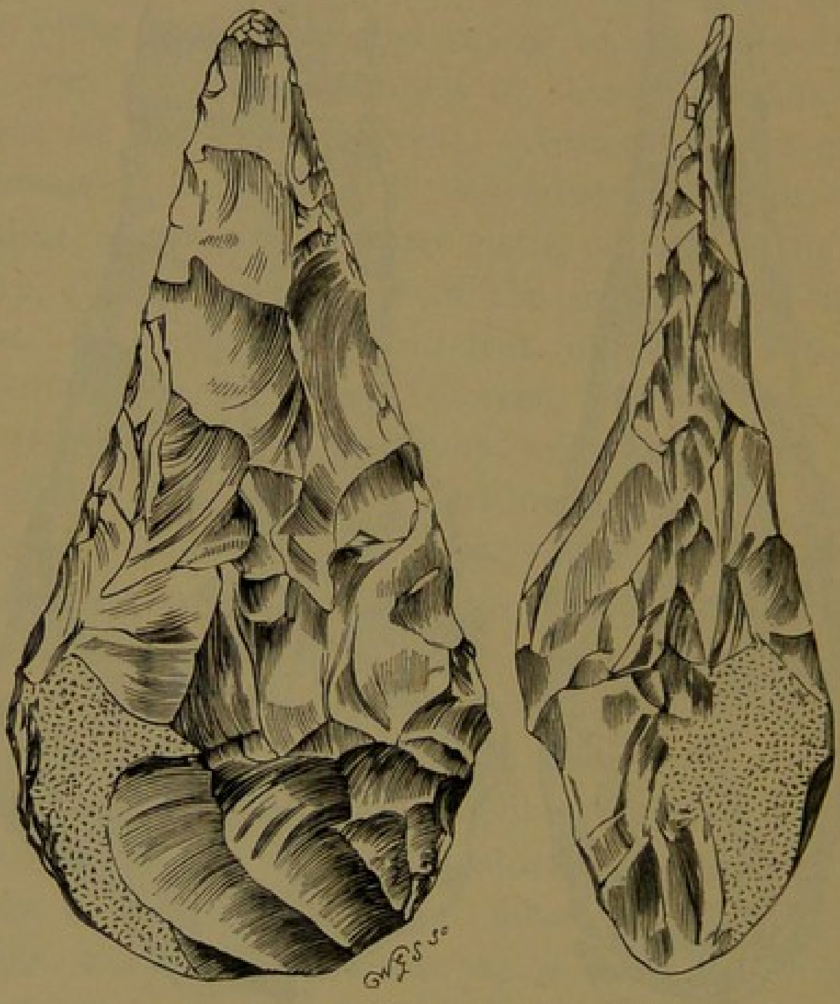


FIG. 148.—Implement, Lower Clapton. Half scale.

friable and dusty material, but the implement still retains traces of the rushes. The worked part in Fig. 147 is beautifully variegated in colour, bay-brown and livid yellowish somewhat like tortoise-shell, and slightly speckled with white; it is highly lustrous, and the slight trace of bark is white or ochreous-white. The weight is 1 lb. 15¼ oz. Another pointed implement or weapon, less in size than the last, and now in the collection of Sir John Evans, is illustrated in Fig. 148. It is remarkably well and symmetrically made, and weighs 1 lb. 5¼ oz. A beautiful somewhat

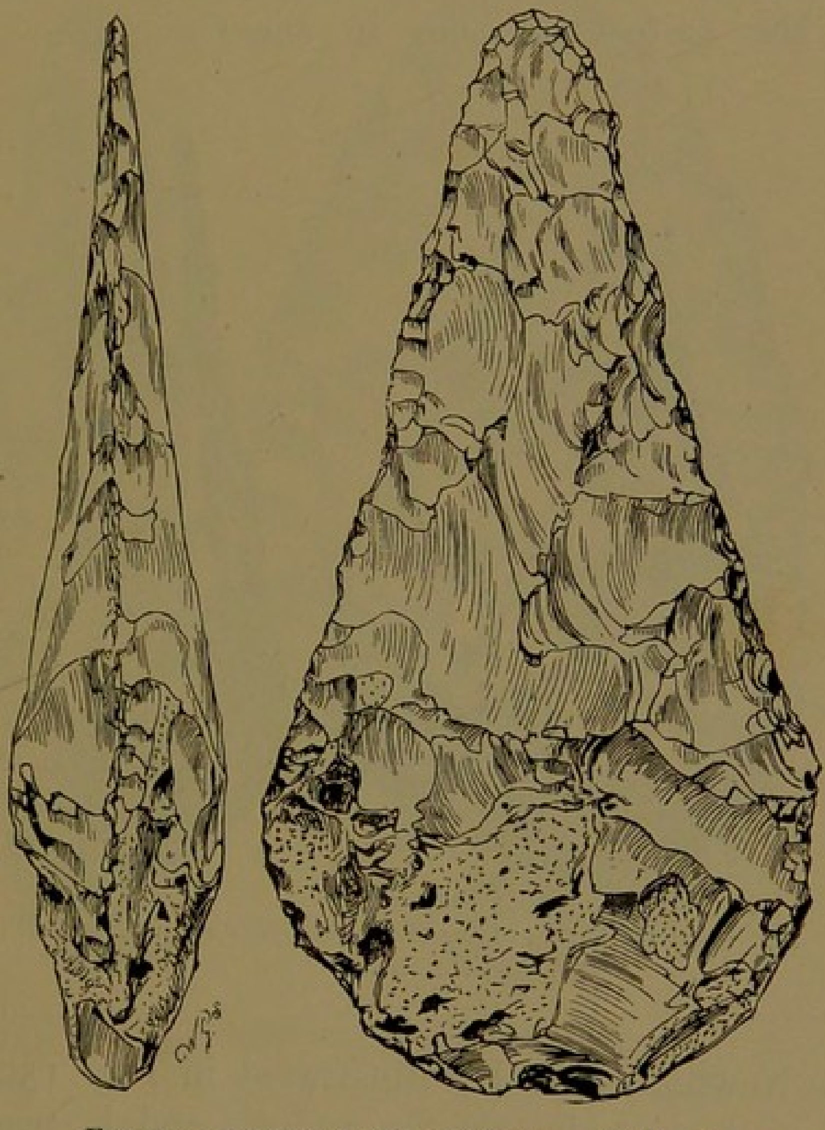


FIG. 149.—Implement, Upper Clapton. Half scale.

thin pointed weapon from Upper Clapton is illustrated in Fig. 149. It weighs exactly the same as the last, viz., 1 lb. 5¼ oz. Nearly all the Palæolithic implements found in England are made of flint: in the cherty gravels of Dorset, Somerset, and Devon, they are, however, made of chert. On very rare occasions a Thames valley implement is made of quartzite. I have seen a few flakes of quartzite in the Stoke Newington gravels, but, as far as I know, only one implement of this intractable material has been met with there. This was found by me in gravel dug from the 12-feet stratum in the Creighton Road,

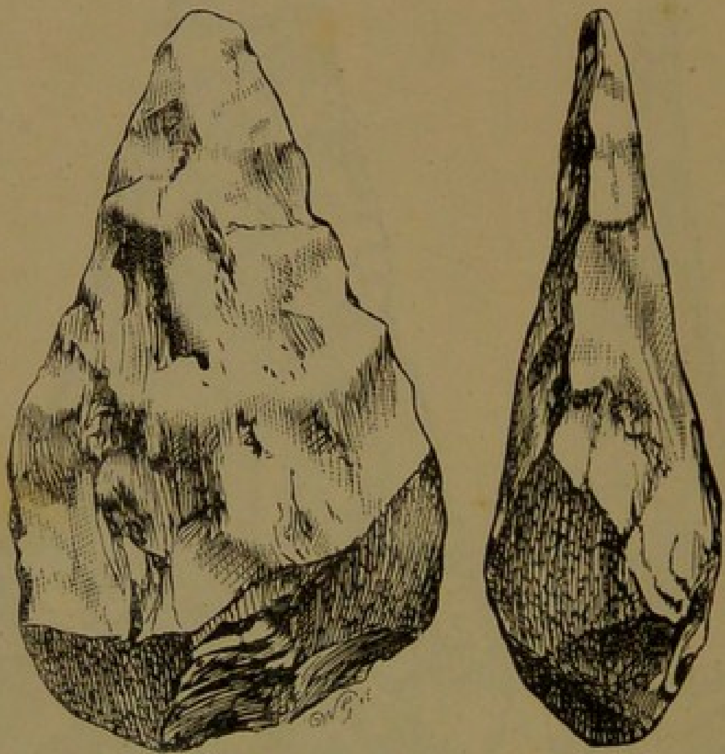


FIG. 150.—Implement of quartzite, Stoke Newington Common. Half scale.

Stoke Newington, and is illustrated in Fig. 150. It is a good example, weighs 13 oz., and is made of compact quartzite: it is now in the British Museum. Why Palæolithic men now and then made quartzite implements in positions where flint was abundant, is hard to say; they were possibly made for amusement, or as proofs of unusual skill and dexterity; they were certainly not made from necessity, for their manufacture must have been very much more difficult than in the ordinary tools of flint. All pointed implements with heavy butts were probably designed for use in the hand; none seem to be suitable for mounting.

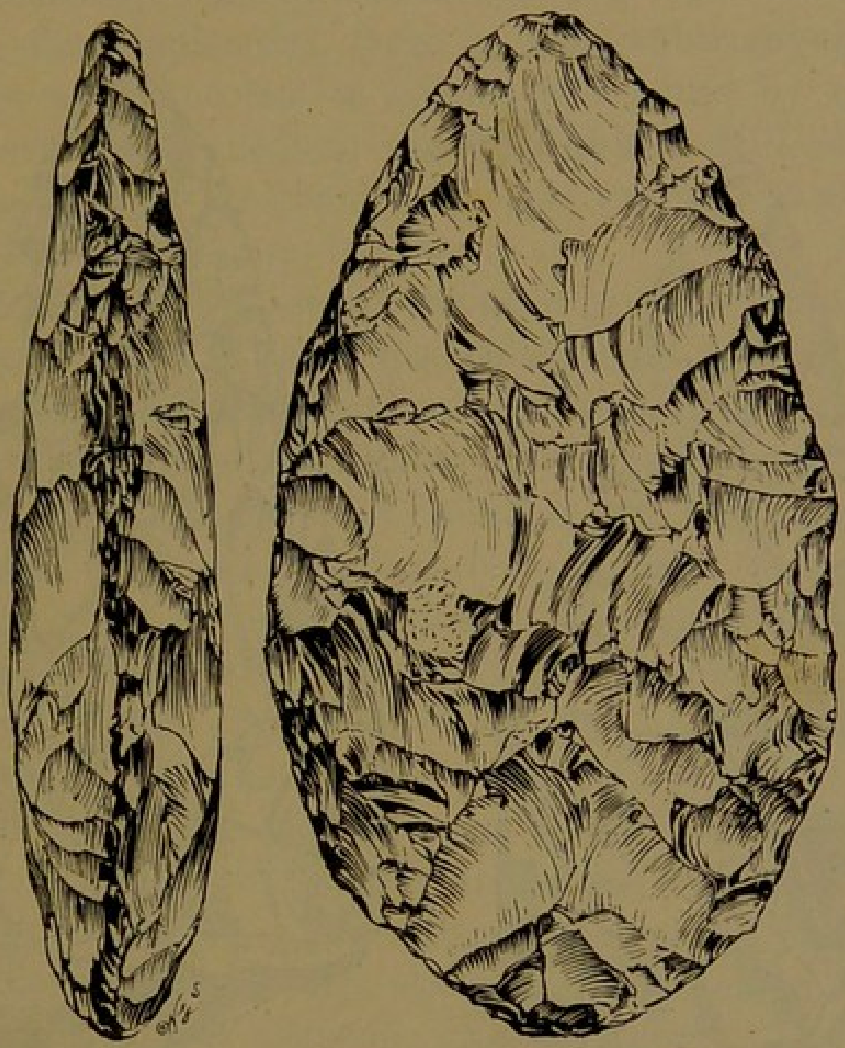


FIG. 151.—Implement, Stamford Hill. Half scale.

A large ovate implement, from the 12-feet stratum at Stamford Hill, now in the collection of Sir John Evans, is illustrated in Fig. 151. It is indigo-blackish in colour, with dull liver-grey spots and a dull ochreous bark on an unworked patch on one side; the worked part is lustrous and slightly abraded; the weight is 2 lbs. 1 oz. An implement of the class illustrated, with both sides the same in shape, could be readily mounted with a bent hazel or sallow stem : so fixed, the stones could be mounted as axes ; I greatly doubt, however, whether these tools were mounted in Palæolithic times. Many oval and ovate

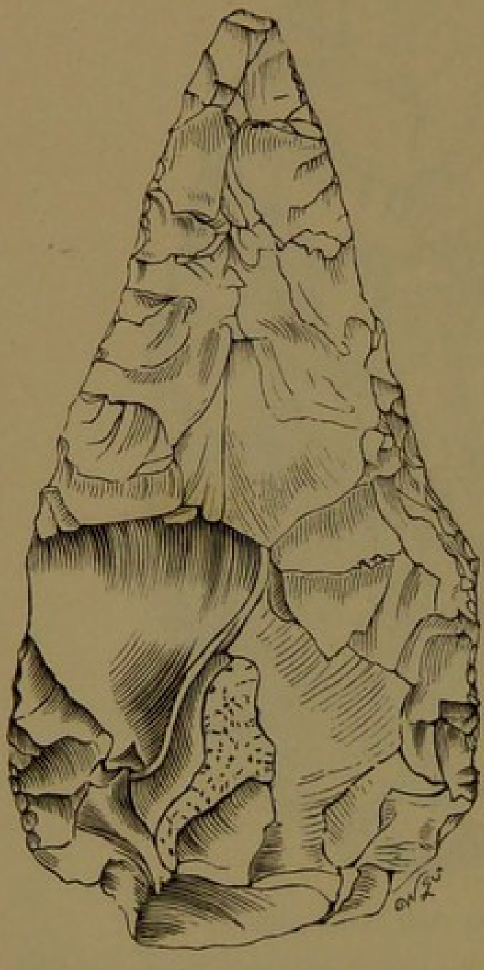


FIG. 152.—Implement, Clerkenwell. Half scale.

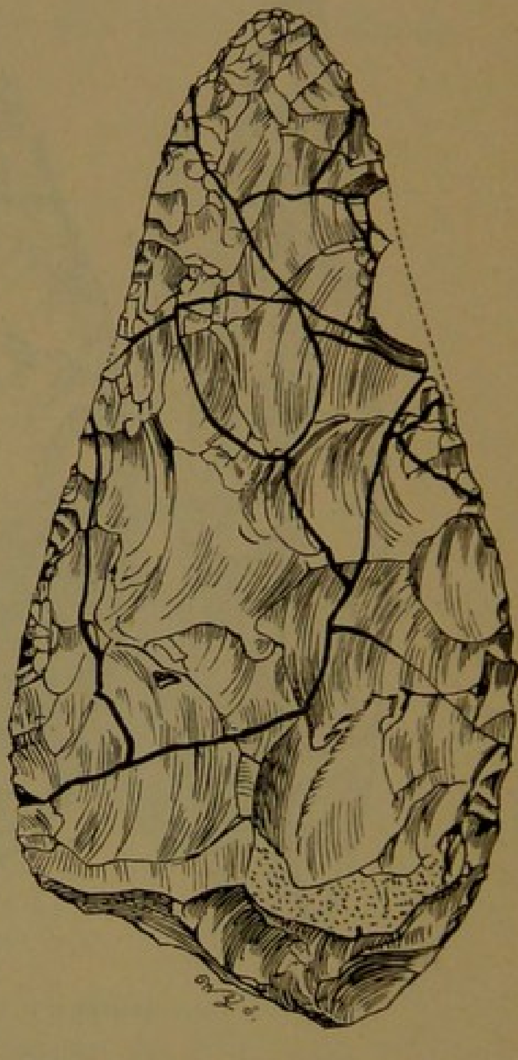


FIG. 153.—Restored implement, Lower Clapton. Half scale.

tools have an inconvenient hump on one side which would make them unfit for mounting. They could possibly be mounted in adze-fashion, but the general design of oval and pointed implements does not suggest to my mind the probability of mounting at all.

Mr. G. F. Lawrence has been fortunate enough to find an excellent pointed implement of medium age at Clerkenwell; this passed into my collection, but it is now in the safe keeping of the British Museum, Bloomsbury. It is illustrated in Fig. 152.

A fine implement, large in size, subtriangular in shape and chocolate in colour, was found by me in the stratum of medium age at Highham Hill, on the north-west of Walthamstow; this example is also in the British Museum.

It is usual to illustrate the most perfect examples in books. Many of these specimens, found as they have been in newly gravelled roads, on gravel heaps, or in gravel pits, have been almost miraculously saved from destruction. It is very common to find recently broken implements. Superb specimens, with the points gone, or beautiful long points with no butts, are frequent. It is almost futile to look for the missing pieces in roads or on heaps. I have hundreds of broken implements in my collection, and it is a melancholy task to look over them. Undoubtedly most of the better, larger, and more delicate implements get broken. I have the lower part of a butt-end of what was once a large and superb implement, found by me at Upper Clapton; the fragment weighs 1 lb. 1¾ oz. I have also the lower part of a very large ovate implement, found at Chard, which weighs 2 lbs. 8 oz. A broken and restored implement, is illustrated in Fig. 153. I found this specimen in a cart-rut at Lower Clapton, in twenty-two pieces. The wheel of a coal-cart had just passed over the tool; I secured and reattached most of the pieces; a small part of one edge was reduced to dust.

Sometimes in London, as in all other Palæolithic localities, implements are found in the unfinished state illustrated in Fig. 154. This I found in excavated gravel on the site of the Orphan Asylum at Lower Clapton. The place is now a Salvation Army Congress Hall. The point of the tool—as indicated

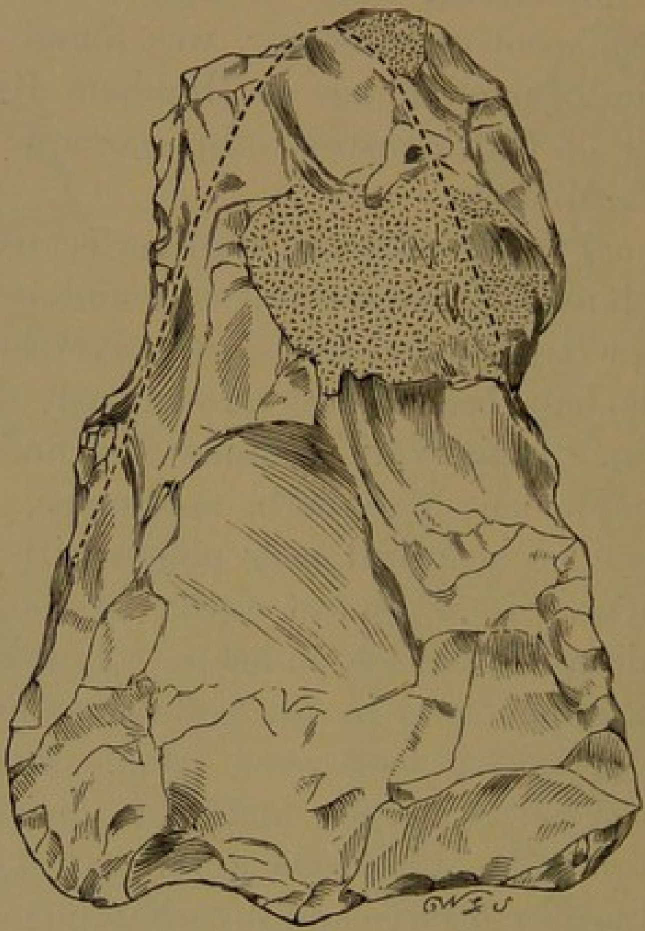


FIG. 154.—Unfinished implement, Lower Clapton. Half scale.

by the dotted lines—was never finished. The original is now in the British Museum.

Occasionally implements are found in an initial or blocked-out state, without any secondary or finishing trimming, as shown in the example illustrated in Fig. 155, found by me at Acton, and now deposited in the British Museum, Natural History, Cromwell Road. A blocked-out implement, of exactly similar nature as found by me at Bedford, is illustrated in Fig. 156. I have found several such at Caddington and many others elsewhere.

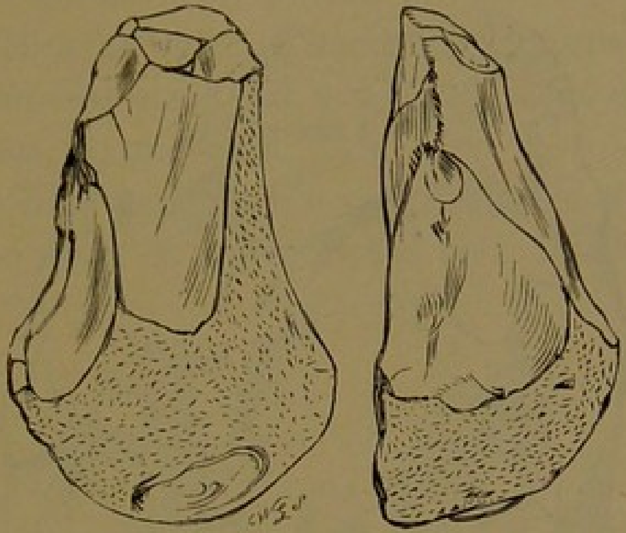


FIG. 155.—Implement roughly blocked out, Acton. Half scale.

Chopping tools are frequent: they vary in size, and though generally large and heavy, a few are of small

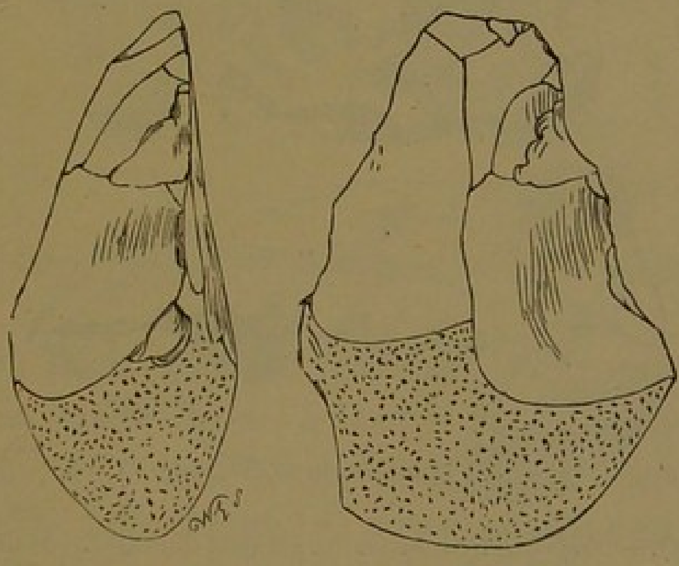


FIG. 156.—Implement roughly blocked out, Bedford. Half scale.

or medium size. They are generally somewhat rude, but a few are as well finished as ordinary implements. A good and massive example from Stoke Newington, now in the collection of Sir John Evans, is illustrated in Fig. 157. The straight part, or back of this tool, more or less covered with natural crust, was no doubt

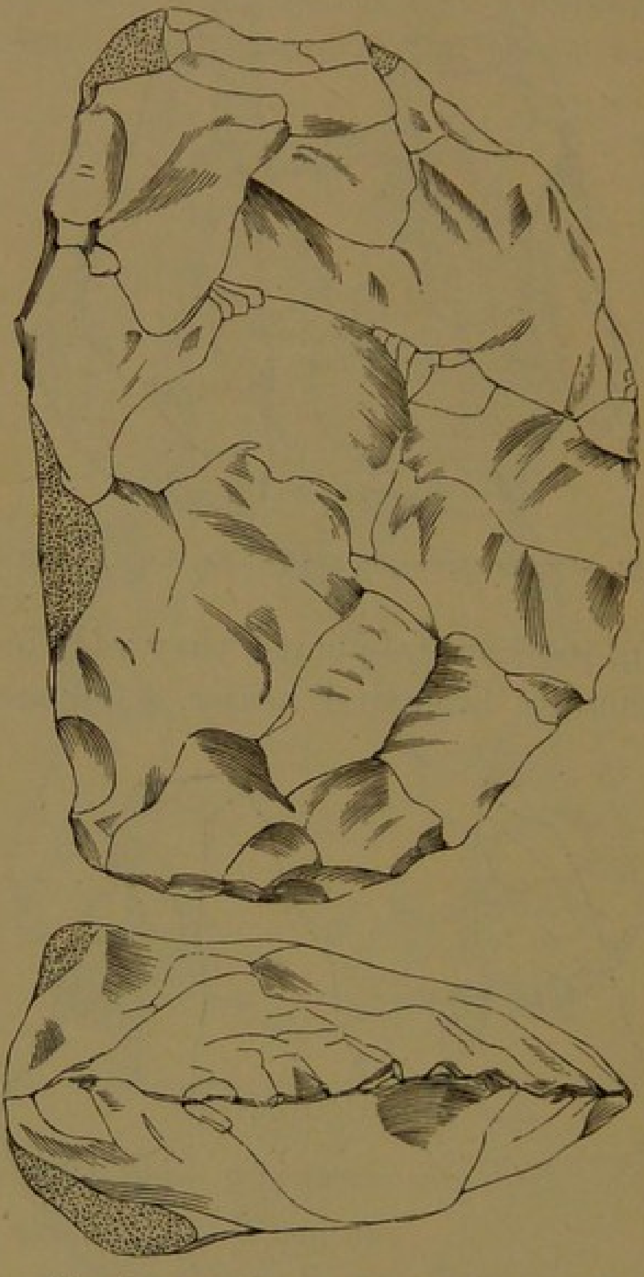


FIG. 157.—Chopping tool, Stoke Newington Common. Half scale.

held in the hand for use, and the semicircular edge was used for chopping or hacking. The weight is 2 lbs. $3\frac{1}{2}$ oz.

Hacking or chopping tools were probably held as illustrated in Fig. 158. The edge of the rude and massive instrument, shown in the illustration, is distinctly battered by chopping. The original, found by me at Stoke Newington, is now in the British Museum, Bloomsbury. The figure is engraved to one-quarter the real size, and not, as in most of the other illustrations, to one-half.

An axe-like tool, with a cutting edge at the broad end in the style of a Neolithic celt, is illustrated in

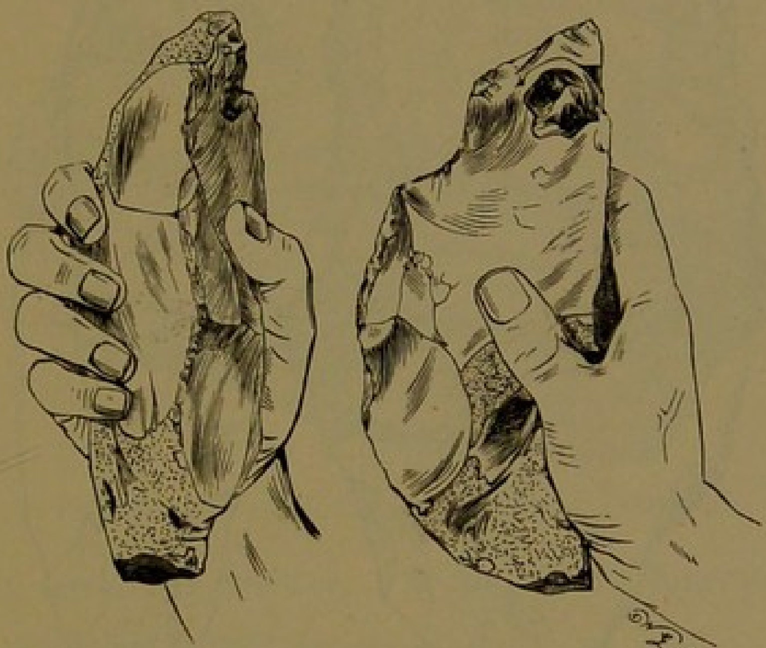


FIG. 158.—Method of holding chopping tool. One-quarter scale.

Fig. 159; such tools are very rare. The example illustrated is made from a very large flake, slightly trimmed. It is sub-ochreous, with no original crust, and weighs 1 lb. 2¾ oz. I have another in the same style from the beach at Hill Head, Hants. A massive axe-like tool, and, like the last, a tool or weapon that might readily be fixed in a handle of twisted hazel, is illustrated in Fig. 160. It was dug from the 12-feet stratum at Homerton, and found by me, like most of my London implements, in a newly metalled road. In style it might be considered a forerunner of the battle-axe and *martel-de-fer*. The worked part of this tool or weapon is lustrous whitish-grey on the side illustrated, and ochreous on the other; the bark is grey ochreous; the weight is 2 lbs. 11¼ oz. If mounted it would make a formidable weapon of offence. I

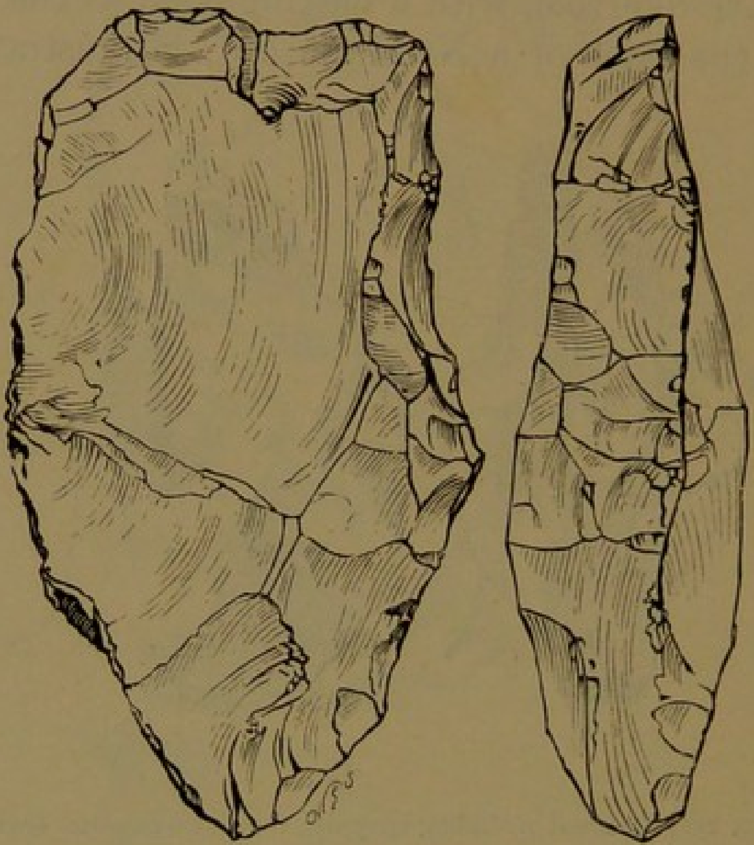


FIG. 159.—Axe-like implement, Lower Clapton. Half scale.

have Neolithic examples of the same class which were undoubtedly made for mounting.

No small scrapers have been found or seen by me from the 12-feet stratum at North-East London; all my scrapers are of large or medium size, many considerably resemble ordinary implements—with one edge only trimmed—as in side scrapers. But the obtuse scraping edge of a scraper, in contrast with the cutting edge of an ordinary tool, is always con-

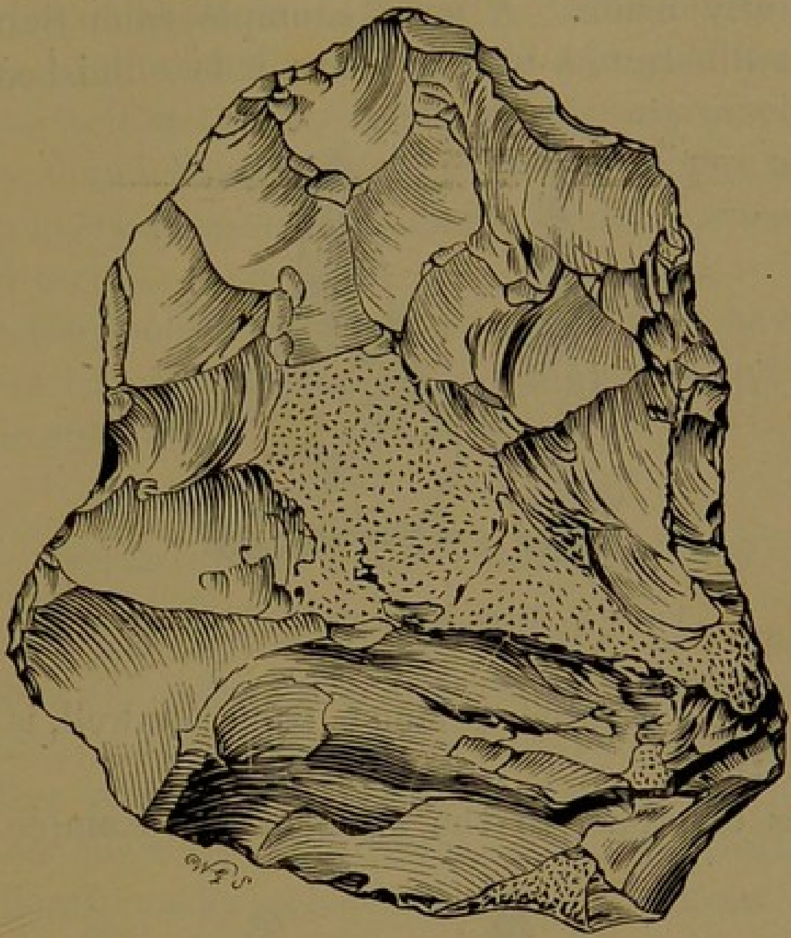


FIG. 160.—Axe-like implement, Homerton. Half scale.

clusive as to its nature. A large and heavy scraper

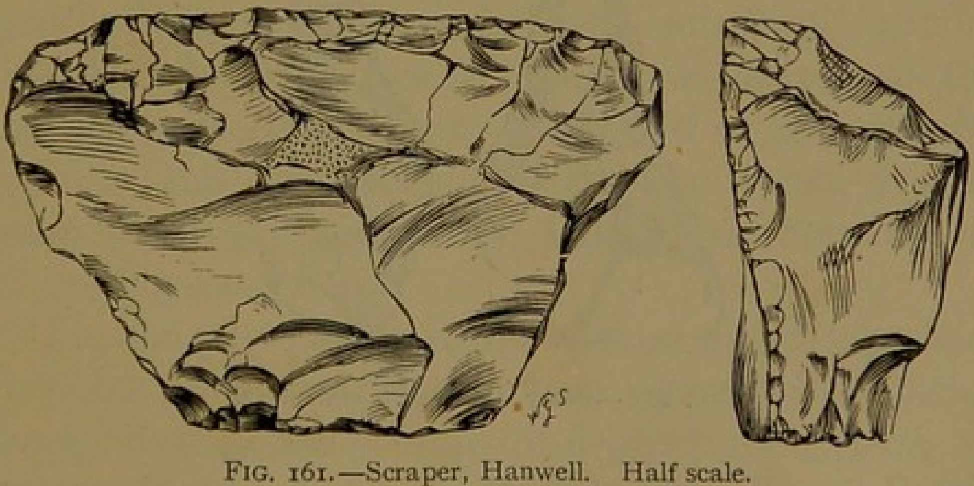


FIG. 161.—Scraper, Hanwell. Half scale.

from Hanwell, made with great skill, is illustrated in Fig. 161.

Borers are somewhat rarely met with; some are beautifully made. A good example from Stamford Hill is illustrated in Fig. 162; a less finished, but

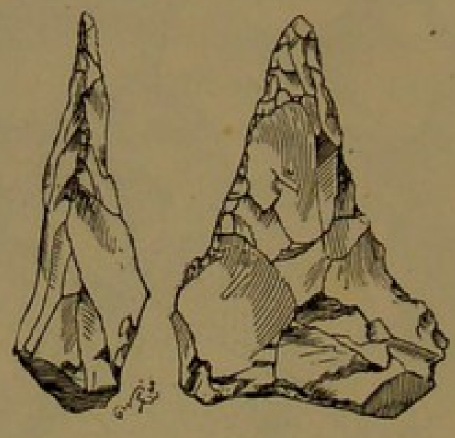


FIG. 162.—Borer, Stamford Hill. Half scale.

more acutely pointed specimen, from Hanwell, is given in Fig. 163.

Discs of stone, in the style of the example illus-

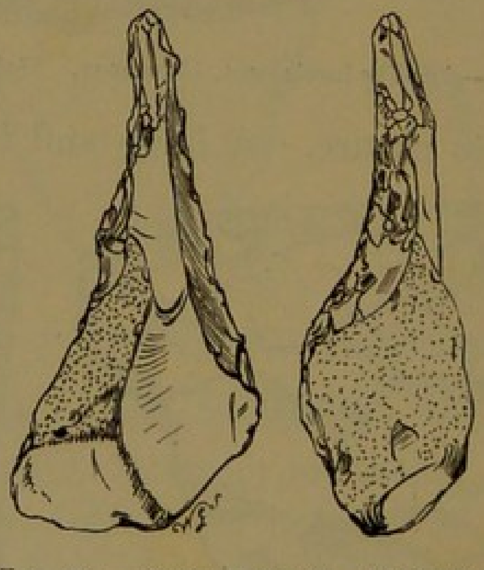


FIG. 163.—Borer, Hanwell. Half scale.

trated from Caddington, Fig. 63, occur in all parts of the implementiferous gravel of London.

The famous implement found in Gray's Inn Lane, at the close of the seventeenth century, and the majority of implements found in the Thames valley, belong to the medium age here adverted to. The older as well as the newer implements are much rarer. I have found Palæolithic implements of this medium age in every part of the London district where river gravel occurs.

All the tools from the 12-feet stratum have been more or less moved by water; none are found on the precise spot where they were made.

Implements of Least Palæolithic Age.

Under the contorted drift of the Lea valley at London, the Palæolithic floor is met with, rarely at the surface, sometimes at two or three feet, and at four feet at Stoke Newington Common. It descends in some places to ten, twenty, or even thirty feet. The depth varies according to the contour of the Palæolithic living surface, or according to the floor being more or less buried by river deposits from the Thames of old times. Modern accumulations have in some places deeply buried it, and subaëreal denudation has in other places brought it nearer to the present surface. The removal of surface material, by builders and brickmakers in modern times, has in other positions brought the Palæolithic floor nearer to the present surface.

The abundant fossil shells of land and fresh-water mollusca prove the place to have been, in Palæolithic times, close to the margin of a great river, with its tributary streams, brooks, and drains. The men and other animals appear to have lived near the river-side for the convenience of the water. The human folk, too, possibly considered themselves safer in the open places by the rivers and streams than in the adjoining woods in company with wild and dangerous animals.

Many of the implements belonging to the Palæolithic floor are highly lustrous, a smaller number are dull; the majority are of the natural colour of newly worked flint, as at High Lodge and Erith, but often with the faintest possible suggestion of ochre; a very few are derived and ochreous. The little highly lustrous quicksilver-like specks frequent on ancient stone implements are common, so are calcareous and ferruginous incrustations, and the moss-like dendritic markings produced by the crystallisation of peroxide of manganese. As a rule, every implement and flake is as sharp as on the day it was made, but a few show the slightest possible amount of abrasion, owing perhaps to some slight movement of the contorted drift by which they are now covered. As a rule, none of the artificially worked stones are scratched by the movement of other stones upon and around them.

The sharp implements at North-East London have been found in such positions, and with such certainty wherever the Palæolithic floor has been uncovered, that the idea is sometimes forced on one, as it is at Caddington, that all the makers of the implements suddenly died or left the place in fear of some impending danger, and left their tools on the very spots where they were actually being used. For instance, an accumulation of sharp flakes, several implements, hammer-stones, and what I take to be anvil-stones, have more than once been found together; the flakes have been replaced, and pieces of implements broken in Palæolithic times have been found near each other, and rejoined by myself. If the men went southwards in fear, it is clear that the first change which took place on the Palæolithic floor was the mere covering of it by fine river sand, often full of the shells of land and fresh-water mollusca. To the present day these shells are, as a rule, unbroken. Even the large fragile shells of *Helix nemoralis*, L., are found perfectly intact; there is no indication of any violent movement of the gravel and sand. It will be remembered that precisely the same conditions hold good respecting the covering of the Palæolithic floor on the hill-top at Caddington.

As a rule, most of the implements belonging to the Palæolithic floor at North-East London are small and thin, sometimes remarkably so; many are made from flakes worked on one side only, and this work is frequently as well executed as in the best Neolithic work. Both kinds of implement are present, the pointed and ovate, and although small tools are the rule, yet a few of the largest size have been found. Scrapers and trimmed knife-flakes are common.

A characteristic implement, now in the collection of Sir John Evans, from the Palæolithic floor is illustrated in Fig. 164. It has a somewhat heavy butt, and the beautifully incurved edges take a slight but elegant ogee form. As seen on edge, the stabbing or point part of the weapon is unusually thin and knife-like. Both larger and smaller forms occur, but with the same general characteristics; sometimes the point is considerably longer, and, as seen on edge, even thinner than in the example here illustrated.

A variety of this tool occurs with perfectly straight sides ending in a sharp point, so that the blade forms an isosceles triangle, almost geometrically perfect in shape, and, as seen from the edge, of almost knife-like thinness.

It is impossible to doubt that tools of this class were weapons designed as daggers or knives for use in the hand. It is only necessary to glance at and handle them to at once perceive their true nature as terrible weapons of offence. The implement illustrated

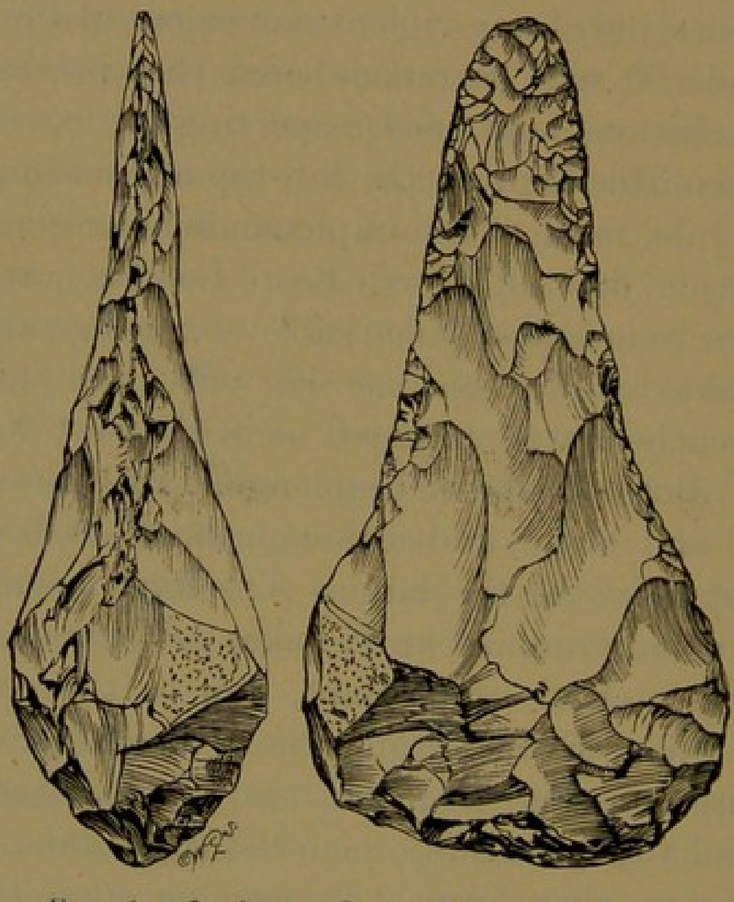


FIG. 164.—Implement, Lower Clapton. Half scale.

in Fig. 165, now in the collection of Sir John Evans, is a good example of one of the smaller sharp-edged tools; the engraving, however, gives a very poor idea of the sharpness and beauty of the original. Fig. 166 is an exquisitely fine trimmed flake now in the British Museum. Fig. 167 is a very small implement, most carefully worked on both sides;

the natural crust of the flint being left untouched at the butt; the weight is only $1\frac{1}{8}$ oz. These two latter examples are by no means the smallest or lightest

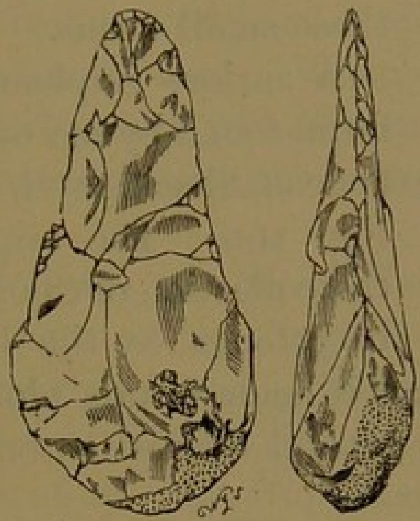


FIG. 165.—Implement, Stoke Newington Common. Half scale.

of the tools found on the floor; several have been found worked on both sides that weigh less than half an ounce each, as the example illustrated in

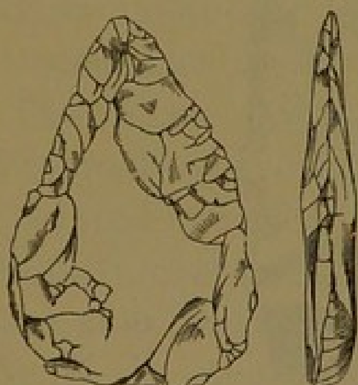


FIG. 166.—Implement, Stoke Newington Common. Half scale.

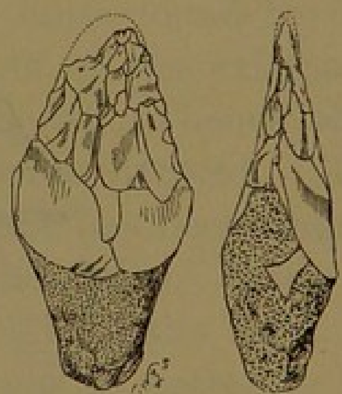


FIG. 167.—Implement, Stoke Newington Common. Half scale.

Fig. 168, found by Mr. G. T. Lawrence, and now in my own collection. It considerably resembles a somewhat large arrow-head or lance-head, but I greatly doubt the possession of any knowledge of the bow or lance by the men of Palæolithic times. No doubt, however, the idea of the lance and arrow head was evolved from these small forms.

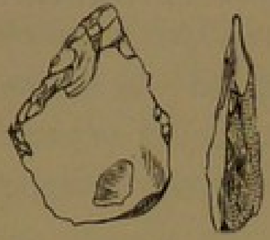


FIG. 168.—Implement, Stoke Newington Common. Half scale.

A curious implement of aberrant form, found by me on the Palæolithic floor at Shacklewell, is illustrated in Fig. 169. The original is now in the collection of the British Museum. It belongs to the keen-edged, unabraded class, and is made from a block of flint which exhibits a deep natural depression on one edge; this

FIG. 169.—Implement, Shacklewell. Half scale.

depression was at first a large natural hole. The implement is beautifully made, and exhibits the work of a skilled and experienced flint tool maker, but why a good workman should have selected such a defective and unsuitable piece of stone to work upon is difficult to imagine. It might have been desired to make an implement with a hole through it—many such implements being known, or it might have been made out of sheer wilfulness. When made, it must have excited curiosity, and possibly some little mirth, or even horse-play, amongst the companions of the maker.

As a contrast to some of the smaller tools, it may be well to refer here to the huge, heavy, and unabraded implement found and given to me by Miss Eleanor A. Ormerod, F.M.S., in gravel and brick-earth, thrown out of an excavation made for the new Hounslow and London Railway, immediately south of Osterley Park, near Isleworth, as illustrated in Fig. 170. The engraving shows the implement one-sixth of the real size, and exhibits a front and side view. The tool is two feet long, and weighs 32 lbs. Judging from what I saw of the sections, and by an implement and other flints found by me at the same place, I have no doubt of the existence of a Palæolithic floor near Isleworth, whence this massive tool and other relics were derived. The more pointed end of the implement has been rudely but skilfully trimmed to a wedge-like point. Towards the base at A (seen more distinctly on the right of left figure at same point), the signs of battering or hammering are remarkably distinct. I don't think this battering arose from the use of the tool as a club, but rather as an anvil. Several flakes have been removed from the extreme butt, and a few small inconvenient asperities have been knocked off elsewhere. Greater part of the flint is covered with the original brownish-ochreous bark, its colour proving it to have been derived from the ochreous gravel. The trimmed parts are lustrous, unabraded, and very slightly stained. The whole condition of the imple-

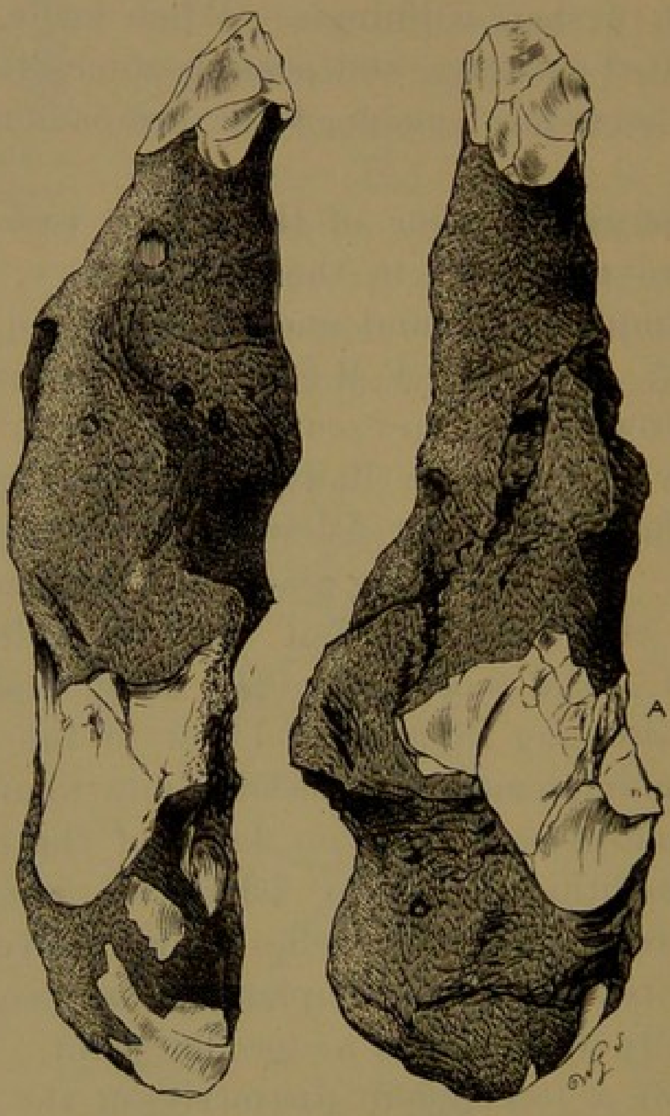


FIG. 170.—Large implement, Hounslow. One-sixth scale.

ment exactly agrees with stone tools found on the Palæolithic floors of Stoke Newington, Erith, Northfleet, and Gray's Thurrock. The tool appears to have been used as an instrument for heavy thrusting, as well as in a horizontal position as an anvil-stone. It would be idle to mention the possible uses of such a large tool as this, but any one who has formed ideas of the probable mode of life of primeval men will readily think of numerous purposes to which such an implement could have been put. The example is now in the British Museum.

A subtriangular implement with incurved sides, found by me near where the large example was lighted on, is now in the collection of Sir John Evans.

Sometimes, as already illustrated in Fig. 154, im-

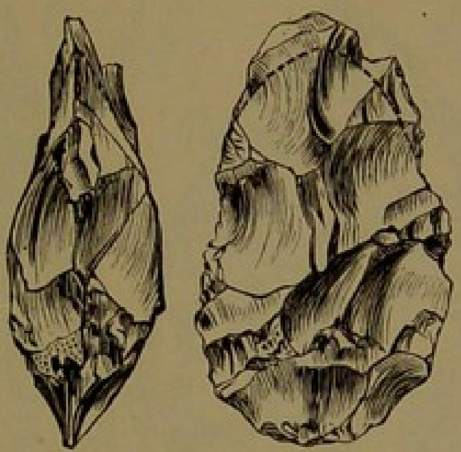


FIG. 171.—Unfinished implement, Stoke Newington Common. Half scale.

plements are found in an unfinished state. Another example of this class is illustrated in Fig. 171; it is a small thick, ovate tool, but the upper edge or point end is unfinished; the dotted line shows the form the implement would have taken had it been completed.

I have several other unfinished implements in my collection, one a large ovate from Warren Hill, near Mildenhall, Suffolk, and another from Kempston, near Bedford. In every instance the butt is complete with the upper part incomplete, as if the butts were flaked before the points, as is natural.

A great number of implements, known as trimmed flakes, are found on the Palæolithic floor. These are flakes of large size trimmed to an implement-like form on one side, whilst the other side is left perfectly plain; the examples are remarkably constant to one form. A characteristic specimen is illustrated in Fig. 172; part of the plain side is seen on the edge view, on the right of the illustration. This edge view agrees in a striking manner with the example from Caddington illustrated in Fig. 70. The

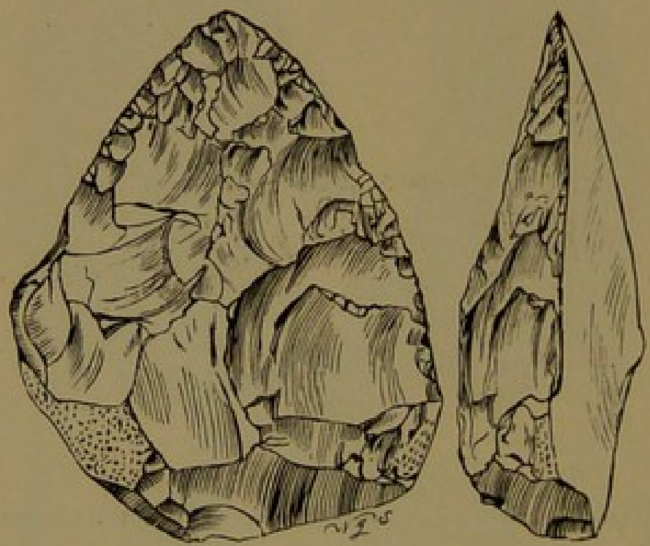


FIG. 172.—Trimmed flake, Abney Park Cemetery. Half scale.

specimens show that both the implementiferous deposits belong to the age of Le Moustier.

A tool, apparently intermediate between an ordinary implement and a scraper, occurs; it is generally large in size, but too narrow for an ordinary scraper, or even side-scraper. The instrument is, however, obviously a scraping, and not a cutting or piercing tool. An example from Stoke Newington Common is illustrated in Fig. 173. More elaborately made specimens are met with. An almost identical tool, but really a trimmed flake with a very acute point, also occurs. The scraper seems to have first appeared as a large side-scraper or a tool like Fig. 161,—a kind of implement worked with one obtuse edge.

The next form seems to be an ordinary scraper, of large size and unusually long. A roughly made example from Stoke Newington Common is illustrated in Fig. 174; in this the actual results of scraping are very apparent on the obtuse edges at A, A, A, as

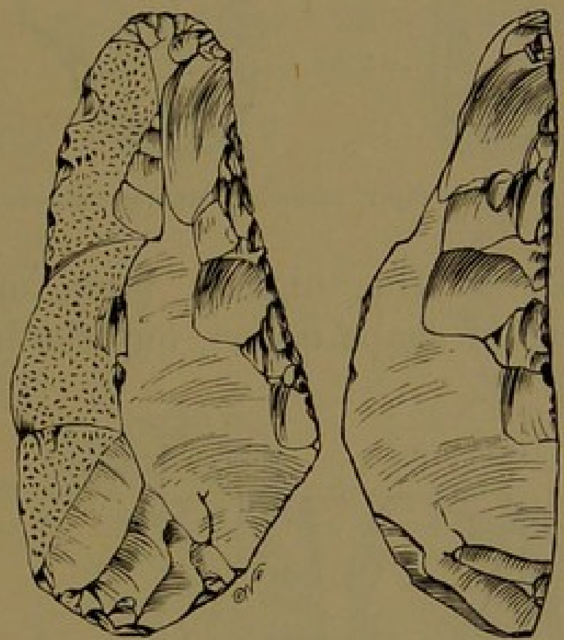


FIG. 173.—Scraping tool, Stoke Newington Common. Half scale.

well as on the more acute edges at B, B, B. A more finished specimen is illustrated in Fig. 175. A tool like this could be readily mounted on a wooden handle, as shown in the outline on the left, further reduced to one-quarter real size. Some barbarians still mount scrapers in this way, but I doubt whether Palæolithic men ever thought of handles of any kind.

On the Palæolithic floor small and neat scrapers occur in large numbers, and the art of making them

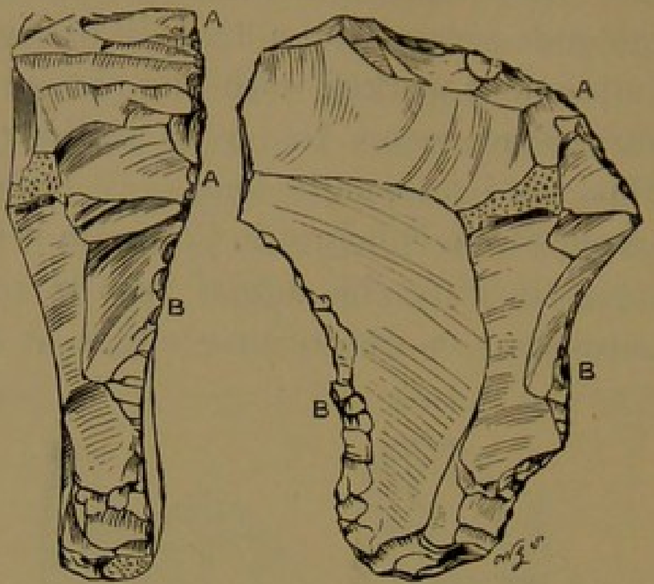


FIG. 174.—Rough scraper, Stoke Newington Common. Half scale.

was brought to the highest pitch of perfection. Great variety of shape occurs, but the beautiful and

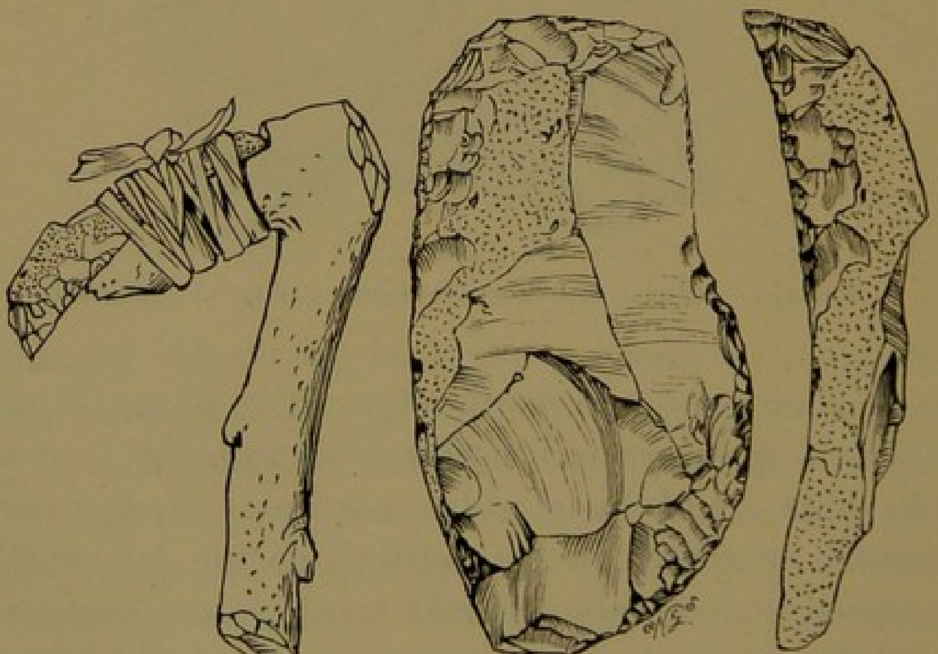


FIG. 175.—Large scraper, Lower Clapton. Half scale. Left-hand figure, one-quarter scale.

well-known horse-shoe form is frequent. A neatly made scraper from Stoke Newington Common, now in the collection of Sir John Evans, is illustrated in Fig. 176. A still smaller and most beautifully made example, exhibiting marks of use, found on the Palæolithic floor as exposed in Abney Park Cemetery, is illustrated in Fig. 177. A boring tool, found on the Palæolithic floor at Gray's Thurrock by Mr. Sidney Roberts, and by him added to my collection, is illustrated in Fig. 178; this is a sharply pointed and remarkable little tool, which, as shown by the outline as seen on edge, might have been used for scratching

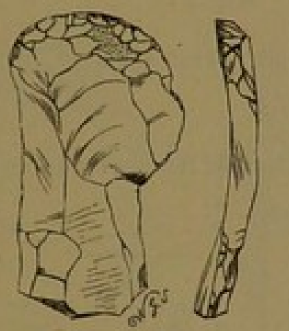


FIG. 176.—Small scraper, Stoke Newington Common. Half scale.

FIG. 177.—Very small scraper, Stoke Newington Common. Half scale.

or tearing. A person with artistic ability could easily scratch out lines on bone with such a keen-pointed and powerful instrument. It resembles a graver.

A kind of knife or chopping tool, from the Palæolithic floor on Stoke Newington Common, is illustrated in Fig. 179. It is made from a large flake, and is a tool characteristic of the deposit and locality. Several similar examples have come to hand; the straight cutting edge on one side, and the acute point, are striking and constant characters. In the example illustrated, the flaking from below upwards at the butt is very curious. The other side of the flake is perfectly plain. A few presumed

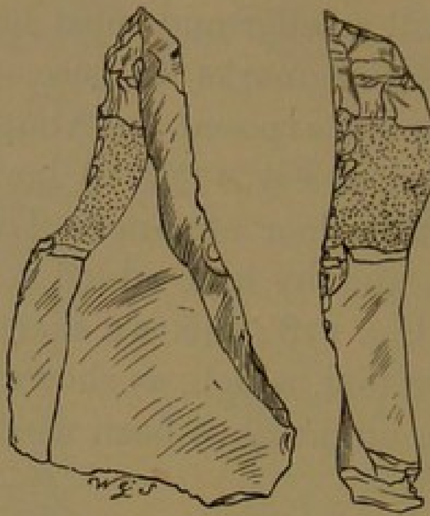


FIG. 178.—Borer, Gray's Thurrock. Half scale.

glacial scratches occur on the natural crust towards the top as seen in the illustration.

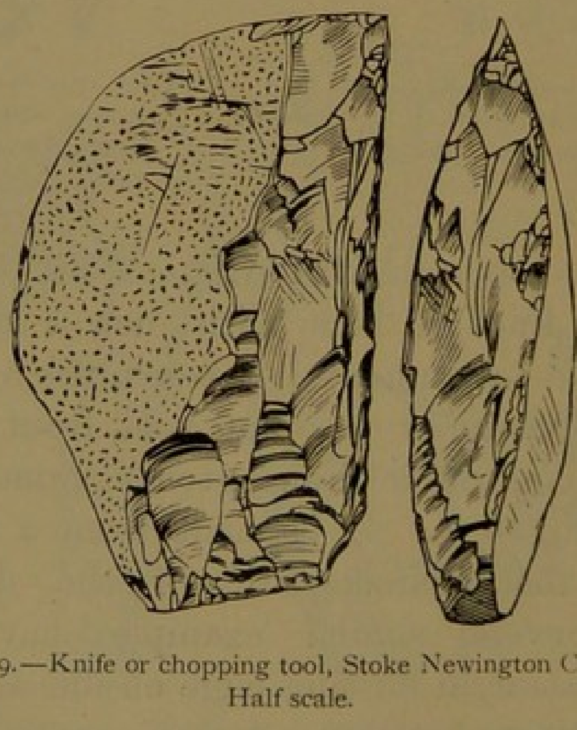


FIG. 179.—Knife or chopping tool, Stoke Newington Common. Half scale.

Knives made from flakes, with the edges trimmed to a beautiful curve, are very frequent: many of these are objects of great beauty, made to perfection. In Fig. 180 a knife is illustrated from the Palæolithic floor, exposed at Leyton on the Essex side of the Lea; the specimen is now in the British Museum collection. This example is skilfully re-trimmed on one side of one edge only; other specimens are trimmed on both edges, or entirely round the instrument, and all over one side. Knife forms

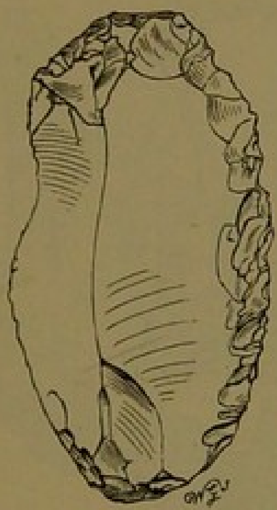


FIG. 180.—Knife, Leyton, Essex. Half scale.

FIG. 181.—Knife flake, untrimmed, Stoke Newington Common. Half scale.

originated in simple knife-like flakes, such as the one illustrated in Fig. 181, from Stoke Newington Common. Such skilfully struck, hastily made, keen-edged flakes answered every purpose of a rough knife. The elaborately trimmed specimens must have been chiefly made for the love of making a real and beautiful work of art. A knife was made by dexterous and well-aimed flaking, so that a large, thin, artificial splinter of flint, with one keen edge, was struck from a flint block. Sometimes, when the flake flew off with an irregular keen edge, the irregularity was remedied by fine and clever secondary chipping.

Flakes in the style of the three examples from Stoke Newington Common, illustrated in Fig. 182, are very common on the Palæolithic floor, and indeed in the Lea and Thames gravels generally; they are interesting as showing distinct evidence of use. In the positions where the dotted lines are shown, the edge

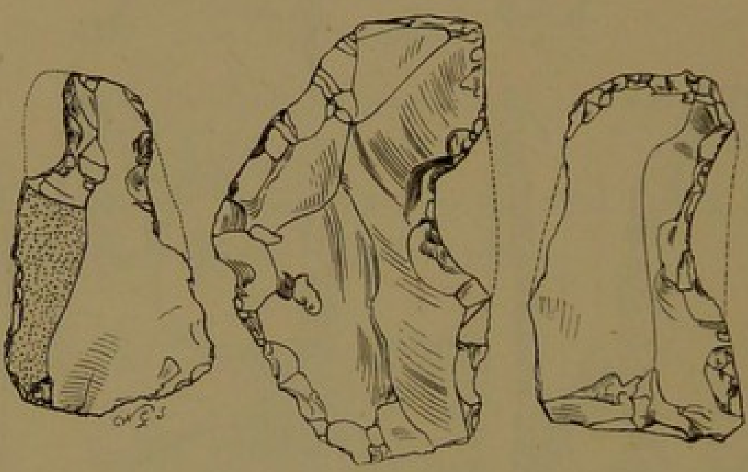


FIG. 182.—Flakes showing evidence of use, Stoke Newington Common. Half scale.

of the flake has been worn away by scraping bones, pieces of wood, or other hard objects. Some examples are more clearly defined than the three engraved. It is not uncommon to see large, regular, semicircular hollows made by work, in the edges of certain thin flakes, not hollows made by secondary chipping, as in the Irish hollow scrapers.

Wedges are not uncommon on the Palæolithic floor. Two views of a massive wedge with a broad chisel edge, and very heavy butt, are shown in Fig. 183. Some wedges are much neater in design and execution than the one illustrated, which is now in the British Museum collection.

D.—Pieces of Implements Conjoined and Flakes Replaced.

The extent of the Palæolithic floor exposed at North London was several hundred times as great as the very limited area excavated on the Palæolithic floor

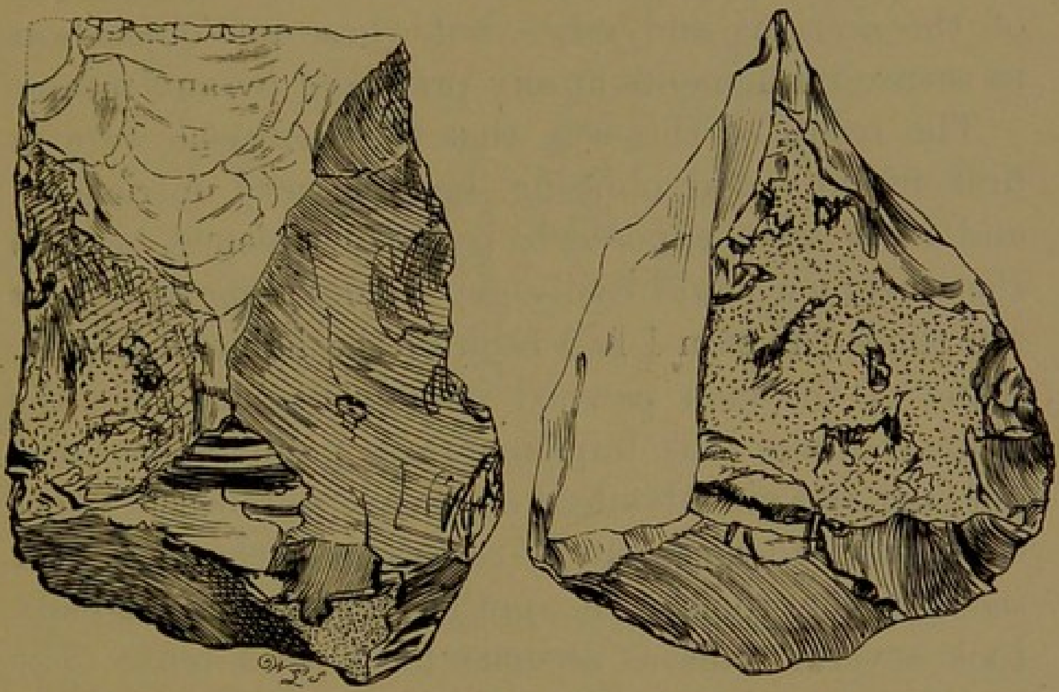


Fig. 183.—Massive wedge, Stoke Newington Common. Half scale.

at Caddington. There can be no doubt, if the former excavations had been systematically examined, and all the antiquities, bones, &c., laid aside for proper examination, the results would have been some hundred times greater and better than those of Caddington. The failure was due to one cause alone. When I first lighted on the North London Palæolithic floor, I was most careful to keep the workmen entirely in the dark as to the real nature of my quest. Under these circumstances, I was able to secure such antiquities as were brought to light in an easy and pleasant manner, without any extravagant expenditure of time or money. After my first paper was laid before the *Anthropological Institute*, it became general knowledge that Palæolithic implements could be found in the gravels and sands of North-East London, and this knowledge was used in an improper way by curio collectors, who neither knew or cared anything for the knowledge which might be obtained from a careful examination of the sections and relics, but whose sole object was to secure implements at any price and by any means.

The result of this was, that the men, who were at first friendly and obliging, became very unfriendly, and I was even exposed to personal violence, because the workmen could easily get from strangers five or ten times the sum I had been in the habit of giving. Some of the men pawned implements and sold the tickets, others took implements to public-houses and got beer and gin advanced on them : purchasers sometimes went to these public-houses, paid the score, and secured the tools. In another instance a landlady took several tools as security for unpaid rent. The men were no better for extra pay, as nearly all the money went into public-houses, and when drunk the men got discharged, and then violent scenes often occurred at their homes. Every result was bad.

A still worse consequence followed. Sometimes the men would dig in unprolific places, and as visitors still came offering money for relics, the men at last—so that the supply might not fall short of the demand—set about making forgeries. These forgeries sold quite as readily as the genuine antiquities, simply because the collectors of curios did not know the true from the false. More is said on this subject in the chapter on Forgeries.

The number of replaced blocks and flakes from material found on the Palæolithic floor at North London is limited, for the reasons above stated. Although I still have a large collection of butts and points separated by use in Palæolithic times, no one example will fit on to another. The reason is obvious.

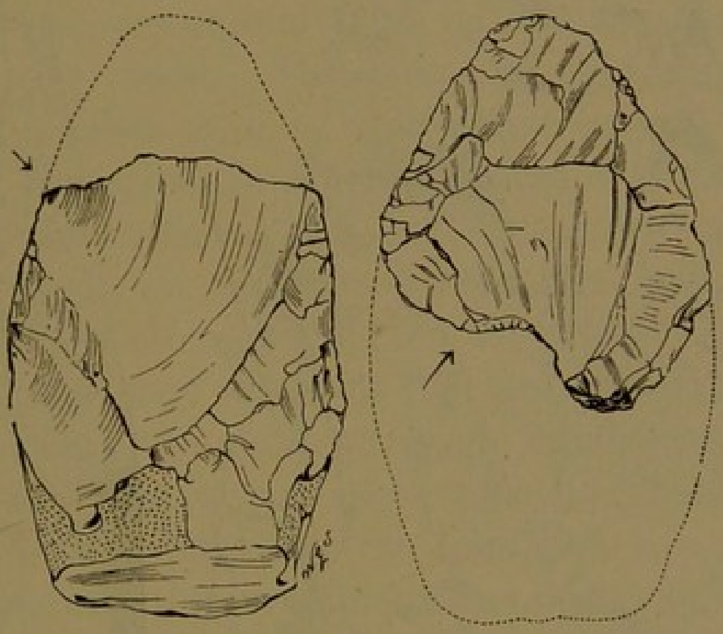


FIG. 184.—Butt and point of implements, Stoke Newington Common. Half scale.

I could not secure one-twentieth part of the relics after the discovery was made public, so that the chance of conjoining pieces—under the most favourable circumstances a most difficult performance—was made at least twenty times more difficult by the army of amateurs and collectors which was always buying up every fragment found by the men.

An example of a butt-end and point is illustrated in Fig. 184. Such examples, keen-edged as when first made, are very numerous. The examples given are not capable of re-attachment, although there can be no doubt that the missing pieces were not far off when the butt and point were found.

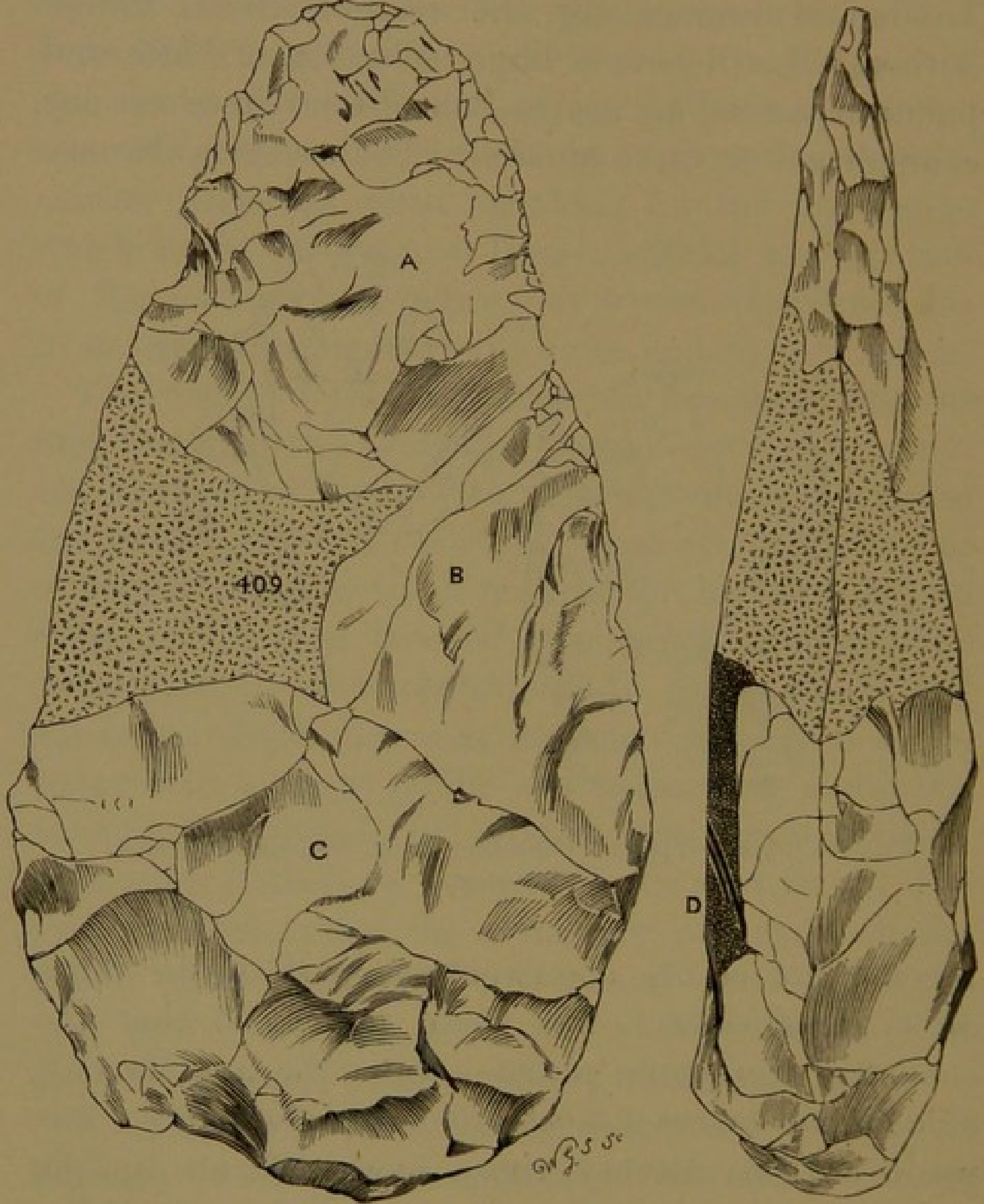


FIG. 185.—Three out of four pieces of a large implement, conjoined, Stoke Newington Common. Half scale.

I have conjoined a few examples, but have seen no genuine conjoined flints but my own from North

London. The forgers, of course, struck off flakes in the manufacture of their forgeries; and I once saw three or four of these precious specimens put together again with marks of the iron hammer which struck them off still upon them.

A good example of conjoined pieces is shown in Fig. 185. The implement, as put together with one piece missing, measures 9 inches by 5, and weighs 2 lbs. 13¾ oz. It exhibits presumed glacial striæ on a large patch of original crust on one side, indicated at D on edge view. The pieces of this implement, three in number, A, B, C, were found by two men at different times, and in different places. If the report given by the finders is true, and I know no reason for disbelieving it, the implement must have been broken in Palæolithic times. The men who found the pieces did not know they would fit together, and the fourth piece, indicated by dots, although much sought for, did not reach me, or was never found. The example is now in the collection of Sir John Evans.

A reproduction of my illustration, Fig. 185, appears in the *Story of the Nations* series, *Early Britain*, p. 110, where it does service for *two* flint knives of *Saxon* age! I do not know how the illustration got into the *Nations* series, or how the name got so marvellously transformed. No explanation of the letters A, B, C, D, is ventured upon for the *Early Britain* volume.

An example of two replaced flakes is illustrated in Fig. 186. The front of the conjoined flakes is shown at G, and the side at H. I found the lower flake two days before, and some distance from where I found the upper one; but as I had a method of placing newly-found sharp flakes on a table, arranged temporarily in accordance with their colour and markings, I speedily saw that the upper flake would fit on to the lower one. Each flake has a cone of percussion, as shown at J, K, and the upper flake has a well-marked depression at L, corresponding with a missing flake, which, if it had been found, would have fitted on to the front of the two conjoined examples. Both flakes are sharp, and slightly stained with the ochreous river sand in which they were embedded. Both flakes (especially the smaller one) show unmistakable signs of having been used as scrapers, the upper curved edge (and that edge only) being worn away by use.

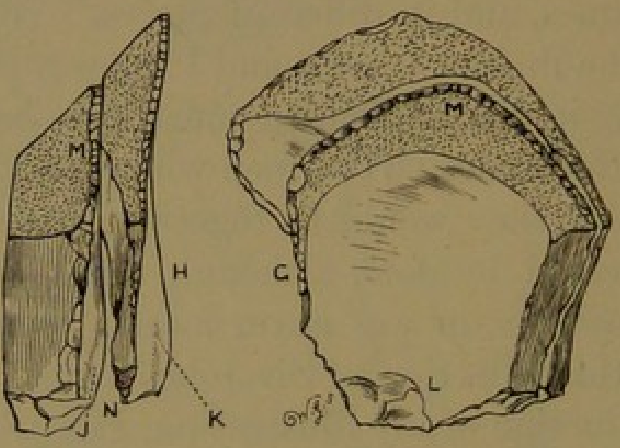


FIG. 186.—Conjoined flakes, Stoke Newington Common. Half scale.

The artificially worn upper edge of the superimposed flake at M, M, is distinctly shown in the illustration. A small intermediate piece, belonging to the position at N, I did not find. Both flakes are naturally mottled in a peculiar manner, and the pattern and colour of the mottling of course exactly agree. The specimen is now in the British Museum, Bloomsbury.

The examples of conjoined flakes, shown in Figs. 187 and 188, are more remarkable than the last, as the individual flakes and blocks were found in different parts of Stoke Newington, between 1878 and 1884. Moreover, all the pieces are slightly whitened by age, and slightly abraded. They belong to the sweepings of the Palæolithic floor, and were found in the upper contorted drift. A front and edge view of a conjoined block and flake are shown in Fig. 187; the back is white, stained with ochre, and worked all over; the top, as represented in the engraving, is livid brown. The replaced flake is *white underneath*, whilst the block on which it fits is *livid brown*. This curious fact shows that the block and flake must have lain apart since the time of the deposit of the topmost contorted drift tens of thousands of years ago. The example is now in the British Museum, Bloomsbury.

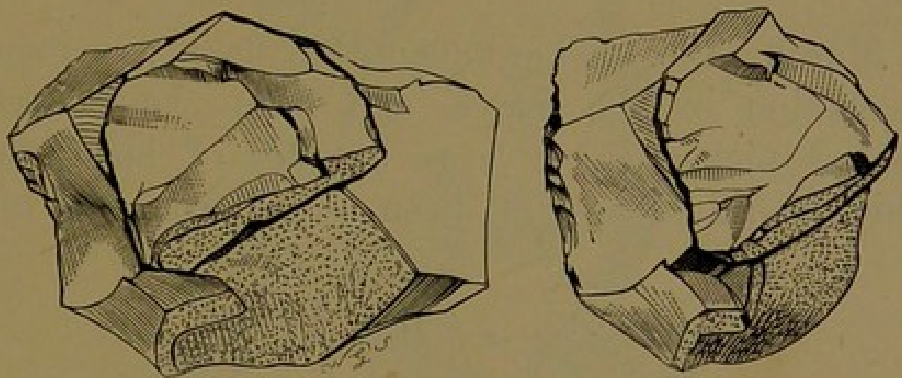


FIG. 187.—Conjoined flakes, near Stoke Newington Common. Half scale.

Fig. 188 is of a similar class with the last, but whilst both flakes are creamy white on the faceted side, they are livid brown on the bulb side. This fact proves—as in the last mentioned—that both flakes must have lain apart for an enormous length of time. There is a curious oval mark shown in the illustration, like a knot of wood, cut across by the Palæolithic flaker in the act of flaking. This example is also in the British Museum, Bloomsbury.

Two conjoined flakes are seen in three positions in Fig. 189. The left-hand figure represents the front, the right-hand the back, and the intermediate figure the edge. The flakes were picked up by me from sand thrown out of a grave in Abney Park Cemetery

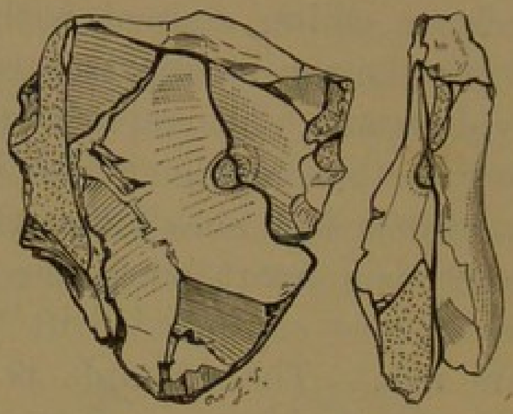


FIG. 188.—Conjoined flakes, Stoke Newington Common. Half scale.

in March 1886. The Palæolithic floor was exposed in section in the grave, and from the excavated sand I picked up a large number of black flakes which had evidently all been struck from one block.

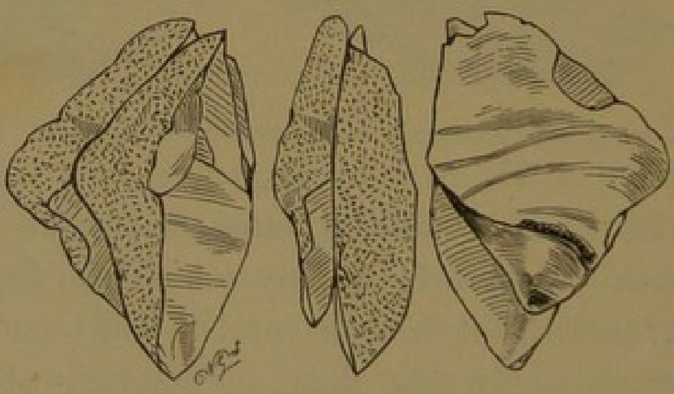


FIG. 189.—Conjoined flakes, Abney Park Cemetery. Half scale.

From this collection I was able to replace the two flakes shown in the figure. Both flakes are sharp, black, and lustrous, like the majority of implements and flakes from the floor.

E.—How Stone Implements were Made.

The excavations made on the Palæolithic floor at North London brought to light a series of minor tools, similar with those already described and illustrated as belonging to Caddington, and which were presumably used in the manufacture of stone implements.

The most obvious relics of manufacture are the flint blocks called cores or nuclei, and flakes or splinters struck from cores or blocks. A core, from which four flakes have been obviously struck, one from the

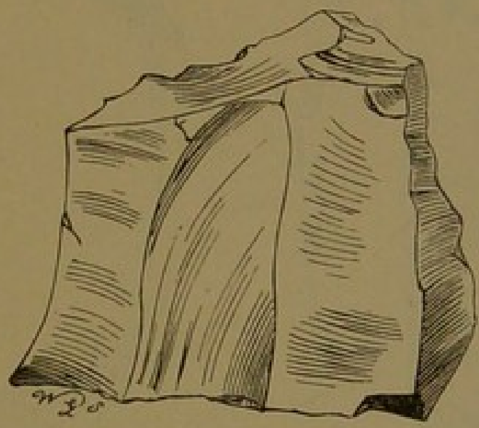


Fig. 190.—Core or nucleus, Stoke Newington Common. Half scale.

top and three from the face, is illustrated in Fig. 190. Other flakes have, of course, been removed from the sides, unseen in the figure. The example is now in the British Museum.

A flake struck from a core is illustrated in Fig. 191. It will be observed that it required six successive blows from a stone hammer to dislodge this flake from the core. The points of impact from the stone hammer are indicated by six cones of percussion shown by the six arrows. A single cone of percussion might have been, and probably sometimes was, naturally produced by one large block accidentally striking against another, but it is clear that six cones of percussion close side by side could not be accidentally produced; they show design from a human worker who six times delivered a heavy blow on as nearly as possible one spot.

It is believed that flakes were dislodged from cores with hammer-stones, frequently of quartzite or hard, tough indurated sandstone. Two of these hammer-

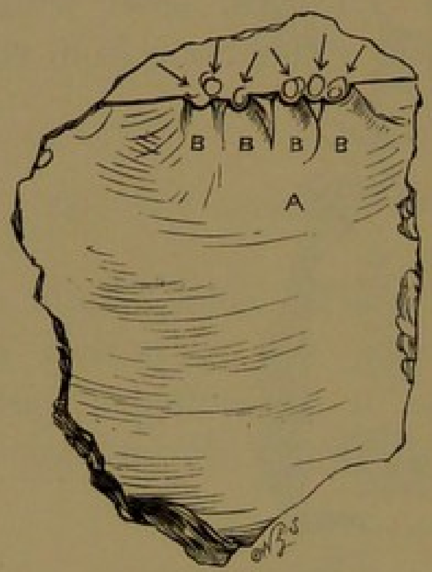


FIG. 191.—Flake showing cones of percussion, Stoke Newington Common. Half scale.

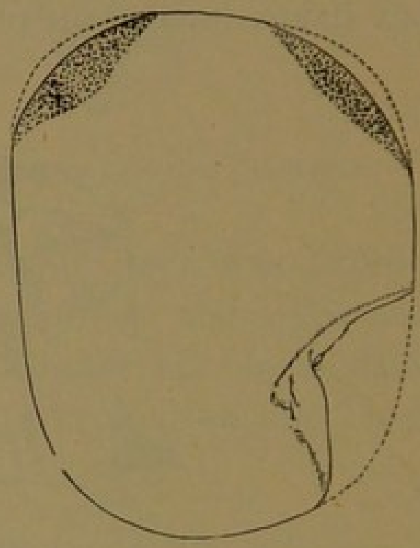


FIG. 192.—Quartzite hammer-stone, Stoke Newington Common. Half scale.

stones of quartzite are illustrated in Figs. 192 and 193. In Fig. 192 it will be observed that the upper part, as indicated by the dotted lines and the spotted work, has been abraded away by hammering. The piece out of the right side at the base is a natural break. This example, found at Stoke Newington Common, is now in the collection of Sir John Evans. In the other example, Fig. 193, it will be seen that the stone has been worn away by battering at A and B, top and bottom. This stone I found, with many others of a like class, with Palæolithic implements in the gravels of Warren Hill, Mildenhall, Suffolk. I have met with no such stones at Caddington.

Quartzite was not exclusively used for hammer-stones, as I have a hammer formed from a very large globular nodule of flint, from Stamford Hill, London, which weighs 3 lbs. 11¼ oz.

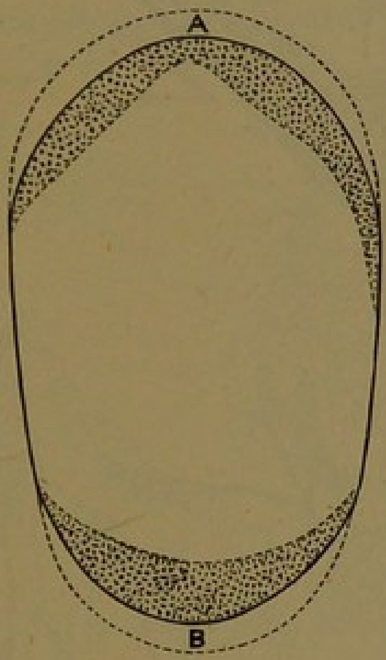


FIG. 193.—Quartzite hammer-stone, Mildenhall. Half scale.

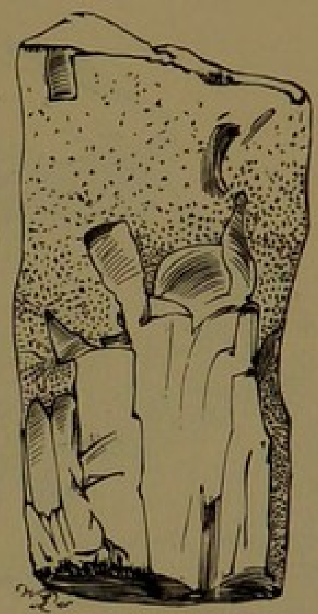


FIG. 194.—Flint hammer, Little Thurrock. Half scale.

Although these quartzites were undoubtedly used for hammering, I do not think they were invariably abraded in the manufacture of flakes and implements, but that they were often used for striking against blocks of flint for the production of fire. Pebbles of quartzite are most effectual for the production of large sparks.

Other hammer-stones of truncated cylindrical pieces of flint also occur. One from the Palæolithic working place at Gray's Thurrock is illustrated in Fig. 194. It will be observed that one truncated end only has been splintered away by hammering. The upper part,

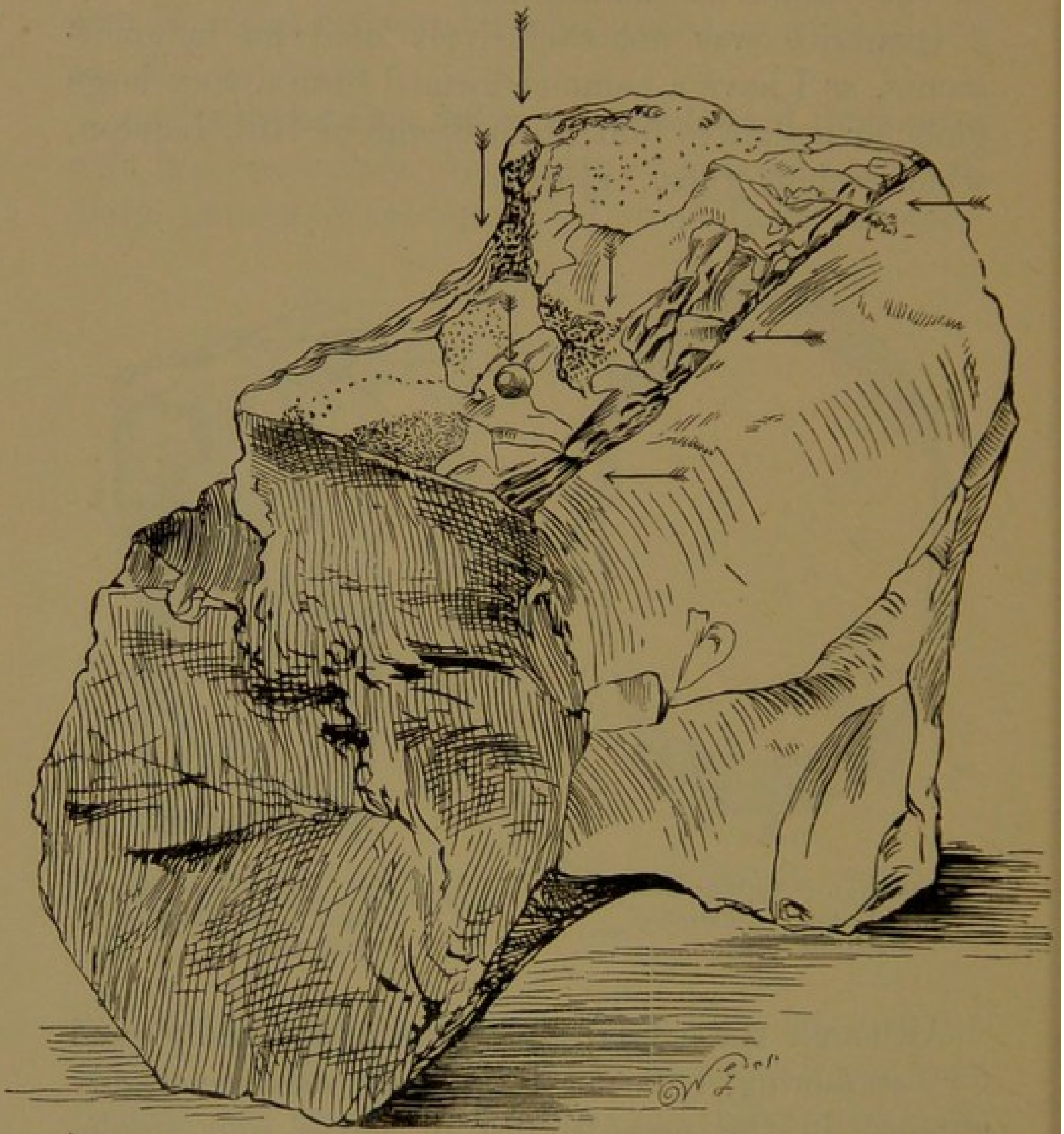


FIG. 195.—Anvil-stone, Stoke Newington Common. Half scale.

which was doubtlessly held in the hand, remains in an unsplintered condition.

Another stone indispensable for good flaking is an anvil-stone. These stones, although common, are mostly so large as to make their removal by hand either very difficult or impossible. They are known by the distinct marks of hammering seen on some special part of the stone, generally on a flat or flattish surface. A small example is illustrated in Fig. 195. The vertical arrows show the direction of the blows from vertical hammering, and the horizontal arrows the direction of blows falling on the block in a horizontal direction. With the exception of the bruised and splintered edge, seen between the two

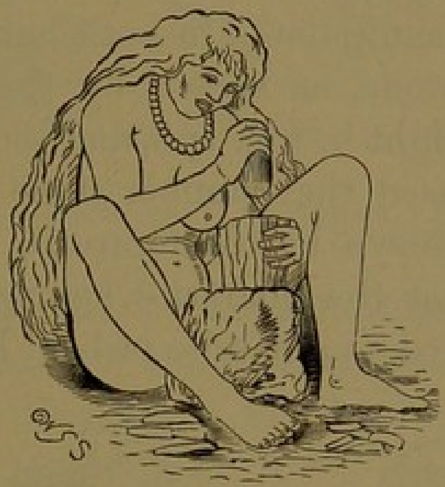


FIG. 196.—Woman flaking with hammer-stone and flint block on anvil-stone.

sets of arrows, all the other edges of the block are sharp. I was present when this stone was exposed on the floor; many sharp flakes were found near it, and several quartzite hammer-stones, including the one illustrated in Fig. 192.

Given a natural block of flint, a quartzite hammer-stone, and an anvil-stone, the flint flaker of Palæolithic times, whether man or woman, would sit on the ground and strike off flint flakes, as illustrated in Fig. 196.

The punch and fabricator were indispensable tools for implement-making. A series of punches is given in illustration of the Palæolithic floor at Caddington. Identical punches occur at North London, and at every other Palæolithic working place with which I am acquainted. A single example, splintered from the point downwards, from Little Thurrock, is illustrated in Fig. 197.

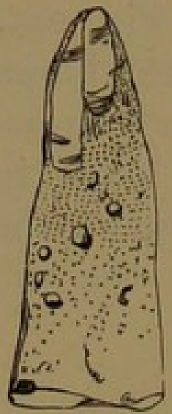


FIG. 197.—Punch, Little Thurrock. Half scale.

To make an implement, a large suitable flake or a suitable natural block of flint was selected. One man or woman carefully held the flint to be manipulated in both hands on an anvil-stone, as shown by the figure to the right in Fig. 198, and the second person used the hammer-stone and punch as shown by the figure to the left. It is just possible that the quartzite hammer-stone might have been secured to a handle of bent hazel or sallow,

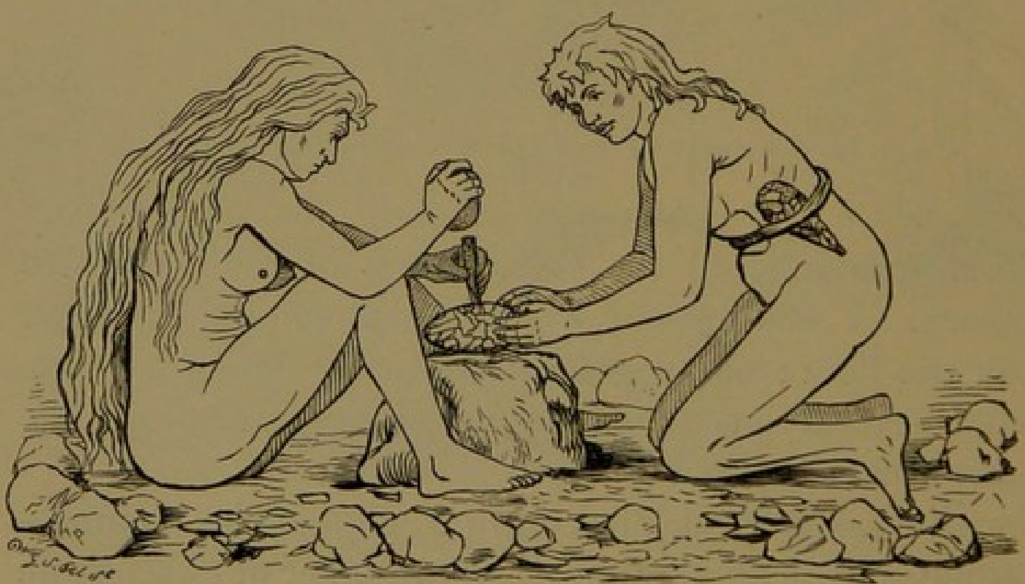


FIG. 198.—Man and woman making implement with hammer-stone and punch on anvil-stone.

much as some blacksmiths fix their hammer-heads now, but I have seen no evidence of any such handles.

To produce the fine secondary and tertiary chipping round the edge or point of an implement, in order to produce a true and perfect shape, a small instrument

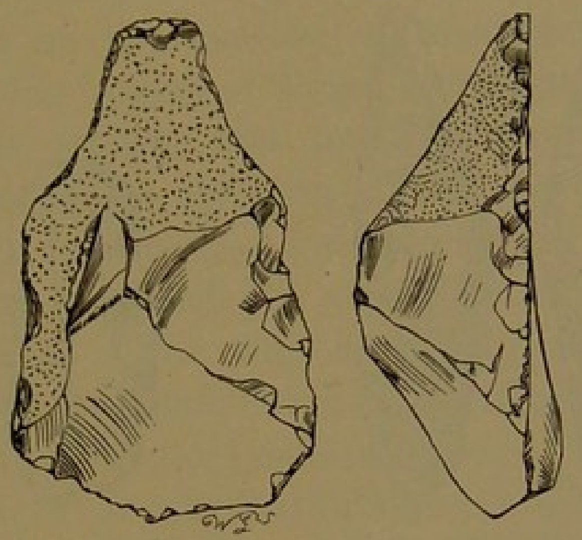


FIG. 199.—Fabricator, Little Thurrock. Half scale.

with a carefully-made obtuse point, named a fabricator, was used. One of these instruments, from Little Thurrock, is illustrated in Fig. 199. A smaller

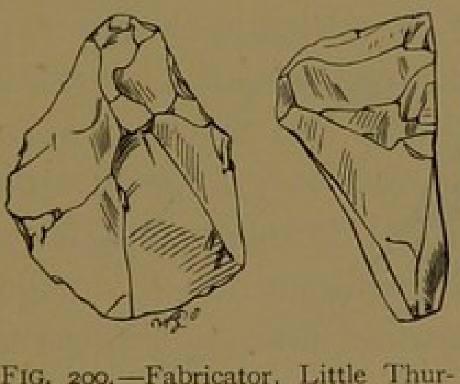


FIG. 200.—Fabricator, Little Thurrock. Half scale.

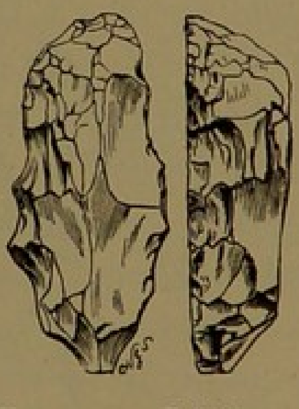


FIG. 201.—Fabricator, Ightham. Half scale.

example from the same place is shown in Fig. 200. A highly-finished example from Ightham, Kent, given to me by Mr. B. Harrison, is illustrated in Fig. 201. One found by me at Stoke Newington Common is given in Fig. 202, and one from Abney Park Cemetery in Fig. 203. Fig. 173 may be a large fabricator.

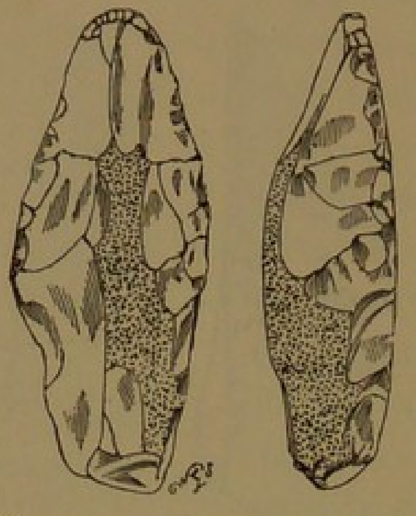


FIG. 202. — Fabricator, Stoke Newington Common. Half scale.

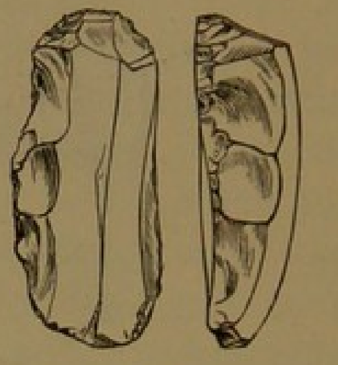


FIG. 203.—Fabricator, Abney Park Cemetery. Half scale.

The fabricator was used in the manner shown in Fig. 204. The nearly completed implement was

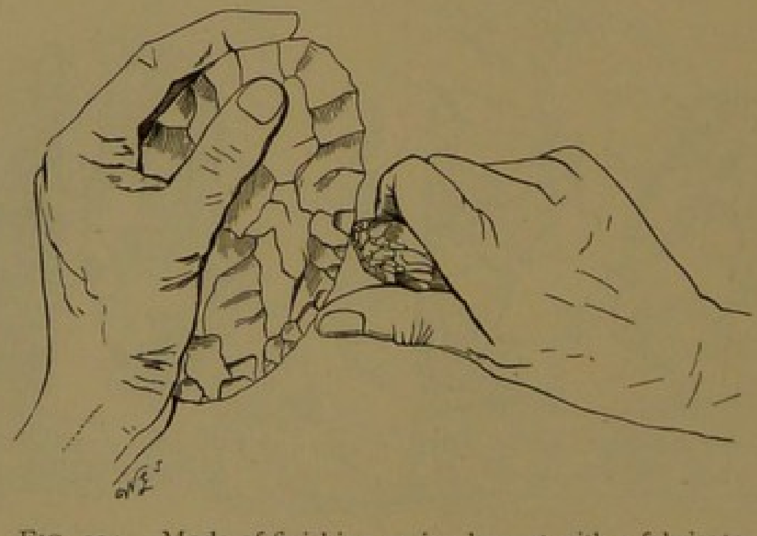


FIG. 204.—Mode of finishing an implement with a fabricator. One-fourth scale

held in the left hand, and the strong very obtusely-pointed fabricator, held in the right, was pushed against the side of the nearly finished instrument: by this means splinters of flint, of varying degrees of fineness, were made to fly off.

The illustrations of implement-making here given are founded on the method of making implements by the modern forgers of Stoke Newington. I made certain men confess, and prevailed upon them to make a tool before my eyes. This they did in the manner here described, the stone hammer and punch of old being replaced by a modern hammer and punch of iron. The fine secondary and tertiary chipping was produced with a shoemaker's awl, or broken stumpy bradawl or gimlet.

The hills of South Bedfordshire are thirty-three miles from the Thames. Roughly following the course of the Lea, the distance is of course more. From South Bedfordshire to the Thames, I have found 697 finished Palæolithic implements, or about twenty implements to every mile, if spread over the entire course. Minor implements, flakes, cores, &c., I have found in thousands. If I had depended upon gravel-diggers, or trafficked much with the workmen, I might have more than quadrupled this number; but it has not been safe to receive implements from any of the London workmen, owing to the large number of forgeries spread amongst them. Implements of doubtful authenticity are not worth the trouble of long boiling in potash or of close examination.

The nature of the forgeries is explained in the chapter on the subject.

F.—Wood, Bone, and Fossils as Beads.

It is probable that primeval man used many objects made of wood, such as clubs for defence and attack, sticks for the assistance of old men and women in walking, and stakes for supporting the skin roofs of rude shelters and sties. A great deal of wood has been met with on the Palæolithic floor at Stoke Newington, chiefly branches, twigs, and tree-trunks. Very little has been preserved, owing sometimes to the unwieldy size of the pieces, and at other times to the very friable nature of the material; neither could room be found indoors or out for the tree limbs, &c., found. One enormous trunk was disinterred. All wood has not indeed become friable; some has remained very firm. Leaves have at times been met with in great abundance, but in the highest degree friable and difficult of preservation. They were often in a black skeleton state on oval pebbles.

Fig. 205.—Two artificially pointed stakes of birch, Stoke Newington Common. One-twelfth scale.

In one place, close to Stoke Newington Common, amongst an enormous compacted mass of the fronds and rhizomes of the fern royal, *Osmunda regalis*, L., two pointed stakes of birch were found, each nearly four feet long, and illustrated to the scale of one inch to a foot in

Fig. 205. The stakes were so soft when found that one parted in two at A, B, when laid down. The two artificially hacked and pointed ends of these stakes are shown, one-half actual size, in Fig. 206. A carefully executed full-size drawing of these stakes was made by me directly they were found, and the accompanying illustrations have been photographically

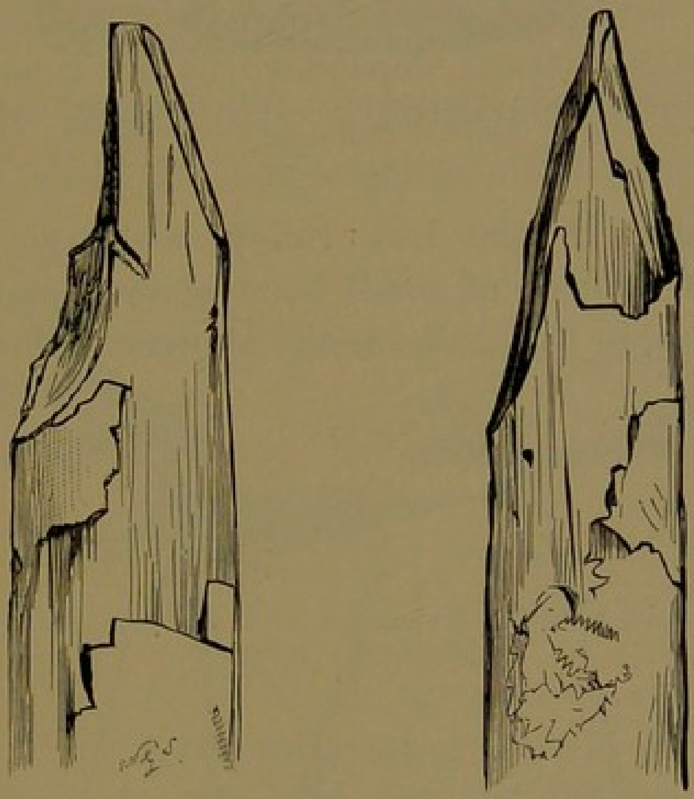


FIG. 206.—Ends of stakes illustrated in Fig. 205. Half scale.

reduced from the original sketches. On drying, the wood became greatly shrivelled, twisted, and split, and the pointed ends became hardly recognisable. However, they were sent in their shrunken and cracked condition, with various other things, to the British Museum, Bloomsbury.

Another piece of wood from the same deposit is shown, one-half the actual size, in Fig. 207. The hacking is seen on the face, and the right-hand end has been hacked off.

Tools of bone have never, as far as I am aware,

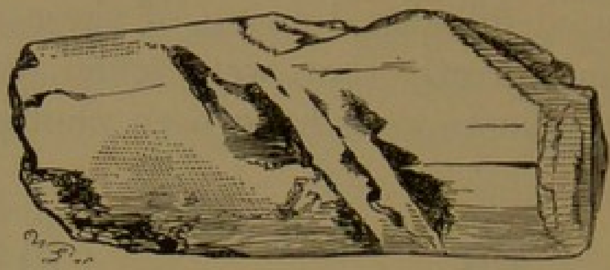


FIG. 207.—Piece of hacked wood, Stoke Newington Common. Half scale.

been found in the Lea valley, although the two views of a piece of fossil bone shown, one-half the actual size, in Fig. 208, closely approaches an ordinary

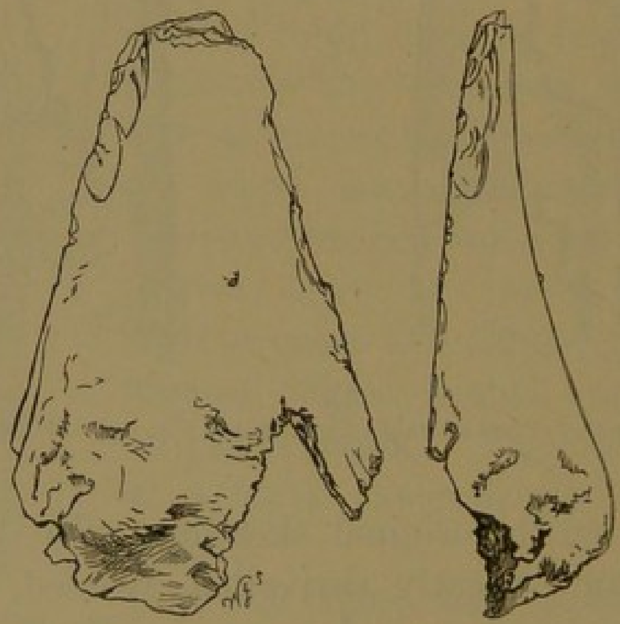


FIG. 208.—Implement-like piece of fossil bone, Stoke Newington. Half scale.

Palæolithic implement in form, whilst the top end shows traces of splintering or flaking, which may, however, be accidental.

In Fig. 209 is illustrated, one-half actual size, a fragment of a fossil antler of red deer, *Cervus elaphus*, L., found by me *in situ*, with numerous other fragments of antlers, bones, tusks, and keen flakes and implements, on the Palæolithic floor at Little Thurrock. It is interesting as distinctly showing, as I think, a fracture produced by the straight edge of a Palæolithic implement at A, B. The blow has broken the antler, and the small piece broken off is seen at C, D; not free, as it was in Palæolithic times, but naturally and firmly cemented by a ferruginous deposit into one mass with the larger piece. The fragment of

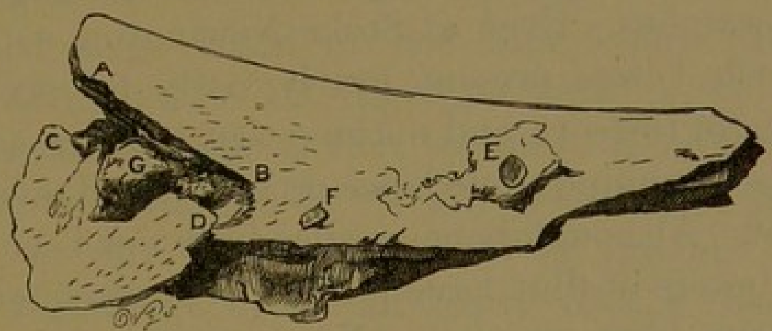


FIG. 209.—Piece of fossil antler, showing evidence of hacking, Little Thurrock. Half scale.

antler is made more interesting by the presence of an impression in the hard ferruginous deposit at E of *Corbicula fluminalis*, Müll., a shell of a mollusc now extinct in Britain, but abundantly found in a fossil state on the same floor; F is a fragment of antler naturally cemented; G is a hard cemented mass of ferruginous sand. The example is now in the British Museum, Bloomsbury.

As far as I know, no undoubted human bones have ever been found in the Palæolithic deposits of North-East London. The workmen certainly at one time brought me human skulls and other human bones, but as some of the best excavations examined by me were in burial-places, there was no difficulty in deciding where the human remains came from, apart from their obvious deficiency in antiquity.

The contents of old dust-bins and refuse heaps were used for the foundations of new villas, and in this dust and refuse it was by no means uncommon to find skulls and other human bones. I once saw a considerable number of human jaws in this material.

For many years I have made most careful search for examples of carved or engraved bone or ivory, needles, fish-hooks, and harpoons, such as are found in some caves, but nothing of the kind has rewarded my researches. Even at Stoke Newington, a position at which I was present nearly daily for six years, nothing of the sort, and nothing that could be accepted even as a genuine stone lance or arrow head, ever came to light. Although bone needles have not been found, small borers of flint have proved not unfrequent.

In one place at Stoke Newington, a large tooth of a fish, probably derived from the chalk, was found with flint flakes on the Palæolithic floor.

At Bedford I have been more successful, and as the water from one side of the Dunstable Hills finds its way to Bedford by the Ouzel, I may be permitted to describe the discovery at this point.

A few years ago at Bedford I found a considerable number of examples of *Coscinopora globularis*, D'Orb., showing an artificial enlargement of the natural orifice, which seemed to indicate that the fossils had been used for personal ornaments as beads. The illustration of a woman flaking, in Fig. 196, shows a necklace of these natural beads depending from the woman's neck. Dr. Rigollot (*Mémoire sur des Instruments en Silex*,

p. 16) says he often found small groups of this foraminiferous fossil in one place—just as if, when swept into the river's bed by a flood, the bond which united them together remained unbroken. The late Mr. James Wyatt of Bedford, in examining these bead-like fossils (*Geologist*, 1862, p. 234), said he had examined more than 200 specimens, and on making sections of some of them, he saw marks which appeared to indicate "drilling with a tool after the object was fossilised." In 1880 I myself found over 200 examples of this fossil at Bedford, with unabraded implements and flakes, and carbonised vegetable remains. The finding of the above-mentioned large hoard at one time seems to lend some confirmation to Dr. Rigollot's view, for it seems unreasonable to believe that so large a number of fossils from chalk could, by any possibility, find a position in one place in any river gravel. The surface round the orifice of many of the Bedford beads was abraded, as if by the constant contact of the adjoining beads on a ligament. A few of the beads also had the hole artificially enlarged, as illustrated, actual size, in Fig. 210; sometimes at both ends, as at section A; sometimes in the middle, as in section B; and sometimes at one end only, as in section C. The dotted lines in these illustrations show the original natural orifice: the solid lines near the dotted ones show the enlargement by artificial drilling. In some instances the drilling appears to be comparatively fresh; in other cases less so; but it must be remembered that the implements found with them were mostly unabraded, and vegetable remains were met with. The specimens were found by myself; they were never touched or manipulated by the workmen.

Other examples of these beads had one end near the orifice broken away, as if in an attempt to enlarge the opening by breaking away the substance of the fossil, as at D, E, F.

Whilst looking through the fallen material in the

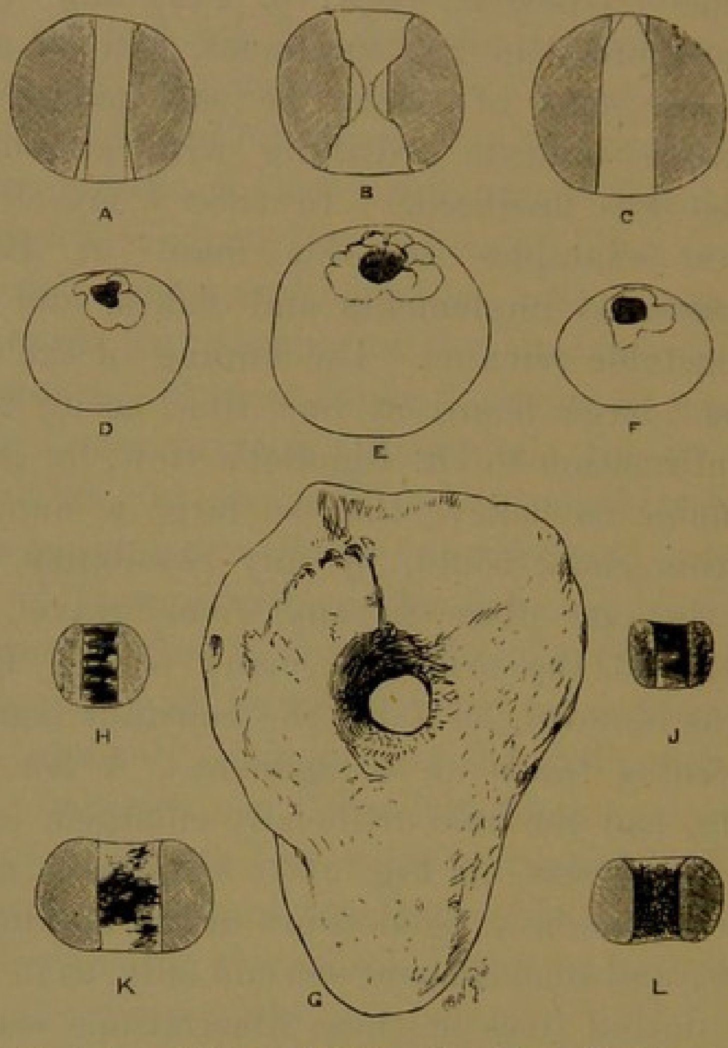


FIG. 210.—*Coscinopora globularis*, D'Orb., with orifice artificially enlarged, and showing traces of ligament, and piece of fossil shell. Natural size.

pit, the piece of naturally perforated fossil shell, illustrated natural size at G, attracted my attention. The hole is possibly due to a shell-boring mollusc, but when I saw the object in the drift, I distinctly noticed that a black substance entered at one side of the hole and emerged at the other. At the moment of picking the object up, this material fell to dust, with part of the very friable surface of the fossil-shell. Some of the beads, as seen in section H, J, K, L, also bore very distinct traces of a similar black substance within the orifice, although not seen till the sand and part of the black substance itself had fallen out. This black material I took to be the remains of part of the ligament on which the beads and perforated shell had been originally strung by their Palæolithic owner, and with this idea in mind, I sent some of the beads to Mr. A. Hobson, analytical chemist, for analysis.

Mr. Hobson replied: "The testing for nitrogenous organic matters, of which animal tissues are composed, was tested in the same manner as testing water for such matter, that is, by converting it into ammonia; precautions were, of course, taken to eliminate from the results any ammonia already existing. The amount of ammonia was strikingly evident, and showed with each bead separately. The blackening of the organic matter in the holes of the beads may have taken place in a manner similar to that of the formation of coal."

On testing the beads, which consist chiefly of carbonate of lime or chalk, without the black material in the orifice, Mr. Hobson reported that "when treated in the same manner as those originally sent, they show a considerable amount of heterogenous or animal organic matter, as was to be expected from their origin, but not so much as those with the black deposit."

A bead containing the black material was also sent to Mr. A. Clarke, analytical chemist, who reported: "I divided the bead into three portions—1. the thin dark crust forming the internal portion of the ring; this is most certainly organic matter; 2. a powdery part between I. and the main body of the ring, consisting of small quantities of carbonates of iron and lime; 3. the outer main body of the ring, mostly carbonate of lime, and a small quantity of silica; here there is only a trace of organic matter, but it is most distinctly present."

G.—Fossil Bones.

Fossil bones, antlers, horn cores, tusks, and teeth are not very common in the gravels and sands of North-East London; when they do occur, they are almost invariably in a broken or fragmentary condition. Although some bones are very hard and heavy, others are so soft and friable that their removal from the matrix in which they are embedded is impossible. I have sometimes seen groups of bones—or rather the changed remains of them—on the Palæolithic floor, but the slightest touch has been sufficient to reduce them to fine dust. Such relics could only be preserved and removed by the superincumbent sand being carefully moved, and hot gelatine poured from the top over and into the softened mass. Sometimes the larger bones are found broken into fragments and flat in the stratified sand. When the fragments are carefully gathered together and conjoined, the bones exhibit their natural curves, as in the scapula of the mammoth, with an implement upon it found by me and now in the British Museum collection. It is common to find the bones in connection with flint flakes and implements, and it is also common to find the fossil shells of land and fresh-water mollusca adherent to them. The bones sometimes show signs of possible hacking, cutting, and gnawing, and differ from each other in hardness and colour, according to the matrix in which they are found. It often happens that ferruginous gravel, fine, almost white sand and clay, occur in close contiguity in very thin seams; therefore the bones in such places, although close together, differ widely in external appearance, and one might think, upon a mere cursory examination, that such bones were derived from wholly different and distinct deposits. I have seen bristles and adipocere with the bones. Sometimes pieces of fossil bone, horn, and ivory may be met with in the newly-gravelled roads. I have a small piece of mammoth tusk with an implement that I found in the sand thrown out of a grave in Abney Park Cemetery.

The fossil remains of the following animals have been found in the gravels, sands, and brick-earth of the Lea and Thames valleys, chiefly near London. A vast number of others might of course be added, were it possible, without great difficulty, to identify the innumerable fragments of bone, and the bones in a soft condition.

Man is at present only represented by his numerous works, but I have little doubt—although I have no positive proof—that I have seen parts of his bony fabric in a soft or flat and broken-up condition.

Some human bones, including part of a skull found in the dock extensions at Tilbury, are placed in the public gallery of Geology and Palæontology at the British Museum, Cromwell Road. The bones were described as of Palæolithic age by the late Sir Richard Owen in his *Antiquity of Man as deduced from the Discovery of a Human Skeleton at Tilbury*, 1884. The deposit in which the remains were found was, however, not of the age assumed by Sir Richard

Owen, and the human bones, though undoubtedly very old, are not of Palæolithic age. Bones of animals other than man are common in the implementiferous deposits at and near Tilbury, but they are always in a totally different condition from the Tilbury Dock human bones.

The following list of the Pleistocene[1] Mammalia of the Thames valley, near London, including North-East London, Gray's, and Ilford, is given as revised by Mr. E. T. Newton, F.G.S., and published by Mr. B. B. Woodward, F.G.S., in his *Pleistocene (non-marine) Mollusca of the London District*. The alterations made in some of the old and familiar names is somewhat confusing, as the revised names are not generally current either in this country or on the Continent, although they are now in use at the British Museum. Where necessary, I have added the older names in parentheses, and I have added the reindeer, an animal whose remains are frequent.

PRIMATES.

1. Man, *Homo*, by his works.
2. Ape, *Macacus pliocenus*, Owen.

CARNIVORA.

3. Wolf, *Canis lupus*, Linn.
4. Fox, *Canis vulpes*, Linn.
5. Lion, *Felis leo*, Linn.
6. Wild cat, *Felis catus*, Linn.
7. Hyæna, *Hyæna crocuta*, Erxl., var. spelæa.
8. Otter, *Lutra vulgaris*, Erxl.
9. Brown bear, *Ursus arctos*, Linn.
10. Grisly bear, *Ursus horribilis*, Ord. (U. ferox, L. and C.).

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[1] πλειστὸς most, καινὸς new.

UNGULATA.

11. Bison, *Bison bonasus*, Linn. (B. priscus, Boj.).
12. Urus, *Bos taurus*, Linn. (B. primigenius, Boj.).
13. Roe, *Capreolus caprea*, Gray (Cervus capreolus, L.).
14. Stag or red deer, *Cervus elaphus*, Linn.
15. Irish elk or deer, *Cervus giganteus*, Blum. (Megaceros hibernicus, Owen).
16. Reindeer, *Cervus tarandus*, Linn.
17. Straight-tusked elephant, *Elephas antiquus*, Falc.
18. Mammoth, *Elephas primigenius*, Blum.
19. Horse, *Equus caballus*, Linn. = E. fossilis, Meyer.
20. Hippopotamus, *Hippopotamus amphibius*, Linn. (H. major, Owen).
21. Woolly rhinoceros, *Rhinoceros antiquitatis*, Blum. (R. tichorinus, Fisch.).
22. Small-nosed rhinoceros, *Rhinoceros leptorhinus*, Owen.
23. Big-nosed rhinoceros, *Rhinoceros megarhinus*, Christol.
24. Wild boar, *Sus scrofa*, Linn.

RODENTIA.

25. Water-vole, *Microtus amphibius*, Linn. (Arvicola amphibia, Owen).
26. Beaver, *Castor fiber*, Linn. (C. europæus, Owen).

INSECTIVORA.

27. Shrew, *Sorex*, sp.

The musk-sheep, *Ovibus moschatus*, Zimm., two species of pouched marmot, one *Spermophilus erythrogenoides*, Falc., and the Russian vole, *Microtus ratticeps*, K. and B., have been detected on the south side of the Thames at Crayford and Erith, but not on the north.

When man first arrived in what is now Britain, he found the brown bear, wolf, hippopotamus, primeval bull, stag, wild horse, wild boar, Irish elk, mammoth, big-nosed rhinoceros, and straight-tusked elephant, with many minor animals, already naturalised in this part of the world.

Accompanying man, as new visitors, or old visitors returning with him, were the lion, wild cat, hyæna, grisly bear, and bison ; these associates, with the exception of the wild cat, have now left Britain.

Man was also accompanied by two other species of rhinoceros, which have now (with the one he found already here) become extinct.

Later on, and after man had long lived in this part of Europe, the lynx, leopard, Caffer cat, reindeer, glutton, and numerous minor animals, arrived and shared the country with him ; the stag was here long before man first set his foot in this quarter of the globe, it lived till he went away, it lived with the Neolithic men, and it lives with us now.

Palæolithic implements are presumed to be of greater or lesser antiquity according as they are associated with the older or newer series of animals. The implements are known by the company they keep. Man, the implement-maker, lived in what is now Britain, with the entire series of older and newer companions mentioned in the list.

The only undoubted human relic of bone of presumed Palæolithic age seen by me is a fragment of a human skull found, in November 1882, near the northern border of Essex, in 7½ feet of brick-earth, by the side of the highroad from Bury St. Edmunds to Saxham, in the parish of Westley, in Suffolk. The discovery was made by my late friend, Mr. Henry Prigg, M.A.I., and is recorded in the *Journal of the Anthropological Institute*, vol. xiv. p. 51. Mr. Prigg says he thinks there can be no question as to the great antiquity of the fragment, and that the deposit of red loam in which it was found must have been formed long anterior to the complete excavation

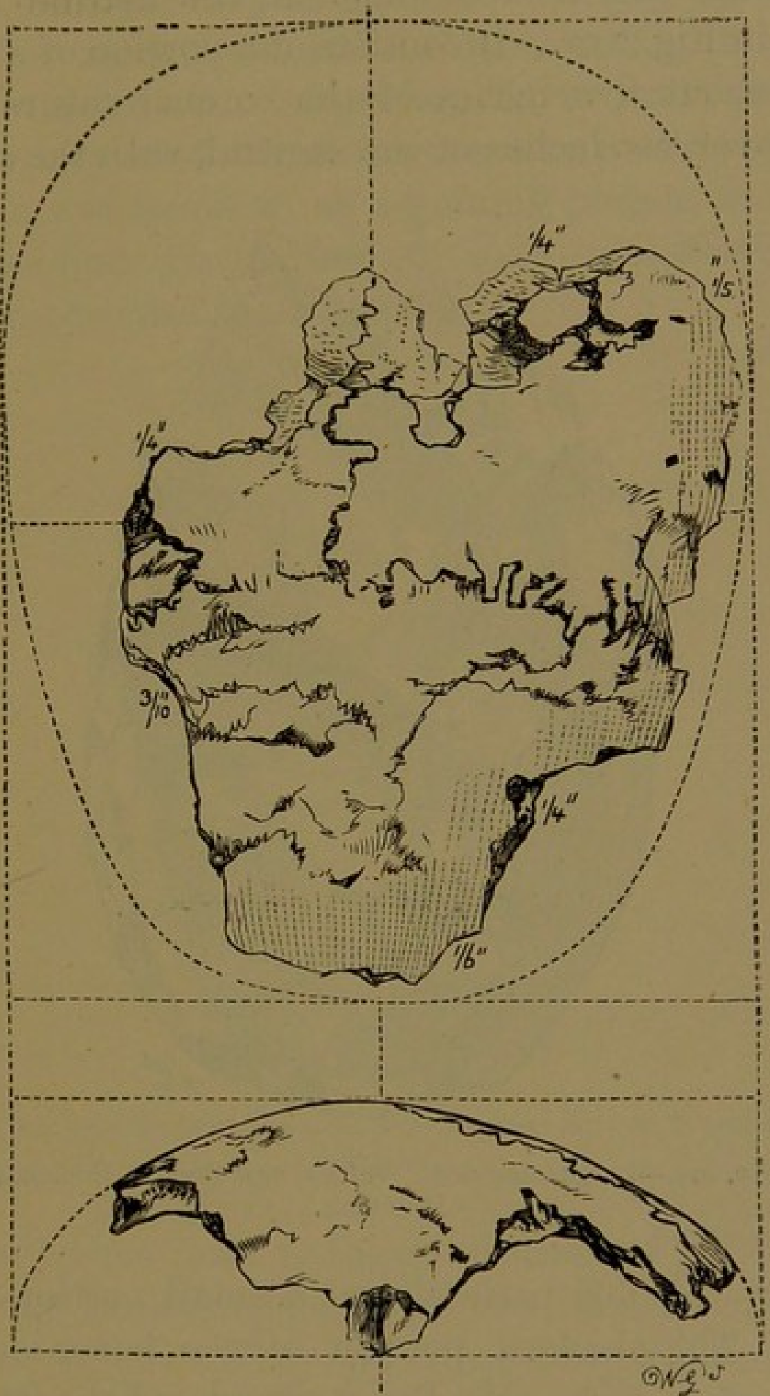

FIG. 211.—Fragment of human skull, of supposed Palæolithic age, Westley, near Bury St. Edmunds. Half scale.

of the valley of the Linnet to the south. It was in a pocket eroded in the chalk. In adjoining pockets two grinders of the mammoth were found, and four Palæolithic implements. An illustration of the skull fragment, engraved to one-half the natural size, is given in Fig. 211. It consists of a portion of a frontal bone, about five inches of the coronal suture, and a little over two inches of the sagittal, with the anterior

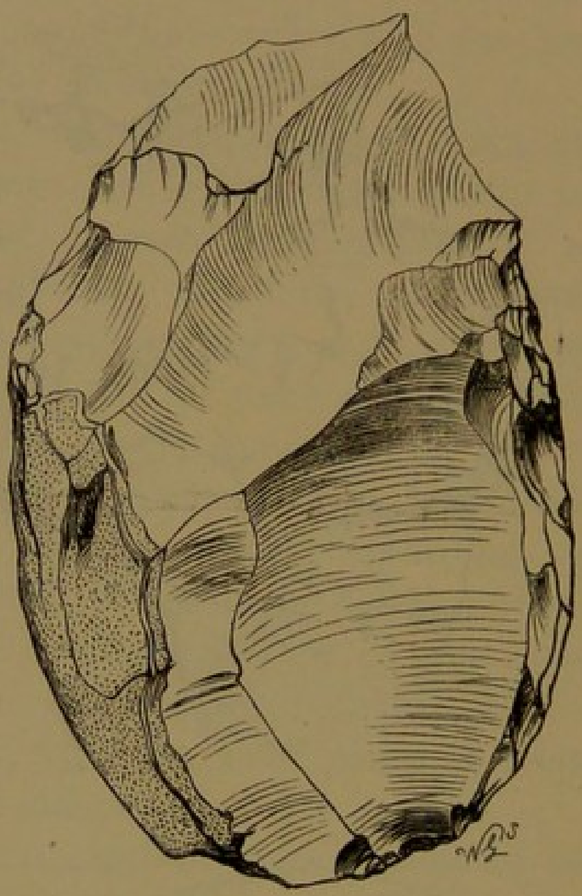

FIG. 212.—Large implement, Westley, near Bury St. Edmunds. Half scale.

third of the left parietal and a small portion of the right. The thickest portion of the bone is three-tenths of an inch. Mr. Prigg considered the fragment to have belonged to an undersized poorly developed individual of middle age, probably of the female sex. A series of "pockets" or small pits were being worked at the time of the discovery; all these pockets were closely adjoining, and in one of them was found the large and fine implement termed by Mr. Prigg a chopper or side-scraper, illustrated in Fig. 212, and in another the implement illustrated in Fig. 213. A labourer assured Mr. Prigg that thirty years prior to the discovery of the skull-fragment an entire skeleton of a man was found in an adjoining pocket, at about eight feet from the surface, in solid brick-earth, and near him the tusk of an elephant.

FIG. 213.—Oval white implement, Westley, near Bury St. Edmunds. Half scale.

A short time prior to the publication of Mr. Prigg's paper, the skull-fragment and two implements were sent on to me. They were carefully packed, and reached me intact. They were returned to Bury St. Edmunds, packed in a carefully pre-arranged manner ; but when the box was opened at Bury, the large implement was broken in two, and the skull-fragment smashed, the broken bones and stones being found loose in the box. Explosions were then going on at London railway stations, and it is believed the railway authorities opened Mr. Prigg's parcel in search of explosives, dropped one of the implements and broke it, and then put the broken pieces without any care into the box again. Mr. Prigg wrote that the railway people had so badly smashed the skull-fragment, that he should not attempt to put the pieces together again. Bad fortune seems to attend nearly all discoveries of very ancient human relics of bone.

H.—Shells of Land and Fresh-Water Mollusca.

The following is a list of fossil shells of land and fresh-water mollusca found in the river-drift of London. The district includes the Lea valley, Brentford, Ilford, and Gray's. The list is compiled from my own series of examples, and from the lists published by Professor Joseph Prestwich and Sir John Evans. The name corrections of previous lists, as made by Mr. B. B. Woodward, F.G.S., in his *Pleistocene (non-marine) Mollusca of the London District*, have been accepted as decisive.

A.—GASTEROPODA.

I. Pulmonata.

a. Stylommatophora.

1. *Limax agrestris*, Linn.
2. *Hyalina nitidula*, Drap.
3. ,, *radiatula*, Ald.
4. ,, *crystallina*, Müll.
5. ,, *fulva*, Müll.
6. ,, *nitida*, Müll.

7. *Helix rotundata*, Müll.
8. „ *pygmæa*, Drap.
9. „ *aculeata*, Müll.
10. „ *pulchella*, Müll.
11. „ *hispida*, Linn.
12. „ *concinna*, Jeff.
13. „ *fruticum*, Müll.
14. „ *arbustorum*, Linn.
15. „ *nemoralis*, Linn.

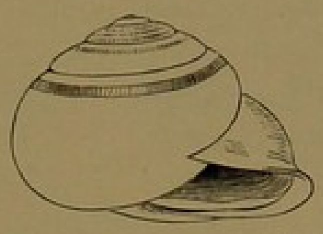

FIG. 214.—Helix nemoralis, Linn. Natural size.

16. *Helix ericetorum*, Müll.
17. „ *caperata*, Mont.
18. *Cochlicopa lubrica*, Müll.
19. *Pupa muscorum*, Linn.
20. *Vertigo antivertigo*, Drap.
21. „ *substriata*, Jeff.
22. „ *pusilla*, Müll.
23. *Balea perversa*, Linn.
24. *Clausilia rolphii*, Gray.
25. *Succinea putris*, Linn.
26. „ *elegans*, Risso.
27. „ *oblonga*, Drap.

b. Basommatophora.

28. *Carychium minimum*, Müll.
29. *Ancylus fluviatilis*, Müll.
30. „ *lacustris*, Linn.
31. *Limnæa auricularia*, Linn.
32. „ *peregra*, Müll.
33. „ *palustris*, Müll.
34. „ *truncatula*, Müll.
35. „ *stagnalis*, Linn.

36. *Planorbis corneus*, Linn.
37. „ *albus*, Müll.
38. „ *glaber*, Jeff.
39. „ *Nautileus*, Linn.
40. „ *marginatus*, Drap.
41. „ *vortex*, Linn.
42. „ *spirorbis*, Linn.
43. „ *contortus*, Linn.
44. „ *lineatus*, Walker.

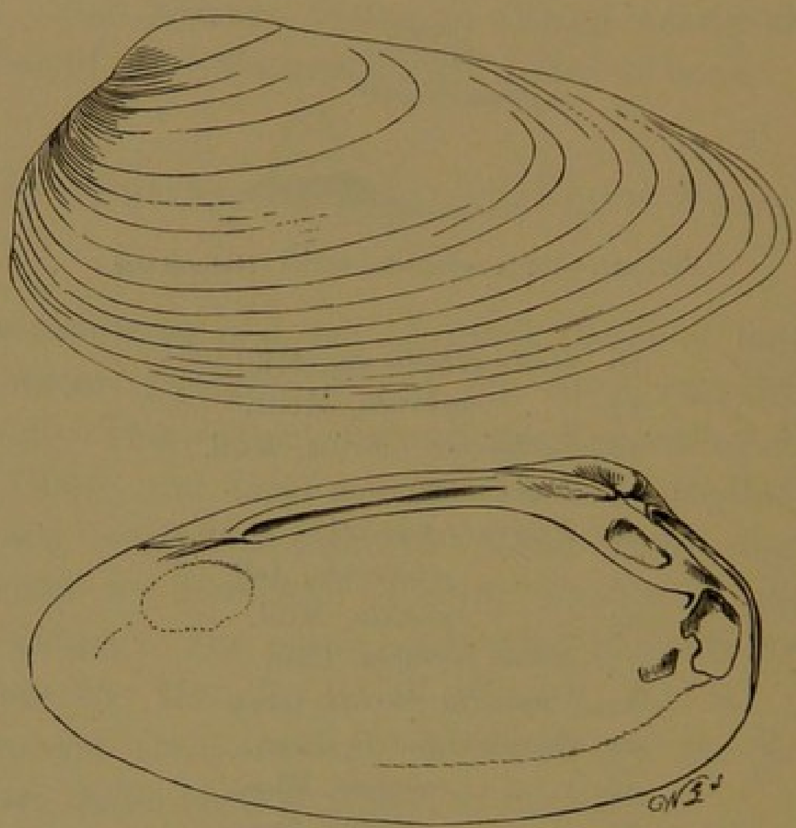

FIG. 215.—Unio tumidus, Retz. Natural size.

II. PROSOBRANCHIATA.

45. *Hydrobia ventrosa*, Mont.
46. „ *marginata*, Mich.
47. *Bythinia tentaculata*, Linn.
48. „ *leachii*, Shepp.
49. *Valvata piscinalis*, Müll.
var. *subcylindrica*, Jeff.
50. „ *cristata*, Müll.

B.—PELECYPODA.

51. *Unio littoralis*, Lam.
52. „ *tumidus*, Retz.
53. *Anodonta cygnæa*, Linn.
54. *Corbicula fluminalis*, Müll.
55. *Sphærium rivicola*, Leach.
56. „ *corneum*, Linn.
57. *Pisidium amnicum*, Müll.
58. „ *astartoides*, Sandb.
59. „ *pusillum*, Gmel.
    var. *obtusalis*, Jeff.
60. „ *fontinale*, Drap.
    var. *Henslowana*, Jeff.
    var. *pulchella*, Jeff.

Dr. J. Gwyn Jeffreys, who named my first series of fossil shells, remarked, "The occurrence of *Pisidium fontinale*, var. *Henslowana*, as well as the *tout ensemble* of all these fossil shells, induces me to believe that they have been thrown up by floods on the banks of a large river, such as the Thames."

In the Stoke Newington sands vast numbers of the opercula of *Bythinia* were found, both valves of *Unio* were commonly found in contact, and the remains of colour bands in *Helix nemoralis* were frequent.

The late James Wyatt, F.G.S., of Bedford, published the following list of land and fresh-water shells found at Bedford. These are important, as part of the Dunstable position is drained into the Ouse :—

1. *Helix pulchella*, Müll.
2. „ *hispida*, Linn.
3. „ *concinna*, Jeff.
4. *Succinea putris*, Linn.
5. *Ancylus fluviatilis*, Müll.
6. „ *lacustris*, Linn.

7. *Limnea auricularia*, Linn.
8. ,, *peregra*, Müll.
9. ,, *palustris*, Müll.
10. ,, *truncatula*, Müll.
11. ,, *stagnalis*, Linn.
12. *Planorbis glaber*, Jeff.
13. ,, *Nautileus*, Linn.
14. ,, *marginatus*, Drap.
15. ,, *vortex*, Linn.
16. ,, *spirorbis*, Drap.
17. *Hydrobia marginata*, Mich.
18. *Bythinia tentaculata*, Linn.
19. *Valvata piscinalis*, Müll.
20. ,, *cristata*, Müll.
21. *Sphærium corneum*, Linn.
22. *Pisidium fontinale*, Drap.

I.—Plant Remains.

Plant remains were of frequent occurrence on the Palæolithic floor at Stoke Newington Common, but the leaves and twigs were almost invariably so excessively fragile that nothing whatever could be done with them. Small fragments of leaves, or impressions of small fragments, were common on pebbles and subangular flints; sometimes impressions could be seen in ferruginous clay. Impressions of portions of leaves and stems of grass, rushes, and sedges were not uncommon. Fragments of stems, with thorns, apparently brambles, occurred; pieces of birch bark and leaves and catkins of alder, *Alnus glutinosa*, Gaertn. Impressions of the pinnæ of the male fern, *Aspidium Filix-mas*, Sw., with parts of the fronds and rhizomes, were very frequent; leaves of "Old man's beard," *Clematis vitalba*, Linn., were not uncommon, and there was a vast amount of royal fern, *Osmunda regalis*, Linn. Pieces of coniferous wood belonging to a Pinus were frequent, and yew, elm, and hazel, with the impressions and remains of leaves and nuts.

Major-General Pitt-Rivers found pine wood and fern remains in the Palæolithic deposits of Acton.

It is remarkable that I have found remains of the vine, *Vitis vinifera*, Linn., with Palæolithic implements, at Stoke Newington, Acton, Hounslow, and Caddington, but in every instance it has occurred under suspicious surroundings. Vines must have been cultivated for centuries near London, and I have never found the pieces of vine *in situ*. From their condition the pieces have obviously been of very great age. At Caddington I found a large piece of vine stem in a block of brick-earth which had just fallen from the side of a pit, and which had covered the Palæolithic floor, but soon afterwards a Roman refuse pit was exposed in section near by, with abundant pottery, a Roman coin, and a piece of wood. There is no evidence of the vine remains being of Palæolithic age, but a few comments on the vine as a wild plant may be of interest here.

Prof. A. de Candolle, in his *Origin of Cultivated Plants*, under Vine, says, on the authority of Griesbach, that *Vitis vinifera*, Linn., now grows wild in the temperate regions of Western Asia, Southern Europe, Algeria, and Morocco. "It is," says De Candolle, "especially in the Pontus, in Armenia, to the south of the Caucasus and of the Caspian Sea, that it grows with the luxuriant wildness of a tropical creeper, clinging to tall trees and producing abundant fruit without pruning or cultivation. Its vigorous growth is mentioned in ancient Bactriana, Cabul, Kashmir, and even in Badak-Khan, to the north of Hindu

Koosh. Of course it is a question whether the plants found there, as elsewhere, are not sprung from seeds carried from vineyards by birds. I notice, however, that the most trustworthy botanists, those who have most thoroughly explored the Transcaucasian provinces of Russia, do not hesitate to say that the plant is wild and indigenous in this region."

Further on De Candolle writes, "Concerning the vine, we have proof of its great antiquity in Europe as in Asia. Seeds of the grape have been found in the lake-dwellings of Castione, near Parma, which date from the age of bronze, in a prehistoric settlement of Lake Varese, and in the lake-dwellings of Wangen, Switzerland, but in the latter instance at an uncertain depth. And, what is more, vine leaves have been found in the tufa round Montpellier, where they were probably deposited before the historical epoch, and in the tufa of Meyrargue in Provence, which is certainly prehistoric, though later than the Tertiary epoch of geologists."

Dr. James Geikie, in his *Prehistoric Europe*, quotes, at pp. 47, 49, a list of plants, including the vine, and a chestnut, *Juglans regia*, Linn., found in the tufas of Tuscany and Montpellier.

The remains of *Elephas antiquus*, Falc., have been found in tufa, with alder and bracken, in the valley Aygalades, near Marseilles.

It is remarkable that Mr. H. N. Ridley, F.L.S., formerly a botanical officer of the British Museum, and now Director of the Gardens and Forests Department, Singapore, has recorded the occurrence of the sweet chestnut with Palæolithic implements at Crayford. De Candolle, in writing of this tree, says, "It forms forests and woods in mountainous parts of the temperate zone from the Caspian Sea to Portugal. It has also been found in the mountains of Edough in Algeria, and more recently towards the frontier of Tunis."

Relics of the elm (*Ulmus campestris*, Sm.), found by me with Palæolithic implements at Stoke Newington, might well be regarded with the same suspicion as the vine and chestnut. The *Ulmaceæ* now grow wild in Central, Southern, and Eastern Europe and sub-tropical India, and it is doubtful whether the common elm is now indigenous in any part of Britain. In Count Saporta's list of plants found in the tufas of Provence, quoted by Dr. Geikie, the elm occurs with the vine and chestnut. The coincidence is curious. Further evidence must be sought for in the future. Mr. William Carruthers, F.R.S., determined the vine, and the Rev. Professor Henslow microscopically examined and confirmed the name of the elm for me.

The remains of yew (*Taxus baccata*, Linn.) were abundant; pieces of branches of a fine deep red-brown colour were found strewn about, as if they had been broken or hacked from trees; some had been flattened by the pressure of tens of thousands of years from above; a few soon fell to pieces in concentric laminæ.

It would seem just possible that the vine grew wild in the part of North-Western Europe now represented by Britain in Quaternary times, in company with the elm and sweet chestnut. Chestnuts still grow luxuriantly in the parks of Britain, and the vine is a very hardy plant, which withstands the cold of the severest winters. Indeed the choicest varieties of vines, which produce fruit in hothouses, have their roots outside in a border.

The remains of *Osmunda regalis*, Linn., were so abundant on some parts of the Palæolithic floor of Stoke Newington, that the idea forced itself upon one that the fronds represented litter, or the beds on which the savages of old had rested themselves. In one mass of compacted fronds I found a keen-edged Palæolithic implement and a leg-bone of a horse.

A most instructive list of plant relics, found in an implementiferous deposit at Hoxne in Suffolk, was published by Messrs. Clement Reid, F.G.S., and H. N. Ridley, F.L.S., in the *Geological Magazine* for 1888, p. 441. The list is here appended.

Ranunculus aquatilis, Linn. Fruits.
,, *sceleratus*, Linn. Fruit.
,, *repens*, Linn. Fruit.
,, *Flammula*, Linn. Fruit.
Rubus Idæus, Linn. Stones.
Comarum palustre, Linn. Fruits.
Hippurus vulgaris, Linn. Fruits.
Œnanthe Phellandrium, Lam. Fruits.
Cornus sanguinea, Linn. Large seed.
Bidens cernua, Linn. Fruits.
Ceratophyllum demersum, Linn. Fruits.
Alnus glutinosa, Gaertn. Cones and seeds.
Betula nana, Linn. Leaves.
Salix polaris, Wahlb. Stem, leaves, fruits.
,, *myrsinites*, Linn. Leaves, fruit.
Taxus baccata, Linn. Wood and seed.
Pinus, sp. Bark.
Sparganium ramosum, Linn. Fruit, one bitten in two.
Potamogeton pusillus, Linn. Fruit.
,, *trichoides*, Cham. Fruit.
,, *rufescens*, Schrad. Fruit.
,, *pectinatus*, Linn. Fruit.
,, *crispus*, Linn. Several fruits.

Scirpus lacustris, Linn. Fruit.
,, *pauciflorus*, Lightf. Fruit.
Eleocharis palustris, Linn. Nut.
Carex ampullacea, Linn. Fruits.
Chara, sp. Nucule.

MOSSES

(*consisting of fragments of stems, with leaves attached, often much decayed, identified by Mr. William Mitten*).

Brachythecium rutabulum, Bruch. and Schimp.
Amblystegium fluitans, Mitt.
Hylocomnium squarrosum, Schimp.
Campylium stellatum, Mitt.
Acroceratium sarmentosum, Mitt.
,, *cuspidatum*, Mitt.
Philonotis fontana, Brid.
Webera albicans, Schimp.
Bryum pallens, Sw.
Mnium punctatum, L.

From the same deposit Professor Prestwich formerly obtained wood of yew and fir, and doubtfully oak, whilst Messrs. Reid and Ridley detected teeth of fresh-water fish, *Esox* and *Leuciscus*.

The flora indicated by the Hoxne plants is, according to Messrs. Reid and Ridley, Arctic, corresponding in some respects with Iceland, for which the two, *Salices* and *Betula*, is sufficient evidence. The Mosses also confirm this conclusion ; *Acroceratium sarmentosum*, Mitt., being an alpine moss, which now grows on the mountains of Killarney and Scotland.

The flowering plants nearly all occur in high latitudes, but several are not truly Arctic at the present time, as *Taxus baccata*, Linn., *Sparganium ramosum*, Linn., *Cornus sanguinea*, Linn., and *Potamogeton trichoides*, Cham. *Bidens cernua*, Linn., is not included in Hooker's paper on the distribution of Arctic plants (*Trans. Linn. Soc.*, vol. xxiii. p. 251), but *B. tripartita*, Linn., is. *Salix polaris*, Wahlb., only occurs now in very high Arctic latitudes.

Messrs. Reid and Ridley say, "The flora thus shows the approach of a warmer period following an Arctic one, so that the Arctic flora was not entirely gone by the time that the more temperate one had come."

Lists of Quaternary and inter-glacial or post-glacial plants, met with in other parts of Europe than Britain, will be found in Geikie's *Prehistoric Europe*, a recent addition to the lists being *Rhododendron ponticum*, Linn., from near Innsbrück.

J.—Forgeries of Implements.

Soon after the publication of my first discoveries of Palæolithic implements in North-East London, forgeries became common, not only of the implements themselves, but of the hammer-stones of quartzite.

No workman ever received a single word of information from me as to tools, or their marks of authenticity; others, however, were not so cautious, but told the men everything they knew, and explained the various characteristic points of form, mineral condition, and abrasion of implements.

The consequence was that carpenters and plasterers, men who knew how to use different forms of hammer and punch, speedily produced forgeries. The forgeries were never made by the labourers, as they were without the necessary skill of hand. The carpenters and plasterers sold the forgeries to the labourers for small sums, and the labourers resold the stones, often for very large sums, to collectors of curios. A sovereign has many times been received for a good forgery, and I know of an instance where five pounds was foolishly paid for an example of surpassing size, weight, and finish.

Excavations were being made at this time in Gray's Inn Lane, and as collectors had learned that the first British Palæolithic implement was lighted on in Gray's Inn Lane, the collectors plagued the diggers there for implements. Several genuine implements were indeed found, but many forgeries were taken by a Stoke Newington plasterer to the labourers of Gray's Inn Lane for re-sale. Genuine implements from Stoke Newington were sold as City implements.

Even at the present time it is in the highest degree dangerous to buy stone implements of labourers and their boys. The art of forgery has been made so complete, that nearly every mark of authenticity has been successfully imitated.

As soon as the men were advised about quartzite pebbles with abraded ends, they speedily produced a large quantity for sale, for nothing could be easier than the abrasion of a quartzite pebble.

The fault, of course, rested wholly with the visitors who gave information to the men. As the forged implements have been sold and resold in all directions, and are doubtlessly in the market to-day, I here describe some of them.

In the first place, the best forgeries are beautifully and perfectly made, in close imitation of the best type forms. Every delicate gradation of form, shape, and thinness of point has been most successfully imitated. Collectors at one time lent the men their best genuine tools as aids to discovery, and one special forger was most successful in exactly imitating the best type forms to the minutest details.

The genuine Stoke Newington implements are often keen-edged, and as often highly lustrous. At first the forgeries were all dull and lustreless. On this fact being made known to the forgers, they vigorously brushed their forgeries all over with a very hard brush; the result was an excellent and natural-looking lustre or polish.

Next, the collectors wanted slightly abraded edges, some genuine tools being slightly abraded. To meet this demand the men put the tools into a twisted sack, and shook the sack with its contained implements together with natural stones and sand, till the tools exhibited a proper amount of abrasion.

Some wise person next showed the men that many genuine tools were stained with ochre, caused by the presence of iron in the soil. To provide this colour the men kept large iron saucepans constantly boiling on their fires—saucepans filled with forged implements, old rusty nails, and other iron fragments; this gave the required tint, but some of the purchasers suspected the tools, and put them again into boiling water, with the result that the ochreous colour soon came off and left the tools grey. Potash removed the colour. This was because the men at first boiled the tools after they had brushed them up to produce a lustre.

The forgers now boiled their unpolished grey tools in their saucepans and polished them up afterwards. When this was done, re-boiling would not remove the ochreous colour derived from the iron, and the longer the tools were boiled the more permanently ochreous they became.

One visitor to the site of my discovery was a believer in pre-glacial man ; he believed all Palæolithic implements to be pre-glacial, and he set the men to look after ice-scratched tools. He brought pieces of indurated glacially-scratched chalk from Finchley, so that the men might better understand what true glacial scratches were. In a few days implements were on sale scratched deeply all over the worked surface.

Of all the devices practised by these forgers, one possessed a great pre-eminence over the others. The men were enlightened as to the presence of the little, highly lustrous, quicksilver-like specks seen on many genuine implements. The forgers soon reproduced these specks perfectly, by forcibly rubbing a small stone burnisher on suitable places.

The only characters they were unable to forge, as far as I know, were the black moss-like dendritic deposits caused by the crystallisation of peroxide of manganese and calcareous and compact ferruginous incrustations. Whitening the forgeries was not attempted.

The forgers did not confine themselves to Palæolithic implements ; they also made Neolithic tools, including polished celts. In form all were perfect, and calculated to deceive the sharpest and most experienced eyes. The polished celts were surfaced on a revolving grindstone ; on an examination with a lens it could be seen that the almost invisible striæ were too perfect, and too much in one continued direction, to be the work of irregular hand-polishing.

Soon after Mr. Spurrell's wonderful discovery at Crayford of Palæolithic flints capable of replacement, one or more persons informed the Stoke Newington men of this fact ; the men straightway began to strike off grey flakes, and put them together again. The

Stoke Newington workmen were even told of the pits at Crayford; they visited the pits and showed the Crayford diggers how to replace newly struck off flakes. Some of the forged pieces were sent on to me. Many of the Stoke Newington forgeries have been sent to me for an opinion.

The moral to be drawn from the facts narrated is—be very careful in dealing with workmen, especially London workmen. It is a different state of things in the country, where fewer persons are on the look-out for antiquities. But even in the country it is in the highest degree inadvisable to inform workmen of the nature and points of authenticity of stone tools; the whole mischief is brought about by collectors of curios airing their superficial knowledge before groups of workmen. Although I have been keenly looking out for Palæolithic implements between London and Bedfordshire for more than fifteen years, and although I have been in close contact with the workmen during the whole of this period, I have never mentioned implements to one of the men, and I do not believe that a single man or boy in any of the pits frequented by me has the least knowledge of implements as such. When I have wanted to examine special gravel, sand, or clay, I have simply paid the men to dig it or spread it out for me with shovels. I have then looked over the material another day, or perhaps weeks after, and taken out anything worth removal.

It is a curious fact in regard to the Stoke Newington forgeries, that some of the collectors who informed the workmen of the points of authenticity in stone tools were themselves severely bitten by the forgers. This fact should delight the hearts of all antiquaries.

CHAPTER XVI.

MESOLITHIC IMPLEMENTS.

By this term is meant implements intermediate in age between Palæolithic and Neolithic. Many such implements have been found in London of late years, which, from their mineral condition, might be taken for modern forgeries. That a Mesolithic series exists is certain, although I have but few examples; these I have found *in situ* myself, so that I know them to be genuine.

They occur above the contorted drift in London and elsewhere in the Lea valley, apparently upon an old land surface; they are surmounted by *humus* or ordinary earth, but buried sufficiently deep from the present surface line to be free from iron stains. In fields, and in places where no foundations have been dug, they have, as a rule, never been reached by the plough or spade. They are at London slate-colour or grey, sharp-edged and lustrous, and they are marked by the familiar lustrous quicksilver-like spots. As far as I have seen these tools, they are invariably of Palæolithic type, rudely triangular, with a heavy butt, ovate or ovato-triangular. Other forms no doubt occur. A characteristic example is illustrated in Fig. 216, found in a freshly-made cutting for a new road at Stoke Newington by myself. It is made from a flint with ashy-grey bark; its colour is white ashy-grey, clouded with blackish slate colour; it is lustrous, and the quicksilver-like specks are indicated by crosses. The part at A represents a piece struck off by the workman's pick in digging the hole. Its weight is 1 lb. $1\frac{3}{4}$ oz. It is decidedly not Neolithic, and if not accepted as Mesolithic, it undoubtedly belongs to the Palæolithic series.

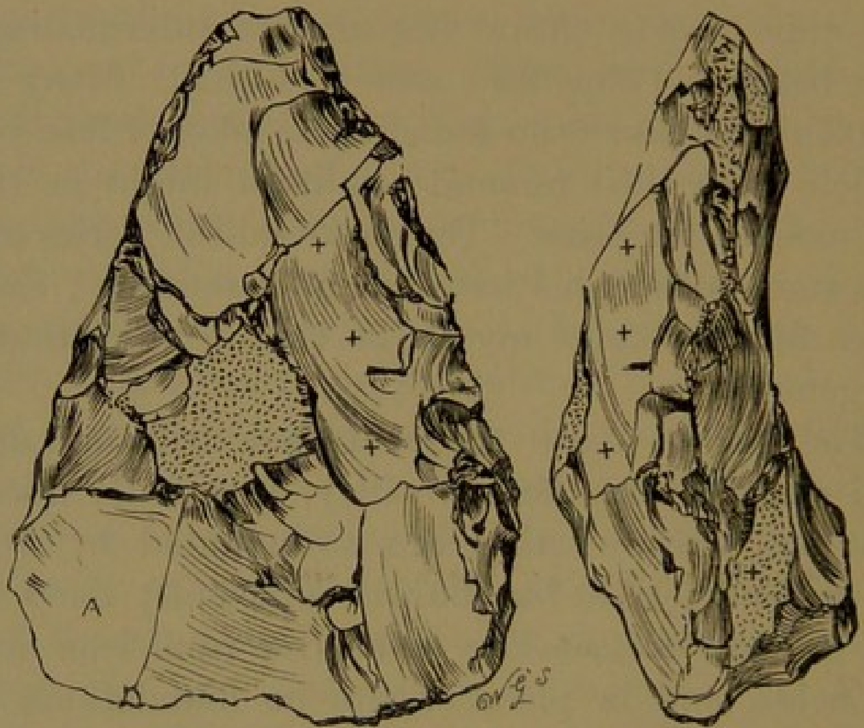

FIG. 216.—Mesolithic implement, Stoke Newington Common. Half scale.

Fig. 217 was found and brought to me by a workman; it was found near the surface in Drury Lane, on the top of the gravel. It agrees in all respects with the last; it is sharp-edged, and its colour is blackish-grey with lighter clouding. The lustrous specks are marked with crosses. This example is now in the British Museum, Bloomsbury.

A third implement, formed from a flake, and taken by myself from above the contorted drift at Stoke Newington Common, is illustrated in Fig. 218. It is

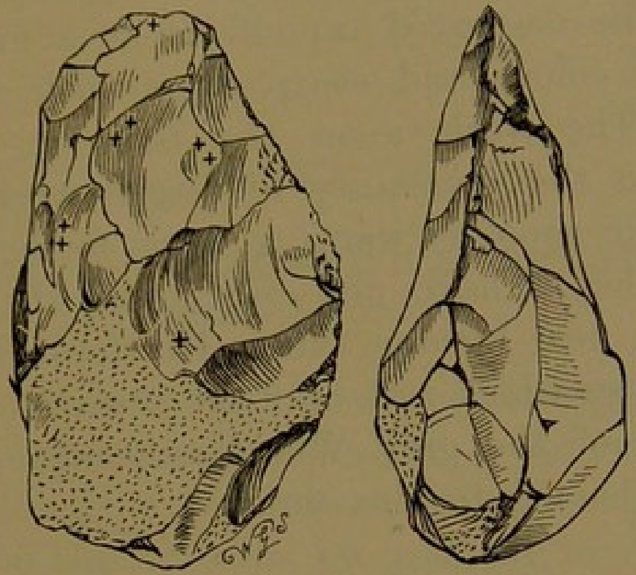

FIG. 217.—Mesolithic implement, Drury Lane. Half scale.

slate colour, blotted with grey-white and lustrous. The shining specks are marked by crosses.

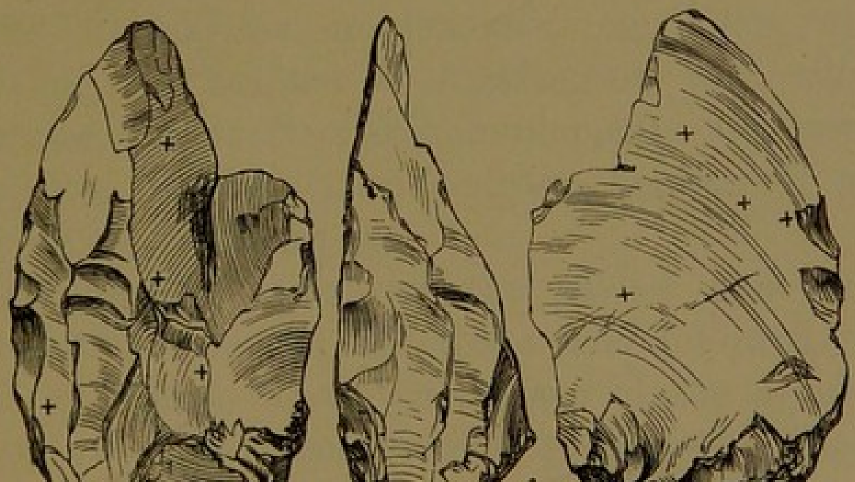

FIG. 218.—Mesolithic knife-flake, Stoke Newington Common. Half scale.

There can be no doubt that many implements of this Mesolithic class have been found by the men.

When offered for sale, the tools have been looked upon as rank forgeries, and no purchasers have been forthcoming. Indeed, I believe that I have caused many to be destroyed myself, as at a first glance their grey colour and sharp edges look most suspicious. The work upon the tools is, however, superior to the generality of forged work; but if any further proof is wanting, it is forthcoming in the fact that I have not only found the tools *in situ* in and near London, but in Hertfordshire, under circumstances which will bear the severest criticism. The whole of the grey Wheathampstead examples appear to belong to this series.

CHAPTER XVII.

PALÆOLITHIC STONES FOUND BY NEOLITHIC MEN AND REWORKED.

In the Dunstable and Caddington district Palæolithic implements and flakes are very rarely found on the surface; they are sometimes brought to that position on the hill-tops by accident in digging for clay, or by deep ploughing or digging. They are rarely found in the valleys, as sweepings from the hill-tops by denudation. The same fact more or less holds good for the whole course of the Lea, from Bedfordshire to London.

The Palæolithic implements, or flakes, which occur on the surface at Caddington are ochreous or white, whilst Neolithic implements are, without exception, jet black; the contrast therefore is great, striking, and conclusive.

The Neolithic men, or the earlier men of the newer stone age, and the Kelts who followed them, lived, of course, upon the surface of the ground as it now exists. No considerable geological change has taken place since these men lived on the hills and in the valleys. The contour of the country was the same then as now, and the date of the stone tools made by the Neolithic men and the Kelts may be roughly put down as from two to ten thousand years. The Neolithic men may, however, be considered as belonging to recent times as compared with the remote antiquity of their Palæolithic precursors.

Now it sometimes happened that in wandering over the hills and plains, the Neolithic barbarians picked up the implements and flakes of the long extinct Palæolithic savages. The Neolithic barbarians and Kelts not only picked up these relics, but they recognised them as of human design and make, and at times even reflaked them. I have

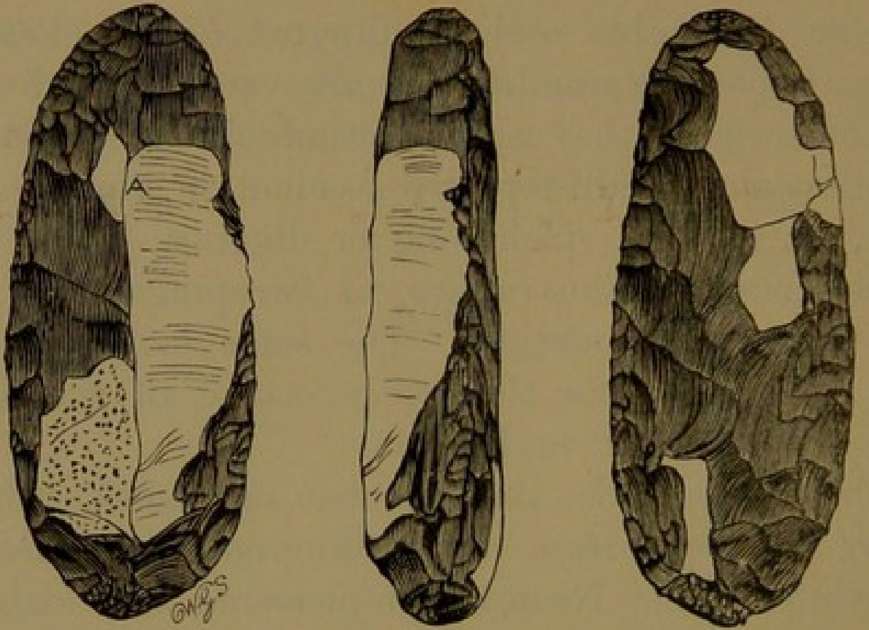

FIG. 219.—Neolithic fabricator, made from a Palæolithic flake, Caddington. Actual size.

several flakes snow white on one side and jet black on the other. The explanation is, that the white side is Palæolithic and tens of thousands of years old, whilst the black side is Neolithic, and not older than from two to ten thousand years, perhaps less. In Fig. 219 is illustrated, actual size, three views of a well-made little Neolithic tool, a fabricator, found by me at Caddington. The remarkable fact in connection with the tool here illustrated is, that it has been made from a white Palæolithic flake, the Palæolithic facets being perfectly white, whilst all the secondary chipping is Neolithic work and black.

A Neolithic scraper, found by me in the British camp named Wanlud's Bank, near Luton, Bedfordshire, is illustrated in Fig. 220. It is made from a whitish-grey Palæolithic flake. The side not seen in the illustration is grey-white, and the white facets seen on the front and edge view are also whitish-grey and Palæolithic; the scraping edge, shown by the

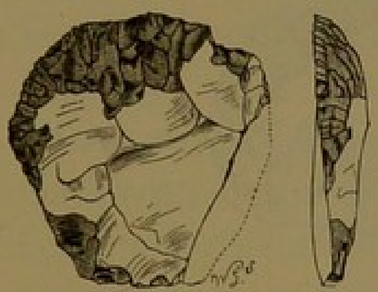

FIG. 220.—Neolithic scraper, made from a Palæolithic flake, Wanlud's Bank, Luton. Half scale.

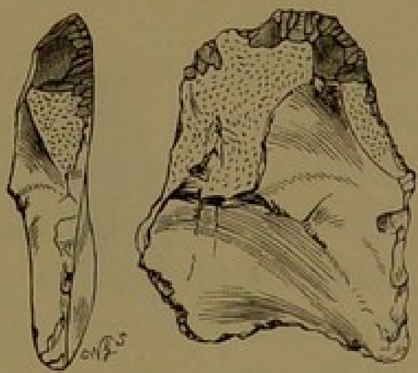

FIG. 221.—Neolithic scraper, made from a Palæolithic flake, Lower Clapton, London. Half scale.

dark tint in the illustration, is dark livid-grey in colour, and Neolithic.

The Neolithic scraper illustrated in Fig. 221 was found by me at Lower Clapton, London. It is made from an ochreous and lustrous Palæolithic flake, with a bold cone of percussion on the side not illustrated. This flake was found by a Neolithic man and made into a scraping tool. The fine, newer work, shown by the darker tint, is livid-grey in colour, and contrasts with the older ochreous facets.

Another example of a Neolithic scraper made from a Palæolithic flake, and found by me at Stoke

U

Newington Common, is illustrated in Fig. 222. This flake was struck in Neolithic times from a larger Palæolithic flake; the side not illustrated is of the same colour as the newer fine work on the left edge and top of tool. The face of the tool and the right-hand side are sub-ochreous in colour, scratched, and obviously of much greater antiquity than the newer work. This front face at its base shows a hollow answering to a bulb of percussion of a missing flake, which must have been struck off in Palæolithic times.

I have several other examples of a similar class;

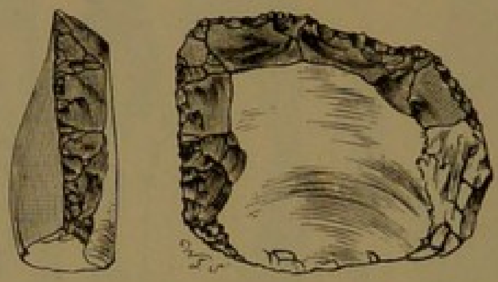

FIG. 222.—Neolithic scraper, made from a Palæolithic flake, Stoke Newington Common. Half scale.

the mention of two may suffice. One is a somewhat large Neolithic boring tool, found by me at Hanwell; the newer work is livid-grey and sharp, whilst the tool itself is made from a large abraded white Palæolithic flake. The other example is a very thin Neolithic knife, picked up by me near Thetford; it is made from a beautiful grey-white mottled, cleverly struck, and thin Palæolithic flake; this whitish flake has been beautifully worked all up one edge and at the point, and so made a perfect Neolithic knife; the newer work is slate-black.

CHAPTER XVIII.

NEOLITHIC IMPLEMENTS AND KELTIC RELICS, FROM SOUTH BEDFORDSHIRE TO LONDON.

A.—Implements of Stone and Bronze.

Stone implements of Neolithic age are very common on both sides of the valley of the Lea, from its source at Leagrave, near Luton, to its outflow in the Thames at Blackwall. Museums and private collections abound with such antiquities; they include polished and chipped celts, arrow-heads, knives, borers, scrapers, hammer-stones, punches, bronzes, and every article of the stock-in-trade of the Neolithic and Keltic man.

At and near Dunstable I have found a considerable collection of celts and broken celts. A chipped celt I found in 1893 lying in the path of the People's Park, Luton, to which position it had been brought with other stones for making the path good. A small celt, with incurved sides, I have picked up close to the town of Dunstable. In 1892 I lighted on a chipped celt at Kensworth, near Dunstable; and returning to the same field the next day, I found another. In an adjoining field I found a third and half of a fourth example in a cart-rut close by. I have found a chipped celt and two half celts at Caddington. I have picked up several chipped celts at Wanlud's Bank, near Luton. Two Wheatampstead celts have been already referred to. I have also found half of a third celt at Wheathampstead.

During the investigation of the age of Loughton Camp, Epping Forest, a chipped celt or chisel was disinterred from the rampart. It is illustrated by three views in Fig. 223. This instrument exhibits traces of the original crust or bark in one or two positions. The tool is of remarkable form, one side

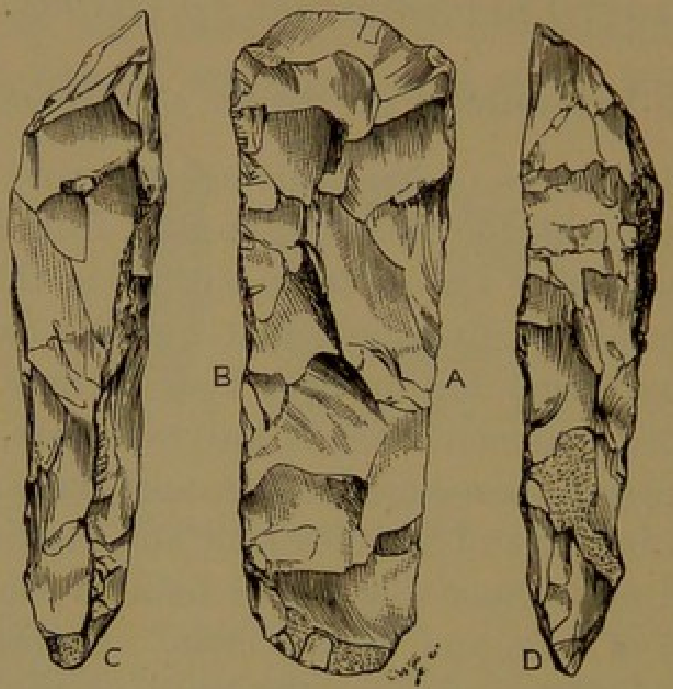

FIG. 223.—Neolithic chipped celt, from the rampart of Loughton Camp, Epping Forest. Half scale.

edge being acute and the other flat. Some doubt exists as to whether it was really intentionally chipped into its present shape, or whether it is simply unfinished on one side. If this instrument is really a chisel, meant to be held unmounted in the hand, and the broad end designed for use, the obtuse edge makes it convenient for handling, as the thumb of the right hand naturally rests on that edge. The central figure of the illustration shows the convex face of the celt;

the cutting edge is at A, and the flat edge at B; the cutting edge is shown facing at C, and the flat edge facing at D. The flat side of the chisel exhibits numerous lustrous spots, caused by the attrition of minute pebbles or grains of sand in the ground during a long series of years; this side was downward in position in the rampart of the camp; the convex side was upwards, as is proved by numerous ferruginous concretions, which must have been deposited from above downwards.

Polished celts are much rarer than rudely chipped ones in the Lea valley, as far as my experience goes, and the only perfect example found by me I lighted on, in 1882, in a field near Bedford. It was a remarkable celt, as it was made of dolerite, and formed with flattened sides in a typical Irish fashion; it was undoubtedly of ancient Irish origin. It is now in the collection of Sir John Evans. In 1886 I found the upper or cutting part of a polished celt on Dunstable Downs, another upper part of a large example at the foot of the downs in 1890, and a piece from the middle of a polished celt at the bottom of Blows Downs, near Chalk Farm, in 1893. I have also found an upper portion of a polished celt at Wanlud's Bank, near Luton. I have some pieces from the middle and a flake struck from the face of a polished celt, both found by myself at Maiden Bower, near Dunstable, and four flakes struck from polished celts found at Wanlud's Bank. I have also found two scrapers made from pieces of polished celts, one in Maiden Bower, the other at Leagrave.

Three polished celts, with an edge-view of one to the right, are illustrated in Fig. 224. These Neolithic tools were found side by side, and touching each other, at Temple Mills, near Stratford, London. They were found by a workman, and could not have got into the position in which they were lighted on by accident, but were clearly so placed in old times

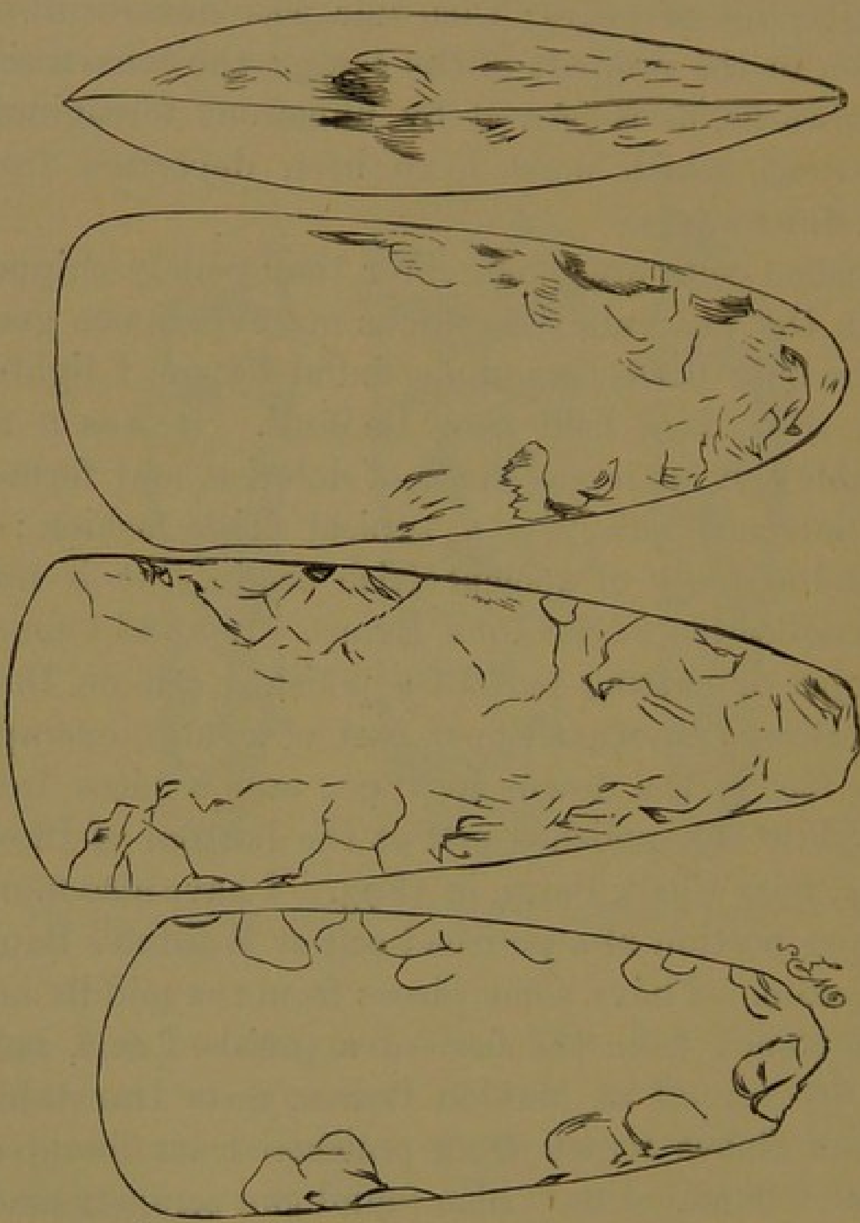

FIG. 224.—Neolithic polished celts, found near the Lea, at Temple Mills, London. Half scale.

by the Neolithic owner. These three beautifully made examples, with edges still so keen that it is impossible to imagine that they could ever have been used, were probably the belongings of some Neolithic man; he carefully placed them on the ground side by side, and never returned to repossess himself of them; the dust and a little surface earth accumulated upon them, and they remained on the spot where the former owner laid them down till they were dug up by accident. These examples are now in the collection of Sir John Evans.

Quartzite pebbles, believed by me to be polishing stones, probably used in old times for polishing celts, are not uncommon. They vary greatly in size, and at first sight appear to be mere broken pebbles. On examination, however, the broken end is seen to be quite flat and polished, as if by constant rubbing on another stone. They are certainly not naturally broken stones. A small example from Maiden Bower is illustrated in Fig. 225.

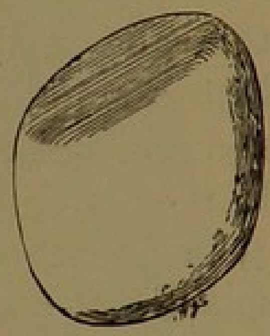

FIG. 225.—Polishing stone of quartzite, Maiden Bower. Half scale.

Of arrow-heads I have a considerable collection, mostly found near Dunstable and Luton: all the different classes are represented, tanged, untanged, and leaf-shaped. Many broken examples may be picked up in the cultivated fields, but as the fields are chiefly chalk, and the arrow-heads are white, the latter are liable to be overlooked. Arrow-heads are best seen in harrowed fields after showers of rain. I have a beautiful leaf-shaped example found at Shacklewell, London.

Lance and spear heads of flint are not very rare in the Dunstable district. These objects are an inch or two in length, and usually very thin; they are commonly found in a broken state.

Flint knives, small pointed instruments of flint termed "borers," and fabricators are not uncommon in the Dunstable district.

Spherical blocks of flint, the size of a cricket-ball and abraded all over by hammering, are very common. I once found one of these *in situ* in the chalk bank which forms the wall of the British camp of Maiden Bower.

Scrapers of horse-shoe form are the commonest of all the Neolithic and Keltic tools found near Dunstable; they are to be found everywhere in ancient British positions: I have thousands.

A drilled hammer of stone I have never found in the valley of the Lea, although I have seen an excellent example found in the river itself at Waltham, and now preserved in the school-room at that place. It is a large drilled pebble of quartzite, measuring $3\frac{1}{2}$ inches across its smaller diameter, and curiously splayed off at one end, to give it an obtusely pointed form; its length is 5 inches and its thickness $1\frac{1}{4}$ inches. There is a specimen in the British Museum from Sandridge, near Wheathampstead. I have heard of other examples, but have not seen them.

Stone spindle-whorls, formerly used with the distaff in spinning wool, I have not found in Bedfordshire, Hertfordshire, or Middlesex, but I have twice lighted on the bone spindles that were used with the whorls. These objects are, however, often later in date than Keltic times, as also are rude pins of bone, which I have frequently found.

A remarkable stone pestle is illustrated in Fig. 226. It was found eighteen or twenty years ago by one of the "squatters" on that part of Epping Forest known as "Black Bushes," on the right-hand side of "Earl's-path," leading from Loughton to the "Robin

Hood" Inn. The earth was turned up for the purpose of setting potatoes, and consequently the position of the stone must have been quite superficial. The spot where it was found was virgin forest land, where the soil slopes down to "Debden Slade." This "slade" is the valley below the Loughton camp. The pestle is a large and remarkable example; its length is one foot and five-eighths of an inch; the weight is two pounds eleven ounces; the material is hornblendic granite or hornblendic gneiss; this material occurs rarely on the London gravels. The pestle is made from a long natural block of this granite or gneiss, and has been picked and partially ground all over, to bring it to the shape shown in the illustration. Both ends have been used for battering, but the larger end is more bruised than the smaller. On examination with a lens, a kind of glaze or lustre is seen all over the instrument, brought about by a slight partial grinding, and afterwards increased

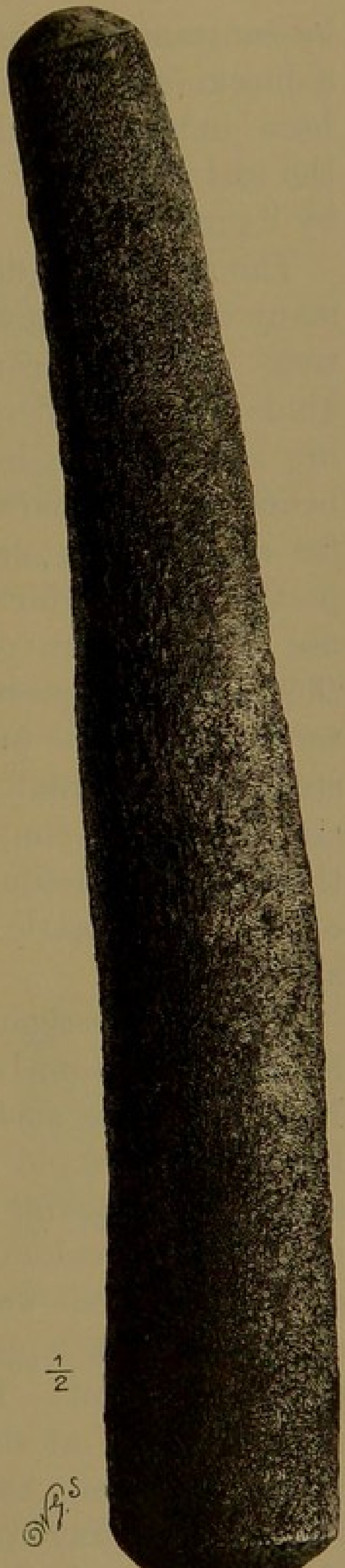

FIG. 226.—Stone pestle, Epping Forest. Half scale.

by constant handling. The labour required to bring a block of granite into such good form must have been immense, and there can be little doubt that the tool was highly esteemed, and carefully preserved by its maker.

The pestle was designed for use in a stone mortar, many of which may be seen in archæological collections. It was meant for breaking and bruising all kinds of food and other objects that required breaking and bruising in a mortar—as corn, nuts, roots, bones, &c.—including the smashing of small stones for mixing with clay for pottery. The use of the pestle and mortar preceded in ancient times the use of the quern or rotary mill. Like the quern, the pestle and mortar has been in use from prehistoric times to the present day. If used as a club, a stone of this kind would prove a most formidable and deadly weapon. It is by no means improbable that it was sometimes so used by its ancient British owner. This pestle corresponds in age with the camp at Loughton.

Whilst investigating the Palæolithic remains at Stoke Newington, London, from 1878 to 1885, a few Neolithic relics, such as celts, arrow-heads, scrapers, knives, and simple flakes were found in the surface soil. Upon looking over these stones in 1888, I was struck by the coloration of certain examples, and by sorting them out was enabled to replace a Neolithic scraper on to a larger flake from which it had been originally struck. Both the scraper and flake were marked by me at the time of finding, "Stoke Newington Common, 1882." In Fig. 227 this replaced scraper is engraved; the scraper is shown at A, the flake on which it fits at B. It will be seen that the superimposed flake has received the necessary secondary chipping to make it a true scraper; this minor chipping exposes part of the mother-flake at B.

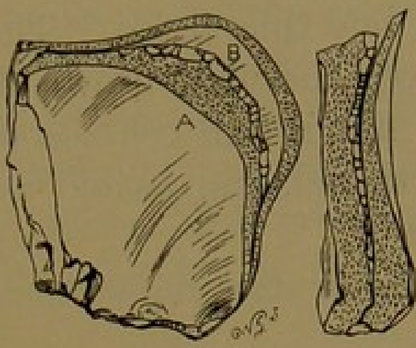

FIG. 227.—Neolithic scraper, replaced on to a flake from which it was originally struck, Stoke Newington Common. Half scale.

A large number of Neolithic flakes were found with the celt in the rampart of Loughton Camp; they were all sharp and lustrous. After a cursory examination

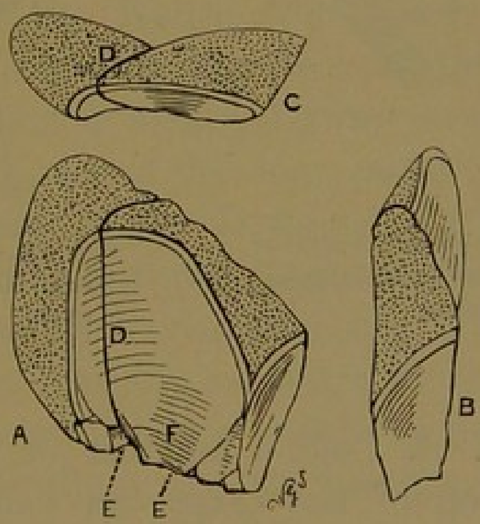

FIG. 228.—Conjoined Neolithic flakes, Loughton Camp, Epping Forest. Half scale.

of some of these flakes, I replaced one flake on to a somewhat larger one, as illustrated in Fig. 228. The front of the two conjoined flakes is shown in the left-hand bottom figure A, the side at B, the top at C, and the line of junction at D, D. Behind E, E, are two cones of percussion, one belonging to each flake, and at F is the depression into which the cone of the missing frontal flake at one time fitted. The fractured part of the flint is deep chocolate-brown and lustrous, and the bark of the flint is dull ochraceous; the flakes are undoubtedly artificial, and as old as the rampart of the camp.

A few days after the replacement of these two

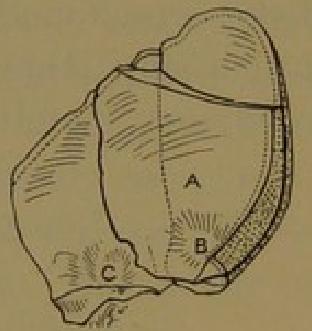

FIG. 229.—Conjoined Neolithic flakes, Loughton Camp, Epping Forest. Half scale.

FIG. 230.—Socketed bronze celt, Toddington. Half scale.

flakes, Mr. H. A. Cole, a member of the committee of investigation of the camp, on looking over the flakes and conjoined examples, replaced a third broken flake on to the two previously conjoined by me. Fig. 229 represents the back of the conjoined flakes, A being the broken flake replaced by Mr. Cole, B is the cone of percussion, and C is a similar cone belonging to one of the two original flakes.

The only bronze implement formerly in my collection, but now in that of Sir John Evans, from the Dunstable district, is the bronze socketed celt found at Toddington, and illustrated in Fig. 230. A "horn" of gold is mentioned as having been found at Wellhead, the source of the Ouzel, near Dunstable, by Mr. H. Brandreth (*Archæologia*, vol. xxiii. p. 96–108). Mr. Brandreth thought this was possibly a sample of ancient "ring-money," but it was more likely part of a British gold armlet or torque.

B.—Earthworks, Roads, and Trackways near Dunstable.

The Dunstable district is rich in Keltic earthworks. Dunstable is the Roman station of Durocobrivis of the Itinerary of Antonine. Durocobrivis is the ancient Latin form of the Keltic *Dor-comriv* or *cobriv* = *Drws-cyfriu*, meaning the door or opening by the hill-sides. There is still a Drws-y-coed in Caernarvonshire, which means the door, portal, or opening to the wood. There is also Drws-y-Nant in Merionethshire. The older antiquaries were greatly misled by the *dur* in Durocobrivis, thinking it meant water, and as there is virtually no water at Dunstable, they fell into all sorts of errors. *Briv*, a bridge, was also a difficulty, as there are no bridges at Dunstable. Professor Rhys, in *Celtic Britain*, suggests that some of the Roman *duro* names are of the same kind as *Forum Juli*, *Forum Voconi*, and the like. In this connection it is remarkable that the Itinerary of Richard of Cirencester gives *Forum* and *Foro Dianæ* for Dunstable.

The ancient British trackway, the forerunner of the Watling Street, the latter a Roman work, is perfect for long stretches between Kensworth to a mile beyond Dunstable on the west side. Its course is marked on the map. Near Kensworth it is a narrow lane following the inequalities of the surface; beyond Dunstable to Maiden Bower it is a green way. This is the precursor of the Roman Via Vitellina, or Vitellina Strata, equivalent to Guethelinga Strata, or Sarn Gutheling (see *Archæologia Cambrensis*, Series iv., vol. vi. p. 164), derived, perhaps phonetically, from the Keltic surname Gwledig or Wledig. The name may indicate the road to the Gwyddyl or Irish. Vitellina Strata became with the Angles phonetically Vledigina, Wledigina, or Wathlinga Strete. Crossing at right angles this ancient trackway or road, in the middle of Dunstable, is the Via Icenorum, or Via Iceniana of the Romans, —the road to the country of the Iceni of Tacitus. It is now known as the Icknield Way or Icknield Street. British coins have been found with Iceni or Eceni abbreviated as ECEN.

The ancient British people of the district were the Cassi, the Catyeuchlani of Ptolemy, the Katouellanoi and Kateuechlanoi of Dio Cassius, or the Catuvelauni; the leader being Casswallon, son of Beli Mawr, and the Cassivelaunus of Cæsar, seventieth king of Britain. The tribal name may possibly survive in the name of the Hundred of Cashio.

The town immediately to the south of Dunstable is St. Albans, the Roman station of Verlamion, Verlam, Verlamium, or Verulamium. This position was the chief town of Tasciovanus, father of Cunobelinus, the Cymbeline of Shakespeare. The town is named from the Ver, near which river it stands.

Ptolemy's name for St. Albans is Uronamium and Verolamium. *Ver* may be a form of the Basque *Ur*, or a Latin form of *Dwr*, water.

A gold coin of Tasciovanus has recently been found

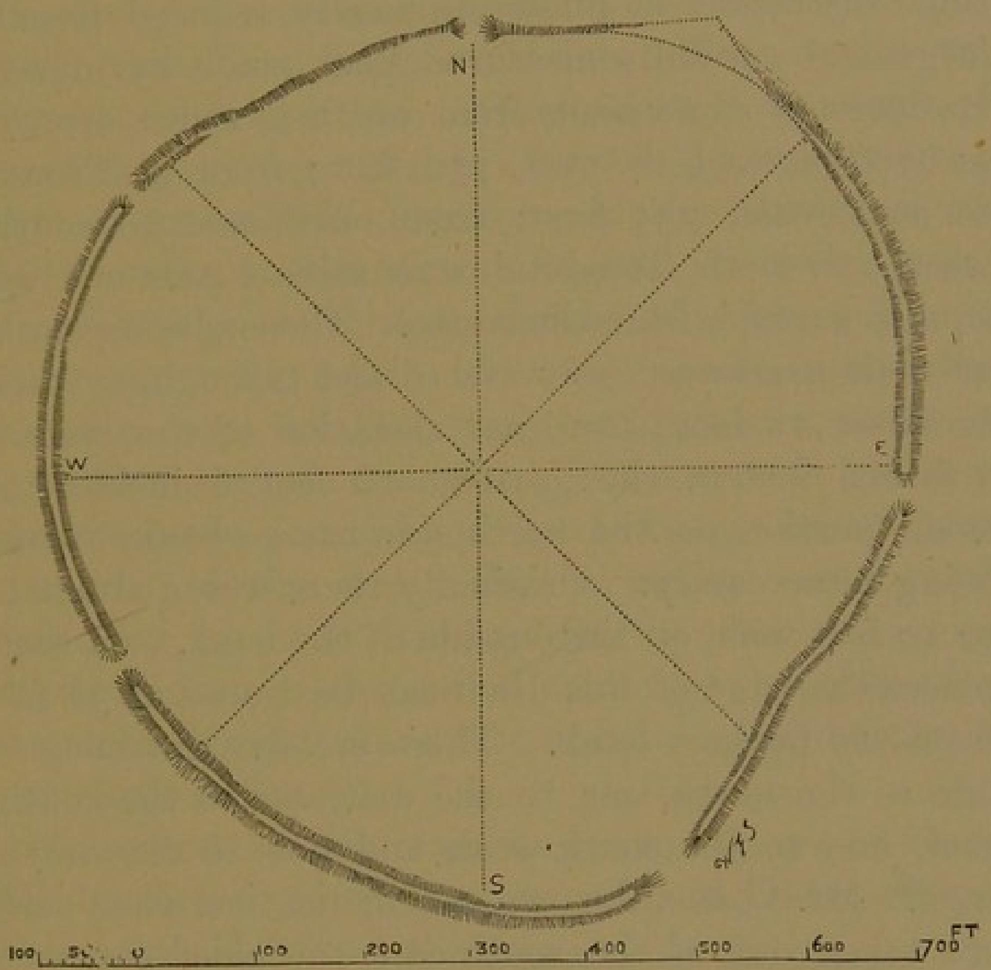

FIG. 231.—Plan of Maiden Bower, Dunstable.

at Leagrave. British coins of copper found at Dunstable are mentioned by Mr. H. Brandreth in *Archæologia*, vol. xxvii. p. 96–108.

The town to the north of Dunstable is Fenny Stratford, the Magiovinium or Magintum of the

Romans, phonetically derived from the Keltic Maes-gwyn, equivalent to fair fields, not to white or chalky fields or white battle-fields, as sometimes given.

One of the most remarkable earthworks in this part of England is the British camp of Maiden Bower, 1½ miles north-west of Dunstable. The accompanying illustration is photographically reduced from a large and carefully measured plan made by myself. Its internal dimensions from north to south are 775 feet; from east to west, 750 feet; from north-west to south-east, 735 feet; from north-east to south-west, 776 feet. It contains 10 acres 2 rods and 25½ square yards, within the banks. The enclosing banks at their narrowest part are 16 feet through, at their broadest 28 feet; the least elevation of the bank is 4 feet 6 inches, the greatest 10 feet 6 inches. A small portion on the north side has no bank, a bank being unnecessary. Originally there was a ditch 18 or 20 feet wide on the outside of the bank. In some places the edge of this ditch can be traced at 32 feet from the present bank. There are five entrances—one to the north, one to the east, one to the south-east, one to the south-west, and one to the north-west. Mr. Cooke, the owner, tells me that when carts are taken out of the south-east, the chief entrance, the one which belongs to the trackway to Dunstable Downs, shown on the map, a hollow sound is heard, as if the carts are passing over a hollow chamber. No sections have ever been made, and the place will probably soon be destroyed by lime-burners, who are now digging for chalk in a most extensive way close by. The interior of the camp and the fields outside are (or have been) full of Neolithic implements, celts, scrapers, arrow-heads, hammer-stones, fabricators, and borers. Bronze tools and a hoard of gold coins have been found, but I have not been able to trace them. Marine store-dealers and jewellers bought the metal before my time.

There are traces of an ancient British trackway from the five knolls on Dunstable Downs to Maiden Bower. A few paces to the north of the northernmost knoll there is a large basin-like hollow, which was formerly a British hut. The trackway can be traced from this hut down the hill, as a slight green depression, in a northerly direction; at the bottom of the hill it turns to the north-west, and it can be traced direct to the south-east entrance of Maiden Bower, as shown on the map. In certain seasons, and when suitable crops are growing, the track can easily be seen for the whole distance. When corn is growing, the trackway is indicated by a darker colour than the rest of the corn; this is caused—as I have found by personal examination—by the corn being much thinner on the actual trackway; more shadow is made amongst the stems, and so a darker tint is seen from a distance.

A second ancient trackway can be traced from Maiden Bower to the long tumulus in Union Street, Dunstable, shown on the map.

Whilst excavations were being made for chalk on the north-west side of Maiden Bower, in 1891, a remarkable old roadway was lighted on, which ran from the north side of the camp to Sewell. The road was made on the solid chalk, and deep ruts from broad cart-wheels were visible in it. The road was only a little more than a foot beneath the present surface, but the plough never reaches to a foot in depth. When first exposed, the road was as hard as rock. An iron arrow-head or spear-head, tanged, and with a shaft-hole, was found on the surface of the road. This antiquity, possibly Saxon, did not reach me.

There was once a second large circular camp on the Heath to the north of Leighton Buzzard, but when the Heath was enclosed the camp was destroyed.

A mile to the west of Maiden Bower, at "Castle Hill," there is a British as well as a Roman camp. Near the great mound on the British camp there is a large and deep hollow, now popularly termed the "Well." It probably represents an excavation in which the Kelts kept stores. The oldest people in the adjoining village say that when they were young children this deep depression was called the "Money Pit," from a large box of money having traditionally once been thrown in. A popular game was then played, in which children ran nine times round the sloping side of the hollow and suddenly jumped to the bottom. At the moment of the jump, money could be heard chinking in the bottom of the pit. So say the oldest folk. Something below might have made a jinking noise in old times; excavation might give a clue.

The fields at the bottom of the east side of Blows Downs are called Street Fields, indicative of an old branch of the Roman road.

C.—British Hut Foundations near Dunstable.

Many groups of ancient British huts occur near Dunstable. There are many on the hill-side facing Valence-end Farm, 1¾ miles south of the Five Knolls at Dunstable; several others occur between the two positions. Some may be seen on Edlesborough Hill; a large example faces the Five Knolls on this hill. An extensive group occurs on the north-west side of Totternhoe Knoll; other groups may be seen on the south-west, whilst isolated examples occur nearly all round the Knoll, and on the hill-side. Several may be seen near the Five Knolls at Dunstable, and round and near Pascombe pit, and other combes. There is a group on the highest point of Blows Downs overlooking Dunstable, others lower down east and south; some may be seen on Ivinghoe Hill, and at Warden Hill, and Gully Hill, three miles north of Luton.

Till lately there existed a group of twenty-four hut remains, 1¼ miles east of Dunstable, on Blows Downs. Eight of the best of these have been unnecessarily destroyed; applications for their preservation were disregarded. A group of seventeen, however, still remains. The accompanying illustration, Fig. 232, is reduced from a plan made by myself when the work of destruction commenced. A deep natural valley or pass in the hills occurs at C; D is a cultivated field at the base of the Downs.

I was present when one of the huts, marked A on plan, was exposed in section as shown in Fig. 233. The hut was originally 13 feet in diameter, and comparatively shallow, being only 1 ft. 6 ins.

deep on the shallowest side, and 3 feet on the deepest.

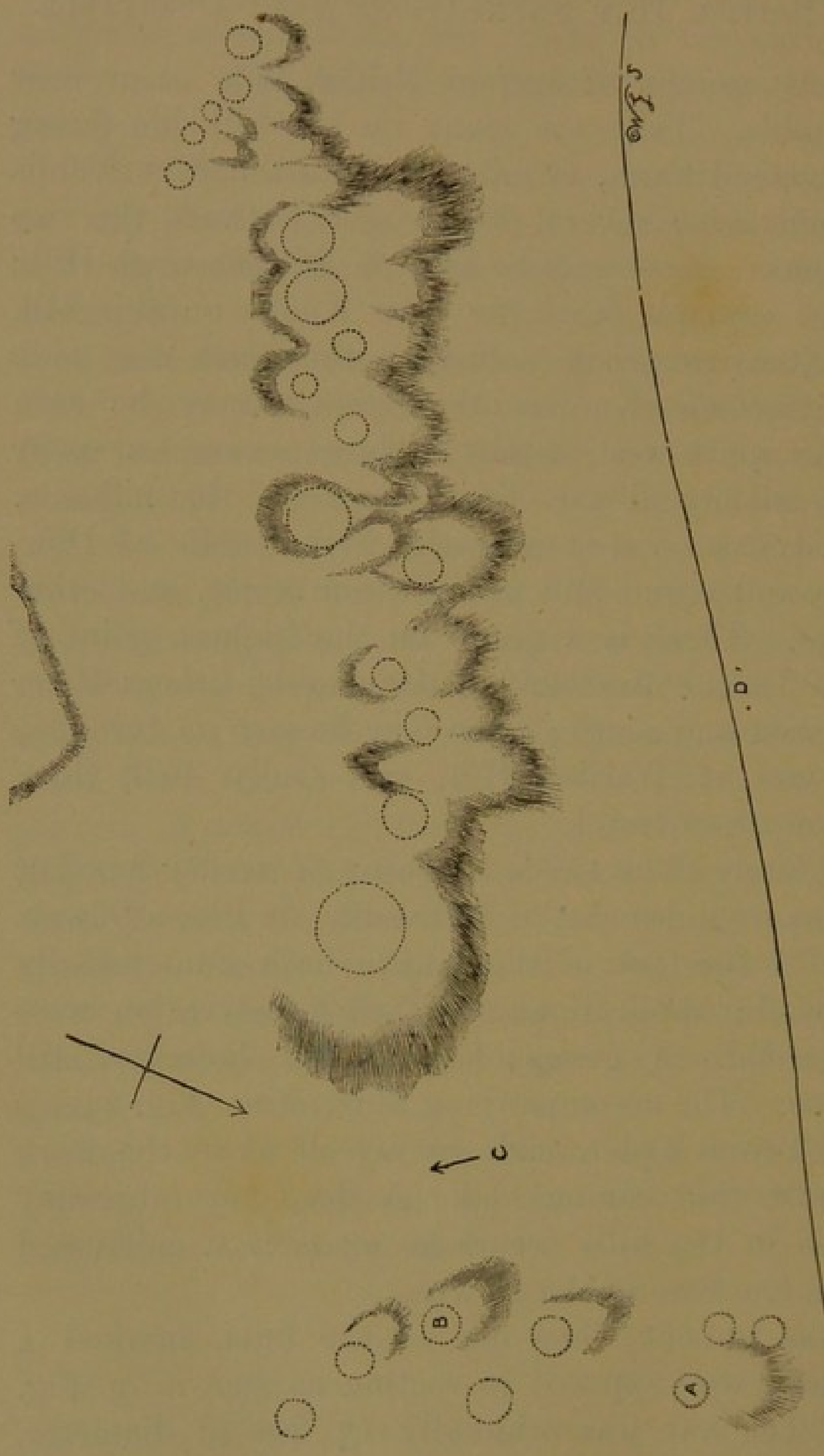

FIG. 232.—Plan of British hut remains, Blows Downs, Dunstable.

There was nothing on the original floor but a few flint flakes and blocks, a scraper, a small fragment of a British pot, and a metatarsal bone of a horse.

I obtained a better result in June 1888, from a second hut, B on plan, viz., part of a human skeleton; but as I was not at Dunstable at the time of the original discovery, and as the men, although previously advised by me, were extremely careless, the best part of the skeleton was carted into the limekilns, and burnt before I could reach the spot. The pieces of human bone secured by me numbered in all 114; amongst them were two molar teeth. Only a small portion of the skull and part of a

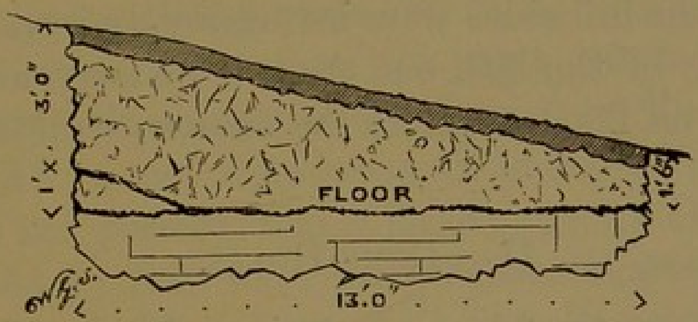

FIG. 233.—Section of ancient British hut, Blows Downs, Dunstable.

powerful lower jaw were secured. The bones, after being carefully cleaned, soaked in hot gelatine, and conjoined, consisted of one thigh nearly perfect, part of a second thigh, one upper arm bone perfect, two lower arm bones, belonging to different arms, part of the hip, breast-bone, one collar-bone, part of blade-bone, numerous ribs, and about one-half of the vertebræ. The original owner of the bones was a tall and powerful man of middle age; his height when alive was 5 ft. 10 ins., or a little over the ancient British average for men. The skeleton lay at full length upon the floor of the hut, at about 4 feet beneath the surface. The man was probably killed in his hut and buried on the floor of his own house. With the bones was a fragment of an ancient British pot, a block of iron pyrites, and seven flint flakes.

The curious habit of building human habitations in low positions, depressions, or dug-out holes seems to have survived to the present time. In the very lowest parts of modern Dunstable houses were built, in the last century, into which the occupiers had, and still have, to descend by one or more steps to the best rooms. Such structures are of course always damp, and liable to be flooded. The ancient British huts on the hill-sides were invariably drained towards the slope of the hill, but there is no convenience for carrying off flood water in the modern structures.

D.—Dene-Holes.

On the north side, and close to Maiden Bower at Sewell, there once existed a very fine Dene-hole. It was almost entirely demolished in digging the cutting for the Dunstable and Leighton Buzzard Railway. It is marked on the 6-inch Ordnance map as "site of well." It was reported upon by the late Mr. James Wyatt of Bedford in the *Times* for October 9, 1860, with comments by Mr. R. Edmonds of Penzance. This communication was reprinted in the *Archæologia Cambrensis* for 1861, p. 172.

As nearly all the "well" is now obliterated, I quote some of Mr. Wyatt's remarks. He says: "At the depth of about 20 feet, cut in the side of the shaft, foot-holes, or 'scotches,' appear, and thence continue downwards at regular distances." It was examined to the depth of 116 feet from the surface, and its contents, after a few bushels of the chalk *débris* were thrown out, consisted of "bones of small animals and birds, and lower down some fragments of burnt wood. Below these were pieces of unbaked pottery of a very coarse kind, then human bones, and a large quantity of the same kind of pottery. Bones and teeth of various animals were thrown up continually, and pieces of pottery occasionally; then a Roman tile, and a piece of sandstone squared like it, and several stones showing the action of fire. At the depth of 67 feet was a quantity of black flints, which appeared to have been purposely laid in a distinct course; not weathered flints like those on the surface, but such as are taken from the chalk cuttings in the hills at some distance, this hill having no flints in its chalk. At 72 feet were bones of animals, fragments of coarse red pottery, and a large quantity of charred wood. At 75 feet were more bones, charred wood, and pieces of black pottery. The diameter of the shaft is 42 inches to the depth of 70 feet, and then gradually lessened to the depth of 110 feet, where it measures 31 inches across."

Mr. Edmonds says the pit was only "intended for a well, and that, when the owners failed to reach water, they filled it up with the nearest rubbish they could find."

This Dene-hole was never meant for a well; for close by is very low-lying ground, and water, which never ceases, pours out of the banks into numerous drains. In fact, the modern name of the place, Sewell, is probably derived from the verb *sew*, to drain; the name being equivalent to Sewer.

The railway men did not reach the bottom of the excavation at 116 feet. Amateur excavators afterwards excavated the hole to a much greater depth, and found more bones and broken pots. The base has never been reached. The work was on the top of a very steep and high bank. The water pours out of the chalk many feet below the lowest excavated level, and in a position which could be reached in a moment or two from the highest point of the hill. No "well" was of course necessary.

About 300 feet to the west from this Dene-hole a second excavation was lighted on by the excavators for chalk for lime-burning purposes, a year or two ago. It was 8 feet across and only 10 feet deep. It had been filled in with chalk rubble, and nothing was found at the bottom. According to the reports of the men, several other holes were found, but all had been filled in with rubble only.

There is another site of a so-called Roman well close to the Billington road, on the south-east side of Leighton Buzzard.

E.—Graves, Tumuli, Skeletons, Bones.

In 1891, an ancient British grave was found 20 feet south from the deep Dene-hole just mentioned; it was 4 feet square, with rounded corners, and 4 ft. 6 ins. deep. A contracted skeleton was in the grave; this was thrown down with the chalk and destroyed. On looking through the carted material for me, the men were only able to find part of the lower jaw, and part of a shin-bone.

Numerous graves of Kelts have been found in the valley, half a mile west of the camp, but a few fragments of skeletons only have reached me. There appears to have been a burial-place on the lowest ground to the west; the place is now intersected by a high railway bank. At this spot I have picked up broken human bones, teeth, a human jaw, pieces of the bones of *Bos longifrons*, Owen, and fragments of British pottery. The place has been cultivated by farmers for many years, and as the graves were originally quite superficial, the pieces of bone, &c., are now very fragmentary.

Contracted skeletons, that is, skeletons on their sides with the knees drawn up under the chin, are frequently found in the fields near Dunstable; but their age must, in many instances, remain uncertain, although the peculiar mode of burial without orientation seems to point to prehistoric times. In the thirteenth, fourteenth, and fifteenth centuries there were various religious establishments at Dunstable, and the canons, friars, and townspeople were continually quarrelling. During these quarrels the clergy would not bury the dead in their burial-grounds; they were buried in the fields outside the town, and suicides were "thrown into holes" or "ditches." Under date 1283 we read of a suicide's burial: "Et postquam visus est a coronatoribus, projectus est in fovea extra villam." One must therefore always be very careful, in deciding as to the age of doubled-up skeletons near the town, even when stone implements and bones of *Bos longifrons* are found with them, as a hole for the reception of a suicide might have been dug where bones of *Bos longifrons* and flint tools were strewn over the ground, as they are strewn to this day.

I have received a very circumstantial, and no doubt reliable, account of the finding of a human skeleton, thirty years ago, near and behind the "Waggon and Horses" Inn at Dunstable. It attracted attention because, as my informant tells me, the face was between the two drawn-up knees, as if it had been tied into position with cords.

I have a virtually perfect skeleton of a man, found in November 1890, in a grave 5 feet deep, at the eastern end of Albion Street, Dunstable. It was in a crouching attitude, in the usual Keltic fashion. The head was to the north-east. The man as deduced from the measurement of the thigh-bones was 5 ft. $7\frac{3}{4}$ ins. high, with a cephalic index of 81, therefore brachycephalic. One of the humeri, or upper arm-bones, is perforated at the olecranon or elbow-joint. No flints of any kind were found with the skeleton, but near the man's haunches were two horn cores from different examples of *Bos longifrons*, one, with part of the skull attached, of an uncommon but well-known variety with thick horns, one piece of Romano-British pottery, part of a rim of a grey Roman pot, and two whitish oval flint pebbles. Part of a younger human individual, also crouching, and part of an old person's skull, with the sutures obliterated, were found close by. Many broken bones of *Bos longifrons* were close to the skeleton, together with broken bones and teeth of the horse and red deer. There was also a broken tibia of a dog and pieces of the scapula, tibia, and metatarsus of sheep or goat. There were several teeth of *Bos longifrons* and horse, an incisor of a sheep or goat, and an incisor of a pig. The human and other animal bones were all alike in absence of gelatine, and in general condition. On removing the earth from the bones, a shell of *Helix* *hortensis*, Müll., and three examples of *Hyatinia cellaria*, Müll., were found.

The skeleton might have belonged to a suicide of five hundred years ago, "thrown into a hole" amongst Romano-British things.

From the frequency of human remains at this position, the place is locally reported to have been an old graveyard, but I can find no evidence of this.

In March 1893, three other skeletons were lighted on at the extreme western end of the same street. No coffins were found, and the men did not notice the position of the skeletons; some of the bones were brought to me, and from the condition of the bones one interment appeared to have been partially burnt. A leaden coffin with a skeleton was found near this spot some years previously, which, taken in connection with the pieces of Roman pots, may point to Roman or Romano-British times, but in mediæval times many persons, including ecclesiastics, were buried without coffins.

Tumuli are very frequent in the Dunstable district; a long barrow, once known as "Windmill Hill," and now built upon with rude wooden stables and workshops, exists in Union Street, Dunstable, on the west of, and close to where the bench mark "492" is engraved on the 6-inch Ordnance map (see map). An ancient trackway can be traced from this tumulus to the chief or south-west entrance of Maiden Bower. The trackway is difficult to make out unless the season and crops are favourable; it meets the trackway already mentioned from Dunstable Downs, and goes to the same entrance to the camp. This mound has never been opened; I have walked over part of it and picked up flint flakes.

A long mound may be seen on the north side of Pascombe pit, terminated at one end with a round tumulus; what its age is I do not know; another mound, oblong in form, occurs close by.

There were formerly round tumuli scattered over the hill-tops before certain parts were enclosed and ploughed up: now these places are cultivated, and the tumuli have been levelled with the ground.

In opening the graves found under the round Keltic tumuli on the hills, it does not always follow for certain that the human bones belong to the Kelts of old. I have two skeletons, extracted by myself from round and now ruined tumuli in cultivated fields on Dunstable Downs. Of the age of one of these, a presumed boy, I am uncertain; of the other, a young woman with an infant, I feel sure of being Keltic from its peculiar surroundings.

The boy was dug by me out of the edge of a ruined round tumulus in May 1887, in a cultivated field on the flat downs. The site is a thousand yards south of the five knolls tumuli, but on the east side of the road which passes over the downs. It is tumulus No. 7 on map. The mound was originally 46 feet in diameter. There was originally a central grave and six or seven other graves round the central one. All the graves were small and shallow; none had been excavated into the chalk; the drift only, a foot or 18 inches in depth, had been excavated. After the interments were made, the drift was thrown over the bodies, and a vast quantity of chalk rubble was brought from a distance to make up the tumulus. When the burials in the circumference took place, the drift and chalk rubble were again dug into, but the solid chalk was not touched.

All the graves at the time of my examination had been rifled, except one to the north. A few pieces of the leg-bones belonging to one of the rifled graves came to light. The boy found in the un-

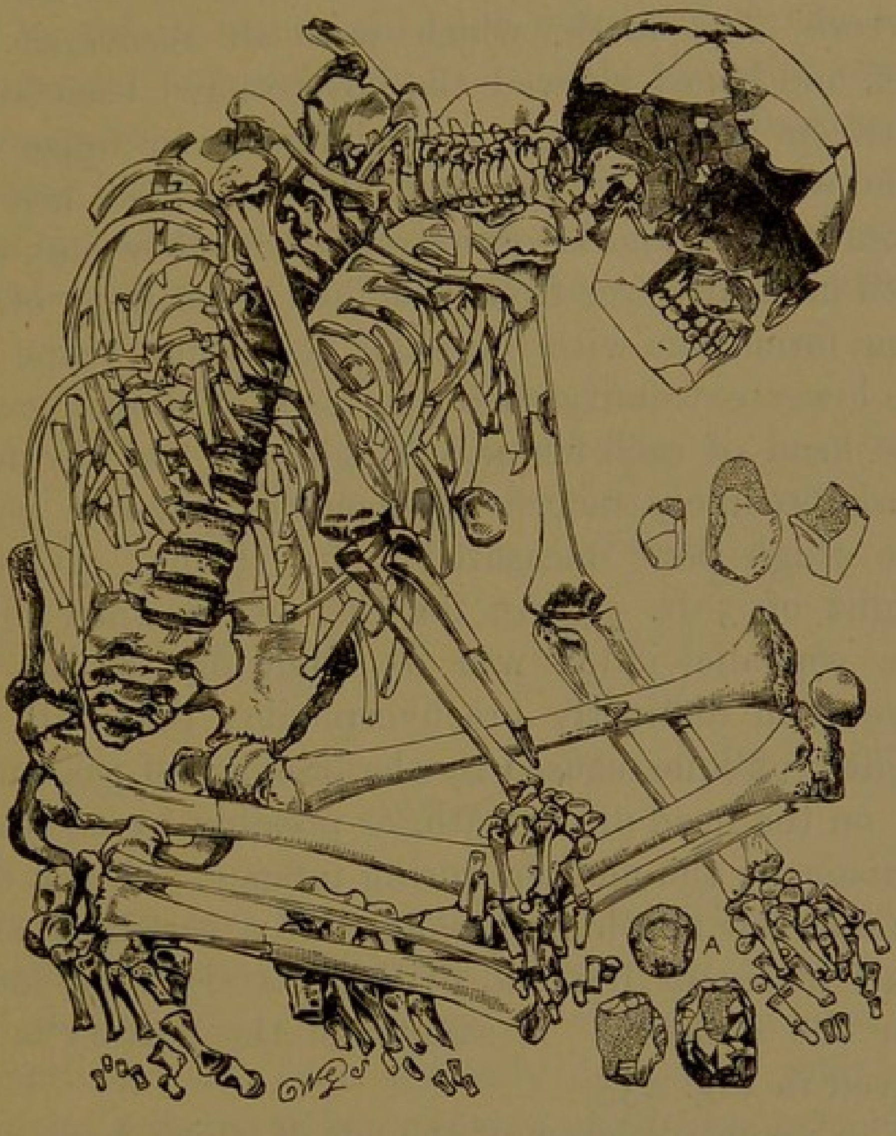

FIG. 234.—Skeleton of boy from round tumulus, Dunstable Downs. One-sixth scale.

disturbed grave was on his left side, and quite flat. The pieces of bone extracted numbered 443. The skull was in sixty-five pieces. The skeleton, as seen in the grave, is illustrated on Fig. 234. Near the face three flint flakes are shown; A represents a nodule of iron pyrites with two flakes, one scraper-like, below. All the teeth belonging to both jaws had fallen out; the lower jaw was in five pieces, and the two uncut and imperfectly developed third molar or "wisdom" teeth had fallen from their cavities or alveoli. The teeth, which were all recovered but one, and bones, showed the boy to have been about fourteen years of age; each humerus or upper arm bone was naturally in three pieces, *i.e.*, the head or shoulder end, and lower extremity or elbow end, were both naturally free from the shaft; the head of the bone forms one with the shaft at twenty years, and the lower extremity with the shaft at sixteen years. The head of each femur or thigh-bone was also free; these become attached at about twenty-five years. The thigh-bone measured 1 ft. 1½ ins., giving a height of 3 ft. 7½ ins. for the owner when alive. The cephalic index was 85, showing the boy to have been distinctly brachycephalic; the skull was slightly oblique, caused by the pressure of the tumulus on the head after death, or possibly by one-sided carriage by the mother during infancy. A few flint flakes, a few non-human bones, and a vast number of small pieces of Romano-British pottery were found near the skeleton. A sample of the pottery is engraved in Fig. 235.

The second skeleton, of the age of which I am sure, is that of a young woman, clasping the almost perished relics of a child, as illustrated in the frontispiece. This skeleton came from a ruined round tumulus, also on the flat downs, and 760 feet north of the last, No. 6 on map. I was not present, in March 1887, when the first bones were disinterred, but I enlarged the grave and recovered certain bones which, together with the verbal descriptions of the original excavations, made the original position certain. Like the last, the circumference of the tumulus was 46 feet. Its height before it was levelled was 10 feet. The tumulus originally included a large central grave, 12 feet by 6 feet, which had been dug through the drift for about 1 foot and 2 ft. 6 ins., into the solid chalk. This grave had been rifled, for on re-clearing it, nothing beyond chalk rubble was found. Round the chief grave were six or seven others, each about 3 feet deep from the surface; all these, with the excep-

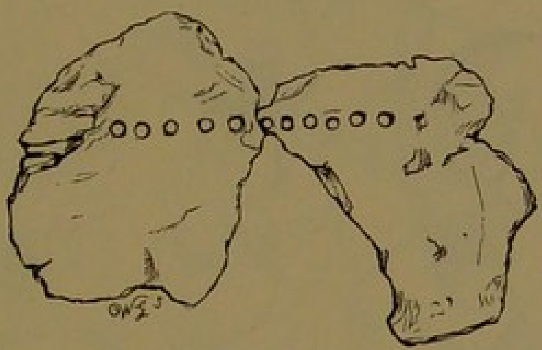

FIG. 235.—Part of pot found with skeleton of boy, Dunstable Downs. Half scale.

tion of two, had been previously disturbed, and the contents, whatever they may have been, thrown out and destroyed. One grave on the east side of the mound had not been seriously disturbed, and from this the skeleton of the girl and child were extracted. Several persons might have been interred in the great central grave, but the graves belonging to the circumference were all shallow and small; they were irregular in shape, and measured roughly about 3 or 4 feet square. No extended body could have been buried in any of them. The head of the crouching girl was to the north. The girl's skeleton was recovered in 340 pieces. Each piece was cleaned and dried, and then soaked in the usual manner in thin, hot (almost boiling) gelatine, and when dry, conjoined. The bones of the child in front of the woman originally belonged to an individual of about five years. The thigh-bones of the presumed mother measured 1 ft. 3¾ ins. in length. This length, according to the plan of measurement adopted by

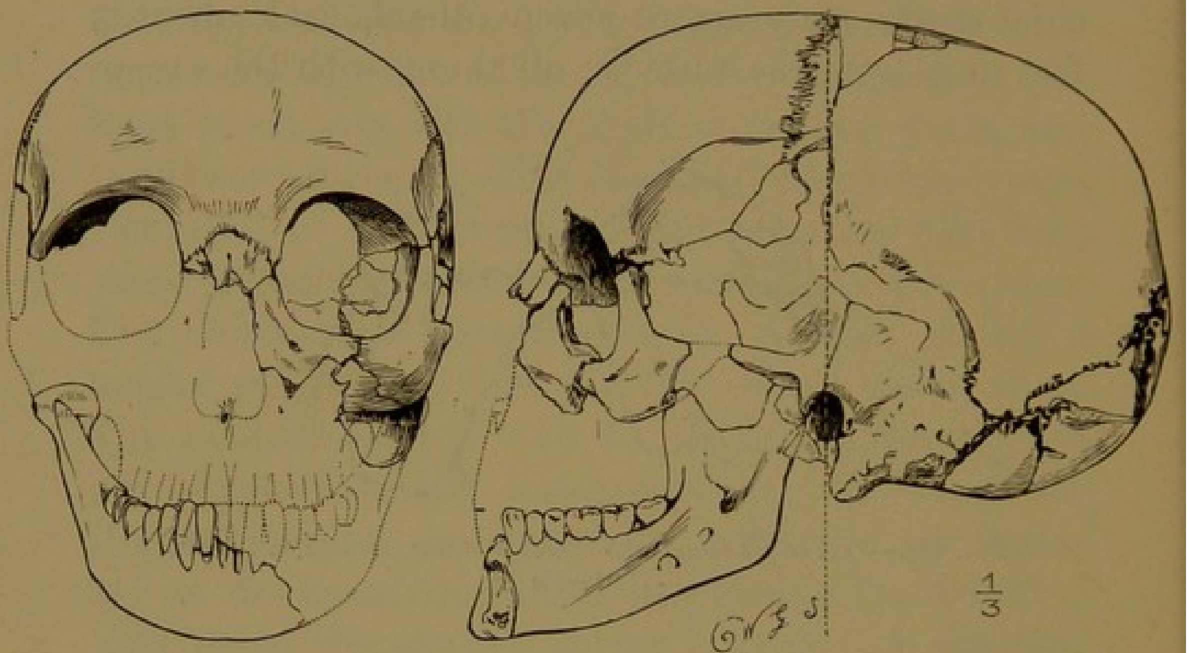

FIG. 236.—Skull of woman from round tumulus, Dunstable Downs. One-third scale.

Dr. James Beddoe, as given in the *Journal of the Anthropological Institute*, vol. xvii. p. 202, gives the height for a woman of 4 ft. 11½ ins. The skull, as illustrated in Fig. 236, shows a cephalic index of 67; it is therefore dolichocephalic, and I take the owner to have been one of the Bronze age dolichocephali; one of the late tall and light-haired Kelts, similar with the British refugees who fled from England to Brittany in the fifth century. The girl was indeed rather short, but Keltic girls were frequently made short by early marriage; good-looking girls were married before they had stopped growing, and before they had cut their wisdom teeth, and child-bearing arrested their further development. The girl was from eighteen to twenty-five years of age, but probably not less than twenty-five, as the hip-bulbs of the thigh-bones are concrete with the shafts. The child might have been buried alive with the mother.

With the girl was found a broken and partly

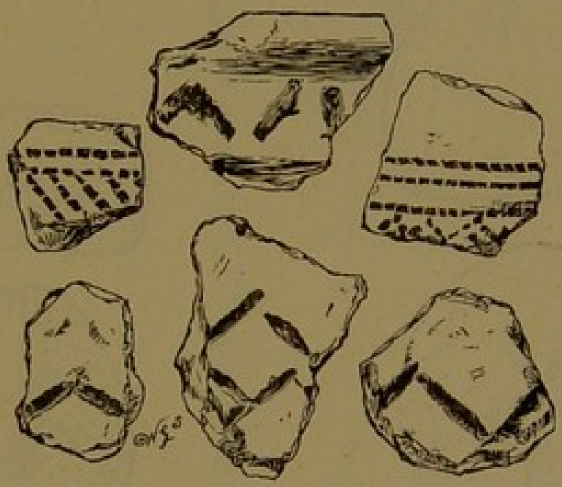

FIG. 237.—Fragments of pots found with skeleton of woman. Half scale.

pulverised British pot, six fragments of which are illustrated in Fig. 237. Three globular hammer-stones of flint were in the grave, two scrapers, two very rudely chipped celts, and a large number of flint flakes. Mr. F. T. Fossey, the owner of the land, who gave me permission to open the graves and dig, informs me that he found an arrow-head in the excavated material, but lost it again. I did not see it.

Most curious of all was a large number of fossil Echini from the chalk. At first twelve were detected surrounding the girl, but at last, on extending the grave, nearly 100 were found. On repeatedly shovelling and raking over the earth from the entire tumulus, 200 or more were found, and most of these, undoubtedly, originally belonged to the girl's grave, as none were found in the other graves. Two species were represented, one the "fairy-loaf," *Ananchytes ovatus*, Leske, Fig. 238, the other the "heart-urchin," *Micraster cor-anguinum*, Leske, Fig. 239. A single pebble of white quartz was also in the girl's grave.

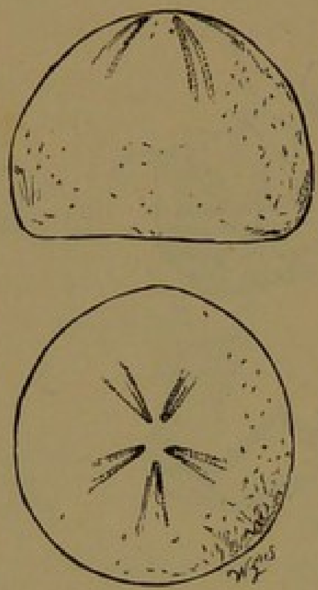

FIG. 238.—*Ananchytes ovatus.* Half scale.

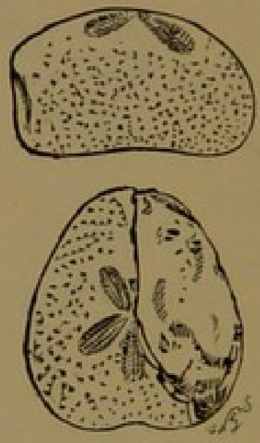

FIG. 239.—*Micraster cor-anguinum.* Half scale.

Broken bones of *Bos longifrons* and deer were found in both the graves just described, and a lower incisor of a pig near the girl. No coins were found.

Dr. Henry Woodward of the British Museum informs me of a Wiltshire tumulus in which the sides of the grave were made up of teeth of *Lepidotus* (*Sphærodus*) *gigas*, in one of which (forming the two sides of a locket) a kind of keyhole had been cut.

Adjoining the grave of the girl, a few fragmentary bones of another human skeleton were found, and the next grave to this contained a burnt interment, the bones highly calcined, and mixed with wood ashes and burnt earth.

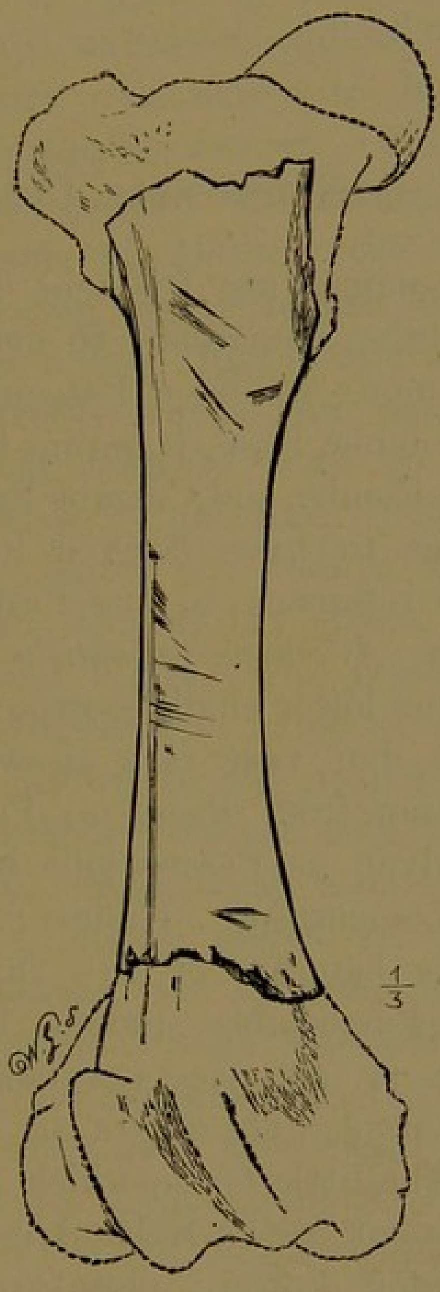

FIG. 240.—Right thigh-bone or femur of *Bos longifrons*. One-third scale.

Broken bones, horn cores, teeth, and skull fragments of *Bos longifrons*, Owen, are not uncommon over the entire Dunstable district. I engrave a right femur or thigh-bone, picked up by myself near Maiden Bower; both ends have been smashed off, presumably in pre-historic times, for the extraction of marrow; the shaft shows the marks of the flint knives used in scraping off the flesh.

F.—Place-Names near Dunstable.

Keltic place-names are frequent in the district. Coombe or Combe, equivalent to cwm, a valley or hollow, is common; we have Pascombe, Duncombe, Incom Hole, Coombe Hole, Hanging Combe, Coombe Bottom, Wards Combe, and Coombe Farm. The name Pascombe seems to have derived its first syllable from Passe, in reference to the Pasque, Easter, or Passover flower, *Anemone pulsatilla*, Linn., a common plant on the lower chalk escarpment of the hills near Dunstable, but very rare elsewhere. Gerarde altered the name from Passe to Pasque in 1636. Pascombe is given as Passecumbe in the *Annales Prioratus de Dunstaplia.* Under 1264 an account is given of the hanging of two thieves, "Qui in crastino apud Passecumbe judicia liter sunt suspensi." There is no pass (as between hills) at Pascombe. Pen, a hill, occurs in Pen field and Sharpenhoe. The little Ouze, which rises near Dunstable, is equivalent to the Keltic Uise. The British camp of "Maiden Bower," close to Dunstable, is probably equivalent to Magh-din-barr (pronounced Mach-dim-bár), Magh being a level expanse, din, a hill or hill-fortress, and barr, a summit. The name means the fortress or camp on the level height, which agrees exactly with the position. Totternhoe by Dunstable is possibly derived from Teotan (pronounced totaun), a burning or fire-signal: it seems to have reference to the use of the great hill for a fire-beacon. A large depression for the furnace of old times still exists on the top of the mound. The word totaun still exists in Knockatotaun in Sligo, the hill of the fire beacon. The word is sometimes applied to speakers of inflammatory words, as Mawish-a-Tothane, or Maurice the fire-brand, who murdered his cousin, the thirteenth Earl of Desmond.

When I was a boy, fifty years ago, there were two narrow streets which ran parallel with the south side of the Icknield Way on the west side of the High Street, Dunstable. The southernmost was named Big Butts, but when a Wesleyan chapel was built by the side of the street, Big Butts was altered to Chapel Walk. The northernmost street was named Little Butts, a name which had replaced an older one, known to old people, of Moll Dyke: the "Moll" probably representing the Keltic Maol —bare, exposed. Maol Dyke is now South Place.

The closely adjoining places, Leagrave, Wanlud's Bank, and Limbury, are all close to the Lea; the latter, with Wanlud's Bank, probably represent the Lygean-birg of the Anglo-Saxon Chronicle, not Lenborough, a hamlet near Buckingham, and still less Leighton Buzzard. The Chronicle says, under A.D. 571, "This year Cuthulf fought against the Britons at Bedcanford (Bedford), and took four towns, Lygeanbirg and Ægeles-birg and Bænesington and Egonesham." Lygean stands for Lyg-water, birg the camp by this water. The Lea is termed Lig in a charter belonging to St. Albans, A.D. 795, where Luton is called Ligtune. The position is in a direct road from Bedford by the old Bedford road. The second town mentioned, Ægeles-birg, may be Edlesborough, a town three miles south-west from Dunstable. Both Limbury and Edlesborough are on the Icknield Way, and a branch of the Icknield Way touches Wanlud's Bank. Old rustics invariably call this camp "Waller's Bank"—on the tythe map it is given as "Wallarde"—which reminds one of the Anglo-Saxon Wealhas—Welshmen or foreigners.

INDEX

THE END.

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