THE PALÆOLITHS OF FARNHAM.

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INTRODUCTION.

IN a former paper* will be found a general account of the gravel beds of Farnham and their palæoliths. It is proposed in the following pages to give some further details of the stratigraphy, and a much fuller description of the implements, relying mainly on my own collection, and only utilising the evidence from other collections where it is of a thoroughly reliable character; but before doing so it may be well to remind readers that these implements have been reported from six different levels in the Farnham district:

1. *Upper Hale Plateau*, 600 ft. O.D.; 350 ft. above the Blackwater on the east, and 400 ft. above the Wey on the south.

2. *Dippenhall*, a small patch of gravel on the left bank of the Wey, 170 ft. above the river.

3. *Alice Holt Plateau*, bounding the valley of the Farnham Wey on the south (right) side, and lying about 150 ft. above it. Terrace A forms part of this plateau.

4. *Terrace B*, on the same side of the valley, with its base about 120-130 ft. above the river.

5. *Terrace C*, 30 ft. below the last.

6. *Terrace D*, 50 ft. above the river. Most of it lies on the right bank of the river, but Bourne Mill Terrace, at the same level, is on the left bank.

Almost all my specimens have been obtained from workmen, and the disadvantages of that method of collection are too well known to need comment; but those disadvantages are to some extent mitigated when the collector lives on the spot, and so is able to become acquainted with the characters and weekly migrations of the gravel diggers. Very few of them, indeed, are wilfully inaccurate, and some are so observant that their statements, even as to the exact position of the implements found, can be accepted with a good deal of confidence. It is, moreover, only by purchase that any considerable number of specimens can be obtained, and all prehistorians will agree as to the importance of large collections in comparing one terrace with another.

On a few minor points this paper will be found to contradict

* *Proc. Geol. Assoc.*, vol. xxiv (1913), pp. 178-201.

my previous one. It has not been thought necessary to call attention to each one of these discrepancies, but it is to be understood that the later statements are deliberate, and are the outcome of increased knowledge and experience.

UPPER HALE.

Four palæoliths in all have been reported to me as coming from this level. Two with white patinas and unabraded are almost certainly surface finds, and now that it is admitted that palæoliths can occur on the surface, there is no difficulty in believing that they were dropped on this plateau long after the deposition of the gravel. Mr. Keable's water-worn specimen, mentioned in my previous paper, presents more difficulty, and shortly after that paper was published, a hand-axe, which I had bought (with others) on Terrace B, was pointed out to me as having been found at the station "tip" in a cart which had come straight from Upper Hale. The man who found it had always proved trustworthy, and I cannot conceive how he could hope to gain anything by deceiving me on that occasion; but whether he was accurately informed as to the provenance of the gravel, I am unable to say. The implement, which measures 4·7 in. by 2·8 in., is amygdaloid and asymmetrical, and has a deep gravel stain, but hardly a patina. It is smaller and more tapering than Fig. 17, but otherwise not unlike it, and it has a similar lateral platform near the base. Mr. Keable's implement is ovate and more ochreous, and both are considerably water-worn; but while neither of them would attract much attention in the lower gravel beds on the opposite side of the river, their presence at Upper Hale remains anomalous and perplexing.

In view of recent suggestions* as to the origin of high-level palæoliths, it may be well to point out that the gravel of Upper Hale is distributed over (1) the true plateau, (2) slopes leading down from it. Of the latter, one extends in a south-westerly direction to the 500 ft. contour, with a gradient of about 200 ft. per mile, while the other faces the Blackwater (east) and reaches down almost to the 400 ft. level, with about the same gradient. At the time I obtained my implement the principal pit lay on the south side, about 20 ft. below the edge of the plateau, but it is not quite clear whether this gravel was originally deposited on the slope, or whether it has slipped down owing to foundering in the underlying Eocene beds, of which Mr. Monckton† finds evidence. In either case channelling at a later date is clearly possible with such a gradient, and palæoliths originally lying on the surface might thus get buried; but that any large amount of abrasion should accompany so small a change in position is

* *Proc. Prehist. Soc. E. Anglia*, vol. ii (1915), p. 114.
† *Quart. Journ. Geol. Soc.*, vol. xlviii (1892), p. 32.

rather difficult to understand. The exact position of Mr. Keable's implement is not known, but it is said to have been near the summit.

Since war broke out a great deal of gravel has been dug on the plateau itself, but no more implements have been reported, and the men I have spoken to, though knowing what to look for and where to get a market, declare that none have been seen.

DIPPENHALL.

The pit opened here several years ago—on the north side of the river and about 170 ft. above it—has long been closed, and

FIG. 16.—IMPLEMENT FROM DIPPENHALL (½).

no fresh digging in that region seems probable; but the one implement found there is of more interest than I at first realised. It is an asymmetrical * pointed hand-axe, about 4½ ins. long, and of a chocolate brown colour, with a fair amount of lustre (Fig. 16). All the principal ridges, as well as the convex left edge, are worn and chipped, as if by river action, but the concave (right) edge shows a different style of chipping which is almost certainly due to human agency. The face not shown in the drawing is nearly flat, but instead of a bulb of percussion it shows a number of rings arranged concentrically round a kind of tubercle about half an inch from the margin; and the same kind of fracture is

* Misprinted "a symmetrical" in my former paper, p. 190.

found on several of the upper facets, including the large one beside the concave (right) edge. It is certain that this structure is due, in part at least, to thermal action, but Mr. Reid Moir, to whom I showed the specimen, thinks that a combination of thermal and percussion influences is indicated ("thermo-percussion"*), and he tells me that the implement agrees in many respects with some obtained by him from the middle-glacial gravels. All the surfaces, whether formed by thermo-percussion or by percussion alone, have exactly the same colour and lustre.

It is difficult to compare this gravel exactly with those on the south side of the river, for, although it is slightly higher than Terrace A, it lies beside a small lateral valley. The abundance of chert in it, however, is clear proof that its main ingredients have a different, and probably earlier, origin. But whatever may be thought of the age and affinities of this implement, two points are, in my opinion, absolutely certain—first, that it is of human origin, and secondly, that it is utterly unlike any of the numerous Chellean hand-axes obtained on the opposite side of the river.

ALICE HOLT PLATEAU.

There is very little gravel in the forest of Alice Holt, but a good deal on the three spurs which run eastwards from it, especially on the northern ridge, which I have called Terrace A, though, since it is actually the watershed between the Farnham Wey and the Bourne, it is, perhaps, not quite correct to call it a terrace at all.

This plateau affords a good example of the ambiguities attaching to the classification of gravels adopted on the maps of the Geological Survey. On Sheet 8 (Old Series) the gravel of the northern ridge (Terrace A) is grouped with that of the lower terraces, as belonging to the "River and Valley Deposits"; whereas the drift of Alice Holt Forest, and of the middle and southern ridges, is classed as "Hill Gravel and Sand (of doubtful age and origin)," implying a connection (which, however, I believe was never intended) with the similarly named, but utterly dissimilar, gravel of the Upper Hale Plateau. In the New Series (Sheet 284) matters were made even worse by the application of the term "plateau gravel" to the drift of Alice Holt Forest, while that at the base of the northern ridge (Holt Pound) was again included in the River Drift series. Although it would be rash to assert that all the gravels of the Alice Holt plateau, or even all those of the northern ridge, are of exactly the same age, they all lie practically on the same horizon, and no such separation of the northern ridge from the rest is in any way justified. If there is any fundamental distinction between plateau and river gravels

* *Proc. Prehist. Soc. E. Anglia*, vol. i, p. 445.

(which is extremely doubtful) it is not recognisable in this district.

When the palæoliths of Farnham first began to attract attention, great quantities were found at the eastern end of Terrace A, opposite Farnham; but there is abundant evidence that as the work of removing the gravel has proceeded westwards implements have become relatively scarcer, and as at the same time the amount of gravel dug at this level has greatly diminished, the number of implements obtainable during the last few years has been extremely small. A possible explanation of this irregular distribution of palæoliths is that the gravel of two different periods is here present—the older one having been disturbed in an irregular manner, and principally at its eastern end by the later, but of this there is no direct evidence. The whole plateau is but poorly represented in my collection. My specimens, which I shall now proceed to describe, are derived from three pits, two on the northern and one on the middle ridge, but it is only the last which has yielded at all a representative series.

Wilkinson's Pit, Boundstone.—This pit, which covers about 1½ acres, is situated on the northern edge of the middle ridge, 160 yds. north-east of Boundstone Post Office. It stands about 360 ft. O.D. on a spur jutting out into the Bourne, and lies a few feet below the centre of the ridge, but that may be due to "sag," which nearly always affects such spurs. Before digging was begun, the ground, which was covered with heather, had a very level surface, but the underlying Greensand was much more uneven, so that the depth of gravel varied from 10 ft. in a few places (more usually 6 to 8 ft.) to only one or two feet at several spots where mounds (or perhaps a broken ridge) of Greensand rose almost to the surface. At the edges of the plateau the gravel thins out rapidly, though it has in a few places slipped a little way down the slope of the hill.

The Drift.—In section the drift shows a division into three layers, the distinctness of which varies greatly from place to place. A good average section would show: (1) Upper gravel, fairly compact for the first 1½ to 2 ft., including a varying depth of black surface soil with whitened stones, then gradually getting more and more mixed up with current-bedded streaks of yellow and white sand, until at about 4 to 6 ft. from the surface it merges into the second layer. (2) Yellow sand usually entirely free from stones, but rarely more than 1 to 2 ft. thick. Its upper margin is seldom well defined, but it is generally sharply marked off from the layer below. (3) Lower gravel 1 to 3 ft. thick. This is sometimes absent, and in other cases was overlooked because the workmen mistook layer (2) for the Lower Greensand. In general character it resembles the more compact layers of the upper gravel.

The Palæoliths.—Since the pit was opened (about 1910) 27 palæoliths have been recorded, of which 23 are in my collection; and a few others, but probably not more than 3 or 4, may not have been reported to me. Two main groups, consisting almost entirely of unabraded specimens, will be first described, and the remaining minority, all more or less waterworn, will be relegated to a third and less homogeneous group.

1. Amygdaloid or pointed hand-axes, usually asymmetrical, and of somewhat rough workmanship. They are thick at the butt, and thin out gradually towards the apex, which, however, is seldom pointed and never acute. There is generally a fair amount—sometimes a very large amount—of crust on both faces, but rarely much at the butt, which is generally trimmed at a steep angle to a sharp edge. Both the lateral edges are usually sharp and moderately zigzag, and there is often a large flat platform near the butt on one side (Fig. 17). One is a side chopper. They are all made of light-coloured flint, mostly opaque and cherty, with a few translucent patches, and they usually show a light yellow stain and a very slight lustre. None have a uniform ochreous patina. Most of them exceed 6 ins. in length, and only one (possibly imperfect) is less than 5 ins. (4·3 ins.). This group includes twelve specimens, all entirely unabraded, and all belonging to the Chellean period.

2. Oval or ovate hand-axes, thinner than the last and more symmetrical. The edge is worked to a more even curve and shows little zigzag tendency. The average size is somewhat smaller, but one specimen must have been a full 8 ins. long before it was broken at the apex. They are free, or very nearly free, from crust; the flint used is again for the most part opaque and cherty, but the colour tends to be somewhat redder than in the first group, and three oval specimens (two comparatively small) which were found near to the surface are dark chocolate brown. Only one has a deep ochreous patina. This group numbers about eight, of which two are imperfect and two slightly worn. It is not perhaps possible to draw a clearly defined line between them and group 1, but on the whole they show an advance in workmanship, and although all are probably Chellean, a few (especially two of the chocolate brown ones) come very near St. Acheul.

3. There remain three implements which do not fall into either of the above categories; they are of widely different character, and agree only in being waterworn. (*a*) A huge and clumsy nodule of flint measuring 7 ins. by 3·6 ins., and 2·5 ins. thick, worked along one border to a rough zigzag edge for about half the total length, but otherwise not much trimmed. It may tentatively be called Strepyan, while admitting that an isolated specimen, however rough, cannot be definitely assigned to that period. (*b*) A small and imperfect implement, roughly ovate-

pointed, but with no marked characteristics. It does not closely resemble any of the small implements (to be described later) found on Terrace B. (*c*) An Acheulean implement, imperfect, and of unusual form, with a broad basil end (*en biseau*). It is 5·5 ins. long, and while one face is gently arched, the other is nearly flat and is worked all over with fine rippled flakes. It is

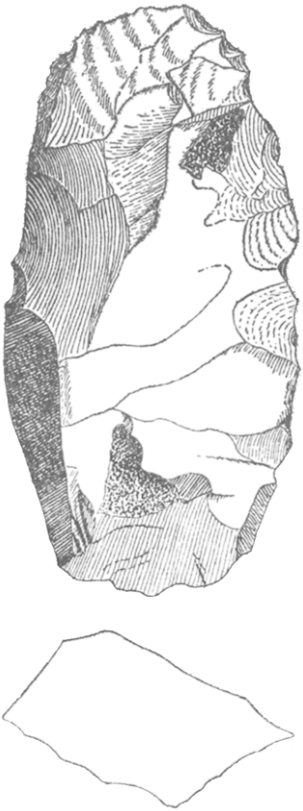


FIG. 17.—IMPLEMENT FROM BOUNDSTONE.

not much worn, but apparently blunted by use. It is highly lustrous, and has an incipient white patina on the convex surface, and a reddish tinge on the other, but both in colour and form it is unique in this district.

The vertical distribution of these palæoliths is attested in a fair number of cases by rather better evidence than usual, for the owner of the pit was generally present, and while he corroborates

the testimony of the more intelligent workmen, he is less liable than they are to exaggerate vertical measurements. Of course here, as elsewhere, we find some men who attribute all implements to the bottom of the pit, because they never see them till they have fallen there; but these can be disregarded. Nothing, with the possible exception of the "Strepyan" implement, has been found in the lower gravel, and probably nothing in the sandy layer, though the want of definition in its upper surface makes it impossible to be quite sure. Certainly the majority of hand-axes were found in the upper gravel, and especially in its lower sandy layers, but three at least of the oval implements (with chocolate colour), as well as two of the third group, came from the top layer, discoloured by humus. There seems in fact, if we omit the third group, to be good evidence of a succession from the asymmetrical forms (group 1) below to symmetrical (group 2) above, the only exception being the largest specimen of all (a long oval 8 ins. by 4 ins.) which is said to have been found at a depth of 6 ft., though this is probably an exaggeration. It is slightly worn, and may possibly owe its deep position to channelling at a later date than the main mass of gravel. It is lighter in colour than most, without stain or lustre.

It should be noted that a rather large proportion of the implements from this pit were found in a broken condition, though in several cases the fragments lay close together and were recovered. All the implements, with two exceptions (one imperfect and waterworn) are at least 5 ins. in length, and most of them are decidedly larger (6 ins. to 8 ins). When, however, we study the details of the gravel we find very few flints large enough for the formation of such hand-axes; indeed, it is an important feature of the Farnham gravels (except those of Upper Hale) that practically all the stones can be put straight on to the roads without needing to be broken. Right down at the bottom of the pit a few larger stones (flints, ironstone, chert, and occasionally sarsen) were found, and for the most part cast aside; but I doubt whether in the whole pit as many as fifty flints were rejected or broken up on account of their size. It is evident, therefore, that the use of large material was deliberate, and that if palæolithic man picked his material from the river bed, he must have had some difficulty in finding flints of the required size. It is perhaps owing to the scarcity of suitable material that many of the hand-axes in both classes show patches of refractory material in which the quality of work falls far below the general average. Although I have repeatedly searched in this pit, not a single flake has been found, either by the workmen or myself.

Northern Ridge (Terrace A).—This ridge is almost continuously covered with gravel from Alice Holt to the Waverley Valley, but none has been dug to the east of the Tilford Road, and in showing the terrace in the map (Plate 27) as extending only

a little beyond this point, I am relying mainly on contours, believing that the continuation towards the Waverley Valley may belong to Terrace B. To the west of the Tilford Road, however, the gravel has, except in one or two private gardens, been completely removed from the crest of the hill as far as the field known as "Broken Back" (B B on the map)—a distance of about one mile—and other scattered pits have been opened from time to time as far west as Wrecclesham. Irregular beds of sand run through the gravel, but there is very little stratification anywhere, and no division into three layers as at Boundstone; and, although the scarcity of palæoliths as we go westwards (and on to higher ground) suggests the possibility that some of the older

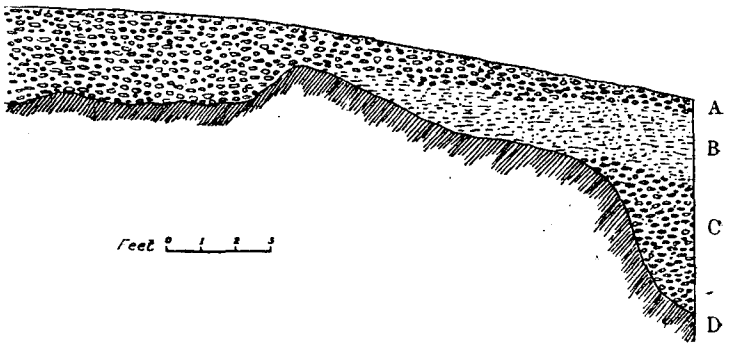


FIG. 18.—SECTION THROUGH THE JUNCTION OF TERRACES A AND B IN BROKEN-BACK FIELD, FARNHAM.—*H. Bury.*
A.—Gravel of Terrace A and hill-wash from it, with chert.
B.—Brick-earth.
C.—Gravel of Terrace B with practically no chert.
D.—Lower Greensand.

(barren) gravel may be present, there is no stratigraphical evidence in favour of this conjecture. My own collection comes from only two small pits, (1) a narrow strip bordering the Ridgway Road at the top of "Broken Back" field; and (2) the District Council's pit, beside the same road, but 300 yards further west.

(1) *Broken-Back.*—This field doubtless owes its name to a lateral valley which bisects it, starting from the edge of the plateau and running down to Terrace D. Where this valley leaves the plateau the gravel of the latter sags down, and just at this point the drift of Terrace B rises up so that in some places it is hardly possible to separate the one from the other. At one or two points, however, I found sections similar to that shown in Fig. 18, where the men had dug deeper than usual, exposing a ridge of Greensand, on one side of which is the gravel of Terrace A, distinguished at this point by a perceptible quantity

of chert (3 to 5 per cent.), and on the other side layers of stony brickearth and gravel almost devoid of chert (·5 to 1 per cent.), covered by a layer of hill-wash from Terrace A. I was at first deceived into thinking that all this drift belonged to Terrace A, and was therefore surprised at obtaining from the diggers several small implements and flakes characteristic of Terrace B; but the similarity of this section to one further east (Paine's Field), in which the junction with Terrace B was actually demonstrated, leaves no doubt that the brickearth and the gravel below it are part of the latter terrace. Some further confusion was caused by the fact that a pit in Terrace B was open at the same time, and in the same field, only 100 yards away, and that some transference of men and implements from one to the other undoubtedly occurred.

Implements.—The only implements from this pit which, having been obtained well away from Terrace B, and from a trustworthy workman, can be wholly relied on, are six in number, and fall into three groups; three are hand-axes of Chellean age, from 4 ins. to 6 ins. in length, probably allied to the earlier Boundstone group, but with blunter butts, and more crust on the butts than usual. All three have white patinas and slightly zigzag edges. There are also two well-made oval hand-axes, one (5.7 ins. long) of late Chellean age or transitional date, and the other (4.7 ins. long) thin and very regular, and of Acheulean workmanship. The latter has a white patina, as has also a similar but smaller implement, 4.3 ins. long, found on the surface of the same field about 100 yds. from this pit, but at the same level. Lastly, there is a small and rough side-chopper with a partial white patina. Besides these there are eight small implements, pear-shaped and discoidal, which, though purchased in this pit, I attribute, for reasons already given, to Terrace B.

2. *The District Council's Pit.*—This pit, situated about 150 yds. west of Green Lane, has been worked at a very slow rate for many years past, and has proved singularly barren. In 1912, however, one of the workmen found, in two "pockets" in the surface of the gravel, a number of worked flints, unabraded and with white patinas, comprising three implements of small size and of late St. Acheul date; one rough and imperfect pear-shaped hand-axe, and remains of five implements all apparently of Acheulean age, but too imperfect for determination. Whether these two pockets were really isolated, or formed parts of a channel, I was unable to ascertain, but the implements can scarcely be regarded as contemporary with the main mass of gravel. From the same pit came also a small side-chopper closely similar to the one from "Broken-Back," and some rough water-worn flakes of no obvious date. Two small and water-worn Acheulean implements were said also to come from this pit, but their authenticity is doubtful.

It will be seen that my own collection from this ridge is far too small to enable us to judge of the character of its palæoliths, but fortunately there are other sources of information. Various private collections (notably the Rev. C. H. Keable's) give us some fifty to sixty well authenticated specimens, while most of Mr. Lasham's implements (many of which can be seen in the Guildford Museum) undoubtedly come from this level. The majority of these hand-axes, in all cases, belong to the two main groups which we have already seen at Boundstone, with a larger proportion of rough "ficrons" than in that pit; but among the oval and ovate forms this terrace takes us to a later stage, several of them being distinctly Acheulean. We find also, besides the Boundstone types, a few well-worked and symmetrical picks (ficrons) with broad butts and acute points, which appear to belong to Prof. Commont's "Chelles évolué." Small implements (say below 4 ins. in length) are rare, and this cannot be attributed wholly to their having been despised by workmen and collectors, for Mr. Lasham's private collection contains a number of mere fragments of large hand-axes, and it is not reasonable to believe that the workmen would have saved, and he purchased, these to the exclusion of perfect specimens of small size, if the latter had been available. Moreover, however little attention may have been paid to small implements when large ones were plentiful, it is quite contrary to my experience to suppose that, when the latter became scarce, the workmen would miss any opportunity of making a little extra money. Although therefore we must not rely too much on the *proportion* of small to large implements, we may safely say that the former are comparatively rare. The same reasoning, however, does not apply to the scarcity of flakes, which were until recently unfamiliar to many of the workmen, and unsolicited by collectors. Large flints suitable for making implements of 6 ins. or more in length are but little more common than at Boundstone.

Evidence as to the level in the gravel at which implements occur is extremely scanty. Mr. Borelli has two fine hand-axes 7 ins. long and remarkably alike, which he found within a few inches of one another at Great Austens (near Mavin's* Road) 8 ft. from the surface, and perhaps 2 ft. from the bottom. They are ovate pointed in form, and of late Chelles date. The workmen assert that a considerable proportion of the larger hand-axes occur at the junction of the gravel and the Lower Greensand; and this may well be the case, though the tendency to attribute to the bottom layer implements which have fallen from higher up must not be overlooked. With regard to implements with a white patina, there is practically universal testimony that they are found on or near the surface.

* Wrongly spelt "Marvin's Road" on map (Plate 27).

TERRACE B.

My own specimens from this terrace are derived almost entirely from two adjacent fields known as Paine's Field and Broken-Back (P. and B.B. on Map), but Mr. H. Falkner's collection from his own pit in Great Austens (Mavin's Road) is so entirely free from suspicion of admixture from other sources, that it also will be included in my description. In disused pits it is possible to trace the terrace at one or two intermediate points between Paine's Field and Great Austens, and it is quite possible, as already mentioned, that the actual hill-top to the east of the Tilford Road belongs to the same horizon, but as yet no pit has been opened there. Immediately to the west of Green Lane gravel is absent at this level, but it has evidently been worked at some time in Wrecclesham, just above the church. Externally there is no sign of any terrace, but when the gravel is removed we find that the plateau of Greensand underlying Terrace A ends in a steep bank about 10 ft. high, at the bottom of which is a platform sloping gently towards the north-west. Brick-earth covers the gravel in the upper part of the terrace, extending right up to, and even sometimes above, the base of the gravel of Terrace A, and over that again is a thin layer of stones which, from the proportion of chert present in some samples, may safely be described as hill-wash from the plateau (Fig. 18). The total width of gravel worked in Paine's Field was so great that I found it convenient to divide it into three roughly equal portions. The uppermost (B 1) is usually covered with brick-earth, and separated by a more or less marked step in the Greensand floor from B 2, with no brick-earth, but the gravel is continuous throughout, and the distinction between the two is arbitrary, though there may be some slight difference in the contents. B 3 is at a distinctly lower level, and differed considerably in the number and character of its palæoliths. Throughout Paine's Field it was separated from B 2 by a ridge of Greensand only thinly coated with gravel, but it was not clear whether it was an older deposit than B 2, or a newer one occupying a lower position on the slope of the hill. On the eastern side of Broken Back the gravel descended steeply into the dry valley, but this I assumed to be due to "sag," though I was puzzled to account for a marked falling off in the supply of palæoliths. Further down the hillside, however (*i.e.*, more to the north), B 3 could be distinctly seen curving round into the hollow, and on its western margin, at a later period, sections were exposed in which layers of roughly stratified gravel and sand descended almost to the bottom of the valley—and therefore below the floor of B 2—without losing their horizontal position (Fig. 19). It became obvious then not only that B 3 was the oldest gravel of the series, but that the hollow

must have been already in existence before any of this gravel was deposited.

Brick-earth.—Under this rather vague heading three deposits seem to be included, the two lower ones being red and the uppermost pale brown. The two former attain their greatest development (5 ft. to 6 ft. each) in Knight's pit, where they are usually separated by a thin layer of white stones. In Paine's Field the lowest layer is very stony, and its junction with the next layer is irregular and ill-defined. The brown layer is best seen in Broken-Back, where it has a thickness of from 4 ft. to 6 ft. It lies on a steeply sloping and evidently eroded surface of red brick-earth and gravel, not only on the side of the hollow, but on the northern face of the hill as well. Evidently then it is a kind of hill-wash belonging to a later period than the gravel; but the origin of the two red layers is obscure, and, unfortunately, the distinction between the different layers is not always obvious.

Hand-axes.—The quality of flint used in the hand-axes at this

FIG. 19.—SECTION ACROSS BROKEN-BACK FIELD PARALLEL TO THE RIDGWAY ROAD AND LOOKING TOWARDS IT.—*H. Bury.*

B2, B3.—Gravel and Sand of Terrace B.
C.—Red Brick-earth (two layers).
D.—Brown Brick-earth.

level shows no improvement on that of Terrace A; black or dark brown flint is very rare, and most of the specimens showing it are water-worn. In the great majority of cases an opaque cherty flint is used, grey when freshly broken, but stained or patinated on the surface in various tints from pale straw to reddish ochre. Many implements show (usually on one face only) a bright ferruginous tint, which is not due to patination or stain, but to the deposition on the surface of the flint of a very tenacious iron oxide. Only one hand-axe, alleged to come from the gravel (as distinct from the brick-earth) has a white patina, and one is cream-coloured. As a rule there is a slight lustre, but very rarely a brilliant one, and dull surfaces are distinctly common. The average size of implements is far smaller than on Terrace A, but this is quite independent of material, for large flints, though nowhere common, are no rarer here than on the Alice Holt Plateau.

In my collection, the bulk of which is uninfluenced by selection, the total number of hand-axes from Paine's Field and Broken Back (omitting the brick-earth for the present) is well

over 300, without counting numerous broken specimens, the shape of which cannot be accurately determined; but of these nearly half are much water-worn and (apart from the fact that they include many anomalous types which are hard to classify) may be regarded as for the most part derived rather than representative of this terrace. The following classification, though applying only to my own collection and not intended for general use, includes practically all the unabraded, and many of the slightly abraded, implements. The figures at the end of each class indicate the number of specimens in my collection.

1. Ovate implements belonging to the second Boundstone group, broad and large (5.5 ins. to 4.2 ins. in length), and sometimes cordate; all except two have sharp rims all round, and little, if any, crust. All except one are sharp (8).

2. Ovates with a marked twist (reversed S) in the edge; thinner, smaller, and better worked on the whole than the last; ranging from 3.9 ins. to 2.7 ins. in length. All are sharp-rimmed, and almost entirely free from crust. Two are slightly abraded (8).

3. Ovate to ovate-pointed implements, smaller, and usually narrower than class 1; very similar in size to Class 2, and often very like them in shape, but with no twist, or at most a rudimentary one, in the edge. Several of them are flat on one face (Fig. 20), and on the whole they are of good workmanship, though a few have suffered from the use of refractory flint. Several are slightly water-worn; 4.2 ins. to 2.6 ins. in length (20).

4. Small and broad ovates, sometimes almost discoidal; thinner and more finely worked than the last; size, 3.5 ins. to 2.5 ins. One or two are blunted, but hardly abraded (11).

5. Irregular discs, some thick and clumsy; a few flat on one side. Crust is usually absent, and the rim is sharp all round. The largest measures 3.8 ins. in diameter. Three are slightly abraded (7).

6. Elongated, approaching the Cissbury celt in form (Fig. 21), some very rough and waterworn (11).

7. Pointed but not acute. Usually large (5.8 ins. to 4.5 ins.) and thick at the butt, but without much crust and with fairly straight edges. Several are slightly abraded (6).

8. Small pointed implements, in typical cases pear-shaped and flattened (see Pl. 37, Fig. 3 of my former paper); broad at the butt and acute-pointed; mostly free from crust and sharp-rimmed, but a few are triangular with abruptly truncated butts. Only six are over 4 ins. in length, the most usual length being 3.5 ins. to 3.7 ins. The smallest is 2.1 ins. About sixty are sharp and unabraded (93).

Although we find a good many Chellean hand-axes among the abraded specimens (some of them extremely rough), the earlier Boundstone group is not well represented. There is one side-chopper 6 ins. long (not included in any of the above classes)

which is of much the same style, but is unusual in its colour (red-brown) and its brilliant lustre. The implements of Class 7 come very near to some of the more pointed Boundstone specimens, and are practically identical with some white hand-axes from Terrace A, except that they never have white patinas.

Class 1 is common to both terraces, but judging from my own and other collections these large ovates are rarer here than on Terrace A, being to some extent replaced by the smaller ovates of Classes 2 and 3. Most of them are Chellean, but I have one or two imperfect implements (apparently cordate) which show fine Acheulean work.

Class 2 appears to be a further development of Class 1, in

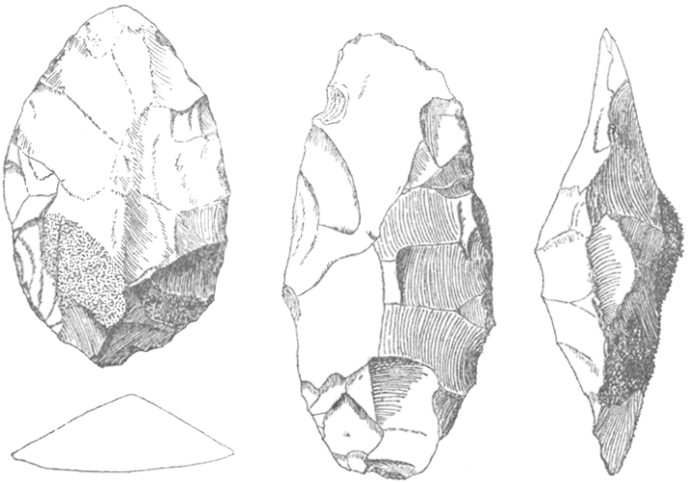


FIG. 20. FIG. 21.

IMPLEMENTS FROM TERRACE B (½).

which, even in Chellean times, the twisted edge began to appear. Here the twist is greater, especially in the smaller specimens, and the workmanship is far superior—certainly Acheulean, and in a few cases perhaps St. Acheul II. I have no proof of the occurrence of this type on Terrace A, but a small implement with white patina in Mr. Lasham's collection may be from that level.

Class 3 is probably to be regarded as a narrower and more pointed continuation of Class 1. Although some are rough they are on the whole distinctly Acheulean. I am uncertain as to their distribution on Terrace A, but a few specimens almost certainly occur.

Class 4 belongs to the finest period of Acheulean work (St. Acheul II). Specimens occur sparingly on Terrace A, but

always, I believe, with a white patina. On terrace B they are, as usual at this level, ochreous, but one is cream-coloured, and another, of light chalcedonic flint, is unstained and unpatinated.

Class 5 would generally be classed as Acheulean, but rough specimens, which may possibly be Chellean, are said to occur on Terrace A.

Class 6 appears to provide the prototype of the Cissbury celt; indeed, several of my specimens if they had white patinas would unhesitatingly be assigned to that date. One of the specimens included in my list (sharp and with a deep ochreous patina) was bought at the top of Broken Back Field, at the junction of the two terraces, but, for reasons already given, probably belongs to the lower level. I have, however, an unstained and unabraded implement which is said (but not on the best authority) to come from a distant part of Terrace A.

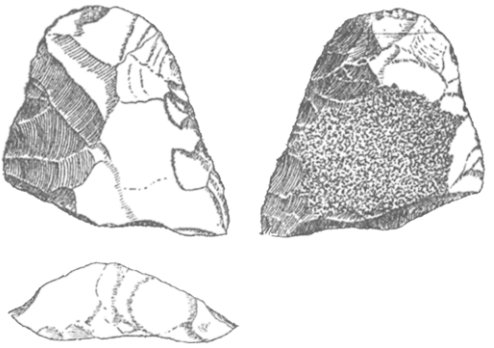


FIG. 22.—IMPLEMENT FROM TERRACE B (½).

Class 7 is of Chellean age, and, as already mentioned, approaches the first Boundstone group. It was exceptionally common in B 3, but I did not secure all the examples of it.

It is obvious that by far the most important class of all is No. 8. A number of the specimens included diverge more or less widely from the central type, as is inevitable in any classification of palæoliths, but on the whole they form a fairly homogeneous group, quite distinct from any of the others; and even the strictest adherence to type would leave this class superior in numbers and percentage of unabraded specimens to any other. As a whole the group is Chellean, but we are led up by a complete series of intermediate forms to implements of the same size and shape, but so much thinner and more finely worked that they would ordinarily be referred to an advanced stage in the St. Acheul period. The importance of this will be dealt with later.

Among the many irregular and fragmentary specimens not

included in the above classification, mention should be made of a small group which seems at first sight to consist of mere broken points of hand-axes; but several of these, on close examination, prove to have been deliberately chipped at the base, so that they were evidently used in their present form, whatever their original shape may have been. Most of them are very small and triangular, and may well be fragments of hand-axes of class 8; but Fig. 22 shows one which is so like the segmental tool ("tea-cosy") of Cissbury and Grimes' Graves, that one may fairly question whether it is not in its original form.

Of the vertical distribution of all these classes in the gravel I have but little to say, for the few occasions on which I was present when implements were found gave conflicting results, and my principal source of information therefore is the opinion of the more observant workmen. On the whole the least abraded specimens seem to come from low down in the gravel, though by no means always from the lowest layer of all; but there was nothing in the stratification to indicate the connection of a definite layer of gravel with a definite group of implements, and some of class 8 were certainly found at high as well as at low levels. At one time I hoped that the ferruginous incrustation already alluded to might afford evidence of a definite horizon, but later this view was found to be untenable. During the progress of the digging I formed the opinion that while class 8 was found everywhere, classes 2 and 4 belonged especially to B 2; but it is difficult to verify this, because, while B 2 was dug out to the last yard of gravel, work on B 1 was abandoned as soon as the brick-earth became too thick for profitable working, and consequently the total area explored of the former was about twice that of the latter. In B 3, however, both hand-axes and flakes were comparatively scarce, and nearly always water-worn, while rough Chellean implements of class 7 occurred in rather large proportion. We have already seen that it is older than B 2, and on the whole it gave me the impression of having more affinity with Terrace C than with the rest of Terrace B; but of course much of its gravel suffered re-arrangement at some later period, before the river finally descended to Terrace C, and therefore the inclusion of a few implements of quite late date need not surprise us.

Since the brickearth (together with the hill-wash over it) is always removed separately in these pits directly it gets at all thick, palæoliths contained in these upper layers are not liable to be confused with those of the gravel; but they are extraordinarily rare, and so far I have only seen two—one from Paine's Field and one from Knight's pit next door. The former is an elongated pear-shaped implement, broken at the point, and with a peculiar curve when seen in profile. It has an opaque white patina, and might belong to any age, there being a closely similar implement in Dr. Sturge's collection from Cissbury. It is uncer-

tain whether it lay in the brick-earth or in the hill-wash covering it—in fact at this point (Paine's Field) most of the brick-earth is rather stony, and it is not always clearly separated from the hill-wash above. The other implement is shown in Fig. 23; it has a lot of crust on the butt, but the general workmanship is exceptionally fine, the edges straight, and the outline beautifully curved. It is extremely sharp, and has a patina which tends to whiteness, but is modified by the colour of the underlying flint (yellow to blue-black). There seems to be no doubt that it came from some distance down in the red brick-earth (which has here a

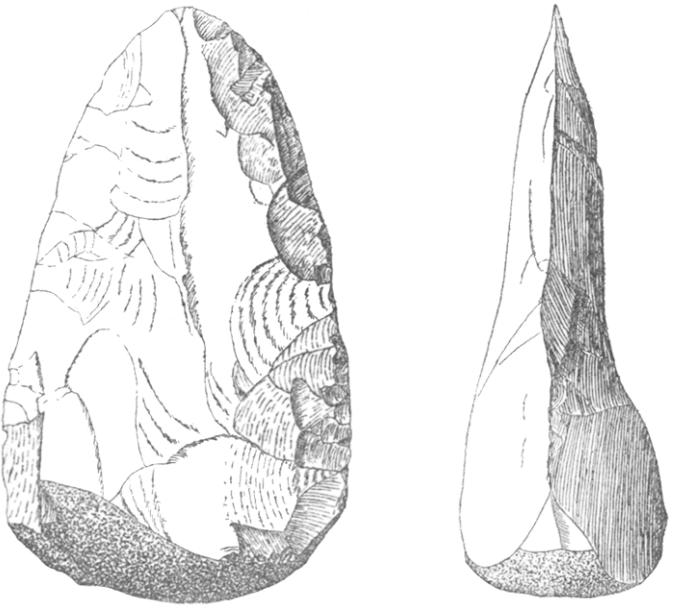


FIG. 23.—IMPLEMENT FROM THE BRICK-EARTH OF TERRACE B (½).

total thickness of 10 to 12 ft., and is used for bricks), but whether from the upper or lower layer, or from the stratum of stones between them, I was unable to ascertain. It is not easy to date such an implement, for while the crust at the butt and some of the bolder flaking suggests the Chellean age, the rest of the work is far too fine for that period, especially some minute edge-clipping which it would be difficult to match even among Acheulean hand-axes. There are, however, some very similar implements in Mr. Worthington Smith's collection (kindly shown me by Mr. Reginald Smith) which seem to point to the Mousterian period.

Mr. Falkner's Pit.—Mr. Falkner has, as far as possible, kept all implements from this pit in his own hands, and I am indebted to him both for every facility in examining his specimens and for information as to their occurrence. Altogether about 45 specimens have come under my notice, and it appears that nearly all of them came from a seam about a foot or two above the Greensand, and some 12 to 14 ft. below the floor of the plateau (Terrace A) from which the gravel has been stripped. An implement was found at this level during the excursion of the Geologists' Association in 1913. The collection is too small for a detailed analysis, and it suffices to say that classes 1 and 3 are strongly represented, and tend to run into one another, while class 8 is much smaller proportionately, but contains several typical examples. One very large elongated ovate (9 in. long) was found, but most of those of class 1 are much smaller, and tend more towards the pointed ovate than is usual in Paine's Field. A few of them are probably Acheulean, as are also a few small implements of ovate or discoidal form (classes 3 and 5), but St. Acheul II is not represented except perhaps by one or two of the latter group.

Taken as a whole the similarity between the two localities is strikingly clear, and only a few points of difference remain to be noted: (1) The absence of water-worn and presumably early forms, which are present in considerable quantities in Paine's Field and Broken Back; (2) the extraordinary sharpness of most of the implements. A large number of my own specimens, especially in class 8, can fairly be called sharp, but very few indeed attain the degree of sharpness which appears to be normal to this pit. (3) The entire absence of flakes comparable with those of Paine's Field, etc., to be described directly. Not one of these peculiarities is due, to any large extent, to selection, or to the ignorance of the workmen, who have been told to look out for flakes, and who, Mr. Falkner tells me, save up everything of value, and a good deal more besides. Indeed, I have seen a few flakes which are enough to prove that the men know what to look for, but are of too vague a character for classification.

Flakes.—From the two pits mentioned above I have obtained well over 200 flakes, but many of these are mere fragments or "wasters," and as such may be eliminated. It is advisable too, for the present, to omit a few from B 3, and five which, though bought in Paine's Field, I attribute, for reasons to be given later, to Terrace C. But even after these deductions there remain well over 150 flakes, nearly all unabraded, which may fairly be considered typical of this terrace. Just as several of the hand-axes described above bear traces of having been made from flakes, more or less completely trimmed on the bulbar face, so here we find a few implements which, when viewed from one face, exactly

resemble hand-axes (especially of class 8), but which are in reality true flakes, with the bulbar face untouched. But these are the exception, and the flakes with which I am here concerned have no such imitative character, but are distinguishable at a mere glance from hand-axes.

Cherty flint is the material most commonly used, as among the hand-axes, and dull surfaces are common. Much the same stains and patinas are found, as well as the ferruginous crust, which occurs more often on the flat (bulbar) side than on the worked one. Black or dark brown flint, however, is distinctly commoner than among the hand-axes, and the surface is usually dull and practically unaltered.

All the flakes have been struck off from cores which were trimmed before their removal to some extent, but not so carefully as at Northfleet and other Mousterian stations, and consequently a good deal of the original crust frequently remains. The most usual intention seems to have been to remove a flake with a single, central ridge, and sometimes the crust extends all the way down one side of that ridge (Fig. 28), but frequently it is confined to the end opposed to the bulb. In a fair number of cases, however, especially where two ridges are present, crust is entirely absent. The flaking of the upper surface is very bold, and is almost entirely effected by blows delivered from the bulbar end, nearly parallel with the final removing blow. The striking platform is, in every single case under consideration, absolutely plane, and frequently more than one blow has been delivered before the flake was detached (Fig. 26). A hollow (negative bulb) of percussion is occasionally present, but rarely immediately above the bulb. None of the flakes are very large (up to $4\frac{1}{2}$ ins. long), and when first struck off they naturally assumed a great variety of shapes; very few were originally symmetrical, but many were, after removal, subjected to a certain amount of trimming, which may only take the form of fitting them for prehension, but in some cases improves their symmetry. Very commonly, in this process, the base is narrowed, and the striking platform is even, in a few cases, entirely removed. Often, too, the extremity of the central ridge, where it projected upwards above the bulb, was struck off, either neatly, by means of a short flake ending in a "hinge fracture" (Fig. 26), or more clumsily by a series of step-like chips (Fig. 25), the difference probably depending more on the character of the flint than on the will of the operator. Hinge-fracture at the end farthest from the bulb is not at all uncommon. A large proportion (roughly 25 per cent.) of these flakes have been used as scrapers, and show secondary chipping round their margins, which appears to be identical in character with that of undoubted Le Moustier implements. Very rarely indeed, however, is any chipping, due either to trimming into shape or to use, found on the bulbar surface. A rough classifica-

tion of 37 flakes (almost all unabraded) in which secondary chipping is well marked gives the following numbers :

1. Side-scrapers, irregular in form, used along one edge only (Fig. 24). (15.)

2. Side-scrapers, more or less symmetrical, used along one or both edges :

(*a*) Apex blunt, rounded or square (Figs. 25, 26 and 27). (4).

(*b*) Apex pointed (Figs. 28 and 30). (2.)

3. Pointed flakes worked to a steep beak-like angle at the apex (Figs. 29 and 32). (4.)

FIG. 24.

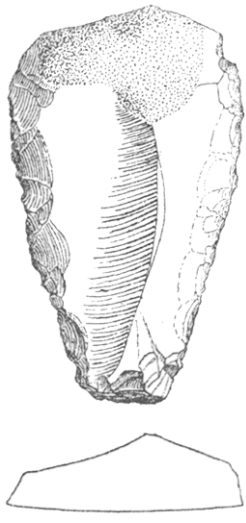


FIG. 25.

FLAKES FROM TERRACE B (½).

4. End scrapers (Figs. 33 and 34). (9.)

5. Thick, worked to a high angle along both edges, usually triangular in section (Fig. 35). (3.)

In the second class Fig. 27 is an unusually thin specimen, and closely resembles a Levallois flake. Fig. 30, which presents some unusual features, came from the junction of Terraces A and B in Broken Back, most probably from the brick-earth. It has a whitish patina, very like that of Fig. 23, with traces of ferruginous deposit on the bulbar face, and the influence of blows transverse to the axis is much more marked than usual. Fig. 29 has an ochreous patina, but Fig. 32 and the other two of the same class are unstained, and would by many people be called

Neolithic, but my information is that they were found in the gravel, though near the surface. Fig. 18 of my former paper shows a white flake from Terrace A of closely similar character.

FIG. 26.

FIG. 27.

FIG. 28.

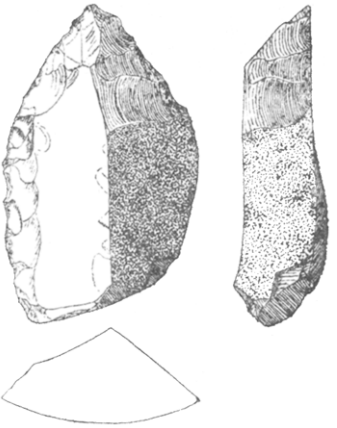


FIG. 29.

FLAKES FROM TERRACE B.

All the end scrapers are chipped along one edge as well as at the apex, and the edge which was not used is frequently formed by a single longitudinal flake nearly perpendicular to the surface (Figs. 33 and 34). Fig. 34 is practically a "blade," and two others are as narrow. One is discoidal.

Class 5 forms a remarkable group, very Neolithic in appearance; but the fact that two out of the three specimens are abraded (they are the only abraded specimens included in my list) seems conclusive in favour of their having come from the gravel. The one figured (Fig. 35) has a triangular section only at one end, but the other two have this form throughout. It has a light ochreous stain, and the base is not quite flat, but is formed by the removal of three broad flat flakes all nearly in the same plane. The edges show signs of use.

Fig. 31 belongs to a curious group of triangular flakes, thin

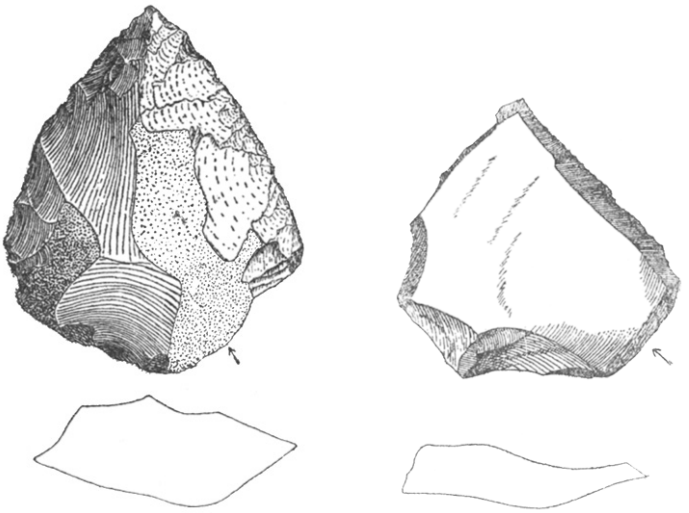


FIG. 30. FIG. 31.

FLAKES FROM TERRACE B.

The arrows show the position of the bulbs of percussion.

at the apex and thick as well as broad at the base, which is often so flat that the implement will stand up on it. The angles at the base are chamfered, and it is at one of them, and never in the centre of the base, that the bulb lies. In this specimen the left edge has been chipped away almost at right angles to the surface in a manner strongly recalling the back of a "dos rabattu" blade. The right edge may have been used as a saw, but in none of this group is there any evidence of use as scrapers.

Of the various uses, enumerated by Prof. Commont,* to which Mousterian flakes are put, side scrapers are by far the most common, and end scrapers come next. Hollow scrapers, or more correctly, concave notches (*encoches*) used for scraping small round

* "Les Hommes Contemporains du Renne," pp. 73, *et seq.*

objects, are rare and seldom deeply worked, while concavities formed by chance in the process of flaking are often left unused (Fig. 24). The most marked examples of this form of scraper (four in number) are all on thick flakes, and in all the chips are removed from the bulbar surface, which as a rule is singularly free from all secondary work. Saws and knives are certainly rare, and it is not always easy, in specimens from the gravel, to distinguish human from natural fractures. Burins and borers are entirely absent.

These flakes are found in all parts of the pits and at various horizons, but generally low down in the gravel, and they were especially numerous at the very bottom of the gravel, lying on the

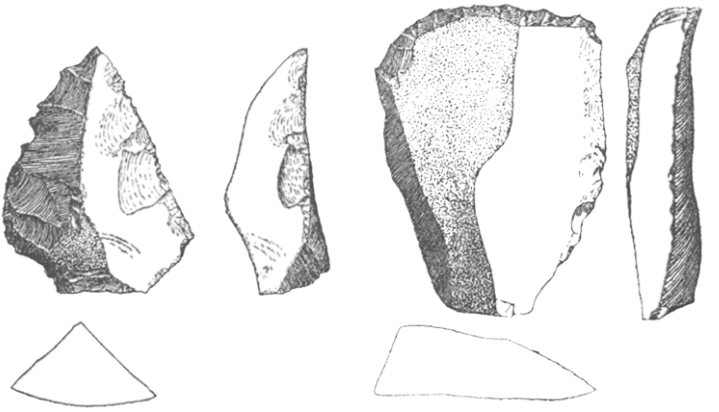


FIG. 32. FIG. 33.

FLAKES FROM TERRACE B.

bank of Greensand which separates B 1 from B 2. The workmen's testimony on this point was very consistent, and was supported first by my getting more flakes week after week from the man digging along this line (no matter which man it was) than from his neighbours on either side; and secondly by the marked falling off in the supply when specially wet weather made it impossible to dig right down to the Greensand. Although I have found a fair number of flakes in the sifted gravel, I have found none *in situ*, partly, perhaps, owing to the difficulty of getting at the bottom layers, except where the men are actually at work.

Only three flakes were obtained from B 3, but all are exceptionally long (5.6 ins. to 4.7 ins.). One is fairly thin and altogether free from crust; the central ridge has been battered down at the butt to assist prehension, and the edges have been a little used for scraping; the other two are rough outside flakes,

quite unused, but one of them is interesting because its striking platform, though practically plane, is traversed by three or four very shallow grooves; it cannot, however, be called truly facetted, and the bulb of percussion is very small.

Mention was made above of five flakes obtained from workmen in Paine's Field, but attributed by me to Terrace C, and it is necessary now to give my reasons for this transference, leaving a full description of the flakes to a later stage. (1) All were obtained at a time when work was just coming to an end in Barrett's Field (Terrace C), and men were moving up almost daily

FIG. 34.

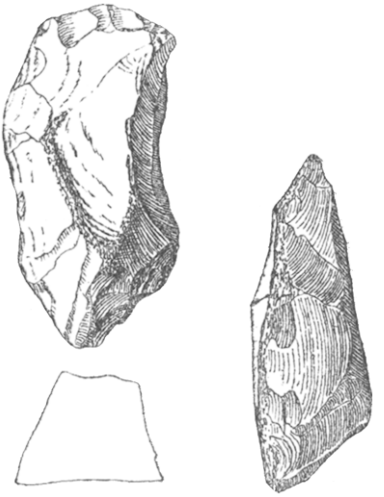


FIG. 35.

FLAKES FROM TERRACE B (½).

from that pit to Paine's Field. That they brought many implements with them is certain, but I did not at once realise this, and so did not always question them closely enough as to the provenance of those I bought. (2) In four of them the striking platform is retained, and in each case it is facetted. This is common in Terrace C, but, except for the transitional case in B 3, absolutely unknown in Paine's Field and Broken-Back. (These were the first flakes I obtained in Paine's Field, and I was therefore unacquainted with the characteristics of that locality.) (3) While two of these flakes, as far as form goes, are possible, though rare, examples of Terrace B work (roughly resembling Fig. 27), the other three are long and narrow blades ("*pseudo-lames*") which can only be properly matched on Terrace C. None of them has any crust left.

I have dwelt at length on the flakes from these pits because they are of considerable importance in the distinction to be drawn between Acheulean and Mousterian work, and also because they do not appear to be of common occurrence in our English gravels. In the plane character of the striking platform they resemble the High Lodge series; but after examining, through the kindness of Dr. Allen Sturge, a number of flakes from that locality, I am of opinion that they are thinner, much freer from remnants of crust, and often finer in their secondary work than the Farnham specimens; they are also made from flint of better and more uniform quality, but that may be a purely local feature. The published figures of flakes, attributed to Le Moustier, from the Wansunt Pit,* and from Dovercourt,† do not indicate any close resemblance to the Farnham types; in neither case is the character of the striking platform indicated, but in both instances it is clear that the worked surface has been chipped from various directions, so as to give a superficial resemblance to hand-axes, whereas in my specimens the primary flaking is almost always longitudinal.

Prof. Commont finds flakes of Acheulean as well as Mousterian age in the valley of the Somme, and admits that in their secondary work they are very much alike; but he tells us‡ that the former are distinguished from the latter (1) by their shortness, thickness, and irregularity of form; (2) by the plane character of their striking platforms, of which he gives a number of outline drawings; (3) in being struck from a different form of nucleus or core, that of the Acheulean period being less carefully trimmed before striking. No nuclei have been identified at Farnham, but the longitudinal character of the flaking suggests derivation from an Acheulean type of core, and this is supported by the platform and by the thickness and irregularity of the flakes. But while it is true that these flakes of Terrace B are, as a rule, distinguishable from the true Le Moustier flakes of Terrace C, the difference appears to me of insufficient magnitude to justify its being used as a barrier between the two great periods of industry. The facetting of the platform is by no means a constant feature among specimens from Le Moustier itself; while the secondary chipping is identical in the two groups, and the other features (size, thinness, etc.) are only matters of degree. It is certain, too, that a complete series of intermediate forms can be found between thick and irregular flakes to such forms as Fig. 27, and from this to symmetrical Levallois flakes with typical facetted bases; while one of the flakes from B 3 even gives a transitional stage in the platform itself.

If therefore we accept Prof. Commont's line of demarkation between the two periods, we must admit a gradual transition,

* *Proc. Geol. Assoc.*, vol. xxiii (1912), pl. 17, p. 108.
† *Proc. Prehist. Soc. E. Anglia*, vol. i (1912-13), pl. xciv, p. 366.
‡ *Op. cit.*, pp. 52-56.

which is opposed to his conclusion* that the Le Moustier technique (as defined by him) marks the advent of a new race and a new civilisation to the north of Europe. But it is suggested that it would do less violence to existing views on classification (at least, as generally held in England) if we recognised the peculiar secondary chipping (*retouche*) of the Farnham flakes as the hall-mark of Le Moustier work, admitting the co-existence at one level and in the same gravel of Acheulean and Mousterian industries. The point is an important one, for we cannot hope to make much progress in this difficult subject until the main divisions of our classification are fairly well defined, but it is one the decision on which must rest with others far more experienced than myself.

The transition from Chelles to St. Acheul also offers an interesting problem. The ovates of Boundstone mark the extreme limit of the Chellean period, while not a few of those from Terrace A are clearly Acheulean. But the small pear-shaped implements, which also show the transition, do not occur at all at Boundstone, and are practically confined to Terrace B, which is otherwise (except B 3) almost wholly Acheulean. We have therefore transitions along two different lines which it seems impossible to regard as contemporaneous. Perhaps the explanation of this may be that the different forms of implements were made by different tribes or races, and that, in this district, the makers of small pear-shaped implements remained in the Chellean stage of culture long after the makers of ovates had arrived at an Acheulean technique.

TERRACE C.

A slight increase in the gradient of the hillside marks the lower (northern) limit of this terrace, but its upper margin is not clearly defined, and the gravel gradually thins out against the rising hillside. In no case that I have seen is there any definite brick-earth over it. This gravel was confused with that of Terrace D by the Geological Survey (Sheet 8, Old Series), and was first distinguished by Messrs. Monckton and Mangles,† who observed it in a pit (still visible, though no longer worked) nearly due south of Farnham Railway Station, and about 90 ft. above the river level. Nothing, however, was obtained from it except a few waterworn hand-axes. Later Mr. Patterson worked along this level a little farther west on either side of the Frensham Road (Firgrove Hill), but the number of implements obtained was again small. In 1911-12, however, the Farnham Gravel Company worked a pit in the upper part of Barrett's Field (the lower part belongs to Terrace D) to the east of the

* *Op. cit.*, p. 68.
† *Proc. Geol. Assoc.*, vol. xiii (1893-4), p. 76.

Waverley Road, and here palæoliths were numerous, and I obtained a fairly representative sample. Recently (1915) gravel has been dug a little farther east, in a field called (after the farm to which it belongs) "Snailslinch"; but although this pit is only 100 yards away from Barrett's Field, implements are decidedly scarce. I have not, owing to the war, been able to visit this pit regularly, or to buy without selection, as I did in Paine's Field; and while it is certain that many specimens have found their way into other collections, it is probable that a good many much abraded implements have been from time to time discarded by the workmen as useless. When, however, every allowance has been made for these sources of loss, it remains an undoubted fact that implements are rare in this pit, and having regard to the meagre supplies from all other pits except Barrett's Field, I am forced to the conclusion that the latter was exceptional, and that implements are far less numerous on this terrace than on Terrace B. Putting all sources together I have notes of about 150 hand-axes, and 26 flakes, which may with certainty be ascribed to this level.

Hand-axes.—Black (or very dark) flint with little or no stain was not uncommon in Barrett's Field, but at Snailslinch ochreous tints are almost universal. Large hand-axes (over 4 ins.) are present in greater proportion that on Terrace B, but the majority in all sizes are waterworn, though seldom to any excessive degree, and there is a fair percentage of unabraded implements, which, however, are so varied in form that it is difficult to make any general statement about them. One of the most striking is shown in Fig. 36, and was found in the lowest part of Paine's Field at the level of Terrace C, but at a point where the gravel of that terrace thins out to a minimum. It is acute pointed, with slightly concave edges, and sharp rimmed all round, except for a facet of the original crust. As the profile shows, it is remarkably thin, but this thinness is assisted near the butt by a fracture which may be of later date. Although the outline is regular it cannot be described as smoothly worked. It is absolutely unabraded, but two large chips on the right edge, and two smaller ones at the butt were caused by the workman's pick, and show a grey cherty flint, stained only on the surface. So far as general form is concerned this pick can be matched on either of the higher terraces, but its thinness is certainly exceptional.

Another unabraded implement may be described either as a small pick, or as a narrow example of the pointed group (Class 8) of Terrace B. It is of dark brown flint without patina, and has a thick blunt butt with a good deal of crust on it. At a point corresponding to the facet in Fig. 36 the edge has been deliberately battered down, apparently to assist prehension. Its chief peculiarity is that it is flaked so as to leave on each face an axial

ridge, which is not central but, when the point is turned away from the observer, well over to the left of the central line, whichever face is turned upwards. This, which is a well-known characteristic of the La Micoque period, is frequently seen on one face in the small implements of Terrace B, but I have no instance from that level in which it is clearly marked on both faces.

These two implements, and perhaps a few others from Barrett's Field, would probably be classed by M. Commont as "Chelles évolué"—a type for which, in the light of his researches in the Somme valley, we are naturally on the look out at low

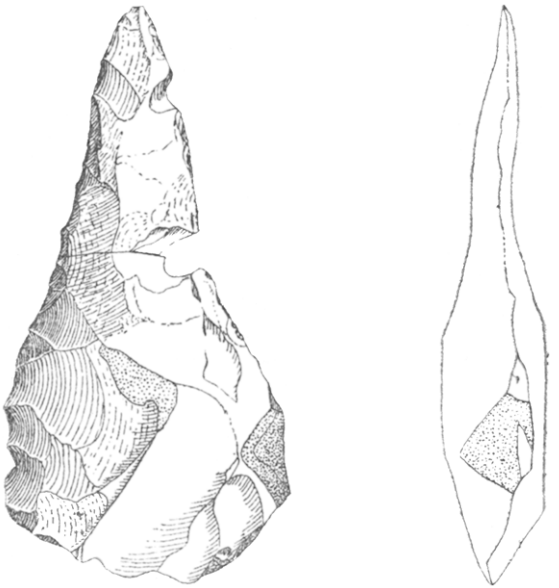


FIG. 36.—IMPLEMENT FROM TERRACE C (½).

levels; but such implements are the exception here, and the majority of the larger implements belong to a decidedly earlier stage of the Chelles period. Large ovates (second Boundstone group) are practically unknown. Among the smaller hand-axes the pear-shaped type of Terrace B is well represented, and a few specimens are sharp; but Acheulean implements are extremely rare, and only one small ovate of St. Acheul II. age is unabraded.*

Flakes.—Flakes are undoubtedly less known to many of the workmen than hand-axes, and to this must, to some extent, be attributed their scarcity in most collections. A fair number

* My former suggestion that discs of St. Acheul II. date might be commoner than on Terrace B was founded on mis-information as to the source of some specimens, and is negatived by further study of the evidence.

were found in Barrett's Field by men who afterwards worked on Terrace B, but for a long time no attempt was made to find or preserve them at Snailslinch; although, however, there is reason to believe that some were for this reason thrown away, there can be no doubt that, like the hand-axes, they are rarer in that pit than in Barrett's Field, and in spite of a good deal of search I have never found one myself. In my own collection there are only fifteen flakes from this level, or twenty if we include the five bought in Paine's Field, but attributed for reasons already given to this level; and to these may be added another 11 from other collections. Of the total of thirty-one, no less than twenty-six came from Barrett's Field, where they were said to occur in an earthy layer near the surface of the gravel.

We have seen that, according to M. Commont, Mousterian flakes are thinner than Acheulean, and usually have facetted platforms, and on these grounds we may safely attribute a fair number of the flakes from this level to the former period. There is, however, some variation among them, and it will be convenient to divide them into three classes as follows:

(1) *Platform facetted.*—Conspicuous among these is the Levallois flake figured in my previous paper.* It measures 3.4 ins. by 2.7 ins., and is of pale grey flint, partly opaque (cherty). It is quite free from abrasion, but there are small irregular chips in the edges, almost as much on the lower (bulbar) face as on the upper, which may be due to use as a saw. The bulb is not very large. Another flake (roughly oblong), 3.5 ins. by 2 ins., has nearly parallel sides and two longitudinal ridges. It is fairly thin, and has a yellow stain. The edges are sharp, and one of them shows a little secondary chipping. The platform is rather flat and very finely flaked, but the bulb is small.

Of the four flakes with facetted butts bought in Paine's Field, one is a small irregular flake of Levallois type, nearly black on one face, and with reddish spots on the other. It is a good deal water-worn. The others are all of black or very dark flint, narrow compared with their length, and flaked longitudinally with one or two ridges. One has a sort of "dos rabattu" character, while the other two show "encoches" with the chipping on the bulbar face. All three are abraded.

Dr. Gibson, of Aldershot, has five flakes of this type. One is a small Le Moustier point (Fig. 39) of dark, almost black, flint, quite sharp, and beautifully worked along both edges. A few chips on the bulbar face are probably accidental. The single longitudinal ridge is just blunted, but not chipped off, as in so many instances in Terrace B. Another of nearly black flint and roughly oblong shape, is unabraded, and measures 2.8 ins. by 1.8 ins. A third, opaque white with reddish patches, is almost a "blade" (*lame*), broader at the apex than the base. It is blunt, but not worn.

* *Op. cit.*, Fig. 21, p. 197. The figure is somewhat reduced.

The remaining two are both water-worn, and more or less gravel-stained, and one (rather thick) has some crust left.

(2) *Platform plane.*—Mr Patterson has a good discoidal Levallois flake (4.2 ins. by 3.3 ins.) with a slight ochreous stain, from a pit just west of the Farnham Grammar School. It is sharp, and shows no definite signs of use. In my own collection there is a pointed flake (3.4 ins. by 1.9 ins.) of dark grey flint with lighter spots. It is thin and sharp, but quite unused, and the bulb is rather large considering the flat platform. An irregular flake (2.6 ins. by 1.3 ins.) of grey flint, thin and with only a trace of crust, is one of the only unabraded flakes obtained from Snailslinch; it is also unusual (at this level) in showing a lot of chipping on one edge, due to use as a side-scraper, in a style common on Terrace B. Another slightly used irregular flake, thin and sharp, is of a deep ochreous colour, and has a lot of crust. It has also a hollow of percussion (negative bulb) immediately over the bulb. I have also a curved and irregular blade of dark flint, which has a few chips on the margin of the platform bringing it very near to group 1. All these might be recognised by their thinness as distinct from the ordinary types of Terrace B, but Father O'Farrell has two thicker flakes from Snailslinch which could be matched on the higher terrace, and I have notes of three others (from Barrett's Field) all showing a good deal of crust and suggesting derivation.

3. *Platform doubtful or altogether absent.*—With these must be classed Fig. 22 of my former paper, for half the bulb has been removed, though the butt is retrimmed in a way which simulates a facetted platform. It is of dark flint, and shows a little secondary chipping. Fig. 37 illustrates a parallel sided blade from which about an inch of the butt has been broken off. It is light in colour, slightly stained, and the edges are blunted, but not rolled. Its primary flaking is mainly longitudinal, but two others are flaked from various directions in the Levallois style, and one of them (in Dr. Gibson's collection) shows a good deal of secondary chipping, some on the bulbar face. Besides these there are four somewhat irregular blades, one of which is shown in Fig. 38; two are of black or very dark grey flint, and two have a pale gravel stain; one in each pair is abraded, and three of them show slight edge-chipping on both faces. The flake of this class bought in Paine's Field is intermediate between Fig. 27 and Fig. 37. It has a deep ochreous patina, and is irregularly chipped on both edges and on both faces, as if it had been a good deal knocked about, but the ridges do not show much sign of abrasion.

Although the series of flakes from this terrace is a small one it is enough to indicate an advance in technique on Terrace B. The facetted butt is a new feature, and one which, according to M. Commont, points unmistakably to a Mousterian date; but I

do not find it accompanied, as in France, by an increase in the size of the bulb. In many of my specimens, on the contrary, the bulb is extremely small, while large bulbs are by no means uncommon in conjunction with the plane platforms of Terrace B. It seems possible, therefore, that this feature depends more on the hammer used, or on the character of the blow, than on the form of the platform. But apart altogether from the platform, it is in most cases possible to distinguish the flakes of this terrace by their thinness and absence of crust. Dark flint, of better quality, is more generally used, and broad, almost discoidal, Levallois flakes make their appearance. Narrow blades, too ("*lames*" and "*pseudo-lames*"), are commoner. On the other hand the fine

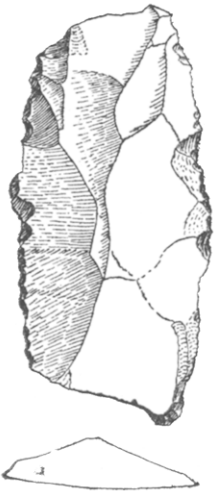


FIG. 37.

FIG. 38.

FLAKES FROM TERRACE C (½).

and flat secondary chipping so characteristic of Le Moustier work (as well as of Terrace B flakes) is rarer, and chips due to use are more often removed from the bulbar face. No cores have been found, but longitudinal flaking was evidently still extensively practised. It is noteworthy that almost all the flakes (all with facetted butts) come from Barrett's Field and from a deposit which appeared to differ somewhat from the ordinary gravel.

Mention may be made here of two fine specimens of Le Moustier flakes (both in Mr. Keable's collection) which were found at about the same height above O.D. as Terrace C, but are not necessarily contemporaneous. One is a broad Levallois flake measuring 4.7 ins. by 3.4 ins., with facetted butt, found on

the surface at the foot of Moon's Hill (Frensham), probably just below the 300 ft. level. It shows a little work on the bulbar side, and is slightly abraded. The other is a beautiful pointed flake (5 ins. by 1.7 ins.), with a white patina, triangular section, and fine chipping along both edges. It is said to have been found at Monk's Hill, Tilford, which should mean rather above the 300 ft. level, but the exact position and circumstances of the find are unrecorded. So far as I know there is no gravel in that region.

Both these flakes occurred on slopes draining towards the Tilford branch of the Wey, so that they were higher above the present river than Terrace C; but it must be remembered that at one time a consequent river ran northwards from Tilford, past Waverley, to the Blackwater,* and if that route was still open these finds would be slightly lower, relatively, than Terrace C. But nothing is really known as to the stage at which this consequent stream was beheaded, and correlation of levels between the two branches of the Wey is at present beyond my powers.

Returning now to a consideration of the terrace as a whole, it is necessary to inquire whether the hand-axes are all derived from higher levels or whether the river may not have been excavated down to this level even in Chellean times. According to M. Commont † the River Somme reached the 10m. terrace (on which he finds implements of "Chelles évolué" type, associated with a warm Chellean fauna) at the close of the Chellean period, rising later (in Acheulean times) to the 30m. level; and in Belgium M. Rutot ‡ finds Chellean implements only on the lower terrace, which was already formed in pre-Chellean times. In the Thames valley *E. antiquus* has been found at low levels, but this has generally been interpreted as indicating an alternation of warm and cold periods rather than an early excavation of the valley. We may, however, have to reconsider this opinion in the light of Continental discoveries.

At Farnham there are no animal remains at this level, and the geological and archæological evidence is far from conclusive. We have seen grounds for believing that the lateral valley in "Broken-Back" is older than Terrace B, and the general resemblance of B 3 to Terrace C rather than to the rest of Terrace B suggests that the river may have reached the level of Terrace C at a very early date. The hand-axes, though abraded, are not altogether what we should expect as derivatives from Terrace B, large Chellean forms being relatively more numerous, and flakes (of Terrace B type) very rare. "*Chelles évolué*," however, is no commoner than on Terraces A or B. It is true that almost all the Chellean implements are abraded, but mere

* *Quart. Journ. Geol. Soc.*, vol. lxiv (1908), pp. 318-323.
† *Soc. Geol. du Nord*, vol. xxxix (1910), p. 207.
‡ *Bull. Soc. Belg. Geol.*, vol. xx (1906), p. 30.

abrasion is not conclusive proof of derivation any more than sharpness is against it; for a river, even while it remains at one level, may keep on disturbing and re-arranging its gravel for a long period; while masses of drift may be let down from a higher to a lower level by the caving in of a bank, with little or no disturbance of their contents. Seeing then how scanty the evidence is, it seems better to wait for further light on the question from other districts before coming to any conclusion.

TERRACE D.

Superficially this terrace is more conspicuous than either of the two next above it. Its width sometimes extends to 400 yds. (or perhaps more), and its lower edge is marked by a steep bluff leading down to the river. Its upper margin, however, merges gently in the slope of the hill, and as digging has never been carried to its extreme limit, we cannot say exactly how far it extends in this direction, or whether it abuts against a bank of Greensand.

One curious feature of the terrace is that although several narrow and steep transverse valleys cut into its northern margin, none of the transverse hollows above it (such as we have seen in "Broken-Back") is continued across it; they merely debouch on to it and then come to an end. They are quite dry, and must have originated under different climatic conditions from the present. The Greensand platform underlying the drift is sometimes remarkably level, and sometimes slopes (or falls in small steps) towards the river. In the former case the drift may attain a great thickness (18 to 20 ft.), the top layers consisting of brick-earth, closely resembling that of Terrace B, and like it, seldom fit for brickmaking. This thins out and disappears towards the northern margin, but is often so thick towards the south as to put an end to digging altogether. Usually the gravel under the brick-earth is paler in colour than that outside it, and it is in this paler gravel that the rare animal remains (*E. primigenius* and *R. tichorhinus*) are found.

Owing to its proximity to the railway, which actually runs along it, this terrace has of late years been more extensively dug than any other, but the yield of palæoliths has been most disappointingly small. For many months I encouraged the workmen in several pits to save for me everything they could find, no matter how much abraded or broken, but my whole collection only amounts to 61 (unselected) hand-axes, to which may be added about twenty (selected) from other sources, and most of these are very much abraded. It is evident, in fact, that as we descend the hillside we find, not only a smaller number of palæoliths for a given area of gravel, but also a smaller number

of unabraded specimens. I have not the necessary data to express this numerically with any approach to accuracy, but the following figures may be attempted in order to give some indication of the differences between the terraces. If we represent the palæoliths in a given area of gravel on Terrace B by 100, those on Terrace C would amount to 30 to 40, and on Terrace D to 8 to 10, while the proportion of unabraded implements (in unselected series) would be about 40, 15, and 8 respectively in every 100 implements. The average degree of abrasion is also greatest on the lowest terrace, not a few having the ridges almost obliterated; but whether this is due to the hand-axes being derived, or to the fact that the gravel of this terrace originated in Chellean times, and was disturbed and re-deposited later, there is no evidence to show.

Among the more striking of the hand-axes found on this

FIG. 39.

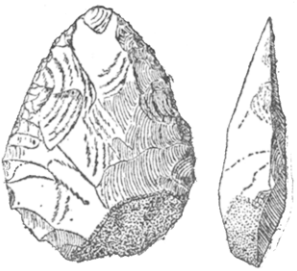


FIG. 40.

FLAKE FROM TERRACE C (½). IMPLEMENT FROM TERRACE D (½).

terrace may be mentioned a small group of pointed implements, comparable with Fig. 36 ("Chelles évolué"?), and showing the same proportion of breadth to length (½). The largest is Mr. Patterson's magnificent specimen 10·7 ins. long, and of a rich ochreous colour, but it is slightly abraded. Mr. Keable has two smaller implements of grey unstained flint (a very rare colour) from different parts of this terrace, both unabraded. In one the axial ridge is in an asymmetrical position on both faces, while in the other this feature is only seen on one face, the other face being flat. In the same class with these may be included an implement in my own collection (6·6 × 3·3 ins.) well worked, but with some crust on its blunt butt. It is pale in colour and slightly abraded.

There are three or four implements with white or earthy-white Patinas which show little or no abrasion, but they are all of

Terrace B types, and since they were found on the surface it is possible that they may have come down to this level in "hill-wash." Most of the other implements are, as already stated, very much abraded, and show a great variety of form, but almost all of them might be matched on other terraces; there is, however, one small group of sharp implements which appears to be peculiar to this terrace. The finest of them is one belonging to Mr. Patterson, and figured in my former paper.* It is 4.9 ins. long and 1 in. thick, and shows (except for some accidental chips near the apex) a remarkably even outline, and skilful working on both faces, though there are indications that it was made from a flake. It is of blue-grey flint, covered with a network of white

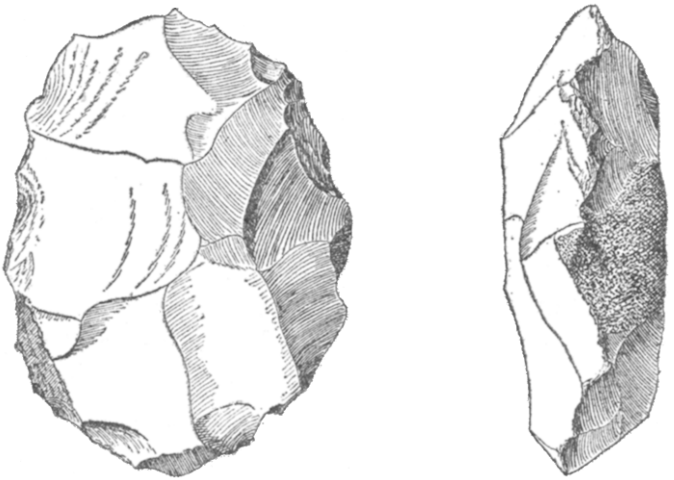


FIG. 41.—IMPLEMENT OR CORE FROM TERRACE D (½).

lines. A much smaller implement in my own collection (Fig. 40) is of the same colour, and although it has some crust at the base is very skilfully worked, and shows very fine secondary chipping along the edges due to use as a scraper. Another of my specimens is of paler flint, slightly stained, and is hardly so well worked; but it is very similar in shape to Mr. Patterson's, except for an "encoche" near the point, and it has some fine edge chipping, reminding one of some of the Terrace B flakes. Mr. Patterson has also a beautiful little ovate implement 3.6 ins. long, of black flint with a brilliant lustre, and finely worked all over. A similar but larger implement was found in the same pit, but was given away and cannot now be traced. There are four

* *Loc. cit.* Pl. 37, Fig. 4.

other unabraded implements known to come from this terrace, which seem to belong to this class, but they are thicker and more pointed, and not so neatly worked. They are, however, all of black flint. Whether this group should be classed as late Acheulean or as Mousterian is not quite clear, but their stratigraphical position, as well as the character in several of them of the secondary chipping, appear to me to point to the latter. Their absence from Terrace C, where, if we adopt M. Commont's diagnosis, the earliest Mousterian flakes occur, may be due to their extreme rarity, and the much smaller quantity of gravel explored at that level. On the other hand they are all unabraded, whereas the flakes of Terrace D are frequently waterworn.

One other unabraded specimen, shown in Fig. 41, exhibits unusual features. Its bold flaking and markedly zigzag edge are Chellean features, but the Chellean ovates from Terrace A are never so thick as this, and differ from it in other ways as well. Mr. Reginald Smith has shown me a number of oval or discoidal masses of flint in the British Museum, which are believed to be, not true implements, but unstruck "tortoise cores," and a careful comparison of them with my specimen shows many points of similarity. There is even a suggestion that an attempt may have been made to remove a flake by a blow on a plane platform (not seen in the figure) a little to the left of the middle line; but if so only a short flake came off, and the core was abandoned.

Flakes.—My collection only includes nine flakes from this level, of which seven are more or less abraded. Dividing them as before into three groups, we find—

(1) Three thin flakes with facetted striking platforms; one somewhat resembles Fig. 27 in shape, but is smaller, and made of yellowish flint. The other two are both irregular, one yellow and the other deep ochreous, but both are flaked longitudinally. All three are abraded.

(2) Two flakes with plane platforms. One is sharp, but is of Terrace B type, and may have come from that level in "hill-wash," for it was found on the surface, and has a dirty-white patina. The other is thick and much worn, and is almost certainly derived from Terrace B.

(3) Four flakes of black or very dark flint, and one grey and unstained. The striking platform is so far trimmed away that it is impossible to say whether it was originally facetted or not; probably it was in at least one case. All are irregular, and all except the grey one abraded.

From other collections I have notes of seven flakes. There are two of Levallois type in Mr. Keable's collection: one (4·5 ins. long) has nearly parallel sides and a facetted platform. It is slightly worn. Another is a typical, rather broad, Levallois flake (5 ins. long) of grey flint, sharp, and with good secondary chipping on the edges; but the platform, though it appears to be

facetted, is so broken away that it is impossible to be quite sure of its original character. Of the remaining flakes three are sharp, but only one has a facetted platform. Two others are abraded, and in general suggest derivation from Terrace B, but in one of them the platform, though large and practically plane, is traversed by several very minute flutings. In this it resembles a flake from B 3, and as in that case the bulb is small.

It will be seen from the above description that flakes are rare at this level, much rarer, even allowing for ignorance on the part of the men, than on Terrace C, and although there is a general resemblance between the two terraces, very few from the lower level have facetted platforms, and most of these are abraded. The bulb is never very large, and longitudinal flaking is still rather the rule than the exception. The characteristic edge-chipping, too, of the side scrapers of Terrace B is almost entirely absent.

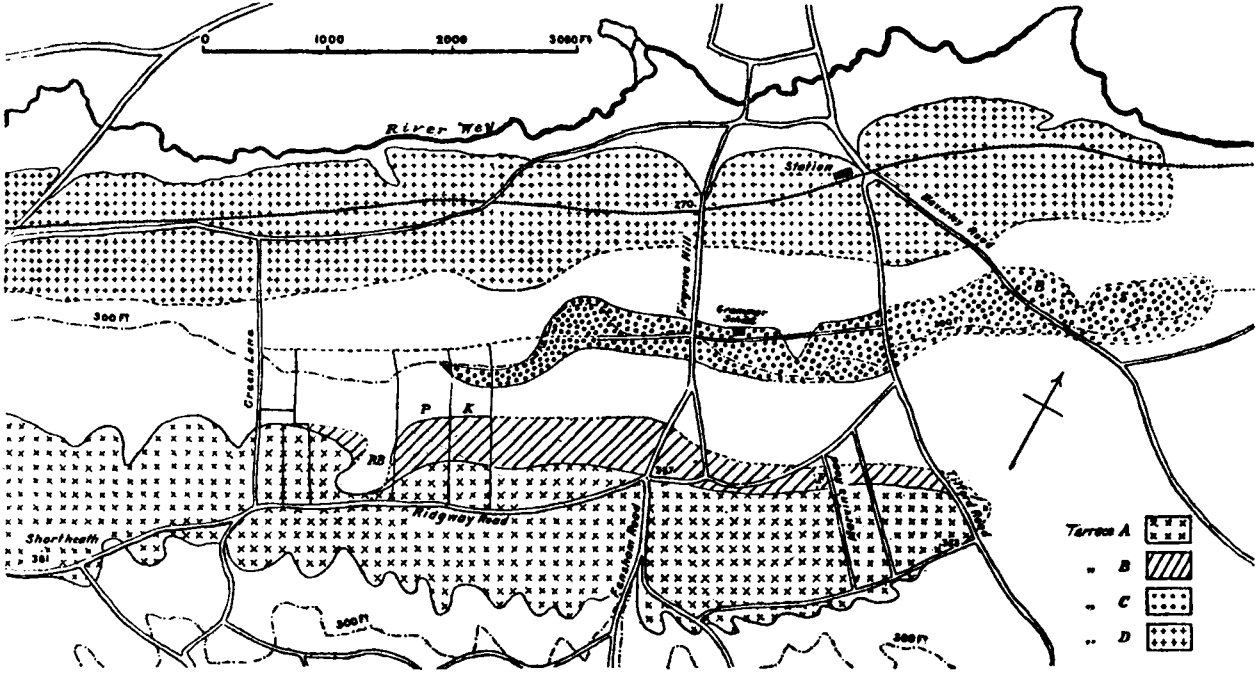
Brick-earth.—No hand-axes at all have been obtained in the brick-earth, but I have two flakes from it. One is an irregular Levallois flake, slightly curved in profile, with a facetted platform, and very fine flaking in all directions over the upper surface. It is of unstained grey flint, extremely sharp and evidently quite unused. The other is a "dos rabattu" blade, 3·9 ins. long, almost exactly resembling in form one figured by Dr. Allen Sturge.* With such extremely scanty material it is useless to attempt to determine the relation in time of the brick-earth to the gravel. As on Terrace B it shows a division into two red or reddish layers separated by a thin band of stones, and it is not altogether impossible that the whole of this deposit, on both terraces, is of sub-aerial origin or of the nature of a "hill-wash," rather than a river-drift of about the same age as the gravel which it covers.

TERRACE E.

Mention was made in my previous paper (p. 184) of gravel beds on the left bank of the river lower than Terrace D, but as I had heard of no palæoliths from them, they were left among the "miscellaneous gravels." As, however, the drift at this level is more extensive and of far greater thickness than I then imagined, it may be well to describe it under the heading of Terrace E.

Recently a pit of some importance has been opened at this level immediately to the east of Bourne Mill. It shows a base of Lower Greensand about 20 ft. above the river, surmounted by about 8 ft. of gravel, and 10 ft. of brick-earth, the top of the latter coming up to or above the base of Terrace D. I am informed by the workmen that a few inferior implements and some ill-preserved bones have been found in the gravel, but

* *Proc. Prehist. Soc. E. Anglia*, vol. 1, pl. xlvi, B.



MAP OF THE GRAVEL TERRACES ON THE SOUTH OF THE RIVER WEY, FARNHAM, SURREY.—*H. Bury.*

Terrace B. BB="Broken-Back" Field. K=Knight's Field. P=Paine's Field.
Terrace C. B=Barrett's Field. S=Snailslinch Pit.

ERRATA.—For "Fensham Road" read "Frensham Road." For "Marvin's Road" read "Mavin's Road."

I have not seen them; and the brick-earth, which differs somewhat in character from that which is typical of Terrace D, has so far yielded nothing whatever.

The same terrace, usually without the brick-earth, was recently exposed all along the main street of Farnham, during the laying of an electric cable. It is seen again a mile west of the town, and further west again, at Willey, a pit which was opened a few years ago yielded one implement, now in Mr. Keable's collection. It is a pointed hand-axe of grey flint, 6·3 ins. long, resembling in form and colour one or two in the same collection from Terrace D. On one face there is an axial ridge markedly out of the centre, but on the other face this ridge is not clearly developed.

Owing to the great thickness of the deposits on this terrace there is some overlap between it and the lower parts of Terrace D, and it is quite possible that in a few cases the two may have been confused together.

GENERAL REMARKS.

The great depth of the buried channel of the Thames, and what we know of the aggradation of river beds in general are a warning against too readily assuming that terraces and the deposits on them are arranged in strict chronological order, and suggest that any one level may have been visited by the river at two or more periods, possibly widely separated in time. On the Continent it is believed that the main valleys were excavated nearly to their present depth in Chellean or pre-Chellean times, and were then aggraded in late Chellean or Acheulean times to the extent of about 100 ft., and the same may be true of England. Evidence, too, is accumulating that the planing off of the platforms and plateaux on which some of the principal palæolithic gravels lie did not immediately precede the deposition of those gravels, but belongs to a distinctly earlier period. Messrs. Smith and Dewey* found in the lowest gravel at Swanscombe only pre-Chellean flakes, and an apparently similar industry occurs in the lowest gravel of the second and third terraces at Amiens.† At Dartford Heath a great mass of gravel, resting on the 100 ft. terrace, seems to be devoid of implements, and may be much earlier than palæolithic times. At Rickmansworth it is not improbable (though by no means certain) that the fluvio-glacial gravels may have extended down to the level now occupied by palæolithic gravel,‡ and lower down the Thames valley Boulder-clay seems to rest on the 100 ft. shelf.§ In the Farnham district an

* *Archæol.*, vol. lxiv (1913), p. 182.
† *Soc. Géol. Nord.*, vol. xli (1912), p. 19.
‡ *Archæol.*, vol. lxvi, p. 223.
§ *Quart. Journ. Geol. Soc.*, vol. xlviii (1892), p. 365.

apparently barren gravel is found at Boundstone and Rowledge underlying Chellean deposits, and probably similar gravels will be found elsewhere; but in the majority of cases it is only to be expected that the disturbance of the lower gravel by the newer should have rendered all distinction between them impossible. Considering these facts and the possibility that they may have been repeated at each of the different levels, the wonder is, not that the palæolithic succession is so often obscure, but that any succession should be traceable at all; yet all the evidence so far collected points to the general accuracy of the French classification.

At Farnham we have in the Boundstone pit a nearly pure Chellean culture, showing two successive types, and on Terrace A a slight advance on these brings us to St. Acheul I; but implements of St. Acheul II seem only to occur on the surface. Terrace B, on the other hand, which seems in most parts of the Thames valley not to be distinct from the 100 ft. terrace, is very largely Acheulean; implements of St. Acheul II are by no means uncommon (occurring in the gravel itself), while flakes are present which very closely approach, if they do not actually reach, the Le Moustier stage. These, however, occur mainly in the upper parts (B 1 and B 2) of the drift, and there is evidence of the formation of a lateral valley (now completely dry) before the earliest gravel (B 3) was deposited. This lowest gravel appears to contain a somewhat larger proportion of Chellean implements, and in general to resemble Terrace C, and it is quite possible that, as in France, the main valley was excavated to a considerable depth during or before the Chellean period. If we may trust the scanty evidence, this stage must have come to an end some time before the close of that period, for the implements of Terrace C are of fairly early type, and "Chelles évolué" is found (sparingly) on Terraces B and A as well.

On Terrace C, besides the hand-axes, which are mainly Chellean, we find some undoubted Le Moustier flakes, differing from the hand-axes in colour and patina. Their exact position in the gravel has not been determined, but the fact that some of them are abraded is opposed to the supposition that they belonged to a sub-aerial deposit (like ergeron or loess) of later date. On Terrace D Le Moustier flakes certainly occur in the gravel itself, but they are so often water-worn as to suggest that some at least may be derived. The majority of the hand-axes, which are scarce, are rude and much abraded, but a few are sharp and of fine workmanship, belonging probably to the Le Moustier period. Too much stress must not be laid on the apparent absence of this rare form from Terrace C. In the brick-earth of Terraces B and D implements are extremely scarce, but it is doubtful whether anything has so far been found earlier than Le Moustier, while one specimen seems to be Aurignacian. It is possible, therefore,

that this deposit is, at both levels, the equivalent of the French "ergeron" rather than a river deposit.

There is nothing in the above summary to suggest that any form of palæolith can be used with the accuracy of a good zone fossil —it would be unreasonable to expect it. But a distinct succession is observable, and any fair-sized group of implements could be referred without difficulty to the particular terrace from which it came. When, therefore, our knowledge of other districts is more complete, palæoliths ought to have a definite geological value.

Several writers have called attention to the remarkable fact that the older palæoliths, unlike those of the Cave Period and Neoliths, are found almost exclusively in gravels which can be directly attributed to river action; and the question has been raised as to whether this indicates that primitive man lived almost entirely in the neighbourhood of rivers,* or that, in the formation of the drift "the surface of the earth must have been swept clean of all stones lying on it, and this over very large areas."† The following facts in the Farnham district seem strongly opposed to the latter view. On the southern parts of the Alice Holt Plateau we find numerous pebbles of chert, brought down by transverse streams from Hindhead, but along the northern edge of the plateau these are rare, and the gravel consists almost entirely of sub-angular flints and rounded (Eocene) pebbles, brought down along the main line of the river from the region of Alton. So far a complete sweeping of the whole area into the drift is not impossible; but at the time of Terrace B, if there had been any appreciable sweeping from the south, chert pebbles must have been fairly numerous. This, however, is not the case—on the contrary the gravel at this level shows derivation from along the normal river line (Alton, etc.), if anything more clearly than Terrace A. Nor do we improve matters by supposing that this gravel represents the sweepings of the northern bank, transported right across the valley to within a few feet of its southern margin; for round Dippenhall and Clare Park are gravels (at about 400 ft. O.D.) with an abundance of chert, while the Upper Hale gravel is of a wholly different character; so that any considerable addition of material from either of these sources could not fail to make itself apparent. When we consider this, and the extraordinary sharpness of the implements in Mr. Falkner's pit, it seems to me that we are bound to admit that primitive man did live, at least to a large extent, in the neighbourhood of the rivers.

The shallow transverse valleys which furrow the hillside as far down as Terrace D, cut right through the gravel of the terraces which they traverse (B and C), and since they are now dry at all seasons, cannot have originated under present climatic

* R. A. Smith, *Archæol.*, vol. lxvi (1915), p. 214.
† A. Sturge, *Proc. Prehist. Soc. E. Anglia*, vol. i, p. 62.

conditions. We are naturally inclined to postulate glacial conditions, which would not only render the soil impervious, but, by heaping up snow on the plateau above, provide a considerable head of water even from that narrow ridge. Such a period of extreme cold is not improbable at the time of Terrace D; but whatever the conditions may have been they seem to have been recurrent, for the valley in Broken Back was present before the deposition of the gravel of Terrace B; and I am inclined to think that some of the valleys which eat into the northern edge of Terrace D point to another repetition of these conditions at quite a late date.

NOTES ON CONCRETIONS.

By Dr. G. Abbott, F.G.S., and Report of a Visit to the Author's Museum at Tunbridge Wells.

May 13th, 1916.

The official party left Charing Cross at 1.5 p.m. by train due at Tunbridge Wells at 2.13 p.m., and assembled at Dr. Abbott's Museum at 2.30 p.m. to inspect his fine collection of concretions from the Magnesian Limestone of Fulwell Hill, and the numerous concretionary forms assumed by various minerals. After the examination of the collection the party were entertained to tea by Dr. and Mrs. Abbott, and then, under the guidance of Mr. H. E. Turner, B.Sc., visited the High Rocks.

Miss E. Pearse acted as Excursion Secretary.

Dr. Abbott has kindly supplied, in the following notes, the substance of his remarks on the nature and scope of his collection.

This collection has been formed to serve as the basis for an explanation of the structures and mode of growth of concretions, especially those characteristic of the Magnesian Limestone of Fulwell Hill, Sunderland.

It has therefore been my aim to bring together as many varieties as possible of concretions consisting of lime, silicic acid and iron, whether typical or not. A majority of the forms are from the Fulwell Hill quarries, partly because this locality yields numerous forms of beautifully developed concretions, and again because the rapid destruction of the most productive beds by quarrying makes the preservation of a representative series of concretions highly desirable.

Many of the structures from these quarries resemble organisms. They are beautiful and also apparently unique objects, for, if any such exist elsewhere, in beds of any age, they have yet to be discovered.