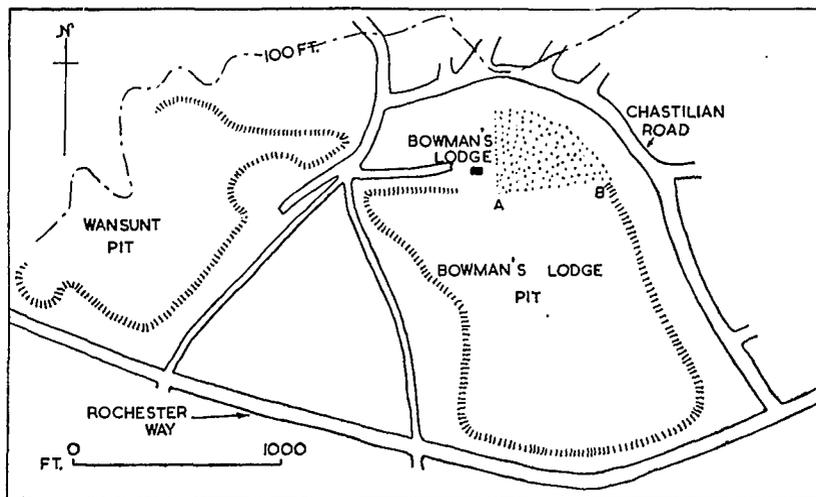


PALÆOLITHIC FLINT IMPLEMENTS FROM THE BOWMAN'S
LODGE GRAVEL PIT, DARTFORD HEATH

By P. J. TESTER

THE Bowman's Lodge pit is the most recent of several extensive excavations which have been made on Dartford Heath in order to obtain sand and gravel for commercial purposes. Through the courtesy of the proprietors, Crayford Sand and Gravel Pits Limited, the writer has been able to keep a close watch on the workings during the last four years in order to record any discoveries of scientific interest. These researches have resulted in the finding of numerous Palæolithic flint implements during the extension of the workings into the area between Bowman's Lodge¹ and Chastilian Road. (See O.S. 6 inch Kent Sheet IX NW.) In the accompanying sketch-map the area in question is indicated by stippling.



Sketch-map to show the relative positions of the Bowman's Lodge and Wansunt gravel pits. The stippling indicates the area from which Palæolithic implements were collected, as recorded in this report

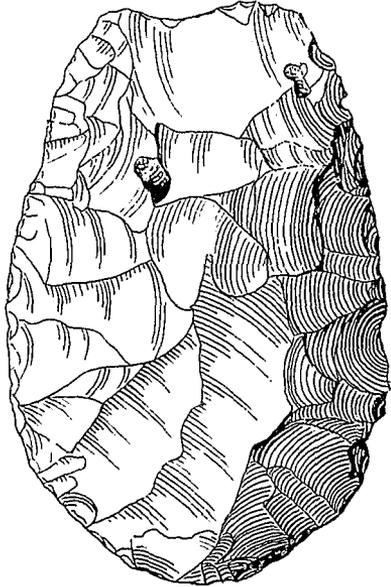
At point A, as shown on this map, the section revealed the following beds in descending order :—

- 1 foot Surface Soil.
- 14 feet Loam.

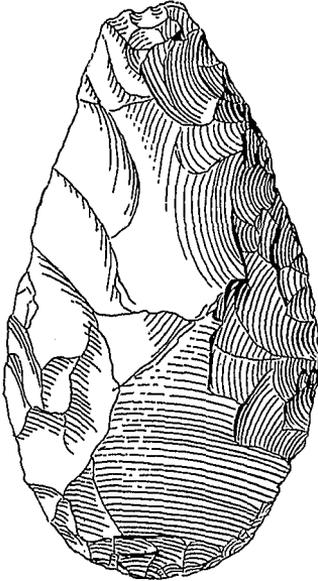
¹ This building is marked as " Bowman's Cottage " on the 1930-31 edition of the 6 in. maps.



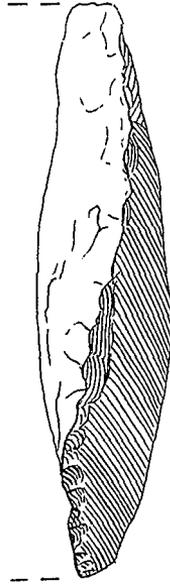
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Palæolithic Implements from Bowman's Lodge Pit.
Acheulian bifaces. 1. Hand-axe. 2. Cleaver. 3. Twisted ovate.
All $\frac{2}{3}$ actual size.

PALÆOLITHIC FLINT IMPLEMENTS

25 feet Gravel.
Thanet Sand.

The base of the gravel rested on the Thanet Sand at 85 feet above Ordnance Datum.

At point B the following section was noted :—

1 foot Surface Soil.
1 foot Loam.
19 feet Gravel.
Thanet Sand.

Here the base of the gravel was at 96 feet Ordnance Datum.

Between these two points the loam formed a continuous spread over the gravel, decreasing in thickness north and east of point A and disappearing near the margin of the stippled area. This deposit, if allowed to mingle with the gravel, would detract from its commercial value and was, therefore, carefully removed before extending the face of the workings. As the junction of the two deposits was clearly defined a mechanical excavator could be used for the purpose, and in this manner a considerable extent of the upper surface of the gravel was exposed at intervals as the pit was enlarged. Upon this newly exposed gravel surface, after the periodical removal of the superincumbent loam, there were found many Palæolithic flakes and implements, most of which are entirely unabraded and patinated white or mottled blue. From their condition it is obvious that they were *in situ* at this level, having remained in many cases practically as they were left by their Palæolithic users. It appears that Palæolithic man occupied this site in the period when the top of the gravel formed a land surface and before the formation of the loam beneath which the implements were eventually sealed.

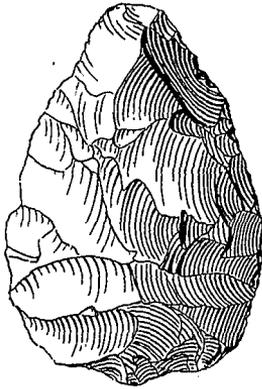
GENERAL DESCRIPTION OF THE FINDS

Almost every humanly worked flint which has come to light from beneath the loam has been collected and the accompanying table conveniently summarizes the essential characteristics of the assemblage :—

Bifacial Implements (chiefly ovates) . .	28
Flakes with plain striking platforms . .	180
Flakes with faceted striking platforms	6
Cores, irregular	55
Cores, shaped (Levalloisian technique)	5
Flakes, retouched to make Scrapers . .	15

To this must be added a considerable quantity of odd chips and splinters, obviously waste material.

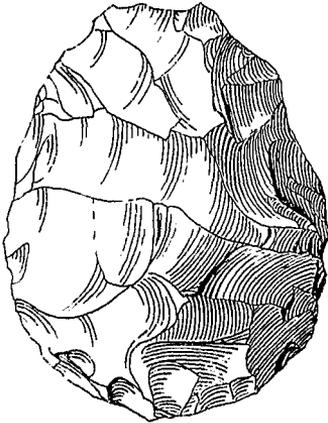
PALÆOLITHIC FLINT IMPLEMENTS



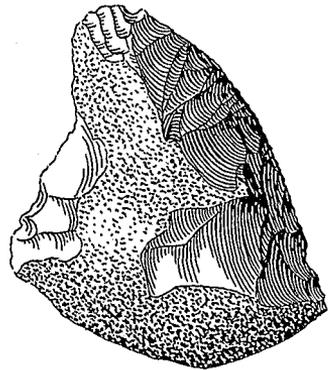
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Palæolithic Implements from Bowman's Lodge Pit.
4, 5 and 6. Small Acheulian bifaces. 7. Scraper of High Lodge type.
All $\frac{2}{3}$ actual size.

Bifacial Implements. These vary in form and quality of workmanship but all the well-finished specimens are typical Acheulian ovates, thin in section and shaped by the characteristic "wood technique". Several are chisel-ended and some possess the peculiar reversed S or "twisted" profile typical of advanced Middle Acheulian. Similar implements occur in the upper parts of the Middle Gravel in the Boy'n Hill terrace at Swanscombe, though the well-known, long-pointed hand-axes found in the lower Middle Gravel do not occur at Bowman's Lodge.

Flakes. These form the largest group of artifacts recovered from the site. Some were doubtless waste material from the manufacture of bifaces, but the presence of numerous discarded cores indicates that flakes were also produced deliberately for use as tools. The majority of the flakes are irregular in form but some show evidence of having been shaped before removal from the core. In most cases the striking platform is flat and at an obtuse angle to the bulbar face, though a small number have faceted butts typical of the Levalloisian culture.

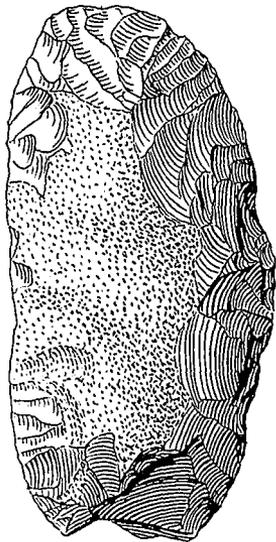
Cores. Most of these are rough nuclei from which numerous flakes have been struck at various angles, the pronounced negative bulbs of percussion indicating that this was done with the aid of a hammer-stone. A few resemble "tortoise cores" showing traces of the removal of a principal flake previously shaped to the required form. This is another distinguishing feature of the Levalloisian culture.

Scrapers. Some of the flakes with flat platforms have been retouched to make scrapers by a flaking technique identical with that employed in the shaping of the bifaces, and in this they resemble tools of the High Lodge or Clactonian III industry. On other specimens, however, the retouch is much cruder and was probably produced by simply rapping the flake on an anvil stone.

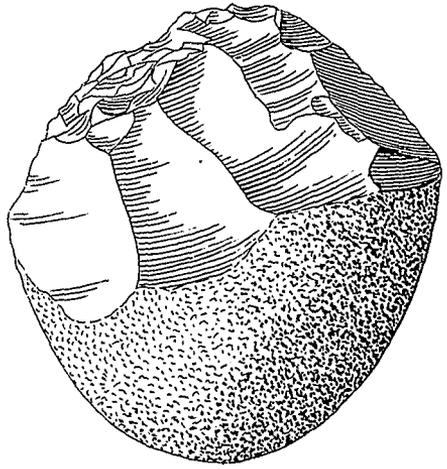
Connection Between the Bifacial and Flake Tools. There can be little doubt that the bifaces and flake tools are contemporary and indeed there is no internal evidence to show that they do not belong to one industry. The same degree of surface change is observable in both groups and all the artifacts occur in the same geological situation. Moreover, it appears that many of the bifaces were made from large flakes and in certain instances flake tools are retouched by the Acheulian technique, as noted above. The association of Acheulian and Levalloisian implements is the most interesting and important feature of the assemblage.

TYPOLOGICAL DATING

The bifaces from Bowman's Lodge are of the same form as many of the late Middle Acheulian tools from Swanscombe, and belong, therefore, to the later stages of the Mindel-Riss Interglacial. The small twisted ovates are particularly characteristic of this period.



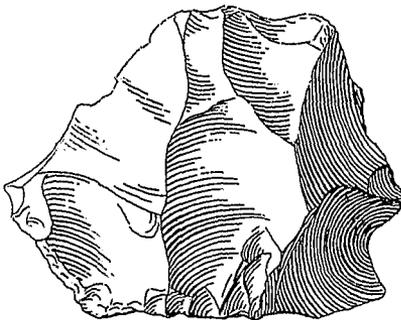
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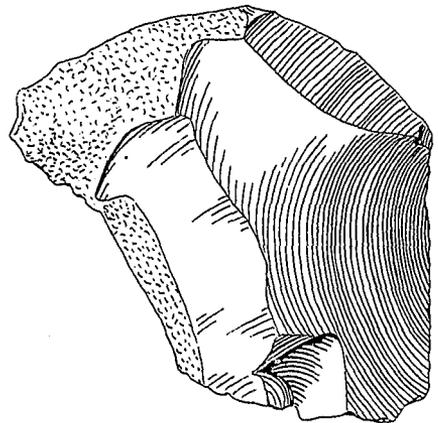
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Palæolithic Artifacts from Bowman's Lodge Pit.

8. Scraper, delicately retouched by the Acheulian technique. 9. Pebble-chopper.

10. Plane or Scraper. 11. Core or chopper. 12. Clactonian-type flake.

All $\frac{2}{3}$ actual size.

PALÆOLITHIC FLINT IMPLEMENTS

The Levalloisian culture, as represented by the shaped cores and flakes with faceted butts, occurs in its early stages in S.E. England at Baker's Hole, Northfleet, where implements, abandoned on a surface eroded at the onset of the Riss Glaciation by downcutting of the river, were covered by Coombe Rock produced by seasonal thawing during the same glacial period.

There is some evidence, however, for regarding the Bowman's Lodge flake industry as slightly earlier than this. The faceted butt, so characteristic of Baker's Hole, is rare in this assemblage, though evidence of shaping the flakes before removal is evident in a larger number of instances. On the whole the work is much rougher and less highly developed than at Northfleet and most of the cores are worked by the simpler Clactonian technique. This cannot be regarded as entirely due to poor raw material as the same flint, namely, water-worn nodules from the gravel, was used for both the rough and the shaped cores. It certainly looks as though this represents the development of the Levalloisian technique from the Clactonian, at a period prior to the Baker's Hole industry, but it cannot be decided without reference to the available geological data, to a consideration of which we will now turn.

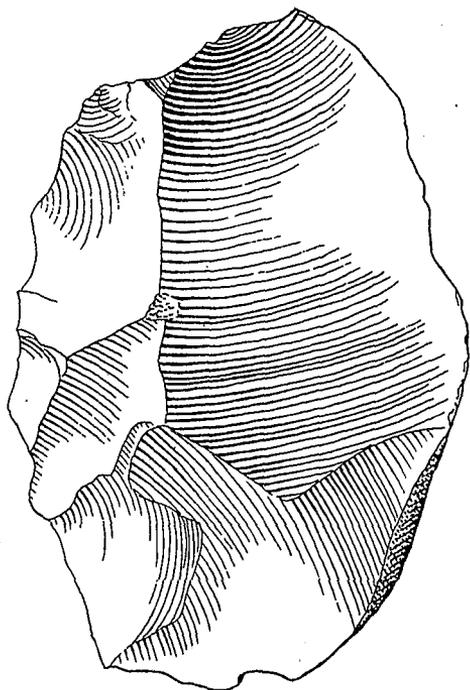
GEOLOGICAL EVIDENCE FOR DATING

As previously stated, the implements were obviously made in the interval between the formation of the gravel upon which they rested and the deposition of the loam beneath which they were sealed. By assessing the respective ages of these two deposits it is possible to determine the geological age of the industry.

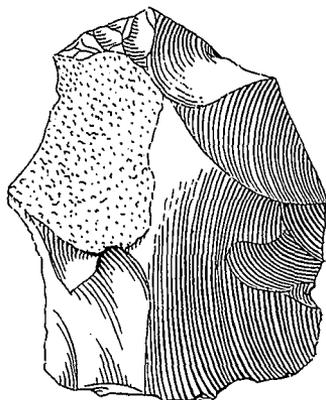
The Dartford Heath Gravel. Concerning the age of the Dartford Heath gravel there is some diversity of opinion. It is generally classed as part of the high level terrace gravel of the Lower Thames and regarded as contemporary with the Boyn Hill terrace gravel at Swanscombe. A comparison of the levels at these two sites, which are separated by a distance of about 5 miles, shows discrepancies which cause some to doubt the latter conclusion. The bench level in the two sections referred to at Bowman's Lodge is 10 to 21 feet above the lowest level at Swanscombe¹ and even higher levels of 100 feet O.D. are recorded in the Wansunt pit adjoining Bowman's Lodge.² Similarly, while the upper limits of the Swanscombe terrace do not rise much above 110 feet O.D., in one part of Dartford Heath a height

¹ This is given as 75 ft. O.D. in *Report of the Swanscombe Committee*, 1938, *J.R. Anthr. Inst.*, LXVIII, p. 17.

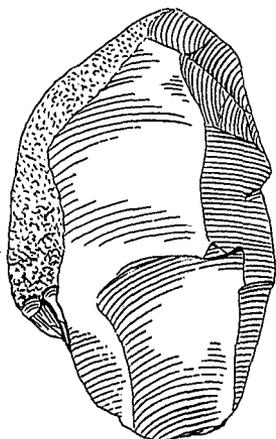
² Geological Survey Handbook, *Geology of the Country Around Dartford*, 1924, p. 94.



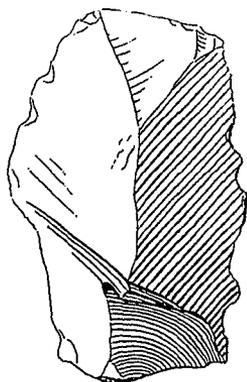
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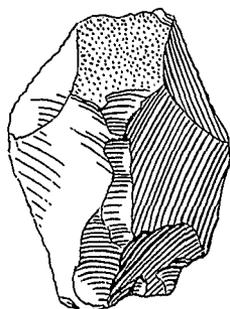
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Palaeolithic Artifacts from Bowman's Lodge Pit.
 Levalloisian-type artifacts. 13. Struck tortoise-core. 14 and 15. Flakes with prepared striking platforms. 16. Flake with faceted butt. 17. Prepared flake with flat striking platform. All $\frac{2}{3}$ actual size.

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of 136 feet O.D. has been noted.¹ Some authorities accordingly class the Dartford Heath gravel as pre-Boyn Hill, supposing it to have been aggraded either in the early stages of the Mindel Glaciation or in the following interstadial.² This much can, however, be stated with certainty; it is not earlier than the Mindel Glaciation as it contains northern erratics deposited in the Thames Valley during this period and it is not later than the Boyn Hill aggradation as after that time the river cut down finally to a much lower level.

After long searches over four years the writer has never obtained a single artifact from the body of the gravel, neither do mammalian remains occur which would help in its dating. F. C. J. Spurrell reported that he obtained an Acheulian ovate at the depth of 8 feet in the Dartford Heath gravel,³ but it would be unwise to attach too much importance to this single find as its position may have been due to secondary disturbance on the slope towards the Cray valley. Derived and abraded Abbevillian implements, typical of the period prior to the Mindel Glaciation, have been found in the gravel.⁴

The Loam. This deposit has the characteristics of a typical flood loam. It is a stiff, reddish clay containing scattered pebbles and small fragments of water-worn flint. A sample examined in the laboratory of the Institute of Archæology by Mr. I. W. Cornwall, B.A., revealed that the sand content was well rounded and very fine in grade—not more than 5 per cent. coarser than 0.5 mm. The sand was bleached and clean. The reaction of the sample was neutral to slightly acid and there was no undecomposed calcium carbonate and, therefore, no shells or Foraminifera which might have settled its mode of formation.⁵ The presence of numerous grains of bleached and well rounded quartz sand was also observed.

Numerous oyster shells were found scattered in the workings and it was formerly believed that these originated in the loam. Closer observation, however, has revealed that they occur only in the surface soil and probably represent nothing more than recent domestic refuse.

As a water-laid deposit the loam cannot, in consideration of its level (110-124 feet O.D.), be later than the final stage of the Boyn Hill phase of the Lower Thames and must have formed before the

¹ Geological Survey Handbook, *Geology of the Country Around Dartford*, 1924, p. 94.

² F. E. Zeuner, *Dating the Past*, 1946, p. 190.

³ Figured and described in *British Museum Guide to the Antiquities of the Stone Age*, 1926 edition, p. 31 and Plate II, No. 2. Also in Evans' *Ancient Stone Implements of Great Britain* (1897), pp. 605-6, where it is noted as having been found about $\frac{1}{2}$ mile s. of Crayford Station.

⁴ M. A. C. Hinton and A. S. Kennard, *Proc. Geol. Assoc.*, London, 1905, XIX, pp. 76-100, Plate I.

⁵ I. W. Cornwall, University of London Institute of Archæology, Sixth Annual Report, 1950. p. 35.

downcutting associated with the early stages of the following Riss Glaciation.

The loam rests directly upon the gravel without any trace of an intervening soil or indications of prolonged weathering on the face of the gravel. This suggests that the loam was deposited shortly after the formation of the upper face of the gravel. But in view of the advanced character of the artifacts sealed between the two deposits the loam cannot be earlier than the later part of the Boyn Hill stage, a conclusion which conflicts with the suggested early, pre-Boyn Hill age of the gravel. There are two possible ways out of this difficulty ; either the Dartford Heath gravel really belongs to the Boyn Hill aggradation¹ or else some secondary agency removed the surface soil and indications of weathering just before the manufacture of the implements and the deposition of the loam.

The Wansunt Channel. The accompanying sketch-map shows the position of the Wansunt pit in relation to Bowman's Lodge. In the northern part of this working there was discovered, about 1912, a channelway filled with loam. Investigation by officers of the Geological Survey led to the conclusion that the channel had been cut into the terrace gravel either by the main river or by a tributary (the Cray) flowing parallel to it. Implements were found in this channel which are typologically similar to those from Bowman's Lodge.²

A glance at the map will show that an eastward extension of this channel would pass near the area of the Bowman's Lodge pit under consideration. This means that possibly the upper face of the gravel at this point is an erosion surface formed in connection with the cutting of the Wansunt channel. This theory rids us of the difficulty caused by the absence of soil or weathering at the top of the gravel and makes it possible to reconcile the suggested early dating of the gravel with the much later form of the artifacts resting directly upon it. It is practically certain that the loam filling the Wansunt channel was part of the same deposit as that observed at Bowman's Lodge.

The only likely period for the cutting of the Wansunt channel is the end of the Boyn Hill stage when the main river rose to 110 feet O.D., as shown at Swanscombe. Under these conditions it is possible to imagine a tributary, close to its point of junction with the main stream, cutting into the earlier terrace gravel and finally retreating downward in the direction of the present 100 ft. contour at the onset of the Riss

¹ Mr. I. W. Cornwall has endeavoured to show that the Dartford Heath gravel may be composite and that the Bowman's Lodge deposits could be Boyn Hill while the higher portions of the terrace are earlier. See University of London Institute of Archaeology, Sixth Annual Report, 1950, pp. 34-37.

² R. H. Chandler and A. L. Leach, *Proc. Geol. Assoc.*, Vol. XX, p. 122, and Vol. XXIII, 1912, p. 103. Also R. A. Smith and H. Dewey, *Archæologia*, Vol. LXV, pp. 187-212.

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Glaciation, eventually forming the existing valley of the Cray. It is to be observed that north-west of Bowman's Lodge there is a continuous downward slope towards the present channel of this river.

SUMMARY

It would appear from the general evidence that the implements from beneath the loam at Bowman's Lodge were all manufactured during a comparatively short interval at the end of the Mindel-Riss Interglacial, contemporary with the final stage of the Boyn Hill phase of the Lower Thames. The occurrence of typical late Middle Acheulian biface implements in such circumstances is hardly remarkable, but their association in this instance with flake tools of Clacto-Levalloisian type is of considerable significance. This clearly shows that the earliest use of the Levalloisian technique in S.E. England was earlier than the Baker's Hole industry and was contemporary with advanced Middle Acheulian. The association of flakes and cores worked by both Clactonian and Levalloisian methods seems to suggest that the latter technique was at this period in process of development from the former, while the occurrence of flakes retouched in the Acheulian manner implies that, in this instance, both flakes and bifaces were produced by men of the same cultural group.

NOTES ON ILLUSTRATIONS

The specimens illustrated have been selected to represent the main features of the whole assemblage. In all cases flakes are figured with the bulb of percussion at the lower end.

Fig. 1. Acheulian hand-axe, finely worked over both faces in the manner characteristic of this culture. One side is slightly twisted and the edge does not continue round the butt. The surfacing is dark and lustrous with streaks and patches of white, sometimes known as "basketwork patina." There is evidence of slight rolling in the dulled edges and numerous incipient cones of percussion visible on this implement. Length 4.6 inches.

Fig. 2. Acheulian cleaver, with wide cutting edge at end opposite butt. The edge continues all round the margin of the implement and there is no twist. Patina on the side illustrated is mottled blue and white, and on the opposite face an even white. There are no signs of abrasion. Length 4.4 inches.

Fig. 3. Acheulian twisted ovate, with chisel point. Bleached surfacing which is stained a dull orange on face illustrated, presumably by contact with the gravel upon which it rested. Rather weathered in appearance on one side, but unabraded. Length 4.3 inches.

Fig. 4. Small Acheulian twisted ovate, with chisel end. Unpatinated and in completely fresh condition with lustrous black surfacing. Length 2·9 inches.

Fig. 5. Small Acheulian ovate, with delicate flaking on side illustrated, which is practically flat, while the other, convex face is more boldly worked. Slightly twisted. Unabraded and patinated mottled blue. Length 2·3 inches.

Fig. 6. Acheulian ovate, with chisel end. The edge, which is straight and continues round the butt, is as sharp as when the implement was made, and it was evidently covered over by the loam without disturbance. Lightly bleached surfacing. Length 3·2 inches.

Fig. 7. Scraper, made from flake with flat striking platform at an angle of 125° to the bulbar face. The edge has been retouched on one face by delicate flaking in the Acheulian manner. It might well be classed as High Lodge or Clactonian III. Unpatinated and quite unrolled, the edge being astonishingly sharp and even. Length 2·8 inches.

Fig. 8. Scraper, made from truncated flake and retouched very beautifully with Acheulian flaking on the convex side. Perfectly sharp and unabraded. The end originally bearing the bulb of percussion has been deliberately removed, presumably to facilitate insertion in a handle. Blue patina. Length 4·1 inches.

Fig. 9. Pebble chopper, roughly worked with hammer-stone flaking on both faces. On the side opposite that shown, only one large flake has been removed, with the addition of a little secondary trimming. The raw material is one of the large Tertiary pebbles which occur in great numbers in the gravel. Patina on the worked portion is bleached white and the implement is apparently unrolled. Marks of utilization occur along the edge, compatible with use against a hard substance. Such a tool would serve excellently for splitting bones to extract the marrow. Length 3·5 inches.

Fig. 10. Plane or scraper, made from thick flake. The striking platform is part of the water-worn surface of the nodule from which the flake was struck. Retouch has been produced by hammer-stone flaking, resulting in a steep working-edge suitable for planing wood. Unabraded and patinated white. Length 2·3 inches.

Fig. 11. Core or chopper, rather like a wedge in form and roughly flaked on both sides. This type of artifact is typical of the Clactonian industry and occurs frequently at Bowman's Lodge. White patination and unabraded. Greatest length 3 inches.

Fig. 12. Clactonian-type flake, with wide and flat striking platform at angle of 110° to bulbar face, and pronounced semi-cone of percussion. Bold flaking has been directed chiefly from the bulbar end, whereas in the early Levalloisian the flaking is generally directed

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towards the centre of the flake from around its perimeter. Unabraded and with even white patina. Length 3·7 inches.

Fig. 13. Levalloisian-type core, from which a large prepared flake has been struck. The core is fairly thin in section and boldly worked on both faces to reduce it to a form rather like a crude hand-axe. The striking platform does not seem to have been prepared by re-touching and would appear on the flake at an obtuse angle to the line of separation. Unworked portions show the raw material to have been a water-worn nodule from the gravel, but the worked edges are perfectly sharp, without any trace of rolling. Patina, lightly bleached to blue. Length 5·2 inches.

Fig. 14. Levalloisian-type flake, with carefully prepared striking platform. Flaking angle is approximately 105° . Pronounced semi-cone of percussion, denoting removal with hammer-stone. Near the point there are traces of retouch, probably originally continuing around part of the dexter margin, which has unfortunately been broken off in antiquity. Sharp and very fresh in appearance. Patina, blue to lightly bleached. Length 3 inches.

Fig. 15. Levalloisian-type flake, with prepared striking platform and a flaking angle of approximately 90° . Bleached white surfacing and unabraded. Length 3·3 inches.

Fig. 16. Flake, with boldly faceted butt and slightly obtuse flaking angle. Greyish surfacing and unabraded. Length 2·8 inches.

Fig. 17. Flake, showing distinct evidence of having been shaped before removal from the core. The shaping blows have been directed towards the centre and the flake-scars are truncated. Striking platform is of Clactonian type and at an angle of 120° to the bulbar face. White patina and unabraded. Length 2·3 inches.

DISPOSAL OF THE FINDS

* All the finds recovered by the writer from this site are at present in his possession.

ACKNOWLEDGMENTS

The writer wishes to acknowledge with thanks the kindness of Mr. G. A. Sewell, Manager of the Bowman's Lodge pit, for allowing him free access to the workings.

Mr. A. C. L. Halsall has been good enough to take the levels recorded in this report.

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