

# Palaeoliths from the Wallingford Fan-Gravels

By W. J. ARKELL

## I. INTRODUCTION

IN July and September, 1943, through the generosity of Mr. William Newton of Benson, the Ashmolean Museum acquired twelve splendid palaeoliths from the neighbourhood of Wallingford, Berks. They had been found between 1924 and 1941 by Mr. Ernest Town, a gravel worker, in the pits at Rumbold's Copse, north of Ewelme, and at Blenheim Farm, Newnham Murren, both on the Oxfordshire bank of the Thames. In October, Mrs. L. Treacher, of Twyford, generously sent four more specimens from the same locality from her late husband's collection, at least two of them also found by Mr. Town in 1926. As I was instrumental in bringing about these accessions to the Museum and was able to discuss with the finder in the pits the circumstances of their discovery, I took the opportunity of making drawings of most of the specimens and of comparing them with other material from the same neighbourhood in the Ashmolean and Pitt-Rivers Museums.<sup>1</sup> Excepting Wolvercote, there is no other palaeolithic locality in Oxfordshire or the whole upper Thames country that has yielded such an interesting assemblage.

The occurrence of palaeoliths here was made known by Sir John Evans, who recorded three pointed hand-axes with a white patina from the gravels at Gould's Heath (*alias* Gould's Grove) and Turner's Court, and an ovate from the surface of the same gravels at Ipsden.<sup>2</sup> Since then there have been several accessions to the two Oxford museums, notably through Mr. E. T. Leeds and the late D. G. Hogarth; most of the older specimens were collected in the first place from the workmen, especially Mr. Ernest Town and his father, by the late T. H. Powell of Denmark Hill, a native of Benson. No implements have been found since the introduction of mechanical excavators.

## II. THE GRAVELS

1. *Situation.* The implementiferous gravels lie to the east of Wallingford, in a strip about 7 miles long from north to south and 1 to 4 miles broad,

<sup>1</sup> For facilities I am indebted to the Keepers, Mr. E. T. Leeds and Mr. T. K. Penniman, and to Mrs. D. Mackay. I am indebted to Dr. K. P. Oakley, Mr. H. J. O. White and Mr. E. T. Leeds for reading the typescript of this paper and for information.

<sup>2</sup> *Ancient Stone Implements* (2nd ed., 1897), pp. 592-3. The first three are now in the Ashmolean, nos. 1928, 186 c, d, e; c is figured here (no. 2); d is similar; e is a large pointed amygdaloidal ovate.

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on the Lower and Middle Chalk plateau at the foot of the southern Chilterns. The distribution is shown on the map (FIG. 1).

2. *Altitude.* Most of the gravels lie above the 300 ft. contour, and large areas, including those where all the principal pits are situated, have a moderately level top at about 330-350 ft. O.D. If they represent a terrace of the Rivers Thames and Thame, as the presence of well-rolled Acheulian implements might be held to indicate, the terrace is at least 200 ft. above the rivers. A river terrace of Acheulian date at such a height would be unprecedented. In some places, moreover, as at Potter's Farm, near the Henley Road, and at Britwell House, the surface of the gravel slopes gradually up to 430 ft. O.D., while in other places it slopes down, as at Primrose Hill, to 240 ft. O.D., which is only about 80 ft. above the River Thame.

3. *Relation to the escarpment.* The general parallelism of the gravels to the escarpment is obvious. At the two places where they reach their greatest elevation of 430 ft. they appear to be banked against it.<sup>1</sup> In front of some of the biggest coombes, as at Turner's Court, below Nuffield, the gravel is truncated at the back by erosion and a tongue of it is left pointing up the coombe.

4. *Sub-surface relief.* Apart from the general slope away from the escarpment and a terrace-like arrangement which could be due to the Lower Chalk subsidiary escarpment, the disposition of the gravels indicates that they choke an earlier topography. The main outcrop, in which lie the important pits at Turner's Court, Blenheim Farm, and Gould's Grove, fills a shallow valley running north-south and opening out south-west to the Thames between North and South Stoke.<sup>1</sup>

5. *Thickness and composition.* The proved thickness of the gravel is locally up to 25 ft. The Blenheim Farm and Gould's Grove pits both show faces 15 ft. deep. The Survey classified it as Angular Flint Gravel, a subdivision of their Plateau Gravel. The material is overwhelmingly angular flint, in a matrix of quartz sand or loam derived from the Reading Beds. Battered beach pebbles and sarsen are common, both also derived from the Reading Beds. I have seen sarsens up to 2½ ft. in diameter near the base at Blenheim Farm, and Mr. Ernest Town told me he once saw one there about 6 ft. square. Chalk is confined to the lower parts, as described below. Northern Drift pebbles occur rarely.

6. *Fauna.* The only animal remains recorded are a tooth of mammoth near Britwell House and a horn of stag near Blenheim Farm.<sup>2</sup> Mr. Newton had a rolled fragment of *Elephas* tooth from Rumbold's pit.

<sup>1</sup> A. J. Jukes-Browne and H. J. O. White (1908), 'Geology of the country around Henley and Wallingford', *Mem. Geol. Surv.*, pp. 89-92.

<sup>2</sup> *Ibid.*, for references.

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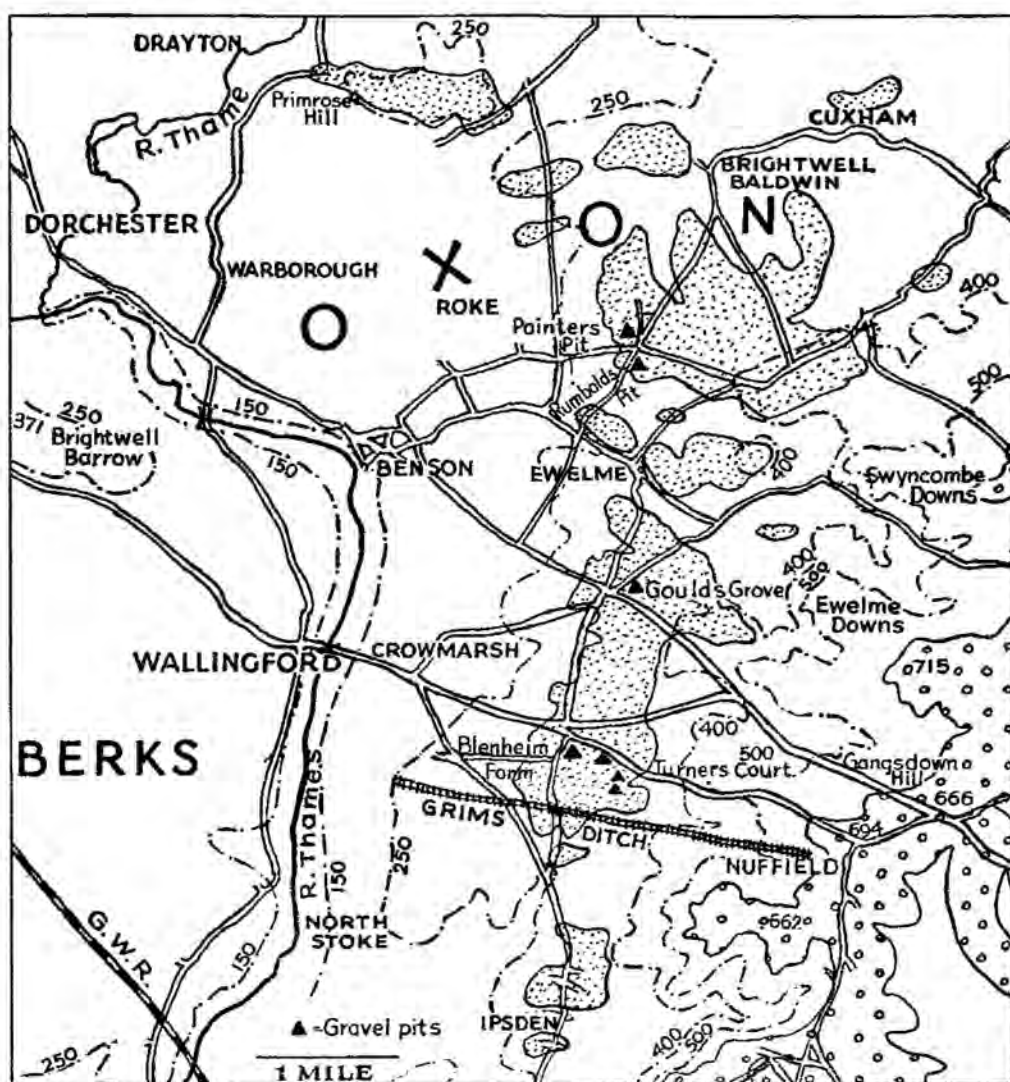


FIG. I

MAP SHOWING THE DISTRIBUTION OF THE FAN-GRAVELS (DOTTED) AND THE POSITION OF GRAVEL-PITS IN THE EWELME DISTRICT

Clay-with-Flints on the Chiltern summits is shown by circles. The 300 foot contour is omitted for clarity.

*Based on the 1 in. Geological Survey map, Henley Sheet, new ser., Sheet 254, with the sanction of the Controller of H. M. Stationery Office.*

7. *Structure.* Locally at the base, in some of the pits, there are a few feet of bedded sandy gravel and sand, which are referred to below (para. 10), but in general the gravel displays to an extreme degree the structure known as festooning. Pockets of gravel and lenticles of sand and loam appear to be contorted as if the whole mass had begun to boil. The general colour of the gravel is rusty brown, but sometimes (especially at Turner's Court and Rumbold's pits) fingers or flame-like protuberances of white gravel rise up from the base for a height of 2 to 4 ft. or more. These are extensions of a white layer which is said to lie nearly always next to the solid Chalk. The white gravel is composed largely of sub-angular and rounded fragments of hard chalk, and the flints in it have a white cortex and deep white or blue patina (where not freshly broken), so that small pieces of chalk and flint are hardly distinguishable at sight.

8. *Interpretation.* The Survey concluded :

'The flint gravels above described are, almost certainly, the work of streams, or rather of torrents, which flowed down the coombes trenching the upper parts of the chalk escarpment to the east and south-east. They rest on an uneven surface, and appear to have been spread out in confluent fans extending from the foot of the steepest part of the scarp.'

Both the tonguing of the gravel up the coombes and the presence of rounded hard chalk pebbles and well-rolled palaeolithic implements prove that much of the material did come down the coombes in streams or torrents. Moreover, since the bulk of the gravel, now brown and chalkless, has probably been decalcified, as indicated by the remnants of white chalky gravel remaining, the uneven decrease of volume attendant upon the process must have caused considerable differential movement and could have accounted for some of the stirring or festooning. This last is developed on such a scale, however, that it is probable that the spreading out of the gravel in its present position in a blanket of confluent fans was due mainly to solifluxion : the downward sludging of the surface layers of the soil over ground-ice during thaws in the ice age, probably accompanied by heavy snowfall or during the melting of deep snow.

9. *Analogues.* Analogous fan-gravels have been described along the foot of the Cotswold Hills<sup>1</sup> and the limestone ridges of the Bristol district, where they form breccias up to 100 ft. thick.<sup>2</sup> The Coombe Rock of the

<sup>1</sup> M. E. Tomlinson (1941), 'Pleistocene gravels of the Cotswold sub-edge Plain from Mickleton to the Frome valley', *Quart. Journ. Geol. Soc.*, xcvi, 385.

<sup>2</sup> L. S. Palmer (1934), 'Some Pleistocene breccias near the Severn estuary', *Proc. Geol. Assoc.*, xlv, 145.

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southern slopes of the chalk downs in the south also had a similar origin and reaches prodigious thicknesses (up to 100 ft. around Brighton and Portsmouth). Around Wallingford, however, chalk is a much more subordinate constituent, and probably was already so before decalcification, while Eocene sand and pebbles are more in evidence. This suggests that the principal immediate source of the Wallingford gravel was Clay-with-Flints, which in turn was the product of greater solifluxion during the earlier glaciations. The closest analogy of all both lithologically and typologically is with Knowle Farm pit on the outskirts of Savernake Forest.<sup>1</sup>

10. *The bedded basal gravel and sand.* In the principal pits a few feet of distinctly bedded sandy gravel and loamy sand have been observed at the base. Mr. H. J. O. White informs me that in 1897 he noted 'distinct stratification' in the lower part of the gravel at Gould's Grove and at Blenheim Farm, and he has kindly sent extracts from two letters from the late Llewellyn Treacher, F.G.S., dated 13 December, 1926, and 21 December, 1931, referring to this. In the former Treacher says that at Turner's Court 'under the angular drift with sharp-edged pointed implements, there now appears to be some current-bedded sand and loam, resting on Chalk. Recently I have obtained implements from this bed at two separate pits'. In July, 1943, these bedded deposits were no longer visible at Turner's Court or Blenheim Farm, but they were clearly exposed at Gould's Grove, and sand floored some of the upper part of Rumbold's pit but was not exposed in section.

Mrs. Treacher most generously presented me with all her late husband's palaeoliths from these pits<sup>2</sup> and looked up her own and her husband's diaries to establish which specimens were referred to in the letters to Mr. White. From the dates on the specimens and in the diaries it emerges that the two are an ovate from Blenheim Farm, labelled '11/11/26', and another from Gould's Grove labelled '1/12/26' (FIG. 7, nos. 15, 16). In view of the importance of these specimens I submitted them to Dr. K. P. Oakley and Mr. A. D. Lacaille, who have kindly inspected them and confirm the dating as Acheul III for the former implement, and suggest that the latter, while atypical, may have been a derived Acheul II specimen. Both are rolled and patinated, but the Acheul III specimen is rather fresher and is stained browner.

That gravel containing such implements could be relics of a 200 ft. terrace of the Thame (there are no Thames materials) is extremely unlikely. It is more probable that it represents relics of the gravels of lateral streams which flowed down the coombes during the interglacial period when the

<sup>1</sup> C. Reid (1903), 'Note on the Palaeolithic gravel of Savernake Forest, Wiltshire', *Summ. Progr. Geol. Surv. for 1902*, p. 208.

<sup>2</sup> Four in number. I have passed them on to the Ashmolean Museum.



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Middle Acheulian implements were made. Or it may be that, as Mr. White suggests, no great interval of time separates the bedded deposits below from the obviously soliflual gravels above, 'the basal bodies of fine-grained material perhaps recording the initial dribblings of one or more vigorous defluxions from the high ground on the east'. In 1897 Mr. White noticed a thinly lenticular seam of sandy material half-way up the Blenheim Farm section (then 15ft. deep) which he is inclined to attribute to 'an effusion of water from a creeping body of sludge'.

### III. THE IMPLEMENTS

11. *Industries represented.* Combining the new acquisitions with the older collections in the two museums, we now have indubitable representatives of Abbevillian (*olim* pre-Chellean of Commont, Chellean *auctorum*), Lower Acheulian (*olim* Chellean of Commont, Acheul I and II of Breuil), Middle Acheulian (Acheul III-IV of Breuil), and Upper Acheulian (Acheul V, VI, VII of Breuil).<sup>1</sup> For the most part four categories are all that it seems possible to recognize in an unstratified series with strict objectivity, but in practice it is easier to distinguish between Acheul III and IV than between Lower Acheulian and Abbevillian.

12. *Numbers and distribution.* A few Ewelme palaeoliths in the Ashmolean are packed away in safety from air raids, and have not been available to me for this study. The material seen by me numbers 65 specimens and can be classified as follows (A=Ashmolean, older collections; N=Newton collection, now in Ashmolean; T=Treacher collection, now in Ashmolean; P=Pitt-Rivers Museum):

	Rumbold's Pit	Painter's Pit	Blenheim Farm	Gould's Grove	Turner's Court	Total
Upper Acheulian .. ..	3N		1N			4
Middle Acheulian .. ..	12A 9P 4N	2A	2T 1A 1N	5A 3P	5A	44
Lower Acheulian and Abbevillian .. ..	6P 2A 2N		1T 1N	1T		13
Indeterminate .. ..	3A			1P		4
Totals .. ..	41	2	7	10	5	65

<sup>1</sup> H. Breuil and L. Koslowski (1931-2), 'Etudes de stratigraphie paléolithique dans le nord de la France, la Belgique, et l'Angleterre', *L'Anthropologie*, xlii, xliii.

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The importance of the acquisition from Mr. Newton appears from this table: it not only comprises nearly one-fifth of all the palaeoliths known from this locality, but also includes four examples of an industry, the Upper Acheulian, which would otherwise be unrepresented.

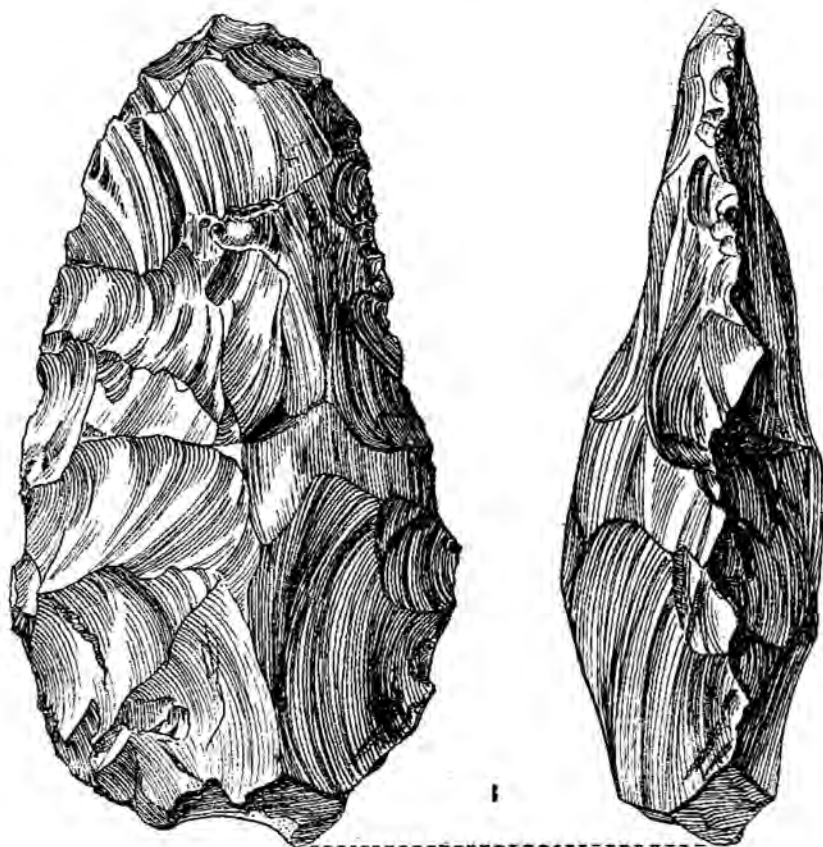


FIG. 2

PALAEOLITH FROM NEAR WALLINGFORD (Sc.  $\frac{2}{3}$ )

13. *Depth.* Two pointed hand-axes in the Pitt-Rivers Museum, one rolled Abbevillian? (FIG. 3, no. 3) and one unrolled Middle Acheulian, are labelled '12 ft. deep, Rumbold's Pit'. Another from the same pit is marked '8 ft.' and another '4 ft.'; one is slightly rolled, the other unrolled. One hand-axe from Gould's Grove in the Ashmolean Museum, collected in 1895,

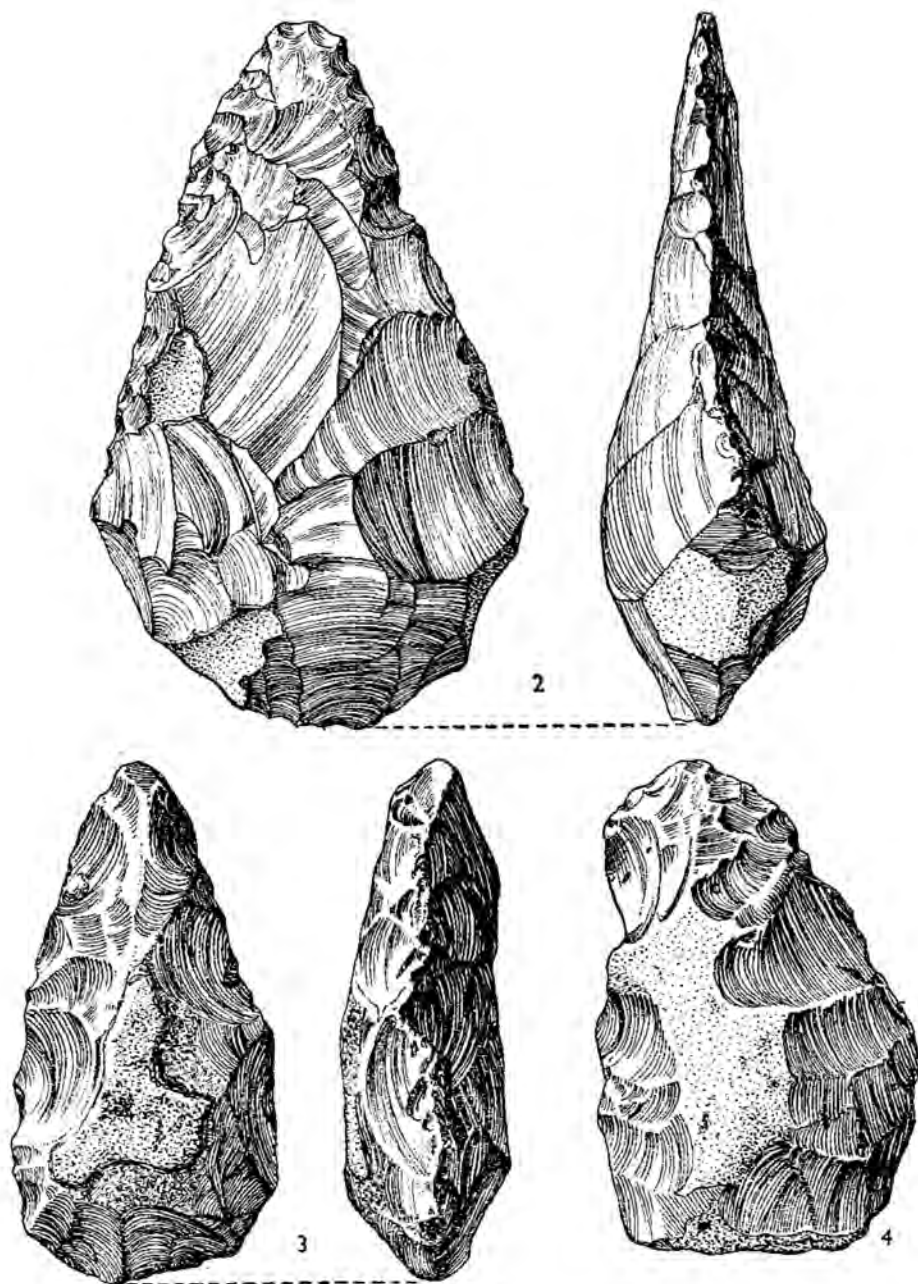


FIG. 3  
PALAEOOLITHS FROM NEAR WALLINGFORD (Sc.  $\frac{2}{3}$ )



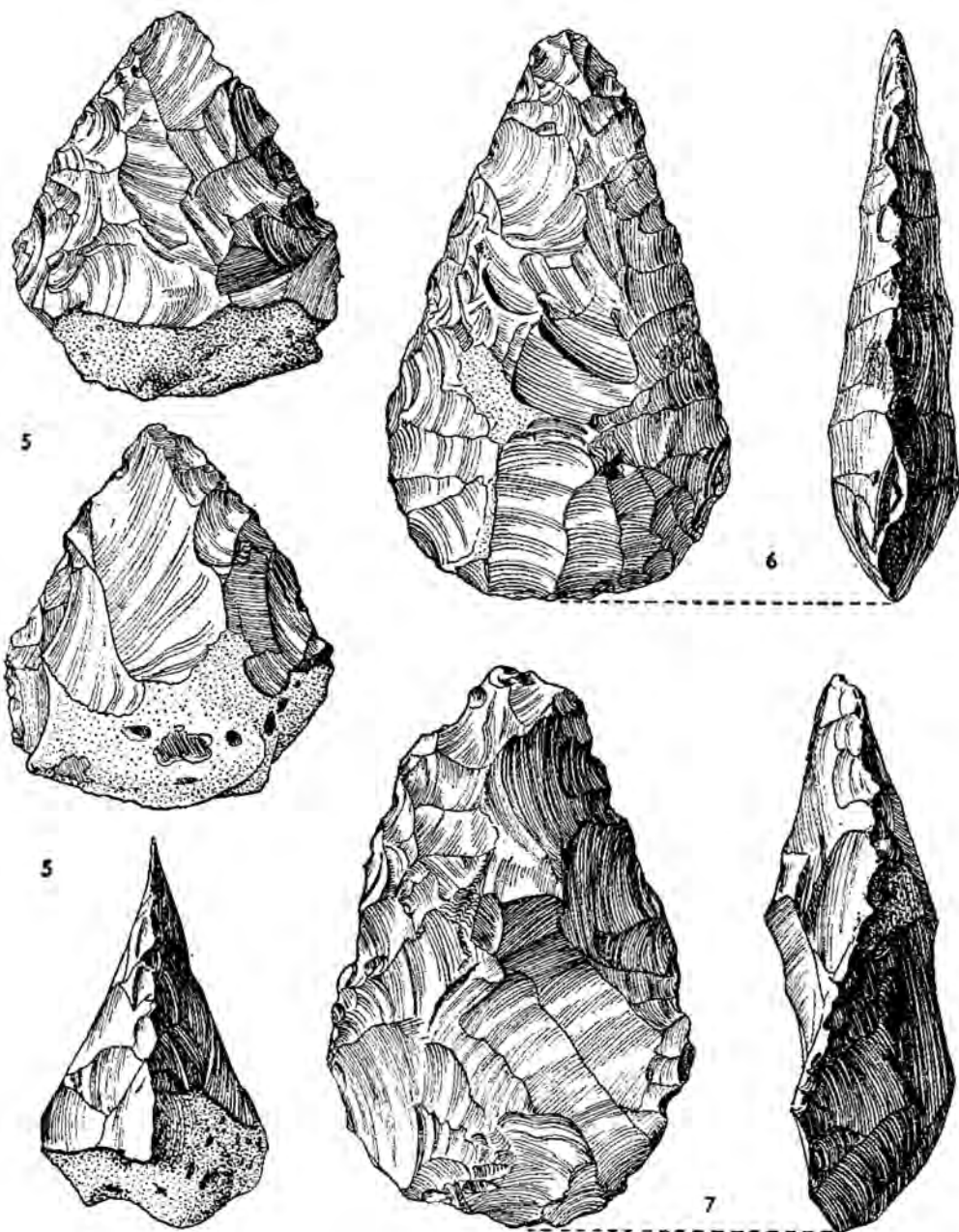


FIG. 4  
PALAEOOLITHS FROM NEAR WALLINGFORD (Sc. 7)

is from a depth of 15 ft. according to the catalogue (A.M. 1911.569). It is now inaccessible, but from the description it may be Lower or Middle Acheulian and is probably unrolled. An ovate from Blenheim Farm from the Treacher collection was found by Mr. E. Town (11 November, 1926) at a depth of 14 ft. and was said to be in the basal bedded sand or sandy gravel. It is rolled and has a brown mottled patina. It is Middle Acheulian (Acheul III). The depth of the other specimens is not recorded, but Mr. Town told me that when he worked at Blenheim Farm pit he used to find the best and biggest 'battle-axes' in and near the bottom of the gravel, which was worked to 15 ft., and that the best specimens he passed to Mr. Newton were found at low levels. The only three specimens from Blenheim Farm in Mr. Newton's collection are all very fine large 'battle-axes', and all of them are unrolled and one of them is unpatinated; one is Lower Acheulian (FIG. 2, no. 1), one Middle, and the other Upper Acheulian (FIG. 6, no. 14). For further light on depth see below, under patination.

14. *Abrasion.* All the Abbevillian artifacts are heavily rolled as if by river action. Of the Lower and Middle Acheulian industries nearly all are at least slightly abraded and a few are heavily rolled. On the other hand some Lower Acheulian and many Middle Acheulian are almost entirely unabraded. Some specimens (e.g. FIG. 4, no. 7) are badly scratched as if by solifluxion. All the Upper Acheulian are almost in mint condition.

15. *Patination.* Every shade of patination is represented, from unpatinated black flint (FIG. 6, no. 11), through grey to ivory-white (FIG. 4, nos. 5 and 6) and various browns. The whiteness is due to deep patination, i.e. removal of opaline quartz from a sufficient thickness of the surface layers to prevent the natural black flint from showing through. The intermediate stages give various blue-grey and mottled effects. Brown patinas result from the staining of the patinated or partly patinated flints by iron oxide. Unpatinated flint may also be superficially stained brown. All these effects are the result of the immediate physical and chemical environment of the implements when they lie in the gravel and consequently are not a reliable criterion of age.

All the implements from Gould's Grove and Turner's Court are white or greyish-white. Of the seven from Blenheim Farm one Lower Acheulian and one Upper Acheulian are almost completely unpatinated, one Lower Acheulian and one Middle are patinated brown, one Middle Acheulian is white (grey on the broken parts), and one Middle Acheulian is white on one face and white, stained brown, on the other, and the seventh is white, stained yellow. Of the two specimens from Painter's pit one is unpatinated but iron-stained, and the other has a buff patina. Rumbold's pit yields

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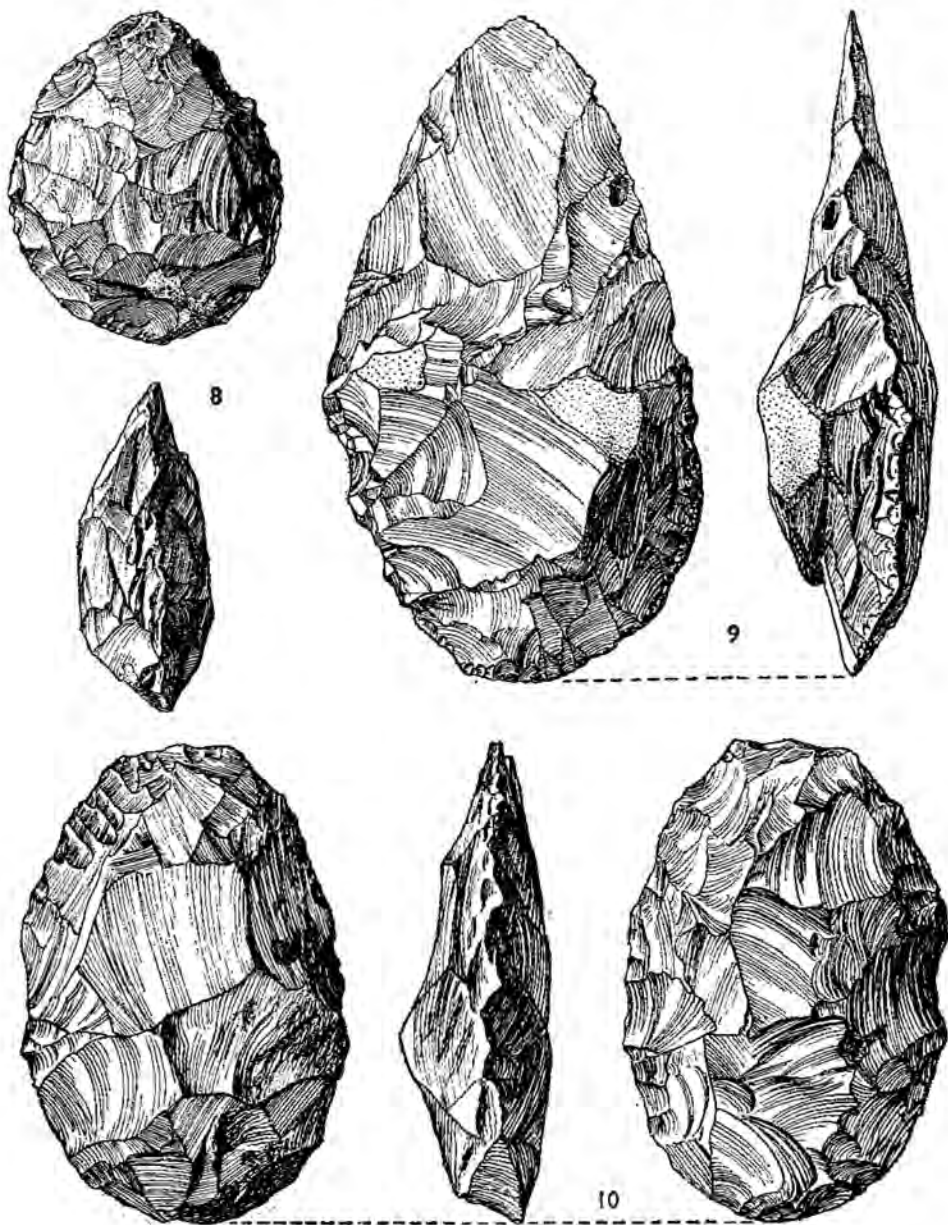


FIG. 5  
PALAEOLITHS FROM NEAR WALLINGFORD (Sc. 1111)

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every kind of patina. It is evident that the ivory-white specimens (e.g. FIG. 4, nos. 5 and 6) can only have come from the white gravel, and this confirms that they were at considerable depth. Similar inclusions and protuberances of white chalky gravel were described and figured by the Survey at Turner's Court (the pit beside the road towards Blenheim Farm), and it seems probable that they or a layer at the bottom yielded all the implements in the past.

### IV. NOTES ON THE FIGURED SPECIMENS (FIGS. 2 to 7)

The 16 specimens figured represent most of the principal types of implement from the Wallingford fan-gravels. Nos. 8 and 12 are drawn by Mr. C. O. Waterhouse, the rest by the author. In the following notes A.M.=Ashmolean Museum, P.R.=Pitt-Rivers Museum.

No. 1. Blenheim Farm, near base of pit. (A.M. 1943.35). E. Town coll., per Wm. Newton of Benson, 1943. Massive hand-axe, slightly asymmetric, with obtusely rounded tip, large deep flakes, and a little re-entrant cortex on the butt. Slight grey patina; slightly rolled. Cf. Commont, *L'Anthropologie*, XIX (1908), 548, fig. 33, and *ibid.*, XLI (1931), 467, fig. 4; also Oakley (1939), *Prehistory of Farnham*, pl. 1, fig. 2, and p. 32, fig. 6 (from terrace A). Of the same age is another coarsely-flaked hand-axe from Rumbold's pit (per Wm. Newton, 1943) of crude ficon type, with thin and tapering tip and heavy cortex butt. Lower Acheulian.

No. 2. Turner's Court. (A.M. 1928.186c). H. Trollope coll. January, 1882. One of Sir John Evans's specimens. Kite-shaped pointed hand-axe. Slightly rolled; white patina. This is the commonest type in the Wallingford gravels. In A.M. there are three each from Turner's Court, Gould's Grove, and Rumbold's pit. In P.R. there are two from Gould's Grove and four from Rumbold's pit; one of the last has a rounded obtuse but carefully made tip and is marked '12 ft., 1895' (T. H. Powell coll., per D. G. Hogarth). Another (A.M., per Wm. Newton, 1943) is patinated white on one face and brown on the other. The shapes vary from piriform to linguat. Some closely resemble examples from the skull layer at Swanscombe (Swanscombe Report, *Journ. R. Anthropol. Inst.*, LXVIII (1938), 42, figs. 2-8; and p. 51, fig. 15). Middle Acheulian (Acheul III).

No. 3. Rumbold's pit, 12 ft. deep. (P.R.). T. H. Powell coll., 1903. Small symmetrical pointed hand-axe, thick blunt tip, crudely flaked, much cortex on middle of one side. Heavily rolled; grey patina. Abbevillian or Lower Acheulian.

No. 4. Rumbold's pit. (P.R.). T. H. Powell coll., 1911. Small asymmetric hand-axe or chopper, with one cutting edge, crudely flaked, much cortex on both faces and butt. Heavily rolled; grey-brown patina. One of five heavily rolled specimens from Rumbold's pit in P.R., some of which grade into elongate side-choppers of the type of Commont's 'grand couteau' from the lower gravels of St. Acheul (*L'Anthropologie*, XIX (1908), 539, fig. 14), but all are less than half the size. Abbevillian or Lower Acheulian.

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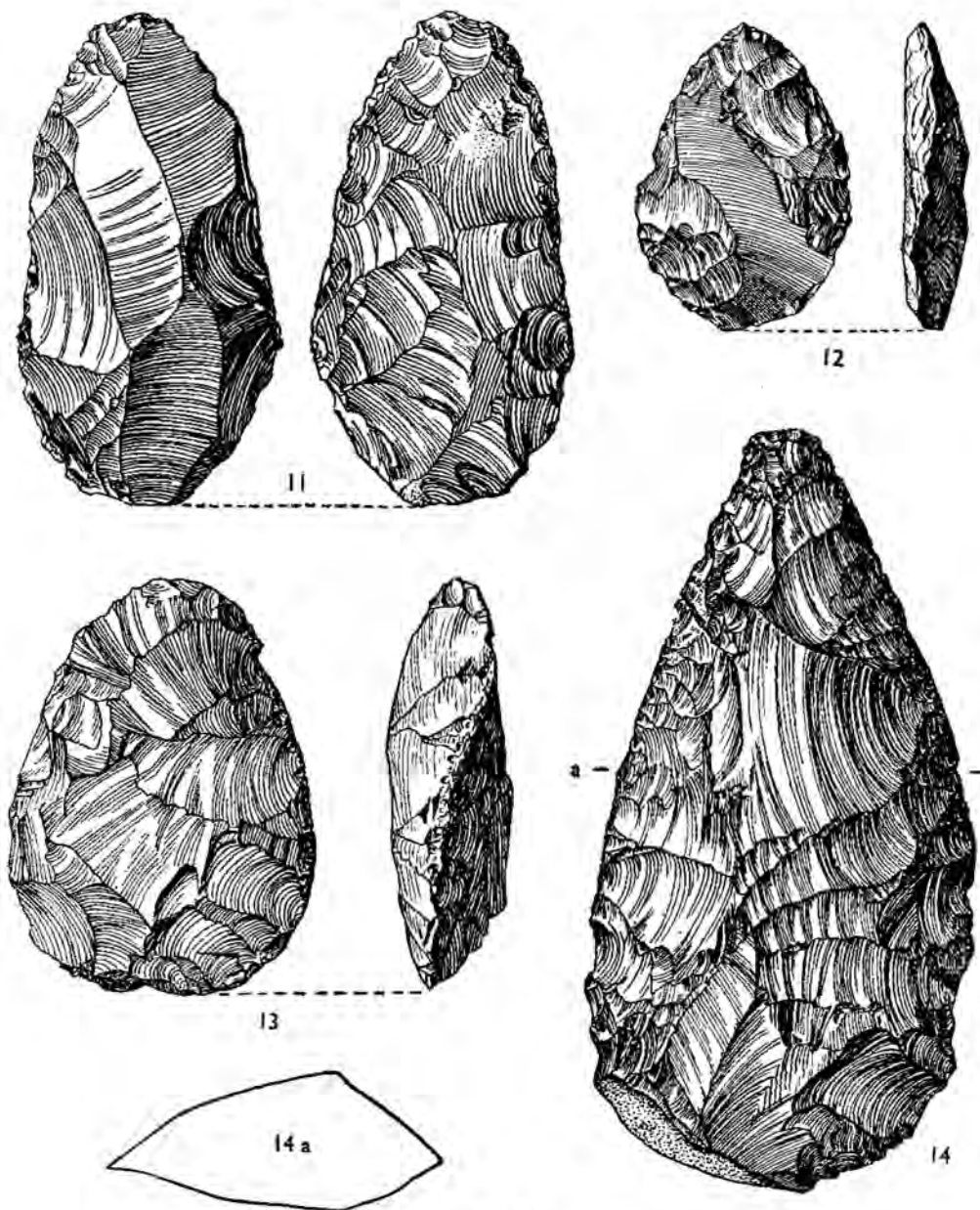


FIG. 6  
PALAEOLITHS FROM NEAR WALLINGFORD (Sc. 3)



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No. 5. Rumbold's pit (?). (A.M. 1943.33). E. Town coll., per Wm. Newton, 1943. Small sharp-edged and thin-pointed hand-axe with cortex butt. Unrolled; ivory-white patina. Notwithstanding the cortex butt, this is unlikely to be earlier than Acheul III and may be later. Cf. Oakley (1939), *Prehistory of Farnham*, p. 49, fig. 24 (from terrace D). Middle Acheulian.

No. 6. Rumbold's pit. (A.M. 1943.27). A. Selwood, junr., coll., per Wm. Newton, 1943. Highly finished, thin, symmetrical hand-axe of regular pear-shaped outline, made with many narrow, centripetal, shallow flakes, some stepped. Slightly rolled; ivory-white patina. Late Middle Acheulian.

No. 7. Rumbold's pit. (A.M. 1943.28). E. Town coll., 1934, per Wm. Newton, 1943. Large twisted ovate; rather thick, blunt-ended. Unrolled but scratched and slightly chipped; brown patina. Cf. Commont in Breuil,

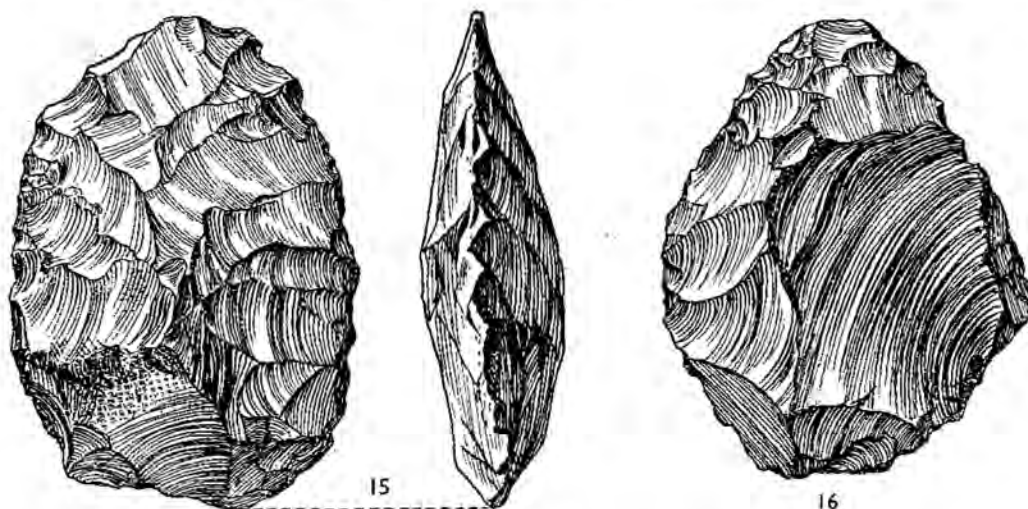


FIG. 7

PALAEOLITHS FROM NEAR WALLINGFORD (Sc. §)

*L'Anthropologie*, xli (1931), 473, fig. 11. There are two other Rumbold's pit specimens, one larger and more circular but less twisted (A.M. 1911.557), the other smaller, more globose and crudely made, but with a marked twist, heavily rolled (P.R.). There is another twisted specimen made from a big flake (Rumbold's pit in P.R.). Early Middle Acheulian (Acheul III).

No. 8. Painter's pit. (A.M. 1911.567). T. H. Powell coll. Small plano-convex, globose, sub-circular, bun-shaped implement. Unrolled; unpatinated; glossy flint stained brown. It is not possible to place this implement in its exact position in the Acheulian sequence on typological grounds, but all its unpatinated associates are or probably are early Upper Acheulian.

No. 9. Rumbold's pit. (A.M. 1943.29). E. Town coll., 1935, per Wm. Newton, 1943. Asymmetric hand-axe with very sharp and thin Gothic-arch

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tip and sharp edges, the lower part of one edge and the base retouched. Unrolled; spots of grey and brown incipient patina; almost in mint condition. Notwithstanding the protuberances bearing cortex and some coarse step-flaking, this implement compares best with specimens (some also bearing cortex) assigned by Breuil to Acheul VI (*L'Anthropologie*, xli (1931), 480, fig. 17, and p. 481, fig. 1), and with somewhat crude Upper Acheulian hand-axes from terrace B at Farnham (Oakley (1939), *Prehistory of Farnham*, pp. 39-42, figs. 15-17). Early Upper Acheulian.

No. 10. Gould's Grove, 1904. (A.M. 1911.570). Symmetrical true-edged plano-convex ovate (*sensu lato*), better described as a broad, blunt-ended foliate; the convex face shaped with relatively few bold flakes, the flat face more elaborately flaked. Slightly rolled; white patina. Space forbids the figuring of a representative series of the ovates and foliates, which vary widely in size and shape. At least four heavily rolled and badly damaged foliates from Rumbold's pit (A.M. 1919.38 and 1941.918 and two in P.R.) are probably Lower Acheulian and are so classed in the table on p. 6. There are five other foliates, smaller, all with white patina and heavily rolled, which are probably early Middle Acheulian; one, from Turner's Court, is twisted (A.M. 1917.8,12; 1921.15; 1941.917—two of these are excluded from the table because they are only labelled 'near Benson, pit unknown'). The present blunt-ended plano-convex variety (no. 10) seems to be transitional to no. 11. There are also thin blunt-ended biconvex forms (A.M. 1923.878, from Blenheim Farm pit, labelled Lonesome Farm, locality checked by E. T. Leeds from E. Town, August, 1943; yellow-stained white patina, slightly rolled); also large amygdaloid ovates (A.M. 1928.186e, from Turner's Court, a white unrolled specimen mentioned by Sir John Evans in *Ancient Stone Implements*, p. 593); and three of regular ovate form in P.R.; also a miniature series believed to be of Acheul IV, date (see under no. 12 below).

No. 11. Rumbold's pit. (A.M. 1943.30). E. Town coll., 1935, per Wm. Newton, 1943. Symmetrical, true-edged, blunt-ended, plano-convex foliate, more elongated than no. 10, and the convex face fashioned mainly by bold opposed primary flakes struck from the ends. Unrolled; unpatinated; of glossy black flint; in mint condition. Cf. an unfinished Breckland Acheulian specimen from Elvedon figured by Paterson and Fagg (*Proc. Prehist. Soc.*, n.s. vi (1940), 12, fig. 8c). Probably early Upper Acheulian.

No. 12. Rumbold's pit. (A.M. 1918.7). T. H. Powell coll. Miniature amygdaloid twisted ovate, flake scars very shallow, twist not pronounced. Slightly rolled; buff patina. Seen by Dr. K. P. Oakley and Mr. A. D. Lacaille, who consider it late Middle Acheulian, probably Acheul IV. Of the same age are four other miniature amygdaloid and sub-triangular ovates, two with twisted and two with true edge, all unrolled, with buff to pale brown patina (A.M. 1917.16; 1918.6; 1919.39, from Rumbold's pit, and A.M. 1911.566 from Painter's pit). Late Middle Acheulian (Acheul IV?).

No. 13. Rumbold's pit. (A.M. 1943.31). E. Town coll., 1934, per Wm. Newton, 1943. Labelled 'Furnis Piece pit', which Mr. Newton informs me is another name for Rumbold's pit. Delicately made, thin, notched, twisted ovate, the twisted edge retouched. Flakes very shallow. Unrolled, unpatinated; brown-stained mottled flint. Upper Acheulian.

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No. 14. Blenheim Farm pit. (A.M. 1943.48). E. Town coll., per Wm. Newton, 1943. Large, thin, unequally biconvex to almost plano-convex, straight and sharp-edged, linguat hand-axe. The upper (figured) face has shallow feather-edged ripple-flaking and both edges retouched. The flatter under face is more simply flaked and has no retouch. A dark cortex hand-grip is left on one side of the butt. The point appears to have broken during or soon after manufacture. Unrolled, unpatinated. FIG. 6, no. 14a shows the upper (figured) face at top, viewed from the tip. Upper Acheulian.

No. 15. Blenheim Farm pit, 14 ft. deep, from bedded sandy gravel. (A.M. 1943.55). E. Town coll., 11.11.1926, per Mrs. L. Treacher, 1943. Symmetrical, bi-convex, true-edged ovate, made with fine shallow secondary flaking. Rolled; mottled brown and yellow patina. Middle Acheulian. Examined by Dr. K. P. Oakley and Mr. A. D. Lacaille, who confirm that the industry is Acheul III at earliest.

No. 16. Gould's Grove, said to be from bedded sandy gravel near base. Depth not recorded. (A.M. 1943.56). E. Town coll., 1.12.1926, per Mrs. L. Treacher, 1943. Side-scraper or rough ovate. Rolled; mottled blue and white patina, some of the white stained yellow. Mr. A. D. Lacaille suggests that this atypical implement may be an early Acheulian core which, after removal of a large flake, has been retouched along one edge and used as a side-scraper; or alternatively, that it is a "spoiled" (unsuccessful) ovate. Since space permits only one face to be figured, I have chosen the flatter face, which illustrates the former suggestion. The other face looks like a rather crude asymmetrical ovate.

## V. CHRONOLOGY

According to the Abbé Breuil's classification, the industries discussed above fit into the European glacial sequence as follows:<sup>1</sup>

	Abbevillian	
Lower	{Acheul I}	Günz-Mindel Interglacial.
Acheulian	{Acheul II}	Interstadial in Mindel Glaciation.
Middle	{Acheul III}	Mindel-Riss Interglacial.
Acheulian	{Acheul IV}	Interstadial in Riss Glaciation.
Upper	{Acheul V}	Riss II or post-Riss.
Acheulian	{Acheul VI-VII}	Riss-Würm Interglacial.

In the Ewelme fan-gravels Acheul III is recorded from depths of 12 and 14 ft., and since many more of the Acheul III specimens have an unstained ivory-white patina they can only have come from the white part of the gravel, which is near the base. The earliest solifluxion in which the gravels can have been constructed in their present form, according to Breuil's classification, is therefore that of the Riss glaciation.

<sup>1</sup> (1931-2), *op. cit.*, *L'Anthropologie*, xli, xlii; and Breuil (1939), 'The Pleistocene succession in the Somme valley', *Proc. Prehist. Soc.*, n.s., v, 33.

## PALAEOLITHS FROM THE WALLINGFORD FAN-GRAVELS

Some of the white Acheul III artifacts are so delicate (e.g. FIG. 4, nos. 5 and 6) and yet so perfectly preserved that it seems they must have been incorporated soon after manufacture and ever since protected from abrasion or damage. It is therefore to be inferred that an important formative solifluxion, again according to this classification, probably took place during the Riss glaciation.

The presence of Acheul VI or VII at both Blenheim Farm and Rumbold's pits, though at unrecorded depths, indicates that the gravels were at least in part reconstructed in the Würm glaciation. The most important fact to be established in the future is the depth at which the rare Upper Acheulian artifacts occur in these gravels. Such evidence as there is suggests that the Upper Acheulian hand-axe illustrated in FIG. 6, no. 14, lay near the bottom of the gravel (see p. 10), in which case the principal solifluxion was Würm. The fact that the Upper Acheulian implements are not patinated suggests that the patination of the others here took place before the Riss-Würm interglacial.

The lithology of the gravels indicates that the materials were largely derived from the Clay-with-Flints, which is a solifluxion product of the earlier glaciations.

The rolling of many of the Middle Acheulian implements can be attributed to transport down the coombes from higher up the Chalk escarpment by streams during an interglacial period. The Abbevillian and Lower Acheulian implements may have suffered rolling during two interglacials and solifluxion during two glaciations, and their condition is consistent with this.

The correlation with Alpine glaciations by typology which Breuil's work seems to establish so satisfactorily, however, has yet to be reconciled with the geological evidence in England. In the Midlands and Thames valley there is evidence of at least four cold periods, into which the Palaeolithic industries appear to dovetail as follows:<sup>1</sup>

?	Berrocian Glaciation (Be).
	Ambersham Interglacial.
Rolled Abbevillian }	
Rolled Acheul I }	Catuvellaunian Glaciation (Ca).
Acheul II-IV	
? Acheul V	Boyn Hill Interglacial (Ca-Do).
Acheul VI-VII	Oxford mammoth bed.
Mousterian-Creswellian	Wolvercote Interglacial (Do-Co).
	Cornovian and Cymrian Glaciations
	(Co, Cy).

<sup>1</sup> W. J. Arkell (1943), 'The Pleistocene rocks at Trebetherick Point', *Proc. Geol. Assoc.*, LIV, 150 (here amended).

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If Breuil's Continental chronology is correct, and if typology can be relied upon for correlation on the two sides of the English Channel, the glaciations correspond as follows :

- ? Be = Günz.
- Ca (also Be ?) = Mindel.
- Acheul V = Riss.
- Co, Cy = Würm.

On the Continent, by far the greatest glaciation was the Riss, as is shown by the southward extension of its boulder clays, and as is deduced from the solar radiation curve calculated from fluctuations in the inequalities of the earth's orbit.<sup>1</sup> In the London basin, however, the greatest glaciation was the Ca, of which alone the boulder clays extend to the lower Thames valley ; and the gravel terraces of the Boyn Hill group, full of fresh Middle Acheul tools (Acheul III especially), appear to be younger than this glaciation, in the valleys of both the Thames and the Ouse.

It is hoped that as many local assemblages of palaeoliths as possible will be figured in the coming years, as territorial groups, with all available geological data ; for it is by this means that the outstanding problems are most likely to be solved.

<sup>1</sup> F. E. Zeuner (1938), 'The Chronology of the Pleistocene sea-levels', *Annals and Mag. Nat. Hist.*, Ser. 2, vol. 1, 404.