On a Bone Implement from Piltdown (Sussex)

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During the past season we have spent much time in examining the Piltdown gravel, working round the margin of the area previously explored in detail. 1 In proportion to the amount of material removed, however, discoveries were few. Rolled fragments of teeth of Rhinoceros 2 and Mastodon, as highly mineralized as before, were again found in place in the dark gravel 3; and they seem to belong to the Pliocene species Rh. etruscus and M. arrernensis, already provisionally recorded. No human remains were met with; but a large piece of bone evidently worked by man compensates for much disappointment, and proves to be so singular that it is worthy of special description.

This bone implement was found about a foot below the surface, in dark vegetable soil, beneath the hedge which bounds the gravel-pit, and within 3 or 4 feet of the spoil-heap whence we obtained the right parietal bone of the human skull. On being washed away, the soil left not the slightest stain on the specimen, which was covered with firmly-adherent pale-yellow sandy clay, closely similar to that of the flint-bearing layer at the bottom of the gravel. 4 The bone, therefore, cannot have lain buried in the soil for any long period, and was almost certainly thrown there by the workmen with the other useless débris when they were digging gravel from the adjacent hole. It is much mineralized with oxide or iron, at least on the surface, and it agrees in appearance with some small fragments of bone which we found actually in place in the clay below the gravel. Its surface is yellowish brown, the cut facets being slightly darker than the rest; but the boney tissue within is yellowish or creamy white, and the whole is much less darkly stained than the bones from the gravel immediately above. As it lay in the rock it was broken across at its middle, and the two broken faces are stained like the rest of the bone: at its thinner end it was accidentally shattered by our workman's pick.

The implement is a stout and nearly straight narrow plate of bone, 41 cm. long and varying from 9 cm. to 10 cm. in width, with the thicker end artificially pointed or keeled, the thinner end artificially rounded. One face is slightly convex from side to side, with a dense longitudinally-fibrous texture which shows that it is the unwrought original outer surface of the bone. The other face, which is more irregular and slightly concave in its middle portion, has a coarser and less firm texture, indicating the wall of a marrow-cavity which is more or less damaged by fracture, attrition, and decay. The bone at the pointed end measures 5 cm. in maximum thickness, while the thickness at the rounded end scarcely exceeds 3 cm. Its nearly parallel lateral edges show no signs of cutting or polishing, and in the half with the rounded end one edge is much thicker than the other. The thicker edge here forms a flattened wall nearly at right angles to the convex face, with the same dense fibrous texture indicating that it represents the original outer surface of the bone. The thinner edge is irregularly broken, exposing bone of a coarser and less firm texture. The specimen, therefore, appears to be a longitudinal strip flaked from a limb-bone by a blow at the thicker end, in the same way as flint-implements were flaked from their original cores.

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The only known Pliocene or Pleistocene limb-bone big enough to have produced the flake is that of a Proboscidean; and the direct comparison shows that the specimen was probably taken from the postero-external part of a left femur, in the region of the third trochanter and immediately above it. In fact, the thick flattened lateral edge passes, just beyond the transverse fracture, into a sharply-rounded edge, between which and the broken margin of the marrow-cavity there is a distinct hollowing of the surface, as it appears to do, this must represent part of the third trochanter itself. In support of this interpretation, it may be noted that the structural fibres of the Piltdown specimen are not directly longitudinal, but make a very acute angle with the flattened lateral edge, exactly as in the part of the Proboscidean femur with which the fossil has just been compared. Some contraction has taken place at intervals along the line of these fibres, and decay has widened the cracks into small superficial grooves, resembling those in a subfossil femur of Elephas from a lake-deposit in Egypt, now in the British Museum (No. M 8526). Microscope-sections of the specimen show that there is no difference between its minute structure and that of Proboscidean bone 5 – the narrow, elongated bone-cells being united by very numerous canaliculi, of which the majority are nearly straight and extend at right angles to the long axis of the cells.

While these comparisons seem to be satisfactory, however, it must be admitted that the genus and species to which the Proboscidean belonged cannot be determined. The third trochanter in the bone from which the implement was made was in line with the rest of the edge, and not projecting; but the prominence of this feature varies considerably in one and the same species, as shown by the series of femora of Elephas primigenius in the British Museum. The microscopical structure is also not distinctive. It can only be stated that the original femur must have been as large as that of E. meridionalis from the Forest Bed in the British Museum (No. M 6928), which measures 1:25 metre in length.

Outline of a left femur of Elephas meridionalis Nesti: hinder view, showing the part of the bone represented by the Piltdown implement ...

The two ends of the implement are shaped entirely by cutting, and bear no marks of grinding or rubbing, except perhaps a slight battering at the point. Most of the cut facets are small, and many of them suggest that they were made by some primitive tool, presumably a flint. The gently rounded end, which seems to have been a ragged flake trimmed for comfortable handling, exhibits three rows of facets, one bevelling the edge of the outer face, another that of the inner face, and a third row being directly terminal. The facets of the outer and terminal rows have especially sharp margins; but those of the inner row are less well defined, owing to the coarser and more fragile nature of the boney tissue at this edge. The thicker end of the implement is trimmed to a sharp vertical keel by the cutting of the lateral edges, and this keel is slightly reduced in depth by a little similar cutting of the outer and inner surfaces of the bone. The trimming extends farthest along the inner lateral edge, where the bone has been most easily worked almost in the direction of its structural fibres. The cut facets here are larger than elsewhere, and notably long and narrow. The shorter trimmed outer edge has been worked with much labour

across the direction of the structural fibres, and is irregularly hollowed with numerous small cross-cuts. Similar cuts pass over the inner or medullary surface of the bone, which is only worked slightly. The trimming of the outer surface extends as far from the sharp terminal keel as that of the outer lateral edge, and the facets here are narrow and smooth like those of the inner edge.

The thicker or outer lateral edge of the implement, just beyond its worked portion and directly opposite the beginning of the worked portion of the thinner lateral edge, is marked by a smooth and rounded groove, which passes from the inner to the outer surface of the bone with a slight inclination outwards in the direction of the keeled end. This groove is cylindrical, not hourglass-shaped, and presents the appearance of having been worn smooth by friction; while on each side of it both the colour and the texture of the bone suggest that is represents a perforation, from which the outer wall has been accidentally broken away. On the inner surface of the bone, just within this groove, the beginning of another perforation is clearly seen, as if an attempt had been made to remedy the defect.

A close examination of the implement leaves no doubt that the working and cutting of the bone were done when it was in a comparatively fresh state. As the longitudinal grooves of decay on the outer surface pass over the cut facets, they are presumably later than the working. It is, therefore, evident that the individual who made the implement was contemporary with an elephant bigger than the Mammoth (Elephas primigenius). Such gigantic elephants are only known to have lived in Western Europe at the end of the Pliocene and the beginning of the Pleistocene Period. The nature of the implement itself thus confirms our conclusion based on its mineral condition, that it originally occurred in the lowest layer of the Piltdown section. This layer sometimes passes imperceptibly into the overlying gravel in which the skull of Eoanthropus was found, and there is no reason to suppose that it is substantially older than the latter. Like the evidence previously described, the discovery therefore seems to suggest that the deposits date back at least to the beginning of the Pleistocene Period.

As to the probable use of the implement, it can only be remarked that we have no evidence to guide us. Its shape is unique, and an instrument with a point would be serviceable for many purposes.

In conclusion, we must again express our thanks to Mr. George M. Maryon-Wilson, the Lord of the Manor of Barkham, and his tenant, Mr. Robert Kenward, for allowing us to continue excavations in the Piltdown gravel-pit.

DISCUSSION.

Mr. G. F. Lawrence said that the form of the implement suggest a club. Its general surface was older than the cutting, being different in colour and more abraded.

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Mr. W. Dale said that the tool-marks on the bone were of a character similar to those on an artificially-cut bone in his possession, which was found in the peat, during the dock-excavation at Southampton, in association with a hammer-stone of Neolithic age. The tool-marks appeared to have been made, not with a flint flake, but with some stronger cutting or chopping implement.

Mr. Reginald Smith said that there was one point on which all were agreed–that there was human work on the bone exhibited. If it came in that condition from the clay below the gravel (as the incrustation suggested), then it would rank as by far the oldest undoubted work of man in bone, nothing universally accepted as such occurring elsewhere before the period of Le Moustier. The possibility of the bone having been found and whittled in recent times must be considered; and, if it were not shaped in its fossil state, it had evidently never been used for any purpose such as grubbing for roots, as the cuts were unscratched, and must have been made with an even-edged chopper. Experiment might prove whether a similar surface could not be produced by cutting, as opposed to fracture. The perforation was not in the centre of the edge, and some theory might be based on the direction in which the hole was worn, as if by the friction of a thong; but he could not imagine any use for an implement that looked like part of a cricket-bat. The discoverers were to be congratulated on providing a new and interesting problem, such as would eventually provoke an ingenious solution.

Mr. E. A. Martin wished to call attention to certain marks leading from the perforation, which seemed to show that a thong had passed through the hole, and had been bound tightly around the bone. The thong-marks suggested that the pointed end of the bone was that by which it was held, and that its purpose was that of a club.

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Mr. A. S. Kennard wished to congratulate the Authors on the discovery of a new problem from Piltdown. From the differences between the cut portion of the bone and the natural surface, he considered it possible that the bone was not in a fresh state when cut. He suggested that possibly experiments made on a fresh bone might throw light on the question as to how the cuts were made.

Mr. F. P. Mennell said that experience in countries where elephants were still plentiful showed that the bones began to weather rapidly as soon as the flesh had decayed away. There was consequently no difficulty in detaching pieces from such bones, but they were usually so splintery and even friable, that they were unsuitable for any kind of serviceable implement. It seemed to him very remarkable that so primitive a being as Eoanthropus should be capable of making and using any implements at all.

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Mr. S. H. Warren congratulated the Authors upon the interest and importance of the discovery. The implement seemed to him to be a hacking-tool rather than a club; but he thought it a mistake to imagine too much specialization of use in such primitive implements. It had always appeared to the speaker that wood and bone must have been used before flint, and the evidence from Piltdown seemed to confirm this opinion.

The President (Dr. A. Smith Woodward), replying on behalf of the Authors, thought that every circumstance of the discovery pointed to the contemporaneity of the implement with Eoanthropus. Mr. Dawson and he were of opinion that the bone was fresh when it was cut. They had not made any experiments in cutting bone with flints. He regretted that the use of the implement still remained a problem. The most plausible suggestion that he had received was, that it might have been a digging stick; but it bore no marks of battering and scratching.

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1 See pages in Q. J. G. S. vol. lxix (1913) pp. 117-51, and vol. lxx (1914) pp. 82-89.
2 Found by Dr. A. Davidson Black, of Western Reserve University, Cleveland (Ohio) U.S.A.
3 No. 3 of section, Q. J. G. S. vol. lxx (1911) fig. 1, p. 83.
4 No. 4 of section, ibid.
5 See 'Catalogue of the Histological Series contained in the Museum of the Royal College of Surgeons' vol. ii (1855) pl. xii, figs. 17-20.