STUDIA PRAEHISTORICA BELGICA 3 - 1983 : 29-41

PONTNEWYDD CAVE AND THE EARLIER PALAEOLITHIC IN WALES

H.S. GREEN

Wales is a region of the highland zone of Britain bounded on three sides by sea, which would have become low-lying plains and river valleys during the cold phases of the Pleistocene, and on the eastern side, by the central English plain (Fig. 1). Wales was totally covered by ice on at least one occasion during the glacial Pleistocene and most of its area was again covered during the last glaciation (1), known in Britain as the Devensian and dated (2) either to Oxygen Isotope Stages 5d-2 or to Stages 4-2. The processes of glacial erosion have destroyed any serious possibility, in most of Wales, of the discovery of open sites which pre-date the Devensian glacial maximum, at its height about 18,000 years ago. In fact, both the Lower and the Middle Palaeolithic are certainly represented by only one cave-site each, Pontnewydd and Coygan caves respectively. Coygan Cave (3-4) is a Mousterian of Acheulian Tradition site of Devensian age which I am now preparing for publication (5). Stray finds of Earlier Palaeolithic age comprise only two handaxes, one of quartzite from Penylan (6) in Cardiff and the second of flint from Rhossili (7) in Gower. That from Penylan is an Acheulian type but is not otherwise closely dateable. The Rhossili handaxe, however, is of a form with plano-convex section comparable with Roe's Wolvercote type and considered by him to belong to a Final Acheulian phase of last interglacial age (8).

The reasons for the sparse evidence for pre-Upper Palaeolithic settlement in Wales must now be considered. The distribution of Acheulian settlement within the context of north-western Europe shows a heavy concentration within the major river

---

1. BOWEN D.Q. *Geol. J.* 8, part 2, 1973, pp. 207-224.
2. BOWEN D.Q. *Quaternary Geology* 1978, p. 107.
3. GRIMES W.F. *Archaeologia Cambrensis* 90, 1935, pp. 95-111.
4. CLEGG J. *Carmarthenshire Antiquary* 5-6, 1964-70, pp. 13-20.
5. As a National Museum of Wales Monograph.
6. LACAILLE A.D. *Antiquaries Journal* 34, 1954, pp. 64-67.
7. GREEN H.S. *Bulletin of the Board of Celtic Studies* 29, part 1, pp. 337-339.
8. ROE D.A. *The Lower and Middle Palaeolithic Periods in Britain*, 1981, pp. 117-128.

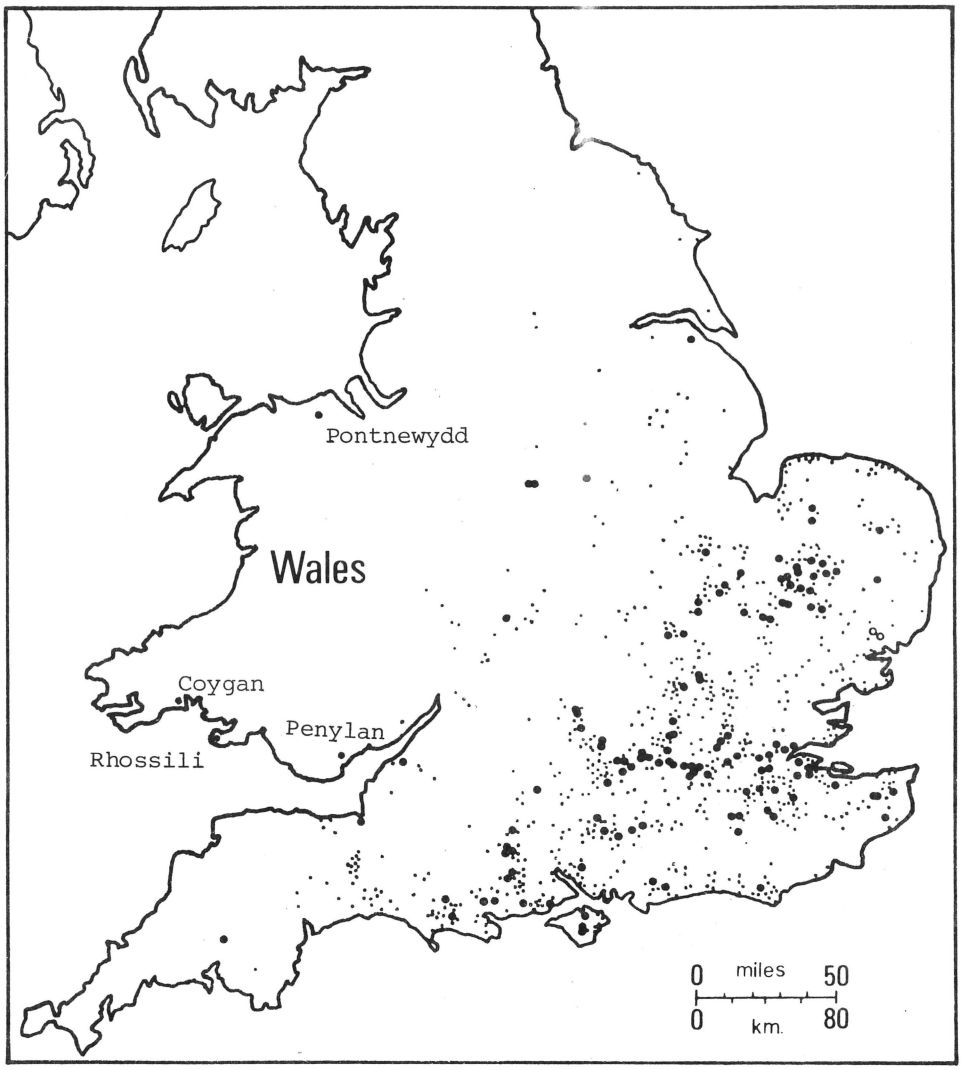


Fig. 1. Earlier Palaeolithic sites in Wales in relation to the distribution of finds in England (after Roe)

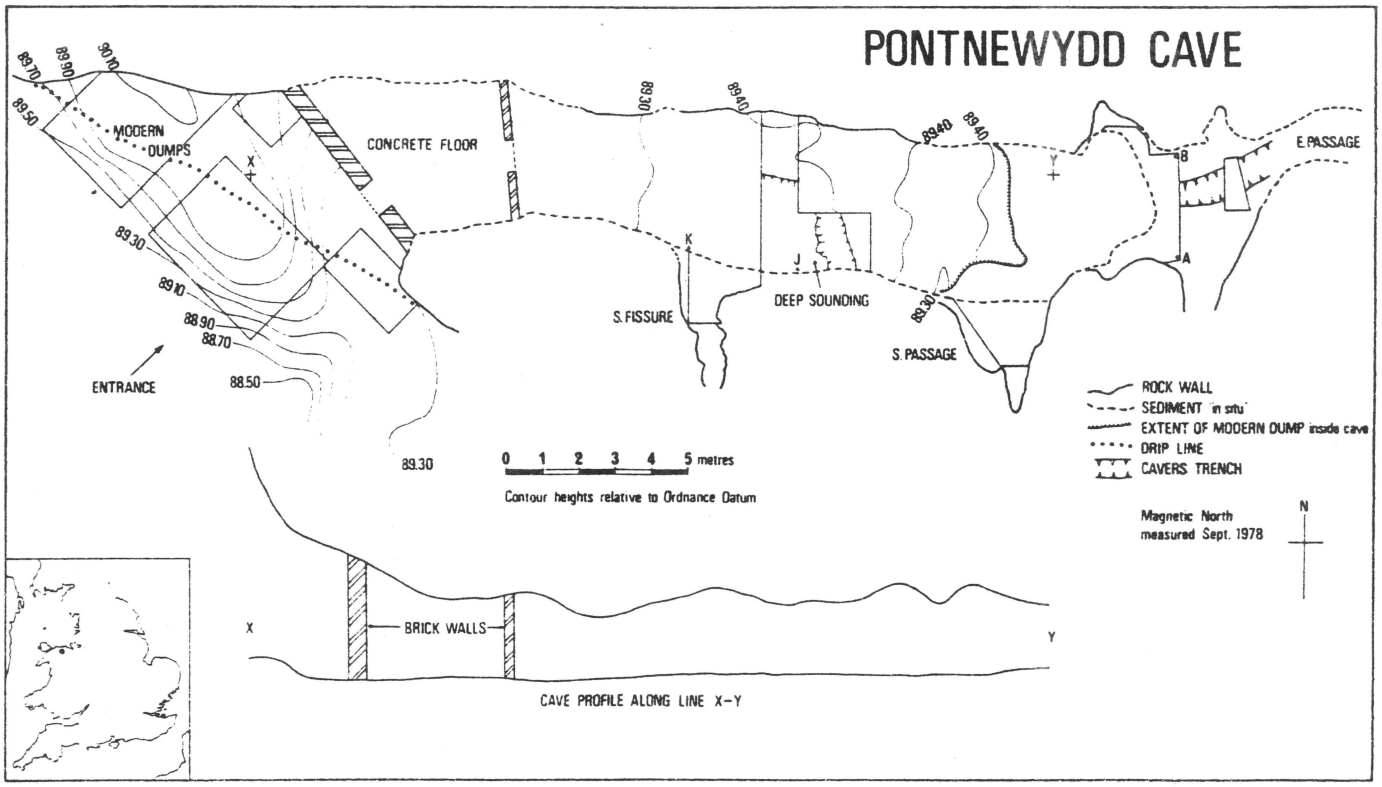


Fig. 2. Pontnewydd Cave. Plan.

valleys of North-Western France and South-Eastern England. Settlement in lowland river valleys is believed by Collins (9) to reflect a genuine preference on the part of the Acheulian hunters of this time and region, and it would indeed be surprising if settlement of the contiguous upland areas was other than distinctly marginal. The glacial ice then has probably destroyed only a small number of transient settlements, representing no more than intermittent occupation of Wales. We must not necessarily believe, however, that such settlement would have been seasonal. Campbell's data (10) suggests an annual range of only some 50 kilometres for many hunter-gatherer sub-groups and there may have been continuous settlement within areas of Wales for many years. We need not think of Pontnewydd as the first English holiday-home in Wales!

PONTNEWYDD CAVE

The present account of work at Pontnewydd covers four seasons of excavation directed by the writer for the National Museum of Wales. Two papers on the site are expected to appear later in 1981 (11-12) to be followed by a monograph (13).

The cave (Fig. 2) opens from a limestone cliff overlooking the Elwy Valley, a tributory of the River Clwyd. The size of the cave is of some importance for the interpretation of the nature of the habitation. Its present entrance area covers no more than 30 to 40 square metres, scarcely room to accommodate more than half a dozen people. We know, furthermore, from the sediments still *in situ* in the entrance area that the floor level, when the cave was occupied, would have been around a metre higher than obtains at the present day - thereby reducing the cubic volume of living-space.

STRATIGRAPHY

The sequence of layers in the cave (Fig. 3) is of the greatest interest for almost the whole of the sequence has been introduced into the cave by the various agencies of fluvial deposition or mudflow. All of the archaeological and faunal remains discovered have been emplaced by solifluction. Whilst this process has totally destroyed any living-floors, it has nonetheless been the agency which has preserved the evidence of human habitation in an area which has suffered, in all probability, several subsequent episodes of glaciation. This unusual circumstance of cave-infill holds out the distinct possibility of the discovery of cave-habitation sites in areas similarly glaciated and far beyond the know distribution of settlement.

---

9. COLLINS D. *Colloque X : l'Evolution de l'Acheuléen en Europe. U.I.S.P.P. IX^{e} Congrès* 1976, pp. 156-165.
10. CAMPBELL J.B. *The Upper Palaeolithic of Britain* 1977, p. 32.
11. GREEN H.S. 'The First Welshman', *Antiquity* 55, 1981, pp. 184-195.
12. GREEN H.S., STRINGER C.B., COLLCUTT S.N., CURRANT A.P., HUXTABLE J., SCHWARCZ H.P., DEBENHAM N., BULL P., MOLLESON T.I., EMBLETON C., BEVINS R.E. 'Pontnewydd Cave, Wales, U.K. A New Middle Pleistocene Hominid Site', *Nature* 294, 1981, pp. 707-713.
13. GREEN H.S. *et al.*, *Pontnewydd Cave : the First Report* (National Museum of Wales, 1982).

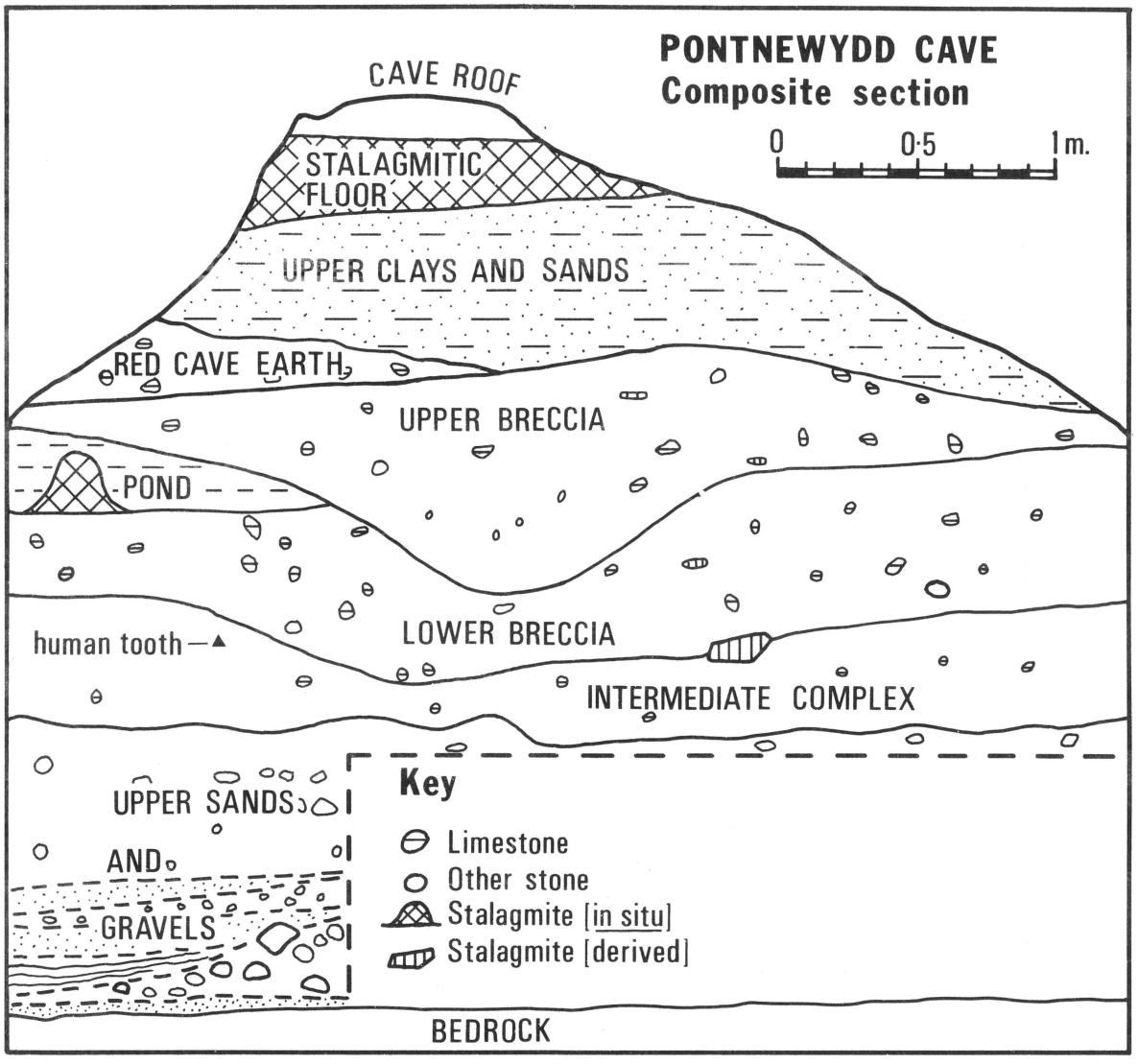


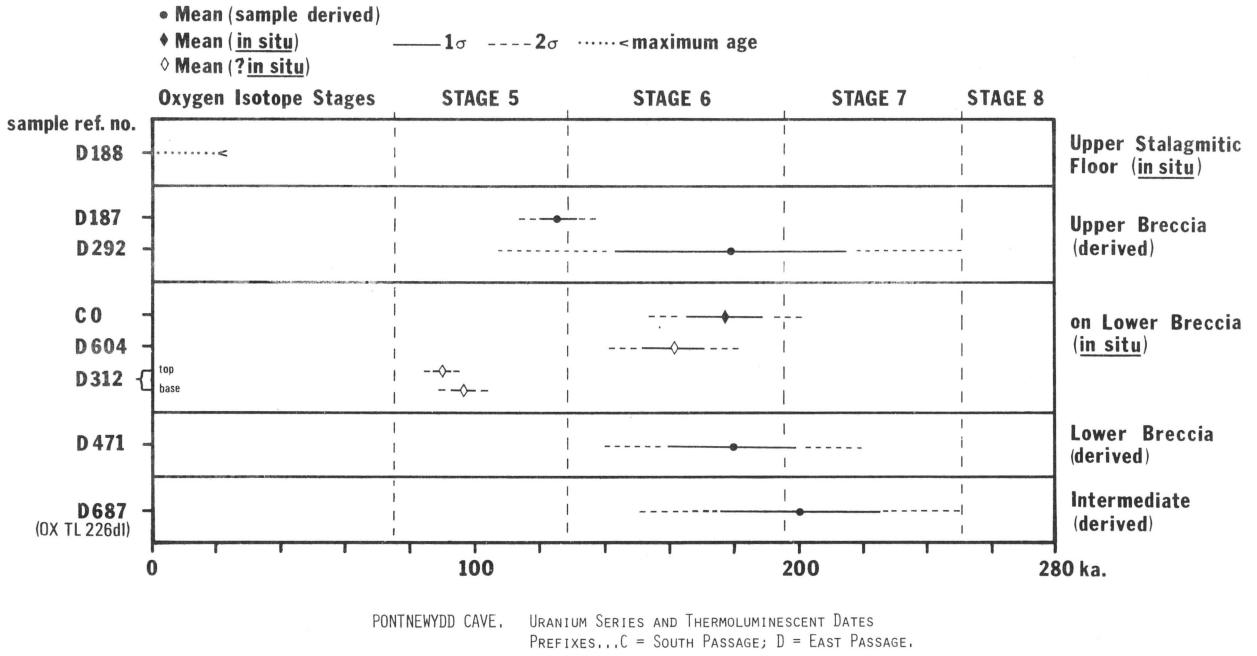
Fig. 3. Pontnewydd Cave. Stratigraphy : composite section. (NB The units below the Upper Sands and Gravels are not shown on this diagram).

The earliest part of the Pontnewydd sequence comprises a deep fissure with a fluvial infill of which only limited examination has, as yet, taken place. It holds tremendous promise for extending the documentation of Quaternary events further back into the Middle Pleistocene.

Overlying the fissure is a deposit strongly cemented by calcite. This cementation must pre-date the introduction of the overlying Upper Sands and Gravels since it would not otherwise have survived the introduction of this unit. It is hoped that Uranium-Thorium dates on calcite crystals may be obtained from this cemented deposit. This layer and the succeeding layer, the Upper Sands and Gravels (formerly designated 'Basal Sands and Gravels' 11-12), were both deposited by a variety of processes including mudflow, deposition in running water and decantation in still water. None of the basal units contains artefacts, fauna or organic matter and must have been laid down when surface vegetation was absent locally. Detailed study of the sedimentology by Simon Collcutt; Electron Scanning Microscope study of the quartz grains by Peter Bull; and study of the petrology by Richard Bevins has shown that these basal layers contain, in all probability, elements of redeposited glacial till including erratic pebbles of igneous, pyroclastic and volcaniclastic rocks derived either from North-West Wales or from the English Lake District. Interim study would favour a Welsh source. It was pebbles of such rocks which were later made into tools by the Acheulian hunters. Flint, likewise transported by glacial action, is present as very small pebbles and forms little more than 10 % of the raw material used by Palaeolithic man.

Two breccias, termed Lower and Upper Breccia, overly the basal sands and gravels and contain virtually all of the artefacts and fauna. The first event to take place was the emplacement of a deposit termed "Intermediate" because it is lithologically intermediate between the underlying and overlying layers. The main characteristic of the Intermediate is the presence of siliceous pebbles, quartz sand and highly altered limestone. The Intermediate Deposit in the East Passage is the richest of all the layers and contains not only artefacts and fauna but also a human molar tooth. Like the overlying Breccias, it was introduced into the cave from the direction of the entrance by the mudflow and we believe its deposition to have been the start of the same process with led to the emplacement of the Lower Breccia. The Lower Breccia, like the Upper Breccia, is composed of cemented angular coarse particles, chiefly of limestone. In other ways, however, the composition of the two layers is quite different : the Lower Breccia contains many non-limestone pebbles of sedimentary rocks, more siliceous pebbles and fewer (and more severely altered) limestone clasts. The lower and Upper Breccias are stratigraphically separated, in parts of the cave, by pond formation and local stalagmite growth. Both Breccias also contain derived stalagmite and stalactite reflecting earlier phases of flowstone formation.

Overlying the Upper Breccia, locally in the South Fissure, is a pocket of deposit termed the Red Cave Earth. On top of this, throughout the cave, is a continuous water-laid deposit - the Upper Clays and Sands - introduced from higher up within the



PONTNEWYDD CAVE. URANIUM SERIES AND THERMOLUMINESCENT DATES
PREFIXES...C = SOUTH PASSAGE; D = EAST PASSAGE.

Fig. 4. Pontnewydd Cave. Uranium series and Thermoluminescent dates from the South and East Passages.

cave-system and representing clearance of that system, probably by water liberated by the thawing of permafrost after the Devensian glacial maximum. The Upper Clays and Sands are overlain by a later Devensian or Holocene stalagmitic floor.

STABLE ISOTOPE ANALYSIS OF SPELEOTHEMS AND CHRONOLOGY (Fig. 4)

The chronology of the cave-deposits is based on determinations on stalagmite made by the Uranium-Thorium (hereafter U-Th) and thermoluminescent (TL) methods of dating. In addition, Joan Huxtable has made a single TL determination of 200 ± 25 ka. on a burnt flint core found in close proximity to the human molar in the Intermediate layer in the East Passage. It is reasonable to suppose that the core was burnt in a domestic fire and is thus our best estimate for human habitation at the cave. The U-Th and TL dates on stalagmite are in close agreement with this estimate of age. The series of U-Th dates, determined by Henry Schwarcz and Nicholas Debenham, include one derived sample from the lower Breccia yielding an age of 180 ± 20 ka. (D471). A series of dates has now been obtained for certainly or probably *in situ* stalagmite from both the East and the South Passages. These dates are 177 ± 12 ka. (CO); 161 ± 11 ka. (D604); and there are also two determinations from a single stalagmitic boss (D312) of 89.3 ± 2.8 ka. (top) & 95.7 ± 4.3 ka. (base). It seems clear, therefore, that an interval of at least 80,000 years (from 177 to 90 ka.) separated the emplacement of the Lower and Upper Breccias. Furthermore, oxygen isotope analysis of single growth layers of sample D312 indicates that the sample grew when the cave was sealed. U-Th analysis of the upper stalagmitic floor suggests a maximum age of 20 ka.

THE SEDIMENTOLOGICAL HISTORY OF THE CAVE IN THE CONTEXT OF THE GEOMORPHOLOGY OF THE ELWY VALLEY

The glacial landforms of the Elwy valley were examined some years ago by Clifford Embleton (14). A new study, prompted by the discoveries in Pontnewydd Cave, is now to be conducted by Helen Livingston - a research student of Clifford Embleton's - as an NERC-funded Ph.D. research project.

The course which the River Elwy follows past Pontnewydd Cave is believed to result from diversion by Irish Sea ice at some stage of the glacial Pleistocene. A length of 3.5 kilometres of the Elwy was involved in this diversion and is likely to be younger than 700 ka. since glacial activity is not certainly attested before the Middle Pleistocene in Britain.

Our model for the emplacement of the successive deposits of the cave relates to the alternate effects of infilling of the valley with glacial drift followed by renewed downcutting by the River Elwy. The height of the cave corresponds to a terrace system along the valley and it is likely that (as stable isotope analysis actually shows) the cave was blocked with drift on more than one occasion. We believe that a plug of Lower Breccia blocked the mouth of the cave until the incoming, during the

---

14. EMBLETON C. *Geographical Journal* 126, 1960, pp. 318-334.

Devensian, of the Upper Breccia. However, the latter is clearly itself composed in part of redeposited Lower Breccia with added cave entrance facies material, particularly limestone clasts. There is no evidence for cave-occupation during the interval between emplacement of the Breccias and we believe the artefactual and megafaunal component of the Upper Breccia to be redeposited from the Lower Breccia entrance-plug.

THE FAUNA

The following species have been identified by Andrew Currant from the Lower Breccia and Intermediate deposits in the East Passage.

microfauna	
Ochotona pusilla	pika
Lepus cf *timidus*	hare
Castor fiber	beaver
Lemmus lemmus	European lemming
Arvicola terrestris	water vole
Microtus oeconomus	northern vole
Microtus gregalis	tundra vole
Apodemus sp.	mouse

megafauna	
Canis lupus	wolf
Vulpes vulpes	fox
Ursus sp.	bear
Panthera leo	lion
cf. *Panthere* sp.	a leopard-sized cat
Equus sp.	horse
Dicerorhinus kirchbergensis	a rhinoceros
Cervus elephus	red deer
Rangifer tarandus	reindeer
Bos or Bison sp.	a bovid
Ovis cf. *antiqua*	sheep

The record of *Microtus gregalis* is only the second from a pre-Devensian context in Britain and the occurrence of *Ovis* cf *antiqua* is the first British record. The fauna represents a minimum of two separate phases of occupation of the cave, involving both habitation by man and use of the cave as a bear den. Scanty remains of other carnivores present suggest possible use of the cave as a lair by other species. Much of the fauna could represent a cool-climate assemblage although many species are indeterminate. *Apodemus*, however, whilst characteristic of temperate forest, does appear in a cooler context in the Grey Clays, Silt and Sands at Bacon Hole in South Wales (15)

---

15. STRINGER C. *Gower* 28, 1977, p. 41.

but *Dicerorhinus kirchbergensis* is normally regarded as an interglacial browser (16).

The fauna, however, taken as a whole clearly indicates cool-climate occupation of the cave by both animals and man.

THE HUMAN REMAINS

Four human fragments have been found in the cave. The first find, that of a molar tooth, was made last century and is now lost. Finds from the present excavation have been studied by Christopher Stringer and include an upper molar stratified in the Intermediate deposit in the East passage in close proximity to the burnt flint core which yielded the TL date of 200 $\pm$ 25 ka. and also fragments of a child's mandible and of an adult's vertebra. These last two finds were found in unstratified contexts but uranium relative dating - by They Mollseon - has shown them to be of Pleistocene age. Samples are to be sent for ^{14}C accelerator dating at the University of Oxford. The molar tooth is of great interest since both metrically and morphologically it compares with Early Neanderthal teeth. The presence of a marked degree of taurondontism makes it particularly comparable with the series of human teeth from the last interglacial/early last glacial occupation site of Krapina in Yugoslavia (17). The occurrence of possible Early Neanderthal remains of this antiquity is not surprising given the Neanderthal features seen in the later Middle Pleistocene skull from Biache (18) in the Pas-de-Calais and also the possible Neanderthal characteristics noted on the Swanscombe skull (19).

THE CLIMATIC CONTEXT OF THE HUMAN HABITATION OF THE CAVE

The chronological and faunal evidence suggests that the human habitation of the cave took place around 100,000 years ago, roughly at the interface of the temperate Oxygen Isotope sub-stage 7; and the beginning of the cool Oxygen Isotope stage 6. This is in keeping with several forms of evidence - deep-sea core (20, stable isotope studies of speleothems in British caves (21) and dating of the interglacial Barbados coral terraces (22) which combine to show that full glacial conditions did not obtain before later in Stage 6 and certainly not before 180 ka. The context of the occupation may well have been cool, and it is hoped that future work may yield palynological data from the cave which may throw direct light on this.

---

16. LOOSE H. *Scripta geol.* 33, 1975, pp. 1-59.
17. KALLAY J. In Malez M. (ed.) *Krapina 1899-1969.* 1970, pp. 165-166.
18. VANDERMEERSCH B. *Bull. Assoc. Française par l'Etude du Quaternaire*, pp. 65-67.
19. STRINGER C.B., HOWELL F.C., MELENTIS J.K. *J. Archaeological Science* 6, 1979, p. 246.
20. NINKOVICH D., SCHAKLETON N.J. *Earth and Planetry Science Letters* 27, 1975, pp. 20-34.
21. GASCOYNE M. *Quaternary Newsletter* 34, 1981, pp. 36-37.
22. FAIRBANKS R.G., MATTHEWS R.K. *Quaternary Research* 10, 1978, pp. 181-196.

THE ARTEFACTS

Over 300 artefacts have so far come to light. The unusual (for Britain) hard-rock raw materials render direct comparison with indigenous industries difficult and the natural chipping which some tools have received during transport in the mudflow presents problems of interpretation. Certain facts, however, stand out clearly. These include the large number of handaxes present, about 40 in all, and the presence of an important Levallois component including points, flakes and blades. Both Levallois and disc cores are present. Formal artefacts are rare but include a fine Mousterian point; many unifacial - but frequently minimally trimmed - transverse and side-scrapers; a few end-scrapers; a few truncated blades; and small numbers of naturally backed knives and probable notches and denticulates. A large number of 'pseudo-tools', the typical products of solifluction, is also present. Any typology of the handaxes must be interpreted with caution, given the raw-material problems, but the commonest types appear to be the amygdaloid and sub-triangular types with other forms - cordiform, lanceolate, ovate, cleaver, pick - represented once or twice only. The so-called *bout coupé* type of handaxe is absent.

The industry finds its best general parallel within Upper Acheulian industries but no precise analogue, in Britain or in proximal areas of the Continent, is known. The occupation of the cave, as we have already suggested, is best seen as a transient affair with only a small number of people involved. The elements of the tool-kit present - handaxes and Levallois flakes for butchering, points for the tips of hunting spears and scrapers for hide-processing - suggest use of the site as part of a hunting strategy. The cave may have functioned in part as an overnight recovered from traps would be thawed out with the use of fire preparatory to skinning; in part as a vantage point for observing the movement of game along the Elwy Valley; and perhaps also as a kill site where the bodies of animals driven over the cliff above were collected.

CONCLUSION

Pontnewydd Cave is important for many reasons. The cave deposits are well dated, there being age determinations already completed on over two dozen separate samples. The site is one of very few British pre-Upper Palaeolithic sites which have been excavated under modern conditions and the results made available promtly to the archaeological world. The discovery of humain remains in a site of Middle Pleistocene age is of the greatest importance as it is one of only two British sites of this antiquity from Britain, the other being the well-known site of Swanscombe in Kent. Finally, the solifluctile infill of the cave is important not only in terms of its implications for future archaeological discoveries but also for elucidation of Quaternary events in Britain : deep-sea deposits have shown the inadequacy of the terrestrial record and land-sites, in which evidence for glacial events and processes is preserved, are all too rare.

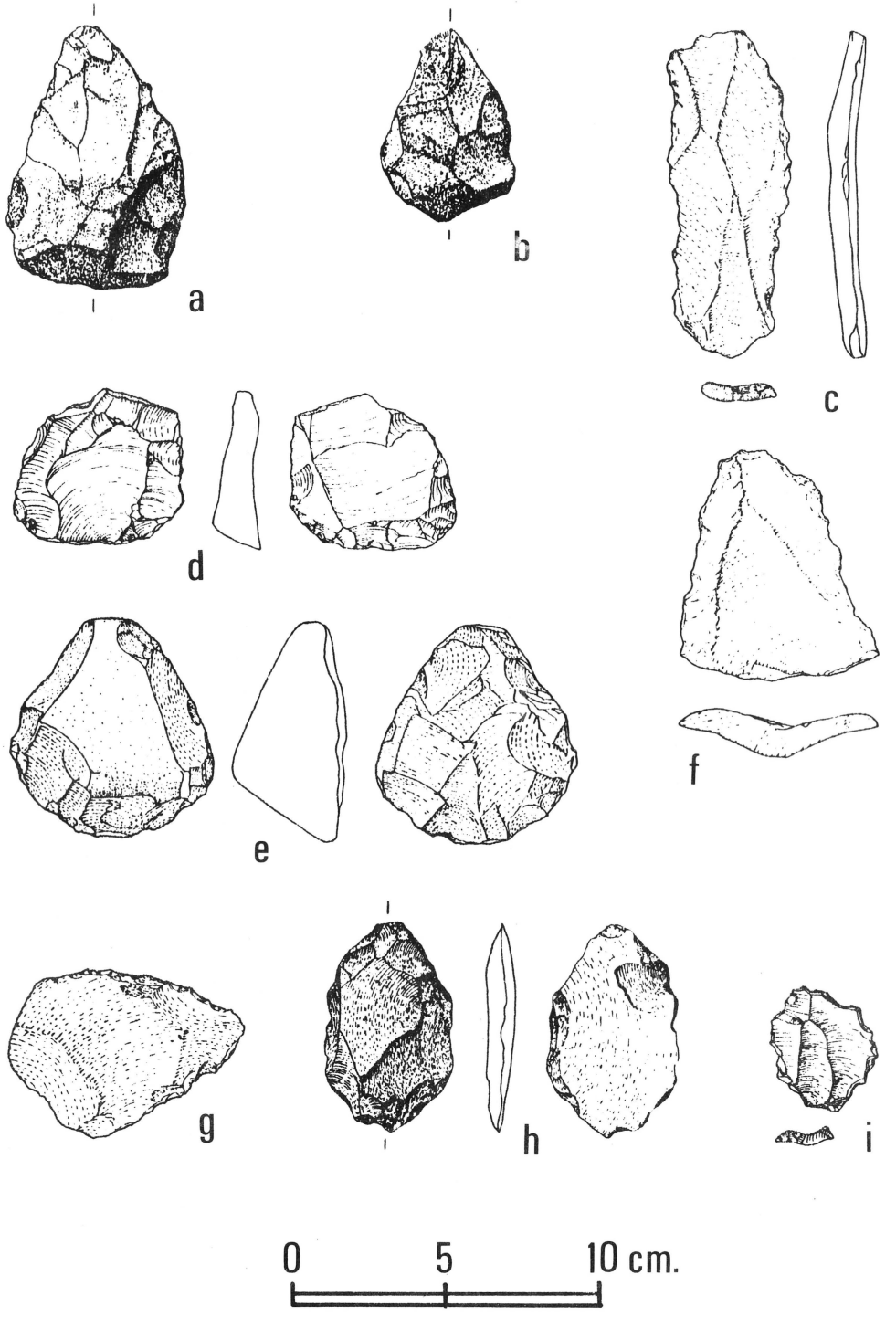


Fig. 5. Pontnewydd Cave. Artefacts.
a-b. handaxes; c. Levallois blade; d. struck Levallois core; e. unstruck Levallois core; f. Levallois point; g-h. scrapers; i. probable denticulate.

I am indebted to Simon Collcutt, Andrew Currant, Christopher Stinger and Miranda Green for reading this paper in draft form and to the many specialists, named in the text, whose work is incorporated here.

Acknowledgement is made of financial assistance from the Board of Celtic Studies, the Cambrian Archaeological Association, the Society of Antiquaries of London, the British Academy and the L.S.B. Leakey Foundation. The illustrations are the work of Paul Hughes and Margaret Ehrenberg. I am indebted to Monica Cox for typing the manuscript. The site itself is a sheduled Ancient Monument, and the work accordingly proceeded with the approval of the Ancient Monuments Branch of the Wels Office. The finds are housed in the National Museum of Wales by generous gift of the landowner, Major David Williams-Wynn of Plas-yn-Cefn, whose interest and support at every stage has made these discoveries possible.