Late Middle Pleistocene Mammoths and Elephants of the Thames Valley, Oxfordshire

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SUMMARY: Mammoths and straight-tusked elephants have been excavated from gravel deposits at Stanton Harcourt near Oxford. These two species are stratigraphically contemporaneous and associated with vegetation, molluscs and insects indicative of fully interglacial conditions equated with part of OIS 7 (c.200,000 BP). This association raises interesting questions regarding the habitat and behaviour of the mammoths and elephants and their interaction with the other large ungulates represented at the site. The mammoth is an early form with distinctive dental characteristics. It is known from several British sites believed to be of similar age to Stanton Harcourt but, at these sites, samples are small and stratigraphic information generally poor or non-existent. It was thus of great interest that another gravel deposit, at Latton, approximately 30km west of Oxford, turned up numerous remains of this mammoth, again associated with an interglacial fauna. Both sites have Lower Palaeolithic artefacts although, on account of the fluvial nature of the deposits, none can be said to be functionally associated with the bones. As the analysis of the material from both excavations is far from complete, this contribution hopes to present an informative summary of interesting aspects of these large vertebrate faunas, concentrating particularly on the mammoths and elephants.

More than 1000 remains of an early form of mammoth Mammuthus primigenius in association with those of straight-tusked elephant Palaeoloxodon antiquus have been excavated from an ancient river channel at Stanton Harcourt near Oxford, England (Fig. 1). The river is believed to be the Thames, following a previous course slightly north of its present position and the age of the fossil-bearing deposits is estimated at c.200,000 years BP (OIS 7). The molluscs, insects and abundant vegetation including large logs of deciduous trees such as oak, indicate fully interglacial conditions. This would be the expected environment of the straight-tusked elephant whereas, until relatively recently, mammoths would have been taken to indicate a cool, even cold, environment. Only a decade ago, when the very possibility of an interglacial equated with OIS 7 was still a matter of dispute, there was unequivocal evidence at Stanton Harcourt of the contemporaneous occurrence of elephant and mammoth with a fully temperate fauna and flora. This mammoth, the most common of all the species at Stanton Harcourt, is now widely recognised as a key species in the recognition of OIS 7 interglacial deposits.

At the outset of the excavations some ten years ago, the site was a disused gravel quarry awaiting use as a landfill site. Initial fieldwork had been carried out there some years previously and several bones, plant, insect and mollusc samples had been collected from remnant channel deposits below the main body of commercially extracted gravel. It was proposed that these plant and animal remains had accumulated under interglacial conditions (Briggs *et al.* 1985) and an age of c.200,000 years was suggested on the basis of amino-acid epimerization of molluscs from the site (Bowen *et al.* 1989). Thus the Stanton Harcourt Channel was attributed to a hitherto unrecognised interglacial between the Ipswichian and the Hoxnian interglacials, equated with OIS 7. The ensuing controversy over the status of this 'new' interglacial is reviewed by Bowen (1999).

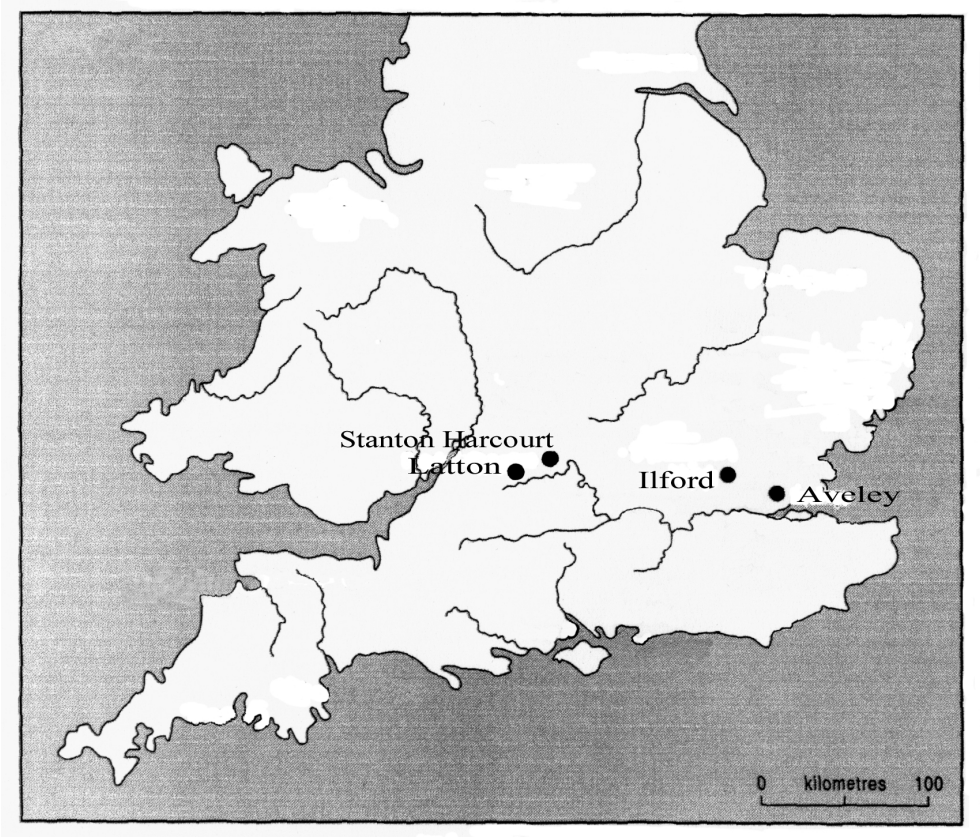


Fig.1 - The Thames Valley sites.

Certainly, when we (the author and C.M. Buckingham) began excavation of the channel deposits, there was widespread doubt among Quaternary specialists as to the age of the site. However, the interglacial issue had less to do with our decision to excavate than did the rare opportunity to retrieve fossils from recorded context with abundant associated biological data. The possibility of finding archaeological material had not been a consideration. In fact, the archaeological evidence for the British Lower and Middle Palaeolithic suggested that the forested environments of the interglacial periods were not conducive to the human occupation of Britain. Thus, the discovery of the first of 27 artefacts among the bones and other fauna and flora at Stanton Harcourt was quite unexpected. Some of these artefacts are weathered and rolled suggesting transport downstream, perhaps from older deposits elsewhere, but others are in quite fresh condition indicating little or no movement since they were discarded in or near the river. Because they occur in fluvial deposits rather than in the strictly *in situ* context of an ancient land surface, it might be argued by some archaeologists that they are derived and therefore invalid as evidence of people during the interglacial. Certainly, it cannot be said that their association with the bones is evidence of hunting or butchery. Nonetheless, as I have discussed elsewhere (Scott 1998), I believe that these unrolled artefacts have the same post-depositional history as many of the large vertebrate remains and therefore indicate the broadly contemporaneous presence of the animals and the people in Britain during the interglacial.

The excavation was concluded two years ago and the lengthy tasks of conservation of bone, analyses of samples and the compilation of

field documentation are underway. Two preliminary reports on the excavations have appeared (Buckingham *et al.* 1996; Scott & Buckingham 1997) and a monograph on the site is in preparation. One of the most difficult aspects of preparing a final report on the large vertebrates is their condition. The fact that these remains have survived at all is due to a combination of the alkaline nature of the deposits (the gravel is 95% limestone) and the fact that the underlying clay bedrock caused them to be permanently waterlogged. The latter factor has been enormously influential in the preservation of wood, nuts and even leaves. However, fossilisation of the bones has not taken place and, although teeth are generally in excellent condition, all bones of reasonable size and certainly all tusks have required plaster or fibreglass casing in order to remove them from the site. Of course, this procedure must be reversed before the assemblage can be studied and, apart from the length of time it is taking, there is the possibility that informative damage (cut-marks or animal gnawing) might be obscured in the process. As final numbers and the results of the analyses of environmental samples are not yet available, I propose for the purpose of this conference publication to outline the significance of the material from Stanton Harcourt, concentrating particularly on the mammoths and elephants. Discussion of these remains will include evidence from a smaller, recent excavation at Latton (Scott & Buckingham 2001).

Most importantly, the finds from Stanton Harcourt were excavated. The majority of mammoth remains in Britain result from gravel extraction or from dredging in the North Sea. In such circumstances there is little or no contextual data. At Stanton Harcourt the fossil-bearing deposits were approximately a metre thick and, as access was possible over an area of several acres, detailed recording was possible. When first identified as a site with interglacial fauna and flora, it became known as the Stanton Harcourt Channel (Briggs *et al*. 1985). This term has remained in the literature although, strictly speaking, it is not a single channel but the result of successive episodes of infilling by the ancient river within a wider channel depression cut into the Oxford Clay bedrock. Thus the fossil-bearing deposits are not uniformly distributed. Excavations revealed that in some areas of the site they had evidently been lain down by the ancient river under high energy conditions; in these areas the bones, vegetation, and other remains were observed to be less abundant and more fragmentary. Other areas had evidently been marginal to banks and had been little disturbed by the movement of the water; in these circumstances, beds of molluscs were excavated in their life-death situations, vegetation was dense, logs and branches were jumbled together, and some bones were in close association

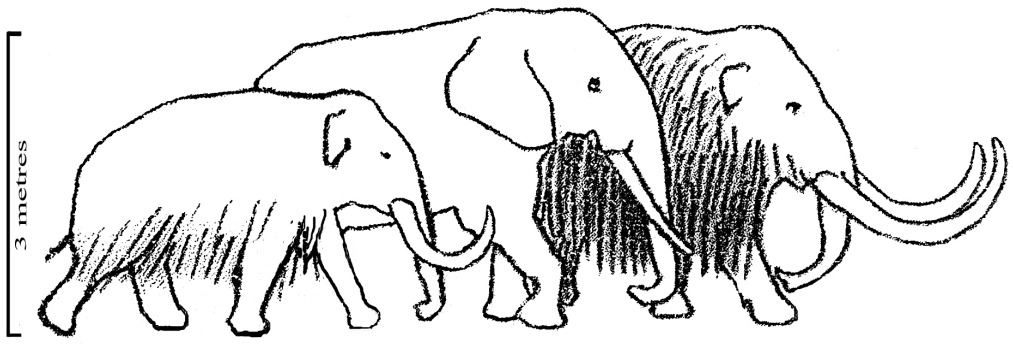
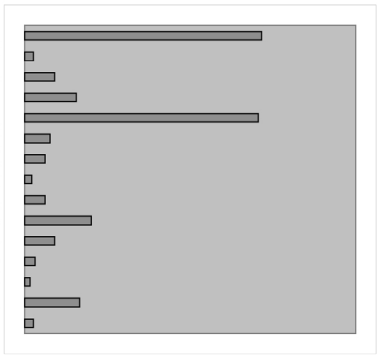


Fig.2 - Artist's reconstruction of the mammoth from Stanton Harcourt and Latton (left), *E. antiquus* (middle) and *M. primigenius* from Ilford (right).

with articulating elements. It is likely that some carcasses lying about on the ground slumped into the river as sections of the bank became undercut and collapsed. It was in these highly organic sediments that some of the least damaged artefacts were found and I propose that they too lay on banks that subsequently collapsed.

As stated above, the mammoth at Stanton Harcourt and Latton is an early form. Three features in particular characterise this mammoth: it evidently inhabited Britain in a fully temperate climate, its teeth have a lower lamellar frequency and slightly thicker enamel than the more evolved mammoth of later stages, and it was approximately one third smaller than its cold stage counterpart (Fig. 2). It was first recorded at Ilford (near London) in the mid-19th century by Adams (1877-81), associated with straight-tusked elephant, and has subsequently been identified at various locations in Britain. However, although the mammoth dentition from Ilford has been compared with dentitions from other European sites from an evolutionary and taxonomic point of view (e.g. Lister & Joysey 1992; Lister 1996), the appearance and habitat of this early mammoth has never fully been described. Although Sandford (1925) certainly recognised mammoth teeth "of Ilford form" in collections from Upper Thames gravels, no stratigraphic data existed and, until the Stanton Harcourt excavations, the total number of specimens of this early form was relatively low. Stanton Harcourt now represents by far the largest assemblage in Britain; there are more than 150 teeth (many of which are in mandibles or skulls) and more than 130 tusks were discovered, although their fragile (unfossilized) condition meant that many of these were not be saved. A large number of post-cranial elements – limbs, scapulae, vertebrae and ribs - were recovered, the pelvis (innominate) being particularly well represented (Fig. 3). Notably scarce are the bones of the feet. Although the sample from Latton, also accumulated in fluvial sediments, is considerably smaller (total number of bones is less than 200), the body part representation is similar. It will be one of my principal aims in analysing all this material to discuss the possible roles of predators and/or fluvial activity in the disproportionate representation of mammoth body parts in these assemblages. However, my greatest interest lies in describing the anatomical features of the various bones of this early mammoth, and to document its differences and similarities when compared with the later form.

It should be possible to describe its overall



Cranial	Tusks	143
	Skulls with dentition	5
	Mandibles with dentition	18
	Mandibles without dentition	31
	Isolated teeth	141
Post-Cranial	Scapulae	15
	Humeri	12
	Radii	4
	Ulnae	12
	Innominates	40
	Femora	18
	Tibiae	6
	Fibulae	3
	All vertebrae	33
	Total carpals,tarsals,metapodia & phalanges	5

Note: unidentified limb fragments, ribs and rib fragments number several hundred

Fig.3 - Skeletal elements of the Stanton Harcourt mammoth.

	O.I.S.7c (earlier phase) *Temperate woodland*	O.I.S.7a (later phase) *Open grassland*	STANTON HARCOURT	LATTON
HERBIVORES				
Straight-tusked elephant				
Palaeoloxodon antiquus	**********	**********	**********	
Woolly mammoth				
Mammuthus primigenius		**********		
Mammoth (Ilford type)				
Mammuthus primigenius		**********	**********	**********
Merck's rhino				
Stephanorinus kirchbergensis		**********		
Narrow-nosed rhino				
Stephanorhinus hemitoechus		**********		
Woolly rhino				
Coelodonta antiquitatis		**********		
Horse				
Equus ferus	**********	**********	**********	**********
Hippo				
Hippopotamus amphibius				
Fallow deer				
Dama dama	**********	**********		
Giant deer				
Megaceros giganteus		**********		
Red deer				
Cervus elaphus	**********	**********	**********	
Bison				
Bison priscus	**********	**********	**********	
Aurochs				
Bos primigenius	**********	**********		
CARNIVORES				
Spotted hyaena *Crocuta*		**********		
crocuta		**********		
Wolf *Canis lupus*		**********	**********	
Bear *Ursus arctos*		**********	**********	
Lion *Panthera leo*				

Fig.4 - Biochronological scheme of large mammals of OIS 7, in comparison with Stanton Harcourt and Latton mammal occurrences.

proportions and shape. It had the spiralled, curving tusks of its more evolved relative but did it also have the domed head, the humped shoulders and sloping back so vividly featured in illustrations from Palaeolithic to modern times? One question that is unlikely ever to be answered but which is intriguing nonetheless: was this small mammoth woolly?

Our understanding of the geological age of the early mammoth has undergone several revisions. Until relatively recently, the Ilford assemblage was believed to be of Last Interglacial age (Stuart 1982) although Sutcliffe (1975) had argued for a hitherto undocumented temperate phase between the Hoxnian/Holsteinian and the Last Interglacial to account for anomalies within the large vertebrate assemblages from Lower Thames localities, including Ilford. The proposal of the additional interglacial equated with Oxygen Isotope Stage 7 at around 200000 years BP (Briggs *et al.* 1985; Bowen *et al.* 1989) seemed to accommodate the Ilford form of mammoth satisfactorily. However, as science seeks to resolve and simplify the past, so it reveals it to be ever more complex. The large vertebrate assemblages that in Sutcliffe's opinion belonged to a pre-Ipswichian interglacial and then seemed comfortably placed in OIS7 have been reviewed and further sub-divided by Shreve (1997) into two warm phases of Stage 7 separated by a cooler interval. On the basis of her study of 26 faunal assemblages, she defines an earlier temperate woodland phase (7c) having straight-tusked elephant as its only proboscidean, and an open grassland phase (7a) characterised by

three proboscideans: straight-tusked elephant, the small (Ilford) mammoth, as well as a more evolved mammoth (Fig. 4). Shreve notes that remains of the Ilford-type mammoth are considerably more numerous in these 7a assemblages than are the other proboscideans. By Shreve's criteria, Stanton Harcourt belongs to this later warm phase, which might be useful in narrowing down the approximate the age of the site but it also raises some interesting questions.

Reference to Figure 4 shows Stanton Harcourt to be relatively impoverished in terms of variety of species and Latton even more so. To some extent, it could be argued that the excavations at Latton covered a relatively small area during a limited excavation period and that further excavation would very likely increase the species list. This would be an improbable explanation for Stanton Harcourt however, which was excavated over several acres during the course of nine years. One might note especially the absence of any species of rhinoceros, in particular the notably interglacial forms: Merck's rhino (*S. hemitoechus*) and the narrow-nosed rhino (*S. kirchbergensis*), both of which Shreve considers to be important members of the Stage 7a faunas. The majority of Shreve's study sites are in the Lower Thames area some 100km east of Stanton Harcourt. It is difficult, given the gently undulating landscape between these two regions, to envisage a physical barrier to the westward movement of various species of rhinoceros, or indeed of aurochs, giant and fallow deer, all absent at Stanton Harcourt. Perhaps the Upper Thames region had a somewhat different vegetation from that of the south-east of Britain throughout OIS7a, one that was insufficient to sustain a greater species diversity than the five ungulates represented. The bison and horse in these OIS7 assemblages are particularly large; perhaps there simply was not sufficient forage available for a greater number of large ungulates. Or perhaps Stanton Harcourt represents a relatively brief period within the interglacial, much shorter than represented at Aveley (Shreve's type site for OIS7). During the gradual development and decline of an interglacial (or of any of the warm phases within it) the ecosystem will have undergone significant changes. At open sites where deep stratigraphy is lacking, perhaps we are presented with a relatively brief moment in that process of environmental change. At Stanton Harcourt, some areas of the excavation were particularly rich in wood (especially oak), fauna in general, and in distinctively interglacial species such as straight-tusked elephant and the fresh-water mollusc *Corbicula fluminalis*. Conversely, some areas with fewer plant and animal remains also tended to have evidence of more rapid deposition of the sediments, perhaps associated with increased rainfall and general climatic deterioration. Details of the geology and sedimentolgy have yet to be finalised with reference to hundreds of recorded sections. There is no indication of a break in sediment deposition signifying separate climatic events, nor is there any way of knowing the length of time represented by the deposits, but our overall impression is that stratigraphically older deposits represent a slightly warmer environment than younger ones. At Latton we conclude (Scott & Buckingham 2001) that a much shorter interval of time is preserved than at Stanton Harcourt, perhaps late in the interglacial. Here the deciduous woodland and straight-tusked elephant have already disappeared, as has the warm water *Corbicula fluminalis*, to be replaced by cooler, open grassland conditions, evidently the ideal habitat for herds of mammoth and horse.

There is little doubt that the large vertebrates and their environment will be better understood once the richly organic sediment samples have been analysed and collated with the stratigraphic data. The associated fauna and flora is of outstanding quality. Other large vertebrates include bison *Bison priscus*, horse *Equus ferus*, red deer *Cervus elaphus*, lion *Panthera leo* and bear *Ursus arctos*. Somewhat disappointing is the absence of any small mammals, although sample processing might yet produce some remains. However, their absence is to some extent compensated for by an abundance of other material. There are more than 40 species of mollusc (terrestrial and fluvial), an insect fauna comprised of almost 100 species, and a

great variety of seeds, including various nuts. Most noteworthy is the outstanding preservation of wood: there were roots still in their rooted position, branches, and large logs, some 2-3m in length. In all, we envisage a mild climate and a relatively slow moving river flowing through a fairly open landscape with stands of forest in the vicinity.

Another avenue of investigation into the environment at Stanton Harcourt that has produced encouraging preliminary results is the isotopic analysis of some of the dental remains. As part of a doctoral thesis, Jones (2000) carried out isotopic analyses of collagen and enamel fractions from mammoth, elephant, horse and bison molars from Stanton Harcourt. The oxygen isotopes were used to calculate palaeotemperatures and the data from Stanton Harcourt exhibit average annual temperatures ranging from similar to the present to cooler by 6-7 degrees C. Carbon isotopic data from both collagen and enamel fractions indicate a 100% C3 diet (both grazing and browsing). Nitrogen isotope data from the collagen fractions of the mammal molars are indicative of water stress within the animal, usually associated with aridity. Cooling and increased aridity are often associated with the onset of glacial periods thus the isotopic data raise the possibility that the final stages of OIS7 are represented at Stanton Harcourt. Jones concludes that the diet of all the animals in the Stanton Harcourt sample was similar but different from that of mammoths in her sample from known cold-stage contexts. This study included only 5 teeth from Stanton Harcourt but the initial results look so promising that further analysis is planned from a wider range of depositional contexts.

There are undoubtedly many aspects that have yet to be documented from this site, which presently represents the richest combined flora and fauna from a British site of OIS7 age. The sample of mammoths and elephants is exceptional. It is anticipated that once these species can be fully interpreted in the context of the abundant plant, mollusc and insect remains from the site, we will have a rare insight into that particular interglacial.

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