Ancient Human Occupation of Britain
Workshop Abstracts

16th-17th September 2003
11 Bedford Square/2 Gower Street
London

The Ancient Human Occupation of Britain project is a five-year multidisciplinary, multiinstitutional effort funded by the Leverhulme Trust. The following abstracts were presented at a mid-project group symposium and represent ongoing research. More about AHOB can be found at http://www.nhm.ac.uk/hosted_sites/ahob/.

Day 1, 16 September

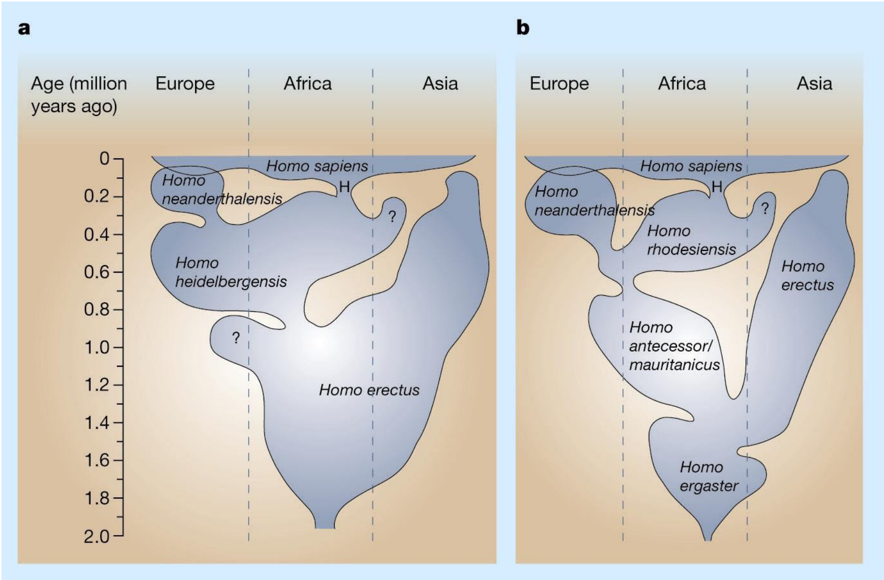
Current views on the hominin fossil record: relevance to AHOB

C. Stringer (NHM)

The course of human evolution (or at least the way it is reconstructed) has never run smoothly, and this is especially true at present. Until a number of significant new finds have been integrated into the developing picture, there will remain much uncertainty about the course of human evolution in Eurasia, and the best way to represent that course taxonomically. In Europe, it is evident that we can recognise a "Neanderthal phase" that stretches from at least OIS 11 - OIS 3, and there are increasingly strong arguments that this should be recognised by extending the usage of the species name *H. neanderthalensis* to fossils such as Swanscombe and Atapuerca SH (Sima de los Huesos). Such an extension would inevitably destabilise the concept of *H. heidelbergensis* used by workers like me, and the status of this species, and the fossils assigned to it, needs to be reassessed.

Workers are also reconsidering the status of the Atapuerca GD (Gran Dolina) fossils assigned to "*H. antecessor*". On the one hand, studies are highlighting differences the material shows from later European fossils attributed to *heidelbergensis*/early *neanderthalensis*, and on the other, dental resemblances have been noted to the similarly dated material from Tighenif (Algeria) originally named "*Atlanthropus mauritanicus*". If these resemblances are considered taxonomically and specifically significant, the name *H. mauritanicus* would assume priority. Although these discussions may seem obscure, they are relevant to the question of who might have been the first inhabitants of Britain. Whether Europe had an even earlier phase of human occupation, involving populations like those known from deposits dated at about 1.8 Ma from Dmanisi, Georgia, is still unknown. However, the Ceprano calvaria from Italy, perhaps close in age to Atapuerca GD and Tighenif, does seem to represent a more derived hominin than African and Asian fossils assigned to *H. erectus*/*H. ergaster*, and perhaps belongs to the *H. antecessor/mauritanicus* group.

The situation in the Late Pleistocene seems much clearer, although there are still many unresolved issues surrounding the chronology of modern human arrival and Neanderthal extinction, the associated archaeologies, and the extent of contact (including genetic) between the populations. But it is increasingly evident that millennial-scale climatic changes must have played an important role in population changes at this time.



The figures illustrate the geographical and temporal distribution of hominid populations, using two different taxonomic schemes. Figure "a" represents the view that both Neanderthals and modern humans derived from a widespread ancestral species H. heidelbergensis*. However, evidence is growing that Neanderthal features have deep roots in Europe and thus* H. neanderthalensis *might extend back to at least 400,000 years. The roots of* H. sapiens *might be similarly deep in Africa, but figure "b" reflects the alternative view that there was a separate African ancestral species called* H. rhodesiensis*. The figures also reflect different views of early human evolution. Some workers prefer to lump the earlier record and only recognise one widespread species* H. erectus *("a"), whereas others recognise multiple species with* H. ergaster *and* H. antecessor *(or* mauritanicus*) in the West, and* H. erectus *only in the Far East ("b").*

Excavations at Warren Hill, Mildenhall, Suffolk, 2002

J. Rose (RH)

Warren Hill, near Mildenhall, Suffolk is known as possibly the most prolific hand-axe site in Europe. Apart from a small-scale excavation in the early 1990s the site has not been studied with current research techniques. Using AHOB funds, an excavation was carried out in the spring of 2002 under the directorship of Jim Rose and John Wymer, aided by Terry Hardaker and Mike Morley. John and Terry concentrated on the archaeology and Jim and Mike on the sedimentology and palaeoenvironments. A DEM of the site was produced by Xingmin Meng. The work was done with permission of English Heritage.

A number of major sections were cut or cleaned-up with a mechanical excavator at sites with stratigraphic and archaeological potential. Sedimentological and stratigraphic work concentrated on the processes responsible for deposition of the sedimentary units and identification of the lithostratigraphy. Methodology included section logging and description, palaeocurrent measurements, particle size analyses, heavy mineral and clast lithological analyses, and trace and major element analyses. Care was also taken, during the study of the sediments, to examine the materials for archaeology and a number of flakes were recorded *in situ*.

Two *in situ*, and one man-made lithostratigraphic units have been identified. The basal unit is a fine sand with bimodal cross bedding and a moderate frequency far-travelled clast lithology. This is interpreted as a moderate energy tidal-current deposit of the Wroxham Crag Formation. This is the furthest east location of this unit in central East Anglia and indicates the easterly extent of the Crag sea in the region and the presence of a col within the Chalk escarpment early in the Pleistocene. There is no archaeology associated with this unit.

The upper lithological unit is a c. 10 m thick cross bedded sand and gravel. The cross beds dip persistently to the south and southeast and their architecture is typical of deposition associated with bar migration in a braided river in water depth of up to 1.5 m. A high, far-travelled clast, mineral and element content indicates transport from regions with Triassic, Carboniferous and Jurassic bedrock. Additionally, some units show a very high chalk content, which is the local bedrock, and some of the chalk consists of large cobbles and boulders. Together this evidence indicates a powerful river, with a ready supply of both local and far-travelled materials. The chalk typically reflects proximal bank collapse with minimal transport distances. The geographical position and elevation of the unit falls within the spatial and elevational envelope of the Bytham River and is attributed to the second terrace of the Bytham Sands and Gravels. The second terrace will now be called the Warren Hill Terrace. This means that the Bytham River flowed through the region of Warren Hill, at a time when this was the largest river in England, draining much of the midlands and southern Pennines. The site is immediately downstream of High Lodge and upstream of Bytham sites in the area around Bury St. Edmunds. This unit contains the archaeology in the form of bifaces and flakes, and both types of artifact were found in situ during the excavations.

A third lithological unit was found with a distinctive particle size and morphology. This consisted of mounds on well sorted gravel and fine cobbles with a relative absence of material finer than fine gravel. These mounds have the appearance of spoil heaps and the bedding structures in this deposit suggest tip surfaces. The presence of spoil heaps composed of this size distribution is very unusual as this fraction is of high economic value and it is suggested that these heaps reflect the waste product of sieving in the search for archaeological material. This would explain the abundance of artifacts recorded from the site.

In conclusion, the excavations at Warren Hill confirm the archaeological provenance of the site, and demonstrate the origin of the archaeology to the Bytham river deposits, similar to a number of other sites in the region such as High Lodge, Lakenheath, Feltwell and Hengrave. However, all of the material is derived and none of it reflects occupation directly. The elevation of the Warren Hill Terrace suggests that the sedimentary units predate the Anglian Stage (MIS 12) of the British Pleistocene by at least one temperate stage, in which case it reflects the inclusion of Human artifacts in material of MIS 14 age at the youngest. Thus the human occupation in the area occurred at or before c. 550,000 years before present.

Early Middle Pleistocene marine and fluvial sediments at Norton Subcourse, Norfolk: implications for landscape development in eastern England

S. Lewis (QM) & S. Parfitt (NHM/UCL)

Norton Subcourse, Norfolk is located in East Anglia on the edge of the low- relief till plateau and lies adjacent to the low-lying areas of the Broads, some 15km inland from the coast. The site lies within the Neogene Crag Basin, which contains Early and early Middle Pleistocene marine sediments of the Norwich Crag and Wroxham Crag Formations (Beds 1 and 2); these shallow marine deposits are exposed at the base of the Norton Subcourse sequence (Table 1). Recently, quarrying has exposed an extensive deposit of organic muds (Cromer Forest-bed Formation) and fluvial gravels infilling a channel that cuts into the Crag. Both are sealed beneath glacial sediments (North Sea Drift Formation) deposited by the British Ice Sheet during MIS 12. Fluvial gravels within the channel (Bed 3f) and immediately overlying it (Bed 4) are interpreted as sediments of the Ingham Formation forming part of the Bytham River system, which drained from the English Midlands into East Anglia and the southern North Sea Basin. Palynology indicates a temperate environment, spanning at least half of an interglacial. Notable finds include at least partially articulated skeletons of hippopotamus and a cluster of hyaena coprolites. Other palaeontological evidence, including molluscs, mammals and ostracods, suggest that this is a previously unrecognised temperate episode in the British early Middle Pleistocene.

Importantly, the site provides the first biostratigraphical constraint on the fluvial sediments of the Ingham Formation (Bytham River). Nearby, terrace deposits of this river contain early Palaeolithic archaeology at High lodge and Warren Hill, and the sequence at Norton Subcourse has implications for the age of these sites and the recently discovered artifacts at Pakefield.

This talk will outline the stratigraphic sequence exposed at the site, discuss the age and palaeoenvironment of the interglacial succession, and summarise the implications of this work for sea level change and drainage evolution in southern Britain. Finally, we will review recent reinterpretations of British early Middle Pleistocene sequence.

Table 1. Stratigraphy at Norton Subcourse, Norfolk.

Bed		Lithology	Lithostratigraphy	
			Member	**Formation**
Bed 5		Sand, few gravelly and diamicton facies	Corton Member	North Sea Drift Formation
Bed 4		Sand and gravel	?	Ingham Formation
	3g	Grey clay		
	3f	Sand		
	3e	Stony organic sandy silt		
Bed 3	3d	Brecciated organic		Cromer
	3c	Woody layer		Forest-bed
	3b	Grey silts		Formation
	3a	Sandy, stony clay		
Bed 2		Sand and gravel	How Hill Member	Wroxham Formation
Bed 1		Sand and gravel	Westleton Member?	Norwich Crag Formation

A Mediterranean style climate in eastern England during the early Middle Pleistocene: Pedosedimentary and isotopic evidence from Pakefield, Suffolk

I. Candy & J. Rose (RH)

Abstract withheld pending publication.

The Hoxne Dating Project

N. Ashton (BM), S. Lewis (QM) & S. Parfitt (UCL/NHM)

Recent work at Hoxne, from 2000-2003 has aimed to re-study the dating of the Lower Palaeolithic industries from the site, and to set these industries in a firmer environmental context. Deposits have been examined in both the Old Brickyard Pit to the east of the Hoxne-Eye road, but more extensively to the west of the Oakley Park Pit on the opposite side of that road.

History of research

Previous work, particularly by Clement Reid (Evans *et al.* 1896), West (1956) and Singer *et al.* (1972-78) has established that the sequence at Hoxne consists of Anglian till lying at the base, followed by lacustrine clays infilling a kettle-hole (Strata F to C of West). These lake beds contain pollen which was interpreted by West as spanning most of the Hoxnian Interglacial from the Late Glacial (HoI) of Stratum F, Early Temperate (HoII) of stratum E, Late Temperate (HoIII) with the peat of stratum D, and finally the Early Glacial (HoIV) of Stratum C. The latter was described by both Reid and West as an 'Arctic Bed' and contained leaves of dwarf birch and dwarf willow.

The overlying fluvial, colluvial and solifluction deposits are less clearly established, but were described as Beds B and A by Reid and Strata B and A by West, but as Beds 1 to 9 by Singer *et al.* (1992). The latter interpreted these deposits as dating to the end of the Hoxnian interglacial through to the early part of the following cold stage.

There have been important differences of opinion as to from which sediments the flint assemblages were recovered. Reid argued that the flint assemblages were collected from the 'Palaeolithic loam' of Bed A, and possibly from the underlying Bed B. In contrast West argued that the artefacts came from Stratum E of the lacustrine sequence, based on an exposure (Section 100) on the west side of the Oakley Park Pit. The only substantial excavated assemblages were recovered by Singer *et al.* (1993) and were divided into a *Lower Industry* and *Upper Industry*. The former was excavated to the west of the Oakley Park Pit at the base of what they interpreted as Stratum C (and suggested to be contemporaneous with Bed 4) at the change from lake to river. The Upper Industry was excavated 50m to the south from the apparently overlying Bed 5, but these relationships were not seen clearly in section.

It can be established from these reports that the three artefacts, fragmentary bones and one piece of charcoal found by West in Section 100 are adjacent to the trenches opened by Singer *et al.* from which the Lower Industry was recovered. It is clear from the heights and description that West's material was the same horizon as the Lower Industry. Equally, it is clear from the sections recorded by Singer *et al*. that the Lower Industry is stratigraphically higher than Stratum D, and therefore cannot be Stratum E. The interpretation by Singer *et al*. that the Lower Industry came from the base of Stratum C (ie the

‘Arctic Bed’), seems at odds with the environmental evidence; the fauna recovered in association with the Lower Industry seems to reflect cool-temperate climate with mainly coniferous, but also some deciduous woodland. It is remarkably similar to that from Boxgrove, with modern analogues such as southern Scandinavia with perhaps warm summers, but cold winters.

Current work

The principal problems that have emerged are the exact contexts of the archaeological assemblages, and hence the problems of dating and establishing the human environments.

Since 2000 a series of trenches have been opened or reopened to examine these problems. Particularly critical is a long north-south trench that linked the location of the Lower Industry (in the north) with that of the Upper Industry (in the south), providing evidence for the context of the industries and their relationship. At the base, Strata E and D could be traced along the entire length of the section. Stratum D was overlain by a thin layer of olive-coloured brecciated clay (perhaps Stratum C). At the south end this was truncated by 1.2m of sandy, chalky clay (identical to Bed 4 of Singer *et al.*), which became decalcified towards the north. Cutting into this unit was a channel filled with laminated sands, silts and clays, which has not been recognised elsewhere at the site. Bed 5 appears to be primarily a colluvial deposit that lies over the channel fill on its southern edge. The soliflucted gravel of Bed 6 overlies most of this sequence.

At the north end of the trench artefacts similar to those from the Lower Industry were excavated from a gritty clay, associated with the base of the newly identified channel. The association of the Lower Industry with this gritty clay is in accord with the descriptions of Singer *et al.* and has been further confirmed this season with the opening of two new trenches. The Upper Industry was recovered by Singer *et al.* in primary context from the colluvium of Bed 5, which has also been examined in the current work.

Bed/Strata	Description	Clement Reid 1896	West 1956	Wymer et al. 1993	Ashton, Lewis & Parfitt
Strata A1 & A2 (West)	Cryoturbated sand & gravel				
Bed A	‘brickearth’	*‘Palaeolithic loam’*		*‘Upper Industry’*	*‘Upper Industry’*
	Channel fill				*‘Lower Industry’*
Bed B	Fine chalky gravel				
Bed C	Carbonaceous loam (Arctic Bed)			*‘Lower Industry’*	
Bed D	Wood peat (Lignite)				
Bed E	Lake beds		*‘Palaeolithic loam’*		
Bed F	Basal lake bed				
Bed G	Anglian till				

The sequence suggests, therefore, that the Lower Industry post-dates not only the ‘Arctic Bed’ of Stratum C, but also the fluvial sediment of Bed 4. The Upper Industry is stratigraphically above the Lower Industry, but as the newly identified channel has clearly been recut several times downslope from south to north, they may be broadly contemporary. This would suggest that both industries are not only post-Hoxnian in date, but also date to after a significant cold event represented by Stratum C. Whether Stratum C is a cold event within the Hoxnian or a full glacial episode has not been established.

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Reanalysis of the dating of Levallois sites in west London

N. Ashton(BM), R. Jacobi (BM) and M. White (DU)

West London has long been noted for the occurrence of a number of sites and find-spots that include Levallois technology. Although there are 28 find-locations, they are dominated by just four sites, Creffield Road in Acton, and Boyer's, Sabey's and Eastwood's Pits in West Drayton, which contribute a significant proportion of known British Levallois artefacts. However, they remain stubbornly difficult to date. They were largely discovered in brickearth and gravel pits by John Allen Brown during the 1880s and 90s, and by R. Garraway Rice from 1905 to 1929. Attribution to context in the modern literature has never been very clear, sometimes referred to terrace gravels, more normally to in or under the overlying brickearths, and other times to solifluction gravels that sometimes lie between the terrace gravel and the brickearths. What is clear is that the Levallois artefacts are in fresh condition, in marked contrast to the rolled handaxe material that seems to come from the Lynch Hill Gravels

Recent work has examined the problem afresh, in particular the description of context in the old literature. There are only three instances where the context is clearly given (Creffield Road, West Drayton and Langley) and in all three the description is the same – ie beneath brickearth or solifluction gravel, but on the surface of terrace gravel. In all three cases the terrace gravel is mapped as Lynch Hill. These descriptions probably account for 80% of such artefacts found in west London. The remaining 20% of Levallois material from other sites have little detail about context.

The mapping of sites in relation to the underlying terrace stratigraphy also provides strong clues to the dating of Levallois material. Where specific locations are known 99.9% of Levallois artefacts come from areas mapped as Lynch Hill Gravel. This remarkable relationship strongly suggests that the artefacts date to a period after the aggradation of the Lynch Hill Gravel, but before the aggradation of the Taplow Gravel, this intervening period of time being widely attributed to late OIS 8 or early OIS 7. This accords with dates for most other Levallois sites which seem to be attributable to OIS 8 and 7.

Environmental and climatic reconstructions based on coleopteran assemblages from sites in southern England

G. R. Coope (UB)

A number of coleopteran analyses have been carried out recently on a number of Pleistocene deposits at sites in southern England, some of which are directly associated with palaeolithic artefacts. These sites range in age from the Cromerian Interglacial to the middle Devensian. The ones to be discussed here will include, amongst others:- (a) Norton Subcourse, (b) Pakefield, (c) Happisburgh, (d) High Lodge, (e) Lynford and (f) Whitemoor Haye. The beetle assemblages from these deposits provide a detailed picture of the local environment and enable quantified Mutual Climatic Range (MCR) estimates to be made of the thermal palaeoclimate and also more qualitative estimates of palaeoprecipitation values. Some of these beetle faunas suggest stratigraphical correlations with other sites that have already been published.

Day 2, 17 September

Lynford: introduction to the stratigraphy

S. Lewis (QM)

The sediments at Lynford underlie the floodplain terrace of the River Wissey and consist of up to c.10m of fluvially deposited gravels, sands and fine-grained sediments. The succession can be divided into four main facies associations (ie. genetically related groups of lithofacies). At the base, Association A consists of coarse, angular flint gravels, lying on the Chalk bedrock surface. The gravels are confined to the northern part of the active quarry (close to the present river) where the Chalk surface is lower; they are largely absent at the southern end of the quarry, where they are cut out against the rising Chalk surface. Facies association B comprises the fined-grained channel-fill deposits from which the archaeological and palaeontological material has been recovered. Association B overlies a concave-up lower bounding surface and occupies a channel feature, the exact dimensions of which are unknown as the edges are lost to subsequent erosion and/or quarrying. The sediments in places show clearly defined stratification, indicative of low-energy deposition, elsewhere they are massive, with no visible structure, possibly suggesting post-depositional disturbance, or rapid deposition. Non-artefactual stones occur within these sediments, some are associated with disruption of the bedding. This may indicate that they have been dropped into the sediments, possibly as a result of release from winter ice cover on the water surface. The organic content (determined by loss on ignition) varies between about 5-20%, and the $CaCO_3$ content is up to c.20%. Also within association B are stony organic deposits at the margin of the channel, which are interpreted as mass movement deposits, resulting from bank failure and slumping of gravels into the channel. Facies association C consists of fluvially deposited gravels and sands, the calibre of the gravels is generally finer than that of association A and there are more abundant sandy facies. The upper part of association B is eroded and Association C also lies on Chalk bedrock at the southern extremity of the quarry. Association D consists of cross stratified gravels, sands and fines, together with peat beds and reworked blocks of peaty material. These facies overlie an irregular concave-up lower bounding surface and form a series of channels cut into the top of association C.

The succession represents fluvial deposition by the River Wissey. Association A indicates high energy conditions and was probably deposited under cold climate conditions. Association B represents the infilling of a channel, with fine-grained sediments, under lower energy conditions. The channel may have been abandoned when the river moved to another part of the floodplain, it is not yet possible to establish whether it represents a significant change in fluvial style. Association C indicates a return to high-energy fluvial deposition, either as a result of changing river behavior or migration of the active part of the floodplain. Association D comprises a series of channel eroded into the underlying gravels, their contained archaeology suggests that they are Holocene in age and are river channels formed as the Wissey migrated over the floodplain.

The Late Middle Palaeolithic lithic assemblage from Lynford, Norfolk

M. White (DU)

Recent work at Lynford Quarry, Mundford, Norfolk has yielded over 2000 lithic artefacts in association with rich mammalian and other biological remains. Analysis of the Lynford lithics indicates that the archaeology at the site is in primary context and has seen very little fluvial disturbance, although bioturbation and random geological events (bank collapses, flood events) have acted to re-arrange the material to some degree. Typologically and technologically, the assemblage shows a dominance of ovate and cordiform handaxes (n = 52, including at least one bout coupe/Coygan type) associated with the debitage from the later phases of handaxe manufacture. Although the channel edges have been destroyed the nature of the assemblage, especially the general lack of flakes from the initial phases of production, is taken as showing that Neanderthals most often visited the site carrying ready made tools and blanks to make other tools, in all probability carried in anticipation of encounters with animals (dead or alive) in the area. Refits to crude handaxes and partially bifacial tools also show the rapid production of a few pieces on the spot. Examination of damage and retouch on the handaxes shows a high incidence of breakage during use, with frequent resharpening and edge modification to re-juvenate the tools, again suggesting a fairly well maintained and curated tool kit. In sum, the Lynford lithics seems to show fairly sophisticated behaviour, with Neanderthals targeting places in the landscape where encounters with faunal resources could be anticipated but not fully planned, combined with a flexible and maintainable tool kit that was carried around to meet the contingencies of this encounter-based foraging.

The Lynford vertebrate assemblage: preliminary results on the taphonomy, palaeoecology and exploitation by Neanderthals

D. Schreve (RH)

The close association of abundant flint artefacts with a Mid Devensian mammalian assemblage at Lynford was originally thought suggestive of a mammoth butchery locality, a rare occurrence for a British Middle Palaeolithic open site. Establishing the precise nature of an elephant exploitation site is arguably more problematic than for other taxa and in this respect, Lynford is no different. Direct evidence of butchery, in the form of cutmarks, is not present and the best evidence for any form of mammoth exploitation (be it for meat, fat, marrow, skins or other raw materials) is the virtual absence of long bones from the main channel deposit. Since there appears to be no taphonomic reason for this absence, selective removal of these elements by Neanderthals remains the strongest possible explanation. Instances of pathologies are unusually common, suggesting that these weaker animals may have been purposefully selected by predators or that their enhanced vulnerability may have led to their demise. However, although the few better-preserved specimens may well be more or less *in situ*, perhaps representing animals that became mired, driven deliberately into the channel or killed adjacent to it, it is clear that most of the 2000+ specimens from the site have experienced very different depositional histories. The majority of specimens are extremely fragmentary (<6cm in diameter), suggesting that they have been extensively trampled, but also weathered, root-damaged or gnawed, a further indication of exposure before burial. Much of the assemblage therefore appears to be a palimpsest of material that has slumped in from the channel sides. To date, the best evidence for direct faunal exploitation at the site are green bone fractures on long bones of horse and reindeer and broken lower molars of horse and woolly rhinoceros that were smashed during fracturing of the mandible for marrow extraction.

The Whitemoor Haye woolly rhinoceros and its relationship to British last cold stage mammal faunas

A. Currant (NHM)

The recent discovery of a partial skeleton of a woolly rhinoceros, *Coelodonta antiquitatis* along with remains of horse, mammoth and reindeer at Whitemoor Haye Quarry near Alrewas, Staffordshire attracted considerable local, national and international media attention.

Although the woolly rhino was apparently a common element of the British Middle Devensian (MIS 3) mammal fauna, complete associated skeletal elements are comparatively rare, primarily because of the bone-eating activities of spotted hyaenas, *Crocuta crocuta*, one of the primary mammalian carnivores of the period. It seems likely that this particular individual was buried in Trent/Tame flood gravels as a frozen carcass. The skeleton was closely associated with finds of well-preserved beetles and plants.

Currant and Jacobi (2001) have designated the Late Pleistocene fossil assemblages to which the Whitemoor Haye finds belong as part of their Pin Hole mammal assemblage-zone (MAZ), which is interpreted as covering much or all of MIS 3. Given the known environmental instability of this period it would be surprising if there was not some kind of mammalian faunal response to these changes, but it has proved immensely difficult to find any site in Britain with the stratigraphic control to be able to discriminate such a record.

New OSL age determinations produced by Phil Tomes suggest that the Whitemoor Haye finds belong to the later part of MIS 3.

Aspects of the Middle and Upper Palaeolithic records of Britain

R. Jacobi (BM)

This contribution briefly examines the dating of the Late Middle Palaeolithic and the Early Upper Palaeolithic of Britain. While there are clearly problems some sort of pattern does appear to be emerging. The second part of the contribution summarizes results from Gough's Cave and suggests that some of the outstanding problems may need to be resolved by further dating.

Stable isotopes and the AHOB project

V. Grimes & M. Richards (BU)

We report here on the progress and preliminary results of a stable isotope study being conducted at the University of Bradford as part of the AHOB project. Stable isotope analyses of bone collagen carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$), and tooth enamel phosphate oxygen ($\delta^{18}O$), have been used to reconstruct the diet and environment of mammals throughout the British Middle and Late Pleistocene. Initially, a small scale pilot study was designed to determine the extent of isotope signal preservation in bone collagen and teeth enamel from samples of varying ages and burial environments. Ten AHOB sites have been selected for the pilot study and over fifty bone and teeth enamel samples were taken from a variety of terrestrial mammals including several species of rhino (*Dicerorhinus kirchbergensis, hemitoechus*, and *etruscus*; *Coelodonta antiquitatis*; *Stephanorhinus kirchbergensis*), horse (*Equus mosbachensis* and *caballus*), bison (*Bison priscus*), reindeer (*Rangifer tarandus*), cow (*Bos*), deer (*Cervus elaphus*), wolf (*Canis lupus*) and mammoth (*Mammuthus primigenius*). Sites were chosen for their correlation with either a cold, warm or transitional climatic stage, while specific animals were targeted based on their physiological appropriateness for stable isotope analysis and existing use as biostratigraphical markers. The results of the pilot study and considerations for the main study will be discussed and put into context with the AHOB project.

The AHOB GIS database

P. D. Polly (QM)

As part of the AHOB project, we are compiling a database that will be linked to a geographic information system (GIS) for mapping. The database has several purposes, some of which are core to the project and some peripheral, and the data have several functions, including: (1) original analysis in support of AHOB key questions; (2) documenting the specimens and data referred to for some sub-projects; and (3) archiving electronic documents associated with the project itself. For the most part, the database is being developed in Microsoft Access with interfaces to ArcView GIS for mapping. We will easily be able to distribute the database itself among members or, if we so decide, other researchers and the general public; most likely, however, the mapping functions will only be available to those with access to ArcView or another ArcGIS product. Most AHOB institutions will have a site license for ArcView.

AHOB Key Localities

The part of the database used for original analysis will focus only on key AHOB localities, and will contain standardized data common to all localities. Data held in this category will include: (1) mammalian faunal lists; (2) archaeological lists of technologies present; (3) location information, .eg national grid coordinates; (4) age information, including AHOB "key question" category, mammal age zone (where available), oxygen isotope stage (where available), absolute age estimate (where available); (5) environmental data, eg isotope or faunal analysis results. Analysis of these data will help answer questions such as whether human occupation was correlated with specific environmental or faunal parameters, whether human absence could be an artefact of temporal and geographic distribution of sites, or whether sites which were not previously attributed can be assigned to particular mammal age zones. Challenges for collecting and integrating these data will be discussed.

Several sub-projects will also produce data that will be integrated with the core database. The largest of these is expected to be Andy Currant's specimen-level inventory of the NHM collections (and elsewhere) that will serve as a list of vouchers that went into the mammal zonation work. Others will include specialist mapping projects, palaeoecological analysis, etc.

Finally, AHOB project archival material will be linked to the database. This will include paperwork, images, data, etc. that have been generated for AHOB work and that are in digital format. Members are encouraged to submit such data for archiving.