THE LOWER PALAEOLITHIC OCCUPATION OF BRITAIN

JOHN WYMER

VOLUME 1
TEXT

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Cover Picture: *Reconstruction of a living site of the Lower Palaeolithic during an interglacial summer. It has to be stressed that this is entirely speculative, for no evidence has been found to indicate the construction of shelters or wearing of clothing. However, it is an assumption of this volume that it was their conception and ability to provide themselves with shelter and protection that allowed Palaeolithic people to migrate into the temperate zones of northern Europe. In view of their long evolution in the tropical or sub-tropical zones of Africa, and possibly the Far East, there is no reason to believe that they would be much hardier than more modern populations. Branches pushed into the ground as supports for temporary dwellings would be very unlikely ever to leave visible features for archaeological recognition. The identification by micro-wear studies of the use of flint tools on hides lends some support to this assumption, for it is difficult to think for what else skins and furs would be required. The use of fire for warmth or cooking is equally tentative. Where burnt soil or charcoal has been found in association with Lower or Middle Palaeolithic occupation in Britain, they could equally be explained as the result of natural conflagrations. The author takes total responsibility for this assumption and for specifying what was to be shown on this beautiful reconstruction by Nick Arber of the Castle Museum, Norwich*

Preface

Palaeolithic archaeology has been a crucial discipline in establishing our knowledge of the earliest human inhabitants of our islands over the past 500,000 years. As a result of multi-disciplinary studies which use the evidence of Quaternary geology, palaeontology, and physical anthropology linked to a number of scientific dating methods, we now have a chronologically sound framework within which to place the archaeological remains of these ancient times. The remains frequently only take the form of distinctly shaped flint implements or the bones of extinct animals, yet this evidence is crucial because it is all that survives from more than 99% of the span of human settlement in Britain. Very occasionally human skeletal remains are found which show us the physical form of our early ancestors: such finds are of great international significance because of the rarity of such discoveries.

The occurrence of Palaeolithic artefacts within geological sediments has been recorded in England since the late 17th century and the growing body of such discoveries was vital to international debates from the end of the 18th century on the true antiquity of the human race. So important are many of our sites that they make a major contribution to global discussion on early human behaviour. At the end of the 20th century, literally thousands of Palaeolithic sites are known in Britain alone, only a few of which have been investigated with forensic precision. This book results from a seven year research programme sponsored by English Heritage which has reviewed all these finds, where possible relating their provenances to the appropriate Quaternary strata. The programme was essential to create a common, basic level of data so that strategies for the future management of these important archaeological remains could be formulated. Assessment of the mass of data gathered has not only identified areas of potential for future research and those worthy of protection but has led to an incomparable overview of the information at the disposal of Palaeolithic archaeologists. This information has been provided to local authorities throughout the country. The purpose of this volume is to present a synthesis distilled from the plethora of information generated by the programme, describing the development of the landscape and the evidence of human inhabitation in that process.

A hundred years ago Sir John Evans published a new addition of his remarkable study of *The Ancient Flint Implements of Great Britain* in which he noted almost every important Palaeolithic find from the country. Despite the vastly increased number of discoveries, the English Heritage sponsored project which culminates in this book has achieved a similar feat. We must anticipate that many new discoveries will be made in the future adding to the total number of recorded sites. So great would be the task of reviewing the entire national collection then that it is doubtful that any one person will manage such an achievement ever again. However, this book does not purport to be the last word on the subject but the reverse. The interpretation put forward and the mine of information generated by the project will be the stimulus for the more detailed investigation of individual sites and the creation of regional synthesis based on new and innovative research, all of which will lead to an even better understanding of our remote ancestors. This book presents what we currently know about the first half million years of the human occupation of Britain, and is the platform from which greater understanding will flow.

Geoffrey Wainwright
November 1998

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Acknowledgements

I wish to give thanks, praise, and acknowledgements to the very many people and institutions that have made these volumes possible. They are based on a six-year survey and should include everyone involved in the Projects during that time. This publication, in some respect, is a condensation of the coordination and effort which enabled Wessex Archaeology, on behalf of English Heritage, to publish seven reports between 1992 and 1996. These were designed to assist County Planners and County Archaeologists in assessing what should be done or not done in response to planning applications which threatened Palaeolithic sites. Hopefully these reports of restricted circulation, will also assist in a more general understanding of the evidence which is known or likely to be revealed. Thus, the input has been from several angles: from academics and fieldworkers at one end, with landowners at the other, and management, word-processors, illustrators, and suchlike in between. County Councils, Archaeological Units, Gravel Companies, and the British Geological Survey have all been involved. In every case, with perhaps the exception of one landowner of a SSSI not a thousand miles from Bedford, there has been wonderful accord and cooperation. Profound gratitude is due to them all.

It is impossible to mention everyone but the following are listed by their particular roles in the projects. They are not placed in any particular order of precedence, or of the value of their contribution, with the exception of those bodies responsible for conceiving and initiating the Projects: English Heritage, the University of Southampton, and Wessex Archaeology.

I am very conscious of the statement I once heard in my youth from a wise man (actually a tramp with a philosophical and poetical frame of mind, on a 65 bus between Kingston and Richmond) that 'the idea is more important than the execution.' I think he was right, so thanks go first to English Heritage, Southampton University, and Wessex Archaeology for formulating the Southern Rivers, English Rivers, and Welsh Rivers Projects. Thus especial thanks go to the then Chief Archaeologist of English Heritage, Dr G.J. Wainwright, Prof. Clive Gamble, formerly Head of the Department of Archaeology, Southampton University, and Mr A.J. Lawson, Director of Wessex Archaeology, for their broad conception on what was required and their ability to convince the powers above them of the necessity for adequate funding. Much of the ensuing management was conducted by Miss S.M. Davies, Deputy Director of Wessex Archaeology and the Administrative Director, Mr Peter Dawes. Their encouragement and tolerance over all these years is gratefully acknowledged.

Allied to the management of the Projects was the watchful eye of the then Chief Archaeologist of English Heritage, and an advisory body to ensure that all was going as it should be, academically within financial estimates and on schedule. I give thanks to this team for their great help and advice. Meetings were held at Salisbury about twice a year, consisting of: Mr A.J. Lawson; Miss S.M. Davies; Mr D. Batchelor, English Heritage; Professor C. Gamble; Dr D.A. Roe, University of Oxford; Dr D.R. Bridgland, University of Durham; and Professor P. Mellars, University of Cambridge. Specialist advice was also received from Dr S.H.R. Aldhouse-Green, Dr P. Callow, and Miss H. Maclagan.

County Archaeological Officer and their Sites and Monuments Records (SMR)

The cooperation of all these people was a major factor in identifying the locations and details of sites. Printouts from all their records concerning the Palaeolithic period were received on request and it is realised that, in many cases, would have incurred considerable time and preparation by the officers concerned. Without this information it would not have been possible to arrange the most economical itineraries for visiting sites, in terms of time and distance. In many cases Planning Departments were also able to give valuable information on past and present mineral extraction, together with current policies. This formed an important part of the specialised reports, of which they later received copies: Mr M. Farley, Buckinghamshire County Council (CC); Mr P. Fasham, Babtie Public Services Division; Mr E. Jones, Warwickshire CC; Miss S. Link, Oxford Archaeological Unit; Mr I. Morrison, London; Miss A. Tinniswood, Hertfordshire CC; Mr M. Watson, Shropshire CC; Mr S Catney, Lincolnshire CC; Miss G Falkingham, Humberside CC; Miss J. Kitchen, Northamptonshire CC; Dr C. Pendelton, Suffolk County; Dr T. Reynolds, Cambridgeshire CC; Mr E. Rose, Norfolk Museums Service; Miss L. Smith, North Yorkshire CC; Mr R. White, Yorkshire Dales National Park; Miss S. Whiteley, South Yorkshire Archaeological Service; Dr R. Yarwood, West Yorkshire Archaeological Service; Mr M. Hodder, Birmingham City Council; Dr A. Myers, Derbyshire CC; Miss A. Graf, Leicestershire CC; Miss V. Baddeley, Nottinghamshire CC; Miss C. Wardle, Staffordshire CC; Miss H. White, West Midlands SMR; Mr P. Chadwick, Berkshire CC Planning Dept (Archaeology Section); Centre for Oxfordshire Studies; Mr D. Allen, Hampshire County Museum Service; Mr M. Hughes, Hampshire CC Planning Dept (Archaeology Section); Isle of Wight CC (Archaeology Unit); Mr L. Keen, Dorset CC; Dr R.G. Bird, Surrey CC Planning Dept; Mr D. Garner, Greater London SMR; Dr J. Williams, Kent CC Planning Dept; Mr S. Timms, Devon CC; Mr N.D. Johnson, Cornwall CC; Mr Chapman, Somerset CC; Dr A.G. Woodcock, East Sussex CC Planning Dept; Mr M. Taylor, West Sussex CC Planning Dept; Mr R Canham, Wiltshire CC Museums and Libraries Service; Mr C. Webster, Somerset CC Planning Dept; Miss L. King, Gloucestershire CC; Mr V. Russell, Avon CC Planning Dept; Mr N. Brown and Miss L. Austin, Essex CC Planning Dept (Archaeology Section); Mr D. Brown, Hereford and Worcester CC; Mr S. Coleman, Bedfordshire CC; Mr J. Hall, Dyfed Archaeological Trust; Miss C. Earwood, Clywd Archaeological Trust; Miss J. Allen, Glamorgan/Gwent Archaeological Trust; Gwynedd Archaeological Trust.

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Considerable time was spent at the offices of the BGS at Keyworth and London. extracting the relevant Quaternary information from the one inch or 1:50,000 geological survey maps, and consulting Memoirs. This also gave the opportunity for valuable discussions with colleagues on Quaternary matters pertinent to the Projects. This formed the basis of the distribution maps showing the relation of Palaeolithic discoveries to the mapped geological deposits (much simplified in this volume). The material from the Geological Survey maps is used by permission of the Director, British Geological Survey © NERC copyright reserved. Similarly, Ordnance Survey maps are reproduced with the permission of the Controller of Her Majesty's Stationery Office © Crown copyright reserved. Keyworth: Dr E.R. Shephard-Thorn; Mr S. Hollayer; Dr T. Dhonau; Mrs J. Allsop; Dr M. Sumbler; Dr A. Branson; Mr M. Bates; Mr R. Bowie; Dr R. Lake; Dr A. Horton. London: Miss S. Bracknell; Miss V. Messenger. Exeter: Dr C.R. Bristow; Dr R.A. Edwards.

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Finally, many thanks and thanks again to Phil Harding, who drove us to and assisted in the location and recording of virtually every Palaeolithic site listed in this volume. Not one mishap or accident befell us, except for one nail in a tyre somewhere in Warwickshire. His notoriety as a member of *Time Team* sometimes served us well in pubs, rather than his position as an experienced Project Officer of Wessex Archaeology. Personally, it was a pleasant, enjoyable, and memorable six years 'on the road' and a further volume could be written on this aspect!

John Wymer

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All other individual artefact drawings are from originals by the author, assembled here as appropriate to this text. Where composite illustrations have been assembled from illustrations that have already appeared in parts of a single publication, or 'whole' illustrations appear as previously published elsewhere, the original place of publication is stated in the relevant caption.

Summary

The distribution of stone tools produced by people living in Britain during the Lower Palaeolithic Period are related to the contexts in which they have been found, from which it is deduced when and where they were active. Favoured areas for occupation are identified by sites with prolific numbers of discarded artefacts. Such are considered to be the accumulation from frequent visitations by small groups, rather than few by large groups. Chronological indicators allow three broad temporal divisions to be made of the half a million years or so involved. These are based on the stage numbers given to the oscillations of cold and warm periods as determined from analyses of deep sea cores, referred to as Oxygen Isotope Stages (OIS). The names of the type sites for the conventional chronology as published by the Geological Society of London in 1973 for the Quaternary Correlations of the British Isles are also retained, with the exception of 'Wolstonian.' This has been removed as later research has identified at least two warm periods during this alleged glacial stage.

The majority of the evidence for occupation comes from derived palaeoliths generally in coarse river gravels, deposited during cold periods by braided streams with cut and fill regimes. Rare, organic sediments of warm periods associated with palaeoliths sometimes survive. Current interpretations are given of the manner in which river terraces are formed, and suggestions of how discarded artefacts on river beaches become dispersed into them. The present assessments of the sequence of these river gravels is also given, allowing chronological distinctions to be made for the various periods of occupation.

Reconstructions of the contemporary landscape as seen by the people is attempted. It is reasoned that what remains now that is older than a particular time of occupation would have been part of the landscape at that time. Also, it is assumed that the general areas of the outcrops of pre-Quaternary rocks, although much modified by erosion and dissection, would nevertheless cover similar areas today. Pollen analysis demonstrates that the vegetational succession during past interglacials would have been similar to the present one, apart from some variations in the types and succession of certain species. It is proposed that herds of large, grazing mammals would have been responsible for keeping well-drained areas comparatively open. A case is made for some of the most favoured areas for occupation being at the confluences of rivers, especially where these were close to accessible outcrops of Chalk downland. Evidence is shown for activity upon such downs or other plateaux, which is considerable in several places. It could be argued that mobility was essential for groups with a hunting and foraging economy, and that the gravelly edges of rivers offered the easiest routes.

Period 1 Occupation is defined as that from any time prior to the end of the major glaciation of Britain, ie, before the following interglacial considered to relate to OIS–11. Evidence is described to show that Britain was certainly occupied before the onset of this major glaciation. There is a major site on the south coast associated with a high sea level of 40 m above Ordnance Datum. There are signs of occupation in a much-eroded cave sequence in the Mendips, and several prolific sites along the valley of a lost river that once flowed between the Midlands and East Anglia.

Period 2 Occupation is from the beginning of the interglacial following the major glaciation of Britain, until near the end of the glacial stage considered to relate to OIS–8. During this period there was occupation throughout much of Britain, at least during the temperate stages of OIS–11 and OIS–9. This was along all of the major river valleys, on downs and plateaux, beside lakes, and on the fringes of the highland zone if not actually within it. Isolated examples of palaeoliths in the very western end of south Wales and in Cornwall add support to some occupation of the highlands. It is suggested that the passage of glacial ice over previously occupied land surfaces may have destroyed all the evidence elsewhere. There is no evidence during this Period 2 for the occupation of any rock shelters or caves.

Period 3 Occupation equates with the Middle Stone Age. including the Mousterian (here regarded as a subdivision of the Lower Palaeolithic). It is related to the time just before the interglacial of OIS–7 to the advent of modern humans in north-west Europe. It is identified here by the biostratigraphical dating of sediments which contain palaeoliths to this period, or by archaeological typology, ie, the presence of full Levallois technology and bout coupé hand-axes.

It is hoped that some of the information contained in this volume will be of use for future research in the Lower Palaeolithic, and also to those with an archaeological interest who wish to learn something of the people who intermittently occupied much of Britain for about half a million years.

John Wymer
August 1998

Résumé

La répartition des outils de pierre fabriqués par les peuples qui habitaient la Grande-Bretagne au cours de la période du paléolithique inférieur est liée à l'environnement dans lequel on les a retrouvés, on a donc pu en déduire quand et où ces peuples étaient en activité. On reconnait les lieux d'occupation privilégiés grâce au nombre important d'objets artisanaux rejetés que recelaient leurs sites. On considère que cet amoncèlement est le résultat de freqentes visites par de petits groupes, plutôt que de quelques séjours de groupes conséquents. Des paramètres chronologiques nous permettent de diviser le demi-million d'années en question en trois grandes périodes. Elles reposent sur les numéros de stades donnés aux oscillations entre les périodes froides et les périodes chaudes telles qu'elles ont été déterminées à partir d'analyses des fonds marins profonds; on s'y réfère sous le sigle OIS, stades d'isotopes d'oxygène. Les noms des sites types utilisés en chronologie conventionnelle tels qu'ils ont été publiés par la Société Géologique de Londres en 1973 pour les Corrélations Quaternaires des Îles Britanniques ont également été conservés, à l'exception de 'wolstonien'. Celui-ci a été éliminé parce que des recherches ultérieures ont identifié au moins deux périodes chaudes durant cette soi-disant ère glaciaire.

La majorité des témoignages d'occupation provient d'objets paléolithiques dérivés présents généralement dans du gros gravier de rivière déposé pendant les périodes froides par des cours d'eau à tresses dont le régime a creusé et rempli les chenaux. De rares sédiments organiques, datant des périodes chaudes, et associés au matériel paléolithique ont quelquefois survécu. On présente les interprétations actuelles de la manière dont les terrasses des rivières ont été formées et on explique comment on a retrouvé des objets manufacturés qu'on avait rejetés sur les plages au bord des rivières, dispersés dans celles-ci. L'évaluation actuelle de la séquence de ces graviers de rivière est également donnée, ce qui permet de faire la distinction chronologique entre diverses périodes d'occupation.

On a tenté de reconstruire le paysage contemporain tel qu'il apparaissait à ces peuples. On a estimé que ce qui subsiste de nos jours et est antérieur à une période d'occupation donnée aurait fait partie du paysage de cette époque-là. On a aussi supposé qu'en gros les régions d'affleurement rocheux du préquaternaire, bien qu'elles aient subi de nombreuses modifications à cause de l'érosion et d'éclatements, couvriraient néanmoins des surfaces similaires aujourd'hui. L'analyse des pollens démontre que la succession des végétaux au cours des périodes interglaciaires passées aurait été semblable à ce qui se passe à l'heure actuelle, mis à part certaines variations dans les types et la séquence de certaines espèces. On suggère que, si des aires bien drainées sont restées relativement découvertes, c'est le résultat du pâturage de troupeaux de gros mammifères. On étudie le fait que certaines des régions d'occupation les plus favorisées se trouvaient aux confluents des rivières, en particulier là où ils se trouvaient à proximité d'affleurements accessibles sur les plateaux calcaires. On apporte des preuves d'activité sur ces "downs" et autres plateaux, elle était considérable dans plusieurs endroits. On pourrait rétorquer que la mobilité était essentielle pour des groupes dont l'économie reposait sur la chasse et le grapillage et que les rives caillouteuses des rivières offraient les voies d'accès les plus faciles.

On a défini la première période d'occupation comme commençant à un moment quelconque avant la fin de la grande glaciation en Grande-Bretagne, c'est à dire avant la période interglaciaire qui a suivi et est considérée comme correspondant à OIS–11. On décrit des témoignages qui démontrent que la Grande-Bretagne était certainement occupée avant l'arrivée de cette grande glaciation. Il existe un site majeur sur la côte sud lié à une élévation du niveau marin de 40 mètres au-dessus des repères établis par le service cartographique.On a retrouvé des signes d'occupation dans une séquence de cavernes fortement érodées dans les collines de Mendips, et plusieurs sites très prolifiques le long de la vallée d'une rivière perdue qui coulait à une époque entre la région des Midlands et celle d'East Anglia.

La deuxième période d'occupation date du début de la phase interglaciaire qui a suivi la grande glaciation de Grande-Bretagne et a duré presque jusqu'à la fin de l'ère glaciaire que l'on estime correspondre à OIS–8. Pendant cette période on trouvait des occupations réparties quasiment partout en Grande-Bretagne, au moins pendant les stades tempérés de OIS–11 et OIS–9. Elles se situaient le long de toutes les principales vallées fluviales, sur les 'downs' et les plateaux, au bord des lacs, et en bordures des zones de hauteurs, si ce n'est effectivement sur celles-ci. Les exemples isolés d'objets du paléolithique trouvés tout à fait à la pointe occidentale du sud du Pays de Galles et dans les Cornouailles viennent à l'appui de la théorie de l'existence de peuplements sur les hauteurs.

On suggère qu'ailleurs le passage des glaciers sur des terrains préalablement occupés a peut-être détruit toute forme de témoignages. Il n'existe aucun témoignage, durant cette deuxième période, d'occupation d'abris rocheux ou de cavernes.

La troisième période d'occupation correspond à l'âge de la pierre moyen, y compris le moustérien, (considéré ici comme une subdivision du paléolithique inférieur). Elle est liée à la période qui a juste précédé la phase interglaciaire de OIS–7 et a duré jusqu'à l'arrivée de l'homme moderne dans l'Europe du nord-ouest. On l'a identifiée ici par la datation biostratigraphique des sédiments qui contiennent du matériel paléolithique de cette période, ou par la

typologie archéologique, c'est à dire la présence de toute la technologie Levallois et de bifaces de type 'bout coupé'.

On espère que certains des renseignements inclus dans cet ouvrage seront utiles pour de futures recherches sur le paléolithique inférieur, et aussi pour tous ceux qui s'intéressent à l'archéologie et souhaitent améliorer leur connaissance des peuples qui ont, par intermittence, occupé la majeure partie de la Grande-Bretagne pendant environ un demi million d'années.

Annie Pritchard

Resumen

La distribución de instrumentos líticos elaborados por gentes que habitaron en Gran Bretaña durante el Paleolítico Inferior, está relacionada con los contextos en los que han sido encontrados, de lo cual llega a deducirse cuando y donde fueron utilizados. Las áreas escogidas para ocupación se identifican a través de yacimientos con un abundante número de instrumentos líticos desechados. Los yacimientos se consideran como el resultado de frecuentes visitas por pequeños grupos de individuos, más bien que de escasos asentamientos llevados a cabo por grupos más numerosos. Los indicadores cronológicos sugieren tres amplias divisiones temporales, a lo largo de un periodo aproximado de medio millón de años de duración. Las fases se han basado en los números de etapas asignados a las oscilaciones de periodos frios y cálidos, deducidas del análisis de los fondos marinos profundos, siguiendo el método de los Isotopos de oxígeno (OIS). Se han conservado también aquí, tal como fueron publicados por la Geological Society of London en 1973, los nombres de los yacimientos tipo para la cronología convencional para las 'correlaciones del periodo cuaternario en las Islas Británicas', con la excepción del periodo Volstoniense, que ha sido eliminado, puesto que investigaciones recientes han identificado al menos dos periodos cálidos en el curso de dicha pretendida etapa glacial.

La mayor parte de la evidencia de ocupación procede de restos paleolíticos presentes, por lo general, en depósitos fluviales de gravas, acumulados durante periodos frios por corrientes de agua en las que se alternaban periodos de curso abundante con otros de estiaje. Excepcionalmente, sobreviven en ocasiones sedimentos orgánicos de periodos cálidos asociados con elementos líticos. Se ofrecen interpretaciones actualizadas del modo en el que se formaron las terrazas fluviales, y también sugerencias sobre como los instrumentos líticos desechados en las riberas quedaron diseminados dentro de aquellas. También se ofrece una valoración actualizada de la sucesión de aquellos depósitos fluviales, que permite hacer distinciones cronológicas para los diversos periodos de ocupación.

Se aborda también la reconstrucción del paisaje tal como era percibido por aquellas poblaciones, razonándose que lo que ahora subsiste y es más antiguo que una determinada época de ocupación, habría formado también parte del paisaje en aquel entonces. Asimismo, se considera que, en general, las áreas de afloración de rocas precuaternarias, si bien muy modificadas por la erosión y fragmentación, podrían ocupar hoy espacios similares. Los análisis de polen demustran que el desarrollo de la vegetación durante pasados periodos interglaciales, debió haber sido similar al de los tiempos presentes, exceptuadas algunas variaciones en los tipos y en la sucesión de algunas especies. Se propone también aquí que el mantenimiento de grandes zonas de terrenos de buen drenaje como espacios relativamente abiertos se debe a la acción de manadas de grandes mamíferos hervíboros, que pastaron dentro de ellos. Se evidencia que algunas de las zonas favorecidas por la ocupación se encontraban en la confluencia de rios, especialmente en aquellos situados cerca de formaciones calcáreas accesibles en los valles. Estos valles y otras terrazas presentan indicios de actividad, que es muy considerable en varios lugares. Puede aducirse que la movilidad era esencial para los grupos humanos de economía cazadora y recolectora, y que las orillas arenosas de los rios constituían para ellos las rutas de más fácil acceso.

El Periodo 1 de Ocupación se define como precedente a cualquier tiempo anterior al fin de la mayor glaciación en Gran Bretaña, esto es, anterior al siguiente periodo interglacial asociado a la etapa OIS–11. Se describe la evidencia que demuestra que Gran Bretaña fue, con toda seguridad, ocupada antes del principio de dicha glaciación mayor. Existe un asentamiento importante en la costa sur asociado a un alto nivel de las aguas del mar, 40 metros sobre el señalado en la Ordnance Datum. También hay signos de ocupación en una muy erosionada secuencian estratigráfica en una cueva en los Mendips, y varios ricos yacimientos a lo largo del valle de un rio hoy desaparecido, que en tiempos fluyo entre los Midlands y East Anglia.

El Periodo 2 de Ocupación se extiende desde el principio de la fase interglacial consecutiva a la glaciación mayor de Gran Bretaña, hasta cerca del final de la etapa glacial asociada a OIS–8. Durante este periodo existió ocupación a través de la mayor parte de Gran Bretaña, al menos durante las etapas templadas de OIS–11 y OIS–9. La ocupación se emplazó a lo largo de todos los grandes valles fluviales, tierras bajas y terrazas, junto a los lagos y en las estribaciones de las zonas de altitud, si no realmente dentro de ellas. Ejemplos aislados de elementos paleolíticos hallados en el extremo occidental del sur de Gales y en Cornwall

fortalecen la teoría de una discreta ocupación de las zonas de altitud. Se sugiere que el deslizamiento de la placa de hielo sobre superficies previamente ocupadas haya destruido toda la evidencia en otros sitios. Durante este Periodo 2, no hay evidencias de ocupación en ningunos abrigos o cuevas.

El Periodo 3 de Ocupación se equipara con el Paleolítico Medio, incluido el Musteriense (considerado aquí como una subdivisión del Paleolítico Inferior). Este Periodo abarca desde el tiempo inmediatamente anterior al interglacial de OIS–7, hasta la aparición de los modernos humanos en Europa Nordoccidental, según evidencia la datación bioestratigráfica de los sedimentos que contienen instrumentos líticos del periodo, o por la tipología arqueológica, por ejemplo, la presencia de una completa tecnología levaloisiense y hachas de mano del tipo *Bout coupé*.

Es de esperar que alguna de la información contenida en este volumen pueda ser útil para futuras investigaciones sobre el Paleolítico Inferior, y para aquellos amantes de la arqueología que deseen aprender algo sobre los pueblos que intermitentemente ocuparon una gran parte de Gran Bretaña, durante un periodo aproximado de medio millón de años.

Carmen Vida

Überblick

Die Verbreitung der Steinwerkzeuge, die von den im Altpaläolithikum lebenden Menschen in Britannien erzeugt wurden, sind im Kontext, in dem man sie fand, zu verstehen. Aus diesem kann man errechnen, wann und wo sie benützt wurden. Als bevorzugte Behausungsstellen werden vor allem jene identifiziert, auf deren Gelände eine ungeheure Menge von abgelegten Artefakten gefunden worden sind, wie zum Beispiel Gelände, die eher von kleineren Gruppen mehrfach als von größeren Gruppen selten bewohnt wurden. Chronologische Anzeichen ermöglichen es, die dabei in Frage kommende halbe Million von Jahren in drei Teile zu gruppieren. Diese Zeitrechnungen basieren sich auf Zeiteinstufungen in den Schwankungen zwischen kalten und warmen Perioden, die von den Analysen des Tiefseekerns ermessen werden konnten und unter den Namen 'Oxygen Isotope Stages' (OIS) bekannt sind. Die Namen der verschiedenen Gelände-Typen der konventionellen Chronologie, wie sie von dem London Geological Society 1973 in der Ausgabe des 'Quartäre Korrelation der Britischen Inseln', publiziert worden sind, werden, mit Ausnahme des Wolstonian-Typs, auch weiterhin behalten. Dieser wurde entfernt, da spätere Forschungen zumindest noch zwei weitere warme Perioden während dieser vermutlich glazialen Phasen, ergaben.

Der überwiegende Beweis für eine Besiedlung stammt von paläolilthischen Artefakten, die während der kalten Perioden bei verzweigten Bächern mit Leer – und Füll –Flußregimen, gewöhnlich im groben Flußschotter abgesetzt wurden. Seltene, organische, mit den warmen Perioden assoziierten Sedimente überleben auch manchmal. Gegenwärtige Auslegungen über den Vorgang der Bildung von Flußterassen werden beschrieben, und Anregungen, wie es dazu gekommen ist, daß sich abgelegte Artefakten auf den Flußufern darunter vermischten, gegeben. Die jetzigen Einschätzungen über die Folgereihe dieses Flußschotters ist gegeben, wobei auf chronolische Unterscheidungen verschiedener Besiedlungsperioden Rücksicht genommen wird.

Ein Versuch, die zeitgenössische Landschaft, die die Menschen damals gesehen hatten, zu rekonstruieren, wird hier gemacht. Man argumentiert, daß, was jetzt übrig geblieben ist und älter als eine bestimmte Besiedlungsperiode ist, ein Teil der damaligen Landschaft hätte sein können. Ferner nimmt man an, daß eine gewöhnliche Gegend bei einem Vorkommen von prä-quartären Felsen, die, obwohl durch Erosion und Dessektion umgebildet, eine ähnliche Fläche heute noch bedeckt hätte. Blütenstaubanalysen beweisen, daß außer einer geringen Anzahl von Variationen der Arten und Reihenfolgen bestimmter Spezien, die vegetarische Serien während der letzten Interglazialzeit den heutigen geähnelt hätten. Man nimmt an, daß große Herden von Gras fressenden Säugetieren dafür verantwortlich gemacht werden können, daß gut entwässerte Flächen verhältnismäßig flatt gehalten worden sind, besonders dort wo Kalkflachgegenden auftraten und leicht zugänglich waren. Aktivitäten auf manch solchen Flachgegenden und anderen Plateaus, die bei einer Anzahl von dieser Gegenden beträchtlich sind, können nachgewiesen werden. Sehr vieles spricht dafür, daß eine Anzahl dieser Gegenden, von denen man behaupet, sie wären einst besiedelt gewesen, oft bei dem Zusammenfließen von Flüssen aufgetreten ist. Man kann dabei annehmen, daß das Fortbewegen für Gruppen mit einer Jag – und Sammelkultur von größter Bedeutung war und die mit Schotter gesäumten Flußufern gerade ideal dazu waren, sich schnell zu entfernen.

Als Phase 1 der Besiedlung wird diejenige bezeichnet, die von je her vor dem Ende der bedeutenden Vereisung von Britannien, d. h. vor der darauffolgenden Interglazialzeit und als zur OIS–11 gehörend, betrachtet wird. Beweise werden angeführt, um darzulegen, daß Britannien ganz sicher vor dem Eintreten der bedeutenden Vereisung besiedelt gewesen war. Es gibt ein Gelände an der Südküste, das man mit einem hohen Meerespiegel von 40 m über der Vermessungsangabe assoziiert. Zeichen, die auf eine

Besiedlung hinweisen, gibt es auch. Sie findet man bei einer Sequenz von einer sehr erodierten Höhle in den Mendips und bei einer Anzahl von fruchtbaren Geländen, dem Tale eines verschwundenen Flusses entlang, der einmal zwischen den Midlands und East Anglia geflossen war.

Phase 2 der Besiedlung beginnt am Anfang der Interglazialzeit nach der bedeutenden Vereisung von Britannien bis fast zum Ende der glazialen Phase, die man als OIS–8 zugehörend betrachtet. In dieser Periode wurden große Flächen innerhalb Britanniens besiedelt, zumindest in den OIS–11 und OIS–9. Dies geschah vor allem entlang den größeren Flußtälern, auf Flachgegenden und Plateaus, neben Seen und am Hochlandrand, wenn nicht innerhalb des Hochlandes selbst. Unterstützt werden diese isolierten Beispiele der Besiedlung im Hochland auch durch die Funde steinzeitlicher Werkzeuge im äußersten Winkel von Südwales und in Cornwall. Ferner nimmt man an, daß der Verlauf des glazialen Eises über die bisvor bewohnten Landflächen jegliches Beweismaterial dafür anderswo vernichtet hatten. In der Phase 2 gibt es keine Hinweise, daß Felsen und Höhlen als Unterkunft benützt wurden.

Phase 3 der Besiedlung identifiziert man mit dem Mittelpaläolithikum, wobei die Mousterian Periode miteinbezogen wird. (Hier auch betrachtet als eine Unterteilung des Altpaläolithikum). Es gehört zur Periode kurz vor der Interglazialzeit der OIS–7 Periode bis zum Auftreten des modernen Menschen in Nordwesteuropa. Identifiziert wurde sie hier durch die Biostratigraphierung – Datierung der Sedimente, welche Steinwerkzeuge bis zu dieser Phase enthielten oder durch archäologische Typologie, d. h. das Vorkommen der 'Levallois' Technik und bout coupé Handpfeilen.

Man wünscht, daß einige in diesem Band angeführten Informationen bei weiteren Forschungen in das Altpaläolithikum von Nützen sein könnten. Dieses gilt auch denjenigen, die sich für Archäologie interessieren und etwas über die Menschen kennenlernen wollen, die einen Großteil Britanniens über ungefähr eine halbe Million Jahre periodisch besiedelten.

Monika Schmid Jenkinson

1. Introduction

1.1 The English Rivers Palaeolithic Survey and the Origins of this Volume

The initiation of the seven-year project that has led to the production of this volume was the massive increase in the quantity of gravel and sand being extracted for road building and urban development. Since many of these deposits were of Middle or Late Pleistocene age it was obvious that much evidence for the Palaeolithic period was being destroyed without record. Coupled with the great advance in Quaternary studies during the last few decades and the realisation that this was not an unlimited archaeological resource, some action was necessary.

In 1991 English Heritage commissioned Wessex Archaeology to undertake a three-year, detailed survey of the Palaeolithic archaeology of England south from the Thames. In 1994 this was extended for a further three years to cover the whole of the country. Named the *Southern Rivers Palaeolithic Project* evolving into the *English Rivers Palaeolithic Project*, its specific aims were:

- to identify, as accurately as possible, the findspots of Lower and Middle Palaeolithic artefacts and the deposits containing them in order to demonstrate fully the distribution of known Palaeolithic sites in England;
- to confirm, where necessary, the validity of previous identifications of artefactual collections;
- to verify, where necessary the provenances of discoveries, and to note the current physical condition of such sites;
- to chart the extent of relevant Quaternary deposits;
- to review previous aggregate extraction so as to understand the circumstances of the earlier discovery of Palaeolithic material;
- to consider current established and potential mineral extraction policies so as to recognise the threat to the Palaeolithic resource;
- to assess the varying relative importance of discoveries and the potential for future finds throughout the study area in order to develop predictive models; to make recommendations to English Heritage in the light of potential threats;
- to disseminate the results as quickly as possible in the forms appropriate to different users;
- to inform the academic fraternity of the progress and results of the survey;
- to put forward proposals for a synthetic monograph which summarises the results of the Project as a final report for sale to a broad market of interested institutions and individuals.

The Country was divided into 12 regions for the purposes of the survey, primarily based on the major river drainage systems. Each year two of these regions were examined. As a final undertaking, a survey of Palaeolithic findspots in Wales was also commissioned (Wessex Archaeology and Cadw 1996). The starting point and source for lists of findspots of palaeoliths was Dr Derek Roe's *Gazetteer of British Lower and Middle Palaeolithic Sites* (1968), coupled with relevant publications. To this was added the entries on the Sites and Monument Records (SMRs) for the counties concerned and the records of the, unfortunately rare but dedicated, local non-professional archaeologists whose interests are in the Stone Age. With few exceptions all findspots were visited, which also provided the opportunity to observe the local topography and any geological exposures where they existed.

The principal means of presenting the data was a series of detailed maps that related known findspots to Quaternary geology, accompanied by a gazetteer. A particularly important feature of the maps was the marking of areas of past, present, and (then) currently predicted future mineral extraction. The reports were presented each in two comb-bound volumes, one of A4 size with text, and the other of A3 size with the maps. The maps were all produced in colour using Computer Aided Design (CAD) and as a result, were extremely expensive to reproduce. The numbers of copies of each year's *Report* (Wessex Archaeology 1992–7; Wessex Archaeology and Cadw 1996) were therefore limited and were only distributed to interested bodies such as County Planning Authorities and involved personnel. At least one copy was lodged with each of the appropriate SMRs for consultation by the sponsoring authority's members and officers, as well as the general public. In no manner are the reports of a confidential nature and they are freely available to landowners, managers, developers, conservationists, researchers, and any other interested party.

A concise summary of the results of the *Southern Rivers Palaeolithic Project* was presented in Wymer (1996). This volume represents a synthesis based on the entire project but with a very significant shift of emphasis. Here we are concerned with people as much as with artefacts: with when and where they moved through the land we now know as Britain and in interpreting, where we can, what they were doing during the first half million or so years of that occupation.

1.2 The Palaeolithic Period

Otherwise known as the Old Stone Age, this period covers that of human existence until, as far as north-west Europe is concerned, the time when the ice sheets and glaciers of the last glacial stage receded, about 10,000 years ago. The term was first used by Sir John Lubbock in 1865 in his volume entitled *Pre-historic Times*. He defined it as 'when man shared the possession of Europe with the Mammoth, the Cave bear, the Woolly-haired rhinoceros, and other extinct animals.' Sir John Evans in his first 1872 edition of his *Ancient Stone Implements … of Great Britain* adopted the term, but was very conscious that there were great differences to the Palaeolithic evidence from river gravels and those found in caves. The former he still referred to as the 'Drift period' as opposed to the 'Cave period'. The latter is now referred to as the Upper Palaeolithic.

This volume is only concerned with the time before the Upper Palaeolithic, when Europe was inhabited by modern humans, physically identical to ourselves. The earlier period of the Palaeolithic can thus now be defined in a temporal sense, for north-west Europe at least, of covering human existence until about 40,000 years ago.

Dates will be expressed here, if not numerically in years before the present (eg, 350,000 BP), usually in thousands of years, abbreviated in the current conventional manner as Ky (eg, 200 Ky = 200,000 years BP), or My (eg, 1.6 My = 1,600,000 years BP).

Lubbock's definition still applies, but only covers a modicum of the various aspects of this enormously long period. As will be outlined in the following chapters, the Palaeolithic Period in Britain spans at least half a million years. For one who finds it difficult to comprehend time on such a virtually geological scale it is best to try and relate it to lineal distance. Consider if this half a million years is represented by a foot ruler, the first mammals would have to be placed about the distance away of 17 cricket pitches, the first primates (our group of mammals) 8 pitches away, and the first man-like apes 3 pitches away. Geologically, half a million years is recent! Alternatively, it can be seen as some 125,000 generations from the Roman period. However, it must be stressed here that the Palaeolithic occupation of Britain was anything but an unbroken succession of people breeding from one generation to another from one end of the Palaeolithic to the other. The country can only have been occupied intermittently, for climatic conditions during some of the glacial stages would have been unendurable.

The Palaeolithic is in some sense, synonymous with the Ice Age, in which we still live. It has been a period of drastic changes of climate with successions of cold and warm periods. Sometimes it was so cold that the polar ice sheet spread southward and covered much of Britain. At other times it was somewhat warmer than at present, with some animals such as the pond tortoise and many species of molluscs that are now found no nearer than the Mediterranean. It is, of course, a time when stone was the dominant raw material for making tools; or at least it appears to be so as nearly everything else has perished. As Lubbock pointed out, many of the animals which were contemporary with the period are now extinct, but other have evolved to slightly different forms; some remain the same.

It will be seen that people were using a distinctive flint-working technology during the latter part of the period, and had probably physically evolved enough to warrant a subdivision within the Lower Palaeolithic Period. Thus, it is referred to as the Middle Palaeolithic Period. Obviously, such changes only occurred over a long period of time and may not often be easy to recognise. Thus, an arbitrary division between Lower and Middle is used here, based on a point in the chronological sequence.

Only in recent years has it become possible to assess the scale of time involved and, to some extent, the sequence of the geological events and geological changes throughout the Pleistocene Period.

This has been achieved by the study of cores taken from the deepest parts of the ocean throughout the world, where there has been continuous or near-continuous sedimentation on the sea bed. Nowhere on any of the land masses is there any such unbroken geological record.

The application of radioactive methods of dating, estimates of the rates of sedimentation, and identification of changes in magnetic polarity have made correlations possible on a global scale. Coupled with measurements of the oscillations of ocean temperature by analysis of marine micro-organisms, the cores give a full record of the cold and warm periods which must relate to the various terrestrial glacial and interglacial deposits. Here lies a framework in which to place the evolution, life-style, and movements of the human species throughout the whole of the Palaeolithic period. For this survey, only the last half a million years or so is relevant.

The marine stages are referred to as Oxygen Isotope Stages (OIS) as the basis of the method for identifying in the cores the climatic changes in ocean temperature is by the composition of the foraminifera preserved in the sediments. This is due to the increase or decrease in the global ice sheets which has an effect on the Oxygen element contained in the carbonaceous shells of the foraminifera. See Patience and Kroon (1991) for details, and also an account of the results related to the

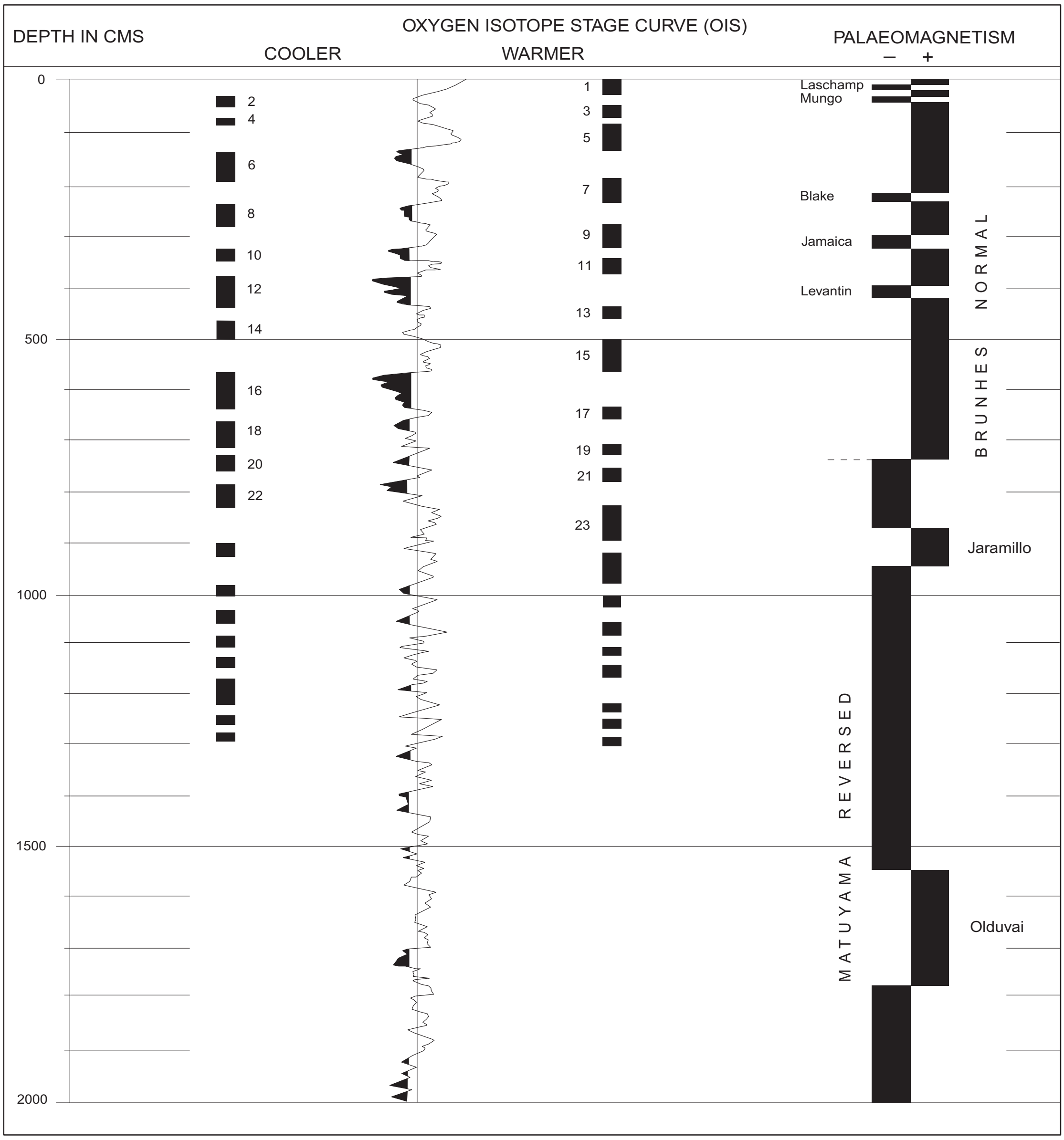


Table 1 Oxygen Isotope Stages

The temperature curve records the oscillation of climate for about the last two million years, as shown by oxygen isotope analysis of deep-sea cores. The adjacent vertical bars indicate the major cooler (even numbers) and warmer (odd numbers) stages, which are thought to be linked with the various glacial and interglacial periods of the northern hemisphere. The rate of deposition of sediment for the last 30,000–40,000 years is known, for it can be measured by radiocarbon dating, and it is in the order of 1.0 cm per 1000 years. To obtain a time-scale for the Pleistocene period it is reasonable to extrapolate this figure. Actual calculations are complicated by such factors as changes in sediment particle size, gaps in sedimentation, and movements of the ocean floor. The curve is based on core V28-239, taken in the western Pacific ocean, and is thought to represent about 2.1 million years of accumulation (Shackleton and Opdyke 1973). A cross-check with certain terrestrial deposits is possible by the combination of palaeomagnetic measurements and potassium/argon dating. The latter method indicates a date of 780,000 for the Matuyama/Brunhes palaeomagnetic reversal

known effects of changes in solar radiation caused by the variable movements of the earth's orbit.

Table 1 indicates the number of cool and warm periods recognised in the deep sea cores throughout the Pleistocene period. Major periods of cooling are shown in black on the Oxygen Isotope Curve. These have even numbers, whereas the warm periods have odd ones. It can be seen that the first major cool period is No 22,

OIS	Age Ky	British conventional chronology	Climate
1	12		Warm
2	25	DEVENSIAN	Mainly cold
3	50		
4	70		
5a–d	110		
5e	130	IPSWICHIAN	Warm
6	186	WOLSTONIAN	Cold
7	245		Warm
8	303		Cold
9	339		Warm
10	380		Cold
11	423	HOXNIAN	Warm
12	478	ANGLIAN	Cold
13		CROMERIAN and earlier	Warm

Table 2 Simplified table showing correlation between Oxygen Isotope Stages (OIS), conventional British Quaternary stages, and climate (based on Shackleton and Opdyke 1973; Mitchell et al. *1973; Bowen 1994*

shortly before the Matuyama/Brunhes palaeomagnetic reversal. The earliest human occupation of Britain, on present evidence, is likely not to have been until OIS–13, or perhaps OIS–15. Unfortunately, it has to be emphasised that sidereal or chronometric dates, as opposed to the relative ones of the sequence, can only be estimated between the limits of radiocarbon dating (*c.* 35–40 Ky) and the Potassium/Argon (K/Ar) date of about 780 Ky for the Matuyama/Brunhes palaeomagnetic reversal. Various 'floating' dates can be inserted from other methods by Thermoluminescence (TL) or Amino Acid Chronology (Chapter 2.4) and glacials or interglacial deposits correlated by 'counting down' the cold episodes in the geological record from the present. The latter is not a very satisfactory method, but current interpretation puts the most extensive glaciation of the British Isles as OIS–12. Relating terrestrial deposits to the marine sequence remains the biggest problem in trying to create a reliable framework for the Palaeolithic period.

In spite of the difficulties stated above, the Oxygen Isotope Stages are used here to define three divisions of time for the Palaeolithic occupation of Britain: Periods 1, 2, and 3. However, conventional stage names for the British Quaternary are based on stratigraphy (Mitchell *et al.* 1973) and are reliable, although certainly incomplete and can only give relative dates. They are referred to by stage names, in order from the last cold period downwards as:

Devensian
Ipswichian
Wolstonian
Hoxnian
Anglian
Cromerian and earlier stages

Table 2 indicates how these conventional stages are related to the Oxygen Isotope scale, together with current estimations of sidereal dates.

The three temporal divisions for the Palaeolithic occupation of Britain for this survey is thus defined by:

PERIOD 1 Before the most extensive glaciation of Britain for which evidence exists (Anglian Stage of conventional chronology) until the advent of the interglacial conditions which followed it = OIS–13 or earlier until the end of OIS–12. This will be referred to as the earliest occupation of Britain.

PERIOD 2 From the beginning of the Hoxnian Interglacial to the latter part of the glacial stage prior to the Stanton Harcourt Interglacial = OIS–11 to latter part of OIS–8. The majority of Lower Palaeolithic sites in Britain are found in river deposits of this period.

PERIOD 3 From the latter part of the glacial stage prior to the Stanton Harcourt Interglacial to the advent of modern humans at about 40,000 BP. This will be referred to as the Middle Palaeolithic of Britain.

1.3 Evolution

From where came the first people we know of in this country? There is, as outlined in this volume, plenty of evidence to show they were here before the major glaciation of the British Isles which commenced on present estimates at about 480,000 years ago. Who were they? What did they look like? These are not easy questions to answer other than by sensible guesses based on present knowledge, insufficient as it is. Negative evidence supports two premises: no-one was here much before about half a million years from the present, and humanity did not evolve in this part of Europe. This means our first occupants must have come from across land which is now the English Channel. The date fits in well with most of what we know in Europe, although there are some very much earlier ones from Spain.

Current thought mainly concludes that humanity evolved in Africa, although the Far East could be another contender. However, there is good, positive evidence in southern Africa for evolutionary change among the Hominidae (ie, ourselves and our immediate fossil ancestors) during the preceding couple of million years.

There have been so many spectacular discoveries in Africa, mainly in Tanzania, Kenya, and Ethiopia in the last two or three decades of well-stratified and dated fossil remains of 'early' humans within this time range that it would be difficult to refute this African origin. As most of the finds are fragmentary rather than complete or even partly complete skeletons there is great difficulty in classifying them. The code for zoological nomenclature is strict, with laws of priority, with the result that individual finds tend to get individual names, even though they may be distantly or even nearly related. Great arguments continue with those who would retain these names and those who would amalgamate those with enough similarities to one species: the splitters and the lumpers to put it flippantly.

Until recently, it was generally agreed that *Homo erectus* was fully evolved in Africa at about 1.6 My and, thereafter there were migrations out of Africa at punctuated intervals. It has now been suggested that *erectus* is confined to Asia and that *Homo ergaster* was the ancestor of humans (Wood 1992). This is not accepted by several palaeo-anthropologists but, in any case, it would be absurd to classifiy a human species on the basis of a broken shinbone and two teeth, as found at Boxgrove in 1993: the oldest human skeletal remains known in Britain (Stringer 1996). So the dead person is referred to as *Homo heidelbergensis*. This is because a massive mandible which was found at Mauer, near Heidelberg, in 1907 is referred to as such and is about the same age as the Boxgrove bone. Hence the adoption of the title on temporal grounds.

Ky	*Britain*	*Europe*
	Modern humans	Modern humans
	Pontnewydd (?N)	Ehringsdorp (N)
		Steinheim (H)
		Arago (H)
	Swanscombe (H)	Bilzingsleben(H)
		Vertesszollos (H)
500	Boxgrove (H)	Mauer (H)
		Atapuerca (?H)
1000		

Table 3 Chronology of the only Middle Pleistocene hominids found in Britain, and some of the major ones in Europe. although tentatively classified here as either Homo heidelbergensis (H) *or* Homo neanderthalensis (N)*, there is much discussion and disagreement by palaeo-anthropologists on the matter and it is much less controversial to refer to them as per Gamble (1993) as 'the Ancients', except, perhaps, for the classic Neanderthalers of the Late Pleistocene*

To revert to how these first occupants came here, it may have been originally from Africa, but many hundreds if not thousands of generations afterwards that people began to migrate across Europe and eventually to southern England. The initial migrations into Europe from Africa were most likely through the Middle East as the Mediterranean would have been a formidable barrier at all times. It is fascinating to reflect that the elegant hand-axes associated with the human remains at Boxgrove are about a million years younger than the first ones found in Africa, yet the technology had hardly changed!

It will be seen that the next half a million years, in Europe at least, saw the evolution of Neanderthalers (now given the name of *Homo neanderthalensis* as opposed to ourselves who are *Homo sapiens*). In view of what is so little known of the period in between, the solution of this problem of nomenclature by Professor Gamble by referring to them as 'the Ancients' is adopted here. Otherwise, 'archaic *Homo sapiens*' is also satisfactory. Such were the people who occupied Britain intermittently until the advent of modern humans. These Ancients as found at Boxgrove and Mauer were almost certainly the ancestors of the later Ancients, the Neanderthalers. From what we know of *H. ergaster* elsewhere, we should certainly recognise him (for the massive shin from Boxgrove suggests it was a male) as one of us, but perhaps be rather alarmed at the flatness of his face and heavy eye brow ridges. He was more likely to have been tall rather than stocky and walk or run as normally as we might.

It is odd that the only three sites in Britain to produce any human remains of the Lower and Middle Palaeolithic periods as surveyed in this volume are in each of the three periods of occupations as defined in Chapter 1.2. Boxgrove is Period 1, Swanscombe is Period 2, and Pontnewydd is Period 3 (Table 3). Also, each site has produced different human parts: a tibia from Boxgrove as noted above, and two teeth; most of a human cranium from Swanscombe; and teeth, mandibular and vertebral fragments from Pontnewydd.

The Swanscombe skull fragment (Colour Pl. 14) has features which suggest it is a female archaic *Homo sapiens* with Neanderthal affinities. The conclusion with the Pontnewydd remains was that there were Neanderthal-like features in the upper molar teeth, but insufficient evidence to align them with archaic or anatomically modern humans.

One of the most intriguing questions is what happened in this country when modern humans began to arrive in north-west Europe, probably from the Near East, across central Europe and eventually across what is now the English Channel. The land bridge had long since disappeared by some 450,000 BP and there is reason to believe that the original narrow straits between Calais and Dover had progressively widened since then. Only when the sea level was low, as it was in the extremes of glacial periods, was it probably less hazardous to cross over.

However, we know that some people did around 40,000–38,000 BP, from the evidence of Kents Cavern. Did they come into contact with any of the later occupants of Period 3? There is evidence in a French cave site at St Césaire in the Charente Maritime of Neanderthal remains associated with the type of blade industry normally attributed to the work of modern humans. The TL dates are 36 Ky, which makes the Neanderthal remains the youngest Neanderthaler so far dated. Some overlap in this area between modern and archaic humans seems evident.

There is only one site in this survey where such an overlap might be represented: the Bramford Road Pit at Ipswich (Map 44, 4). Here, an assemblage of Levallois flakes and small hand-axes recovered from gravel of a low terrace of the River Gipping, dated to the Devensian Stage, was mixed with a few blades and leaf points that are characteristic of the early Upper Palaeolithic. In view of the derived nature of the material and the possibility of reworking of the gravel, this cannot be substantiated. The disappearance of Neanderthalers everywhere remains one of the great debates of the later Palaeolithic period (Mellars 1996).

1.4 Technology, Typology, and Terminology

Palaeolithic archaeology would hardly exist without stone tools. In Britain there is one part of a wooden spear from Clacton (Colour Pl. 15), some skull bones from Swanscombe, a piece of a leg bone and two teeth from Boxgrove, some teeth and small bones fragments from Pontnewydd, and a few bones with cut-marks that would be difficult to explain as a result of non-human activity. If these rare objects had not been preserved or discovered, or people had not made stone tools, it is astonishing to realise that people had been living here on and off for half a million years and we should know nothing of it. Furthermore, we should known nothing of when they were here, what they did and, the main point of this volume, where they went. Thus, a brief note on stone tools during the Palaeolithic period is essential.

There is no evidence in Britain for any working of bone or antler during the whole of the Lower and Middle Palaeolithic, although pieces were probably utilised for various jobs at times, such as the antler flint-working hammers from Boxgrove. The same is true in Europe, although there are some scratched and perforated bones associated with the Mousterian (Mellars 1996, 371–6).

(Fig. 1)

Mode 1. Assemblages with flakes struck by hard hammers on cores, either haphazardly wherever a suitable flaking angle was available on the parent nodule, or more systematically by alternate flaking. The latter is the method by which the struck surface on the nodule from the first flake is used as the striking platform for the next one, and so on. Such flakes sometimes retouched with hard hammers. Occasional rough, bifacial pieces. No hand-axes.

(Fig. 2)

Mode 2. Assemblages with hand-axes made by hard or soft hammer technique. Retouched flakes, sometimes of standard forms. Occasional alternately struck cores.

(Fig. 3)

Mode 3. Levallois flakes from discoidal or prismatic cores. Retouched flakes. Some hand-axes, including bout coupé forms.

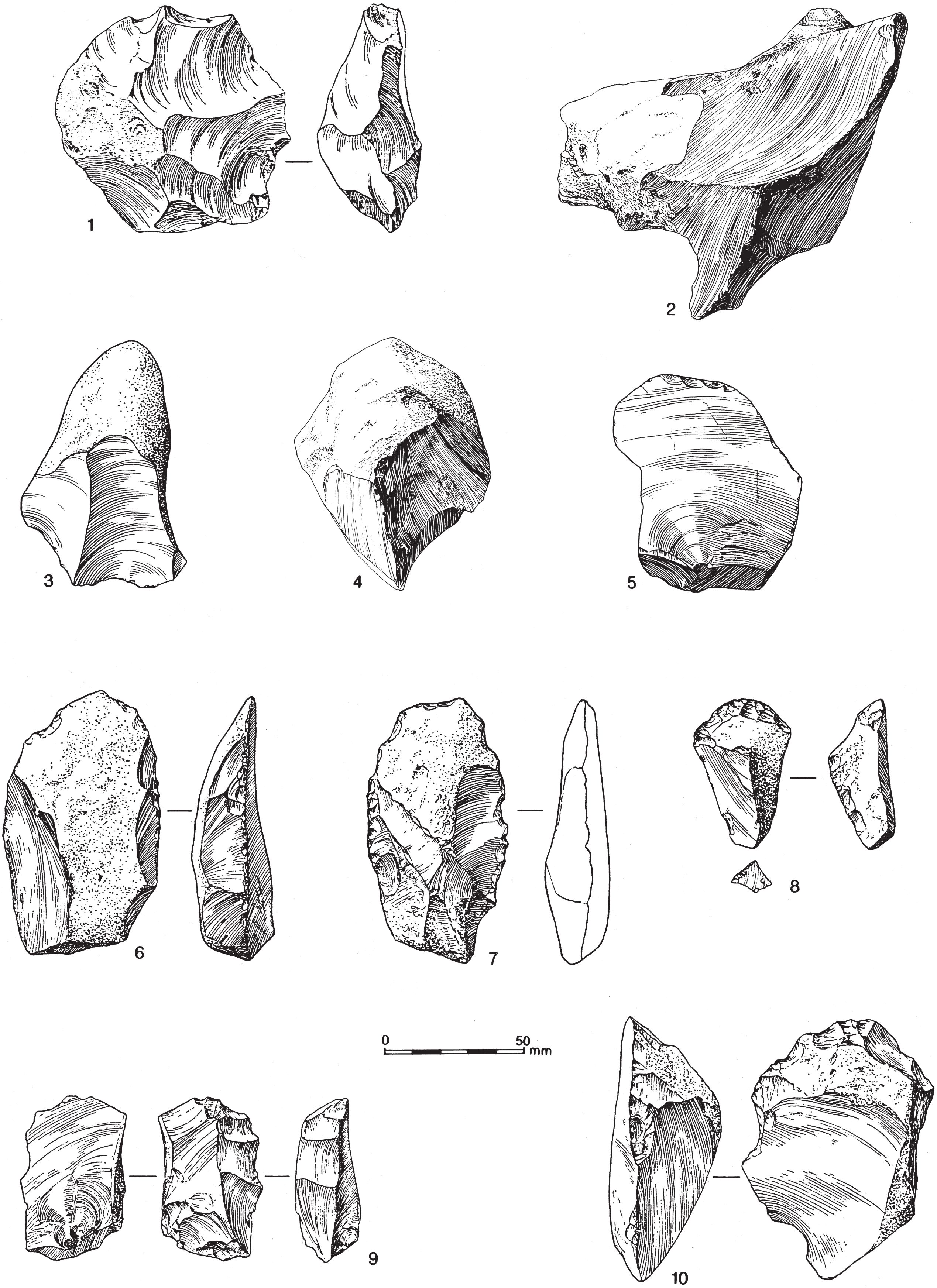


Figure 1 Mode 1 technology. 1–2) core, alternately flaked, Clacton-on-Sea, Jaywick sands and Harpsden, Highlands Farm; 3–4) 'chopper-cores', Clacton and Highlands Farm; 5) flake struck with a hard hammer, Clacton; 6–10) retouched flakes, Clacton

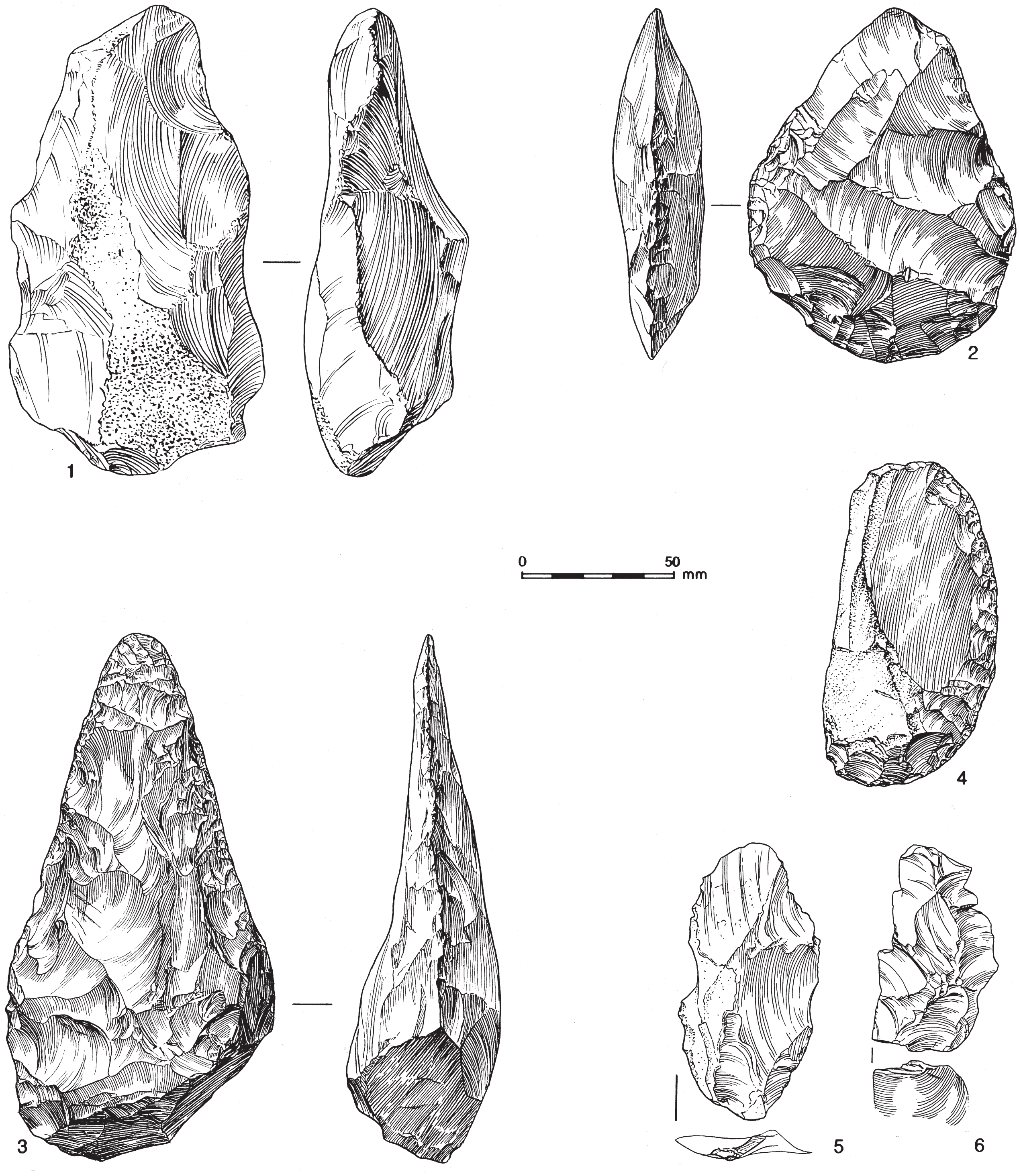


Figure 2 Mode 2 technology.
1) stone-struck crude hand-axe, Harpesden, Highlands Farm;
2) ovate hand-axe with tranchet edge, Swanscombe, Upper Loam;
3) elegant pointed hand-axe, Swanscombe, Middle Gravel;
4) retouched flake, Hoxne, Upper Industry;
5) hand-axe thinning or finishing flakes, Hoxne, Lower Industry

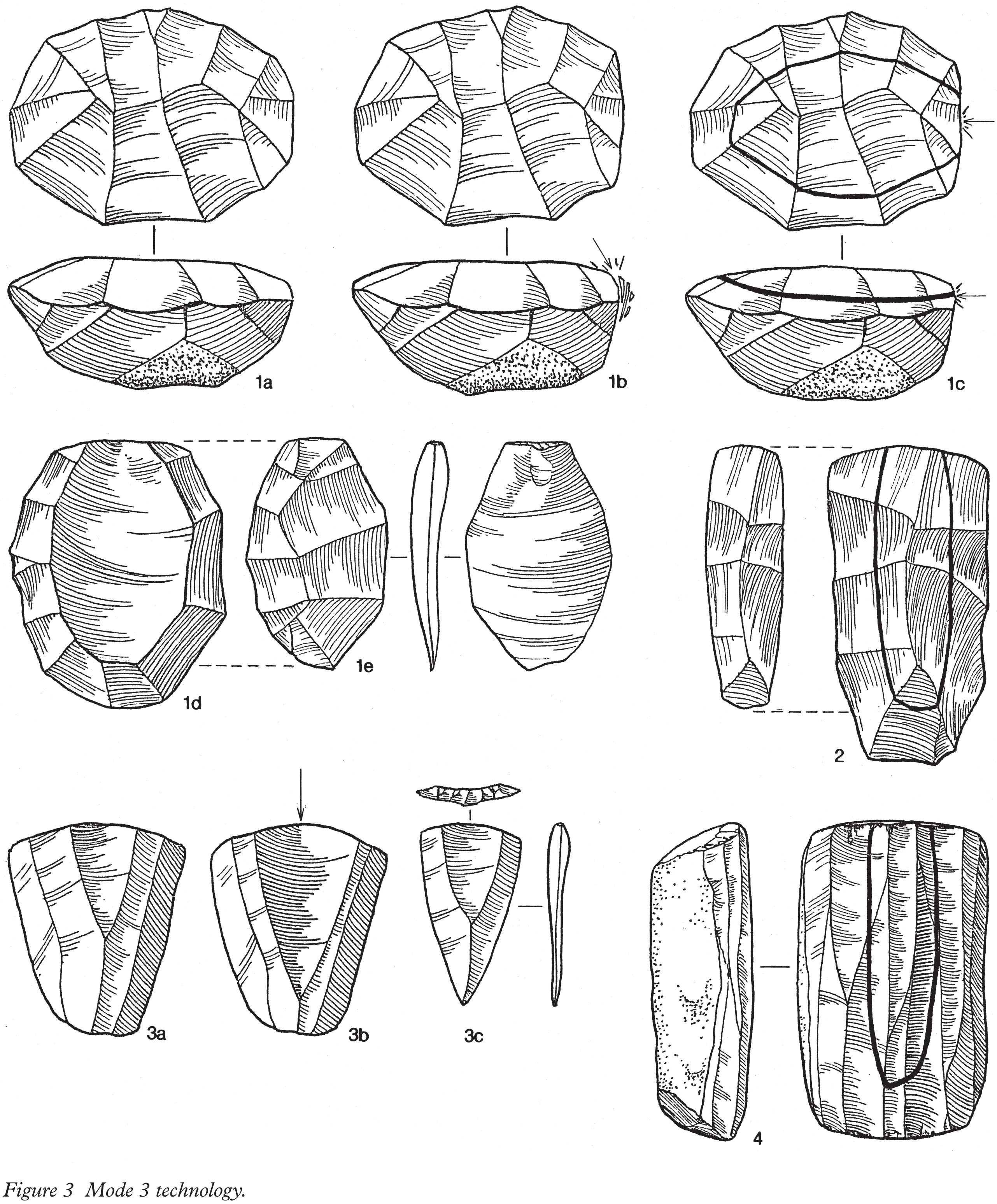


Figure 3 Mode 3 technology.
1) production of Levallois flake from radial 'tortoise' core: 1a) blocking out with hard hammer; 1b) preparation of striking platform; 1c) removal of flake from core; 1d) distinctive face left from flake removal; 1e) flake removed from core
2) Blade-like flake removed from core
3 a–c) Production of pointed flake-blade
4) True prismatic core with opposed platforms (rare)

There is no need to dwell on the stone tool-making of the early forms of *Homo* in Africa, who struck flakes off suitable pebbles as early as about 2.5 million years ago. The ability of modern chimpanzees to do likewise has been demonstrated, but significantly they will only copy and there is nothing to indicate they ever do so on their own accord. The chimps and other higher primates can be ruled out as responsible for these very early artefacts. It is reasonable to conclude that it was only *Homo* who was capable of a thought process that related stone tool-making to perceived advantages. It took a very long time to develop this practice into a highly skilled stone-working technology, but by 1.3–1.6 My, most of the essential techniques and typologies existed in Africa that are found in the European Lower Palaeolithic. So the first people who came to Britain had a background of about a million years of hand-axes, retouched flakes, and suchlike behind them. Different groups probably had traditional methods passed on from one generation to another, which varied from group to group. Upon this has to be considered several other factors which could influence the types of stone tools which are found, and the manner in which they were made: availability or type of raw material, varying individual skills or exigencies of the moment.

First, it would seem best to consider what categories of tools are found as recurring assemblages in the

Figure 4 (opposite and below) Terminology, typology and various technological attributes of hand-axes

MODE 1
Type A) chopper-core;
B) biconical core;
C) proto-hand-axe

MODE 2:
Type D) stone-struck crude hand-axe;
E) small (< 10 cm length) hand-axes, usually of irregular shape;
F) pointed hand-axe;
G) sub-cordate hand-axes;
H) cleaver;
J) cordate hand-axe
K) ovate hand-axe;
L) segmental 'chopping' tool;
M) ficron hand-axe;
N) flat-butted cordate hand-axe or bout coupé

MODE 3: Levallois cores and flakes

Hand-axe typology

BUTTS AND POINTS
mainly applicable to type F hand-axes

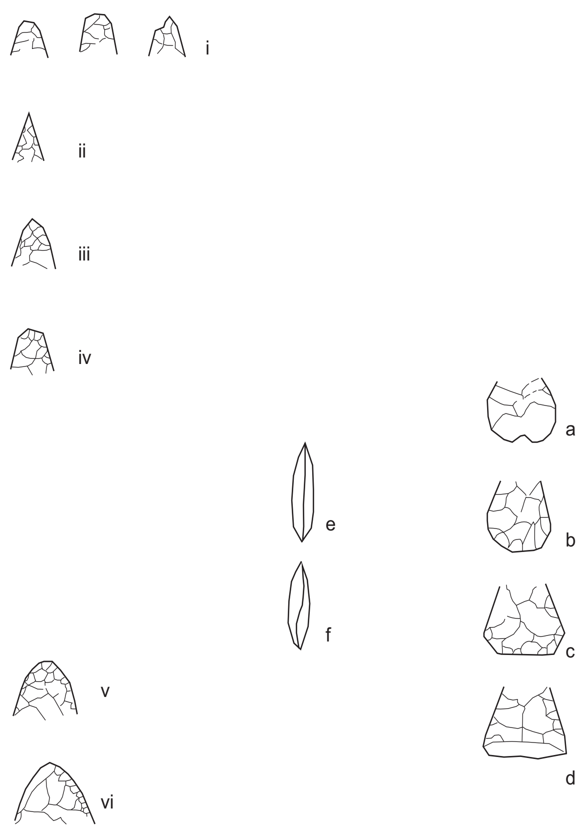
(a) over 50% cortex or natural fracture on butt
(b) trimmed butt
(c) trimmed butt, chamfered corners
(d) flat based butt

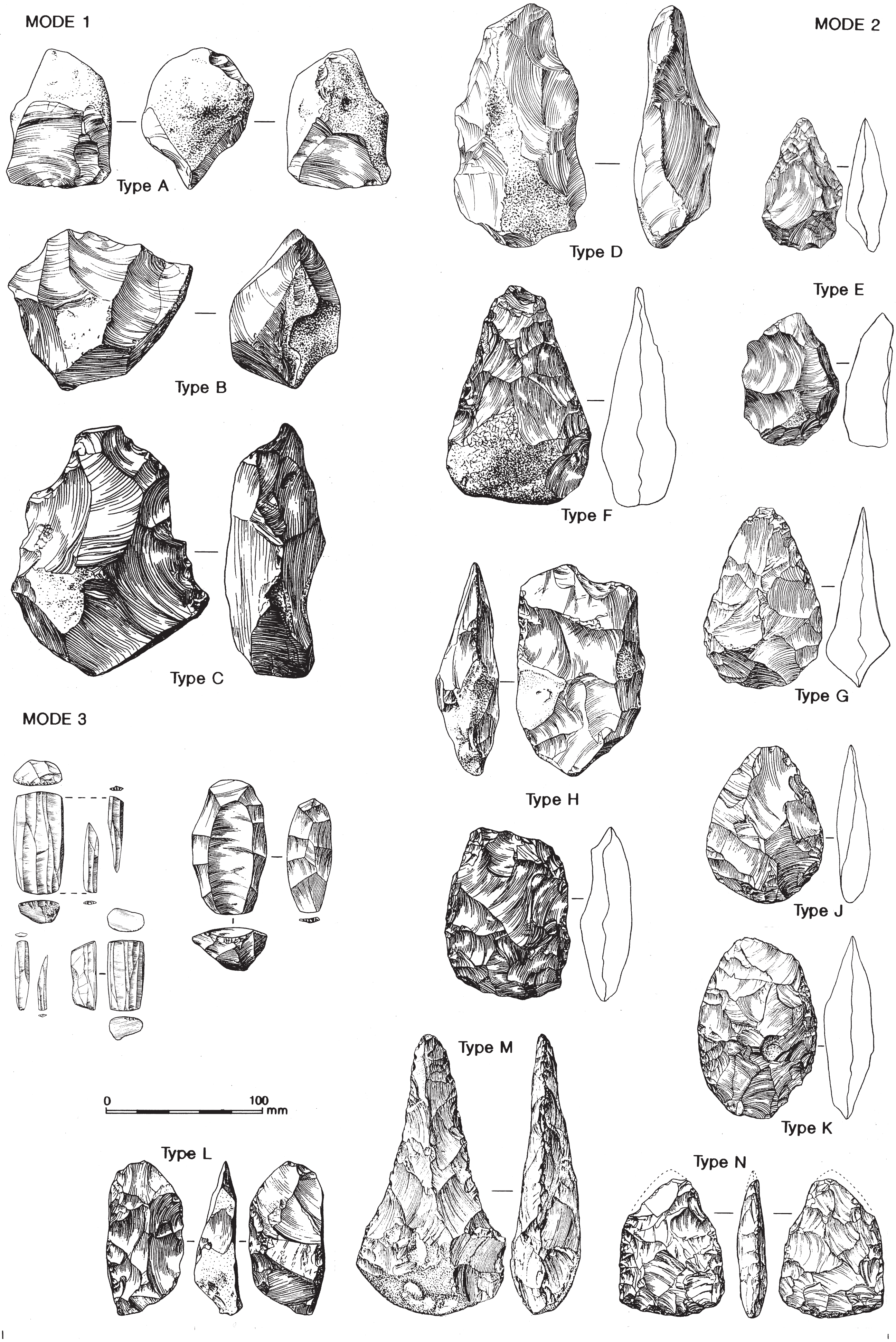
(i) rounded, lingulate or irregular point
(ii) acute point
(iii) ogee point
(iv) basil point

EDGES
mainly applicable to types J and K hand-axes

(e) straight-sided
(f) twisted edge, usually reversed S

(v) without tranchet edge
(vi) with tranchet edge





MODE 1
Type A
Type B
Type C
MODE 2
Type D
Type E
Type F
Type G
Type H
Type J
Type K
MODE 3
Type M
0
100
mm
Type L
Type N

Lower Palaeolithic of Britain. Flint is the usual raw material, but other stones, especially quartzite, were sometimes used. Flaking was done with hard or soft hammers. Grinding and polishing was never employed, but usage sometimes imparted a slightly polished edge. Pressure flaking does not seem to have been used.

The main characteristics and descriptive terms of Palaeolithic flint-working are shown in Figures 1–3 as per Barton (1997) and summarised in the box on p. 6.

This is a very broad description of these three assemblages and they are not always mutually exclusive. However, the use of full Levallois technique does seem to have some temporal significance, in that it is not apparently found prior to the latter part of the cold period of OIS–8.

As explained in the previous section, these assemblages were given industrial status, named after type sites, Modes 1, 2, and 3 as above becoming the Clactonian, Acheulian, and Levalloisian or Mousterian. The latter still seems valid but doubts have been expressed more recently on the use of the terms 'Clactonian Industry' and 'Acheulian Industry'. This is mainly as they suggest a separation that may not be justified, with connotations of equating with different life styles if not physically different people. This may be so, or not so, but the terms are so entrenched in the literature and, if restricted in their use to observations concerning the similarity or otherwise of assemblages to the type sites, their use seems justified. They facilitate general comparisons between what are seemingly non-hand-axe assemblages as at Clacton, and hand-axe dominated assemblages as at St Acheul in northern France. Used in a decriptive sense, with any necessary provisos, they convey adequate descriptions of the assemblages in question. In no manner should they imply any temporal or chronological sense. Hence, the terms are used here, sparingly.

A particular aspect of assemblages dominated by hand-axes is the variation in their shapes (Fig. 4). They range from pointed forms, to cordate or ovate forms, sometimes with heavy butts, sometimes flaked round all the edges. Metrical analysis by Professor Roe of numerous hand-axe groups in the 1960s suggested that they could be separated into seven distinctive groups. either in the pointed or ovate tradition. This seems indisputable, but why they should be is another matter. It cannot be a matter of increasing refinement through time, as some of the most skilfully made, elegant hand-axes occur at the early site of Boxgrove. It has been suggested that the shape of the flint raw material decreed what could be made from it. Large, flattish nodules would allow ovates to be produced, which had the advantage of an all-round cutting edge. However, several wide cordate hand-axes have cortical or unflaked butts which could easily have been thinned down to a working edge. Conversely, more cylindrical nodules as likely to be found in river gravels would be too thick and narrow to allow anything but a point to be fashioned at one end, with no or limited flaking of the thick butt. Furze Platt, Maidenhead, seems to have been a site with ample supplies of large nodules of flint from the Upper Chalk, yet the dominant form of hand-axe is pointed. It has also produced the largest hand-axe in Britain which is in the same tradition, from a piece of flint that could easily have been used to make two ovates! Certainly, it is impossible to make a slender ovate hand-axe from a thick nodule that is no wider than the desired width, but inherited traditional methods may have had a considerable influence. It remains one of the fascinating aspects of Palaeolithic technology.

As will be seen in the next section of this Chapter, the typology of stone tools has been one of the major elements of Palaeolithic archaeology since the period was first recognised. Differences in style and quality of workmanship, form, and possible purpose were recognised and studied. It was soon noticed that certain assemblages resembled each other: some were dominated by particular types of hand-axes, some only contained cores and flakes, others included Levallois flakes. There was much sound observation and recording but, with the lack of any sound dating framemorks or the application of biostratigraphical methods of investigation, conclusions were based on assumptions.

There is still more to learn than is known but, as far as typology is concerned, and with this survey, it is apparent that until the advent of full Levallois technique at about perhaps 250 Ky, Modes 1 and 2 as defined above could occur at any time and no tidy, evolutionary sequence exists. Whether this is the result of different traditions of inherited stoneworking, exigencies, choice of or availability of raw material, human variability, or a mixture of any of these factors is another matter. There is nothing in Africa or the Near and Middle East to suggest anything different, although the virtually total lack of hand-axes in Asia must have some relevance. However, with the more refined and elaborate technologies, such as the reduction sequences in the making of an elegant, symetrical hand-axe, or the striking of a large flake from a Levallois radial core, one is able to follow the thought processes of the ancient knapper. It is as near as it is possible to get to a Palaeolithic individual.

1.5 History of Research

Palaeolithic archaeology was initiated on 22 June 1797, when John Frere's account of his acute observations on the 'flint weapons' (= hand-axes) was read to the Society of Antiquaries of London (Frere 1800). His realisation that they belonged to a remote period 'even beyond that of the present world' was at variance with current thought of the time and received none of the attention it deserved. It was not the first published report of hand-axes from a geological context, for one from Grays Inn Lane was published in 1715, but was regarded as the work of some ancient Briton and received even less attention. This, and published papers emanating from the well-known excursion to Abbeville by Falconer in 1858 and Sir John Evans and Prestwich in 1859 (Evans 1860), eventually convinced the learned and not so learned world of the great antiquity of their own species. The remainder of the century saw a phenomenal rise in the collection of palaeoliths, the study of Pleistocene geology and observations on the contexts of archaeological discoveries of the period. 1872 saw the publication of Evans' monumental work on the *Ancient Stone Implements … of Great Britain* and its later, much-revised edition in 1897. Worthington Smith was recording the rich sites often in primary context at Stoke Newington, Caddington, and elsewhere, culminating in his 1894 publication of *Man the Primeval Savage*. Allen Brown studied the sites around Ealing and published his *Palaeolithic Man in North West Middlesex* in 1887. Spurrell was excavating the Crayford site. The British Geological Survey were giving detailed attention to Quaternary deposits in their mapping and *Memoirs*. It was a time of great activity and consolidation.

Abroad, the Swiss were laying down the principles of glacial geology. Agassiz (1840) had already convinced British geologists that their country had been covered by ice, and Penck and Bruckner put forward in 1909 their fourfold interpretation of glaciations based on deposits remaining in the Alps. They identified four glaciations which they named Günz, Mindel, Riss, and Würm, with intervening interglacials. These names were to dominate most attempts to produce chronologies in Britain for many years. No human remains had been found in Britain which could be associated with the Palaeolithic, although several were being unearthed abroad. The first Neanderthal skeleton – from Neandertal – was found in 1856. By the early part of the 20th century, several other Neanderthalers had been found in France and elsewhere, and a much earlier mandible from Mauer in Germany. The only contribution from Britain was the infamous Piltdown skull: always controversial and ultimately declared an implanted fake.

By this time, Palaeolithic archaeology began to waver. Much good work continued, such as the British Museum excavations at Swanscombe, Northfleet, and Sturry, but Quaternary geologists had not developed the analytical techniques required to unravel the bewildering complexity of deposits, especially in East Anglia, and place them in any sequence. Several archaeologists began a quest to find the oldest artefacts. There were emotional arguments and lengthy publications about 'eoliths' and 'pre-Crag' man. The attempts to place different types of flint tool assemblages into a chronological sequence by typology and not stratigraphy was fraught with confusion. Typology, in Britain and especially in France, was elaborated to a point of absurdity. Assemblages were given industrial status: ie, Acheulian (hand-axe) industries, Levallois (prepared core) industries, and later Clactonian (core and flake) industries. As descriptive terms these were and still are acceptable, but the subdivision of them by degrees of evolving typological finesse made a mockery of it. As one wag once commented, it was as if the artefacts were breeding among themselves!

In retrospect, as several archaeologists have commented, this was something of a 'hang-up' from the Victorian notion that everything evolved from the crude to the refined: human beings, culture, artefacts, whatsoever. Current philosophy finds little to support such a notion.

This is not to suggest that no progress was being made. By the 1930s, the University of Cambridge was sponsoring excavations on East Anglian sites by T.T. Paterson, methodically dug and well published. Many others could be cited, but it has to be emphasised that scientific techniques for dating, interpreting the deposits, or obtaining environmental information, either were not applied or did not exist. Quaternary geologists were in a somewhat similar situation. The basic sequence of glaciations was still controversial. It still is, but certain aspects of it are not. Even in 1957, Professor Wooldridge, who had been making outstanding progress on interpreting the Pleistocene succession in the Thames Valley, had to comment in despair on 'the incessant wavering of typological judgement and opinion' of archaeologists. This referred to the dating of geological deposits by the chronological scheme in which archaeologists placed their stone tools. Such methods of dating have long since been happily abandoned.

In any brief summary of this nature it is likely to be invidious to extol individuals, but there were two people who did much to rescue Palaeolithic archaeology after the Second World War from the doldrums: Dr K.P. Oakley (1964) of the British Museum (Natural History) and Professor F.E. Zeuner (1959) of the Institute of Archaeology (University of London). Both placed the subject on a scientific footing that has remained. It became obvious that unless the subject was treated from a multi-disciplinary approach it would never advance. Such had already been applied by West and McBurney (1955) at Hoxne, mainly with the application of pollen analysis to give environmental and chronological information and control.

Radiocarbon was now being used for dating archaeolgical sites of later prehistory. The foundation of a Research Laboratory at Oxford gave a great boost to the experimentation and application of other dating methods which would probe back into the Palaeolithic. Similar research was also being conducted at the Godwin Laboratory of the University of Cambridge, and in the British Museum. Numbers of students were being trained as specialists who could work on mammals, molluscs, insects, soils, pollen, and any other matter that might be encountered on Quaternary sites, archaeological or otherwise.

The turning point was the formation of the Quaternary Research Association in 1968, for this has at last brought together archaologists and geologists of the Quaternary period, and specialists in many related fields. The advances have been considerable and no large scale excavation of a Palaeolithic site would now be undertaken without a team of specialists. Recent examples of such excavations are those which have been undertaken by the Quaternary Department of the British Museum Department of Prehistoric and Roman Studies at High Lodge, Barnham, and Elveden; at Pontnewydd Cave by the National Museum of Wales; and at West Stow by the University of Liverpool. Many other small scale investigations, often conducted by County or Trust-based Archaeological Units, are supervised in the same manner.

From the mid 1960s it was apparent that the mass of Palaeolithic artefacts accumulating dust in museum stores throughout the country required to be made known nationally. The majority were unpublished finds made by observant and often enthusiastic people with archaeological interests. Research into the Palaeolithic could hardly proceed if it were not known what had been found. Evans' *Ancient Stone Implements* still remained the standard work, although a few publications, such as that on the Sturge Collection at the British Museum (Smith 1931), helped considerably. Derek Roe set out to record everything Palaeolithic in the museums of Britain which had a provenance. This monumental task resulted in the Council for British Archaeology publishing the results as a gazetteer in 1968 (Roe 1968; 1996). At the same time Wymer published details of the Thames Valley sites and, somewhat later in 1985, those in East Anglia. Other publications such as the volume on the Sussex Palaeolithic sites by Woodcock in 1981, and on the non-flint artefacts in Britain by MacRae and Moloney in 1988 have all helped to make this volume on the Palaeolithic occupation of Britain possible.

This period also saw a great advance in the knowledge of the geological and climatic events of the last half a million years. Professor West's paper in 1963 on the problems of the British Quaternary summarised the situation and proposed a succession based on the cold and temperate stages in East Anglia. He introduced stage names, the majority of which are still used. Three interglacials were recognised in the Middle and Late Pleistocene: the Cromerian, Hoxnian, and Ipswichian. These were shown to differ in their sequences of vegetational changes and could thus be used as chronological indicators. This was the beginning of a biostratigraphical approach that culminated in the publication by the Geological Society of London in 1973 on The Quaternary correlation of the British Isles (Mitchell *et al.* 1973; See Table 17).

There now also exists, as decribed in Chapter 1.2, a global framework of climatic change produced by the study of deep sea cores. In spite of the problems of making correlations between marine and terrestrial events, there is at last an unbroken timescale for the whole of the Pleistocene as a background to what was happening on the land. Current interpretations based on this marine Oxygen Isotope Scale (OIS) are used when possible in this survey as a framework for estimating the dates or durations of the periods of occupation (Chapter 2.4). Such were first applied in a detailed review of Pleistocene dating and the British Quaternary by Dr P. Evans (1971).

Coupled with these new chronologies, new approaches were applied to river terrace deposits, concentrating on the deposits themselves rather than on the terrace surfaces, combining lithostratigraphical analyses and biostratigraphy, the latter dependent on organic sediments with floral or faunal contents. Such were applied by several quaternary geologists, and in particular by Gibbard (1983; 1985) for the Thames Valley. As the Thames Valley has rightly been described as 'probably the most detailed terrestrial sequence in the British Isles' and its deposits from source to mouth contain large numbers of Palaeolithic sites, this work has been of immense value for this survey. Gibbard's monumental work on the Middle Thames (1985) was followed by its sequel on the Lower Thames (1994). At the same time, Bridgland (1994) published his independant survey of the Quaternary of the Thames. In many respects these publications complement each other although there are some conflicting interpretations. Perhaps the greatest difference between them is that Gibbard has preferred to relate his sequence to the conventional chronology as based on pollen analyses of interglacial deposits, whereas Bridgland has used the Oxygen Isotope Scale. It has to be emphasised that this combined work has been a major influence for this survey, for the Palaeolithic sequence found in the Thames Valley is the most complete in the country and has given a yardstick for less prolific regions. To some extent, this survey is reciprocal, for the relegation of individual sites to their respective terrace sediments can assist with correlations.

There is still much to learn and modify, but the reports on some of the large scale excavations of Palaeolithic primary context sites in the last two decades clearly reflect many of these changes. To this can be added the advances of purely archaeological nature that enhance the understanding of the human activities represented by the lithic evidence: microwear on artefacts, refitting of debitage, spatial distributions of artefacts and fauna, and cut-marks on bone, let alone the environmental information that can be given by floral and faunal analyses.

1.6 The Landscape Approach to the Volume

The distribution of palaeoliths from known sites, as recorded, has been related wherever possible to various aspects of the physical landscape as it is thought to have been at the time. This is an attempt to demonstrate what may have been the favoured places and the movements of the people who occupied Britain intermittently at various times for about half a million years. A distinction is made between three periods where dating is reasonably justified in doing so, as defined in Chapter 2.3 below. This is obviously subject to many variable or unknown factors, the main ones being:

i) Fluvial, subaerial, or periglacial agencies may have made such radical changes that the past landscapes cannot be assessed sufficiently to make this feasible.
ii) That climate and associated successions of vegetational changes during interglacial periods cannot be taken into account unless the archaeology is in primary context with adequate biological information.
iii) That the dating of the majority of the recorded palaeoliths can be accepted.

To take each aspect in turn, the reconstruction of past landscapes during various periods of the Quaternary is possible, with reservations. This is only possible of course, in unglaciated areas. In lowland Britain rivers have cut down into their valleys, there has been solifluction down hillsides, coombes have formed from meltwaters, permafrost has disturbed land surfaces, frost has split the soil and formed ice wedges, and calcareous soils and rocks have suffered dissolution from acidic rain. In spite of all this, there is enough to show that much of the landscape is very little different to what it was. For instance, many of the floodplains of rivers which are now terraces, were land surfaces, and the people who lived on them would look up to the levels of higher terraces, just as we can today. Coombes may have cut through them, but little else has changed. On top of the chalk downs there is usually Clay-with-flints. Much has been eroded on the edges, but the Clay-with-flints is still there. On a broader front, the solid geology may have suffered erosion but not to the extent that whole geological systems have been removed. Thus, where a river runs today through a valley cut in Chalk, it would have done so for all or most of the time. If Reading Clay or Thanet Sand now out-crops on the higher ground above the valley, it probably did then, albeit perhaps less of it or traversed by drainage channels which no longer exist. It therefore seems legitimate to place on some of the distribution maps the names of the rocks which out-crop there today and are considered to have done so during the Middle and Late Pleistocene.

The vegetational succession during interglacial periods is well known through the analysis of fossil pollen in stratigraphical sequences. The succession is from birch and pine in the post-glacial zones giving way to deciduous forest in the middle zones, and there is generally an open landscape during the later end of the interglacial through deteriorating climate and impoverishment of the soil. There are thus relatively open landscapes at the beginnings and ends of interglacials. It has to be remembered that interglacial periods may cover 30,000 years or more, that minor climatic oscillations may occur, and that change was such a slow process that populations would not notice it within a lifetime. Also, apart from the climate affecting the growth of forests, large herds of grazing elephants, bison and deer would have kept many places open, much as is the savannah of southern Africa today.

It has been suggested that the most favourable time for occupation would have been at the beginning and end of interglacial periods because of the open landscape, but there is little to substantiate it. Others have suggested that the forested periods resulted in smaller populations, less social contact, and ultimate loss of lithic skills. It is possible, but as far as this survey is concerned, areas of undrained claylands, marshes, or dense undergrowth would have been major areas avoided by Palaeolithic groups. There is much on the distribution maps to suggest that chalk downlands were favoured areas, presumably because large herds of animals kept them open, and they were there for the taking.

It is obvious that the vast majority of the evidence for the past presence of Palaeolithic people has come to rest in the gravels of river terraces. This is interpreted here as being the result of rivers being highly favoured areas, for facility of movement from one area to another, for the security of fresh water, for finding beasts and birds to hunt, and for unlimited raw material for tools.

To some extent, the arguments in favour of this interpretation, that accepts considerable preservation of the Pleistocene landscape, answers some of the concern in the second factor. It suggests that lifestyles did not necessarily change very much whatever the climate, except during the glacial stages. Even then, summer forays from refuges further to the south of the ice sheets may have been regular activities. More likely, populations migrated to the continent when the climate was unbearable, provided they could cross the waters.

The third factor concerning dating cannot, in most cases, be resolved. Whether the vast mass of artefacts found in the terrace gravels of major rivers are, as suggested in Chapter 2.3, derived from interglacial surfaces of river floodplains, or are contemporary with the braided channels of the rejuvenated rivers at the beginning and end of glacial phases cannot be proven. It just seems far more likely that it was the former.

Away from the rivers, distribution maps show the surprising number of small concentrations of sites on the present surface of the Chalk downs and a few other places to the west and north of the Chalk outcrop. Some of the concentrations are large, such as those in north Kent around Ightham. There is every reason to believe that the artefacts found on these sites are in the place where they were discarded, apart from movements in the soil and some dissolution of the underlying Chalk. There is evidence for the occupation of lake sides, but in these cases geological events have removed all surface expressions of such sites. It is the same with the rare sites of palaeoliths in Raised Beaches or marine sediments, for here the processes of change have removed them totally from the present landscape. Some caves were occupied during the Lower and Middle Palaeolithic. Most of them are obviously in the highland areas, and those which were covered by ice sheets remain as testimony to occupation where nothing else has been preserved.

It is difficult to know just how much the landscape has changed during the Middle Pleistocene. Obviously, the formation of ice sheets, the passage of glaciers, outwash, and solifluction will have modified the landscape drastically within and around its limits, but it is considered here that much that is now beyond those limits would not be so very different. The broad pattern of the solid geology probably remains. Thus, where it is feasible, the general outcrop of some clays, sand, and Chalk of the solid geology are indicated on the distribution maps. For example, palaeoliths found on Clay-with-flints were discarded on the Clay-with-flints.

Thus, the main theme of this volume is the locations in which the imperishable aspect of the Palaeolithic occupation of Britain survive, and how it may have related to the contemporary landscape and climate, and when. From this, it is hoped that something can be deduced of the movements and lifestyle of our predecessors on this island. Hence, the next chapter summarises something of the archaeology and geology of the period as it is interpreted at present. Some explanations are offered to explain how some of the artefactual evidence is found where it is, and the different climates and environments to which people adapted; also dating methods and an emphasis on the earliest occupants. Thereon follows the evidence for the presence of people at times during the last half million years, mainly in the river valleys but also elsewhere, as noted above.

2. The Background

2.1 Geological Change and Climate

The whole of the Palaeolithic period comes within the Quaternary period of geological time. All scientific definitions are by nature controversial, but the Quaternary is generally accepted at present as covering the last two million years. It is divided into the Pleistocene and Holocene epochs. The Pleistocene is subdivided into Early, Middle, and Late parts (this refers to Pleistocene *time* whereas Lower, Middle, and Upper refer to Pleistocene *sediments*). In Britain, Lower Pleistocene sediments are typified by marine deposits of shelly sands and gravels in eastern England. Nothing of the Palaeolithic period has ever been found within them although, as they were laid down in shallow seas, this is not surprising. However, the chronology of all the known Palaeolithic sites within this volume comes within the Middle and Late Pleistocene. The division between the Early and Middle can be taken as the time when there was a reversal of the earth's polar magnetism at about 780,000 years ago, ie, a modern compass would have pointed south before this change and, as now, to the north afterwards. This particular reversal in the palaeomagnetic sequence has the advantage of being recognisable in the marine deposits from deep sea cores, and also in terrestrial deposits which contain suitable volcanic constituents of terrestrial deposits (see below, Section 2.3).

The Pleistocene has been defined as being equivalent to the Glacial Epoch. This term is rarely used now as it is evident that the glacial chronology is so complex. In spite of this, the term would be very suitable for the Middle and Late Pleistocene which concerns this survey, for it is a time of radical changes of climate, alternating between cold and warm periods. Depending on the intensity of either, these resulted in southern extensions of the arctic ice cap (glacial periods), or recession to roughly where they are today (interglacial periods). There is plenty of geological evidence to demonstrate the past presence of ice sheets or glaciers over most of the British Isles on at least two occasions in the Middle and Late Pleistocene in the form of glacial boulder clays or tills, outwash gravels, pro-glacial lakes, and erosional features. Nothing of this nature has been observed in the Lower Pleistocene, but it has to be considered that one major ice sheet could obliterate the evidence for a previous one. The present interpretation of the sequence and chronology of these episodes are outlined in Section 2.3 below, but it is obvious that succeeding generations of any occupants would have to cope with very different environments, if they elected to do so. Some of the changes through time are considered below and how they may have influenced human occupation.

2.1.1 The Extents of the Glaciations

The map, Figure 5, shows the known limits of the two major ice sheets which covered Britain. The first one was in the Anglian Stage (Section 2.3) and was the most extensive known, reaching down as far as the north Cornish coast and the Thames Valley in the London area, diverting the previous course of the Thames in the process. The other was the last to occur before the present amelioration of the climate, and is

Figure 5 Principal glacial limits of Britain during the conventional stages of the Anglian and Devensian. The possible glacial limit of the Wolstonian Stage is omitted in view of the alternative interpretations equating the deposits of that stage with the Anglian; but see Fig. 43

known as the Devensian Stage. There was almost certainly at least one other glaciation in between, but its limits remain controversial. A tentative line is shown through Lincolnshire and the Midlands on Figure 43 as a likely limit of it in that part.

It can be assumed that there was no human occupation on the ice sheets, but there could have been not far from its limits at certain times. Also, it has to be taken into account that the ice took a long time to reach its limits and there could have been intervening milder periods, referred to as interstadials. Human occupation would have been possible then, even if only seasonal. Any palaeoliths discarded by people who had been within these glacial limits may well have become incorporated in the outwash melt-water gravels as the ice receded. Some could have become constituents of the actual till.

2.1.2 Uplift and Subsidence

There have been minor tectonic movements during the Pleistocene. It is now considered that there has been and still is a continuous uplift of the land of about 70 mm per thousand years. This is regarded as a legacy from the massive earth movements of the Miocene period. However, this is a figure that has to be balanced against uplift or subsidence as a result of other agencies. There is much to show such tectonic movements on the east side of England. Marine platforms in the north-east now above present sea level indicate uplift of the land in response to the removal of the great weight of ice sheets as they receded or melted. Conversely, the southern part of the North Sea bed is subsiding under the weight of sediment upon it derived from the rivers which flow into it from both sides. This has been calculated at about 25 mm per century. The uplift would seem to be a major factor in river terrace formation (Section 2.3), whereas the North Sea subsidence has great bearing on the coastal parts which would have been suitable or available for occupation.

2.1.3 Sea Levels

Changes in sea level have also been caused by the extensions of the Arctic and Antarctic ice caps locking-up sea water from precipitation as ice. Hence, the sea level is lowered. When the ice melts so the sea level rises. This normally happens during the Late-glacial stage and Early-interglacial, as can be shown so clearly from the evidence after the last Devensian Stage to the present day. Such has had marked effect on the lower reaches of valleys such as the Thames, submerging several of the terrace levels from Tilbury downstream, and buried channels in the Southend–Shoeburyness area testify to similar events in the past. The oscillations of sea levels were formally considered as the main agent in terrace formation, but it would now seem that this is not so. It does mean that human occupation of estuarine land surfaces that were later submerged could preserve sites in primary context. A classic example of this is the Levallois working site beneath estuarine sands and silts at the Lion Pit, Thurrock, in the Thames Valley (Section 3.3.9, below).

Uplift would also seem responsible for the raised beaches preserved in many places around the coast. Some, as described in Chapter 4, are associated with human occupation.

2.1.4 Climate

During very cold or glacial periods, beyond the limits of the actual ice sheets or glaciers, permafrost could have had a marked effect on the landscape. Flat lands, depending on their permeability, the severity of the climate, and the duration of the repeated freeze–thaw cycle, can be transformed into hummocky terrain. The mounds are known as pingos. Hydrostatic pressures build up when saturated ground above impermeable layers is subject to seasonal freezing. Cracking of the soil and underlying deposit and the formation of ice wedges results in patterned ground. It is unlikely that there would be occupation of areas during such severe climates, but discarded palaeoliths from an earlier pre-glacial period may well be mixed with the unstratified deposits of such features. On sloping ground, such as the edges of coombes or river valleys, periglacial climate can result in mass movement of soil and rock fragments down the slope. This is referred to as solifluction. They accumulate at the bottom to form wide spreads of so-called Head Deposits. There are several thick deposits of this nature which contain large numbers of palaeoliths, such as at Boxgrove, Knowle Farm at Savernake, and the Roebuck Pit at Tilehurst. It is difficult to think of any other reason for their presence than they have been transported from a hilltop site by such solifluction. It is also possible that this was a very slow process and that, at times of milder climate between one solifluction flow and the continuation of it, there were surfaces on which people were active.

The climate of interglacials generally follows a straightforward succession, usually recorded by the identification of one or more of four zones:

I Pre-temperate
II Early-temperate
III Late-temperate
IV Post-temperate

Fossil pollen is very resistant to decay, except in some calcareous soils, and when extracted from suitable organic deposits it can be studied and the plant species identified and counted. The proportions of the different species to the total give a very accurate record of the vegetation at the place where it was collected at the time it was deposited. Generally, for the most accurate results, deposition in the still water of a lacustrine environment or the cut-off meanders of rivers is desirable so that pollen derived from earlier, eroding sediments is not mixed with the contemporary pollen. Such would be the the case in pollen extracted from fluviatile deposits, but it is often possible to differentiate between derived and contemporary pollen grains. Frequently, the sediments contain fossil pollen in organic silts and clays. These may also contain macro-plant remains, molluscs, and faunal remains, often of microscopic creatures. When associated with contemporary Palaeolithic archaeology their value is self evident. This aspect is enlarged upon in Section 2.2 below.

2.1.5 Rivers

As the great majority of the evidence for the Palaeolithic occupation of Britain comes from river deposits, and constitutes the major part of this volume, a separate section (2.3) on them is appended. This includes current ideas on the formation of river terraces. Suffice here to note that it is generally agreed that the coarse gravel deposits of river terraces were deposited by cut-and-fill regimes of braided river courses during cold periods. This would have been when the valleys were receiving outwash from melting snow and ice in the summer months but were mainly quiescent during the freezing temperatures of glacial winters. Erosion, during the critical times of change from warm to cold or *vice versa*, would have cut wide valleys and wide floodplains over which single thread river channels flowed during the ensuing interglacial periods. Such is the origin of so-called misfit valleys. The present floodplain of the Thames is about ten times wider than the stream now flowing over it could ever cut. However, under natural conditions, meander loops would gradually form with the inevitable cut-off and silting: the optimum conditions for creating organic deposits within them.

The preservation of flights of terraces is mainly determined by the situation of their river valleys in relation to the limits of the ice sheets. Drainage patterns and any existing flights of terrace gravels would not survive within glaciated areas, so those that are now present must be more recent than the last time of glaciation. In this respect, rarely more than four terraces are found in the major valleys of the Midland rivers such as the Trent and the Great Ouse. The Middle Thames, however, which escaped any of the known ice advances, can boast at least nine.

2.2 Fauna and Flora

An example is given (Fig. 6) of a pollen diagram from Marks Tey in Essex (Turner 1970), which has the rarity of giving a complete sequence through the whole of the Hoxnian Stage Interglacial. In most cases, pollen diagrams are restricted to just part of an interglacial sequence, but it is usually possible to identify the particular zone. The plants on the diagram are restricted to trees and those of open landscapes. The proportion of one to the other gives a very good indication of the amount of forest cover in the vicinity. Thus, if Palaeolithic material can be related to part of a pollen diagram, the vegetation it shows will give a vivid picture of the environment and climate which the people were experiencing.

The deposits at Marks Tey are lacustrine, some of which are laminated. These laminations are not interpreted as annual depositions but, as the report concludes: 'conditions in the lakes favoured rhythmic graded bedding of its sediments over a long period of time.' The four characteristic zones of interglacials shows well in this unbroken sequence, from the Late-glacial of the Lowestoft Till (Lo) of the Anglian Stage, to the Early-glacial of the Gipping (eGi) (later Wolstonian).

To a limited extent, pollen profiles can be used to distinguish separate interglacials. For example, Hoxnian Stage profiles often contain a pollen grain of a plant species that has not yet been identified. It is referred to as Type *x*. It is not known from any more recent interglacials than the Hoxnian. The Hoxnian is also distinguished by a high frequency of *Hippophäe* (Sea buckthorn) in Zone I, and a significant rise of *Abies* (Silver fir) in Zone III. The Ipswichian is distinguished by high frequencies of *Corylus* (hazel) and *Carpinus* (hornbeam) in Zone III. There are many other subtle variations in the pollen diagrams from different interglacials but, unless considered with other aspects of dating, it is probably unwise to use them as chronological indicators. In spite of this, it does seem that the Type *x* of the Hoxnian Stage, and the rise in silver fir, is peculiar to that time. The differentiation between pollen diagrams of the Ipswichian and Stanton Harcourt Interglacials is questionable, for it has to be noted that there is no record from any one site of these interglacials showing a complete record from one end of the interglacial to the other. So far, only composite diagrams can be constructed for either of them from a number of sites. More important, even when only one or two zones may be represented in a pollen diagram, if palaeoliths are associated, this is valuable information as to the contemporary environment.

Some of the plants recognised in the pollen analyses may have been collected as foodstuffs, but there is no way of knowing. Fossil fruits, nutlets, and

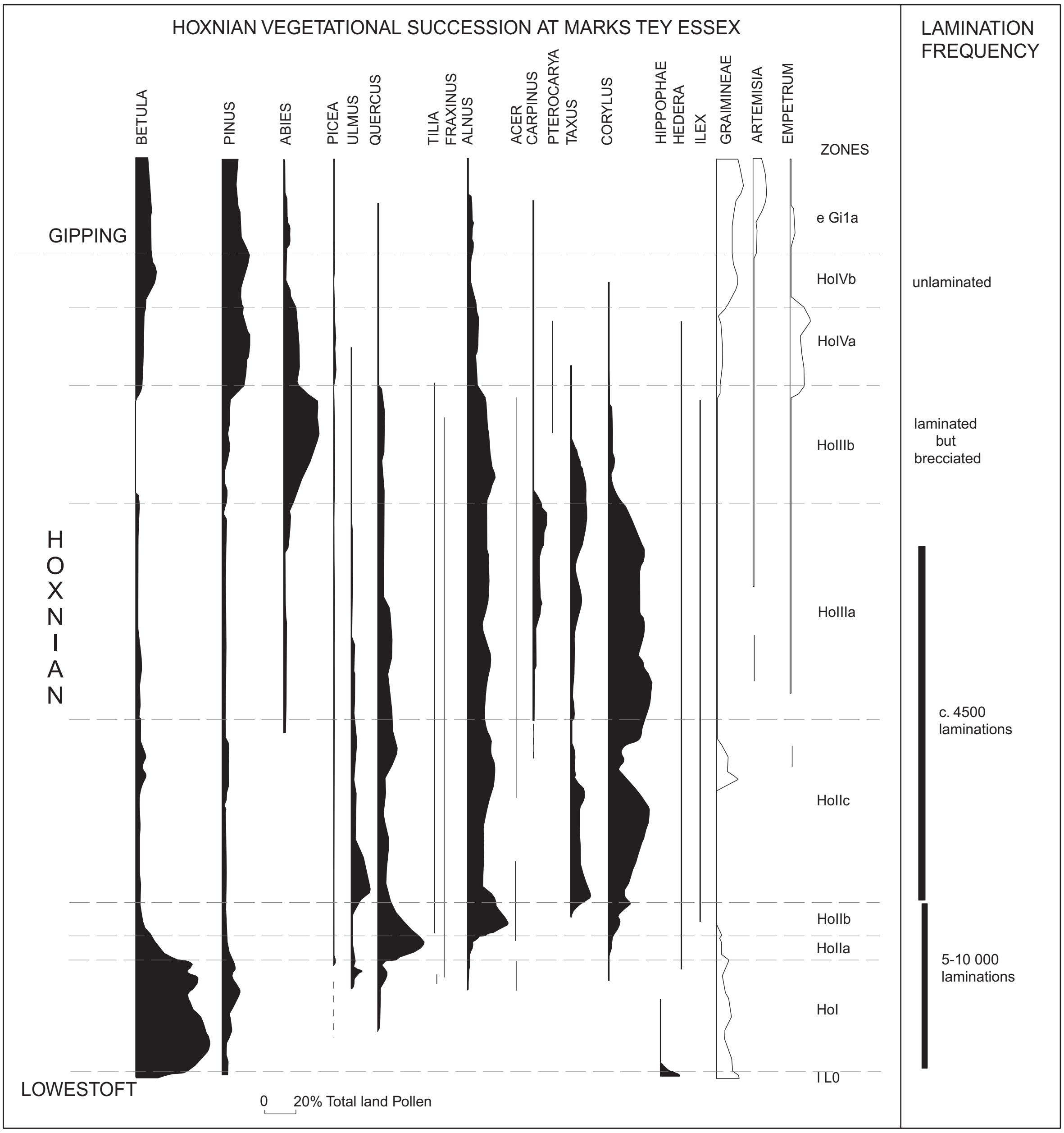


Figure 6 Composite pollen diagram of the Hoxnian Stage vegetational succession at Marks Tey, Essex. This covers all four sub-zones of the interglacial from the end of the Anglian Stage to the onset of a further cold stage, noted in the diagram as the Gipping but since related to the Wolstonian of the conventional chronology (from Turner 1970, 404). The numbers of laminations in the lacustrine beds do not necessarily represent annual accumulations, but estimates have been made of between 20,000 and 25,000 years for the duration of the interglacial. Source: Turner 1975

seeds have been found at Hoxne, also a seed of *Vitus vinifera*. It would be astonishing if fruits, nuts, and edible roots were not part, if not the greater part, of the daily diet. It is certainly more likely than that they made wine! More certain is that meat was eaten, either from hunted animals or scavenged carcases. There are enough cut-marks on bones from sites such as Boxgrove and Hoxne to substantiate this. The Palaeolithic occupants shared a land with a range of large and small mammals comparable in the kind of numbers that might be seen in parts of Africa today. Their bones are found, sometimes in considerable quantity, at many of the sites recorded in this volume. For the most part they are in river terrace gravels or the 'brickearth' of ancient floodplains. Some of the animals represented are now extinct but most of them resemble their modern counterparts enough to enable us to visualise just what confronted Palaeolithic groups during their movements. However, it is not easy to visualise elephants and rhinos moving over our modern humanised landscape. The study of this Middle Pleistocene mammalian fauna is highly specialised and, in view of the people of that time dependent for their livelihood upon it, is a critical aspect of Quaternary archaeology. For the purpose of this survey it is necessary to know just what animals people were likely to see, hunt, ignore, or avoid. This would obviously differ to some extent for the period concerned, the climate and the environment. From the palaeontological aspect, there is emphasis on evolution or extinctions. This can add chronological information.

The following large mammals would probably have been most commonly seen during:

interglacial stages	*glacial stages*
Straight-tusked elephant	Woolly mammoth
Mammoth	Woolly rhinoceros
Narrow-nosed rhinoceros	Horse
Merck's rhinoceros	Giant deer
Hippopotamus	Red deer
Horse	Reindeer
Giant deer	Bison
Red deer	Musk ox
Fallow deer	Cave lion
Roe deer	
Aurochs	
Bison	
Boar	
Brown bear	
Cave lion	
Spotted hyaena	
Wolf	
Giant beaver	
Beaver	
Rabbit	

Not all these animals were present in each interglacial or glacial stage, but it would seem that most of them were. The red deer was surprisingly adaptable, being at home in deciduous or coniferous woodland, or on the cold treeless steppes–tundra. Roe deer was probably absent from the Ipswichian Stage. The giant beaver became extinct after the Hoxnian. Horses are associated with open country. The non-Woolly rhinos were grazers. Hippopotamus occurs in the Cromerian Interglacial and the Ipswichian (OIS–5e) but not in the Stanton Harcourt or Hoxnian Interglacials. There were many mammoths in the Stanton Harcourt Interglacial, seemingly a specialised form and smaller and possibly non-Woolly. Large herds of bovids existed, mainly aurochs, during the interglacials, and bison in cold periods.

As more specimens are found from known contexts and studied, so it is becoming apparent that detailed study can discern various evolutionary anatomical features in several of the species that are peculiar to particular stages of the Middle Pleistocene. Coupled with pollen analyses, a chronology based on bio-stratigraphy is emerging which will give a firm basis for a dating framework (Section 2.4). Small mammals are particularly useful in this respect because of their relatively rapid rate of change. The classic example is the extinct water vole, *Arvicola cantiana* which is found in the Hoxnian Stage but not in the Cromerian, and evolved from *Mimomys savini* which is not in the Hoxnian. They can be used as chronological indicators as can several other features, such as hippopotamus (albeit different species) only occurs in the Cromerian and Ipswichian Stages; there is hippo and no horse in the Ipswichian, and horse and no hippo in the earlier Stanton Harcourt Interglacial. Recent studies (Schreve and Parfitt in prep.) distinguish Swanscombe from other interglacials by its large fallow deer, and small red deer, which is different to the size of the same species in the later interglacial (OIS–9) represented by the sites at Purfleet, Belhus Park, and Cudmore Grove. The Stanton Harcourt Interglacial has further differences to other interglacials in that the horse is smaller and the northern vole *Microtus oeconomus* is large. Hopefully, further work will corroborate these findings.

Wet sieving is now normal practice on Palaeolithic excavation sites where the sediments warrant it, and much environmental information results from the extraction of remains of micro-mammals, fish, reptilian, and bird bones. Molluscs have always received attention and give additional details of the immediate locality if terrestrial, and the nature of any adjacent water if freshwater, ie, lacustrine, fast or slow flowing, stagnant or otherwise. They can also indicate the climate, although some of the species tend to survive for some time in an alien environment. Beetles are preserved in many organic sediments surprisingly well. They are very sensitive indicators of local environments as they tend to adhere to very specific habitats and vacate them immediately upon any change. Other micro-organisms such as ostracods and diatoms can add to the knowledge of a site. Such a biological and palaeontological approach to Palaeolithic investigations places, literally, life upon the landscape.

2.3 The Archaeology of River Terraces

More Palaeoliths are found in the deposits underlying river terraces than any other context. For the most part they are not in primary context, but derived from river beaches, old land surfaces, or even earlier reworked terrace deposits. Thus it is obviously necessary to consider these deposits, just as one would interpret artefacts in any later prehistoric site by the soils containing them. Although the interpretation of such derived palaeoliths in river terrace deposits is beset with all the problems of geologically derived fossils, they can still reveal a wealth of information on the distribution, date, and contemporary environment of past human populations.

2.3.1 Terraces as Features

All the rivers of lowland Britain exhibit, in varying degrees of preservation, flights of terraces above their present floodplains. These represent the land surfaces of former floodplains, left high and dry as the river has cut down to lower levels. A sloping bluff is generally visible from one step to another. The vertical interval between one terrace level and one above it is generally only a few metres, often between *c.* 3 m and 8 m but, for reasons outlined below, will differ considerably in the upper, middle, and lower reaches of any valley. A classic area which can be taken as a model for the preservations of terraces is the Middle Thames Valley, where a flight of them can be observed from a height of 211 m OD at Nettlebed in the Chiltern Hills, dropping southwards in a series of steps to the modern river 150 m below (Fig. 7). Each drop, certainly in this part of the Thames Valley, represents the erosion of a floodplain to a new lower level, thus the higher the terrace the older it is.

This indicates that the river never rose again to its former level. Reasons for this are also considered below. This brief section is merely to discuss the terraces for what they are: morphological features.

There has been much confusion in the past between assuming that the surface level of the terrace was commensurate with the deposits beneath it. This may be true in most cases, but it need not necessarily be so. Deposits of different dates, including bed-rock, may lie beneath one terrace level, as a result of planation by an eroding river over earlier levels. Hence, geologists are now very adamant that a clear distinction must always be made between the terrace as a morphological feature and the fluvial deposits beneath (Gibbard 1985, 4–6).

For example, the Boyn Hill Terrace is a very prominent feature to the west of Maidenhead, but the palaeoliths found in the gravel on (technically under) that terrace have come from Boyn Hill Gravel. It is no longer geologically correct to speak of palaeoliths from such and such a terrace but, when the terrace and the gravel beneath it have the same nomenclature, it is not unreasonable. However, it is a landform and thus always thought of as such. Terraces of the Middle Pleistocene are land surfaces, little altered where they remain and over which people roamed or camped. Someone standing, for instance, on a floodplain now referred to as Taplow Terrace in the Middle Thames, looking northwards would see much the same topography as anyone doing so now. Looking towards the river at that time, of course, would be very different to the present day.

Terraces are usually named after a site where they are well preserved and the use of the same name at a different locality implies that it is a continuation of the same morphological feature, ie, Lynch Hill Terrace at its type site at Lynch Hill, near Burnham, Buckinghamshire, Lynch Hill Terrace as mapped at, say, Marble Arch.

A further aspect concerning terraces and what is referred to as Lithostratigraphic Classification is the definition of the deposits beneath them as either Formations, Members, Units, and Sub-Units. Gibbard (1985) refers to Terraces as Members, whereas Bridgland (1994) classifies 'individual terrace aggradations' as Formations. This is unlikely to have much relevance to archaeology, but warrants notice. Also, the British Geological Survey (BGS) had temporarily abandoned a nominal system of classification for terraces and adopted a numerical system with number 1 being the lowest terrace and ascending numerically upwards. Other systems have been used in the past based on altitude, such as the '100 ft Terrace.' However, some of the more recent BGS maps, such as Sheet 256 North London, have reverted to the nominal system.

2.3.2 The Formation of River Terraces

Gravels and sands fringing present day valleys but at heights far above any modern flooding have long been recognised as remnants of ancient abandoned courses. Evans, writing in 1872, was much concerned with the palaeoliths found in these so-called river drifts of Britain and paid great attention to their heights above existing streams. He was too cautious to infer that the highest drifts were unquestionably the oldest as he realised the great number of unknown factors involved, but he stressed their antiquity, commenting 'that, with our present amount of knowledge, it is hopeless to attempt its determination with anything approaching to precision' (Evans 1872, 617). With great foresight he saw that the gravels containing Palaeolithic 'implements' in the upper reaches of rivers were at much lesser heights above the present floodplains than further downstream. Nowhere does he allude to the terraces associated with these river drifts.

However, by the end of the 19th century, the existence of river terraces as being old floodplains was well established, with the mechanics of their formation explained by successive phases of erosion to lower levels (In Lyell's *Elements of Geology for Students* (1885, 74) and Geikie's monumental *Text Book of Geology* (1885, 368–9)). Since then, there has been much study and publication, both on the processes responsible for the evolution of river systems, of which the terraces remain as visible evidence, and the Quaternary history of some

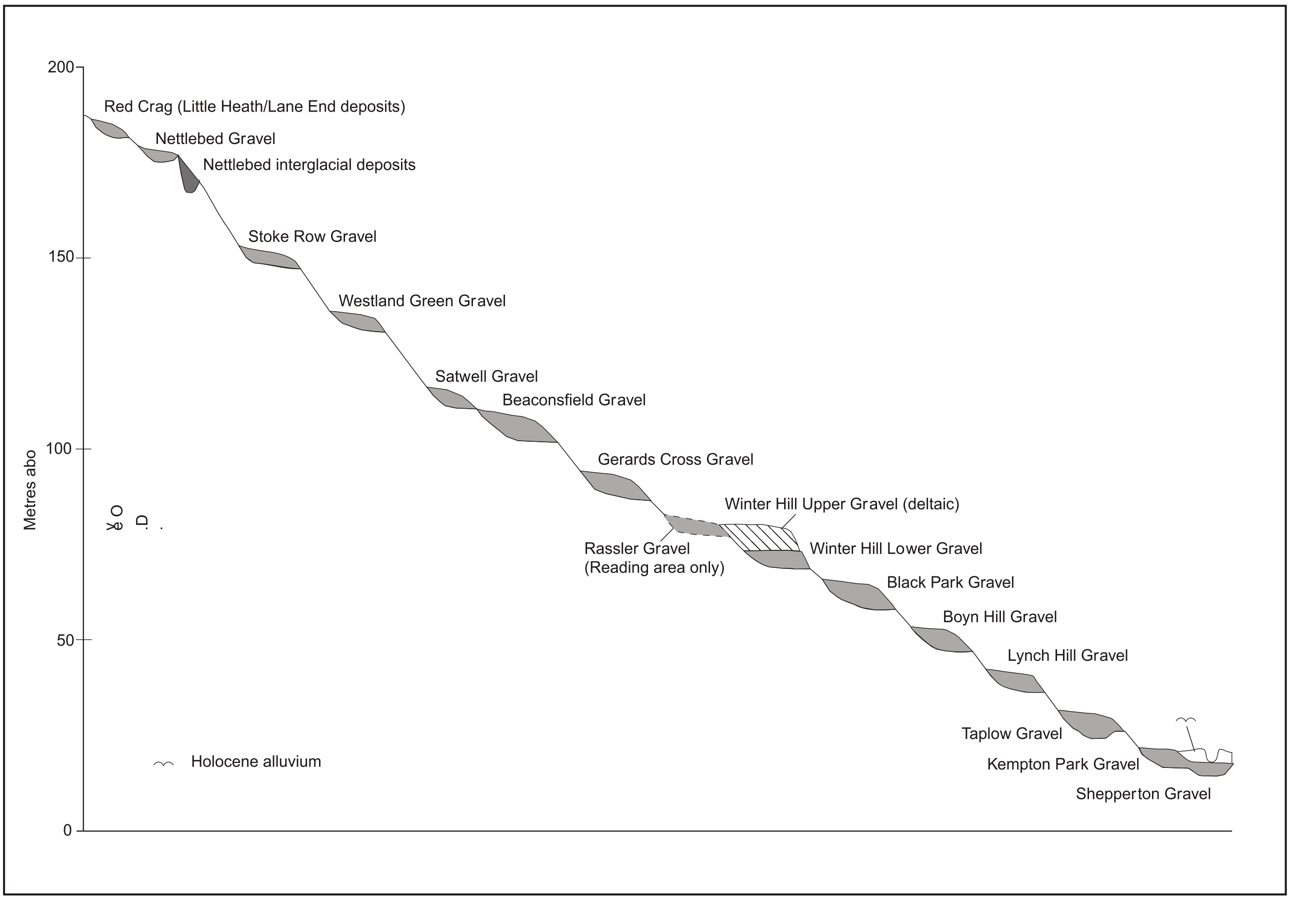


Figure 7 Diagrammatic section through terraces of the classic Middle Thames sequence in the Slough and Beaconsfield area. Source: Bridgland 1994, 86

of the major river valleys. It is not necessary here to summarise the development of this subject, other than to realise the factors that are involved and relate the present state of knowledge to interpret the meaning of the palaeoliths contained in terrace deposits.

An excellent account of the different approaches and manner by which studies have progressed during the last century, can be found in a paper by Green and McGregor (1980). Although this paper has especial reference to the Thames, it has interpretations and conclusions which are equally relevant to other rivers in lowland Britain. Some of the earlier significant publications (King and Oakley 1936; Zeuner 1959; Hare 1947; Wooldridge and Linton 1955; Clayton 1957) have done much to influence this aspect of Quaternary studies. It must also be noted that the more recent works by Gibbard (1985; 1994) and Bridgland (1994) have greatly influenced the suggested explanations of the development of terrace formation, stratigraphy and chronology. Their conclusions are mainly used in what follows below and is acknowledged accordingly.

Firstly, some notes are required on factors controlling river developments in lowland temperate zones.

Climate

The changing climate from one interglacial cycle through a glacial phase to another is the most important element, as several of the other factors listed below are dependent upon it. The periods of cold (glacial) and warm (temperate) which affected Britain and, of course, the whole of the northern hemisphere are adequately demonstrated by the evidence from the deep sea cores (Section 1.2). As noted in the previous section, interglacials can be divided into four zones (Turner and West 1968).

1 Pre-temperate
2 Early-temperate
3 Late-temperate
4 Post-temperate

These zones can be identified by pollen analysis or macro plant fossils within undisturbed organic sediments, on the basis that the vegetation is dependent on particular climates. Allowance has to be made for regional variations, if not sometimes local. Early-glacial and Late-glacial zones can also be identified.

A complication that can render some interpretations invalid is that minor episodes (interstadials) can be mistaken for parts of interglacials, and the fluctuation of climate during glacial periods is mainly unknown. Mounting evidence from the ice cores in the Greenland ice sheet suggests that there were numerous oscillations during the long glacial stages, some of which could have rendered periglacial zones habitable or otherwise. Similarly, minor cool stages in the temperate zones, such as the so-called 'little ice age' of the medieval period, may have had an effect on human occupation.

Vegetation
A direct result of climatic deterioration is deforestation and a thin vegetational cover which is easily eroded by heavy rain or flooding. As such periods coincide with the cooler climate before an impending glacial phase with increased precipitation, quantities of rock waste would find its way into the river valleys.

Glaciation
The blocking of river valleys by the advance of glacial lobes impeded the drainage and could produce ice-dammed lakes, catastrophic outwash and remove part of (eg, the Thames) or a complete (eg, the Proto-Trent) drainage system.

Periglaciation
As already mentioned, much of southern England experienced a periglacial climate when ice covered the Midlands, Wales, and northern England. The alternate seasonal freezing and thawing of the ground caused great spreads of surface soil and underlying rock to fragment and, on sloping ground, to sludge downwards (solifluction). This could bring much rock waste into existing valleys, block tributary valleys, and generally impede the drainage. Permafrost on old floodplains contorted the superficial layers and renders the differentiation difficult between fluviatile and glacial gravels, as in the Trent Valley near Derby.

Sea levels
The world-wide rise and fall of sea levels during the Pleistocene period is mainly the result of the waters of the ocean being precipitated on to the glaciated continental areas, freezing and not returning to the sea. There is, thus, a gradual fall in sea level during the course of a glacial stage, and a corresponding rise after the glacial maximum as the climate ameliorates. The rise in sea level in the Thames estuary since the last glacial maximum when it was *c.*100 m below OD has been radiocarbon dated and shown to have risen to near its present level (OD) within about 16,000 years It is still rising at about 25 mm every century (Greensmith and Tucker 1980), although the rise may be more spasmodic than continuous. It is reasonable to suggest that a similar time scale can be accorded to previous Late-glacial periods. This, on the basis of what can be seen in the present estuary of the Thames, indicates that there is a vast aggradation of fine grained sediments in the tidal regions. Upstream in the non-tidal Middle and Upper parts of the valley this rise in sea level is now thought to have had little effect.

Tectonics
There is convincing evidence that the North Sea Basin has been subsiding throughout the Pleistocene period and it is apparent that there has been a general uplift of the land in southern England at the same time, irrespective of other tectonic movements created by the weight of glacial ice sheets or deposits washed into the North Sea. However, without such a slow and continuous uplift the existence of terraces is difficult if not impossible to explain. If there were no uplift and the sea level returned to the same height after each glacial stage, the rivers would have reverted to their former levels and moved laterally over the same floodplain as before. The net result would be a peneplain, with steep sides. Recent work by Maddy (1997b) concludes that central England is rising *c.* 70 mm every thousand years (see note on terrace formation below).

Lithology
The gradient or lateral movement of a river may be affected by the nature of the rocks over which it flows. An example is the passage of the River Thames from Henley to Cookham where it flows across Chalk. In order to maintain its gradient it has had to expend its energy on cutting downward through the relatively hard Chalk, so producing the beautiful Henley Gorge. Once off the Chalk and into the London Basin of soft Tertiary Rocks (Reading Beds, London Clay) it has spread out to form the broad floodplains of what is now the Taplow Terrace and the more recent ones.

When a river meets a very hard stratum, such as basalt and other volcanic rocks, it may be unable to erode it, and be forced to take an alternative route. Such an event obviously has a big effect on the river's gradient and subsequent terrace formation. In lowland Britain this situation only exists in a minor way such as the example produced by hard Chalk cited above.

2.3.3 River Profiles

The downward gradient along a river from the source to its estuary is referred to as a longitudinal profile. It is generally somewhat curved and steeper near its source, becoming much less so in its middle reaches and levelling out where it becomes tidal. The surfaces of terraces do the same, but as they are traced upstream the height between each one and the river itself diminish until, in the upper reaches near the source they may merge. This means that the correlation of terraces by altitude from one part of the valley to another can be unreliable. It also means that deposits of very different ages are likely to be virtually at the same level in the upper reaches, but well separated lower down the valley. It also means that terrace levels in the lower estuarine reaches may descend below the present OD and now be submerged. For this reason, the archaeology contained in the terrace deposits of the major rivers has to be described in palaeogeographical terms for each of these divisions of the valley; ie, Upper, Middle, and Lower.

The distinction between the Middle and Lower parts of any modern river is straightforward: the lower being tidal. That between the Middle and Upper parts is arbitrary. The Goring Gap is taken as a convenient division for the Thames: everything above it being regarded as part of the Upper Thames. These geomorphological aspects were thoroughly described in a book on geomorphology by B.W. Sparks (1960), together with many other matters concerning the development of river systems.

When a river deposit is described it is always essential to make it clear that any height given is either that of the terrace surface or the bench level, ie the height of the base of the deposit, which represents the erosional plane prior to aggradation. Combined with lithological analyses this enables different deposits to be identified with much greater accuracy than using terrace surfaces. Furthermore, it also enables much of the history of a river to be constructed by the study of far-travelled or erratic rocks in the constituents of gravel deposits.

With so many factors influencing the development of rivers during the palaeolithic period, all that can be done to elucidate the stone artefacts found within their deposits is to record what is found and see how they best fit into current geological interpretations.

2.3.4 *The Interpretation of Derived Palaeoliths within Terrace Deposits*

The current interpretation of the formation of river terraces and their deposits favoured here is that of Dr D.R. Bridgland. It accepts that climatic factors are of primary importance and that most if not all of the major gravel accumulations are the result of cut-and-fill regimes during cold climates. His interpretations, as published in 1994, have since been slightly revised, mainly as a result of a reconsideration of the effect of tectonic movements, ie, the gradual rise of the land in relation to sea level, at least in southern England. His model accepts that there has been a very slow but gradual rise in the land during the Pleistocene period, and also stresses that all the major changes in the depositional regime or downcutting to lower terrace levels of the major rivers of southern England took place during the relatively short intervals when the climate changed drastically from warm to cold or vice versa, ie: at the end of an interglacial or at the end of a glacial phase. Recent research by Dr D. Maddy (1997b) and Bridgland *et al.* (1995) supports this new model. Bridgland divides the depositional sequence as seen in such rivers as the Thames into five phases which can be summarised as shown inset below.

Bridgland's model is mainly in agreement with the conclusions of Green and McGregor (1980) who published a diagram illustrating successive stages from one interglacial, through a glacial and further interglacials. They take into account many of the complications that result from the influence of the factors mentioned above. Their contention that interglacial alluvium is found on sediments dating to the early part of an interglacial is at variance with the modern post-glacial alluvium of the Thames and most other rivers. This is overbank accumulation on deposits of the previous glacial stage, with very little or no aggradation of coarse gravel sediments after the Late-glacial. However, this is a minor point and it was one of the first sequence diagrams of its kind and does much to emphasise what they refer to as 'the diversity of the processes involved.'

Gibbard (1985, 4–6) also stresses the danger of only using a morphological approach to terrace stratigraphy, as has often been done in the past, and the necessity that they can only be studied by geological stratigraphical techniques if any sequence is to be understood. His work on the Thames Valley terrace deposits has concentrated on the application of numerous standard lithostratigraphical techniques on the deposits themselves. This has been a major contribution and given considerable support to conclusions based on less objective methods.

A more speculative attempt to explain the formation of terrace deposits through a glacial–interglacial–glacial cycle was made by Wymer (1968, 25–33, figs 5–6) in order to demonstrate the possible manner by which palaeoliths were dispersed from their original, primary context by flood waters, and their subsequent further reworking. The sequence in that diagram mainly conforms with Bridgland's model, but not the acceptance of sea level as a major factor. This needs revising, although the suggested sequence of artefactual dispersion still holds.

The diagrams below (Fig. 8) are given to indicate how palaeoliths, originally in primary context on the floodplains of rivers, may be dispersed by erosion and become constituents of gravel deposits. The geological sequence is based on Bridgland's model. Hopefully, it should be clear that the same events as shown in the diagrams could produce other combinations of palaeoliths from different ages within one deposit, and emphasise the caution required in dating the sequence of palaeoliths in derived contexts.

Phase 1 LATE GLACIAL with the change from cold to warm

This is the most active period. The long full glacial phase 5 (see below) is over. Melting ice and permafrost fill the valleys with surging floodwaters which now have the energy to erode and, in the long interval (tens of millennia at least) since they were too frozen to do so, tectonics have raised the land by a few metres and there is thus a period of downcutting to a new longitudinal profile.

Phase 2 LATTER PART OF LATE GLACIAL: warmer

Aggradation now exceeds erosion as the river adjusts to its new and lower level. Braided channels flow and cut and form a floodplain which constitutes the terrace surface of the succeeding interglacial

Phase 3 INTERGLACIAL: warm

Single thread channel meanders in its 'misfit' valley. Seasonal overbank flooding deposits alluvium over much of the floodplain. Lakes may form in cut-off meanders and organic deposits accumulate in the stillwaters. Similar deposits may form in minor abandoned channels.

Phase 4 LATE INTERGLACIAL–EARLY GLACIAL

This is the other period of major change. The end of interglacials are marked by a deterioration in the vegetational cover caused by a combination of the cooling of the climate and impoverishment of the soils. The more barren landscape renders the floodplains and valley sides susceptible to erosion. The onset of glacial conditions with permafrost, solifluction and seasonal melt-waters produces some erosion, aggradation and many braided channels with a cut-and-fill regime. Thus, there is much reworking of the terrace deposits.

Phase 5 FULL GLACIAL: very cold

The progressively frozen landscape with permafrost and ice and limited seasonal outwash reduces the activity of the river. There are fewer braided channels and little or no downcutting. Stable conditions ensue until there is any major climatic change, as per Phase 1 above.

Phases 1 and 2: Latter part of glacial to early interglacial

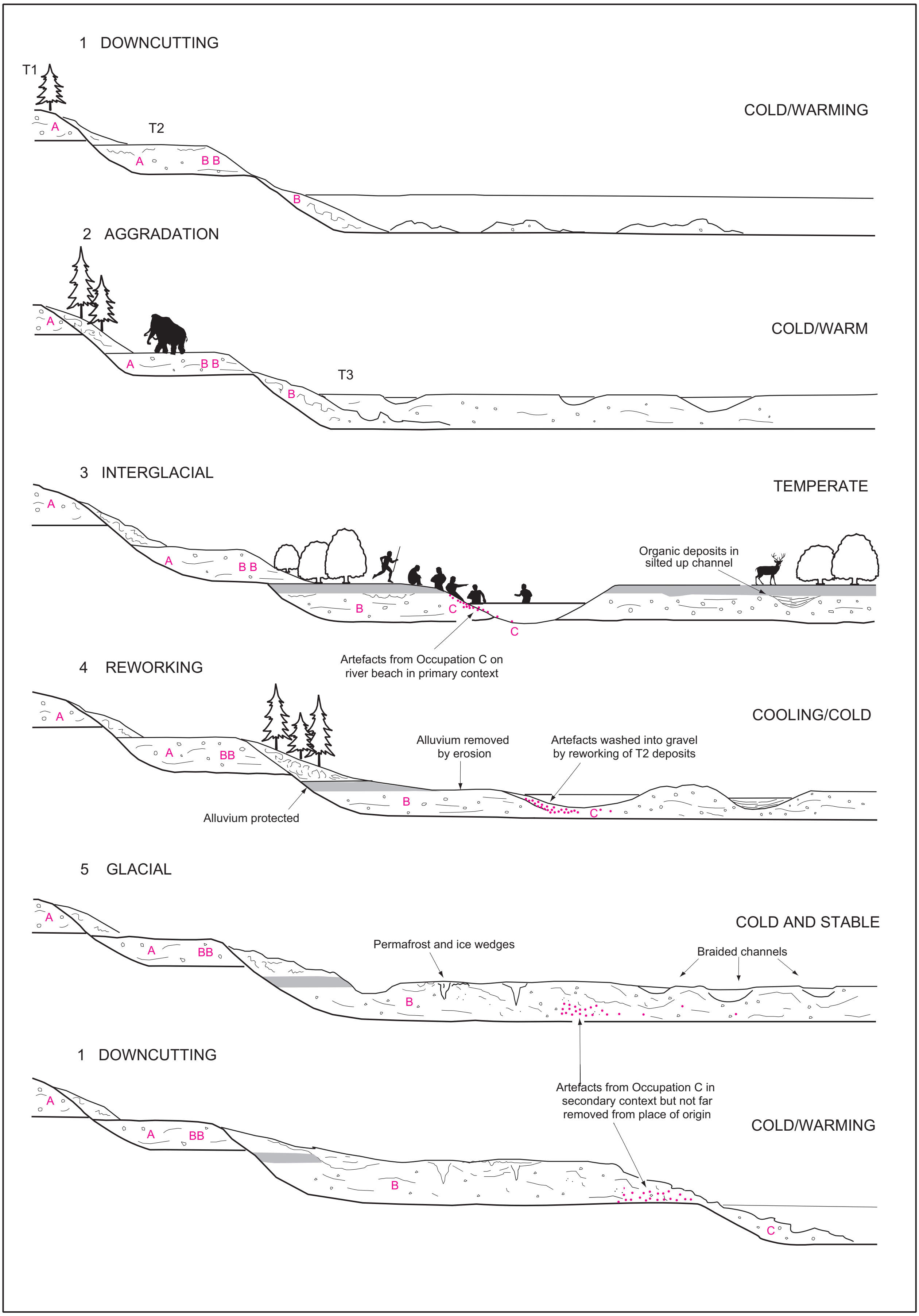
The rejuvenation of the river due to the effect of a gradually warming climate causes drastic changes in the valley, with downcutting followed by aggradation. This is an unlikely time for human occupation until the river had adjusted itself to its lower level and was no longer fed with melt-waters. Gradually, braided channels aggraded and drainage was along one major channel.

Phase 3: Interglacial

Conditions in the diagram are shown as they are at the present day (Early-temperate zone) with mixed deciduous woodland and open grassland, especially on the floodplains. Contemporary occupation is on the river beach and adjacent land surfaces, including the rise of Terrace 2 (T2) which represents an aggradation during the former half of a previous glacial phase, earlier than the gravel underlying the floodplain, which was deposited during the latter half of the last glacial phase (Terrace 3 = T3). Overbank alluvium covers the floodplain and the river is confined to one main channel within a wide valley over which it meanders. Channel fills of abandoned meander loops are likely to contain organic sediments.

Gravel of T2 could contain derived palaeoliths of Occupation A and B which might date from any time prior to or contemporary with the formation of that gravel. As that would have been during the severe climate during the latter part of a glacial phase it is most likely to represent a human presence prior to the aggradation, but it could have been during the Late-glacial phase when summer forays may have been possible. What is certain from the stratigraphy is that A and B must have been deposited in the gravel of T2

Figure 8 (opposite) Diagram to illustrate the probable sequence of geological events in the middle reaches of a major river from one Late-glacial cycle to another. The discarded artefacts of three successive periods of Palaeolithic occupation (A–C) are shown in order to indicate some of the ways in which they become incorporated in gravel deposits and how they might be interpreted. The numbers relate to the five phases of Bridgland's (1995) model of terrace formation



1 DOWNCUTTING
T1
T2
COLD/WARMING
A
A
B B
B
2 AGGRADATION
COLD/WARM
A
A
B B
B
T3
3 INTERGLACIAL
TEMPERATE
A
A
B B
B
C
C
Organic deposits in silted up channel
Artefacts from Occupation C on river beach in primary context
4 REWORKING
COOLING/COLD
A
A
BB
B
C
Alluvium removed by erosion
Artefacts washed into gravel by reworking of T2 deposits
Alluvium protected
5 GLACIAL
COLD AND STABLE
A
A
BB
B
Permafrost and ice wedges
Braided channels
1 DOWNCUTTING
A
A
BB
B
C
Artefacts from Occupation C in secondary context but not far removed from place of origin
COLD/WARMING

before any palaeoliths were deposited in the lower gravel of T3. However, palaeoliths from Occupation A or B could have been reworked into T3 from T1 or T2. Gravel of T2 could also contain palaeoliths from a Late-glacial Occupation B. There would be no way of distinguishing them, although palaeoliths from A might be more rolled than those from B. This is, of course, the unsatisfactory nature of evidence in derived contexts, but at least it does give a *terminus ante quem*, for any palaeoliths found in the gravel, ie, they must be as old or older than its deposition.

Occupation C on the bank or beach of the interglacial river will leave discarded palaeoliths in primary context, or very nearly so. It can be assumed, in this diagrammatic instance, to be a favourite, regularly visited place and a concentration of tools and debitage has accumulated. If the river channel silted up and covered the assemblage with a fine silt, and this was preserved until the present day, it would be a Palaeolithic site of national significance. Unfortunately, the drastic regimes of rivers during glacial periods rarely, if ever, allow this to happen. The subsequent diagrams show one possible sequence of events terminating in Palaeolithic sites in gravels for which analogous examples can be given (eg, Furze Platt in the Middle Thames Valley).

In Phase 3, the landscape of the Early-temperate zone as depicted would, as the millennia of the interglacial passed into the Late-temperate zone, gradually change from deciduous to mainly coniferous woodland. As the climate continued to deteriorate so the vegetation declined, precipitation increased and the swollen river began to erode and rework its gravel deposits.

Phase 4: Late-interglacial–Early-glacial
The onset of even greater climatic deterioration and little vegetation to give any resistance to fast flowing water, produced a rejuvenated river of ever-changing braided courses in a cut-and-fill regime. At this stage sedimentation exceeded erosion. By now, nearly all the interglacial alluviums and organic deposits were washed away, apart from rare instances as shown in the diagrams where solifluction deposits have covered and preserved the interglacial alluvium. Colluvial deposits and solifluction added to the load. Much of the gravel deposits of T3 is reworked and palaeoliths of Occupation C are washed off the beach as a braided channel erodes against it. They are dispersed but, if this is one short event, they are still concentrated near the point of origin and remain relatively fresh and unrolled. The artefacts washed further away into the gravel become much rolled and edge-damaged. This would be an explanation for the usual discovery of rich concentrations of palaeoliths being in the lower part of coarse river gravels. Further reworking would obviously destroy any such patterning but the diagram for Phase 5 is based on the supposition that the palaeoliths of Occupation C, although now no longer in primary context, suffered little reworking. Many would be in sharp or only slightly rolled condition.

Phase 5: Full Glacial
This represents a very long period with stable conditions. It is possible that some occupation or activity within the valley may have taken place during the more clement months but nothing is shown on the diagrams.

Phase 1: Next interglacial
The same conditions apply as in Diagram 1.

2.3.5 Archaeological Implications of Bridgland's Model

With the main downcutting at the end of a glacial episode it means that the deposits at the new lower level remain on that level from the beginning of and throughout an interglacial period and also during the reworking of much of the deposits during the following glacial period (ie, during his Phases 3, 4, and 5 of the terrace formation diagram, Fig. 8). Thus, artefacts discarded in the valley during the Late-glacial or Early-interglacial would be covered or worked into the deposits before the stable conditions of the full interglacial ensued. Artefacts discarded during the latter are then likely to have been washed into the deposits as they were reworked in the following early part of the next glacial period. Thus, in Bridgland's chronology for the Thames Terrace Deposits (Table 6, below), they are shown as 'Basal' before an interglacial and as the main terrace afterwards, eg, Basal Lynch Hill appears at the end of OIS–10 and Lynch Hill Gravel at the beginning of Stage 8, with the interglacial of OIS–9 between. The equivalent terrace deposits in the Lower Thames, the Corbet Tey Gravel, have been less reworked and show a tripartite stratification, confirming this sequence (Colour Pl. 10), as per the note below.

Note on interglacial deposits in tidal regions of a valley

Global warming at the close of glacial phases produces a high sea level and thick layers of generally fine sediments accumulate up the valleys as far as the tide extends. As can be seen from Figure 8 interglacial deposits such as overbank alluvium or cut-off meander channels with organic deposits rarely survive from erosion during the glacial stages. The more rapid erosion during the later glacial stages in the lower parts of a valley system may leave some of these interglacial deposits high and dry and, exceptionally, they can survive until the sea rises and sediments gently cover them. Such interglacial organic deposits are preserved within the present estuarine regions in the Thames, Ouse, and Hampshire Avon. A good example of such is at Belhus Park in the Lower Thames Valley.

2.4 Dating Frameworks

For those only familiar with historical time in calendar years, the magnitude of the dates in thousands, tens of thousands, or even millions of years cited on many of the following pages in this volume is difficult to comprehend. It is easier to comprehend what can be termed relative time, such as the obvious instance where a deposit overlying one beneath it must be the more recent of the two or, to labour the point, the one below must be earlier than the one above. This is the simple but incontestable principle of stratigraphical dating. This survey is much concerned with geological deposits in that some, such as river gravels, contain the flint tools and debitage of the people whose presence is being investigated.

Because the application of various dating methods suggests that the date of a particular gravel is, say 200 Ky (200,000 years) it does not mean that any palaeoliths found in that gravel are of that age. They may be, but they could also be older but not, of course, younger. They may have been derived from the erosion of earlier gravel deposits. This introduces the matter of the number of considerations that have to be applied before any archaeological or associated objects can be related to any date that has been given to the gravel that contained them. This is known as 'taphonomy', which may be defined as the study of the manner in which material ends up in the place where the archaeologist finds it. The failure to apply this concept has caused many errors of judgement in the past, and probably still does as the history of individual objects in not always easy to determine.

When it comes to dating by calendar years this can really only be done from historical records, tree-ring dating (dendrochronology), or varves in glacial lakes (counting of annual laminations produced by spring-thaw discharges). Where dates in years are given by the results from the numerous highly technical scientific methods that are now used, they are normally quoted as years before the present, in thousands (Ky) or millions (My). They are estimations and any figure given is very unlikely to be an absolute date as on a calendar, hence they are often referred to as 'sidereal' dates, meaning time as measured by the diurnal motion of the stars.

However, the length and duration of time is of paramount importance when attempting to assess the arrival and movements of human populations and the Quaternary archaeologist is dependent on scientific colleagues for any sidereal dates which can help place the relative stratigraphy into a dated sequence.

Dr K.P. Oakley clearly expressed, in 1964, the main approaches to dating in his *Frameworks for Dating Fossil Man*, with four types of absolute dating (which he called 'chronometric' but is now usually referred to as 'sidereal') and four types of relative dating.

2.4.1 Sidereal Dating

A1 The dating of the object (eg, a palaeolith as opposed to a diagnostic neolith)
A2 The dating of the source of the deposit
A3 The dating of the bed by correlation with another
A4 The dating by some theoretical consideration (ie, astronomical theories)

2.4.2 Relative Dating

R1 The age relation of fossil or archaeological material to the containing deposit (ie, contemporaneity)
R2 The stage in the local sequence of the deposit containing the material (a fact)
R3 The position of the stage in wider-scale stratigraphy or archaeology (inference)
R4 Morphological dating: the relation of groups of fossils or archaeological material where the time span of genera or sequences are relatively short or well-known (often unreliable).

Oakley will be remembered for applying fluorine and nitrogen dating tests to the spurious Piltdown skull which demonstrated its recent date. His analyses were based on the fact that bones in the soil absorb fluorine, so the greater the amount the older it is. Conversely, there is less nitrogen the older is the bone. This is a good example of his A1 dating. Since then, there has been a great advance in the development of scientific forms of sidereal dating. The main methods are outlined below in Table 4, with indications of the range of time covered by each method and the most suitable materials on which they can be applied. There are many complications and the calculated dates may not be reliable. Final estimations of dates should ideally comprise the comparison of dates by different methods and obviously not clash with associated stratigraphical dating. In some cases, such as with amino acid dating, the fact that the dates give consistent sequences through time may be more important than the sidereal dates assigned to them.

It can be seen from the table that only some of these methods are of use for Palaeolithic archaeology. Radiocarbon (^{14}C), for instance,the most reliable of all

	Range (Ky)	Applicable to
Isotopic		
Radiocarbon (^{14}C)	<40	Ocean cores, corals, shells, bones, teeth, wood, and plant residues
Potassium-Argon (K-Ar)	<20,000	Volcanics
Uranium Series (U/Th *et al.*)	3–1500	Ocean cores, corals, volcanics, tufa, speleothems, shells, bones, teeth
Trapped eletrons		
Electron Spin Resonance (ESR)	1–900	Corals, volcanics, tufa, speleothems, shells, teeth
Thermoluminescence (TL)	.01–500	Corals, volcanics, sediments, speleothems
Fission Track	.1– >2000	Volcanics, obsidian
Biological		
Amino Acid Racemisation	<400	Shells, teeth
Geomorphic		
Rate of deposition	Indefinite	Sediments
Rate of deformation	Indefinite	Sediments
Rock and mineral weathering	Indefinite	Sediments
Rock profile development	Indefinite	Sediments
Correlations		
Lithostratigraphy	Quaternary	Stratigraphical sequences
Palaeomagnetism	.05– >2000	Ocean cores, volcanics, sediments
Orbital variations	Indefinite	Astronomy

Table 4 Dating methods: based on Smart and Frances 1991 (see for details and scientific explanations, also Rutter (1985) for particular problems with the dating of quaternary deposits)

sidereal dating methods, does not go back far enough. It is, of course, of inestimable value for the dating of Upper Palaeolithic sites and later prehistory. Potassium-Argon (K-Ar) dating is useless in Britain as there are no Quaternary volcanics. Electron Spin Resonance (ESR) is useful for speleothems (such as stalagmites and stalagtites in caves), and Thermoluminescence (TL) for sediments and burnt flint and clay. Uranium/Thorium methods are now used on an increasing number of materials, including some peats. The latter is obviously of high potential value for archaeological sites and is currently employed with increasing reliability (Debenham 1998; Debenham and Aitken 1984; Aitken *et al.* 1985).

Fission track dating has no use as there are no volcanic obsidians in Britain. Amino acid dating is of importance, especially as it can be used on shells, which are common fossils in Quaternary deposits (Bowen *et al.* 1989; Miller and Mangerud 1986). Geomorphic dating requires the application of other methods to determine the rates of deposition or deformation. Correlations when combined with other methods are the basis for creating frameworks.

The dating of deposits by the assumed typological sequence of artefacts is no longer tenable. The existence or extinction of certain animals is becoming a seemingly reliable means of identifying different interglacial periods, thus placing them into date order (Schreve 1998). Pollen profiles have been used in the same manner, but many local factors and incomplete profiles often make this difficult and sometimes erroneous. Certain molluscs, such as *Corbicula fluminalis* only appear to be present in interglacials OIS–9 and OIS–7.

Unless this is all put together into some sequence it makes little sense and many different attempts have been made to produce frameworks for the Quaternary into which geological, biological, and archaeological episodes and events can be placed in temporal order, both relatively and siderealy.

Pleistocene Sub-divisions	*British Quaternary Stage*	*Climate*	*Possible correlation with deep-sea Marine Stage*	*Possible date (Ky)*	*Sites and events*	*Divisions of the Palaeolithic*
LATE	FLANDRIAN	Warm	1	Present 12	Development of Post-glacial environments	MESOLITHIC–MODERN
	DEVENSIAN	Mainly cold temperate	2–4 5a–d	70 115	Max. ice sheet 18–20,000 BP reached N. Norfolk	LATE
	IPSWICHIAN	Warm	5e	130	No certain occupation of Britain	MIDDLE
MIDDLE	WOLSTONIAN COMPLEX	Cold Warm Cold Warm Cold	6 7 8 9 10	360	*Pontnewydd*: sparse occupation of Britain *Hoxne* Many Lower Palaeolithic sites	
	HOXNIAN	Warm	11	400	*Swanscombe* skull site	LOWER
	ANGLIAN	Cold	12	470	Major glaciation of Britain	
	CROMERIAN COMPLEX		13	500	*High Lodge* *Boxgrove* *Westbury-sub-Mendip*	

Table 5 Simplified correlation of British Quaternary events and marine stages

One of the first stratigraphical frameworks was based on the fourfold interpretation of the Swiss glaciations by Penck and Bruckner at the beginning of this century. The sequence of Gunz, Mindel, Riss, and Würm dominated geological interpretations for many years. Europe produced its own terminology in relation to it. It gradually became apparent that the record of the glaciations in Britain could not be correlated with the Swiss sequence with any reliability. The geological and archaeological literature of the following decades abounded with contradictory interpretations and, coupled with the misinterpretation and obsession with archaeological typology, Palaeolithic archaeology made little advance except in amassing localised information.

A great advance was made when the Geological Society of London published their report in 1973 on *Quaternary Correlations*. A stratigraphical framework was produced based on type sites and interpretation of past climates. The country was divided into regions and described accordingly. Table 5 summarises the recommended stratigraphical sequence through the Quaternary as published by the Geological Society of London.

2.5 The Earliest Occupation of Britain

Period I of the occupation of Britain as defined for this survey covers the time before the most extensive glaciation known in Britain (the Anglian Stage of the conventional chronology, considered to relate to OIS–12 and date from about 478,000 to 423,000 BP) until the advent of the interglacial period which followed it (see period definitions on p. 4). However, this section is only concerned with the pre-Anglian evidence, in order to see who may have been the very first humans to put foot on this country. At this time Britain was not an island. There is good reason to think that the present South Downs extended across what is now the English Channel to the Pas de Calais in

France. There was almost certainly a valley in between with a minor river flowing westwards to be joined by the ancient Solent River and precursors of the Somme and Seine. As noted above in the short note on evolution (Section 1.3), this is likely to have been the only route, although there have been suggestions that people may have found a passage round the edges of the Rhine delta and so to the estuary of the Bytham River. This would have certainly given a corridor across East Anglia and into the Midlands. There is some evidence to support this as will be noted below. However people arrived, they had to come from north-west Europe. Recent assessments of the dates for the earliest occupation of Europe conclude that it was mostly if not entirely uninhabited until about 500,000 BP, except possibly in northern and southern Spain. There would appear to be nothing conclusive prior to this date north of the Pyrenees, in spite of numerous claims otherwise. There are also much earlier dates from the Middle East at Ubeidiya and in Georgia at Dminisi. There is the Mauer jaw in Germany and a hand-axe of quartzite possibly from the same river deposits (Roebroeks 1994; 1996; Roebroeks and Kolfschoten 1995; Roberts *et al.* 1995). The paucity of the evidence from north-western Europe may be a result of the greater spread and intensity of the later glaciations obliterating the evidence rather than sparseness of occupation.

Sites in England are known in two areas: on the south coast, and in the West Country and along the extinct Bytham River. Details of the individual sites are all in the following chapters in the relevant geographical sections, but they are considered critically below in respect of the validity of their dating.

2.5.1 The Earliest Sites in the South

Nothing is known or can be identified positively from river terrace gravels. The most informative site is Boxgrove in West Sussex. It would seem logical that the first occupants had crossed over on the Chalk from north-western France and generations gradually made their way westwards either along the coastline or sides of the Old Solent River. Their discarded artefacts are found in a stratified succession of marine beach deposits, and on land surfaces within sands and silts. Occupation was not continuous but intermittent over an unknown period to be measured in centuries if not millennia. Much of the great amount of lithic material in the head deposits that eventually overwhelmed the site probably came from contemporary occupation on the top of the original cliff or on the downs in the near vicinity. Dating by biostratigraphy gives a pre-Anglian age on the basis of the presence of animals (eg, the vole *Sorex savini* (Stuart 1996) and an extinct form of rhinoceros) that are not found in later interglacials. A Late Cromerian age of OIS–13 or earlier is thus inferred. Amino acid dating suggests a later date of OIS–11, but the former seems explicit. The same is presumably true of the other sites along the line of the Slindon Raised Beach from Chichester to near Arundel.

Much further west is the site at Westbury-sub-Mendip. Here, the sparse Palaeolithic flakes and cores are in the deposits of a much-eroded cave system, but the micro-mammals in particular are also of Cromerian type. The only other site that may be of this age is Kent's Cavern at Torquay. The presence of the extinct Sabre Tooth in the lower breccias of this cave indicate a Cromerian date. Unfortunately, it cannot be sure that the several Palaeolithic hand-axes found in the cave were found in the same deposit, but it seems very likely they were.

2.5.2 Sites in East Anglia and the Midlands

Whether people found their way into the Midlands along the valley of the lost Bytham River, from East Anglia upstream, or perhaps up the Severn from the West Country and into the proto-Soar is unknown. The site at Waverly Wood is unequivocally stratified beneath glacial till, identified as that of Anglian Stage, although originally considered Wolstonian. The human occupation was found in at least two levels within river channels that were flowing at the end of a temperate stage. Assuming that the interpretation of the overlying till as Anglian is correct, then the river channels must be earlier than the Anglian. Mollusca and micro-mammals indicate a date no older than the latter part of the Cromerian. Amino acid dating suggests an age equivalent to OIS–15. A Late Cromerian–Early Anglian date seems most likely. A further andesite hand-axe to the three found at Waverley Wood comes from Pool's Pit nearer Coventry, in gravels considered to be of the same age.

No other Palaeolithic material has so far been found in the gravels of this Bytham River on the west side of the Fens, but there are several sites in Norfolk and Suffolk. They are known, in downstream order, at Shrub Hill at Feltwell, the Frimstone Pit in the same parish, Hockwold-cum-Wilton, Brandon, Lakenheath, High Lodge, and Warren Hill, Mildenhall. The most unusual site is that of High Lodge, where a great raft of interglacial alluvium of the Bytham River has been torn from its geological context and transported bodily by glacial action into the till of the Anglian Stage. Fragments of an extinct rhinoceros associated with the assemblage of flakes and finely-made scrapers confirm the date. Shrub Hill is a prolific site, and Warren Hill even more so.

There is no reason to doubt with all these sites in the south of Britain and along the lost Bytham River that occupation was no less intense before the Anglian Stage than it was afterwards. Although there is strong evidence to support a pre-Anglian age for them, apart from Waverley Wood there is little to denote how much older they may be. In view of the general conclusion that there is no proof of any occupation of north-west Europe before about half a million years, it is best to regard that as the time when Palaeolithic people first came to Britain until further evidence might suggest differently.

2.6 The Last Lower Palaeolithic People Before the Advent of Modern Humans

The earliest sites noted above come within the earlier part of Period 1 as defined in this survey (see p. 4). The latter part of Period 1 and all of Period 2 contain the major evidence for the Palaeolithic occupation of Britain, and constitute the bulk of the listed sites which occur in the following sections. For clarity, however, a note is given below of some of the evidence for occupation during Period 3, in which technological innovations, if nothing else, allow it to be differentiated.

The term Middle Palaeolithic is used in this volume as that part of the Lower Palaeolithic that can be identified by the emergence of more complex forms of flintworking technology and the presence of *Homo neanderthalensis.* The end of it is regarded as the time when distinctive flint industries appear based on blade production and the use of bone and antler for other tools or weapons, and considered to be produced by modern humans. The transitions from one to the other, at both ends of the scale, were neither simple, abrupt, nor, sometimes, recognisable.

The recent end, heralding the Upper Palaeolithic period, is one of great change and variation in life styles; the older end is more one of gradual adaptation over many millennia to what, on continental correlations, can be called the Mousterian. It is especially in what is now France that the full impact of the Mousterian can be assessed, with its numerous variants and much use by the people of caves and rock shelters. Before about 30,000 BP all identifiable human remains from the time of the last interglacial are of Neanderthalers. Thus, it is best to restrict this section to what is known in this country of the people who were here during that time, ie, from the end of OIS–5e to about 40,000 BP (ie. the latter part of Period 3 as defined on p. 4).

It can only be assumed that the population during this period were Neanderthalers, but not a single bone of them has ever been found in Britain. The nearest in time are the teeth and mandible fragments from the Pontnewydd Cave (Chapter 8) which are at least 200,000 years earlier. These did have some Neanderthal characteristics and, in view of the lack of archaeological evidence for any modern humans before about 40,000 BP it seems a fair assumption that the population was mixed, at least elsewhere in Europe. It also has to be realised that there is not a single artefact-rich archaeological site of this period in Britain with material in primary context that has ever been thoroughly investigated by modern methods. The evidence from the few caves that have yielded artefacts has been, in most cases, looted rather than excavated.

Serious attempts have been made to remedy this, as at Kent's Cavern and Creswell Crags, but so little has been left *in situ* that not much more has been possible to add to the earlier records. It seems ironic that more is known of earlier Period I sites than these relatively more recent ones! All that can be done apart from gleaning what is possible from the past records from various caves is to use typology as a guide. Yet sites of this period are so few and non-prolific that there is very little on which to apply any typology. This does suggest quite strongly that there was not any intense occupation of the country during this whole time, as in central and southern France. Some possible reasons for this are outlined below.

The last interglacial (the Ipswichian Stage or OIS–5e) was for much of the time as warm as today, as can be deduced from the classic sites at Bobbitshole near Ipswich and Trafalgar Square. The latter site produced a great range of animals that create a very different scene to that from the lions of Nelson's Column above them. Apart from also having lions, many other animals frequented the old floodplain of the Thames; hippopotamus, straight-tusked elephant, rhinoceros, giant deer, red deer, fallow deer, aurochs, and bison. Significantly, there were no horses nor mammoths; neither was there any archaeology. This fauna and lack of anything to denote the presence of anyone is repeated at other sites which can be related to OIS–5e. Some confusion has arisen in that other sites that are now attributed to the previous interglacial of OIS–7 (such as Stanton Harcourt, Stoke Tunnel, Crayford, Ilford, Aveley; with a different fauna and some archaeology) were originally included with OIS–5e. The lack of palaeoliths in the later Ipswichian sites suggests the country may have been totally uninhabited at the time.

The only site that appeared to show otherwise is the Rhinoceros Hole Cave at Wookey. In the basal deposits hippopotamus was recorded with a bout coupé hand-axe and three flakes. The deposit was partly fluviatile so the artefacts may have been derived from the overlying deposits containing a typical cold, Devensian fauna. In any case, the hippopotamus identification is disputed. Similar hand-axes have come from the nearby Hyaena Den Cave where the faunal remains indicate a time-span from the end of the last interglacial through the Devensian. Other cave sites clearly relate the sparse archaeology they contain of Mousterian aspect to the cool or cold earlier part of the Devensian Stage: Kent's Cavern, Coygan Cave, Uphill Quarry, Robin Hood's, and Pinhole Caves at Creswell Crags. The evidence from all of these and other cave and rock shelter sites is summarised in Chapter 8.

This sparse evidence for occupation is also found in the few open sites that can be related with any certainty to the early part of the Devensian. Bout coupé hand-axes have come in small numbers from low lying gravels of the Great Ouse at Little Paxton and the Avon at Christchurch. Other bout coupé hand-axes shown and listed on some of the distribution maps in this volume have no certain context or come within the typological variation between extreme forms and other elegant ovate or cordate hand-axes which are found throughout Periods 1 and 2. A few from the buried channel of the Thames estuary have a better claim to belong to Period 3 and there is an important site on the Isle of Wight at Great Pan Farm, Newport. This has produced a relatively large number of artefacts from various levels within river gravels of the Medina, including about 50 hand-axes, at least one of which is of bout coupé form, some Levallois flakes and cores, and other flakes.

A sandy deposit within the gravels was interpreted as a beach sand and equated with the 7.5 m Raised Beach. If this is correct, then a date of OIS–7 is more likely than OIS–5e. The only other site with an assemblage of palaeoliths that, from their typology, would qualify for a Mousterian date is that of the much-eroded rock shelter at Oldbury, near Ightham in Kent. It includes at least 5 bout coupé hand-axes and 11 Levallois flakes and has been described with some justification as 'the richest Mousterian assemblage in Britain.' Unfortunately, the artefacts were all found on the surface and it can only be seen as most likely that they have been derived from a rock shelter that has eroded away. The bout coupé hand-axe from the Fisherton brickearths near Salisbury was found in association with mammoth remains and, from its context, is probably early Devensian.

Thus, there was occupation during the cool or cold periods of the last glacial stage, spread sparsely but fairly uniformly east to west across southern England, and into the Midlands. People were using caves for shelter, but were also still in the river valleys. A few surface sites on higher ground of hand-axes described as bout coupé may indicate a wider distribution. The apparent lack of occupation during the last interglacial, or at least until near the end of it, may have been a result of the English Channel being a barrier. There was a higher sea level at the time, but it is not considered to have been much higher than the present day. More likely, it was not the height of the sea level so much as the width of the channel, ever increasing throughout the Middle and Late Pleistocene. A lack of occupation would also imply that people had either retreated to the continent during the extremes of the previous glacial period (OIS–6), when a low sea level would have rendered getting across hazardous perhaps but not impossible. Alternatively, the population had gradually perished.

Whatever the reason, people were reoccupying the country, and it can only be assumed that they did so from France when the sea level had fallen enough to allow it. In the absence of anything to show otherwise, it could be taken that this reoccupation took place in OIS–4 or OIS–3. This brings these people of the Middle Palaeolithic into the time around 40,000 BP when modern humans were in France. There are radiocarbon dates of around 30,000 BP from Kent's Cavern associated with a leaf point, and another of about 31,000 BP of a modern human mandible (see Section 3.8.6). Were the people who made the leaf point Neanderthalers or modern humans? Notions of Neanderthalers and modern humans coming face to face or fighting each other belong to Hollywood (Otte 1990). There are all manner of complexities to consider, and although dates in thousands of years are being bandied around here, peoples' life spans were still, on average, probably about 40–50 years at the most.

The one site in Britain where there is some suggestion of an overlap is that of Bramford Road, Ipswich (see Section 3.6). From gravels of the Gipping are numerous small ovate and cordate hand-axes and flakes struck in a Levallois manner. Such is a typical assemblage of the Mousterian of Acheulian Tradition. From the same gravel are a few blades and leaf points, which are typical of the Early Upper Palaeolithic. They are all in a derived context so there is no stratigraphical context that may have separated them. However, it would be an assumption to consider that they necessarily belong to differing periods, traditions, or cultures, whatever one may wish to term it. The Mousterian of France, so richly preserved and recorded, contains far greater variation than England in the technology used in its variants. For instance, at Seclin in the Pas de Calais, in assemblages dated to about 90,000 BP there are blades from prismatic cores that are identical to those in Upper Palaeolithic industries of 50,000 years later, if the dating really is correct. Also, bifacial leaf points are virtually unknown in the extreme western parts of Europe but are found in central and eastern parts. A Neanderthal at Saint-Césaire in the Charente, is dated to no earlier than 38,000–35,000 BP. This is some 3000–5000 years after somewhat similar blade industries were present in south-western France and northern Spain. There is clearly, in those areas, overlap and contact over several thousands of years. Populations of both Neanderthal and modern types would appear to have been moving over much of Europe.

How those people at the north western peninsula were affected by all this is unknown. All that can be stated is that nothing of Middle Palaeolithic nature can be discerned in England after about the middle of the Devensian. The population probably migrated southwards on to the continent as the climate deteriorated and the polar ice sheet once again slowly began to creep south. The radiocarbon dates from the artefact level at Coygan Cave with its fine bout coupé hand-axes of around 38,000 BP is very similar to the date of the leaf points at Kents Cavern. Both dates are virtually at the limit of radiocarbon dating and the real dates are probably much earlier. Uranium-series determinations on stalagmite which underlay or was within the artefact level gave a date of about 64,000 years. The conclusion is that the Mousterian at Coygan Cave lies somewhere between 64–38,000 years.

The last glacial maximum was between about 20,000–18,000 BP. Before then from about 40,000 BP or later, people of modern type were in southern England. The leaf points suggest migrations from central Europe; the so-called Aurignacian blade industries from perhaps France or the Low Countries. It was a time of great change. The Lower and Middle Palaeolithic is replaced by the Upper Palaeolithic. Hand-axes had been made on and off in Britain for half a million years; now, no longer. The last people to make them are typified by those who sought the shelter of caves from the Devensian wind; presumably Neanderthalers. They disappear slowly as modern humans arrive. There was seemingly an overlap of perhaps 10,000 years. DNA extracted from a bone of the first eponymous Neanderthaler shows a different genetic structure to ourselves, which would inhibit interbreeding. What happened to those people in 10,000 years has yet to be understood. There is adequate evidence in the Near East that anatomically modern humans and Neanderthalers were contemporary there at about 100,000 BP. It is possible that it was the same in Europe, so it need not imply that they could be identified by characteristic types of stone tools.

2.7 The Mode of Life

This volume is concerned with where and when people were living in Britain from about half a million years ago until around 40,000 BP. It makes no pretence to be a text book on Palaeolithic archaeology but it would be incomplete without some consideration of the actual people who were living here: what did they look like, how did they organise themselves? Is it reasonable to call them people or, if we had ever met them, would we regard them as fellow-humans or deformed savages? The answer must be somewhere in between, and much more likely nearer the former. Little can be said of their physical aspect from the scanty remains surviving of the only three individuals from the whole period, but scanty as they are, they fit in with what is known from the rest of Europe. Almost certainly distant descendants of *Homo ergaster* from Africa, they arrive as *Homo heidelbergensis* and disappear as *Homo neanderthalensis.* Best to call them, as per Professor Gamble, 'The Ancients'. They were undoubtedly well built and not necessarily stocky. Probably the most obvious difference we might notice is the heavy brows and flattish faces, not all that different from some modern boxers. More cannot be said. It is not known whether they were dark or light skinned, or they had more body hair than ourselves, or whether sexual dimorphism was as marked then as it is now. The danger, perhaps, is thinking they were more human than they were, in the sense of sharing a similar psychology to ourselves, but it would be equally dangerous to regard them as totally non-human. In any case, the scientific nomenclature is *Homo*, so they will be called people here.

The archaeological evidence on which to assess the mode of life of these people, in Britain and elsewhere for that matter, is restricted almost entirely to stone artefacts and a few butchered bones. From these, assumptions can be made, varying from the most likely, likely, probable or doubtful, inevitably reflecting the personal bias of the assumer. One thing that seems to be certain, and is accepted here, is that they lived in groups. The size of such groups is unknown, but a reasonable guess is about 50 or so, comprising extended families in the genetic sense (Mithen 1993). It can also be assumed with some confidence that, if a group became too large to survive comfortably for social reasons or availability of foodstuffs, then it would split up. In this way, the knowledge and skills of one group would transfer into another.

2.7.1 Subsistence

This is obviously of paramount importance. It seems certain that at this stage of the Palaeolithic period these people were neither totally dependent for their meat from scavenging, nor were they highly efficient hunters like the later modern humans of the Upper Palaeolithic period. There is no evidence for the foraging for nuts, fruits, and edible roots, but it would be strange if these did not contribute considerably to their diet, possibly the major portion of it.

Evidence for hunting is unambiguous, since sites such as Boxgrove and Hoxne, where the faunal remains are preserved in fine condition, bear cut-marks commensurate with efficient butchering. Furthermore, at Boxgrove, gnaw-marks of carnivores are superimposed over the humanly-made cut-marks. Thus, the animal had been killed by humans, butchered on the spot, and the meat mainly removed and later found by carnivores. They were the scavengers! These people were capable of hunting large and dangerous beasts such as rhinos and bovids. The only known fragment of a spear is from Clacton. It is made of yew (Colour Pl. 15). Other complete spears of about the same date have recently been found at Schoningen in Germany (Thieme 1996).

It seems very likely that, even at this early period, there would have been a division of labour between the sexes. Females with children would have been at a great disadvantage in the hunting of dangerous animals, to themselves and to others. It would seem most likely that men would have dominated hunting activities, and women the foraging, but not with any prerogative.

2.7.2 Mental Capacity, Communication, and Language

Much has been written on this vital aspect of the Ancients, especially on decision-making and language. Suffice here to observe that the hunting of large, dangerous animals could only have been a group activity and would have required some form of communication. Whether such was in the form of elementary language or just by signs is debatable. Also, some of the activities of these people, such as tool-making, require considerable learning and organisation that would seem impossible without some form of verbal communication. The cranial capacity of the Swanscombe skull is estimated at 1325 cc, which is close to the average volume of modern ones at *c.* 1350–1445 cc. No relationship has ever been established between brain volume and behaviour, but would appear, when increased in relation to body size, to be a reasonable indication of greater intelligence. To express it in the vernacular, it is very unlikely these people were fools. Such aspects as 'combined social action', language and other possible behaviour patterns are well summarised by Gamble (1996) and Mellars and Stringer (1989).

2.7.3 Habitation, Shelter, and Clothing

Most of the sites listed in this volume are open sites. The number of cave sites and rock shelters that are known to have been used are negligible, with none for Period 2 occupation. In any case, with a very minor exception, such are restricted to the highland zone of Britain. There seems no reason to think that a species which evolved in the tropical or Mediterranean climates of Africa would have been any more equiped to cope with the British climate during interglacials than ourselves. Even if they were hardier and hairier it would seem unthinkable that they would not have sought or made means of protecting themselves from the cold and wet of summers, let alone winters, or during periglacial conditions. The obvious means of doing this would be shelters made of flimsy, leafed branches, or even large, joined skins. Some form of clothing for protection rather than modesty during inclement periods must have been worn. There is nothing in the archaeological record to support this, apart from the numbers of scrapers that are found. Microwear studies have identified some examples of what are termed as scrapers as having actually been used for scraping hides (Fig. 9). It is considered here that the acquired capacity of people to combat the discomfort of unpleasant climates with clothing and shelters was a major factor of their migration into the temperate zones during the early Middle Pleistocene.

Any human groups dependent for their subsistence on hunting and foraging must be nomadic, but this does not mean that they may not have stayed in one place occasionally for some period of time. From such a 'home base' they could have exploited certain favoured areas. It is possible that some of the prolific sites along the river valleys may be the result of a gradual accumulation of discarded palaeoliths by protracted visits to the same spot.

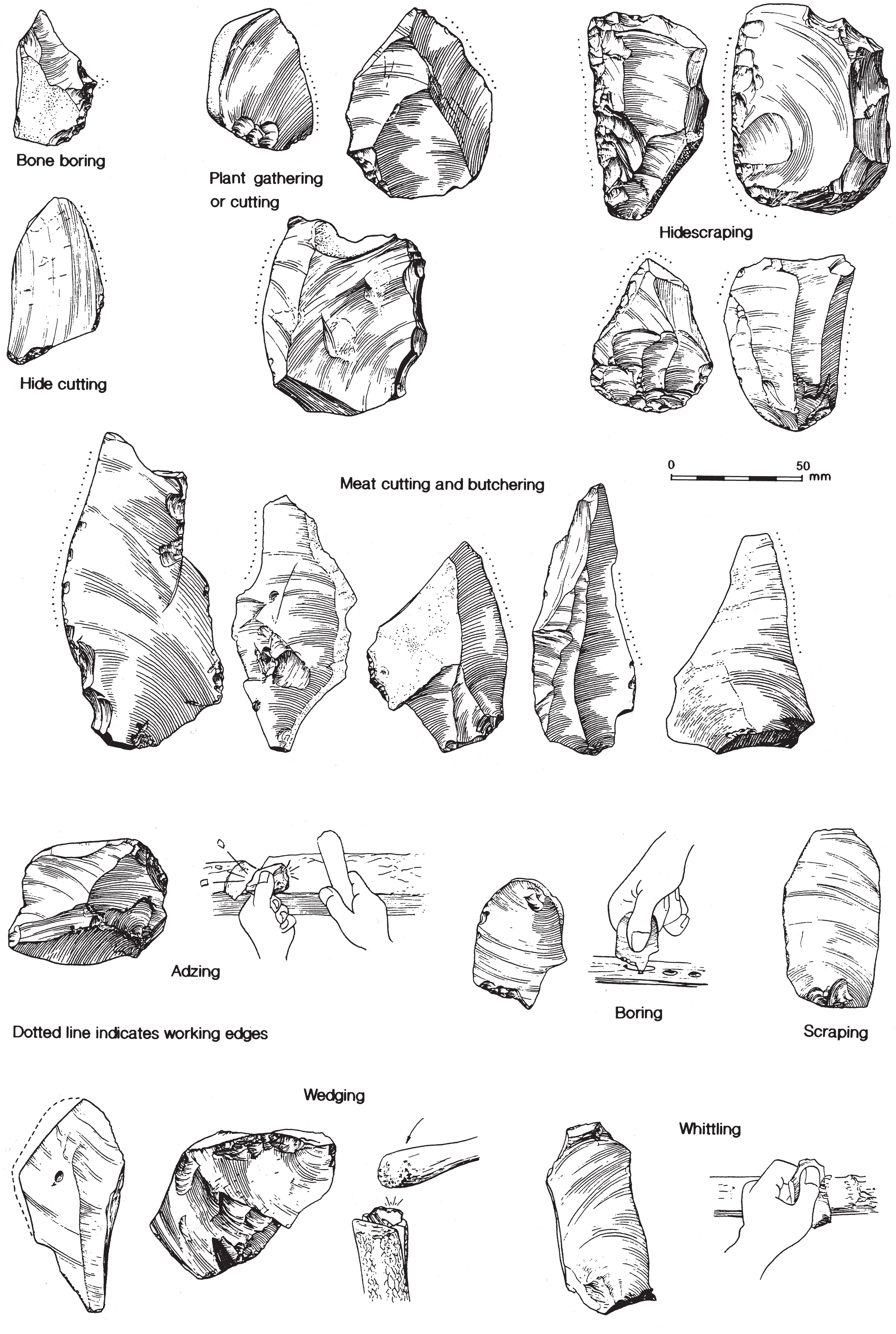
2.7.4 Fire

Specks of charcoal are sometimes found in the sieved samples from sites such as Swanscombe, Boxgrove, and Hoxne, but whether they have come from humanly-made fires or natural conflagrations is uncertain. No hearths are known, but a small 'combustion area' of burnt clay has recently been found during excavations at Beeches Pit, West Stow, in association with some burnt flints and small pieces of calcined bone. Such is the best contender, so far, for the use of fire. If confirmed, it would be good to know whether it was for cooking or burning areas to attract game when the vegetation regenerated, or for just keeping warm.

2.7.5 Tool-making and Other Crafts

As so little else survives, accounts of the Palaeolithic period tend to be dominated by descriptions of the lithic material and its probable uses. There is no doubt that hand-axes were used for butchering animals, possibly among other uses. People at Clacton seem to have managed with suitable flakes. Some of the flakes from Hoxne were also considered from the microwear imparted upon them to have been used for cutting meat. Scrapers have also been identified as having been

Figure 9 (opposite) Flint artefacts of the Upper and Lower Industries at Hoxne, identified from microwear analysis as having been used for various purposes (Keeley 1980, 132–5)


Bone boring
Plant gathering
or cutting
Hidescraping
Hide cutting
Meat cutting and butchering
0
50
mm
Adzing
Boring
Scraping
Dotted line indicates working edges
Wedging
Whittling

used for scraping hides. Some other activities are indicated by microwear traces as shown on Figure 9, although some doubt has been expressed on the accuracy of such identifications. From experimental use by replicated flints on different materials such as bone, wood, and leather, and their comparison with Palaeolithic examples, many of the identifications seem justified. Such replicated and used flints given to a microwear specialist without any knowledge of what they had been used for, were identified with about 75% accuracy. This supports the notion that the majority of flint or stone tools were intended for working other materials. If the same skill that was employed on the fashioning of elegant, symmetrical hand-axes was applied to other materials such as wood, leather, and bark, the discovery of the products might well revolutionise our ideas of the status of these people. All we have, as stated above, is the spear from Clacton.

Another, more archaeological, aspect to the stone technology is the question of the typology of hand-axes and the sites as at Clacton and Swanscombe where there is a vast quantity of flakes and cores. Original interpretations of these sites as earlier than hand-axe assemblages have been discounted by stratigraphy, but there is still the problem of why there should be such a quantity of somewhat haphazardly struck flint at these places. Arguments that they represent the work of people with different traditions, if not abilities, is seriously questioned, but it is not easy to prove that the occasional hand-axe that may be contemporary has been made by the same people, or the work of others, or derived from earlier deposits. Arguments in favour of the flakes and cores being the products of people who generally made hand-axes but produced the former when the quality of the raw material was not good enough are not very convincing. They certainly occur together in the gravels of the Ancient Channel between Reading and Henley, but this does not prove the matter one way or the other. The hand-axes at Barnham could, as the original excavator concluded, be stratigraphically above solifluction deposits that only produced cores and flakes of Clacton type. It remains a problem and is not considered here as proved one way or the other, in spite of comments to the contrary in recent publications.

Another aspect of raw material is that it has been suggested that the typology of hand-axes has been controlled by the shape and size of the flint or other stone available (White 1998). Certainly, a cylindical nodule only about 100 mm in diameter at its thickest point would not be suitable for making an ovate hand-axe of about that width. Conversely, if the quality was adequate it would be suitable for one of pointed form. It is probably significant in this respect that at Boxgrove, with an endless supply of large nodules out of the Chalk cliff, ovate or cordate forms dominate, generally with a cutting edge all round the tool. In the Swanscombe Middle Gravels, however, with only gravel flints available, the dominant form is pointed. This could suggest that the various hand-axe groups identified by Roe were merely sites where similar-sized raw material was to be found. Yet, the impression is often given of hand-axes being made to an 'imposed form'; that is, made in a manner as learnt from one and taught to another, and so perpetuated through time.

Raw material generally appears to have been selected locally. The gravelly beaches on the sides of rivers was a common source. Much of this type of flint may have been subjected to battering or frost action and, as such, might be unusable. Good quality flint fresh from the Chalk was ideal, but rarely available except on sea cliffs or river gorges cut into that rock. Vegetation would normally conceal flint nodules that might have outcropped on the downland, except perhaps in the cooler periods at the beginning and end of interglacial periods when the vegetation was sparse. Certain green-coated flint nodules in the Essex area were recognised for their good quality. These come from the base of the Thanet Sand on top of the Chalk, but many occur in the river gravels. Beyond the outcrops of the Chalk any available, tractable stone had to be used: quartzite or volcanic rocks. The only recognisable stone which may have been collected and carried somewhere was the honey-coloured Upper Greensand chert which occurs so richly in the gravels of the River Axe in Devon. No quarries or any exploited sources for raw material apart from possibly the Axe gravels around Broom have ever been recognised in the British Palaeolithic.

2.7.6 Disposal of the Dead

It is commonly asked why are there so few human skeletal remains in the Lower Palaeolithic. The answer is that there was no burial custom or any other known ritual for the disposal of the dead. In France there are a few Mousterian burials. It can only be assumed that the dead were just abandoned and carnivores or bacterial and chemical decay did the rest, as with other animals.

2.7.7 Epilogue

No distinction has been made in the above comments on the mode of life during the three periods of occupation recognised for this survey. This is deliberate as, apart from a few innovations in lithic technology, there is nothing to denote any change: almost half a million years of Palaeolithic activity with hand-axes at both ends of the scale; hunting and foraging. In the restless years of the last few thousand years, and the present situation where each generation has to cope with what the last one did not know, this uniformity throughout the Palaeolithic may give an impression of stagnation. It can be seen otherwise. The people who are only known from the sites listed in this survey were at one with their environment. They were part of the so-called natural order of things. They had enough to eat or they would have become extinct, even if some groups perished through famine, disease, or disaster. They were successful in the Darwinian sense of survival. Their social organisation must have worked. They would have known this and would probably have been hesitant to adapt to any changes which had no immediate advantage. Palaeolithic reactionaries would not have been popular, if the term has any validity in such a society.

3. Along the River Valleys

3.1 Introduction

The distribution of palaeoliths in Britain is often broadly referred to as being south of an imaginary line drawn between the Wash and the Bristol Channel. More accurately it can be described as largely beyond the line of the limits of the last ice sheet which covered much of the country (Fig. 5). Very few palaeoliths are found within the area covered by this ice sheet. The great majority of Palaeolithic artefacts have been found in terrace deposits of rivers outside of it. This does not necessarily imply that there was little or no human occupation to the north and west of this line, but that is the subject of Chapter 7. This chapter is concerned with the evidence for human occupation along the river valleys of lowland England. The great number of palaeoliths which have been found in terrace deposits is incontrovertible evidence for the presence of human groups during intermittent occupations in all the major valleys, over a time span of some half a million years.

It can be argued, of course, that there was an equal density of population at times elsewhere, away from the valleys, and that the preponderance of palaeoliths in the terrace deposits merely reflects that it was there that they found raw material along the river banks, made tools and then discarded them. Certainly, there is good evidence for occupation on the Downs, beside lakes, and elsewhere, as described in the following chapters, but not seemingly in anything like the density within the valleys. The point is that the majority of the evidence for the occupation of Britain is found in the deposits of river valleys.

The advantages of river valleys during interglacial periods are self-evident: fresh water, relatively easy movement, exposed raw material for tools, open grassy floodplains for grazing herbivores, and access up the valley sides to a variety of habitats. The latter would give shelter among trees and perhaps security from larger carnivores, with wood for fashioning into simple equipment or even burning, if they really did make fires.

Obviously, the sites of palaeoliths which are described in the following sections on the major river valleys are not all of the same age. In a survey of this nature little can be done to try and place them in a neat chronological order, even if this were possible. Nor can it generally be stated as to whether a particular site represents occupation during the early, middle, or latter part of an interglacial. Gamble (1986) has made a strong case for his 'Ancients' favouring the beginnings and ends of interglacials, as the landscape would have been more open. Mithen (1993) would see the simple so-called Clactonian industry as a result of groups being isolated from each other during the more densely wooded landscape of full interglacial climate, and thus not able to pass on technological skills possessed by people who made hand-axes. Ashton and McNabb argue that there is no real difference between the Clactonian and Acheulian other than that which results from the quality of available raw material or perhaps immediate circumstances. All these things could be true but exceptions can be found to disprove the rule. Such is the essence of Palaeolithic archaeology but, as already stated, this survey of sites is to indicate just where these distant people went and emphasise the variety of environments with which they could apparently cope. Enough examples can be shown, however, to show that they lived in or through most of the changing climate of interglacial periods and, rarely but astonishingly, in periglacial ones.

In spite of these reservations it seems that interglacials were the most favoured periods of occupation, even if the majority of palaeoliths have been found in gravels that were deposited during periglacial or full glacial conditions. Reference to the diagram explaining the relation of discarded artefacts to terrace deposits (Fig. 8) should clarify this apparent contradiction. A further assumption is that concentrations of artefacts mainly in relatively fresh condition relate to one episode, such as at Furze Platt, Swanscombe, or Dunbridge. An episode could be a few days, weeks, or irregular visits, but by the same group or groups. A more negative assumption is that associated mammalian bones are not necessarily there as a result of human activity, unless they bear definite cut-marks from dismembering or defleshing.

The sections on the different valleys in this chapter are arranged in a similar manner:

- a general summary of the distribution of sites along the whole of the valley or drainage area;
- notice of prolific or key sites for interpretations, accompanied by
- a map or maps (volume 2) with numbered locations relating to lists of sites, and an indication of the likely local geological outcrops beyond the valley on which vegetational characters would be imposed depending on the prevailing climate.

A short text in this volume is added to the majority of individual maps with more detailed information which may be of interest or of use as reference. Details of particular sites, the types and quantities of the palaeoliths found and where they are conserved, can be found in Roe's 1968 *Gazetteer of British Lower and Middle Palaeolithic Sites*. Wymer (1968) gives details for the Thames Valley and (1985) for East Anglia. Considerably more detail on the geology of the sites is contained in the six reports published on the Southern Rivers and English Rivers and Welsh Palaeolithic Surveys (Wessex Archaeology 1992–7; Wessex Archaeology and Cadw 1996). The latter are available by arrangement for *bona fide* enquiries or consultation in the archaeological units, planning departments or museums of the county involved.

SITES – The term site can mean many things to an archaeologist. It is clearly a location or place but it could apply to a Roman Villa or the discovery of a single flint scraper. Sites can be seen as 'episodes of activity across a landscape' but the term is used here to mean any location where one or more palaeoliths have been found. 'Scatter' would be more archaeologically correct but is synonymous.

Where possible, some separation has been made of sites with very different dates. Thus, much is made of the know limits of the till (Boulder clay) left by the most extensive glaciation of Britain that has left any record. Figure 5 shows the limit of this ice sheet, referred to as the Anglian Stage in the conventional chronology, and generally considered but not proved to relate to the cold period of Oxygen Isotope Stage (=OIS)–12. This is a convenient marker for the Middle Pleistocene of Britain and it can be accepted that palaeoliths found in river terrace deposits above the till of the Anglian Stage represent the discards of people here more recently than that glacial episode. Correspondingly, palaeoliths found in deposits below Anglian till must be older than that glaciation. It can be appreciated that the passage of glacial ice usually leaves little of unconsolidated deposits beneath it intact, so such instances of preservation are rare. However, it will be seen in the Midlands section (3.6) that some have survived with contained palaeoliths.

Another dating marker for the end of the Middle Pleistocene is an interglacial episode thought to relate to OIS–7. This is the time, or just before, when artefacts of Middle Palaeolithic technology appear. Unfortunately, there are few valleys in which terrace deposits of this interglacial have been found. However, for the purpose of this survey, the Lower and Middle Palaeolithic sites of Britain will be divided where possible into three periods (1–3), as indicated in Chapter 1.

The first and longest section in this chapter is of the Thames Valley, for the good reason that, as Bridgland (1994, xii) expresses it: 'The Thames terrace deposits ... provide what is probably the most detailed terrestrial Pleistocene sequence in the British Isles.' It is the only existing valley which, with its tributary, the Kennet, can allow a separation to be made in this broad survey, of Pre-Anglian sites, sites between the end of the Anglian (OIS–12) and OIS–8, and sites of the Middle Palaeolithic (ie, Periods 1–3 as defined on p. 4).

3.2 Thames

This section includes the tributaries Kennet, Wey, Blackwater, and Colne, all of which contain Palaeolithic sites. The Lea, Darent, and Medway are excluded, as they only became part of the Thames system after the great diversion during the Anglian Stage. The chronology of the Pleistocene deposits of the River Thames, related to OIS, is used here as a basis for dating the various periods of occupation (Periods 1–3 as defined in Chapter 1). This is summarised on Table 6, with correlations of the terrace deposits in the Upper, Middle, and Lower parts of the valley, together with those in Essex associated partly with the River Medway. This table is based on current interpretations by Bridgland (1994), although there are some controversial aspects between his interpretations and those of Gibbard (1985; 1994) for the Middle and Lower Thames. These are outlined in the following sections, but are mainly matters of detail that do little to alter the general sequence and distribution of the human occupation of the main valley and its tributaries.

The palaeogeography of south-east England prior to this Anglian Stage differed considerably to that of the present day (see Fig. 46 for the ancestral route of the Thames across Essex and Suffolk), especially in that the Strait of Dover did not exist. East Kent and the Pas-de-Calais were connected by a Chalk ridge (Destombes *et al.* 1975). There may have been a small stream that drained westwards into the bight that eventually became the English Channel, but nothing to prevent people and, of course, animals, coming across from Europe, or *vice versa*. From the point of view of the earliest occupation of southern Britain there was no other way to get here, although there may have been accessibility into what is now East Anglia up the lost Bytham River (Chapters 2.5.2, 3.6). We know, from the evidence of the Boxgrove site, that they reached Sussex possibly along the ancient coastline that would probably have been accessible. There is nothing in the Medway or Darent to suggest such early occupation there, although some of the undatable surface sites could be of this time.

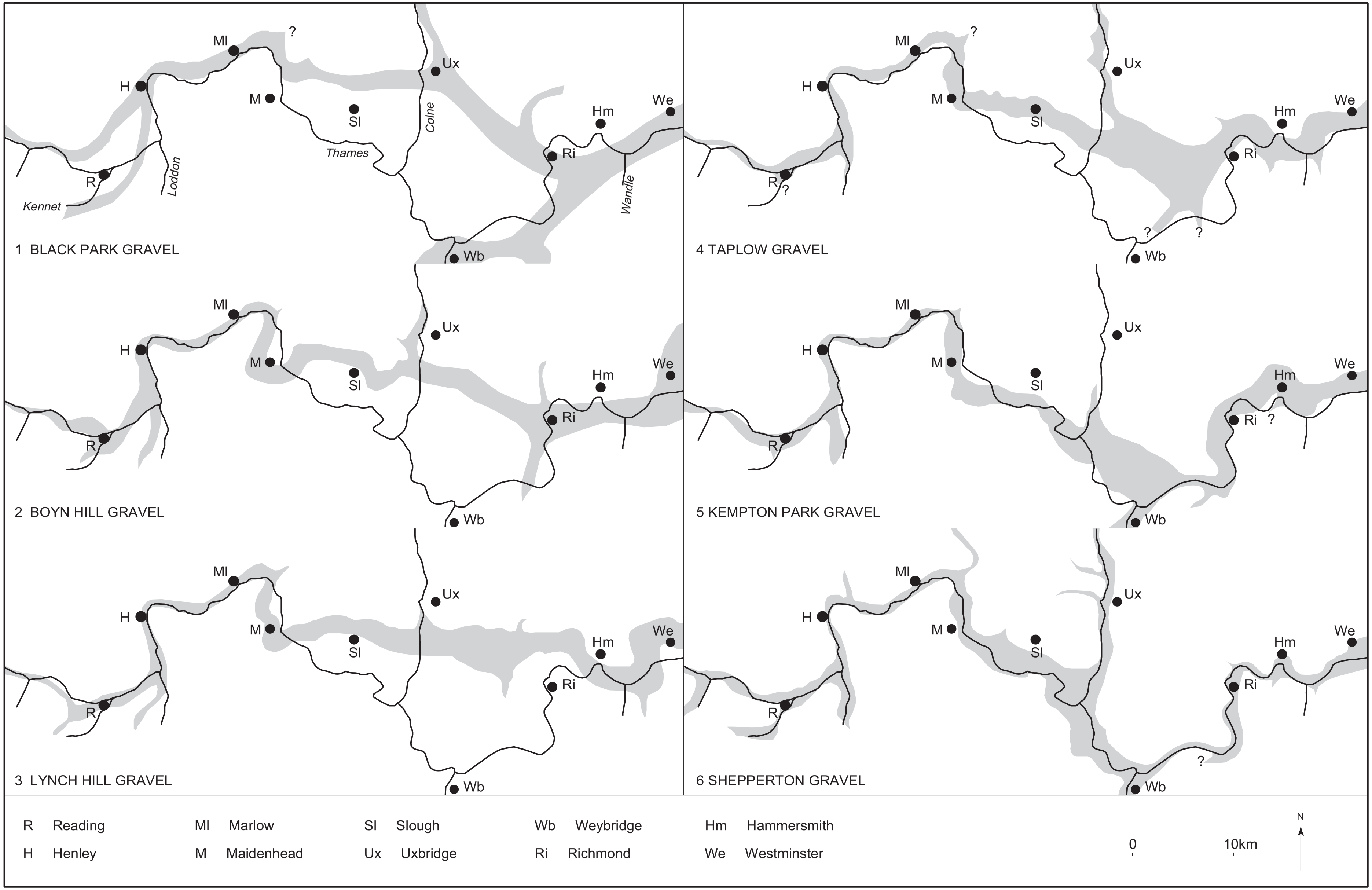


Figure 10 Palaeogeographical evolution of the Middle Thames. The toned areas indicate the approximate course of the river and its major contributaries at each stage, superimposed on its present course (after Gibbard 1994)

It is sheer speculation, but the present South Downs and Salisbury Plain must perpetuate a somewhat similar well-drained landscape that was relatively open from the grazing of the herbivores which were certainly present. Such could also explain the presence of people in East Anglia well before the Anglian, but along the Thames Valley there is not a single site which has any claim for being definitely pre-Anglian. However, there are high level gravels in the Wey Valley at Farnham and Weybridge that could be of Anglian age which have produced a few hand-axes. It could be argued that, rather than belong to that glacial stage, they could have been derived from pre-Anglian deposits or eroded land surfaces.

The same can be said of the several hand-axes that have come from the high level Silchester Stage gravels which flank the south side of the Kennet Valley (Table 7, see below). These gravels, of shattered flints and numerous sarsen stones, have all the appearance of being the residue of tumultuous flooding off the chalklands to the west. Yet, some of the hand-axes from Hamstead Marshall are in better condition than one would expect from such an episode, and at least 23 hand-axes have come from this locality. There were obviously people in the area before the later interglacial, but just when cannot be stated.

Equally puzzling, but incontrovertible evidence for occupation during the latter part of the Anglian Stage are the prolific sites along the so-called Ancient Channel between Caversham and Henley, such as Farthingworth Green, Kennylands, and Highlands Farm. The gravel within this abandoned valley which has produced so many palaeoliths has been confidently dated to this time, being the first deposit of the Thames after its diversion from the Vale of St Albans; otherwise referred to as gravel of the Black Park Terrace (Fig. 10). There can be little doubt that these palaeoliths are not derived from earlier deposits for the Ancient Channel is cut through Winter Hill Gravels and no palaeoliths have ever been found in them. The most likely explanation is that there was a minor warm interstadial during the aggradation of this channel that has not left any recorded evidence.

The most interesting aspect is the presence of people at this time, apparently in some numbers to judge by the quantity of their discarded tools and debitage found in these Ancient Channel gravels. By now, the glacial lake in what is now the North Sea had broken through the Chalk ridge between Dover and Calais to form the English Channel (Gibbard 1988). Possibly it was a fairly narrow gorge at this stage and not a very difficult barrier to cross, so migrations of groups from north-west Europe could well have arrived and found their way into the Thames Valley. This would seem more likely than a continued presence of human groups in southern England during the vast period of most of the Anglian: at least some 40,000 years or more.

It is also intriguing to find in these gravels a diverse assortment of artefact technology, from the simplest biconical or opportunistically-flaked cores and the resulting flakes from them, to every manner of crude or refined pointed or ovate hand-axes (Fig. 13). This does not seem to be a result of the type of available raw material as the channel is cut through similar zones of flint-bearing Chalk from one end to the other. It could result from the activities of different groups over centuries if not millennia with different traditions, or merely reflect the accumulated lithic products of a myriad of minor episodes in which time, chance, and human adaptability dictated the technology required. As has already been stated there are good arguments to support either interpretation. In reality, probably both are true (see Maps 2 and 3 and text for details of the evidence for the earliest occupation in the Thames/Kennet Valley).

The Black Park Gravel only remains in small patches down the valley, but it has produced hand-axes at Hillingdon (Wymer 1968, 255) and there a few other isolated finds including one in Richmond Park (*ibid.*, 275) Further east down the valley there is a substantial spread of high level gravel on Dartford Heath which Gibbard (1994, 19) has correlated with the Black Park Gravel, but Bridgland (1994, 192–3) argues that the gravel is post-Anglian on the grounds that it equates with the Boyn Hill/Orsett Heath Gravel. It has produced a few hand-axes.

As stated, apart from possible sites of that date around Lympsfield, there is no definite indication of any very early occupation of Period 1 in the Darent or Medway Valleys, but little has survived of pre-Anglian deposits. Nor can it be confirmed in the Upper Thames Valley. However, the basal gravels at the famous Swanscombe site, may well be of Late Anglian age and have yielded a rolled and battered collection of cores and flakes of Mode 1 technology, so people were certainly around in this part of the Lower Thames. In conclusion it can be stated that there is nothing yet found in the Thames Valley and its tributaries to show that people were certainly active there prior to the Anglian Stage glaciation, although it is very likely that they were. The evidence from the Caversham–Henley Ancient Channel is sufficient to prove their presence after the diversion of the Thames but before Period 2, which will now be considered.

This long passage of time, about 180,000 years on present estimates, contains two full interglacial stages (OIS–11 and OIS–9). From the numerous sites of individual palaeoliths (Fig. 11) or concentrations of them in the terrace gravels that were deposited or reworked during the intervening glacial stages, it is evident that all of the river valleys in this great Thames

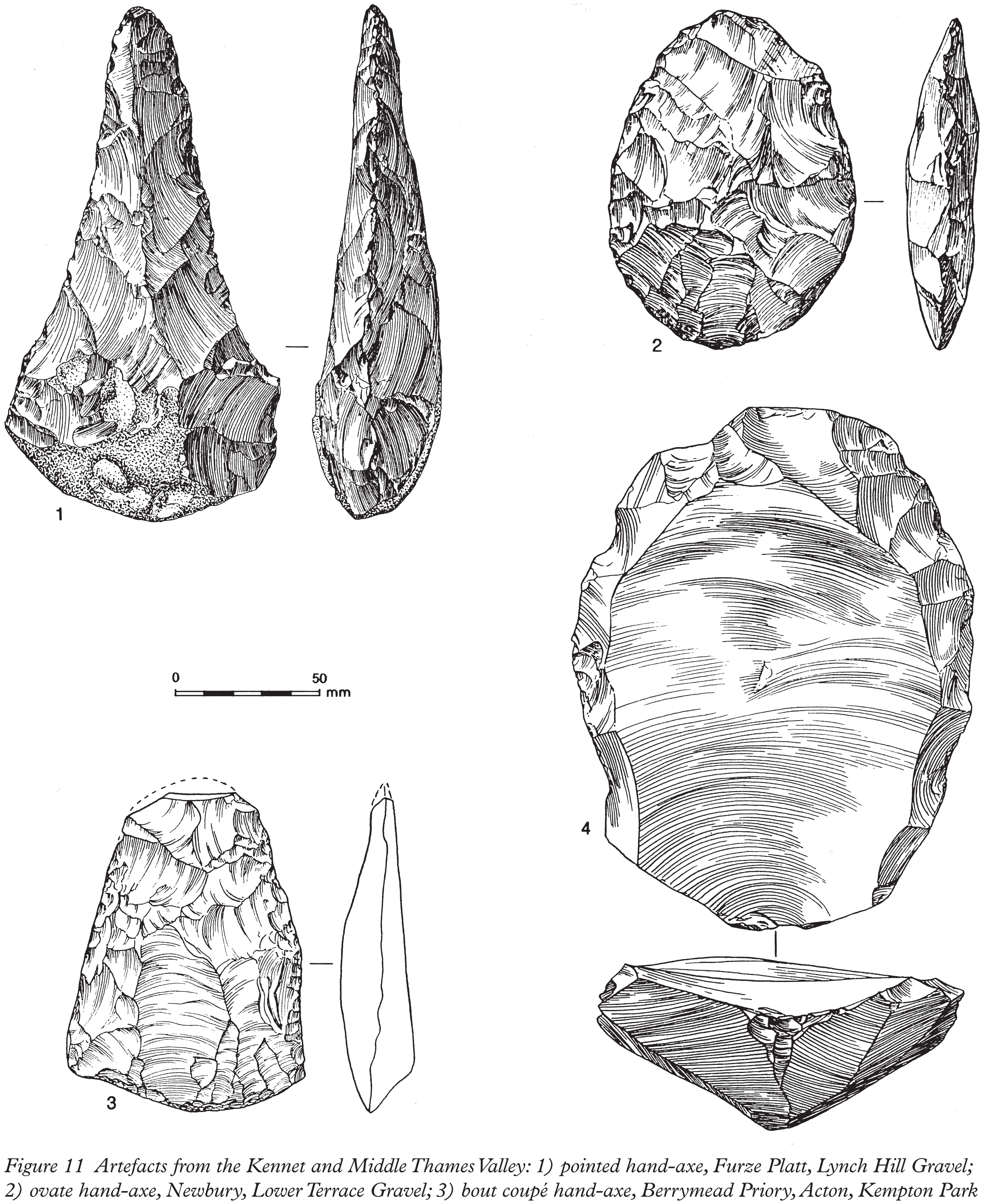


Figure 11 Artefacts from the Kennet and Middle Thames Valley: 1) pointed hand-axe, Furze Platt, Lynch Hill Gravel; 2) ovate hand-axe, Newbury, Lower Terrace Gravel; 3) bout coupé hand-axe, Berrymead Priory, Acton, Kempton Park Gravel; 4) discoidal Levallois core, Northfleet, Baker's Hole, Coombe Rock. Source: No. 1, Lacaille 1940, pl. xlviii

drainage system were at one time or another visited by people, presumably of *Homo heidelbergensis* type. It can only be guessed as to whether some had survived in the country since the latter part of the Anglian, or were all post-Anglian migrants. If they were the latter, then the Strait of Dover was still no barrier, even with the almost certain rise in sea level in the Late-glacial–Early-interglacial zones at the end of the Anglian.

There is plenty of evidence to show that during this Period 2 there was human occupation along the whole of the Thames Valley and up its tributary valleys, but it is very unlikely to have been continuous. Intermittent occupation, for the most part during interglacials, is much more likely, with some probably during interstadials which have left no geological record, and even occasionally under periglacial conditions. On the basis of the known numbers of sites with either single, few or prolific Palaeolithic artefacts, a distinction can be made as to what appears to be highly favoured areas as opposed to single or occasional visits. Thus, occupation of the Upper Thames Valley, certainly above Oxford, appears to have been more sporadic than in the Middle and Lower Thames.

Nor can it be ascertained just how far down the valley the occupation extended, for marine erosion has removed or submerged the terrace deposits. Mapping has proved the existence of ancient channels continuing in the Lower Thames offshore under the present North Sea (Bridgland *et al.* 1995 and see Section 3.2 of this chapter). There is no reason to think that there was no occupation in these areas that are now submerged. It may be that most of the migration at various times was upstream from the now vanished coastline. The narrow but gradually widening channel between Dover and Calais was still probably the only way across from the mainland. Straight across the Weald would have been a hazardous journey during thickly-forested interglacials, except perhaps in the periods of regeneration and deforestation at the beginnings and ends respectively, when the landscape would have been more open. Rivers were undoubtedly corridors, and the Thames Valley the biggest one of all.

Differentiation is made on the maps accompanying this section between the sites found within deposits of the Boyn Hill and Lynch Hill Terraces of the Middle Thames, and their equivalents in the Upper and Lower parts of the valley (Table 6; Figs 12, 15, 19). The palaeoliths found in the Boyn Hill Gravel certainly were incorporated in that deposit at a much earlier date than those found in Lynch Hill Gravel. It cannot be proved conclusively that some of the palaeoliths in the lower terrace are not derived but they do represent occupation of a more recent date than those in the upper one (Fig. 8). For this account it is accepted that this was so, and is likewise accepted by all archaeologists concerned with the Quaternary. However, for all the great length of time involved, it has to be concluded that there is nothing in the technology or typology of the artefacts to suggest any major changes which might be reflecting social, economic, or behavioural patterns that were any different from one end of it to the other. However, there are differences that may result from particular activities at any one time, such as the availability and quality of the raw material, which could affect the type and style of tool production. This is about the only visible difference, but a myriad of hidden differences must exist that can only be inferred: the weather; choice of site; dangers; type of activity (this can sometimes by identified) such as scavenging, hunting, or butchering animals; disease; accidents; death; social interactions; and so on. Clues may perhaps be found in the typology of the tools that were made. Roe (1968) has separated by metrical analysis hand-axes into various groups which can be identified at particular sites.

This suggests the possibility of known methods of working being passed on from one generation to another. Certainly there is a great variety of hand-axe forms (Fig. 4; Wymer 1968, 38–60). There are also sites where there is nothing or very little but crudely-flaked cores and flakes. The concept of these being 'Industries', possibly the products of people with very different traditions, is now seriously questioned. These matters are elaborated on in Chapter 1.4) but are emphasised here because, as in Period 1, there is nothing to indicate anything that might be termed evolution throughout Period 2 (Fig. 11). The terms 'Acheulian' and 'Clactonian', so entrenched in Palaeolithic literature, are retained here in the sense of hand-axe technology, and opportunistic core and flake technology respectively (ie. Modes 1 and 2).

A glance at the distribution maps, from the present source of the Thames to its estuary, and along the Wey and Colne, show a pattern of separated concentrations of sites or prolific spreads in certain areas. It is suggested here that this is not the result of haphazard geological preservation or a reflection of the areas of commercial gravel exploitation (although, to some extent, both must be factors), but indicates favoured areas of activity by human groups. If this really is the case, then these areas would have been visited intermittently throughout the whole of Period 2 when conditions were suitable for them. They must have been attracted for the same reasons, and there are two which could apply to nearly all of these favoured areas: the communication and movement centred upon the confluence of major tributaries with the main river; and secondly the proximity of Chalk hinterland. Such sites are listed below, with comments. The paleogeographical evolution of the Middle Thames Valley is shown on Figure 10 and diagrams of the terrace sequences of the Upper, Middle, and Lower Thames Valley are given in the appropriate sections (Figures 12, 16, 19).

3.2.1 Sites at the Confluence of Tributaries with the Main River

Windrush: more sporadic finds in this part of the Upper Thames than elsewhere. Majority of hand-axes made of quartzite.

Evenlode: only two minor sites at confluence.

Cherwell: this could account for the rich Acheulian sites of Wolvercote and Iffley and the general scatter of hand-axes found in the Summertown–Radley Terrace on

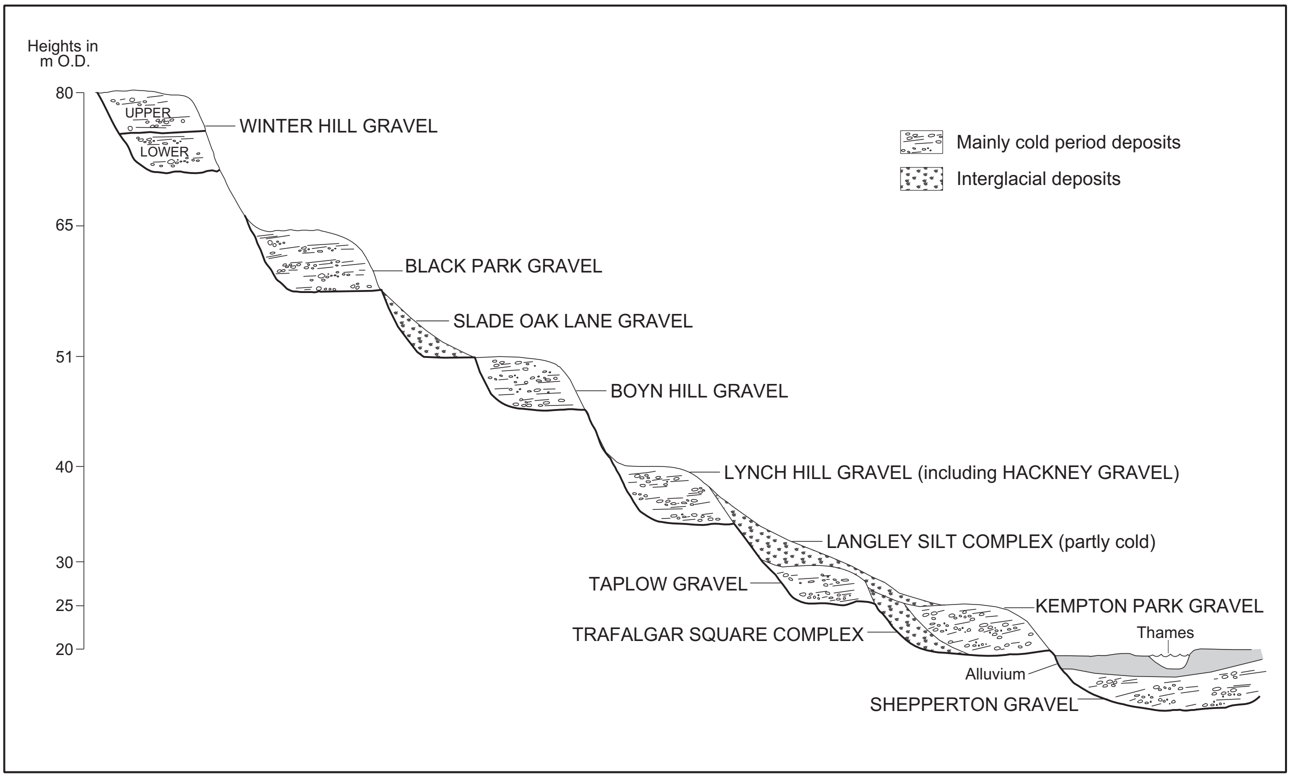


Figure 12 Diagrammatic section of Thames Terraces in the Middle Thames Valley

which most of the city of Oxford stands. Use of flint in the Wolvercote assemblage suggests that hand-axes made of that material were brought there. A greater proportion of the Iffley hand-axes are made of quartzite, readily available in the locality.

Thame: the richest site for quartzite hand-axes is at Berensfield.

Proto-Loddon/Blackwater and Kennet: there is a long, complicated history of river diversions and captures (Thomas 1961; Walder 1967; Gibbard 1982)

Colne: there is a prolific spread of hand-axes in the Yiewsley–West Drayton area in Lynch Hill Gravel where the Colne would then have met the Thames. Upstream, along the Colne itself, the only prolific sites exist at Rickmansworth and Croxley Green, where the Colne receives the Chess and the Gade. Acheulian and Clactonian technology is mixed in the gravels.

Ealing to West London: the prolific spread of sites from Hanwell, through Ealing and Acton and thinning out towards West London cannot be related to the confluence of any present or past tributary. The Brent is only a minor river probably non-existent until the Late Pleistocene.

South-east and north-east London: at Clapham and Wandsworth in the south are several sites in Lynch Hill Gravel, large numbers in the Westminster–Bloomsbury–City area in Lynch Hill or Hackney Gravels, and especially around Stoke Newington and Clapton, the latter being the famous sites as published by Worthington Smith (1894). The Wandle was a much more significant river in the Middle Pleistocene than it is now and could possibly account for the more southerly groups, but whether the Stoke Newington–Clapton sites are connected with any ancient confluence of the River Lea is problematical.

The present lower part of the Lea valley flows south into the Thames in an impressively wide floodplain. There is Taplow Terrace Gravel on its west bank but very few remnants of higher terraces above Tottenham. The wide spread of Hackney Gravel around Stoke newington suggests that area may have been close to its confluence in the Middle Pleistocene.

East London: there are numerous scattered sites in the Poplar–Plaistow–Dagenham area that have yielded one or just a few palaeoliths, in gravels of the Corbets Tey and Mucking terraces. Virtually all of these flakes or hand-axes are very rolled and battered. This could be support for the Lea having reworked older gravels and washed the palaeoliths out of their former contexts in the Lea Valley.

Cray and Darent: would have joined the Thames around the present town of Dartford at the time of the deposition of the Orsett Heath Gravel, and there are rich sites, such as Bowmans Lodge, Wansunt Pit, and Pearson's Pit on Dartford Heath, apart from numerous sites with one or a few hand-axes.

The prolific sites in the Greenhithe–Swanscombe–Thurrock area do not seem to have any relation to any river confluence, although it is possible that the present wide valley of the Ebbsfleet may have been occupied by a much larger stream than the present one.

3.2.2 Proximity to the Chalk Hinterland

The reasons for considering that the Palaeolithic sites along the Thames near or beside Chalk outcrops would have been regarded as favourable sites is based here on several assumptions:

i) that the well-drained, fertile soils offered good grazing for large herbivores;
ii) that the grazing of large herbivores prevented the growth of forest;
iii) that people were hunting live herbivores and scavenging dead ones;
iv) that Clay-with-flints and patches of Tertiary deposits gave rise to areas of woodland for cover or shelter;
v) that erosion since the Middle Pleistocene has not altered drastically the present topography.

The latter can be assessed to some extent by the relation of dry valleys which clearly do cut through the Chalk, before and since the Middle Pleistocene. Another aspect which indicates that what was probably Chalk downland was exploited is that the majority of Palaeolithic surface sites in southern England are on Chalk or Clay-with-flints (see Chapter 6).

Goring Gap: there is very little Palaeolithic material known along the river between Wallingford and Goring, or in its abandoned meander around Cholsey Hill. However, few of the higher terrace deposits survive that may have contained evidence for human activity in this part, where the river cuts through Chalk. However, surface sites on the Chilterns and the relatively rich discoveries in the Wallingford Fan Gravels (see Chapter 6) testify to nearby occupation.

Henley Gorge: the same reasons for lack of evidence for occupation as noted above in the Goring Gap must apply here, for few terrace deposits of the Middle Pleistocene have survived in the Gorge between Henley and Bourne End.

Maidenhead–Cookham: it is possible that clays and sands of the Reading Beds were more extensive to the west of the diverted Thames south of Bourne End, but otherwise Chalk country would have been immediately beyond the slope up from the Boyn Hill Terrace. There was also a steep Chalk cliff on the east side of the floodplain of the time, presumably in both Boyn Hill and Lynch Hill times, which was Upper Chalk and thus a plentiful source of easily available flint.

Dartford–Swanscombe–Thurrock: downstream of Maidenhead the Thames flowed across London Clay and no Chalk would have been encountered until near Dartford. Coupled with the Darent, which would have given easy movement on to the Chalk areas of what are now the North Downs, the river was flowing through flintiferous Upper Chalk. Apart from some higher hills of Thanet Sand and Blackheath Beds there would have been a wide landscape of downland to the south, rising as it does now, gently to higher ground capped by Clay-with-flints.

Whatever the reason, this was certainly a highly favoured area to judge by the number of prolific sites. These include the famous Swanscombe site that produced three fragments of the only skull known in Britain of one of the people who lived at this time, *c.* 400,000 BP. The terrace deposits are much better preserved in this part of the Lower Thames and the stratigraphy found in the pits at Swanscombe place deposits containing artefacts of both Acheulian and Clactonian technologies into a sequence. The Lower Loam of the Barnfield Pit has yielded the only palaeoliths preserved in primary context of this Period 2 in the Thames Valley, apart from Bowman's Lodge and the Wansunt Pit on Dartford Heath, and Possibly Greenlands Pit at Purfleet.

Rich sites in this area have produced large collections of artefacts of both Acheulian and Clactonian technologies, from deposits assigned to interglacials of both OIS–11 (Swanscombe) and OIS–9 (Purfleet). Numerous palaeoliths come from the Orsett Heath Gravels (OIS–10) and Corbets Tey Gravels (OIS–8) (Table 6). Contemporary mammalian remains come from Grays, Swanscombe, Purfleet, and Ilford. This is the classic area of the Thames Valley for Palaeolithic and Quaternary studies. Downstream, below Chadwell St Mary, the river found its way back to the softer rocks of the Lower London Tertiaries (mainly clays). Terrace deposits are poorly preserved or submerged and there are few sites.

Kennet Valley: in spite of flowing through Chalk from its source to Newbury, and with well-preserved terrace deposits, it has only yielded a a few palaeoliths at isolated sites. There is enough to indicate a past human presence and the absence of sites may just be reflecting the lesser commercial exploitation of higher level gravels. A much greater indication of human activity along the valley would be expected, especially in view of the very prolific site of Knowle Farm, Savernake, in Head Gravel within a side valley (Chapter 6)

Wey Valley: the wonderfully-preserved flight of terraces at Farnham (Fig. 14, below) are in a very critical geological position where Chalk of the North Downs meets the eastern Chalk of Salisbury Plain. A thin layer of Gault Clay covers the Chalk but for a thin strip running parallel with the valley. This strip was probably a slightly wider outcrop in the Middle Pleistocene. Farnham was therefore a veritable gate between two regions of Chalk country and it seems very likely that this was the reason for the accumulation of so many palaeoliths in the gravel deposits of Terraces A and B, which belong to Period 2.

This would have been before the capture of the Wey by a river to the south of the Hogs Back, the so-called Godalming River (Oakley 1939), which diverted it from its Middle Pleistocene course through the Runfold Gap into what is now the valley of the Blackwater. There was thus a corridor to the north connecting the Wey and the Thames in the Reading–Twyford area, although very few palaeoliths have been found along it.

The final downcutting and gravel aggradations at the end of OIS–8, represented by the basal Taplow Gravel in the Middle Thames and basal Mucking Gravel in the Lower Thames (Bridgland 1994; see also Table 6), mark the beginning of Period 3. This covers the interglacial as represented at Stanton Harcourt in the Upper Thames Valley, a further glacial stage, the last interglacial known as the Ipswichian (OIS–5e) and the first half of the last glacial stage known as the Devensian in the conventional chronology. It is the time of the Middle Palaeolithic.

The term Middle Palaeolithic is used here in both a temporal and technological sense. In north-west Europe, the Middle Palaeolithic is synonymous with the Mousterian, and the appearance in Britain at this time of Levallois technique and distinctively shaped hand-axes (bout coupé or flat butted cordates) suggests that it is reasonable to regard such artefacts as perhaps an insular variant of the Mousterian of Acheulian Tradition.

It is only in the Thames Valley that there are a sufficient number of sites where such artefacts have been found and deposits identified of this age from one end of the valley to the other, that a separate map can be justified (Map 13). Unquestionably there was occupation at various times by people we might refer to as Neanderthalers on the basis of the European evidence. The map shows all the sites that satisfy the following criteria to indicate they are probably Middle Palaeolithic:

i) They have come from deposits of the interglacial considered to relate to OIS–7 (eg.: Stanton Harcourt, Aveley, Crayford), or
ii) They have been found in deposits stratigraphically dated later than OIS–7 (ie.: Taplow Gravel in the Middle Thames and Mucking Gravel in the Lower Thames, or
iii) The artefacts are of Levalloisian technology or of bout coupé type.

There are obvious shortcomings in these criteria: artefacts may be derived from much earlier contexts and bout coupé hand-axes are not necessarily Middle Palaeolithic (Coulson 1986). However, such hand-axes are characteristic of some French Mousterian industries (Mellars 1996, 128–9), and those that are found in this country are usually in Late Pleistocene contexts. A particular problem, especially in the Middle Thames, is that Levallois material sometimes occurs in gravels of the Lynch Hill Terrace, as at Yiewsley and West Drayton, and it is impossible to know whether they were associated with the late interglacial reworking of it, or were at the top during the aggradation of Lynch Hill Gravel in late OIS–8. The latter seems the most likely situation, but it does mean that several of the sites on the map of the Middle Palaeolithic in the Thames Valley appear also on the lists of sites for Period 2.

There is mounting evidence that the use of full Levallois technique (see Chapter 1.3) appears at the end of the cold period of OIS–8. It certainly does at the Lion Pit at West Thurrock (Bridgland and Harding 1995) where it was found in primary context above Coombe Rock in a coarse flinty gravel. This is a similar situation to the richest Levallois site known in England, at Bakers Hole, Northfleet, across the river (Smith 1911; Wymer 1968, 354–6), where it was found in and under Coombe Rock.

Both sites are in Upper Chalk country which abounds in fine quality flint. Levallois flakes struck from large tortoise cores demand such raw material, and the prodigious quantity of debitage at Bakers Hole indicates that it was readily available. Such would be easy to find on the bare Chalk slopes of a Late-glacial landscape. The other rich Levallois site, or rather a number of sites, at Crayford, exist in or under brickearth overlying gravel. Some are in primary context, associated with large mammals such as rhinoceros, and probably date to a somewhat later time in the interglacial of OIS–7. It is especially interesting in that the flintwork is dominated by flake-blades. There are no other known sites like Crayford in England and the general impression is that the population was very thin throughout the whole of the interglacial.

It seems very unlikely that the people responsible for all this new style of tool production were a surviving population from the previous interglacial, but migrated across from northern France or the Low Countries during the Late-glacial period preceding the following interglacial. By this time the sea must have eroded much of what is now the Strait of Dover, but a low sea level at the end of the glacial phase presumably allowed crossings to be made. As the sea level rose such a crossing probably became too hazardous, if not impossible without some form of craft.

An isolated population would explain the considerable difference between the archaeological sequence on the continent to that in Britain. It is intriguing to consider what happened to this population, whose movements are well recorded over much of England during this interglacial. Could people get back to the mainland before the onset of the very cold or periglacial conditions of the following glacial phase, (Colour Pl. 4) or did they gradually perish? In this respect it has to be noted that, as yet, no evidence of any human presence has been found in the deposits of the last interglacial (OIS–5e) either in the Thames Valley or anywhere else in Britain.

However, perhaps a low enough sea level during the first part of the Devensian Glacial Stage allowed people to move in again and repopulate the Thames Valley and elsewhere. It is difficult to date unequivocally sites of this episode, but Creffield Road at Acton and perhaps some of those at Yiewsley and West Drayton may qualify. They left behind long or pointed flake-blades from Levallois type cores and rare, usually small hand-axes. More details of these key sites and a few others are given with the lists accompanying the map.

3.3 The Thames Valley and Its Tributaries

3.3.1 Summary

The River Thames has been a major river of lowland England throughout the whole of the Pleistocene. There has been human activity in the main valley and along the Kennet at least since the Anglian Stage. It is the second longest river in Britain, although its present catchment area is less than that of the Severn, Aire–Ouse–Humber, and the Trent. This section covers all of the tributaries except those draining from the Weald (Darent and Medway), thus including the Kennet, the Windrush, Evenlode, Cherwell, and Thame in the Upper Thames, the Loddon/Blackwater. Colne, Wey, and Mole below Reading in the Middle Thames, and the Wandle and Lea in the tidal reaches of the Lower Thames. All these river valleys existed during the Middle Pleistocene, but with a long and complex history of terrace formation, aggradations, and river captures, before and since.

The source of the Thames in the Lower Pleistocene was in the highland zone of Wales, as was the ancestral river that flowed across the Midlands (Rose 1994). The Thames flowed south-east towards Oxford, through the Goring Gap and north-east along the dip-slope of the Chiltern Hills, through the Vale of St Albans, across the southern part of East Anglia, and so out to the sea. This great ancestral Proto-Thames had, by the middle Pleistocene, been truncated and had its source west of the Cotswolds, as it does today. It still flowed through the Vale of St Albans and across Essex and Suffolk but nothing has yet been found in any of its deposits of this time to indicate that there was any human occupation along its valley.

Such was its course until ice of the Anglian Stage advanced into the Vale of St Albans and diverted the river, forcing the Thames waters to cut through the chalk south of Bourne End on to the softer and more easily erodable clays and sands of the Lower Tertiary formations (Gibbard, 1977; 1983). This right-angled bend of the river to the south remains a feature of its present course, with an impressive steep cliff at Cliveden.

This event was some 450,000 years ago. Thus, for the earliest period of human occupation in Britain, prior to the drastic diversion of the Thames, there was no such river below Bourne End or Lower Thames Valley. For this reason, this section will first consider the evidence for any occupation in the valleys of the Thames and its major tributaries that can be found in terrace deposits dated to this time or before the end of the Anglian Stage.

3.3.2 The Earliest Human Occupation in the Thames–Kennet Valley

Between Caversham and Henley, on the southern dip-slope of the Chilterns, there is an abandoned valley of the Thames, some 45 m above the present level of the river at Reading. It is separated from the modern valley by the higher ground of Rose Hill and runs in a straight line north-east between those two places. Often just referred to as 'The Ancient Channel' it is now recognised as the course of the Thames during the Late Anglian Stage, after it had ceased to flow through the Vale of St Albans. Being well above Bourne End, where the river had been forced southwards, it was flowing here along the line of its original drainage, and the gravel of the 'Ancient Channel' is the first terrace downslope of the Winter Hill Terrace, which did flow through the Vale of St Albans. This first post-diversion terrace is named the Black Park Terrace after a site near Burnham.

The Black Park Gravel (Figs 12 and 13) within the channel has a number of prolific Palaeolithic sites which constitute the best evidence for human occupation in this part of the Thames Valley at some time before the end of the Anglian Stage (*c.* 423,000

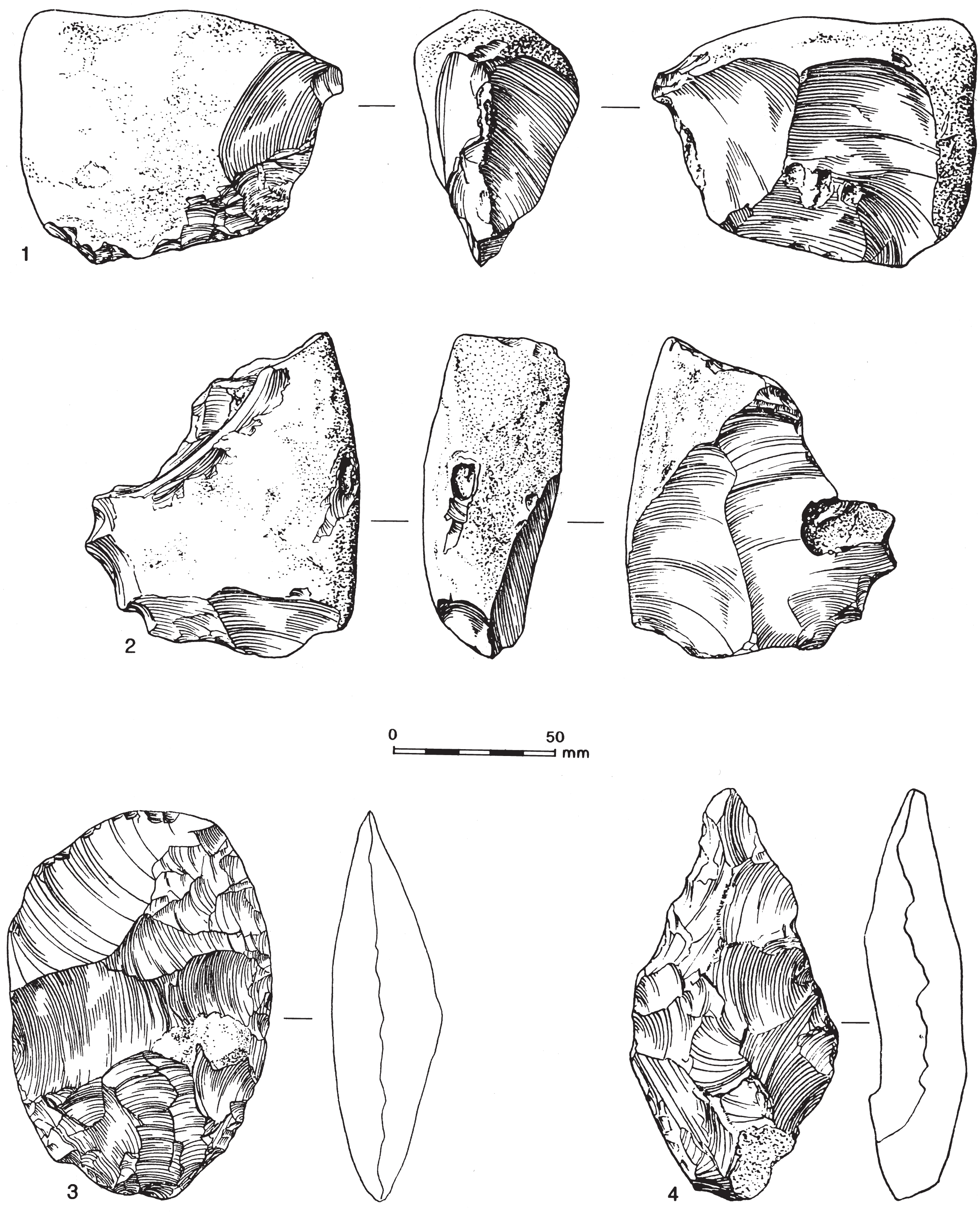


Figure 13 Artefacts from the Black Park Gravel of the Ancient Channel between Caversham and Henley-on-Thames at Highlands Farm. 1–2) Mode 1 pebble 'chopper-cores'; 3) ovate hand-axe with tranchet edge; 4) pointed hand-axe made by hard hammer technique

BP). Just how long before is difficult to know. It must have been after the deposition of the Winter Hill Gravel for, apart from the concentrations, relatively fresh condition and numbers of the artefacts, they cannot have been derived from that gravel which belongs to an earlier stage of the Anglian for it has never produced any palaeoliths. If anything had been swept off pre-Anglian land surfaces in this area, some would have been found in this Winter Hill Gravel. It is difficult to imagine human occupation here during the time of the maximum glaciation of Britain. The most likely answer is that in the Late-glacial period of the Anglian there was a temperate phase which has left no geological record, or it has not yet been found or recognised either here or anywhere else in Britain for that matter.

Further up the valley in the Upper Thames at Sugworth near Abingdon there is evidence of an interglacial beneath pebbly clays which may be decalcified glacial or river deposits identified as belonging to the Anglian Stage, but everything except its altitude dates it to the preceding Cromerian Interglacial. The mammalian fauna includes *Sorex savini* and *Stephanorhinus hundsheimensis* (Stuart 1982, 116) both of which are regarded as markers for that stage. No palaeoliths have been found in the Sugworth Channel and there does not appear to be any possibility that 'The Ancient Channel' could be correlated with it. This emphasises the problem of interpreting such distant events when there cannot be found in any one place a continuous unbroken geological sequence.

MAPS 2 and 3. EARLIEST OCCUPATION OF THE THAMES–KENNET

It must be stressed here that, although there are certain fixed points in the British Quaternary sequence (such as the diversion of the Thames, the maximum limits of the ice sheets, the identification of certain interglacial episodes from fossil pollen, and the broad dating obtained from the evolution or extinction of particular mammals in the fossil record), much more has to be learnt than is known. Intelligent guesswork has to embellish the few stratigraphical or environmental indicators. This part of the Thames Valley is especially relevant in this respect, for even the very status of the Anglian Stage has recently been questioned and suggestions made on very convincing grounds that it may represent two distinct glacial episodes with an intervening interglacial and not just one! This is the result of surveys in the Thame and Upper Thames Valleys (Sumbler 1995). Sumbler points out that what is generally accepted, that the Wolvercote Terrace Deposits in the Upper Thames are essentially outwash from the Moreton Drift of the Cotswolds which is regarded as of Anglian Age, conflicts with the Winter Hill Gravel also being Anglian. This is based on the demonstrable fact that the longitudinal profile of the Wolvercote Terrace – if traced downstream and extrapolated – would be separated from the Winter Hill by a vertical height of some 40 m. This implies a great interval of time between them and, therefore, Sumbler suggests that the interval between them is the interglacial thought to relate to OIS–11 of the deep sea core record. However, as far as the archaeology is concerned, there can be little doubt that the 'Ancient Channel' with its contained palaeoliths shows that humans were certainly active in the area before the interglacial of OIS–11 which is associated with Swanscombe in the Lower Thames.

'The Ancient Channel' is not the only place in the Thames Valley where deposits assigned to the Anglian Stage contain palaeoliths. To the west of Reading, the land rises to a small plateau at Tilehurst, 100–105 m OD, covered by a gravel considered by Gibbard (1985, 17) to be earlier than the Winter Hill Gravel, referred to as Gerrards Cross Gravel. This is 30 m above the gravel in Reading of the Boyn Hill Terrace, dated to OIS–10.

There are eight places on this plateau at Tilehurst where hand-axes have been found (Map3, Nos 8–15). They are mainly in sharp condition and one was found below a metre from the surface in clay, and another apparently from the gravel, but still in sharp condition. Their freshness and patination is more in accord with derivation from the surface and being later discards, but it is unusual for so many hand-axes to come from this particular level. A few kilometres to the west, on the high ground above the abandoned through valley of the Pang between the Kennet and the Thames, in gravel at about the same level as the Tilehurst plateau, two other sharp hand-axes have been found. Other finds have been made on the Silchester Stage gravels which form such a prominent, wide feature on the south side and parallel to the steep-sided valley of the Kennet, especially at Sulham, Brimpton, Wasing, and Sulhampstead (Map 5, 2–3).

Further west, beyond Newbury, in the same gravel at Hamstead Marshall, at least 23 hand-axes have come undoubtedly from the gravel. There are some others from Wash Common at Newbury itself, and at Greenham. These Silchester Gravels represent sweepings from Wiltshire and west Berkshire: coarse and fine fluviatile gravels of flint and much sarsen. They have been correlated with the Winter Hill Gravels of the Thames (Arkell 1947a) and also with the Black Park Gravel (Gibbard 1985; Bridgland 1994). It seems that these widespread gravels, although at the same level, cover a long period of deposition during the Anglian Stage but the few palaeoliths found within them, as noted above, relate to those of the Black Park. Again, it is inescapable that people were around during or, more likely before, this gravel was deposited.

Elsewhere in the whole catchment area the evidence for such early occupation is less convincing. The Black Park Gravel has been identified below Bourne End, particularly at Hitcham, Iver Heath, and Hillingdon (Hare 1947) and at Richmond Park and Wimbledon Common (Gibbard 1985). The latter were probably contemporary deposits of a Proto-Mole river. Gibbard also correlates the Dartford Heath Gravel of the Lower Thames with the Black Park Gravel, but Bridgland (l994) does not accept this. It is clear that most of the terrace associated with the Black Park Gravel below Burnham has been eroded away during later events in the Middle Pleistocene.

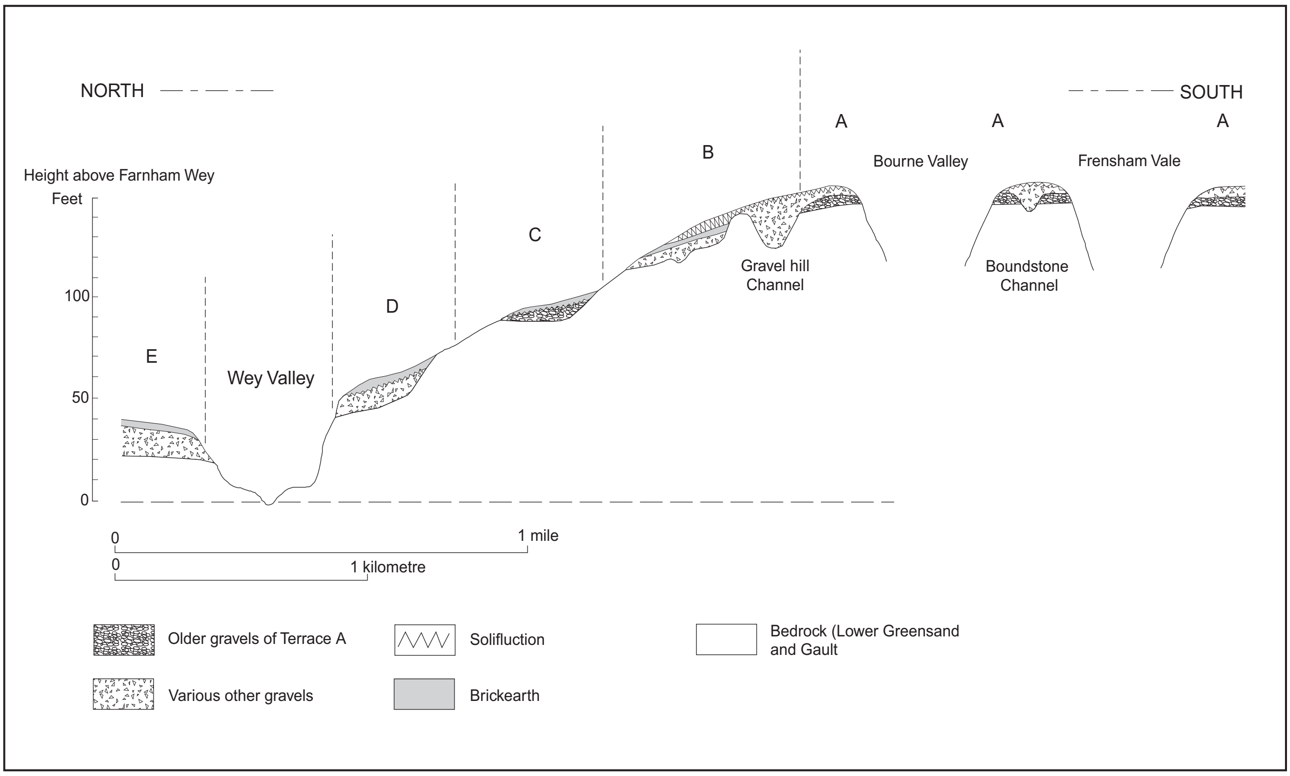


Figure 14 Schematic profile of the Farnham terraces

The most likely collection of palaeoliths belonging to this period of the Late Anglian downstream of Henley are those found in a pit at Hillingdon, within gravel mapped as Black Park Gravel, and at Burnham at about the right height but possibly surface discards. A hand-axe found in gravel at Hanger Lane, Ealing, at 62 m OD may qualify, as may another found on the surface of high level gravel in Richmond Park. A further possibility within the Thames Valley catchment area for palaeoliths belonging to this early period are six hand-axes that were discovered at St George's Hill, Weybridge. Some were found in sand beneath gravel which is at 75 m OD and considered by Gibbard (1979) to be of Early Anglian age close to the then confluence of the Mole and the Wey near there.

In the Wey Valley there is a finely preserved flight of terraces at Farnham (Fig. 14; Map 14) and the highest, Terrace A, contains palaeoliths and is about the same height as a wide spread of gravel on the Alice Holt Plateau. Oakley (1939) thought that Terrace A could be composite with deposits of several ages, spanning much of the Anglian Stage and earlier. This is supported by Gibbard's study of the Plateau Gravels and rivers of North Surrey (Gibbard 1982). If confirmed, this Farnham evidence gives additional support for human activity during and possibly before the Anglian Stage in one of the major southern tributaries of the Middle Thames.

The deposits of the pre-diverted Thames across Hertfordshire into southern East Anglia are known as the Kesgrave Sands and Gravels. No palaeoliths have been recorded from any of the numerous exposures. Although the Thames was obviously flowing here at a time when this part of its valley could have been occupied, those deposits which may have contained the Palaeolithic evidence would have been subjected to the passage of glacial ice and melt-waters. It would be surprising if any such deposits were not reworked and even flint, under such conditions, can be rolled and fractured to such an extent that it ceases to exhibit traces of human workmanship. Also, it has to be considered that the Kesgrave Sands and Gravels constitute the deposits of a major river for perhaps a million years. They have already been classified as High and Low Level Kesgraves and it would only be the most recent of them that might contain palaeoliths. Some remnants of ancient terraces must lie below the Till but nothing has yet been found. Further mention of these pre-Thames diversion gravels is made in Section 3.6 on East Anglian Rivers.

The following section relates to the series of maps, presented at a scale of 1:100,000, giving the locations of known Palaeolithic finds covering the whole of the Upper, Middle, and Lower Thames Valley from Reading to Southend. Only those sites are included that can be related to the period after the Anglian Stage and before the interglacial stage as represented by the Stanton Harcourt Channel, following the policy in this volume of, where the evidence makes it possible, considering the periods of human occupation within three consecutive very broad periods.

The maps for this middle Period 2 thus show all the known sites of palaeoliths found within the fluvial deposits of the Boyn Hill and Lynch Hill terraces, with the exception of anything that would seem diagnostic of Middle Palaeolithic industries on the grounds of typology. The third period of occupation for the Middle and Thames Valley follows this section.

3.3.3 The Upper Thames Valley

Maps 4 and 5 show the location of Lower Palaeolithic sites in the Upper Thames Valley in relation to the Wolvercote and Summertown–Radley Terraces and, below Abingdon, also the Northmoor Terrace. The Hanborough Terrace is omitted on the map, as also is the Floodplain Terrace or Alluvium. No sites are shown which have only yielded artefacts that, on typological, stratigraphical, or palynological grounds, may be of Middle Palaeolithic date. Thus, such sites as the Stanton Harcourt interglacial channel are not included, but will be found in the section on The Middle Palaeolithic in the Thames Valley. The reasons for this are explained below, but it is most likely that the majority, if not all, the sites shown represent occupation of this part of the Thames Valley during the Period 2 Occupation of this survey (ie, OIS–11 to later parts of OIS–8).

MAPS 4 and 5. UPPER THAMES VALLEY: STANDLAKE–GORING

It is clear from the distribution of the sites shown on Maps 4 and 5 that this upper part of the Thames Valley above the Goring Gap was known to and frequented by people at various times after the major glaciation of Britain (OIS–12, ie, the Anglian Stage, but see comments below). This is all the more interesting as, above Cholsey, the Thames flows beyond the flint-bearing Chalk of the Chilterns. Limestone gravels predominate, although these do contain varying proportions of flints. However, the gravel flints are mainly small or otherwise unsuitable for making into useful hand-axes. For the most part they probably derive from one-time tributary streams flowing off the Chalk downs to the south. There is the probability, of course, that flint nodules could have been found in the Clay-with-flints on top of the Chilterns but such may not have been visible under dense vegetation, even if they had been of suitable quality. The same can be said of the flint contained in the Wallingford Fan Gravels, the deposition of which would, on present dating assessments, pre-date the period concerned with here. Larger cobbles or broken quartzites are more common, derived from the pre-Anglian Northern Drift, so it is not surprising that there is a fair proportion of hand-axes made from this rock.

Plate 1 One of the numerous mammoth tusks exposed during excavation of part of the Stanton Harcourt Channel. This interglacial deposit can be considered as the type site for an interglacial stage between the Devensian and Hoxnian Stages of the conventional chronology, related to OIS–7. Thus, assuming that the associated artefacts are contemporaneous, this is evidence for occupation in this part of the Upper Thames Valley during Period 3 (see p. 80)

Yet, flint hand-axes predominate, for instance, at the most prolific site yet known, at Berensfield, the collections comprise 87 flint hand-axes and 24 of quartzite (MacRae 1982; 1988a). Similarly, higher up the valley in the Wolvercote Channel, Tyldesley (1986a; 1986b) records 51 complete flint hand-axes and 10 of quartzite. It is also surprising that the third largest flint hand-axe found in Britain comes from gravel at Stanton Harcourt (Fig. 15; MacRae 1988b). Primary and thinning flakes of flint have come from Berensfield and not all of them can necessarily be explained by the reworking of broken hand-axes, but the almost inescapable conclusion is that hand-axes in a finished state had been brought into the area by itinerant groups (MacRae 1990): a significant indication of their social organisation and previous knowledge of the area into which they were moving.

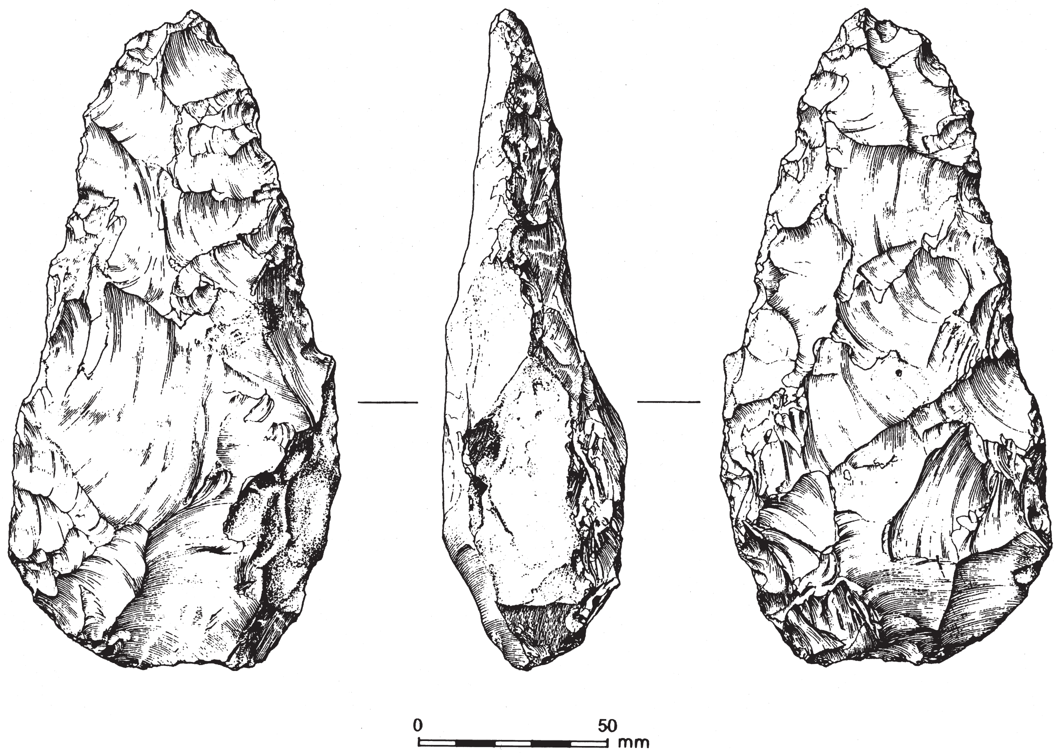


Figure 15 Stanton Harcourt interglacial channel. Abundant large vertebrate faunal remains, especially of mammoths. Nine stone artefacts have been found associated with the channel (5 hand-axes, 2 flakes, a small core that has a flake removed by Levallois technique, and a possible chopper). All are made of flint except for one quartzite hand-axe. There is no indication that any of the faunal remains were the result of human activity or butchering and the excavators could not be certain that they were necessarily contemporary with the faunal remains. The finely made large flint hand-axe illustrated would almost certainly have been an import in this non-flint area. All the artefacts could be consistent with the OIS–7 date assigned to the channel. Source: Buckingham et al. *(1996)*

The Quaternary deposits of this area of the Upper Thames have been the subject of much research and investigation ever since the 19th century, but it is only necessary here to consider those of the Middle and Upper Pleistocene. There are aspects quite different to those of the Middle Thames: firstly, the proximity of glacial ice on the Cotswolds during the Anglian Stage and its effect on the deposits within the major tributary valleys of the Evenlode and Cherwell, and, secondly, the difficulty of separating one terrace deposit from another as they tend to merge upstream. This latter problem was recognised by Sandford (1965) at Dorchester-on-Thames, where the deposits of the higher Summertown–Radley Terrace are partly overlain by Floodplain Gravels. A fine example of such superimposition is shown by Briggs *et al.* (1985, pl. 4) by a photograph of the the junction of the Summertown–Radley and Floodplain Terrace Deposits at Smith's Pit, Stanton Harcourt. This, obviously, has a bearing on the identification of the particular terrace deposit from which palaeoliths are found on gravel company's reject heaps. As Sandford points out, the lithology of these limestone gravels does not vary sufficiently to differentiate them, but he does note that the Summertown–Radley Gravels are generally somewhat consolidated by lime cementation, whereas the more recent Floodplain Gravels are unconsolidated.

Figure 16 gives a diagrammatic cross-section of the terraces in the Oxford area of the Upper Thames, but it has to be stressed that in reality they are not easily correlated down or upstream. This is why the maps show the location of palaeoliths in areas mapped by the BGS as Floodplain Gravels, particularly in the lower part of the Windrush, for these gravels are probably overlying remnants of the older Summertown–Radley Terrace.

The majority of palaeoliths have come from these latter terrace deposits, but much is not yet understood of the sequence. For instance, the gravels overlying the Stanton Harcourt Interglacial Channel, both of which were first recorded by D.J. Briggs and D.D. Gilbertson in 1980 and published in detail with a comprehensive account of the geology and archaeology of the Upper Thames (Briggs *et al.* 1985), must be more recent than the channel. This is considered to belong to OIS–7, which puts the overlying gravel as OIS–6 or later. Some

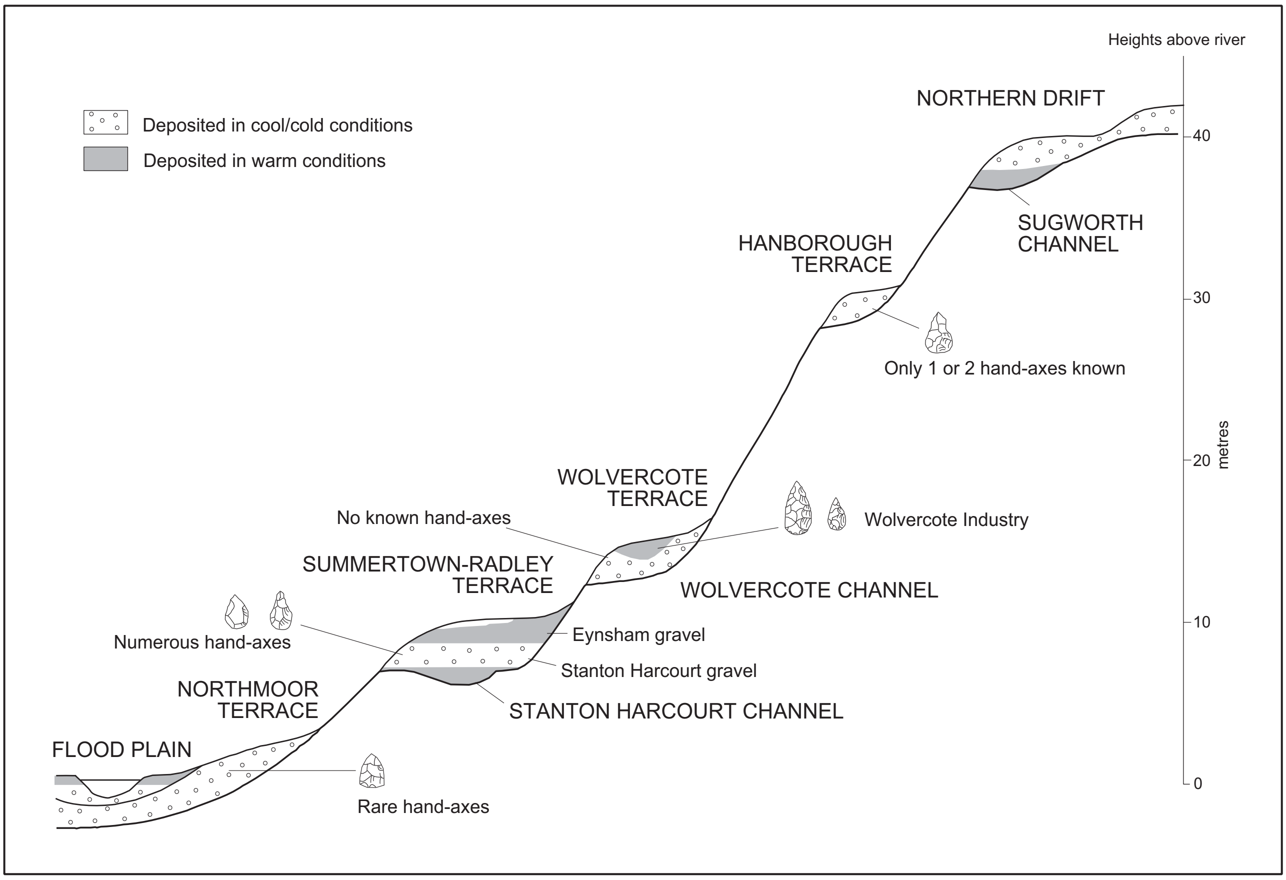


Figure 16 Terrace deposits and palaeoliths in the Oxford area

30 hand-axes and flakes have been found in the nearby Gravelly Guy Pit (Map 4, No. 9) yet palaeoliths are rare elsewhere in the Thames Valley in deposits considered to be of this age. This remains a problem, but in view of the many unknown factors in this part of the Upper Thames, they have been included on the map. Bridgland (1994, 77) would see these deposits as subdivisions of a single aggradation sequence referred to as the Summertown–Radley Formation, as shown on the terrace diagram (Fig. 16). This places the gravel underlying interglacial deposits with *Corbicula* as at Oxford, containing hand-axes, as the basal Summertown–Radley, attributed to OIS–8. The gravel above as at Gravelly Guy Pit is the Stanton Harcourt Gravel Member.

The Hanborough Terrace Gravel is the highest of the limestone gravels and the last deposit preceding the cutting of the Evenlode Gorge (Arkell 1947b). It is 32 m above the present floodplain at Hanborough but merges into the lower terraces upstream. Originally, it was thought to have been deposited during a warm phase because it contained remains of straight-tusked elephant, horse, and ox, but Briggs and Gilbertson (1973) demonstrated conclusively from contained molluscs that it was deposited during a cold phase. The remains of the warm-loving animals were presumably derived from a pre-glacial land surface. Only one hand-axe is recorded from the Hanborough Terrace Gravel, at Duke's Pit at Hanborough itself (Wymer 1968, 86). It is now placed by Bridgland (1994, 49–58) in OIS–10 or OIS–12. This has bearing on the glacial stage or stages represented by the cold-climate deposits in this area so close to the once or more glaciated Cotswolds.

Arkell (1947b) concluded that the Hanborough Gravel, when traced up the gorge, was beneath and therefore older than the Moreton Drift, the name given to an Oolitic flint-rich till on the Cotswolds. The gravel underlying the Wolvercote Terrace, the next terrace below the Hanborough, contains fresh flint and it has been considered that this was derived by glacial out-wash coming down the Evenlode and Cherwell valleys from the Cotswolds and Midlands respectively (Bishop 1958). However, Maddy *et al.* (1991) dispute this and, from re-examinations of the lithologies, concluded that there is no significant difference between the flint content of the Wolvercote and Hanborough Gravels.

The age of the glaciation or glaciations involved are problematical, but recent work by Sumbler (1995) on the terraces of the Thame and the Thames suggests a solution. This is based on the Moreton Drift belonging to the Anglian Stage, and that the Wolvercote Gravel incorporates out-wash from it. Furthermore, however,

Table 6 (opposite) Chronology of the Thames (after Bridgland 1994). Terraces, events, and critical sites (vertical spacing not to scale)

OIS	*Ky*	*Upper*	*Middle*	*Lower*	*Essex*	*Conventional Chronology*
1	10	Floodplain	Floodplain			
2–4	71	Northmoor	Shepperton			DEVENSIAN
5a/?c			Isleworth			
5d	?	Eynsham (upper gravels)	Upper Taplow (at Reading) Kempton Park	E. Tilbury Marshes	Submerged	IPSWICHIAN
5e	122 128	Eynsham Gravel	Taplow (at Reading) Trafalgar Square Brentford	Below floodplain	Submerged	
6		Stanton Harcourt Gravel	Taplow Basal Kempton Park	Basal E. Tilbury	Submerged	
7	186	Stanton Harcourt Channel Magdalen Grove Summertown	Redlands Pit at Reading	Aveley Ilford (Uphall) W. Thurrock Crayford Northfleet	Submerged	W O L S
8	245	Basal Summertown–Radley at some sites Wolvercote at some sites	Basal Taplow Lynch Hill Gravel	Basal Mucking Corbets Tey	Submerged Barling Gravel	T O N
9	303	Wolvercote Channel		Ilford (Cauliflower Pit) Belhus Park Grays Purfleet Stoke Newington	Shoeburyness Channel	I A N
10	339	Basal Wolvercote ?Moreton Drift Hanborough Gravel	Basal Lynch Hill Boyn Hill	Basal Corbets Tey Orsett Heath	Basal Barling Gravel Southchurch Asheldham Mersea Island Wigborough	
11	380	Reworked fauna in Hanborough Gravel		Swanscombe	Southend, Asheldham Cudmore Grove Clacton–Clacton Channel	
12	423	Basal Hanborough Freeland Moreton Drift Freeland Formation	?Basal Boyn Hill Black Park DIVERSION OF THE Anglian glaciation Winter Hill Westmill	Basal Orsett Heath Basal Swanscombe Gravel THAMES Hornchurch Till NO VALLEY	as above St Osyth Gravel Holland gravel	A N G L I A N
13–21	478	Sugworth			Wivenhoe Ardleigh Waldringfield	CROMERIAN

the Wolvercote Terrace when traced downstream is 56–8 m OD at Goring and cannot possibly correlate with the Black Park Terrace of the Middle Thames which is 62 m OD 50 km downstream! The inevitable conclusion, as the Black Park Terrace is accepted as representing the first course of the River Thames after its diversion by the Anglian Ice, is that there are two Anglian Stage Glaciations: OIS–12 and OIS–10. This interpretation puts the Wolvercote Channel with its rich assemblage of hand-axes into OIS–9, as per Bridgland (1994) and Table 6. Such an interpretation has important repercussions for the understanding of the numbers of glaciations in Britain during the Middle Pleistocene.

Any attempt to reconstruct the course of the Thames and its major tributaries during all of the Middle Pleistocene is so fraught with difficulties that it has not been done on Maps 4 and 5. Changes, caused by glacial melt-waters down the Evenlode and the Cherwell, have eroded the soft Oxford Clays and removed or reworked old terrace deposits. The main Thames drainage was probably across what is now the Evenlode Valley until after the deposition of the Hanborough Terrace Gravel. Remnants of Hanborough Terrace Deposits remain between the present Windrush and the Thames and north-east of Abingdon, but they are not plotted on the maps as their date is so problematical. As mentioned above, the Evenlode Gorge was cut after the Hanborough Terrace and the river there has remained within it ever since. The present Thames probably perpetuates the later course of the river. What can be said with more confidence is that, below Oxford, the Thames terraces are on the left bank, resulting from the river adjusting to lower levels down the southward dip-slope of the Jurassic Rocks. Whether claylands predominated during the Middle Pleistocene or there were more of the Greensands and Corallian limestones, such as still exist within the great meander east of Oxford around Boars Hill, is unknown.

Rocks of this nature may have given a much more favourable hinterland, but more likely it was not so and human activity was mainly confined to the valley floors and sides. Westward up the valley, beyond the margins of Map 4 there are only a few known individual finds of hand-axes, although this would have been a direct and easy route to the Cotswold Hills.

Downstream, there is a feature which shows very clearly on Map 5; Summertown–Radley Gravel can be seen making a loop around Cholsey Hill, marking the earlier course of the river during the late Middle Pleistocene (Davies 1923). A line of sites with individual finds of hand-axes can be seen between Wallingford and Cholsey. This interesting area for the Palaeolithic period has attracted considerable attention and there are several recent surveys of the archaeology which can be recommended (MacRae 1985; Briggs *et al.* 1986; Roe 1995).

3.3.4 Middle Thames Valley – Reading to Henley-on-Thames

From the large numbers of Palaeolithic artefacts that have been found in this part of the Thames Valley it is evident that it was a much-favoured area, even if the occupation was intermittent. Every area of Boyn Hill or Lynch Hill Gravel has produced evidence of it. The attraction of the confluence of several rivers may have been a major factor, apart from the varied nature of the surrounding landscape, with old gravel-covered terraces to the north and west, and the valley of the Thames giving access to Chalk downland at one end and steep-sided gorges at the other (Colour Pls 3 and 5). The clays and sands of the Tertiary rocks in the western end of the London Basin are likely to have been less hospitable. As to the human activities in the area between the present day Pang Valley and the River Loddon, along the floodplains now since eroded away but for occasional remnants preserved as terrace levels, it is only possible to speculate upon them.

It cannot even be certain just where the various rivers did actually flow for, in this area of the Thames, there has been a very complex history of river diversions and captures. The Thames itself has, as described in the section above on the earliest industries, once it had to abandon its so-called ‘Ancient Channel’ between Caversham and Henley at the end of the Anglian Stage (OIS–12), remained within the valley in which it still flows. Terrace remnants are sufficient to show that as the river lowered its level from about 30 m above its present floodplain at the Boyn Hill Stage to where it is now, there was only a general southward shift and, for the most part, earlier terrace deposits were removed in the process.

The same cannot be said of the tributaries on its right bank: the Kennet, Loddon and Blackwater in particular. During the period concerned for this section, when the Boyn Hill and Lynch Hill terraces were deposited, none of these rivers flowed where they are today. The palaeogeography as seen by the people who made and used all the artefacts left behind them is almost impossible to reconstruct, other than it is clear that gravelly floodplains below older terrace flats existed. Figure 17 shows a possible reconstruction of the river pattern during this time, superimposed on the present position of the local rivers. Assuming this is correct (but see Table 7) there would have been some higher ground between the veritable peninsula formed south of the Thames by the Proto-Loddon and Proto-Blackwater and this may have been a factor affecting the relative concentration of occupational evidence. However, as hinted above, several other interpretations have been published which are radically different. Some of these are summarised on Table 7. As they obviously affect the meaning of the Palaeolithic evidence they need to be considered.

MAP 6. MIDDLE THAMES VALLEY: READING–HENLEY-ON-THAMES

Many geologists had drawn attention to river diversions in this area since the beginning of the century. Some of the related features were obvious, summed up by Professor H.L. Hawkins in 1926 on a Geologists' Association excursion up the Pang Gap otherwise known as the Sulham Valley. The 'misfit' of the great floodplain to the minor Pang and Sulham streams so obviously indicated that the valley had been occupied by the River Kennet until the formation of the present low terrace and floodplain. Hawkins contrasted this with the narrow Coley Gorge at Reading through which the Kennet now passes through to join the Thames; clearly a recent feature. Other features connected with these river diversions were not so obvious. Reference to Table 7 shows that more recent studies differ in concluding that the Kennet met the Thames either through the Pang Gap or south of Reading and so to near Henley, that the Proto-Loddon and Proto-Blackwater were confluent or separate, and so on.

Although it immediately precedes the time period under consideration, it is relevant to mention here that the interpretation given on Map 3 of the Silchester Stage Gravels linking up with the Black Park Gravel of the 'Ancient Channel' is refuted by Gibbard (1982, 381) on the grounds that the higher ground of the Tilehurst Plateau would have been in its way. The reconstruction given here suggests that the course of this river could have been to the east of the Tilehurst Plateau. Similarly, the reasons given for the suggested drainage pattern during the Lynch and Boyn Hill stages, however controversial, is that it seems the simplest way to explain the terrace remnants which are preserved. The main points are:

i) There are two large areas of preserved Lynch Hill Gravel, one west of Reading and the other from Earley to Woodley on the east side of the town. It does not seem possible that one river could have been responsible for both of them as they are aligned in opposite directions, hence one was probably resulting from the Proto-Blackwater, and the other the Proto-Loddon.

ii) The spread of Lynch Hill Gravel on the west side of Reading is on both sides of the high ground of Prospect Park. Only a river flowing on the south side could have deposited this gravel, that is south of the Bath Road and a Proto-Loddon flowing to meet the Kennet near Englefield could explain this. The Denton's Pit site is in this gravel. An explanation for the gravel on the north side which contains the prolific Grovelands site, may have been a diversion of the Proto-Loddon towards the Thames in the latter part of OIS–8.

iii) The Boyn Hill Gravel at Caversham, with its numerous sites, may represent terrace gravel preserved in an old meander loop, but could be perpetuating an erosional feature of the final abandonment of the 'Ancient Channel', for it lies exactly at its southern end.

iv) The Boyn Hill Gravel at Christchurch may be an earlier terrace of the Proto-Loddon.

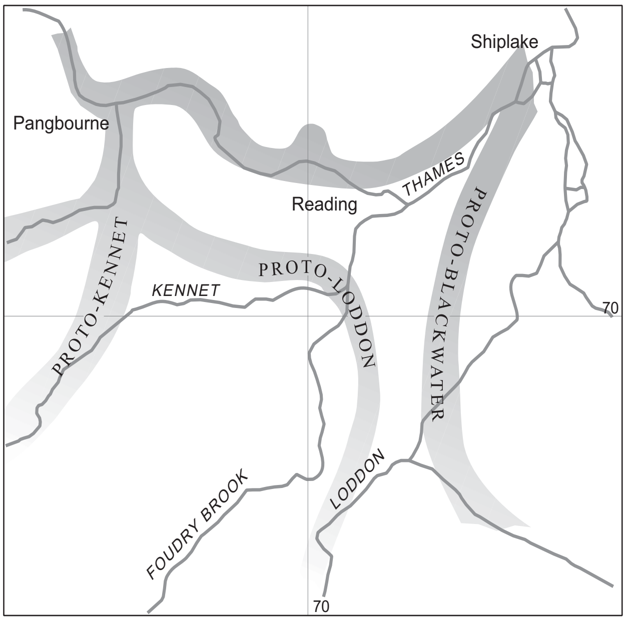


Figure 17 Possible courses of rivers in the Reading area after the abandonment of the Thames from its ancient channel between Caversham and Henley during the Hoxnian Stage

Speculative and controversial as this map may be, it conforms closely to the scheme of Thomas (1961).

A great variety of Palaeolithic artefacts have come from the sites shown on Map 6. Denton's Pit has yielded chopper-cores, many stone-struck flakes, pointed, and ovate hand-axes. It has also produced two Levallois flakes found *in situ* near the base of the gravel, which could pre-empt the suggestion made above concerning earlier and later periods of gravel deposition during the Lynch Hill stage. Grovelands Pit has also produced numbers of pointed and ovate hand-axes, large and small chopper-cores, and a remarkable series of finely made flake tools. In the nearby McIlroy's Pit on the Tilehurst Road, a small but extremely elegant series of large pointed hand-axes were found on Reading Clay beneath '12 feet of gravel.' This suggests that they were in a primary context and their relatively fresh condition supports it. Pointed and ovate hand-axes occur in the prolific Caversham area and at Christchurch, both in the Boyn Hill Gravel, but no Levallois flakes or cores. The discoveries in the

	Sealys (1956)	Thomas (1961)	Clarke and Dixon 1981	Gibbard 1982
		THAMES–KENNET		
SILCHESTER STAGE				Kennet not in Pang Gap but south of Reading and confluent with Thames near Henley
	Kennet through Pang Gap	Kennet through Pang Gap		Refutes Silchester gravels could have flowed into Ancient Channel as its course would have been blocked by the higher Tilehurst Plateau
BOYN HILL				
	Kennet through Pang Gap Thames Ancient Channel abandoned	Kennet through Pang Gap		
LYNCH HILL				
	As Boyn Hill but lower terrace	As Boyn Hill but lower terrace		
		BLACKWATER–LODDON		
SILCHESTER STAGE	Proto-Loddon joins Thames in Ancient Channel near Reading; Proto-Blackwater joins Thames near Henley	Proto-Loddon joins Kennet near Englefield and flows through Pang Gap Proto-Blackwater joins Thames near Shiplake–Henley	Proto-Blackwater confluent with Thames near Henley (Terrace 7) Proto-Loddon and Proto-Blackwater separate streams	Blackwater–Loddon confluent and flowing east towards Wey–Mole drainage
BOYN HILL				
	Proto-Loddon confluent with Thames east of Reading; Proto-Blackwater joins Thames near Henley	Proto-Loddon and Proto-Blackwater still separate, flowing through Pang Gap and confluent with Thames at Henley respectively	Terraces 4–6	
LYNCH HILL				
	As Boyn Hill but lower terrace	As Boyn Hill but lower terrace		

Table 7 Alternative interpretations of river diversions in the Reading area

spreads of Lynch Hill Gravel at Woodley, Ruscombe, and Twyford tell a similar story, with hand-axes and Levallois material. Some of the large number of hand-axes and flakes from Prior's Pit came from a thin layer of Lynch Hill Gravel on Reading Clay; another instance, it seems, of material in primary context.

The only site of this period around Reading known to have produced mammalian remains is Grovelands. The following have been recorded: Mammoth, straight-tusked elephant, rhinoceros, horse, and red deer.

3.3.5 *Middle Thames Valley: Medmenham to Iver*

The course of the river at this time from Medmenham downstream to just past Marlow has altered little from its present one. It cut deeply into the Chalk as the river has done ever since and the modern Henley Gorge is perpetuating this feature (Colour Pls 3 and 5). Even in the cold periods with increased precipitation and discharge there has been minimal lateral erosion, with the result that nothing remains in this part of the gorge of either the Boyn Hill or Lynch Hill Terraces. Correspondingly, if any palaeoliths had been discarded along the river banks they have presumably been washed away. As can be seen from the map (Map 7), none has been recorded.

It is a very different picture where the river makes its great swing to the south at Bourne End for, although it continued to cut a steep cliff into the Chalk on its left bank, with the combined flow of the River Wye it spread over its west bank and deposited sands and gravels that have been preserved in part as the Boyn Hill and lower Lynch Hill Terraces. Even greater spreads of terrace gravel formed where the river swung round again to the east. It could now cut into the soft clays of the Reading Beds and London Clay. Palaeoliths have been found in large numbers in these terrace deposits almost anywhere pits have been dug into them.

There is little to indicate the cold periods that must have been associated with the major periods of deposition, but the basal bed of the Boyn Hill Gravel at Winch's Pit contained large slabs of consolidated

KEY SITES

Winch's Pit, Courthouse Road. The importance of this site is that, although it has yielded few palaeoliths, it is the only pit at Boyn Hill that has been dug under controlled conditions. The unusual nature of the basal bed has already been commented upon above.

Cannoncourt Farm, Furze Platt. One of the most prolific sites in the Thames Valley that must represent an *in situ* concentration of hand-axes and debitage that was not dispersed far by flood waters (Colour Pl. 8). It is particularly famous for the discovery of the largest hand-axe known in Britain (Lacaille 1940; Wymer 1968, 221–5).

Burnham, Deverill's and Cooper's Pits. These are the only pits in the Boyn Hill Terrace in this region of the Middle Thames that have yielded large numbers of hand-axes and flakes. Roe (1968, 26) records 46 hand-axes between them but many more were certainly found there according to Lacaille (1939; pers. comm.).

Burnham, Lent Rise Pit, Stomp Road. Large numbers have come from this locality in the Lynch Hill Gravel, where several small pits gradually merged into each other. The geology and the artefacts are recorded well by Lacaille (1940, 245–71).

Slough, Baker's Farm Pit. Another very prolific site in the Lynch Hill Gravel (Roe, 1968, records 387 hand-axes). It has been well recorded by Lacaille (1940, 245–71). Lacaille notes the presence, apparently in the gravel, of a Levallois flake and core, and Roe (1968, 33) also notes Levallois material. This will be further mentioned below in the section on the Middle Palaeolithic in the Thames Valley.

All these sites have now been built over.

Reading Beds that could only have been moved by torrential waters (Lacaille 1961). Also, an exposure in 1994 of the Lynch Hill Gravel being dug at the Switchback Road Pit, revealed a thick overburden of colluvial or slumped Reading Beds and hillwash, 6 m thick or more, covering the inner edge of the Lynch Hill Gravel. This could well be the result of periglacial conditions during OIS–8 or OIS–6. Palaeoliths found in the Boyn Hill Gravel tend to be rolled or very rolled,

MAP 7. MIDDLE THAMES VALLEY: MEDMENHAM–IVER

and not so numerous as those in the Lynch Hill Gravel. Large numbers of palaeoliths have also been found in the pits at Iver, in the gravel beneath the Langley Silt Complex (Lacaille 1936).

From the prolific quantity of palaeoliths found between Cookham and Iver from the Boyn Hill and Lynch Hill Terrace Gravels, it is clear that this was a favoured area for humans, presumably during the temperate phases of OIS–11 and 9, the palaeoliths of the former being washed into the terrace gravels that formed during the intervening cold OIS–10. It is possible that human groups made forays into the valley during the less temperate periods, but nothing has been found in a primary context with associated environmental evidence that could confirm it. Also, it may have been particularly attractive because of the varied nature of the surroundings: Chalk plateau to the west, reasonably well-drained ancient gravel terraces to the north, and steep Chalk cliffs between Maidenhead and Cookham (Colour Pl. 7). The latter, with terrace flats abutting against the cliff, may have assisted with hunting techniques. There would also have been flint from the Chalk and fresh water and the facility of movement along the river. Conversely, to the south, the Tertiary clays and sands would, during interglacial phases at least, have supported thick woodland and undrained areas which may not have been attractive.

The archaeological importance of this part of the valley lies in the prolific nature of the sites and much could be learnt if another was revealed and could be excavated on a large scale so that an unselected assemblage could be recorded and some objective knowledge gained on the manner in which the artefacts are washed into terrace gravels. The chances of finding primary context sites seem very small.

The maps (Maps 6–7) show the estimated courses of the river during the deposition of the Boyn Hill and Lynch Hill Terrace Gravels. Surviving remnants of these gravels are coloured red.

3.3.6 Middle Thames Valley: Hillingdon to Acton

The large numbers of palaeoliths found in this part of the Thames Valley testify to considerable human activity within this period, presumably during the more clement episodes. It also happens to be in that part of the valley where the classic sequence of Thames terraces are well preserved. From Beaconsfield to Windsor there is virtually an unbroken series of steps dating from the early Middle Pleistocene when the Thames flowed through the Vale of St Albans until the present day. This section, as stated above, is only concerned with the archaeological evidence from those terrace deposits which are considered to date from after the retreat of the Anglian Stage ice (OIS–12) until the latter part of the OIS–8 cold period, before the Stanton Harcourt Interglacial (OIS–7). This involves all the artefacts found within the gravels of the Boyn Hill and Lynch Hill Terraces. In actuality only a relatively small spread of Boyn Hill Gravel has been preserved in the north Hillingdon area and everything else has come from Lynch Hill Gravel. An added complication is the widespread mantle of clays, silts, sands, and what is termed 'brickearth' over much of the Lynch Hill Gravel. This is a complex deposit formed by different natural agencies (colluvial, solifluction, aeolian, fluvial) over a long period, even during the Late Pleistocene. It has understandably been termed the 'Langley Silt Complex' by Gibbard (1985). Some of this deposit, certainly in the Yiewsley–West Drayton area, would appear to immediately post-date the Lynch Hill Gravel. It can also be stated that it has not been found on any of the Boyn Hill Terrace deposits in the Middle Thames so it is unlikely that any of the Langley Silt Complex is older than the Lynch Hill Gravel.

The present River Thames is now some 10 km south of West Drayton at Shepperton, indicating the great lateral movement that has taken place since it flowed directly west–east from Maidenhead towards London. This is probably the result of a combination of two factors: the dip-slope of the London Basin to the south, causing the river to erode southwards each time it had to find a new, lower level, and the easily-eroded clays of the Lower London Tertiaries against which it abutted. The river would also tend to erode laterally into its own unconsolidated deposits. South of the area which is the concern of Map 8, the vast spread of the lower Taplow Terrace is occupied by Heathrow Airport, then the wide spread of the Kempton Park Terrace, the present floodplain, and so to the river. However, on the other side of the river, terraces are non-existent. Each time the Thames has moved south it has cut into the clay and produced steep slopes which are now such prominent landscape features: St Anne's Hill at Chertsey, Kingston Hill, Richmond Hill, Putney Hill. There seems no reason to think that it would have been different during the Middle Pleistocene, for the geology would have been the same. Thus, a reconstruction of the landscape during the interglacial of OIS–9 when it is assumed that most of the occupation took place can be made with some confidence.

As indicated on Map 8, immediately south of the contemporary floodplain there would have been steep, unstable clay slopes. Looking north, people would have seen the bluff of the terrace cut during the previous cold period, beyond which were higher terraces covered with trees or bushes according to the nature of the soil and the climatic zone of the interglacial. The River Colne certainly existed and there must have been a confluence in the neighbourhood of West Drayton. It is unlikely that the present Crane or Brent existed but there may have been minor streams entering the main river across the floodplain. The floodplain itself was probably 2–3 km wide with the river quietly meandering across it. Such conditions were obviously favoured by the human occupants.

MAP 8. MIDDLE THAMES VALLEY: HILLINGDON–ACTON

The distribution of palaeoliths as shown on Map 8 suggests that the area between the Crane and Brent was less favoured, but this is almost certainly a discrepancy resulting from lack of opportunity for archaeological discovery of palaeoliths. The prolific numbers of them in the West Drayton, Yiewsley, and Dawley area (628 hand-axes from Sabey's and Eastwood's Pits at Yiewsley alone, apart from flakes, cores and other artefacts) were found in the large gravel pits by both gravel workers and flint collectors in the days before mechanical excavation.

The palaeoliths in the Ealing–Acton area seem to have been found during the course of residential development in the latter part of the 19th century. This was to be a smart suburb on the west side of London and most of the houses had cellars. The excavation of such, the digging of drains and foundation trenches, all gave opportunities for interested people to search for and find palaeoliths (Brown 1887). The scale of the development explains why most of the Ealing and Acton sites have only produced single or a few artefacts. The great number of sites around Ealing and Acton does suggest, however, that if there had been large commercial gravel quarrying there, as at Yiewsley, similar numbers would have been found.

As for the relatively blank area between these two very rich ones, this is clearly the result of a lack of commercial quarrying, apart from the removal of the brickearth of the Langley Silt Complex. Sherlock (1931, 117) notes that in the 19th century one of the chief centres for the production of stock bricks was between Southall and Slough. He also noted that this brickearth as far up the Thames as Windsor covered the Thames Gravels to 'a depth of 4 to 5 feet, and this has been removed nearly everywhere.' It also has to be considered that this same brickearth prior to the later urban sprawl of London was intensely cultivated, especially for orchards. Such prevented the large scale quarrying of the gravel beneath.

To conform with other sections on the Thames Valley and some of the other major river valleys, sites only with artefacts which can be identified as of Middle Palaeolithic technology or typology are not included on Map 13. They are listed in the section on the Middle Palaeolithic in the Thames Valley.

Thus, sites which have only produced Levallois flakes and no hand-axes do not appear on Map 8, but do so on that for the Middle Palaeolithic of the Thames Valley (Map 13). However, for this area of the Thames in particular this is somewhat anomalous. This is because Levallois flakes have been recorded, sometimes with hand-axes, in rolled and worn condition that would indicate that they have come from gravel, and not just, as at Yiewsley and elsewhere, on the surface of the gravel beneath or in the lower part of the Langley Silt Complex. There is a total lack of records of any *in situ* material in primary context, although Collins (1978) has made a valuable contribution to what is known of the Palaeolithic of the Yiewsley area sites. It would seem reasonable to conclude that deposition of the Lynch Hill Gravel containing Levallois material may have immediately preceded the amelioration of the climate of the OIS–7 interglacial. This would equate with some discoveries in the Lower Thames (Section 3.3.9).

3.3.7 Middle Thames Valley: Putney to Hackney – Evidence for Occupation During Period 2

A concentrated scatter of sites producing hand-axes in small numbers in the Lynch Hill and Hackney Gravels, from in and to the east of Hyde Park (Lacaille 1960), through Bloomsbury to Hackney, testifies to plenty of intermittent occupation in this part of the Valley (Map 9). The Hackney Gravel is considered by Gibbard (1994, 85) most likely to have been deposited by the River Lea rather than the Thames, so this could be another instance of the confluence of rivers attracting people. In this case there would have also been both the Wandle and the Lea joining the Thames not far from its estuarine reaches.

MAP 9. MIDDLE THAMES VALLEY: PUTNEY–HACKNEY

No prolific sites are known in this area of Lynch Hill and Hackney Gravel south-west of Stoke Newington and Clapton, but being so close to the City there has been no large, commercial quarrying of gravel. Vast areas of brickearth and gravel have been removed from the Hackney–Shoreditch area, but this was in the 17th–18th centuries, or earlier, before palaeoliths would have been recognised. The exception was a pit at what is now Granville Square off Kings Cross Road, in which, at the end of the 17th century, a Mr Conyers found a flint which he recognised as being of human workmanship. This found its way into the British Museum (Evans 1872, 521) and was described as a 'British weapon' but would now be called a pointed hand-axe or biface. An elephant's tooth was found with it. The many hand-axes that have been found since have been casual finds usually by sharp-eyed labourers during the extensive building developments of the later 19th century.

The most important collection of sites is at Stoke Newington, so well observed, collected from, and recorded by Worthington G. Smith (1894) in his book *Man the Primeval Savage*. During the digging of brickearth and gravel, either for the clay, gravel, or excavations for cellars, flakes and tools were found in or under the brickearth, for the most part in primary context. Smith made spectacular numbers of refits, many finely illustrated in his book. These deposits have yielded mammalian bones, shells, plant remains, and some birch 'stakes' thought to have been artificially pointed but almost certainly the result of beaver gnawing.

Obviously, with the area now covered by houses, exposures of these archaeologically valuable brickearth deposits are rare. Attempts have been made in recent years to try and relocate them, when opportunity has arisen, but as yet no actual primary context site has been found (Harding and Gibbard 1984). However, these investigations combined with boreholes have allowed Gibbard (1994, 80–6) to give detailed descriptions of the geology. He has been able to confirm many of Smith's observations and also to demonstrate that there are colluvial deposits that have moved down the slope from the Upper Clapton area above the fluvial sands and clays which contain the so-called 'floors' of Worthington Smith. He concludes that the River Lea probably abandoned its course here, represented by the underlying implementiferous gravel, and the fine sediments accumulated on floodplains, gently covering occasional land surfaces.

The BGS map the Stoke Newington brickearth deposits as Langley Silt Complex. Gibbard (1994, 189) considers that the pollen profile confirms an Ipswichian Stage date for the brickearths and is not prepared to accept the contrary evidence from amino acid dating of Miller *et al.* (1979). Bridgland (1994, 227, 236) regards the gravel and brickearth as part of the Corbet's Tey Formation. There is thus a conflict between the acceptance of the Stoke Newington brickearths as relating to either OIS–5e or earlier. On present evidence, with no Levallois element in the artefacts, the OIS–9 seems more likely.

KEY SITE

HACKNEY LONDON BOROUGH

Stoke Newington. Map 9

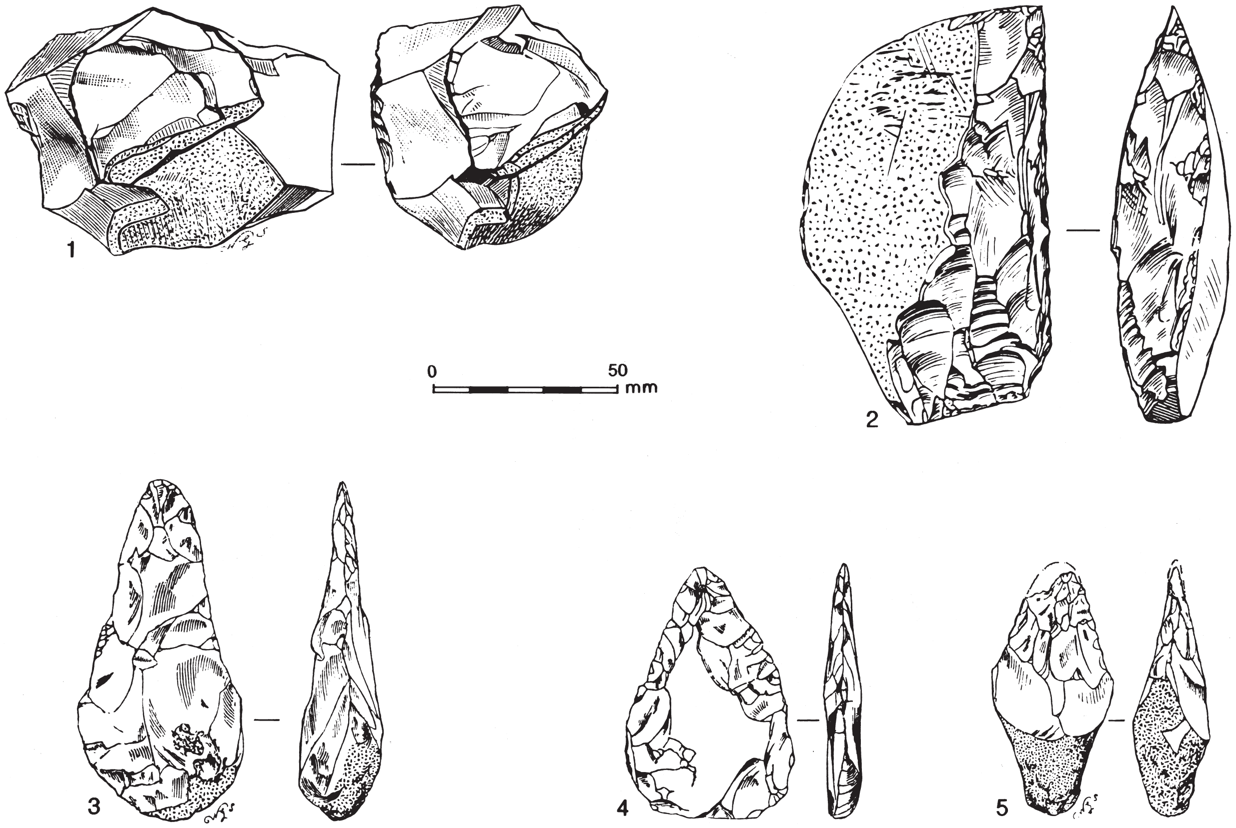


Figure 18 Stoke Newington. Artefacts in primary context from Worthington Smith's 'Palaeolithic floor'. 1) conjoined flakes; 2) scraper; 3–5) small pointed hand-axes. Source: Smith 1894, 239, 248, 252

Locality: Numerous sites in residential district as shown on Map 9 and listed (Nos 75–103).

History: Observed and collected from by Worthington G. Smith from 1878 during late 19th century residential development of area which previously included market gardens and brickmaking. Particularly rich sites along Alkham, Kyverdale, Cazenove, Osbaldeston, and Fountaine Roads, Stoke Newington Common, and Abney Park Cemetery. Some recent trial excavations failed to relocate the archaeological levels he described.

Archaeology: Flint artefacts found in this strata within deposit referred to as brickearth. At least three levels described as 'floors'. Palaeoliths mainly in mint condition consisting of hand-axes, flakes, and retouched flakes. Several conjoinable pieces (Fig. 18).

Context: Colluvial deposits overlying fluviatile bedded sands and gravels. The artefacts are within the colluvial material and in the underlying fluvial sandy loam. The palaeoliths in the latter, from the records of Worthington Smith, must be in primary context.

Associated material: Molluscs and rare bones and antlers. Two lengths of birch wood were thought to be artificially pointed but probably result from beaver gnawing. They were found at Baystock (=Bayston) Road with a compact mass of the fern royal, *Osmunda regalis*.

Dating: Amino acid dating suggests OIS–11, but deposits equated by Bridgland with the temperate deposits at Little Thurrock, Belhus Park, and Purfleet, as OIS–9.

Major references: *Account of discoveries*: Smith 1894. *Summaries*: Wymer 1968, 297–301; Roe 1968, 203; 1981, 172–5. *Geology*: Gibbard 1994, 81–5, 172; Bridgland 1994, 227, 236. *Trial excavations*: Harding and Gibbard 1984, 1–18; Richardson 1977, 37, 66–76

Numbers and location of artefacts: Roe 1968, 202–4

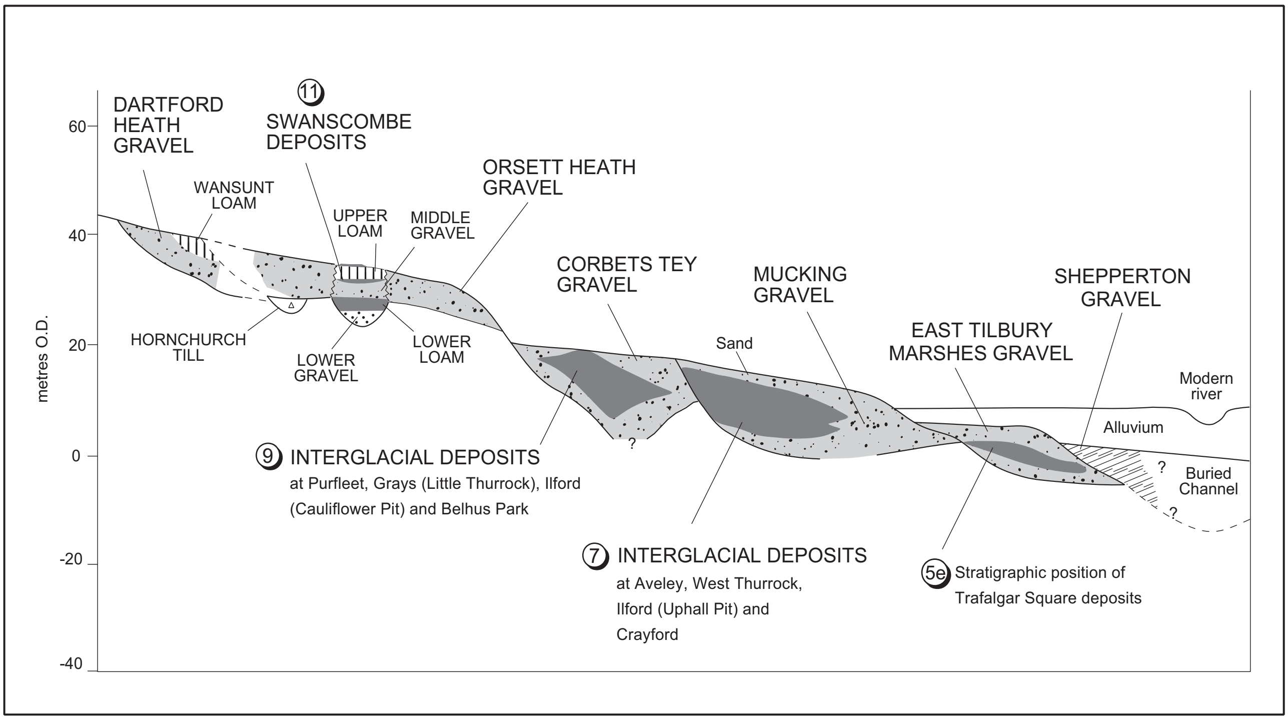


Figure 19 Diagrammatic section of Thames Terraces in the Lower Thames Valley (after Bridgland 1994)

3.3.8 Lower Thames Valley: Poplar to Dagenham – Evidence for Occupation During Period 2

There are wide, well-preserved terraces north of the present Thames on each side of the Roding, which has merely cut its way through them (Fig. 19). Map 10 shows the extent of the Orsett Heath Gravel and Corbets Tey Gravel (Colour Pl. 6) as on the BGS 1:50,000 Sheet 257 for Romford, but referred to as Boyn Hill and Hackney/Lynch Hill Gravels respectively on the latter. There is a scatter of palaeoliths from these gravels and even in the lower Mucking Gravel.

MAP 10. LOWER THAMES VALLEY: POPLAR–DAGENHAM

There are no very prolific sites known, and the only ones where they have been found in any numbers are Bents Farm at Leyton in Hackney Gravel (32 hand-axes), Stonehall Farm Pits at Redbridge (Boyn Hill Gravel, 20 hand-axes), and possibly the West Ham Union Pit (Mucking Gravel, 20 hand-axes) if Plaistow Pits and Town Pits refer to the same place. These may indicate the general area of occupation at times along the valley, but the majority of the palaeoliths are so rolled and damaged that it would seem they have been widely dispersed from their original source. The confluence of the Lea a little further upstream may have been the cause if such is really the case.

Although this is not a very rich or useful area for Palaeolithic sites there is one key site of considerable importance at South Woodford. This was found in 1975 when the M11 and North Circular Road intersection was being built. Clearance of a cutting immediately north-west of the intersection revealed 1–2 m of silty clay (brickearth) with sandy lenses, on gravel mapped by the BGS as a small outlier of Boyn Hill Gravel (Orsett Heath Gravel in Bridgland's terminology as used here for the Lower Thames). Apart from a few rolled flakes, 3 hand-axes, a cleaver-like tool on a large flake, the point of a hand-axe, and 9 flakes were found close together at the base of the brickearth on or just into the underlying gravel, in mint condition (Wymer 1985, 298–9; Fig. 20) This is unquestionably a primary context site and does much to corroborate Worthington Smith's contention (1894, 194, 214) that his Palaeolithic 'floors' could traced to the Roding and beyond. The date of this site can only be assessed as being younger than the Orsett Heath Gravel on which it lies, but OIS–9 as at Stoke Newington is very likely.

The other important sites in this area are those of the brickpits at Ilford, but as these are considered to belong to Period 3 they have been included with the part of this section concerned with the Middle Palaeolithic in the Thames Valley.

KEY SITE

REDBRIDGE LONDON BOROUGH

South Woodford. Map 10, No. 24

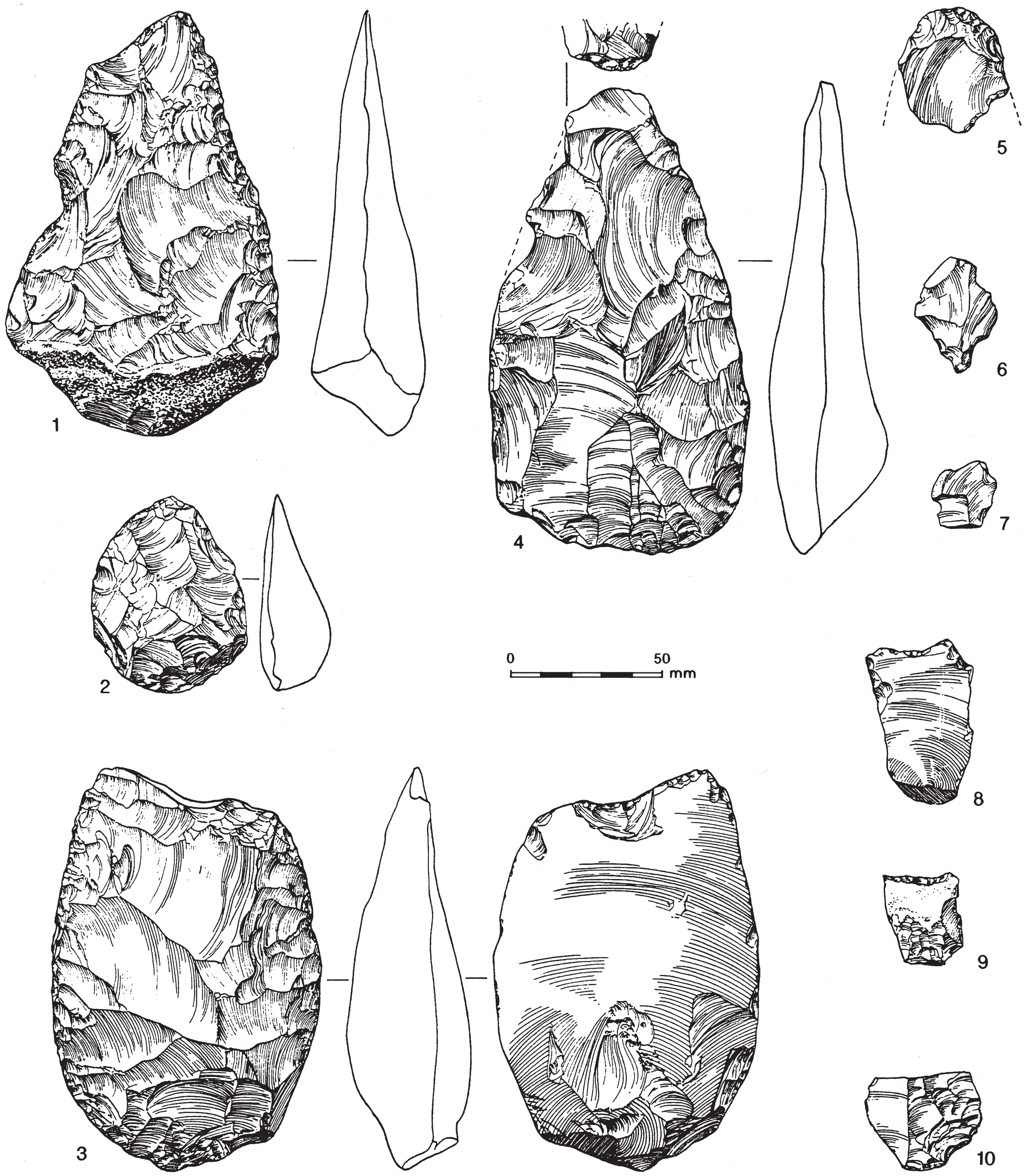


Figure 20 South Woodford. Artefacts found in primary context beneath brickearth on Corbets Tey Gravel during construction of the M11 motorway in 1975. 1–3) hand-axes; 4) cleaver made on large flake; 5) tip of hand-axe; 6–10) flakes

It is considered that this site would have been on the outer bend of a meander of the River Roding, and was most likely a butchering activity area (White et al. *forthcoming). This may account for the broken tips of hand-axes and the signs of heavy use on the cleaver. It could, as Worthington Smith surmised, be contemporary with his 'floors' in north-east London*

KEY SITE

REDBRIDGE LONDON BOROUGH
South Woodford. Map 10, No. 24

Locality: North side of intersection of A406 road and M11 Motorway.

History: Discovered in 1975 during archaeological watching brief on major road works. Controlled excavation of small area.

Archaeology: Four hand-axes, 1 point of a hand-axe and 9 flakes found on surface of gravel beneath 1-2 m of sandy silt (Brickearth) with thin lenses of gravel. Three of the hand-axes had broken points. All in mint condition except for 6 of the flakes which had been retouched afterwards (Fig. 20).

Context: Beneath colluvial deposits in primary context. In terrace of River Roding at 21 m OD.

Associated material: Some fire-crackled flints and a piece of burnt clay a few cm below in the gravel. One bone fragment in very poor condition of a large mammal.

Dating: Height of terrace suggests correlation with Corbets Tey Gravel (? OIS-8)

Significance: Confirms belief of Worthington Smith that his north-east London 'Floor' extended further eastwards as far as the Roding valley.

Major References: *General summary*: Wymer 1985, 298-9. *Roding terrace diagram*: Gibbard 1994, 113

Numbers and locations of artefacts: Wymer 1985, 298

3.3.9 Lower Thames Valley: Crayford to Northfleet

From the point of view of Quaternary geology and Palaeolithic archaeology this is the richest and most well-known area of the Thames Valley and, for that matter, Britain. It contains sites with palaeoliths and faunal remains in stratified sequences, sites with associated organic deposits, sites with every known technology, sites with material in primary context, sites directly associated with glacial till or periglacial Coombe Rock, and even the only remains of a human skull associated with hand-axes yet found in Britain.

KEY SITE

THURROCK, Purfleet
Map 11, Nos 17 and 18

Locality: Bluelands and Greenlands Quarries, north and south of North Road.

History: Quarries opened in 1960s. Fluviatile deposits exposed above the Chalk including shelly deposits with faunal remains and artefacts at various levels. Excavations by S. Palmer in early 1970s. Sections cut south of Bluelands Quarry at Stonehouse Lane by the Essex County Council Archaeology Section in 1995, and on the edge of Greenlands Quarry by the Quaternary Research Association. Now partly an SSSI.

Archaeology: A complex sequence including artefacts which could relate to Mode 1, 2, and 3 types. The Levallois of Mode 3 may the same as that found at the Botany Pit (Map 11, No. 16), possibly the earliest use of the technique in Britain.

Context: Fluviatile deposits of Corbets Tey Gravel. Originally these deposits were considered to be those of the Mar Dyke as they relate to that valley and the direction of flow was east to west. Later interpretations accept them as Thames deposits when that river made a great meander loop to avoid high ground to the east. It is thought to have flowed here until it cut down after the Corbets Tey Gravel. However, the dating of the deposits is still controversial.

Associated material: Rich deposits with molluscs and mammalian remains. Recent work suggests the mammalian assemblage is distinctive, differing from and later than that of Barnfield Pit, and earlier than later pre-Ipswichian ones.

Dating: Corbets Tey Gravel here attributed to OIS–9 by Bridgland (1994). Amino acid ratios indicate an earlier date than that suggested by the mammalian assemblage.

Significance: A critical site for interpreting the sequence of events in the Lower Thames Valley during the Middle Pleistocene, with associated faunal remains and Palaeolithic artefacts.

Major references: *General summaries*: Palmer 1975; Wymer 1985, 311–3; Bridgland 1994, 218–28; Bridgland *et al.* 1995. *Excavations*: Palmer 1995; Schreve 1997. *Artefacts*: Palmer 1975. *Interpretation of Mar Dyke deposits as of Ipswichian age*: Gibbard 1994, 38, 190–1. *Mammalian remains*: Bridgland *et al.* 1995; Schreve 1997; forthcoming. *Mollusca*: Snelling 1975; Preece 1995, 53–60. *Amino acid geochronology*: Bowen *et al*. 1995.

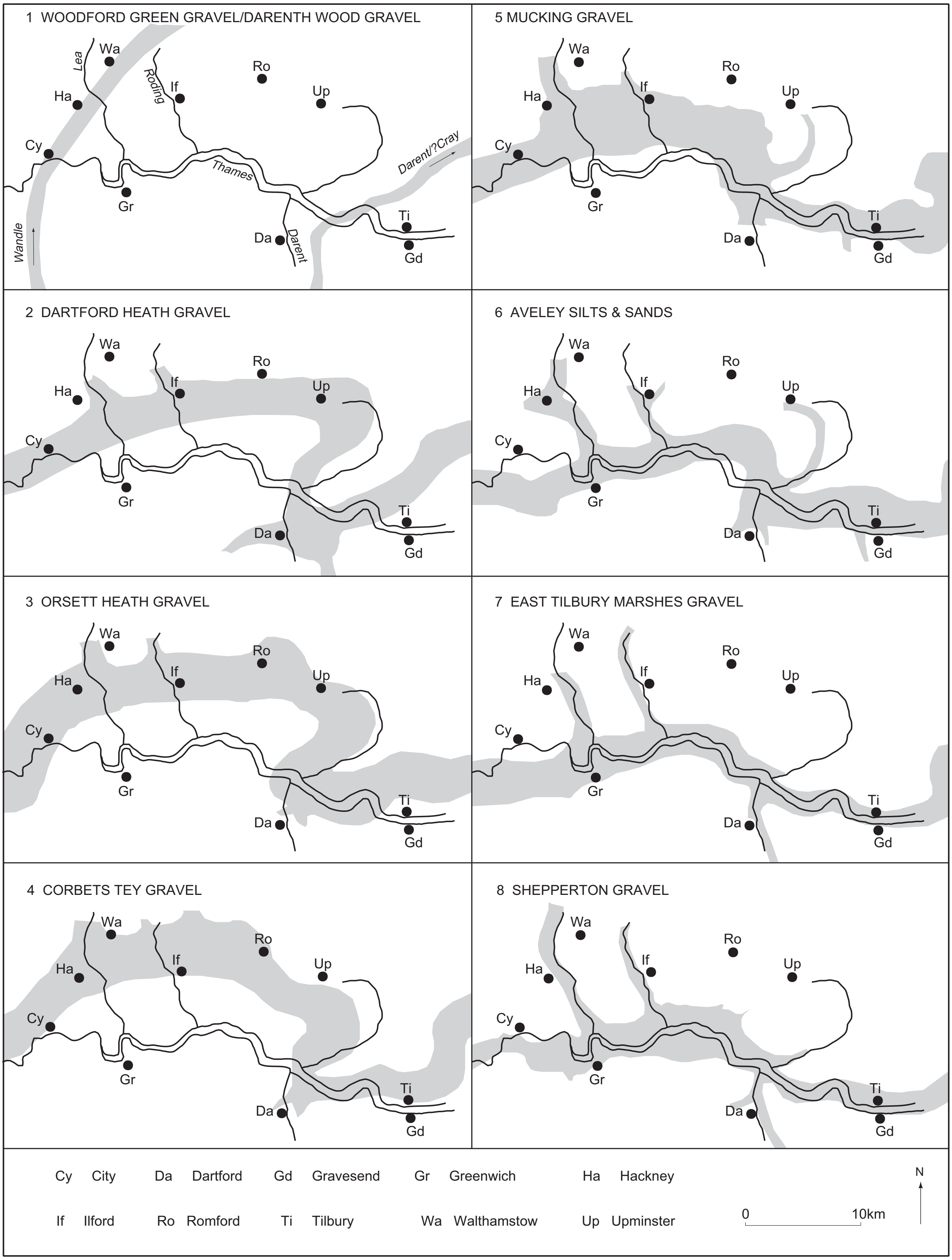


Figure 21 Palaeogeographical evolution of the Lower Thames. The toned areas indicate the approximate course of the river and its major tributaries at each stage, superimposed on its present course (after Gibbard 1994)

KEY SITE

AVELEY
Map 11, No. 19

Locality: Belhus Park. Construction of M25 London Orbital Motorway

History: Large exposures of Corbets Tey Gravel were made in 1980–1 during the building of the M25 at this point. A dark, organic deposit was revealed within the body of the deposit and G. Ward, then of the Passmore Edwards Museum, retrieved some palaeoliths from the sandy gravels immediately above it.

Archaeology: Palaeoliths found by Ward include a cleaver, at least three hand-axes, and some flakes, in fresh condition.

Context: Corbets Tey Gravel of Bridgland 1994.

Associated material: Molluscs in the organic bed included *Corbicula flumenalis*.

Dating: Organic beds related by Bridgland to OIS–9, and the sandy gravel containing the palaeoliths to OIS–8. It is very likely that the palaeoliths have been derived from a land surface contemporary with the interglacial represented by the organic bed.

Significance: Full sequence represented of the Basal and later Corbets Tey Gravel with intervening interglacial beds. Palaeoliths associated with the latter part.

Major references: *General summary*: Wymer 1985, 314. *Geology*: Bridgland 1994, 177. *Dating*: Bridgland 1994, 227.

MAP 11. LOWER THAMES VALLEY: CRAYFORD–NORTHFLEET

There is much here to be learnt of the people who obviously found this a highly favourable area of occupation during Periods 2 and 3. There was no River Thames here until the Late Anglian Stage so nothing pre-Anglian could be expected.

People were certainly here from the Late Anglian (Map 11), as shown by the presence of flakes and cores of Clactonian technology in the Basal Gravel of the Swanscombe sequence (Table 6; Fig. 21). This is the only evidence for anything so early, unless the argument of Gibbard (1994, 19) for the gravels on Dartford Gravels also being Black Park Gravels is accepted. King and Oakley (1936) and Bridgland (1994, 188–91) both disagree and place the gravels as an aggradation after the main Swanscombe sequence. Understandably, with such complex geology and now so much dug away without adequate record, there has been a long history of controversy.

There has also been a long history of collecting, investigation, and excavation in many of the pits, ever since the local cement industry expanded in the late 19th century to meet the demand for chalk and clay, both of which abound in the area. The proximity of the river was a further advantage to the cement industry for purpose of transport of their products to the great city upstream. However, as all the available chalk near the river was quarried away, it was necessary to go further inland, where Middle Pleistocene deposits created an overburden that had to removed to get at the chalk. Thus, so much of these archaeologically rich sediments were exposed. Vast quarries appeared on both side of the river at Greenhithe, Stone, Swanscombe, Northfleet, Grays, and Thurrock. None now operates.

The history of archaeological investigation in this part of the Thames Valley is virtually a history of Palaeolithic archaeology, but this is no place to expand on what has been done in many publications. However, some of the more important discoveries and matters of contention will be mentioned in the brief summaries of the key sites below. Crayford, Northfleet, and the West Thurrock Levallois sites are not included as they feature in the section on the Middle Palaeolithic in the Thames Valley.

The major key site is Barnfield Pit, Swanscombe, and this can be used as a yardstick to judge the chronology and evidence of human occupation in the area. The recent description of the stratigraphy and geology of the site by Dr B.W. Conway (in Conway *et al.* 1996) is the culmination of a study by a long line of geologists, observers, and excavators such as Dewey, Chandler, Marston, Oakley, Kerney, Waechter, Wymer, and others, sieved and rationalised by a professional geologist. His conclusions are summarised in Table 8. Figure 19 shows the sequence of terraces and deposits in the Lower Thames Valley and Figure 21 the palaeogeography of the evolution of the Lower Thames Valley. (See also Table 6 for correlations with the terrace sequences of the Upper and Middle Thames Valley).

KEY SITE

THURROCK

Little Thurrock Map 11, No. 28

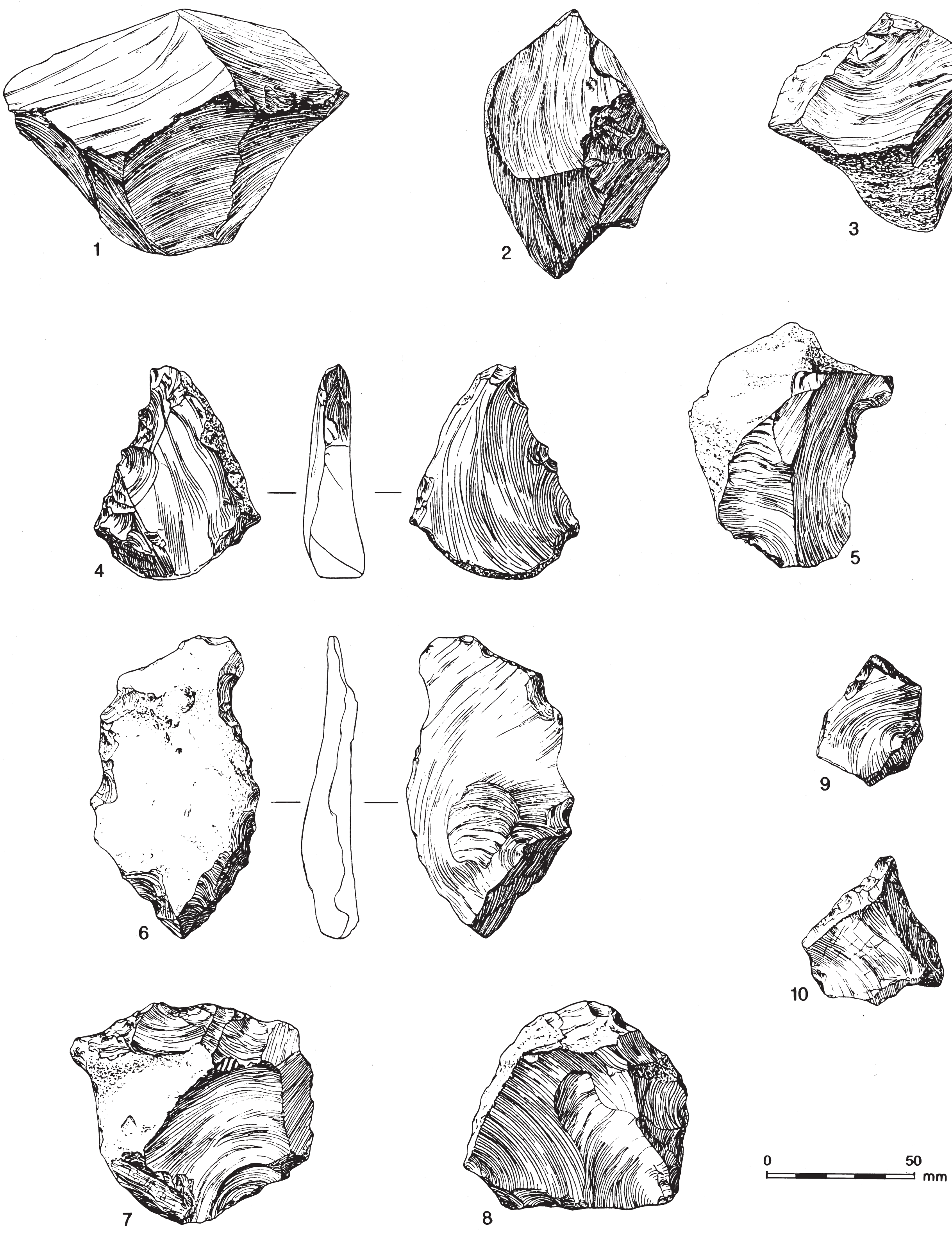


Figure 22 Little Thurrock, Globe Pit. Flint industry of cores and flakes from Corbets Tey Gravel. 1–3) cores; 4–8) retouched flakes; 9–10) flakes with minor retouch or edge damage. Source: Wymer 1957 (4–8)

KEY SITE

THURROCK,
Little Thurrock Map 11, No. 28

Locality: Globe Pit, east of Whitehall Lane.

History: A small gravel pit on the east side of the large quarry for Chalk and Thanet Sand. Bench level of gravel is 14 m OD. Visited in 1910 by B.O. Wymer who discovered numerous flakes. Probably the same pit known to Spurrell (1892) as the one 'with numerous flint waste in the easternmost pit at Little Thurrock.'

Excavations conducted by B.O. and J.J. Wymer in 1954, by A. Snelling in 1963, and Bridgland and Harding in 1983. Geology investigated by B.W. Conway of B.G.S. in 1964–5. Now a private garden.

Archaeology: All excavated material is of Mode 1 type of flakes and cores (Fig. 22). No hand-axes have been recorded. Artefacts very prolific (up to *c.* 60 per cubic metre) mainly in sharp or slightly rolled condition, and a few mint. Hammerstones also found. One flake identified by Harding as a hand-axe thinning flake.

Context: Corbets Tey Gravel of Bridgland (1994). Artefacts at all levels within 1.5–2.0 m thickness of gravel.

Associated material: None, neither molluscan nor mammalian.

Dating: Corbets Tey Gravel related to OIS–10 by Bridgland (1994). Gravel is stratigraphically earlier than the Grays Brickearth which butts against it. Amino acid ratios suggest Grays Brick-earth is OIS–11, but this is discounted on basis of biostratigraphy.

Major references: *General summaries*: Wymer 1968, 314–7; 1985, 307–10; Bridgland and Harding, 1993; Bridgland 1994, 236. *Excavation reports*: Wymer 1957; Snelling 1964; Bridgland and Harding 1993. *Dating*: Amino acid ratios: Miller *et al.* 1979; Bowen *et al.* 1989. *Archaeology*: Wymer 1968, 314–7; Bridgland and Harding 1993.

Numbers and location of artefacts: Roe 1968, 61 and excavation reports as cited above.

KEY SITE

SWANSCOMBE AND GREENHITHE
Ingress Vale. Map 11 No. 53

Locality: Dierden's Pit.

History: Pit opened on west side of Ingress Vale about 1900. Elegant hand-axes in sharp condition collected from the pit by various people but excavations by Smith and Dewey in 1913 only produced flakes and cores, although the former were very numerous (*c.* 500). Principally known from its rich shell bed. Some further unpublished excavations by Tester and Carreck in 1953 (Tester, pers. comm.) also only found flakes and cores in the shell bed, which they regarded as a Clactonian Industry, but later excavations by Kerney found hand-axe thinning flakes in the Shell Bed. Site now covered by residential flats.

Archaeology: Flakes and cores in the Shell Bed equated with Mode 1 Clactonian Industry of the Barnfield Pit Lower Gravel or Lower Loam. Level of earlier discoveries of hand-axes not substantiated, although Kennard records an atypical hand-axe from the Shell Bed.

Context: Fluviatile deposits of Basal Orsett Heath Gravel and Swanscombe Deposits (Bridgland 1994), on same bench level as Lower Gravel of Barnfield Pit. Dewey considered earlier discoveries of hand-axes may have come from pockets of loam channelled into the Shell Bed.

Associated material: Shells, bones, teeth, and tusks found in the Shell Bed.

Dating: Correlated originally with the Lower Gravel of Barnfield Pit, regarded as Late-Anglian–Early Hoxnian (OIS–12 to OIS–11). Presence of giant beaver, *Trogontherium*, supports Hoxnian date, but Rhenish Mollusca in the Shell Bed indicate an interglacial post-dating the Lower Loam of Barnfield Pit.

Significance: Further evidence of Mode 1 flintworking assemblage during Late Anglian–Early Hoxnian stages.

Major references: *General summary*: Smith 1926, 27–8; Dewey 1931, 148; 1932, 42–3; Wymer 1985, 168, 333–4; Roe 1981, 143; Bridgland 1994, 210–1. *Excavations:* Smith and Dewey 1913. *Mammalian*: Kennard 1916, 254; Sutcliffe 1964. *Molluscan*: Kerney 1959.

Numbers and locations of artefacts: Roe 1968, 163

KEY SITE

DARTFORD

Dartford Heath Map 11, Nos 31 and 32

Localities: Wansunt Pit and Bowman's Lodge Pit

History: Wansunt pit on the west side of Dartford Heath has been extensively dug for gravel, sand, and brickearth since the beginning of this century. Up to 20 m of deposits exist, the surface of which forms a plateau at 42 m aOD. The bench level is at about 28 m aOD but overlies some channels which are lower. The upper part consists of clays and silts referred to as the Wansunt Loam and contains hand-axes and flakes in primary context, including nests of conjoinable flakes. These were excavated by Chandler and Leach in 1911–12 and the same deposits with further artefacts relocated in 1995 by English Nature.

These Dartford Heath Gravels have been a matter of controversy for almost a century, and still remain so. They were mapped by the Geological Survey in the late 19th century as Boyn Hill Gravel, the same as the deposits at Swanscombe, in spite of their surface height being 8 m higher. An alternative view was put forward by Hinton and Kennard in 1905 that the Dartford Heath Gravels represented a higher and earlier terrace than Swanscombe. Since then there have been arguments put forward to support both views.

Those who see the Dartford Heath Gravels as earlier than Swanscombe (as represented by the Barnfield Pit sequence) have suggested it is the earliest evidence for the presence of the Thames below London after its diversion from its pre-Anglian route through the Vale of St Albans. Gibbard thus relates it to the Black Park Gravel. This would mean that the palaeoliths found within the Wansunt Loam would be older than anything at Swanscombe. Conversely, if the spread of gravel from Dartford Heath to Swanscombe is considered as one large aggradation, then the palaeoliths in the Wansunt Loam would be younger than the Swanscombe Middle Gravels at least.

It is certainly difficult trying to explain an aggradation of some 20 m, with the Orsett Heath Gravel surface considerably below the top of the Dartford Heath Gravel, but arguments in its favour point out that the gradient of the Black Park Terrace upstream is so steep that it would have been below that of the Boyn Hill/Orsett Heath level. It is also seen significant that the Anglian till at Hornchurch descends to just below 30 m OD and is covered by Boyn Hill/Orsett Heath Gravel and not Black Park Gravel. However, records of channels beneath the main body of the Dartford Heath Gravel give altitudes which could correlate with the basal part of the Lower Gravel at Swanscombe. A possible compromise, suggested by Gibbard, is that the Dartford Heath Gravel may be composite with elements of both periods of terrace gravel formation.

The pit is now partly occupied by industrial buildings but is classified as a SSSI by English Nature.

Archaeology: The palaeoliths from the Wansunt Loam, and others in a similar context at Bowman's Lodge Pit, only a few hundred metres east of the Wansunt Pit, consist of elegant, mainly ovate or cordate, hand-axes and small cores. Some were certainly in primary context, but others have been disturbed by natural agencies and, as shown in the 1995 excavation, are distributed throughout the body of the deposit.

Dewey has recorded small numbers of artefacts from the Dartford Heath Gravel below the Wansunt Loam, but none apparently from any of the earlier basal channels.

Contexts and dating: The dating of Wansunt Loam occupation remains controversial, dependent on the interpretation of the position of the Dartford Heath Gravel within the Lower Thames sequence. A likely date, favoured here, is that of the interglacial represented by the Upper Loam at Barnfield Pit, Swanscombe. The mint condition of many of the artefacts precludes that they have been derived, but must have been contemporary with its deposition.

Associated material: Mammalian remains in the Wansunt Loam were not prolific, but Chandler and Leach have recorded straight-tusked elephant, deer, horse, and rhino, which support the interglacial nature of the Palaeolithic site.

Significance: At both pits there are hand-axe industries, partly if not entirely in primary context. The whole interpretation of the earlier part of the Lower Thames sequence is dependent

KEY SITE

DARTFORD

Dartford Heath Map 11, Nos 31 and 32

on the eventual resolution of the controversy concerning the Dartford Heath Gravels and their relation with the Swanscombe deposits only 8 km downstream. Undisturbed areas of Wansunt Loam remain for future investigation.

Major References: *In favour of Dartford and Swanscombe being separate aggradations of terrace deposits; Dartford being the earlier*: Hinton and Kennard 1905; Zeuner 1959, 155; Gibbard 1979; 1994, 18–24. *Regarded as one terrace aggradation*: Chandler and Leach 1911; 1912; King and Oakley 1936; Dewey 1959; Evans 1971, 291–2; Bridgland 1994, 185–93. *Excavations of Palaeolithic sites in Wansunt Pit*: Chandler and Leach 1911; 1912; Leach 1913; White *et al.* 1995, 117–28. *Excavation of Palaeolithic site in Bowman's Pit*: Tester 1951; Wymer 1968, 328–9. *Palaeolithic sites of Dartford Heath area*: Wymer 1968, 326–33; Waechter 1973, 80–5.

Numbers and locations of artefacts: Roe 1968, 148.

	Modern Surface 32 m OD				
	PHASE III				
IIId	Upper Gravel	OIS–8	Hillwash and solifluction	Cold	Derived hand-axes; rare faunal remains
IIIc	Upper loam	OIS–9	River deposit	Warm	Acheulian Industry in ?primary context
IIIa–b	Upper Sand	OIS–10		Cold	
	PHASE II				
				E6	
IIb	Upper Middle Gravel	)	River gravel and sand	Cool	Acheulian Industry; rich fauna human skull fragments
		)		E5	
IIa	Lower Middle Gravel	)	River Gravel and sand	warm	Acheulian Industry; rich fauna
		)		E4 Cool	
		) OIS–11			
	PHASE I	)			
I d–e	Lower Loam	)	Channel fill of fine sediments	Warm E3	Clactonian Industry in primary context; rich fauna
I b–c	Lower Gravel	)	River gravel	Warm	Clactonian Industry; rich fauna
		)		E2	
Ia	Basal Gravel	)		Cold E1	Clactonian Industry
	CHALK OR THANET SAND BEDROCK				

Table 8 The Swanscombe sequence based on the tripartite division given by Conway et al. *(1996). E1–E6 = erosional surfaces. The mammalian faunal remains in Phases I and II are all interglacial species and include: Straight-tusked elephant; rhinoceros; giant ox; giant, red, fallow, and roe deer; horse; lion; wolf; marten; monkey; hare.*

KEY SITE

SWANSCOMBE AND GREENHITHE

Swanscombe Map 11, No. 55

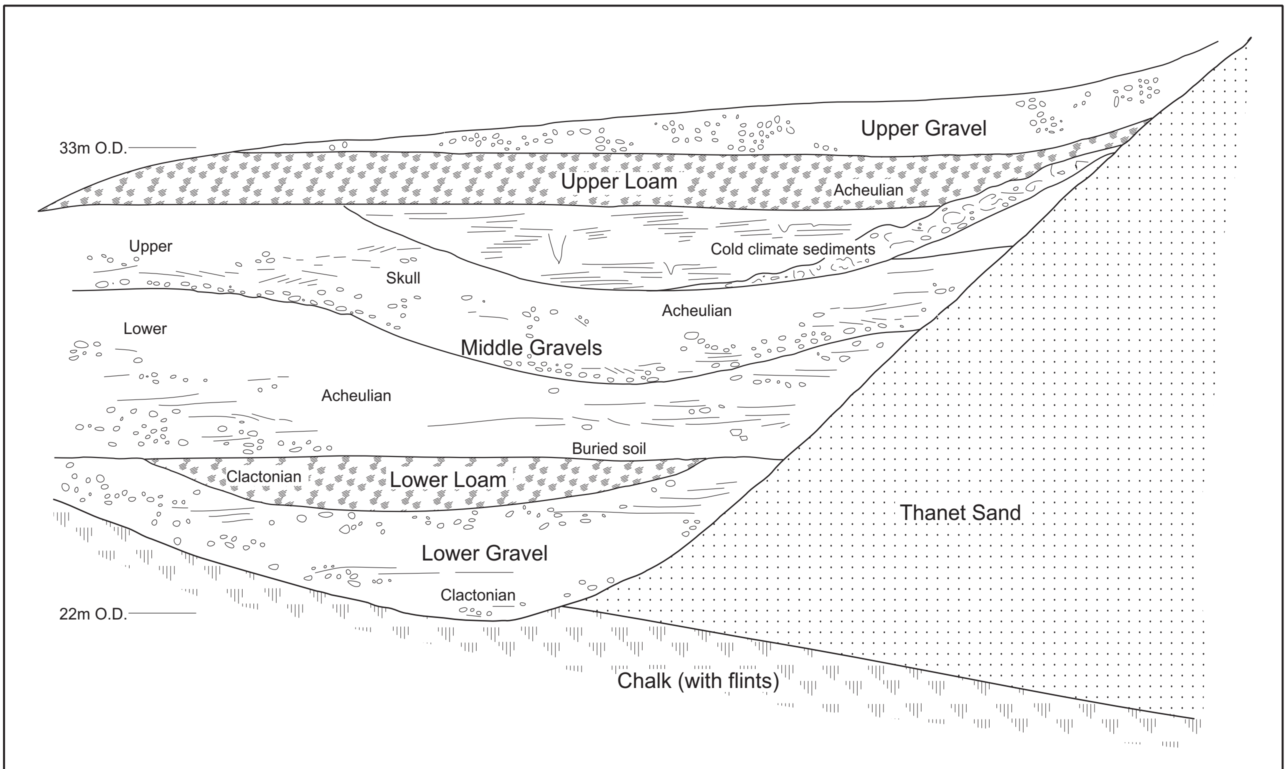


Figure 23 Diagrammatic section across the terrace deposits at Swanscombe, Kent. The succession of deposits and flint industries at this famous site is a major key for interpreting the sequence of human occupation of the valley during the Hoxnian–'Early Wolstonian' Stages of the conventional framework

Locality: Barnfield Pit

History: Part of large quarry open for extraction of chalk in late 19th century but with some 12 m of overlying fluviatile deposits. Vast collections of palaeoliths made by numerous people, especially by Dr Henry Stopes. Excavations made by British Museum in 1912 and by the Swanscombe Committee in 1937. Other work on a smaller scale by Chandler, Leakey, and others.

Human occipital and left parietal bones found 1935 and 1936, and conjoining right parietal in 1955, all from Upper Middle Gravel. Excavations by Ashley Montague in 1948 failed to relocate the Upper Middle Gravel.

Further investigations by B.O. and J.J. Wymer from 1950 eventually relocated the Upper Middle Gravel beneath spoil of 1948 excavation. Excavations of Upper Middle Gravel by Wymers 1955–60, and by Waechter of Lower Loam and Gravel in 1968–72, with geological reassessment by Conway. Further witness sections cut by INQUA and QRA. Site now under control of English Nature. A small display is open to the public in the Council Offices near the entrance.

Archaeology: Sequence of stratified archaeological levels as shown on Figure 23.

Context: Fluviatile deposits of basal Orsett Heath Gravel and Swanscombe Deposits of Bridgland (1994) and Stages I–III of Conway (1996), and Swanscombe Member of Gibbard (1994, 24–9).

Palaeolithic artefacts numerous in all stratigraphical layers, but less so in Upper Loam. Those in the Lower Gravel in derived context; Lower Loam in primary context; Lower Middle Gravel derived but with evidence of

KEY SITE

SWANSCOMBE AND GREENHITHE
Swanscombe Map 11, No. 55

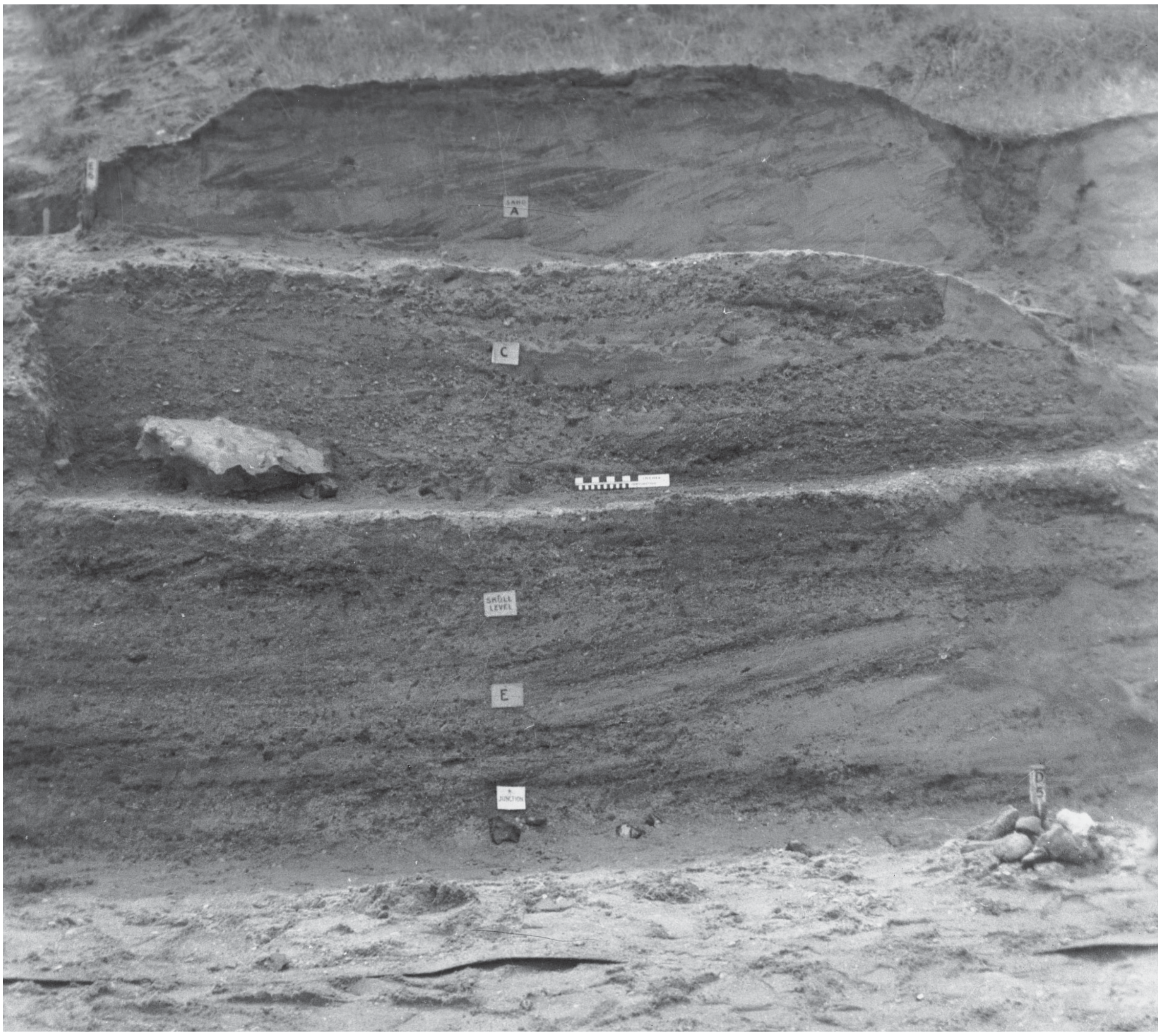


Plate 2 Barnfield Pit section exposed in 1956 excavations in the Upper Middle Gravel. The level at which the human right perietal was found in 1955 is indicated by the label beneath the scale. The large flint nodule in fine, current-bedded sands appears to be humanly introduced, possibly being unused knapping material

land surface at base on top of Lower Loam; Upper Middle Gravel derived, but evidently from nearby surface of channel cut into Lower Middle Gravel with majority of artefacts in sharp condition (Pl. 2); Upper Loam rare derived artefacts but possible localised remnants of land surfaces (Fig. 24).

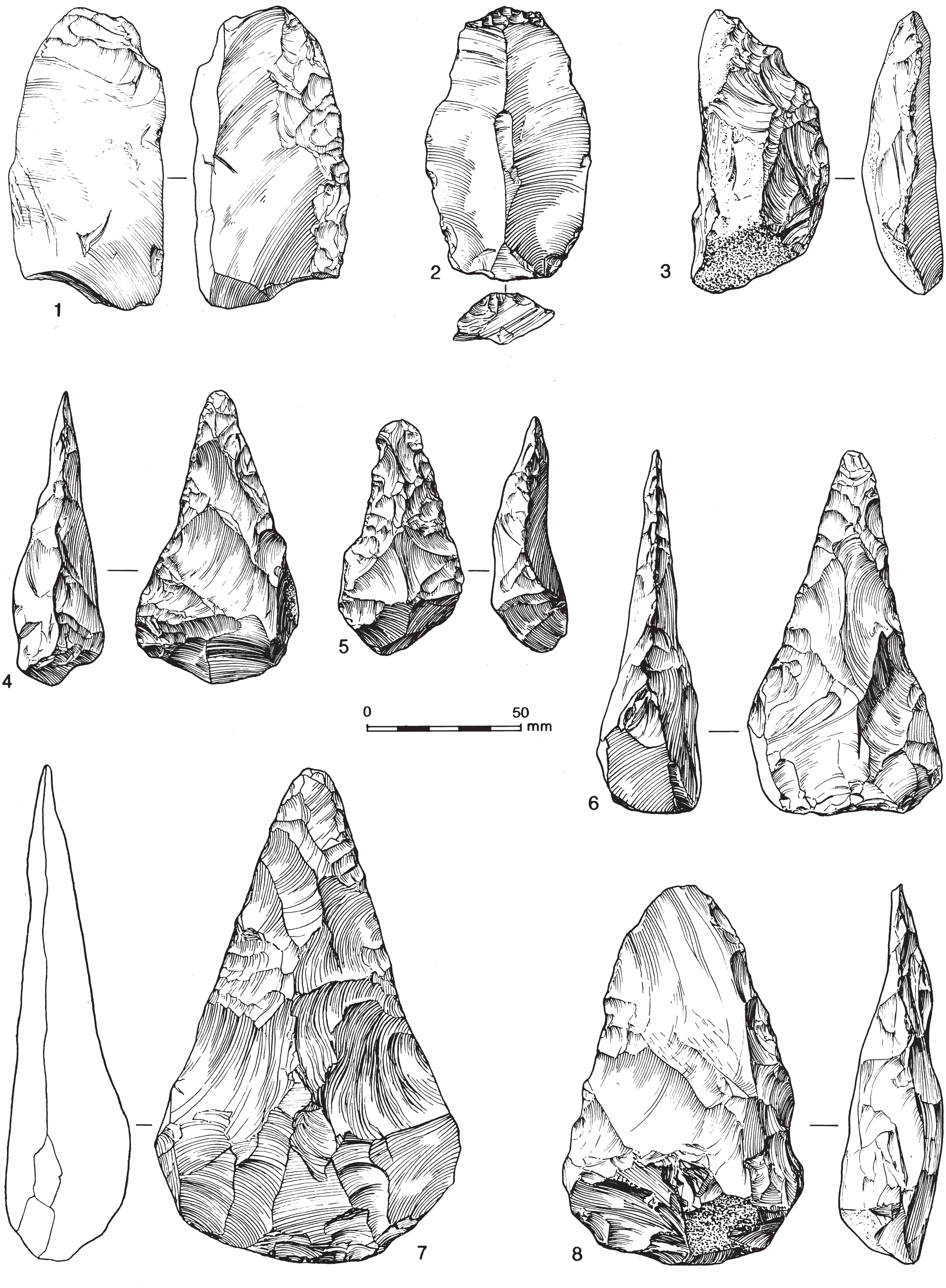
Lower Gravel yields prolific industry of cores and flakes of Mode 1 as at Clacton. Middle Gravels yield Mode 2 (Acheulian) mainly pointed hand-axes and flint debitage. Upper Loam also Mode 2 with patinated hand-axes of pointed and ovate forms, and possibly some Mode 3 (Levalloisian) artefacts.

Associated material: Three human skull fragments of same individual (Colour Pl. 14) in Upper Middle Gravel. Mammalian faunal remains at all levels: prolific in Lower Gravel, Lower Loam, and Middle Gravels. Also, some bird and fish in the Lower Loam. Molluscs prolific at various levels in Lower and Middle Gravels. Ostracods and pollen in Lower Loam.

KEY SITE

SWANSCOMBE AND GREENHITHE

Swanscombe Map 11, No. 55



KEY SITE

SWANSCOMBE AND GREENHITHE

Swanscombe Map 11, No. 55

Dating: On basis of terrace sequence, the Basal Lower Gravel is Late Anglian (OIS–12), the Lower and Middle Gravels Hoxnian Interglacial (OIS–11) with a cool period between them represented by the hiatus at the top of the Lower Loam. The sands above the Upper Middle Gravel are considered to be OIS–10 and the Upper Loam OIS–9. There is a Uranium Series date for the base of the Upper Middle Gravel of 272 Ky (Szabo and Collins 1975).

Significance: Most informative stratified sequence of sedimentary deposits and associated archaeological material in the Thames Valley. Only human remains known in Britain of the Hoxnian Interglacial (OIS–11). Type site for distinctive mammalian fauna for the British sequence. Evidence for human occupation at intervals throughout the whole interglacial.

Major references: There is a great number of reports and various publications concerning the Swanscombe site. The lists below give reference to mainly those which are more recent or relevant to this survey.

General summaries: Wymer 1968, 334–46; Roe 1981, 68–80; Conway 1996, 9–30; McNabb 1996, 31–51. *Excavations, 1912*: Smith and Dewey 1913; 1914; *Late 1920s*: Chandler 1930; 1931; 1932; *Swanscombe Committee 1938*: Ashley-Montagu 1949; *Wymers 1955–60*: Ovey 1964, 19–61. *Waechter 1968–72*: Conway, McNabb and Ashton 1996. *Archaeology post-Swanscombe Committee 1938*: Wymer 1964, 19–61; Wymer 1968, 334–51; *Waechter 1973*: Roe 1981, 68–80; Ashton and McNabb 1996, 201. *Human skull remains*: Marston 1937; Weiner and Campbell 1964, 127–201; Day 1986, 18–26.

Mammalian fauna: Sutcliffe 1964, 85–111; Schreve 1996, 149–61; Currant 1996, 163–7. *Avifauna*: Swinton 1964, 113; Parry 1996, 137–43. *Ichthyofauna*: Patterson 1964, 115; Irving 1996, 145–7. *Mollusca*: Kerney 1971; Castell 1964. *Ostracods*: Robinson 1996, 187–90. *Palynology*: Hubbard 1982, 37; 1996, 191–9; Wymer 1985, 406.

Number and locations of artefacts: Roe 1968, 183

Figure 24 (opposite) Barnfield Pit. Flint industry from the Middle Gravels. 1) flake with soft hammer edge retouch; 2) end scraper; 3) side scraper on thick flake; 4–8) hand-axes
Nos 1–3, 5, 6 are from the Lower Middle Gravels. Remainder from Upper Middle Gravel. Nos 4, 5, and 8 associated with the human skull fragments. Pointed hand-axes predominate but the majority are small and crude, as No. 5, in contrast with the very skillfully produced, elegant hand-axes such as Nos 6–8

KEY SITE

SWANSCOMBE AND GREENHITHE

Map 11, No. 59

Locality: Rickson's Pit on east side of Southfleet Road overlooking Ebbsfleet Valley.

History: Otherwise known as Rixon's or Barrack's Pit. Worked in 1930s, and occasionally in later years to about 1950. Regularly visited by Burchell and Chandler and some unpublished excavations by L.S.B. Leakey in 1934. Now partly open but overgrown and southern part a landfill site.

Archaeology: Mode 1 Clactonian Industry of flakes and cores and later industries of elegant hand-axes and Levallois cores (Fig. 25).

Context: Fluviatile deposits of Basal Orsett Heath Gravel and Swanscombe Deposits of Bridgland (1994). Bench level on Chalk or Thanet Sand same as Lower Gravel of Barnfield Pit. Section recorded by Dewey (1932) (Fig. 24), related Clactonian Industry to Lower Gravel at base, and hand-axes from just above a Shell Bed. Burchell (1934) records a similar section but with two levels of Loam, below and above his Middle Gravels. Burchell records Levallois material in the Middle Gravels and Upper Loam. Some hand-axes may have come from locally preserved land surfaces within the loams.

Associated material: Only molluscs in the Shell Bed, including *Theodoxus crenulatus* and *Corbicula flumenalis*.

Dating: Lower Gravel with Clactonian Industry correlated with Lower Gravel of Barnfield Pit. Middle Gravels and Upper and Lower Loams correlated with Upper Loam of Barnfield Pit. The Lower Gravel of Rickson's Pit is therefore thought to be OIS–12 or OIS–11 and the despots above to a later interglacial of possibly OIS–9 or OIS–7.

Significance: The sequence corroborates that of Barnfield Pit, although the Middle Gravels of the latter are missing. It confirms the appearance of Levallois technique in Stage III of the Barnfield Pit sequence as per Conway (1996).

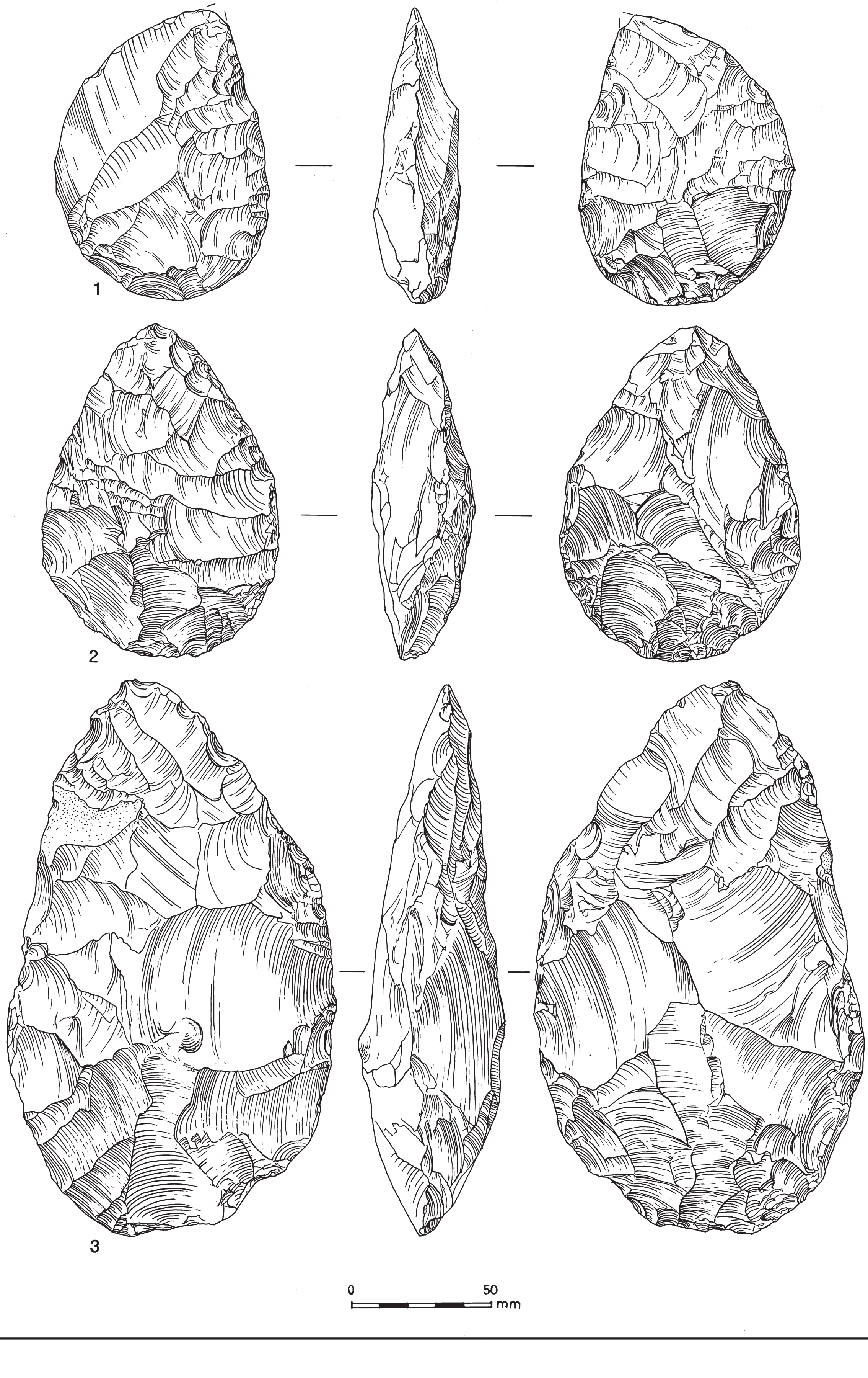
Major references: *General summary*: Dewey 1932, 44–8; Waechter 1973, 75–9; Wymer 1968, 351–3; Roe 1981, 67, 77–8; Bridgland 1994, 211–2. *Artefacts*: Waechter 1973, 77–9; Roe 1981, 70; Tester 1985, 4. *Geology*: Dewey 1932, 44–8. *Molluscs*: Dewey 1932, 45.

Numbers and locations of artefacts: Roe 1968, 184; Wymer 1968, 353.

Figure 25 (opposite) Hand-axes from the Upper Gravels at Rickson's Pit. The preferred shape was ovate. Edges were frequently sharpened by a tranchet flake, as on No. 1. As at Barnfield Pit, the flint industry in the underlying gravel deposit was of Mode 1 technology: flakes and cores with no hand-axes. The hand-axes in the upper gravels are thought to equate with similar hand-axes in the Upper Loam of Barnfield Pit. Source: Waechter 1973, fig. 8

KEY SITE

SWANSCOMBE AND GREENHITHE
Map 11, No. 59



3.3.10 Estuary of the Thames: Chadwell St Mary to Canvey

MAP 12. LOWER THAMES VALLEY: CHADWELL ST MARY–CANVEY

Apart from the prolific sites in the Orsett Heath Gravel at Chadwell St Mary, which extends the evidence for much human activity in the Thurrock–Swanscombe area immediately upstream, there in nothing except for a couple of palaeoliths at Mucking and Stanford le Hope, probably from Corbets Tey Gravel (Map 12). This is because downstream of Stanford le Hope as far as Southend nothing of the higher terraces survive, and the lower ones are submerged. However, the river is of interest for a few hand-axes have been dredged from the river bed at Tilbury and are of Mousterian type. Presumably they have come from the submerged gravels of Early or Middle Devensian age. These are noted in Section 3.3.11 and suggest that human occupation at this time may have been more dense than the scanty evidence elsewhere in this part of the valley indicates.

3.3.11 The Middle Palaeolithic in the Thames Valley

The sites shown on Map 13 and listed in the gazetteer are those which have produced artefacts of Levallois technology or distinctive forms of hand-axes known as bout coupé hand-axes, or are considered to be contemporary with deposits of the interglacial as represented at Stanton Harcourt, Crayford, and other sites as noted below. The distribution of these selected sites should conform to the movements along the valley by people during Period 3 as defined in this survey. However, there are good reasons for questioning these criteria, especially as most of the Levallois material has come from sites already shown on the general distribution maps for the Thames Valley, which represent occupation along the river in Period 2. There are other reasons for querying the dating of the appearance of the earliest Levallois technology. Also, bout coupé hand-axes are not so distinctive that they could not be confused with occasional elegant ovate hand-axes made during Periods 2 or 1. The major factor in justifying this division of lithic technology between the non-Levallois of Periods 1 and 2, and Period 3, has been that no fully-developed Levallois flintwork with well-prepared cores and flake-blades can confidently be dated to before the latter part of the cold period of (OIS–8). This immediately precedes the Stanton Harcourt interglacial (OIS–7) in which Levallois cores and flakes occur at Crayford in primary context.

Sites at Northfleet and West Thurrock can be stratigraphically related to the Late-glacial phase of OIS–8. However, Levallois artefacts and bout coupé hand-axes do occur in deposits associated with the Lynch Hill Gravel of the Middle Thames and the Corbets Tey Gravel of the Lower Thames. It could be argued that they are earlier than this date, but in the absence of any informative context there is no other option but to relate these sporadic finds to key sites where similar material occurs in a stratigraphical sequence. Concentrations of Levallois style knapping seems to have been restricted to places where there was plenty of available good quality flint, whether it was from the Chalk or off river beaches. Hand-axes still dominated in the absence of such. In spite of some reservations it is suggested that these maps do give a fair representation of the extent of human occupation in the Thames Valley during the Middle Palaeolithic period.

To start downstream, the first site from the source – Stanton Harcourt (Buckingham *et al.* 1996) – is somewhat atypical, in that it is securely dated to the OIS–7 interglacial, but has very few artefacts, with just five hand-axes, a few other pieces, and only one flake that might be classified as Levallois. It has to be emphasised that Stanton Harcourt is well upstream of the outcrop of flint-bearing Chalk. This, of course, is something which has to be taken into account when considering any of the palaeolithic flintwork in this area.

MAP 13. MIDDLE PALAEOLITHIC SITES OF THE THAMES VALLEY

As can be seen from Map 13 there is very little that can be identified as probably belonging to Period 3 around Oxford. There is a Levallois flake from the bed of the Thames at Long Wittenham and several flakes and cores from the prolific site at Berensfield near Dorchester. The Kennet can only claim one flake from the Folly Pit at Hungerford and two possible ones at Newbury. There are only isolated single finds in the Reading area, but significantly none in the Period 1 'Ancient Channel' between Caversham and Henley. There is a core from Butts Hill, Woodley, in the Lynch Hill Gravel which approaches a prismatic blade core. A slightly greater number of Levallois artefacts come from the Ruscombe–Twyford area (Fig. 26). A group of flakes from Northbury Farm at Ruscombe have also been struck from carefully prepared prismatic cores (or single platform cores). One large flake has been very elegantly retouched with a soft hammer.

There are only isolated finds of Levallois flakes and occasional bout coupé hand-axes as shown on the map until Iver is reached. Downstream from here there are

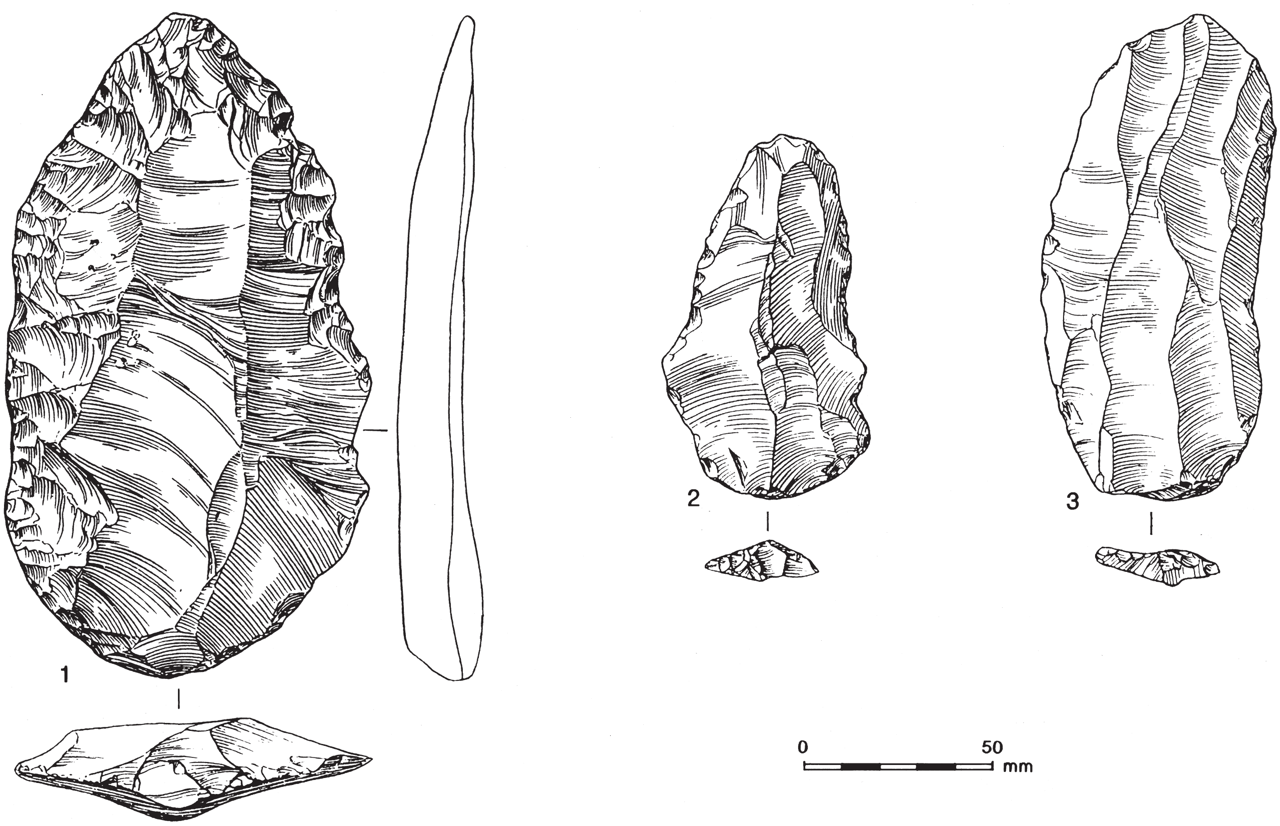


Figure 26 Levallois artefacts from Lynch Hill Gravel in the Middle Thames. 1) Sonning Cutting, finely retouched flake; 2–3) Ruscombe, Northbury Farm, flake-blades

sites with material in primary context or moved so little that they cannot have moved far. They are in very fine sediments generally referred to as brickearth. Between Iver and West Drayton, Acton, and in the Dartford area on the other side of London, there are several sites which give valuable chronological and environmental information which can relate to the much less informative scatter of derived artefacts.

Levallois flakes and cores occur in fair numbers in or under the brickearth at West Drayton and Yiewsley. From the mint condition of many of them, some must have been in primary context. Unfortunately they were all collected during the commercial working of the pits and none of the sites in this rich area has ever been excavated by archaeologists. Other, similar Levallois flakes and cores from these sites in museum collections are in stained, rolled condition and must have come from the underlying gravel. Flakes have been struck from radial and prismatic cores. The refinement of this material is surprising in view of the absence of good quality flint in the immediate vicinity.

An unusual site was recorded by Allen Brown (1889a) from Norwood Lane at Southall. The report may be a little exaggerated but he claims to have found the complete articulated skeleton of a mammoth in what would now be defined as Lynch Hill Gravel, in a bed of sandy loam between coarse sandy gravel. He figures a Levallois pointed flake-blade said to have been found, together with some others, actually in contact with the mammoth. A more prosaic version of the discovery may be the writing on a Levallois pointed flake-blade from the site in the British Museum reading 'Norwood Road, Windmill Lane, Hanwell. 13–14 ft down – near it at same levels a tusk, teeth and bones of mammoth. Ian Gosling Sept 30, 1887.'

Such pointed flake-blades as found at Southall are rare in the Levallois assemblages at Iver, West Drayton, or Yiewsley, but not so in the site at Creffield Road, Acton (Fig. 28). Some 400 artefacts were collected at a temporary pit there at the end of the 19th century (Brown 1889b). They appear to have come from two or three different levels but mainly on what Allen Brown described as a 'floor' at the base of brickearth on top of gravel. There were no faunal remains.

Other Levallois material was found in or under the brickearth in the vicinity of Creffield Road but, although attempts have been made, these archaeological levels have never been relocated. One of the two small hand-axes associated with the Creffield Road site was of bout coupé type. Pointed flake-blades are a typical component of Mousterian industries in France, but whether the parallel is sufficient to suggest that the Creffield Road site is of Devensian age is debatable.

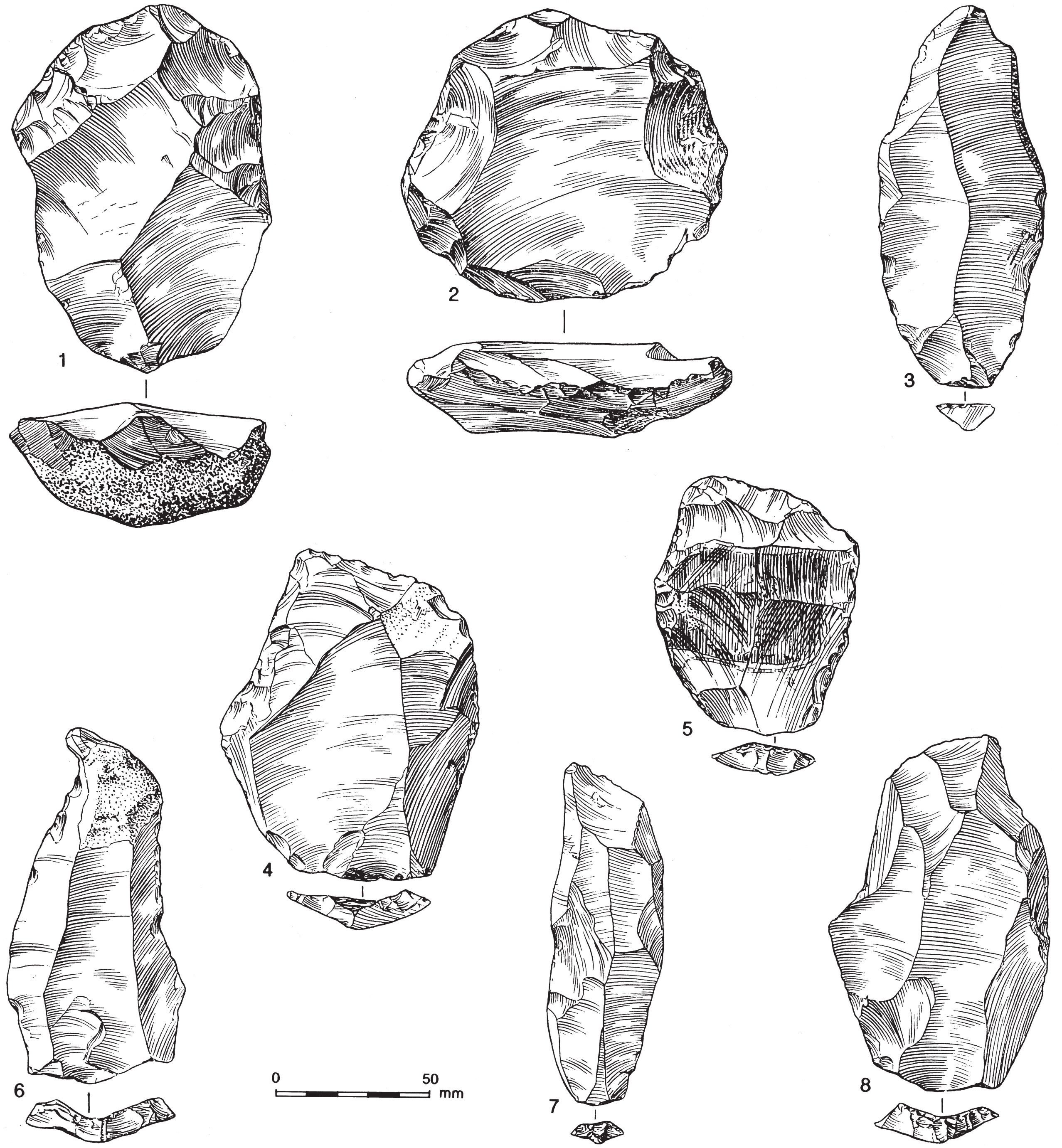


Figure 27 West Drayton and Yiewsley. Levallois industry from Lynch Hill Gravel or Langley Silt Complex. 1 and 2) radial cores (No. 1 has not had the final flake removed); 3–8) flakes and flake-blades

Only two or three Levallois flakes may have come from the rich Stoke Newington sites as observed and investigated by Worthington Smith, among what was clearly the work of people in the habit of making hand-axes.

The most important sites are in the Dartford area: three can be dated to the latter part of the cold stage of OIS–8: Crayford, Baker's Hole at Northfleet, and the Lion Pit at West Thurrock. Crayford is particularly important for the stratified succession of deposits with material in primary context and associated mammalian remains and molluscs. Crayford is really a series of sites as listed for Map 13. It is a key site for the area as the earliest occupation was certainly in primary context at Stoneham's and Rutter's pits. The so-called 'floor' in Stoneham's pit beneath brickearth on a buried land

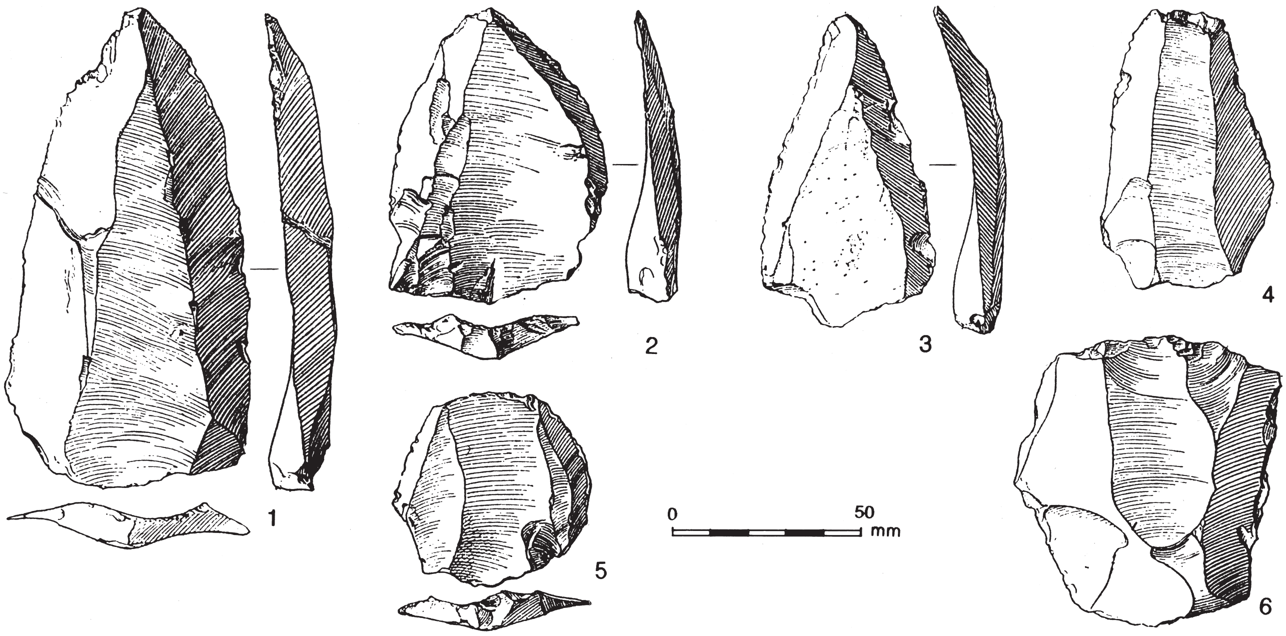


Figure 28 Acton, Creffield Road. Levallois industry from Langley Silt Complex above Lynch Hill Gravel. A very distinctive industry containing Levallois points such as 1–3. Source: Smith 1931, Sturge Collection 87

surface of gravel was meticulously excavated by F.J.C. Spurrell in the late 19th century. One flake actually lay on top of the jawbone of a woolly rhinoceros. Even more remarkable was his achievement at refitting all the flakes struck off one flint nodule, together with the prepared core which had been the object of the knapping. Unfortunately, for the knapper concerned but not archaeologists, the prepared core had broken in the final stages.

The other two sites of Baker's Hole and the Lion Pit give, respectively, the most information on Levallois technology, and valuable corroborative dating evidence. The former is the most prolific Levallois site in Britain. It is estimated that at least 100,000 flakes alone were recovered there during the working life of the Chalk quarry. This was a site where nodules of good quality flint abounded on the edges of a small coombe eroded through the Chalk, and people were grubbing them out and knapping them on the spot. Hence the use of the extravagant (as far as flint is concerned) use of Levallois methods, where much flint was sacrificed to obtain usually just one finished product (Fig. 31). This was all overwhelmed later by a chalky solifluction deposit often referred to as Coombe Rock which sludged down the slopes. Such usually occur in very cold conditions, which suggests that prior to this event the slopes may have been devoid of much vegetation that would conceal the protruding flint.

The dating of the Baker's Hole site has always been controversial, but more recent work at the West Thurrock Lion Pit has yielded what appears to be an identical style of flint knapping associated with Coombe Rock beneath a massive accumulation of estuarine sand and gravel which, on stratigraphical grounds, can be dated to OIS–7. Thus, there can be little doubt that both sites date to the latter part of the OIS–8–OIS–7 transition.

Further evidence for the wholesale exploitation of flint from the Upper Chalk in this area comes from the Botany Pit at Purfleet. This is where flint was exploited from the Upper Chalk of the local Purfleet anticline, against which the Thames was flowing. Corbets Tey Gravel was being deposited at the time when the Thames was making a great meander loop as it was barred by the high ground of the London Basin Tertiary rocks to the east and had to reverse its direction and flow round the northern edge of this localised high outcrop of Upper Chalk. At some time people were grubbing out the flint and, as at Northfleet on the other side of the Thames, were knapping it on the spot. Here, however, the flintworking technique was very different and had none of the method and refinement of that at Baker's Hole. To some extent it appears to be a form of opportunist flaking, and much of the debitage is indistinguishable from sites such as at Clacton or the Lower Gravel at Swanscombe, with hard hammer alternate flaking. It would seem that the results mainly served whatever purposes they had in mind, but in order to obtain larger or more symmetrical shapes they sometimes carefully prepared a platform off which they could strike them.

There are no discoidal cores as at Baker's Hole. This type of knapping can be referred to as Proto-Levallois. Other sites around the Purfleet anticline as listed have

KEY SITE

BEXLEY LONDON BOROUGH

Map 13, Nos 109–15

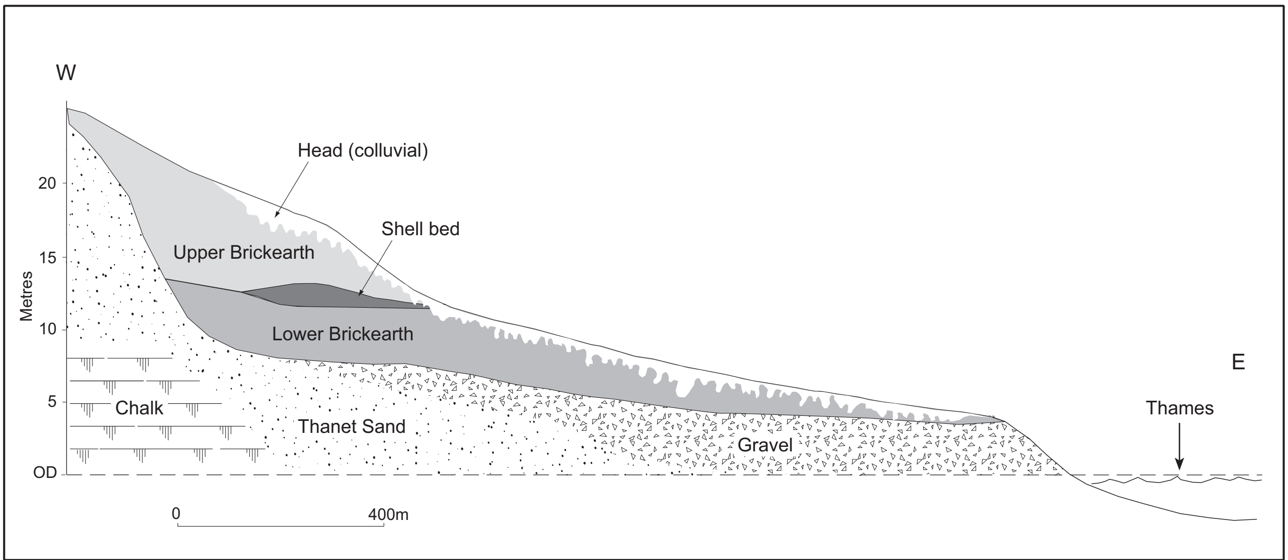


Figure 29 Diagrammatic section between Crayford and the River Thames based on Chandler (1914). Levallois artefacts including elegant flake-blades were found in the latter part of the 19th century at various pits dug for brickearth. Some, such as those from Stoneham's Pit, lay in primary context on a land surface intermingled with animal bones, some actually in contact with a woolly rhinoceros jawbone. Other material in primary context came from Rutter's Pit. Colluvial deposits overlie fluvial deposits. The sequence is complex and not yet fully understood. Part appears to equate with OIS–7. Source: Chandler 1914, Wymer 1968, 323

Localities: Various pits at Crayford, Erith, and Slades Green as listed

History: Brickearth has been removed extensively in this area since the earlier part of the 19th century. One of the earliest pits was Stoneham's and the fossil bones and shells found within the brickearth attracted much attention. The first evidence of contemporary Palaeolithic occupation was the finding of a flake by the Rev. O. Fisher, in the brickearth at about 2 m above its base.

Soon afterwards, F.J.C. Spurrell made his remarkable discovery of a 'working floor' at the base of the brickearth in Stoneham's Pit. Other palaeoliths in primary context were found by R.H. Chandler in Rutter's Pit. The area was well known at this time by A.S. Kennard and his paper in the *Proceedings of the Geologists' Association* contains a full account of what was known then. A large part of these deposits has been dug away and, because of modern develop-ments, no exposures are now visible.

Archaeology: The material that was found in primary context by Spurrell was an elegant Mode 3 Levallois industry, with distinctive flake-blades (Fig. 30) from prepared cores. His outstanding discovery, meticulously excavated, was a number of flakes which he refitted, comprising the debitage from the production of a prepared core from a large flint nodule. A flake was also found in context with the jawbone of a woolly rhinoceros. Other palaeoliths in mint condition have been found within the body of the brickearth, including a few hand-axes. Rolled hand-axes have been found in the basal gravel.

Geology: Up to 12 m of Lower Brickearth overlying fluviatile gravel is banked against a steep river cliff on the west of solid or disturbed Chalk and Thanet Sand. A grey sand rich in Mollusca separates the Lower from the Upper Brickearth. Bridgland refers to these as Lower Fluvial Deposits. They are covered by solifluction or periglacially disturbed deposits which he refers to as Colluvial Deposits (Fig. 29).

KEY SITE

BEXLEY LONDON BOROUGH

Map 13, Nos 109–15

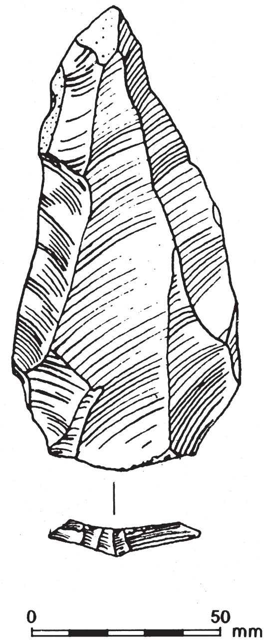


Figure 30 Levallois pointed flake-blade from Crayford. Source: Watson 1950, pl. iii

Associated material: There is a relatively rich fauna of large and small mammals in the Lower Brickearth of both temperate and cold forms. Numerous shells including *Corbicula flumenalis* occur in the grey sand overlying the Lower Brickearth.

Dating: The underlying gravel is equated with the Mucking Gravel by Gibbard and Bridgland, and the Lower Brickearth with Phase 3 of the same formation. The presence of horse and the absence of hippopotamus suggests correlation with OIS–7 and not the Ipswichian (OIS–5e). Amino-acid dating supports this.

Significance: Confirmation of a Levalloisian Industry during the latter part of OIS–8 or early OIS–7, as also seen at the Lion Pit tramway cutting at West Thurrock.

Major references: *General summary*: Kennard 1944; Wymer 1968, 322–6; Roe 1981, 86–8. *Geology*: Chandler 1914; Gibbard 1994, 69–72; Bridgland 1994, 249–50. *Archaeology*: Spurrell 1880; Chandler 1916; Wymer 1968, 324–6; Roe 1981, 86–7. *Fauna*: Kennard 1944; Stuart 1982, 127; Sutcliffe 1985, 134. *Dating*: Bowen et al. 1989.

Numbers and locations of artefacts: Roe 1968, 146.

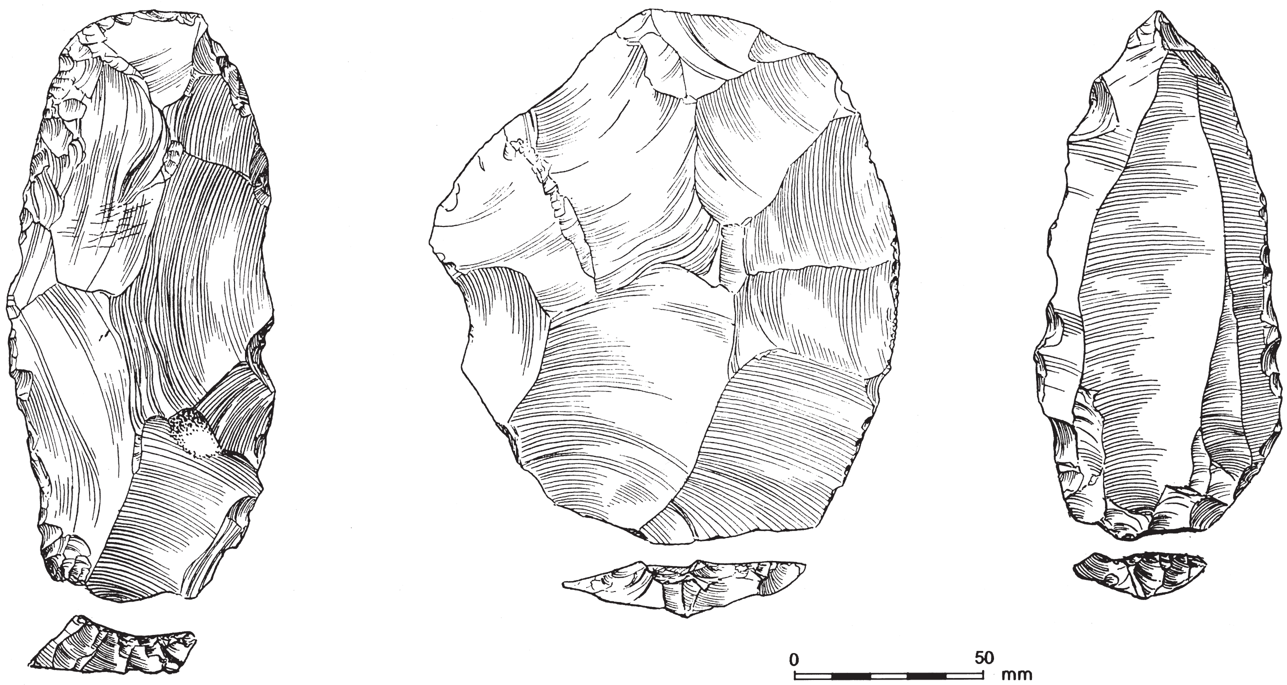


Figure 31 Northfleet, Baker's Hole. Three Levallois flakes from the most prolific site of its nature in Britain. Great quantities of cores, flakes, and debitage lay in and under a chalky head deposit (often referred to as Coombe Rock) which must have sludged down the side of the Ebbsfleet valley and overwhelmed working areas

also produced similar material but in much lesser quantities. Recent excavations in Greenlands Pit have yielded a few such flakes in a deposit stratified above an interglacial one which, from the mammalian and molluscan evidence alone is dated to OIS–9. This is key evidence for a very early date for the Middle Palaeolithic in the Thames Valley, as this higher deposit must represent the onset of cold conditions, which would equate it with an early stage of OIS–8, as opposed to the late stage of the same glaciation of the Lion Pit and Baker's Hole. This Proto-Levalloisian has not been recognised anywhere else in the Thames Valley. There is thus an impression of considerable activity in this part of the Thames Valley by people occupying the river banks. Sporadic finds and other major sites such as those at West Drayton and Yiewsley show that the valley was occupied at times with people roaming at least as far upstream as Stanton Harcourt. From the archaeological angle, it is particularly interesting to note the very considerable differences between the technologies. The classic 'tortoise core' technology of Baker's Hole and West Drayton and Yiewsley is one. Knappers at Crayford concentrated on producing remarkably elegant flake-blades which are not known in any numbers from anywhere else. The Creffield Road site has produced pointed flake-blades from carefully prepared cores for the purpose. The knappers at the Botany Pit site seem as though they knew what to do, but with so such a proliferation of raw material to play with they did not care very much if they wasted most of it!

There cannot be any argument in this instance that the technology was dictated by the quantity and quality of the natural nodules of flint in the Chalk for, around Purfleet at least, it all came from the same source, ie, a particular zone in the Upper Chalk. People who made the Proto-Levallois flakes and cores may well have been around the lower part of the Thames valley at least around 300,000 BP, but it would seem that the Middle Palaeolithic period occupation was when the climate began to ameliorate some 50,000 years later. These people could obviously adapt to very cold conditions, but whether there was any occupation at all during the full glacial climate of OIS–8 is unknown. It is unlikely the actual ice sheet over the country was any nearer than the Midlands so summer forays along the valley and elsewhere could have been possible.

3.3.12 Valley of the Wey

The major southern tributaries of the Middle Thames are the Blackwater–Loddon–Whitewater, Wey, Mole, and Wandle. All have a long history of river captures and diversions and most of the present courses have little resemblance to those of the Middle Pleistocene, or even the Late Pleistocene. Mention has already been made in the section on Reading to Henley of the complex river diversions in that area, and there are very different interpretations of them (see Gibbard 1979; 1982; 1985; Clarke and Dixon 1981). Great spreads of High level gravels in the north Surrey–south Berkshire

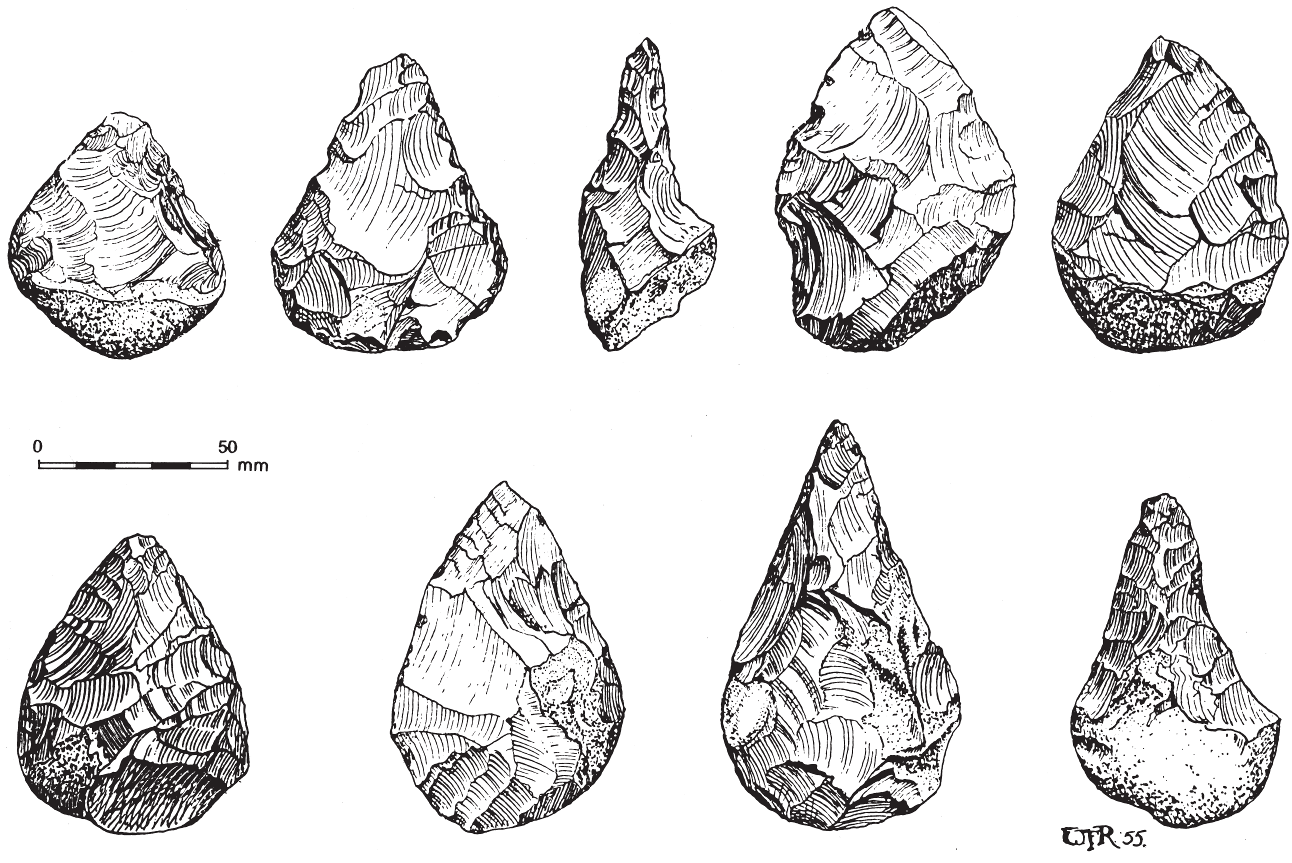


Figure 32 Farnham. Hand-axes from gravels of Terraces A and B. Source: Rankine 1956, 2

area relate to these Early and Late Anglian times, such as around Easthampstead, Camberley, and Crowthorne. By Late Anglian times the Wey–Blackwater river, north of the Chalk escarpment, was flowing towards Windsor. No palaeoliths can be definitely associated with them but whether this indicates that, with all the geological disturbances and erosion, the valleys were unoccupied or the evidence has been washed away and dispersed so much it has not been found, cannot be known. What is more definite is that Gibbard (1979) confirmed that the Thames never flowed through the Finchley Depression prior to the advance of the Anglian ice, as considered by Wooldridge and Linton (1955). During the Early Anglian it was the Wey and Mole which joined near Weybridge and flowed through it. This is important for Gibbard would see the gravel on top of St George's Hill at Weybridge as belonging to this stage. A few palaeoliths have been found in this gravel so, if they are really contemporary with its deposition then it is some evidence for human occupation during Period 1.

Further to the east, the River Wandle appears to have had a similar complex history of diversions when it was cut off from its headwaters in the Weald, reworking much of its deposits and producing wide spreads of terrace gravel around Croydon and Mitcham. A few hand-axes have come from what is identified as Boyn Hill Gravel in the Croydon area, but the Mitcham gravels are, in part at least, very much more recent (Peake 1982; Peake and Osborne 1971). South of the Chalk escarpment the Mole gravels have only produced three hand-axes from two sites. It is only in the Wey Valley at Farnham that there is plenty of evidence for the occupation of this part of the valley throughout different times in the Pleistocene. At Farnham there is one of the best preserved flights of river terraces in southern England outside of the Thames Valley, with great numbers of palaeoliths in the gravel of all but the lowest of them. Figure 14, above, gives a simplified cross-section across the Wey Valley at Farnham. The terraces are generally referred to by the letters A to E, A being the highest. They were first described in detail by Oakley (1939) and this remains the best and most informative paper on the subject. Further finds and records since this time, such as the discoveries and observations of W.F. Rankine (1947; 1956) have supported Oakley's conclusions.

The highest Terrace, A, is at the general level of the Alice Holt Plateau. This is a much dissected but extensive feature of gravel aggradations representing wide floodplains that are thought to constitute remnants of braided channels of this course of the Wey when it was receiving large quantities of rock waste off the Hampshire Downs and the Weald. It probably spans most of the long Anglian Stage but may also go back much earlier. The channels which are cut into this Alice Holt Plateau at Farnham, such as the Boundstone Channel, are very rich in palaeoliths (Fig. 32). They presumably date to Period 2 occupation, but some rolled hand-axes in the gravel of Terrace A itself could belong to Period 1 (Map 14). Terrace B has also produced large numbers of hand-axes and flake tools. A few in Terrace C may be of Period 3. Organic deposits within Terrace D have been radiocarbon dated to around 36,000 BP and it was not until after this in the Late Devensian that the Wey was 'captured' by the minor Tilford River. This must have been a catastrophic event as the downcutting has left a steep cliff 16 m high on the south side of the river at Farnham. This diverted the river to its present course through the Wey Gap at Guildford (Worssam 1973). A few rolled Levallois flakes and small cordate hand-axes in Terrace D give support to occupation here in Period 3.

MAPS 14 and 15. RIVERS WEY, BLACKWATER, AND LODDON: FARNHAM–WOKINGHAM

On the basis of terrace stratigraphy it seems that people were considerably active in this Farnham area at times during each of the three broad divisions of the Palaeolithic used here, ie, Periods 1–3. Yet, as stated above, very little other lithic evidence has been found to show a human presence in the southern tributaries of the Thames. As can seen from Map 15 there is a small group of four hand-axes from Wokingham from what is apparently Lynch Hill and Boyn Hill Gravel, possibly a deposit of the Blackwater but mapped as Plateau Gravel by Gibbard (1979, 371). Yet, at least the Wey–Blackwater valley should have provided a corridor into the Thames around Reading or Twyford. The presence of fairly numerous surface finds of palaeoliths on the North Downs in the Kingswood, Banstead, and Walton-on-the-Hill areas (Chapter 6) may be giving a more accurate representation of the intensity of occupation in the area.

3.3.13 Valley of the River Kennet

This section is concerned with the Kennet Valley as it appears today, in the sense of an easterly flowing stream rising in Wiltshire near the famous prehistoric site of Avebury. It has eroded through Chalk and as far as Hungerford abuts against a steep slope, at times a veritable cliff, on its right bank. There is a much gentler slope on the north side. There are spreads of gravel rather than distinct terrace features. Below Hungerford, low terrace features have been identified, also at Newbury. This valley is a minor descendant of the river which produced the great sheets of gravel at higher levels. These all date to the Late Anglian Stage and much earlier and, as noted in the section on the earliest human occupation of the area, the more recent of those gravels contain palaeoliths. They constitute what Wooldridge and Linton (1955, 62) refer to as the Thames–Kennet, for they represent a precursor of the present Kennet which flowed through what is now the Pang Gap where it must have been confluent with the Thames. By the time of OIS–11 it was still flowing through the Pang Gap but no longer such a major river. However, it has since then cut a very impressive, wide, steep-sided gorge between Woolhampton and Theale. It is this Period 2 occupation of the river that is the concern of this section, during the Later Middle Pleistocene from OIS–11 to OIS–8.

As can be seen from Maps 16 and 17, only 14 localities can be recorded as Palaeolithic find-spots between Marlborough and Brimpton. These are mainly individual discoveries of hand-axes. Only Enborne Gate Farm Pit at Newbury (No. 8) and Hill's Pit at Thatcham (No. 13) have produced five hand-axes apiece. There is enough to indicate some human presence or activity during unspecified time or times during the vast period involved, but this paucity is surprising when the very prolific site of Knowle Farm at Little Bedwyn, with over 2000 hand-axes, is in Head Deposits within a nearby side valley. There was also occupation during the Late Anglian at Hamstead Marshall, and even Palaeolithic discards on the downs around Avebury. There is no reason to think that the valley or its surroundings would not have been a favoured place as other chalk streams in southern England. Probably it was, but the evidence may have become obscured for two reasons: lack of chance for palaeoliths to be discovered (eg, few gravel exposures, few people purposely looking for them) and extensive solifluction during cold periods with frequent, repeated reworkings of terrace deposits (thus, total dispersal of any concentrations of artefacts within them).

It is possible, but not very likely, that much more material has been found than is known. For instance, the first palaeoliths recorded in the valley were those found by J.W. Brooke around Hungerford in the 19th century (Summers 1926) but nothing is known of them except that he found 'palaeoliths' in the plural at each site. Crawford (1920, 87) published a hand-axe from the pit at Brimpton (No. 14) which is important as the small patch of gravel at Brimpton is about the only remnant of what may be the equivalent of Boyn Hill Gravel of the Thames. Local people found the palaeoliths at Enborne Gate Farm in the 1930s and others with archaeological interests, such as D.B. Connah, F.R. Froom, and the Sheridans began to visit in the 1950s some of the old find-spots or the few working pits. It took several years for R. Sheridan to accumulate five hand-axes from Hill's Pit, so there is nothing to indicate that much has been lost.

There is little to gain in either dating or environmental evidence from these Kennet sites. E.P. Richards (1897) was the first person to draw attention to two terrace levels at Newbury, 6 m and 12 m above the floodplain, Upstream these two levels tend to merge together and Richards thought that the two terrace features were merely imposed on one thick aggradation of gravel. This may well be, but it is possibly significant that all the Newbury discoveries, sparse as they are, come from the higher terrace (Terrace 2). A terrace deposit lower down the valley at Brimpton of similar height above the floodplain (8 m) was investigated by Bryant *et al.* (1983) in what they term 'Thatcham Terrace 1'.

The first detailed mapping of the Kennet terraces was made by M.F. Thomas (1961), although Sealy and Sealy (1956) mapped the terraces west of Reading as far as Theale; they identified seven levels on the basis of longitudinal profiles, which they correlated with terraces of the Middle Thames. This is a very useful study, especially for the evolution of the drainage pattern in the Reading area, but it has not gained general acceptance. The latest scheme is that put forward by Chartres *et al.* (1976). They postulate:

- High Terrace Remnants, *c.* 52 m above the present river.
- The Hamstead Marshall Terrace at *c.* 47 m above the river.
- The Kintbury Terrace at 12–15 m above the river.
- The Thatcham Terrace at *c.* 10 m above the river.
- The Beenham Grange Terrace at *c.* 2–3 m above the river.

It will be observed from the maps that the Kennet is shown passing through what is now the Pang Gap, from Theale to Pangbourne. Professor H.L. Hawkins of the University of Reading did much useful work on the local Quaternary features and demonstrated (Hawkins 1926; 1943) that the river was diverted from this course through the Pang Gap comparatively recently, probably during the last glacial stage (ie, Devensian). He postulated this was by river capture, allowing the river to pass through the narrow Coley Gap in Reading to join the Thames where it does now to the east of the town. This is beyond the time period being considered here but it is possible that there were other similar diversions from the Pang Gap at earlier periods in the lower Middle Pleistocene. The Lynch Hill Terrace on the west side of Reading, along the Bath Road, is separated from the Thames by the high ground of Prospect Park. As already noted in the section on the Middle Thames in the Reading area Thomas (1961, 435) suggests that the gravels underlying that terrace (Fig. 17) were deposited by a former course of the Loddon which joined the Kennet at Theale.

Gibbard (1994, 133) also concludes that these deposits were not of the Thames but from the Kennet, diverted from the Pang Gap in Lynch Hill times, flowing into the Thames also east of the town. With so many uncertainties it is obviously difficult to re-construct the palaeogeography in this area.

MAPS 16 and 17. THE KENNET VALLEY: MARLBOROUGH–THEALE

This section gives the locations of palaeoliths from gravel deposits which could be related to the Kintbury and Thatcham Terraces but, on present knowledge, it would be unwise to accept that any useful chrono-logical information can be gained from them. Little can be stated regarding the Palaeolithic archaeology of the Kennet Valley after the Late Anglian Stage, other than some people were there at some time. As already stated, during the later Middle Pleistocene, there is no reason why this valley, except during the very cold glacial stages, was very different from other river valleys in southern England which were suitable for human occupation. The broad, flat areas of old gravels to the south of the valley (ie, Silchester Stage Gravels) would have provided well-drained semi-open country, probably looking much as the present heaths in the district do today. The present dry valleys would, of course, where they existed at all, be much less extensive, but where they had eroded through the gravel, Tertiary clays and sands would be exposed, producing ideal habitats for small game. On the north side of the valley, easily accessible, would have been a varied landscape of clays and sands with gravel plateaux and areas of Chalk downland, especially in the upper part of the valley. As will be seen in Chapter 6 there is some evidence for human activity in these parts.

The maps shows the approximate position of the course of the River Kennet during the Middle Pleistocene between OIS–11 and OIS–8 (423,000–245,000 BP). Find-spots of palaeoliths are listed as numbered on the maps. Remnants of terrace deposit are coloured red. Some of these terrace deposits probably belong to this period, but many have seemingly been reworked during later ones.

3.3.14 Valley of the Colne

The present River Colne with its tributary, the Ver, flows off the Chilterns to join the Thames Valley around Uxbridge. It has no long history and no such drainage system existed here on the southern dip-slope of the

London Basin during Period 1. There is nothing to suggest there was any human occupation of the area prior to or in the later part of the Anglian Stage glaciation. Ice and pro-glacial lakes covered the ground and, if people had been there before this and left their flinty evidence, such has been washed away. This was the time of the maximum advance of the ice sheet with its catastrophic diversion of the Thames from its course through the Vale of St Albans (Gibbard 1983; 1985). It was the meltwaters of the ice sheet which initiated this valley and transformed the local landscape into something resembling its present form.

MAP 18. COLNE VALLEY: ST ALBANS–DENHAM

As can be seen from Map 18, a scatter of sites, mainly yielding just a single hand-axe are sparsely distributed up the valley. Most come from surface or unknown contexts other than Glacial Gravel. Whatever terrace gravels may have existed during Period 2 have, for the most part, been eroded away so it is impossible to know whether this was a favoured valley or not, yet three sites exist which do suggest it may have been. Two are close together west of Watford, where the Colne is joined by the Chess and the Gade: at Long Valley Wood, Croxley Green, and Mill End, Rickmansworth. Both have yielded some hundreds of hand-axes, flakes, and cores. Simple and refined technology is mixed together (Wymer 1968, 246–9; Roe 1981, 154, 189). Excavations were conducted by R.A. Smith of the British Museum and H. Dewey of the Geological Survey in 1914 (Smith and Dewey 1915). They found numerous artefacts at the Croxley Green pit but, oddly, only a few flakes at Mill End. At Long Valley Wood several of the hand-axes were found among or under a deposit of large boulders resting on Chalk.

Smith and Dewey considered the jumbled and distorted gravel to be glacial out-wash affected by periglacial agencies, but it is possible that such disturbance was the later result of large masses of included Chalk (Gibbard 1985, 51) being decalcified. Bridgland (1994, 51) maps this terrace as Winter Hill, but this seems very unlikely. There has clearly been much reworking of the terrace deposits all down the Colne Valley, and it is not possible to give any date to these two prolific sites. In fact, Mill End has a surface height of 12 m above the river, and Long Valley Wood is considerably higher at 20 m, so the sites are not necessarily the same age. However, a Period 2 date is almost certain and it does mean there were people around. There are surface sites on the Chilterns not far away which could relate to them.

The only other site in the valley where more than two or three hand-axes and some flakes and cores have been found is at Normer Hill, Denham, discovered when a road cutting was made in 1928 (Marsden 1929, 131–5). They came from gravel or clay mapped by the BGS as Glacial Gravel, but by Bridgland (1994, 84) also as Winter Hill. Some of the artefacts were in mint condition. The deposit is at 68 m OD on the interfluve between the Misbourne and the Colne. Not far from here on the same interfluve, Gibbard (1985, 26–8) discovered organic deposits in what has been interpreted as a large solution hollow or basin. Pollen analysis indicates a late Hoxnian date. These organic clay muds were in a dry valley. Unfortunately, no artefacts were associated with them. It was a very important stratigraphical marker as he concluded that these Hoxnian deposits were earlier than at least part of the Boyn Hill Gravel of the Thames.

3.4 Wealden Rivers

3.4.1 Summary

This section surveys the evidence for human occupation during all periods of the Palaeolithic within a large area of Kent and south-east Essex, as demonstrated by the discoveries in river gravels. As will be seen, without reference to other Chapters, especially Chapters 6 and 7, a false impression of being a very poorly-favoured area would be given. This is because in Kent at least there are many more prolific sites contained in or under Head Deposits or on the present surface of the downs or plateaux.

All the rivers to be considered, except perhaps the Cray, had their origins in the High Weald, before the Pleistocene and long before there was any human occupation anywhere in Europe, as far as we know at present. It was also a time when, until the earlier part of the Middle Pleistocene, the Thames was still flowing up the Vale of St Albans. The Darent probably joined it far to the north of its present confluence at Dartford; the Medway and Stour found their own way to what is now the North Sea. The Medway flowed north-east across what is now the Thames Estuary and has left in East Essex a fine series of terraces that pre-date the catastrophic diversion of the Thames by the Anglian ice (Bridgland 1988, 1994). Within one of these terrace deposits at Wivenhoe, considered to be of Late Cromerian Stage (OIS–13), two possible flakes were found in an organic deposit (Bridgland 1994, 316) which, if unequivocally of human workmanship, show that people were in Essex during Period 1.

When the Thames had been diverted by the Anglian ice into its present valley system, the Darent was truncated (Fig. 33). However, it seems very likely that the Thames had flowed into a pre-existing tributary channel of the Medway, so the two major rivers became confluent in the Southend region, becoming a combined Thames–Medway River which flowed across the most eastern part of Essex, joining the Blackwater near Mersea (Fig. 33 E, F). The Lower Gravel beneath the channel deposits at Clacton has been correlated with the basal part of the Lower Gravel at the famous Swanscombe site which, in turn, is equated with the Black Park Gravel of the Middle Thames dated to the Late Anglian. This is strong evidence for people with a Clactonian Mode 1 technology active here, and probably elsewhere, in Period 1 as defined in this survey.

There is nothing in the Cray Valley which can be dated. The only two sites at Bexley producing three hand-axes and a single one between them, are in floodplain alluvium and probably derived. In any case, the River Cray is not a true Wealden river and may not have existed until the Late Pleistocene. There is also nothing in the Derwent Valley south of Wilmington, which is a relatively prolific site but in Head Deposits. This may be partly due to the generally poor preservation of terrace deposits in Chalk gaps. The same is true of the Medway, in its magnificent cutting through the Chalk from Aylesford to Rochester, and in the Stour from where it enters the Chalk at Wye until near Canterbury.

The only prolific sites along the Medway are at Aylesford and nearby New Hythe, both just south of the river's entrance into its great cutting through the Chalk escarpment. The rich site of Cuxton is not included here as it is partly a Head Deposit. Several hundred hand-axes and other artefacts have been found in these various pits. The Aylesford pits are at 15 m OD and mapped by BGS as Terrace 2, the New Hythe Lane Pit as on Terrace 3. This seems very low to correlate with the terraces on the Hoo Peninsula (see Bridgland 1996 for a discussion of this problem).

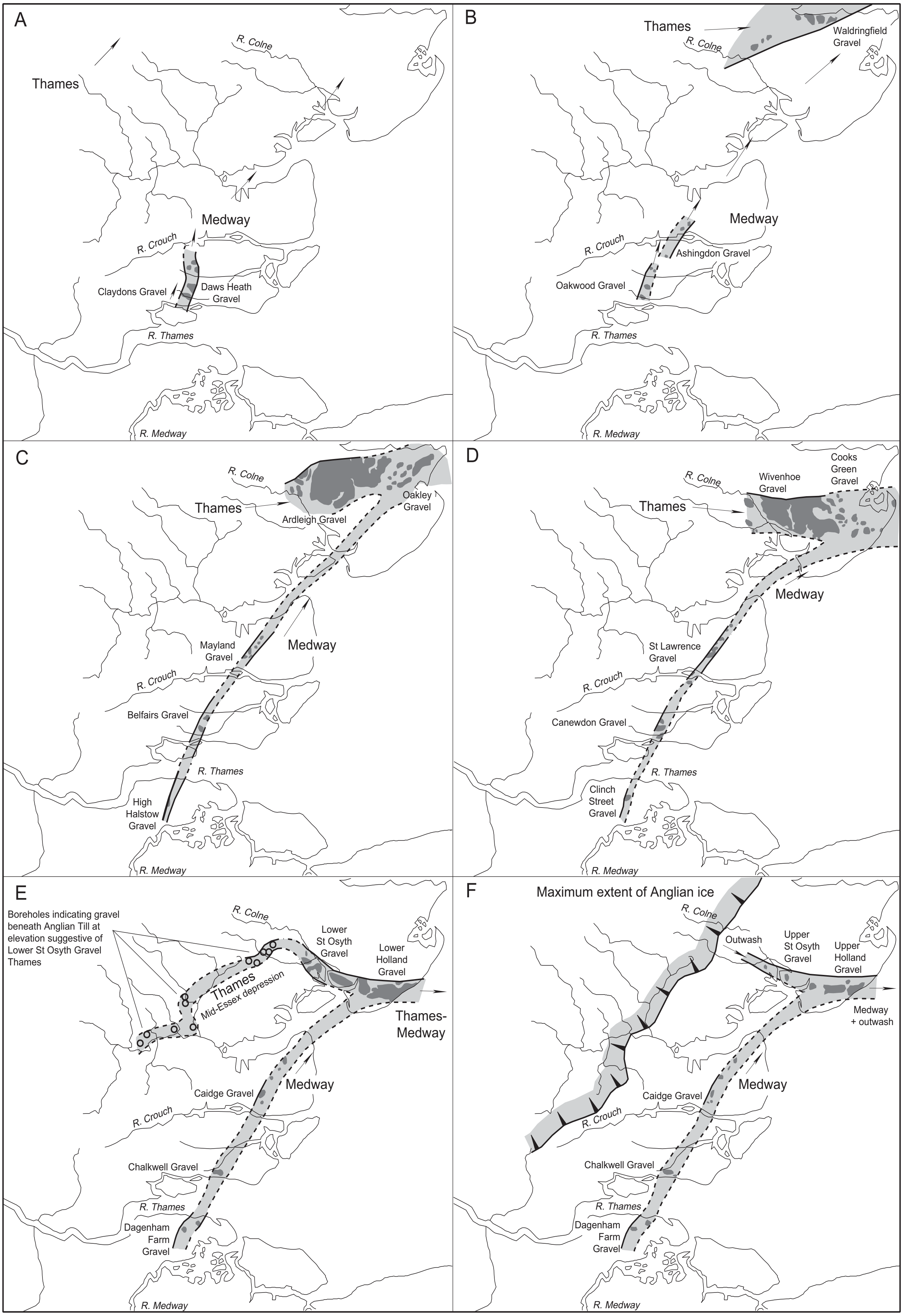
Furthermore, Dr Paul Ashbee has recently assessed the evidence for the later prehistoric discoveries made during the 19th century in Wagon's Aylesford Pit (Ashbee 1997) and noted several discrepancies and ambiguities surrounding their discoveries. He has also expressed doubts (pers. comm.) on the authenticity of the provenance of the Aylesford hand-axes at this large pit, and that they may have been imported by workmen for sale from another pit (?New Hythe). It seems that there are no reports of the finding of such palaeoliths there which could not be contested, so the problem of so many palaeoliths in such a low terrace gravel may not really exist. Tyldesley (1987, 66) identifies an ovate hand-axe from the New Hythe Lane Pit as a bout coupé but its precise context is unknown. However, two bout coupé hand-axes from Chubb's Ballast Pit at Snodland (Map 19, No. 6) were found in gravel brought to the site for screening. This gravel had apparently come from dredgings of the buried channel of the Medway near Rochester (Tyldesley 1987, 62; Carreck, pers. comm.) and this could well indicate human activity along the valley during the later part of Period 3.

The only secure dating evidence comes from the investigations conducted at the Shakespeare Farm Pit at St Mary's Hoo (Bridgland and Harding 1985). The gravel there has a surface height of 33 m OD and is equated with the Southchurch Gravel on the Essex side which, in turn, is correlated with the Orsett Heath Gravel of the Lower Thames Valley. This is considered to relate to OIS–12/OIS–10. Two hand-axes, a core, and four flakes were found during these investigations, some *in situ* in the gravel. This could well indicate a similar date for most of the isolated finds of palaeoliths at these levels in the area, ie, during Period 2.

The paucity of sites on the Hoo Peninsula may reflect the unattractive nature of the claylands, although older spreads of gravel might have compensated. Similarly, on the Dengie Peninsula, but the Chalk and sandy plateaux to the south were certainly occupied quite extensively at times to judge from the surface evidence.

Both of the two major Wealden rivers, the Medway and the Stour, have a similar pattern, being consequent rivers running down the dip-slope of the uplifted Wealden dome and later developing subsequent tributaries along the strike of softer rocks. Hence the Medway, south of the Chalk, has the Eden on its west side, and the Beult on its right. Only the lowest terraces are preserved along both of them and palaeoliths are virtually absent. Similarly, the Great Stour before it enters the Chalk gap at Wye has the subsequents of the East Stour and the West Stour. Again, very few terrace deposits survive in these upper reaches and the only hand-axes recorded are two from Ashford with vague, general provenances.

Terrace deposits are better preserved in the Stour Gap than the Medway Gap, but nothing is known of palaeoliths in the lower part of its valley other than one from the surface at Chilham. However, once through the gap there is prolific evidence for Palaeolithic occupation during Period 2, at Canterbury, Sturry, Fordwich, and Westbere. However, there is a particular problem here and throughout much of this area of north-east Kent that Head Deposits are not only spread over much of the high ground and in dry valleys, but cover river terrace gravels. Hence, the BGS maps, which are obviously restricted to showing the outcrops of Quaternary deposits, have Head Brickearth masking much of the gravels underlying it. Map 20 of the Stour sites has excluded the Brickearth as shown on the published 1:50,000 BGS sheets for this area and given


A
Thames
R. Colne
Medway
R. Crouch
Claydons Gravel
Daws Heath Gravel
R. Thames
R. Medway
B
Thames
R. Colne
Waldringfield Gravel
Medway
R. Crouch
Ashingdon Gravel
Oakwood Gravel
R. Thames
R. Medway
C
R. Colne
Thames
Ardleigh Gravel
Oakley Gravel
Mayland Gravel
Medway
R. Crouch
Belfairs Gravel
R. Thames
High Halstow Gravel
R. Medway
D
R. Colne
Wivenhoe Gravel
Cooks Green Gravel
Thames
Medway
St Lawrence Gravel
R. Crouch
Canewdon Gravel
R. Thames
Clinch Street Gravel
R. Medway
E
Boreholes indicating gravel beneath Anglian Till at elevation suggestive of Lower St Osyth Gravel Thames
R. Colne
Lower St Osyth Gravel
Lower Holland Gravel
Thames
Mid-Essex depression
Thames-Medway
Medway
Caidge Gravel
R. Crouch
Chalkwell Gravel
R. Thames
Dagenham Farm Gravel
R. Medway
F
Maximum extent of Anglian ice
R. Colne
Outwash
Upper St Osyth Gravel
Upper Holland Gravel
Medway + outwash
Medway
Caidge Gravel
R. Crouch
Chalkwell Gravel
R. Thames
Dagenham Farm Gravel
R. Medway

the estimated extent of River Terraces 1–4 based on what is known from records, published sections, and some personal observations.

This is particularly relevant to the great spreads of Head Brickearth or Head Gravel on the high ground between Canterbury and the coast, known as the Blean. The geologist, Henry Dewey, who worked with Reginald Smith of the British Museum on the Sturry sites, recognised a series of levels at *c.*15 m intervals across this plateau of the Blean and considered they represented the original course of the River Stour (Dewey 1925). Others disagreed, so Alice Coleman (1952; 1954) made a thorough survey of the area and she identified ten separate levels forming 'a staircase thirteen miles wide, indicative of a persistent easterly migration' of the River Stour. This seemed conclusive until further detailed study was made of the whole area by the BGS, culminating in the publication of the BGS Faversham *Memoir*. It was concluded that 'most of the erosion of the Blean was accomplished mainly by solifluction and meltwaters under periglacial conditions' (Holmes 1981, 4). It further pointed out that the three terraces of the Stour gravels and its buried channel are confined to its present valley, and that the river appears to have established its present course at an early date.

The Palaeolithic importance of this matter is that a particularly rich site is exposed on top of the cliffs between Herne Bay and Reculver, with hand-axes and flakes apparently falling on to the beach from fluviatile gravel, which is beneath deposits mapped as Head Brickearth. Whatever the explanation, it demonstrates occupation of this part of Kent, presumably during Period 2. Then, of course, the coastline would have been much further to the north. Coastal erosion is very active at the present day. There have been several estimates of the rate of erosion and Holmes (l981, 102–3) considers most of them are greatly exaggerated and that at present it is no more than about a metre a year. He suggests that the Roman coastline would have been no less than 1.5 km from the present one. This rate can hardly be extrapolated back into the Middle Pleistocene but it is a forceful reminder of the great geographical changes that must have occurred around the coast of Britain where softer Tertiary rocks outcrop against the sea.

The Blean itself has not produced any evidence for occupation during the Palaeolithic, but on the other side of the Stour Gap, on what are now the North Downs, there is considerable surface evidence for it. As for the land to the east, so much has been eroded away that it is impossible to assess the ancient landscape, let alone whether it was ever occupied. However, it would be unusual if it had not been.

There is nothing in the valley of the Stour that can definitely be dated to Period 1. The only site that has been a contender for such a date is that of Fordwich, on the basis of the number of crude hand-axes found in the terrace gravel which is on a higher terrace than those of the nearby Sturry sites on the other side of the valley, but this cannot be substantiated. However, there is considerable evidence in the Canterbury area for occupation along the Stour in Period 3. This can only be assessed on the basis of archaeological typology, ie, the presence of Levallois flakes and cores or bout coupé hand-axes, all of which have been found there.

3.4.2 The River Medway: Maidstone to St Mary Hoo

Apart from the pits at Aylesford (but see above), Cuxton, and possibly those at New Hythe, there are no prolific Palaeolithic sites along the Medway or its tributaries. This gives a misleading aspect to what may have been a much occupied area at times, mainly in Period 2, for several rich sites are known along the lower part of valley, such as at Cuxton, Frindsbury, and Twydall. These are shown on Map 19, but are partly in Head Deposits and thus included in Chapter 6.

Figure 33 (opposite) Palaeodrainage of eastern Essex up to the Anglian glaciation (after Bridgland 1988)

A) Palaeodrainage at the time of deposition by the Medway of the Claydons and Daws Heath Gravels, part of the Rayleigh Hills Gravels. The Thames and Medway are thought to have had separate routes to the North Sea at this time.

B) Palaeodrainage at the time of the deposition by the Medway of the Oakwood and Ashington Gravels. The Waldrington Gravel, which might be a correlate of the Ashington gravel, is also shown. It is believed that the Thames and Medway joined during Waldrington Gravel times, but this confluence is believed to have been situated to the east of the present coastline.

C) Palaeodrainage at the time of deposition by the Thames of the Ardleigh Gravel.

D) Palaeodrainage at the time of deposition by the Thames of the Wivenhoe Gravel.

E) Palaeodrainage during the early Anglian Stage prior to the inundation of the Thames Valley by the Lowestoft Till ice sheet

F) Palaeodrainage during the Anglian glaciation, prior to the diversion of the Thames but after its valley became blocked by ice. The highly distinctive St Osyth and Upper Holland Gravels were laid down at this time.

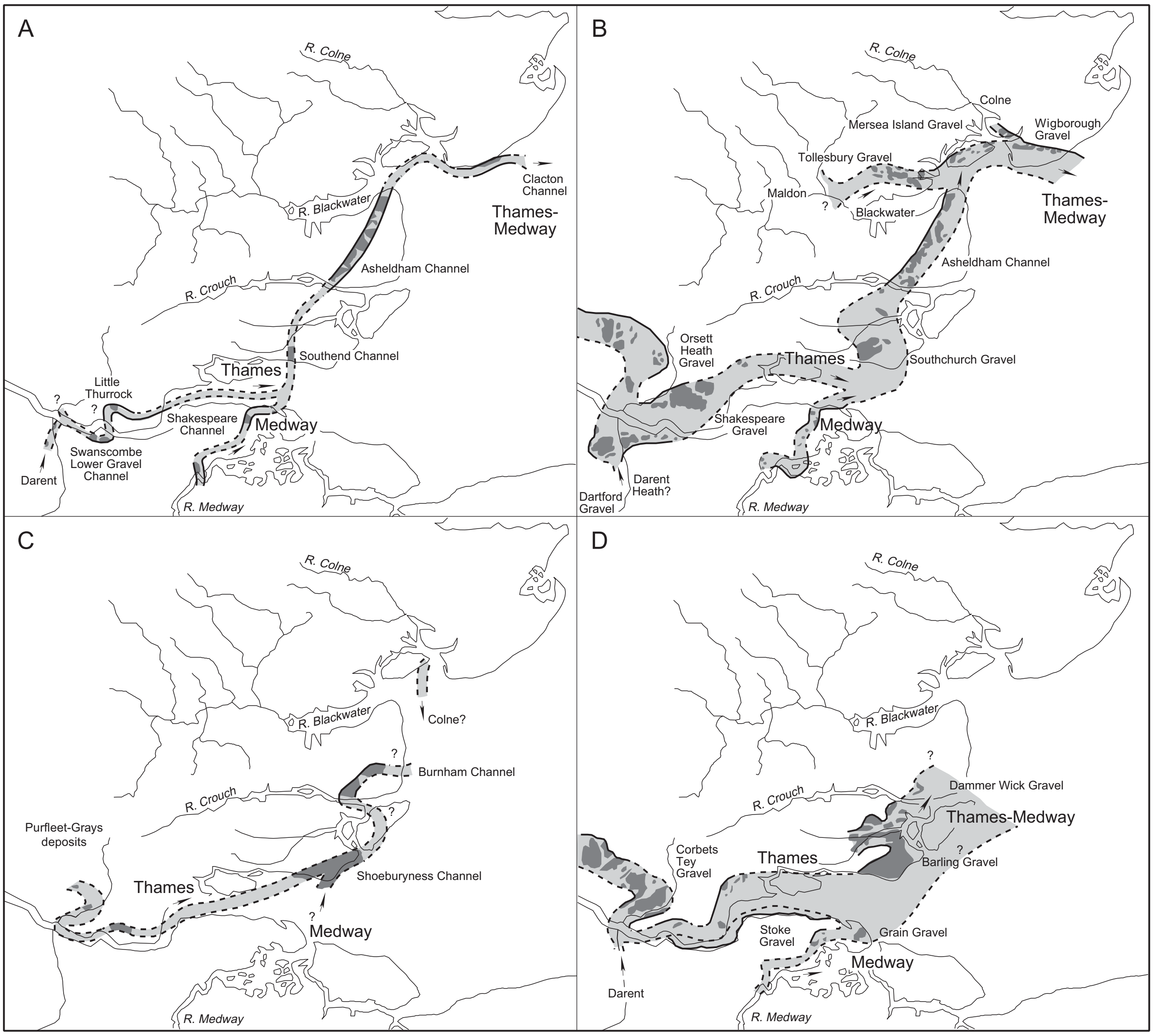


Figure 34 Series of Palaeogeographical maps of the lower reaches of the Thames, after Bridgland (1994) but modified to incorporate the findings of Roe (1995) and to depict the interglacial high sea level phases.

A) Swanscombe/Southend/Asheldham/Clacton Channel (estuarine at downstream end). Infill during OIS–11.
B) Orsett Heath/Southchurch/Asheldham/Mersea Island/Wigborough Gravel. Aggradation ceased during OIS–10.
C) Purfleet–Grays deposits/Shoeburyness/Burnham Channel. Infill during OIS–9, partly estuarine.
D) Corbets Tey/Barling/Dammer Wick Gravel. Aggradation ceased during OIS–8.

Likewise, the great number of surface sites on the plateaux above the valley are included in Chapter 6. It is surprising that more has not been found in the terrace deposits, but this may be more a matter of the degree of commercial exploitation than their non-existence.

The Aylesford sites are published as coming from gravel of Terrace 2, except for Bryce's Pit which is Terrace 1, but there are only three hand-axes known from the latter and are probably derived from the former. An impressive number of hand-axes has been recorded from Aylesford, but most of them with only a general provenance (see note on p. 91). However, 42 hand-axes are said to have come from Halls Aggregate Pit and others from the pits listed on Map 19, all from Terrace 2. The inclusion of a few Levallois artefacts in those with only a general provenance should perhaps be discounted. Perhaps not surprisingly, there are no other records of palaeoliths from Terrace 2 anywhere else in the valley, except for one hand-axe at Allhallows.

Terrace 1 has yielded a few hand-axes at Marden (TQ 761474 (E) and also (G)) from gravels in a branch

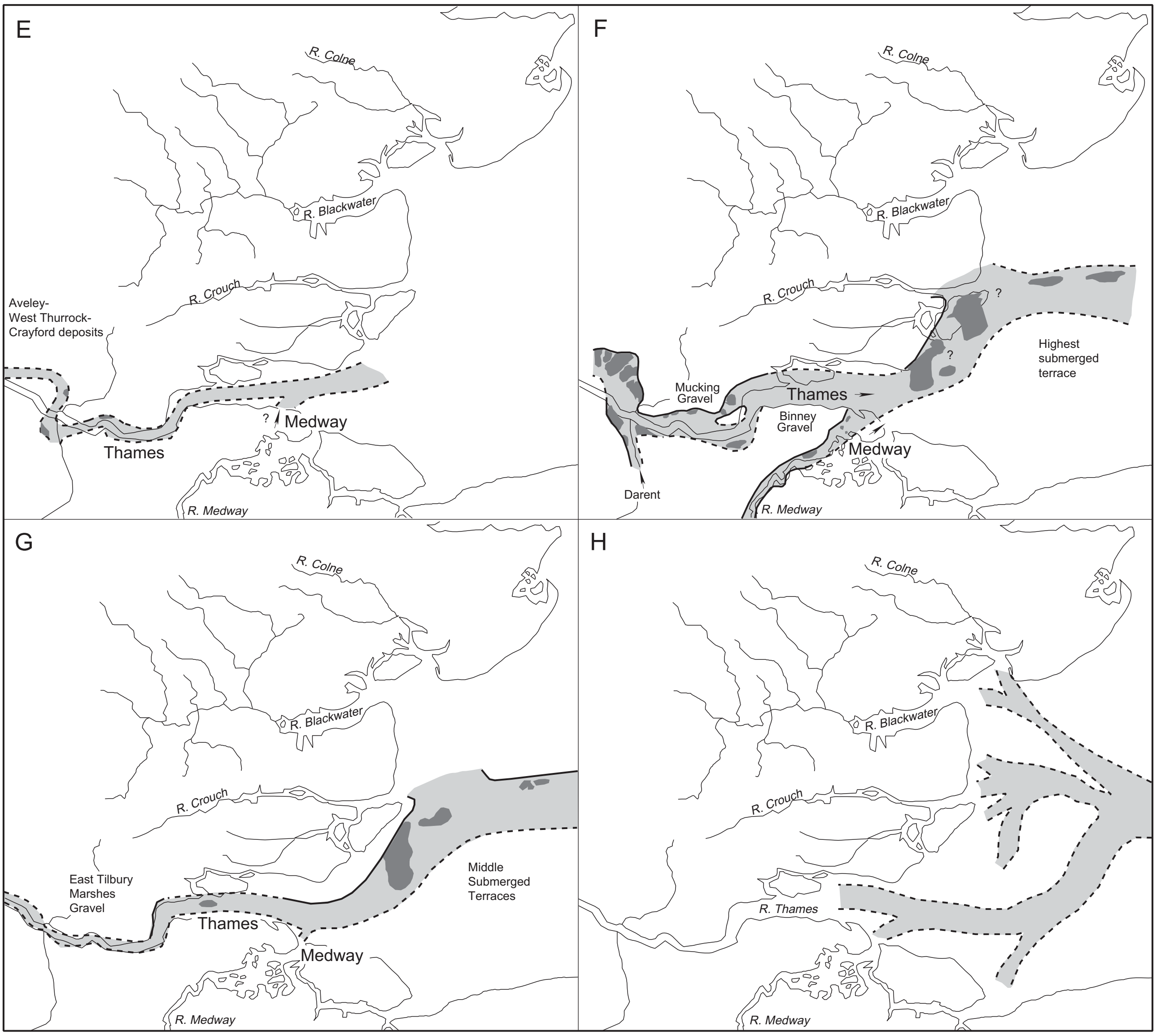


Figure 34 (continued)

E) Aveley–West Thurrock–Crayford deposits. Include estuarine sediments dated to OIS–7.
F) Mucking Gravel. Aggradation ceased during OIS–6.
G) East Tilbury Marshes Gravel. Aggradation ceased during Devensian Stage (OIS–4 to OIS–2).
H) Buried valley (offshore continuation only). this is a continuation of the buried channel beneath the modern floodplain. Late Devensian (OIS–2)

of the River Teise. Nothing else is known from any of the other tributaries of the Medway, including the Beult. In a sand pit at Boxley, on the edge of Terrace 1, some 20 hand-axes, numerous flakes, and a Levallois flake have been recorded. There are two isolated finds of hand-axes from small remnants of Terrace 4 at East Peckham, Goose Farm (TQ 647511 (A)) and Hale Park Wood at Nettlestead (TQ 677508 (E)) (Kelly 1968, 296).

Just north-west outside of Maidstone gravel was dug in pits at New Hythe in Terrace 3 gravel. A large number of palaeoliths were found: more than a hundred hand-axes and numerous flakes (Hinton and Kennard 1905). There were also 42 Levallois flakes and 5 Levallois cores. Although Terrace 3 is not an unexpected context for palaeoliths, the large number of Levallois artefacts is puzzling. It may be relevant that Tyldesley (1987, 63, 67) records two bout coupé hand-axes from Snodland, considered to have been dredged from the bed of the Medway and another from the New Hythe pits. The latter have not been dug for many years, but floodplain gravel is extensively worked at

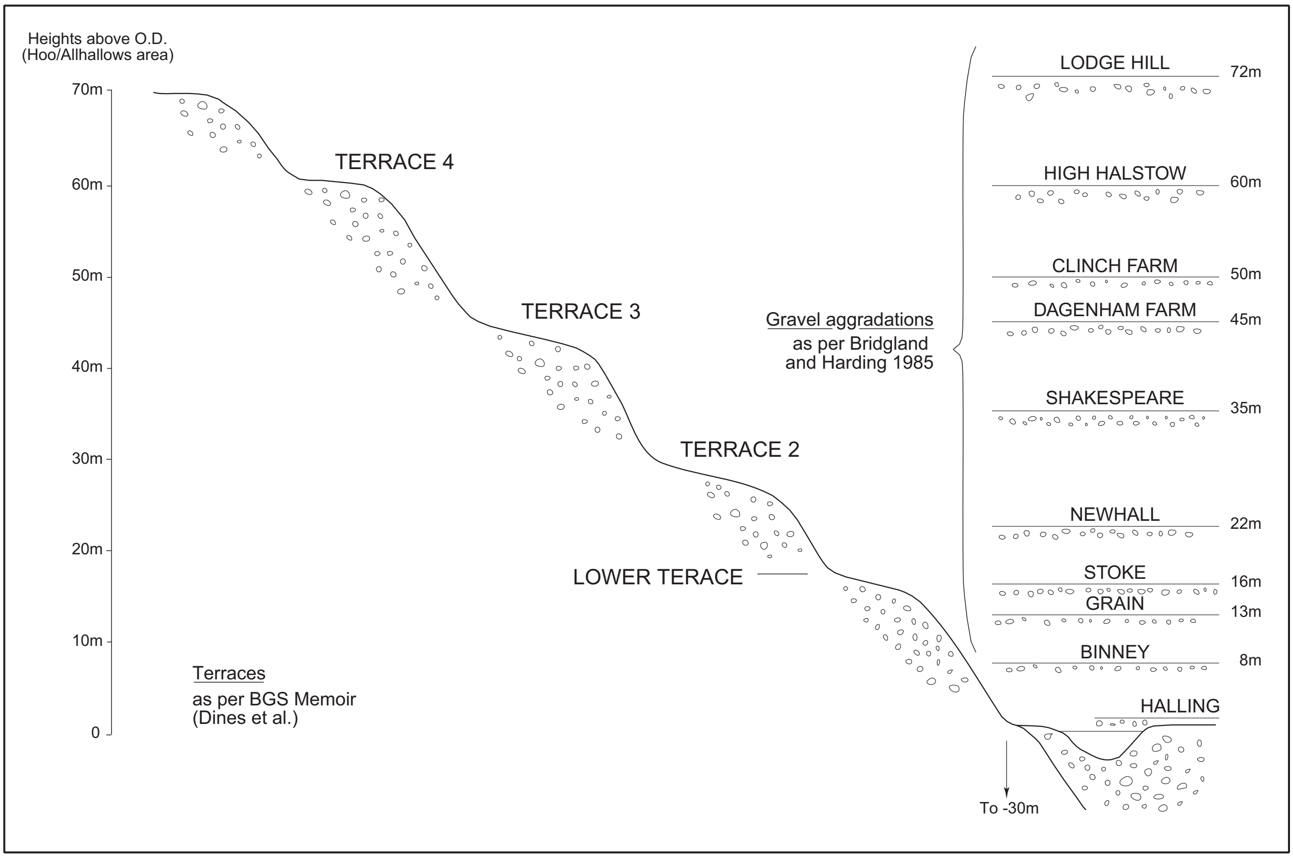


Figure 35 Medway/Hoo Terraces and Gravels, as per Bridgland and Harding (1985) and Dines et al. *(1954). Palaeoliths have been found* in situ *within the Shakespeare Gravel which can be traced downstream across the present Thames estuary to eastern Essex*

Snodland. The records for the material from the New Hythe pits, as already noted, has to be accepted with caution in view of gravel from other pits having been screened there.

MAP 19. RIVER MEDWAY: MAIDSTONE–ST MARY HOO

It is difficult to interpret the evidence from the river deposits of the Medway, except for concluding that the palaeoliths amply demonstrate occupation along the lower part of the present valley during Periods 2 and 3. There is nothing to indicate the same for Period 1.

Beyond Chatham, the present Medway diverts eastwards from the original north-east direction of the river. It can be seen from the map that large remnants of Terrace 2, 3, and 4 are preserved from High Halstow to Allhallows-on-Sea, showing the gradual southward shift of the river. At St Mary Hoo is the only Palaeolithic site that has been investigated methodically. This is the Shakespeare Pit and the work was conducted as part of a general survey of the Medway terrace stratigraphy by Bridgland (1994). A test section was cut at this pit, mapped as Terrace 3 (Dines *et al.* 1954; Fig. 35) and a rolled, pointed hand-axe was found *in situ* (Bridgland and Harding 1985; Fig. 36). Another hand-axe had also been found previously in the pit, and a couple of flakes and a core during the investigation. Bridgland refers to the deposit of this terrace as Shakespeare Gravel, at 35 m OD, in his terminology for the gravels of the Hoo Peninsula. Bridgland (1994, 294) equates the cutting of the Shakespeare Channel with the Late Anglian Stage, after the Thames had been diverted from its original course and that the aggradation of the gravel within it took place during OIS–10. Furthermore, the Shakespeare Gravel is correlated with the Southend/ Asheldham Gravel and thus relates the Medway to the Thames sequence which, at this time in the Lower Thames was equivalent to the Orsett Heath Gravel.

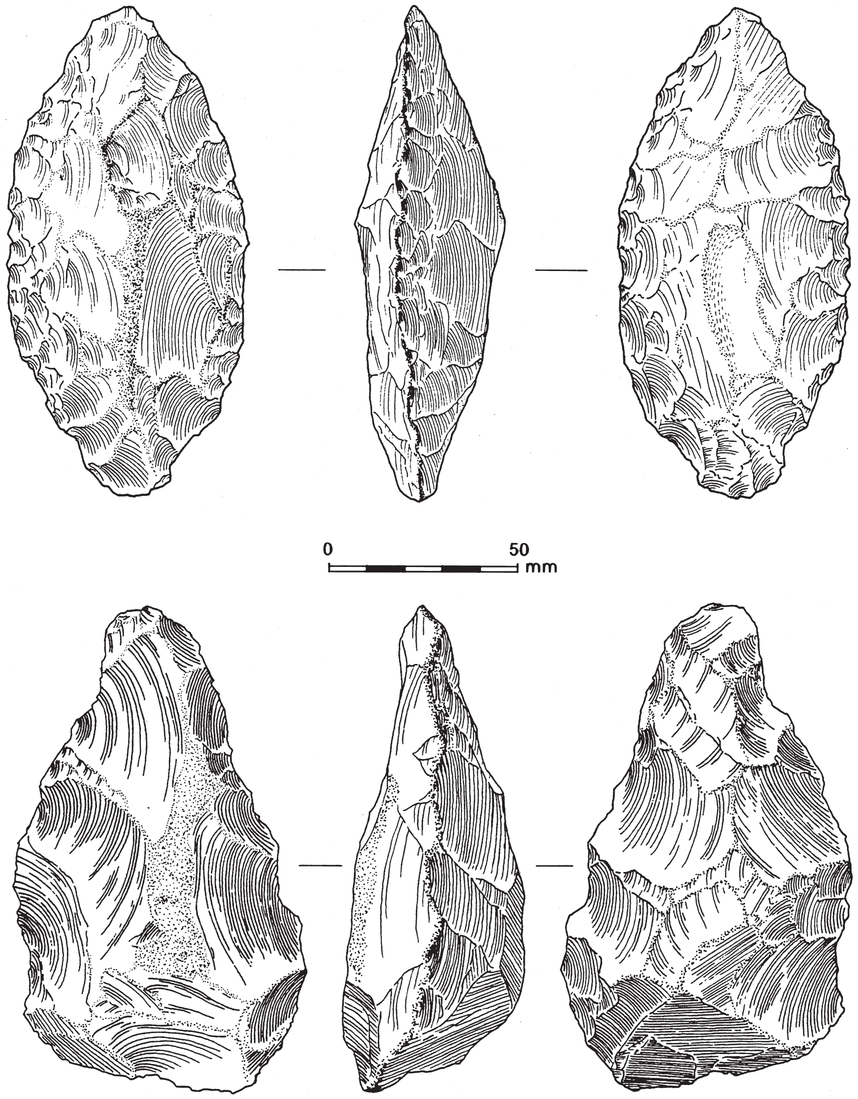


Figure 36 Hand-axes from the Medway gravels at Shakespeare Farm Pit on the Hoo peninsula. Source: Bridgland and Harding 1985, 48

3.4.3 The Evolution of the Thames and Medway in Eastern Essex Before and After the Anglian Glaciation

Southend-on-Sea and the Dengie Peninsula

As can be seen on Figure 34, the diverted Thames joined the Medway at Southend some time in the Late Anglian Stage, and the combined rivers flowed across south-east Essex towards Mersea and Clacton during the following interglacial from about 428,000 BP. It has to be visualised that at this time the coastline would have been considerably far east east of its present position and has long since eroded away. Some idea of the landscape can be formed by the submerged courses of the major rivers draining towards former coastlines, as shown on Figure 34, H (see Bridgland *et al.* 1993 for correlations between submerged offshore continuations of the Thames–Medway and Thames terrace deposits). It can only be guessed as to what occupation there may have been on this lost land, but possibly very little as the bed-rock was London Clay, as it is now in the whole of the area of this part of Essex. It is an assumption of this survey that ill-drained claylands would not have attracted early Palaeolithic groups, except perhaps along river valleys or on surviving terrace gravel land surfaces adjacent to the river.

Bridgland (1994, 327–8) has divided the complex sequence of terrace gravel deposits into Low-level and High-level East Essex Subgroups (Fig. 37).

The Low-level Subgroup is attributed to the combined Thames–Medway drainage, whereas the High-level Subgroup pertains to the River Medway when it was not confluent with the Thames until much further north on the Tendring Plateau. This would have been prior to the Thames having been diverted by the Anglian ice. Thus, the Low-level Subgroup is not found much to the north of the Dengie Peninsula. The sequence of events from the time of the Anglian Stage

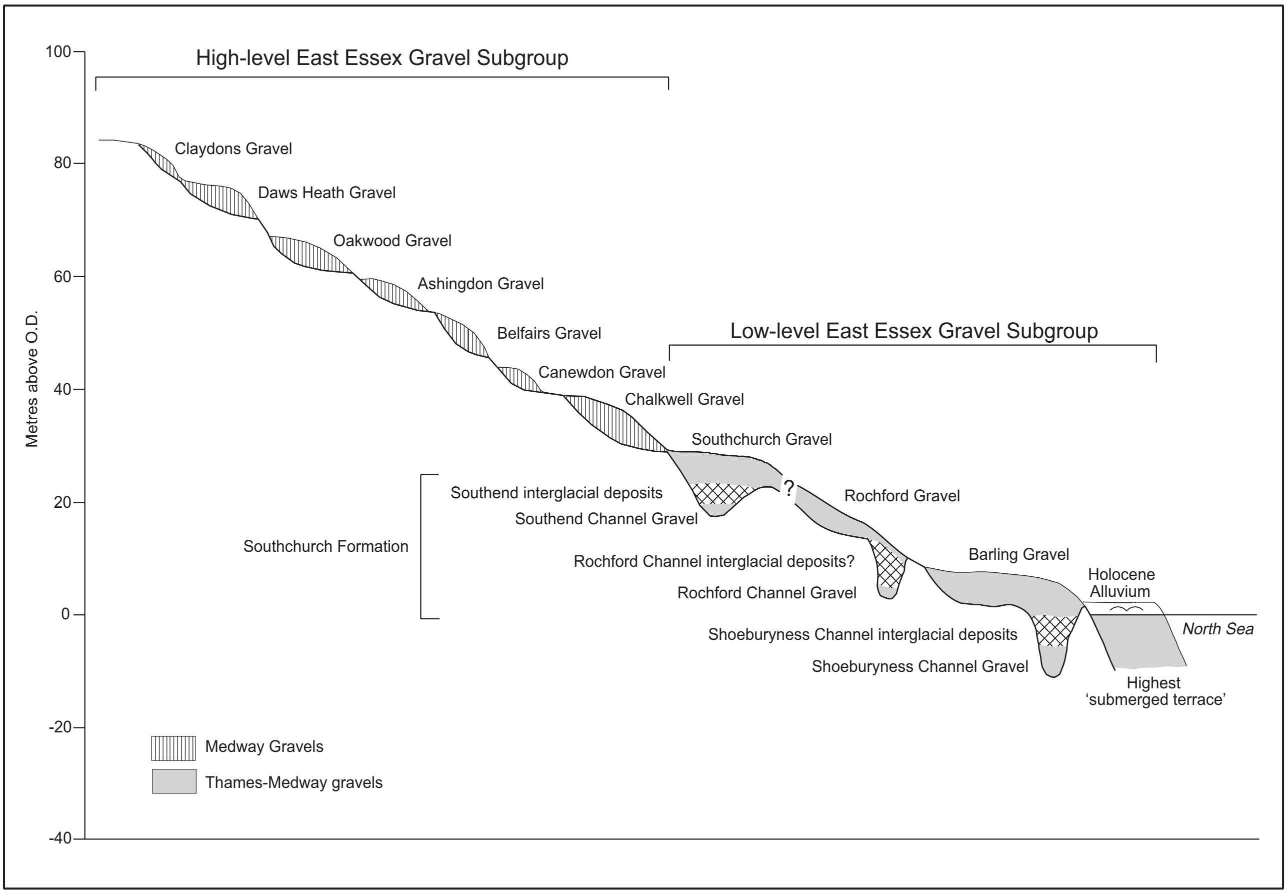


Figure 37 Idealised transverse section through the gravels of the Southend area. Source: Bridgland 1994, 328

to the present day as published by Bridgland is shown in Figures 33 and 34.

There are no prolific Palaeolithic sites known in the area of Southend and the Dengie Peninsula, but enough to show that there was human activity there at some times during Period 2 and possibly Period 3. Period 2 is best represented by the hand-axes from Baldwins Farm Gravel Pit at Barling Magna (TQ 936893 (A)). This is the only site which is known to have yielded more than one or very small number of hand-axes, and the only one which has been investigated methodically (Grühn *et al.* 1974, 62–3; MacLeod 1971, 4–8; Buckley 1977, 60–9). 11 hand-axes are recorded from here, one being found *in situ* at a depth of –3 m OD. This is the Barling Gravel of Bridgland's terminology, and the hand-axes have come from the same gravel at Shoebury (Thorpe Dene Gardens TQ 927850 (A)) and at Shoeburyness (in a sand pit at TQ 940845 (A)) and three others from a general provenance.

Of particular interest are a few hand-axes that have been found in the Southchurch/Asheldham Gravels at Southend (Prittlewell, near church and Roots Hall Gravel Pit (TQ 874868 (A)) and Sweyne Avenue (TQ 875862 (A)) for this gravel represents the earliest deposit after the confluence of the Thames and Medway at the very end of the Anglian Stage or beginning of the ensuing interglacial. Terrace 3 of Lake *et al.* at Southminster and Burnham-on-Crouch probably equates with this same gravel. At Southminster, in the Goldsands Road Gravel Pit, two broken hand-axes were found *in situ* when a test section was cut in 1983 (Bridgland 1994, 361). Hand-axes have been recorded from Creeksea Place Grounds (TQ 935961 (A)) and north-west of Burnham-on-Crouch (TQ 945972 (E)).

There is nothing to indicate any occupation during Period 1 and the only suggestion of any human presence during Period 3, however likely it may have been, is one Levallois flake and a hand-axe from Martins Gravel Pit at Stambridge (TQ 898918 (A); Pollitt 1953, 50), a couple of hand-axes from the same parish but with only a general provenance, and another from Broomhills at Rochford (TQ 890904 (E); Pollitt 1935, 40).

These sites are all in Terrace 1 and probably date to the Devensian Stage. A hand-axe from the Star Lane brickworks at Great Wakering was found in or under brickearth and possibly relates to the underlying Barling Gravel rather than the brickearth which is also probably Late Pleistocene.

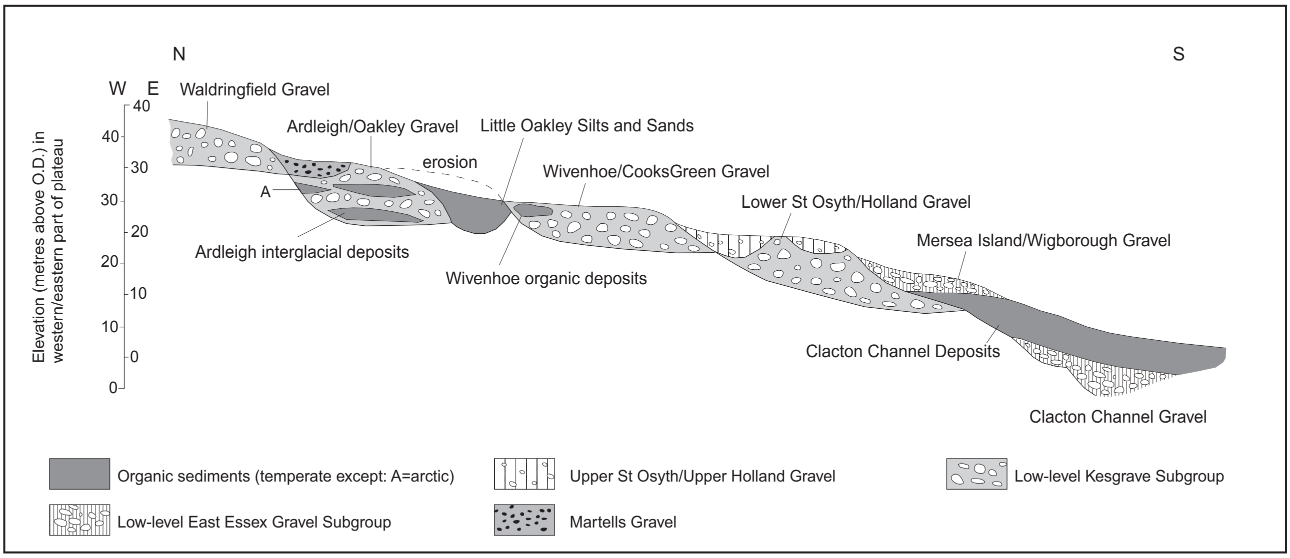


Figure 38 Idealised north–south transverse section through the Pleistocene deposits of the Tendring Plateau. Source: Bridgland 1994, 287)

The Tendring Plateau

As can be seen from Figures 33 and 34 (Bridgland 1988; 1994), prior to the advent of the Anglian ice the Medway was confluent with the ancestral Thames when it flowed across East Anglia. This was before its diversion by the Anglian ice. The actual confluence was probably east of the present coastline and estuary of the Blackwater. Bridgland's published diagram of the terrace sequence is also reproduced here (Fig. 38) and has considerable relevance to the Palaeolithic sites of the Tendring Plateau, especially Clacton.

There is a hand-axe from Ardleigh that may have been found in the Ardleigh Gravel (Hillhouse Farm (TM 034286 (A)), and possibly two others although they only have a general provenance. If they really have come from this Ardleigh Gravel and be shown to be contemporary with its deposition, then they would date to some time in the Cromerian Complex. It would be unwise to accept this for occupation at a very early date in Period 1, but in another organic, temperate deposit actually within the Wivenhoe Gravel, two possible flakes were found in a secure context. Again, this is not convincing evidence for Period 1 occupation in the Cromerian Stage before the Thames was diverted.

There are a few palaeoliths from Glacial Sands and Gravels at Colchester, and also in the valley of the Holland Brook, at Daking's Pit, Weeley (TM 154233 (A)).This site was investigated in 1970 and yielded several flakes and a some cores (Wymer 1985, 261–3). At least six hand-axes had been found there previously. This is the Cook's Green Gravel of Bridgland and hand-axes have also been found in it at Fingringhoe Nature Reserve (TM 049195 (A)), and at Marsh Farm, Brightlingsea (TM 097176 (E)).

A hand-axe was found *in situ* by Bridgland (1994, 364–8) when making a test section through Glacial Sand and Gravel on Till in the old railway cutting at Maldon. Thus, there is a little more evidence for some occupation during Period 1 in this part of Essex (but see note below).

A few other palaeoliths have been recovered from the surface, which may or may not have been derived from underlying gravel deposits. There are three hand-axes from Bradley Hall Farm at Thorpe-le-Soken (TM 167232 (A)) found when ploughing over Glacial Sand and Gravel. Another hand-axe was found on the valley side of the Holland Brook at Little Clacton (TM 181209 (A)) where the underlying gravel is mapped as Cooks Green Gravel. One also comes from the surface of the Ardleigh Gravel at Elmstead (TM 072248 (E))

Bridgland's interpretations put the Clacton Channel Gravel and Channel Deposits into the Late and Post-Anglian sequence, by which time the Thames had been diverted and joined the Medway around Southend. The Cudmore Grove Channel at West Mersea (TM 068146 (A)) is now considered to be an interglacial channel of the Colne of OIS–9 (Roe 1995). Significantly, it has yielded five flakes and at least one hand-axe (Bridgland 1994, 355).

The most important sites in this ancient Thames–Medway system are those of Clacton (Map 20). Since the middle of the 19th century, large mammalian remains had been collected on the foreshore, obviously derived from the erosion of the deposits of a channel exposed in the low cliffs, subsequently being referred to as the 'Elephant Bed'. At the end of the century, Palaeolithic flakes were being found in association with them, initiating a long history of collecting and study, with controlled excavations on sites to the west and beyond the actual 'Clacton Channel' by Oakley and Leakey (1937) and the University of Chicago (Singer *et al.* 1973). Previous pollen analyses of the channel deposits by Pike and Godwin (1953; Turner and Kerney 1971), boreholes, watching briefs on a large

KEY SITE

CLACTON-ON-SEA

Map 20, Nos 1–6

Locality: various sites between the Pier and Jaywick Sands.

History: Mammalian remains, especially of elephants, had been collected and recorded from the foreshore at Clacton since the middle of the 19th century, but it was not until the 1890s that flakes were recognised as being associated with them.

Large collections were subsequently made, mainly by S. Hazzledine Warren, mainly from the organic beds exposed in the cliffs to the west of the Pier and on the foreshore at Lion Point.

The Abbé Breuil pronounced the flakes and cores to be a separate industry from those with hand-axes and, in 1932, named it the Clactonian. Warren published numerous papers on the geology and archaeology of the sites, culminating in 1951 with his paper in the *Proceedings of the Geologists' Association* on the Clactonian Industry.

The first controlled excavations took place close to Jaywick Sands by K.P. Oakley and M. Leakey in 1934. In 1951 it became the first Palaeolithic site to be related to a pollen sequence, which was interpreted as that of the Hoxnian Stage. Further large scale excavations were conducted by the University of Chicago on the Golf Course in 1969–70 (Pl. 4). Rescue excavations were made by the Essex County Council Archaeology Section in 1987 prior to the destruction and development of the Butlins Holiday Camp.

Archaeology: An industry of Mode 1 cores and flakes is prolific in the organic beds of the so-called Clacton Channel, and in gravel deposits at a lower level (Fig. 39). Artefacts from the Golf Course excavation were in primary context on the beach of a river channel. Some were in suitable condition for microwear analysis and some could be refitted.

Others were found in the gravel at the base of drainage trenches dug on the Butlin's site. No hand-axes have been recorded *in situ* but some derived flakes may be hand-axe thinning flakes and a few hand-axes have been found on the foreshore. The most famous discovery is that of the pointed end of a wooden spear found by Warren (1911) (Colour Pl. 15).

Plate 3 Mandible of the giant beaver, Trogontherium*, in the gravels of the Clacton Channel. This is not only an indicator of the immediate environment but also of date as it is considered that this animal became extinct in Britain after the Hoxnian Stage. A Hoxnian date is supported by other bio-stratigraphic markers such as the giant fallow deer, and also Hoxnian affinities of the pollen diagram*

Associated material: There is a large range of molluscan and mammalian remains (Pl. 3).

Context: All within fluviatile deposits of the early Thames/Medway. A test section by Bridgland in 1987 confirmed that the Clacton Channel deposits are cut into the Holland Gravel.

Dating: The deposits of this early Medway/ Thames river are dated to a period immediately following the major glaciation of the Anglian Stage. The Clacton Channel is of the Hoxnian Early-temperate and Late-

KEY SITE

CLACTON-ON-SEA

Map 20 Nos 1–6

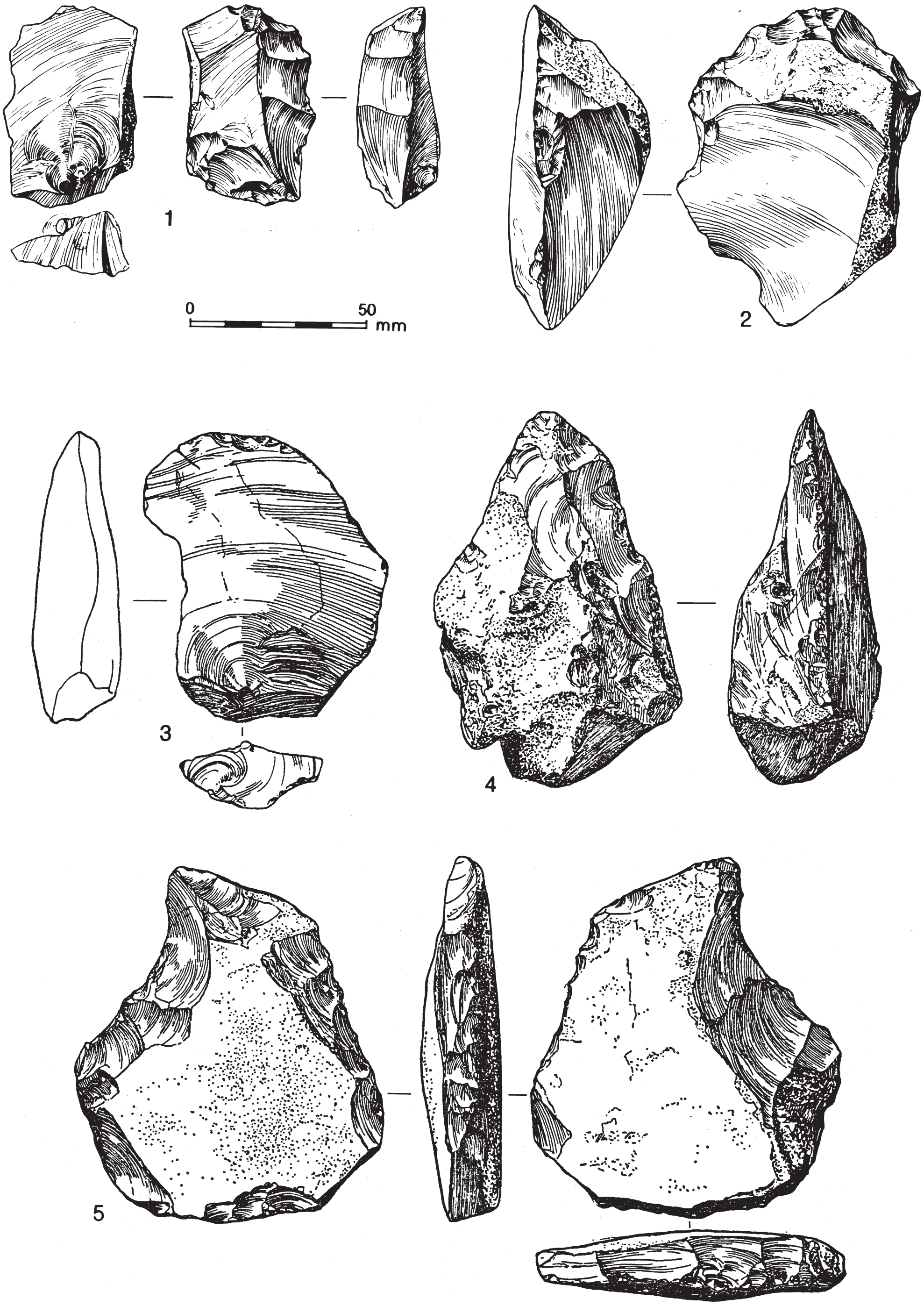


Figure 39. Artefacts found in primary context from the University of Chicago's 1969–70 excavations at Clacton. The Clacton deposits occupy a series of channels that are banked against Anglian glacial gravel and can be traced from near Clacton Pier eastwards to Jaywick Sands (Map 20). 1) Retouched denticulate flake; 2) retouched flake; 3) flake showing characteristic prominent bulb of percussion from a hard hammer; 4–5) no hand-axes have been recorded from the Clacton Channel deposits but crude bifacial or unifacial pieces such as these occur. Source: Wymer 1973, 48, 54, 58

KEY SITE

CLACTON-ON-SEA

Map 20 Nos 1–6

Plate 4 Excavations in progress of the gravel at the base of the Clacton Channel deposits in 1970. Flakes and cores of Mode 1 Clactonian Industry occur in primary context beside an abandoned meander loop of a braided river. Overlying organic and marine deposits are not preserved here, but remain further east towards the Pier, where the original discoveries of artefacts, bones, and the wooden spear (Colour Pl. 15) were made before the construction of sea defences prevented further exposures of the Channel deposits. From Jaywick Sands to Clacton Pier is a distance of 3 km and many hundreds, if not thousands, of artefacts have been found. This is very puzzling as the site is of Hoxnian age and elegant hand-axes (as per Boxgrove) were being made at a much earlier time

temperate zones, prior to being covered by estuarine deposits (Pike and Godwin 1953). The mammalian fauna, including the giant beaver, *Trogontherium*, supports this dating.

Significance: Type site of a Mode 1 type assemblage representing occupation along the early Thames/Medway for about 3 km, usually referred to as the Clactonian Industry. It is well-dated with associated faunal remains, a palaeobotanical record and a rare wooden spear.

Major references: *General summary*: Wymer 1985, 264–85; Roe 1981, 137–43

Excavations: 1934: Oakley and Leakey 1937; 1969–70: Singer *et al.* 1973, 6–74; *Geology*: Warren 1924; 1955; Bridgland 1994, 330–47; *Archaeology*: Breuil 1932; Warren 1932; 1951; *Mammalian fauna*: Singer *et al.* 1973, 274–5; Stuart 1982, 119–200; *Micro-wear*: Keeley 1980, 86–119; Bridgland *et al* 1999

Numbers and locations of artefacts: Roe 1968, 59.

housing development, and other geological investigations (Wymer 1988; Bridgland 1994; Bridgland *et al.* 1999) make this one of the most fully documented Palaeolithic sites in the country. From the aspect of human occupation it demonstrates a presence along the Thames–Medway River during the latter part of Period 1 and in the earlier part of the interglacial of OIS–11, ie, Hoxnian. These people were contemporary with a rich fauna of horse, deer, *bos*/bison, rhinoceros, and elephant and, in view of the wooden spear found in the Channel Deposits by Hazzledine Warren in 1911, they presumably hunted some of them. Keeley (1980) identified some flakes that had been used for meat cutting in his study of the microwear on the artefacts found in the primary or near-primary context site excavated on the golf course in 1969–70 by the University of Chicago. He also identified other activities such as working wood and bone, as well as hide scraping, all executed with flint tools made by the simplest technology.

MAP 20. CLACTON-ON-SEA: JAYWICK TO HOLLAND CLIFFS

Apart from a few sparse finds of hand-axes, the only other sites in this area which suggest a presence in Period 2 are at Daking's Pit at Weeley (6 hand-axes, 21 cores, 56 flakes) and 37 hand-axes and other artefacts with the general provenance of Frinton and Walton. The latter probably came from the beach at Stone Point, where artefacts of many different periods from Palaeolithic to Neolithic are found. The sites in the Clacton Channel demonstrate considerable activity in the early part of Period 2. The prolific site of Gant's Pit at Dovercourt shows that there was occupation along the River Stour during the later part of Period 2 and is noted in the Section below on that river. There is nothing on the Tendring Plateau to relate to Period 3 but for a Levallois flake and core among numerous other Palaeolithic artefacts found on the beach at Stone Point. Others come from Frinton and Walton, and at Walton itself. Flakes and hand-axes from here seem to be a conglomeration of material derived from various unknown sources, but surprisingly not all of them are in a rolled condition. They remain a puzzle. Similarly, a hand-axe found during the Hullbridge Survey (Wilkinson and Murphy 1995, 25) on alluvium at the edge of terrace gravel at Goldhanger (TL 914081 (A)) presumably has a very derived context.

3.4.4 The River Stour of Kent

The prolific sites in the Sturry area (Map 21) have produced many hundreds of hand-axes and excavations were conducted there by the British Museum in 1921–3 (Dewey and Smith 1925; Roe 1981, 105–6). Homersham's East pit has produced 310 hand-axes from gravel of Terrace 2 and over 500 have come from Sturry with no specific provenance but almost certainly from that and other pits in the same terrace gravel.

On the other side of the river in the higher Terrace 3 is the site of Fordwich (Smith 1933). This and the Sturry sites are well summarised by Roe (1981, 104–8), who considered that the archaic character of many of the hand-axes from Fordwich, coupled with their coming from a higher terrace, suggested they might pre-date such assemblages at Swanscombe. Thus, they would qualify for Period 1 of this survey, but this cannot be regarded as conclusive and a recent reassessment of the Fordwich hand-axe collections by Ashmore (1981) questions the proportions of crude to refined hand-axes.

MAP 20. RIVER STOUR OF KENT: CHARTHAM–RECULVER

Without Fordwich there is nothing in this valley of the Kent Stour that indicates any occupation during Period 1. Although dating could be contested, Sturry and Reculver suggest much activity at certain times in Period 2 (Pl. 5). The evidence for Period 3 in the Canterbury area is, as stated in the summary, only based on archaeological typology. Tyldesley (1987, 66–70) notes and figures three bout coupé hand-axes from Canterbury and one from Faversham. There is also one from Reculver but of unknown context. Another and a few more unrecorded recent finds are from Hampton to the west of Herne Bay. These may have been associated with the well-known Stud Hill deposits (now eroded away) from which numerous mammoth and straight-tusked elephant remains were found (Evans 1897, 617). However, the one from St Stephen's Pit at Canterbury is of greater interest as, typologically, it really does resemble some of the elegant examples in the French Mousterian, and the pit has produced two Levallois flakes as well as 34 hand-axes.

At least three other sites in Canterbury have produced a small quantity of Levallois material: Gaskin's Pit (6 flakes and 5 hand-axes); the Gasworks Pit (6 flakes and 8 hand-axes) and the King's School (1 flake). All these Canterbury sites are on Head Brickearth of Terrace 2. At Gaskin's Pit, otherwise known as the Vauxhall Pit, 'sharp artefacts' are recorded from beneath the brickearth above the gravel. If these are the flakes, then they may have been stratigraphically separated from some or all of the hand-axes.

Plate 5 Cliff section at Reculver, Kent (1987). Channels of the Middle Pleistocene Stour Valley overlain by brickearth show in section, cut into the sands of the Lower Tertiary sands of the London Basin. Numerous palaeoliths have been recovered from fallen material on the beach

The same may apply to the other Canterbury sites with this small element of Levallois material, and possibly the odd Levallois flake reported from the Sturry pits. Thus, there is a hint of human activity in the Stour valley during Period 3, but a much more prolific site at Bapchild (see Chapter 6) may be giving a more accurate picture.

3.5 Solent and Avon Drainage

3.5.1 Summary

All the rivers of this area, past and present, drain into the Hampshire Basin, which is surrounded by the Dorset Downs, Salisbury Plain, and the South Downs. Geologically, the basin is a trough (syncline) with a series of east–west ridges (anticlines) which bring the Chalk or older rocks nearer to, or actually to, the surface. Otherwise the basin is covered by clays and sands of the Tertiary era. Broadly, the landscape in the northern part of the basin would not have been so very different during the times of Palaeolithic occupation apart, of course, from some dissolution of the Chalk, the deepening of river valleys, and the formation or modification of dry valleys. However, nearer to the present coastline there has been so much change that any attempt to reconstruct the former topography back to about half a million years is restricted to little more than speculation. Coastal erosion has been extensive but the prodigious number and richness of Palaeolithic sites in what remains of this southern part of the basin suggest this was perhaps the most favoured part of Britain for human occupation during at least Period 2.

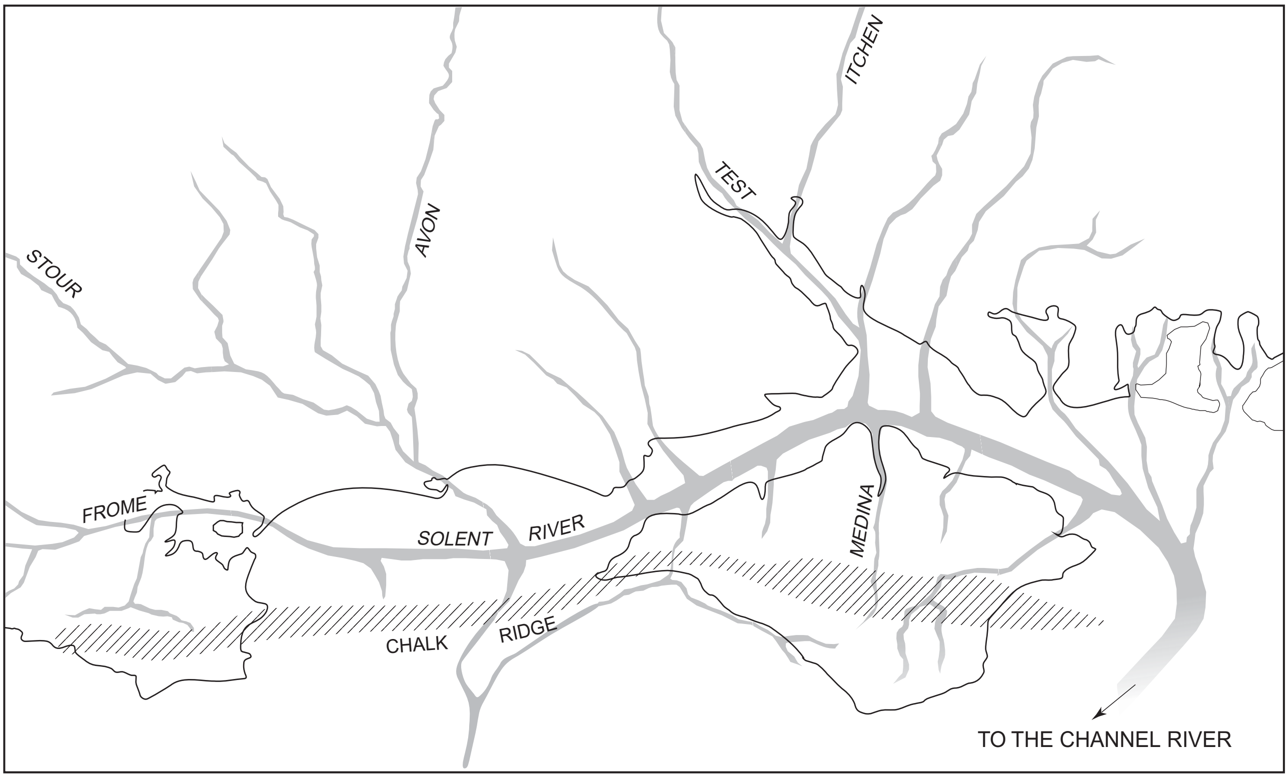


Figure 40 Reconstruction of the Solent River and its tributaries, prior to the breaching of the Chalk ridge between the Needles and the Isle of Purbeck. The modern coastline (broken line) acquired its present form after the rise of sea level since the last glacial period (based on Everard 1954; Small 1964; West 1980)

There are more Palaeolithic sites here than anywhere else in Britain, including several with many hundreds of hand-axes, retouched flakes, and flint debitage. Dunbridge Hill Gravel Pit is one of the most prolific Palaeolithic sites in Britain (953 complete hand-axes recorded by Roe (1968)). Terrace gravels in the Bournemouth and Southampton areas have scatters of sites covering 8–9 km, almost anywhere it would seem where the gravels were exposed.

It is difficult to know why this part of the south coast of Britain should have been so favoured; it is not on the Chalk and the coastline of the Middle Pleistocene was certainly several kilometres further south. The answer must lie in the rivers, in the deposits of which is the evidence itself. In this respect, the area being considered is very different from other parts of non-glaciated Britain, for the major river during the time of most of the Palaeolithic occupation no longer exists. This was perhaps as much a major river as the Thames or Severn. Its source was somewhere in the high ground beyond the Dorset Chalk and it flowed eastwards towards what is now Spithead, where it turned south and presumably joined a now submerged Channel River. As the bight of the English Channel increased so an estuary developed. This was the old or ancestral Solent River into which drained all or most of the rivers of the Hampshire Basin. Thus the Wiltshire/Hampshire Avon, the Test, Itchen, and the northward flowing rivers of the Isle of Wight were its tributaries.

The Isle of Wight was not an island it would seem until very late in the Pleistocene. Figure 40 indicates the probable geography of the Middle Pleistocene. The Solent River flowed a few kilometres to the north of the chalk ridge from Purbeck to Sandown. This was the land over which people roamed during Period 2. There is no evidence to show they were also there in Period 1, but with Boxgrove not so far away it would seem likely. However, such evidence may have been washed away and now lies dispersed under the sea. There was certainly some occupation during Period 3, as will be noted below.

There is a long and complex history of this ancestral Solent, with the gradual drowning of its estuary. As it shifted southwards down the dip-slope of the basin, successively lowering its level, so its tributaries worked their way across its earlier terrace gravels. Much is not yet understood and it is not always possible to know whether existing remnants of high terrace gravels were laid down by the ancestral Solent or one of its tributaries. In spite of the superbly preserved flight of at least 14 terrace levels in the New Forest between Hordle and Calshot (Fig. 41) and many years of study, there is no concrete marker or dating evidence on

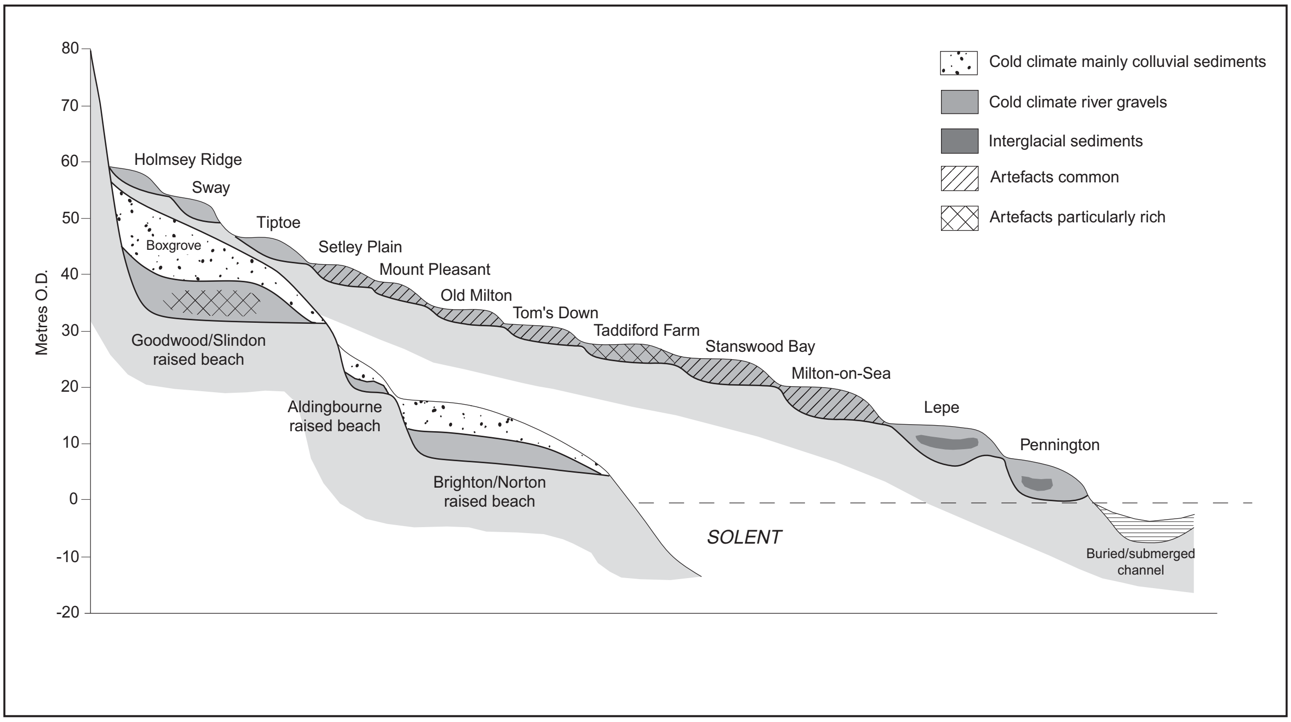


Figure 41 'Staircase' of terraces pertaining to the Solent River, related to the Sussex Raised Beaches (provided by D. Bridgland)

which to relate the archaeology (Allen 1991). The great misfortune is the total lack of discovery as yet of any organic beds in the terrace deposits earlier than OIS–7. However, beneath the floodplain of the Avon at Ibsley (Barber and Brown 1987), pollen analysis has suggested a probable date of the Ipswichian Stage (OIS–5e) with the interesting conclusion that a high level of deforestation had been induced by large herbivores. This is some corroboration for the assumption made in this survey that large herbivores had been responsible for much open landscape during interglacial periods. Organic deposits also occur at Lepe and Pennington. These date to OIS–7 and OIS–5e respectively (Allen *et al.* 1996; see Fig. 41).

The Bournemouth area makes a starting point, for here can be observed the confluence of the River Stour with the ancestral Solent. A so-called '150 ft bluff' between these two rivers has been recognised with Terrace 10 of the Stour on the north side of the bluff cutting into Terrace 11 of the Solent on the south side (Bury 1933; Green 1946, 87). It is in the gravel of T-10 at Bournemouth that the great majority of hand-axes have been found (see Table 9 for terrace numbering for here and in the Avon valley). It is tempting to see this bluff as a feature remaining from the long cold period of the Anglian Stage and thus putting T-10 with its palaeoliths neatly into Period 2, but there is no foundation for this. The attribution of Period 2 for the palaeoliths as given here rests, it must be admitted, entirely on supposition, but it conforms with what is known from other areas.

The only Palaeolithic sites which have any claim to pre-date this confluence of the Stour and the ancestral Solent are those at Corfe Mullen on T-12 (Fig. 42). Nearly 200 hand-axes have come from the Railway Ballast Pit there, and more from nearby pits. Some are recorded as being in mint condition, but J.F.N. Green who had seen the working pits concluded that the palaeoliths were not contemporary with the terrace deposit but had been buried by bluff deposits, ie, under deposits which had later slipped down from the edge of the terrace. However, other palaeoliths may have been in the actual terrace deposit and thus be considerably earlier than those in T-10.

Particularly rich sites which have yielded at least 50 hand-axes, some many more, are those of Redhill Common, Moordown, Kings Park, Queens Park, Winton, Boscombe, and Pokesdown. These are places where there has been commercial exploitation of the gravel. The vast majority of the Bournemouth discoveries appear to have been casual finds during building developments or drainage work (Harding 1997).

On each side of the estuary of the combined Stour and Avon at Christchurch, there are lower terraces and Calkin and Green (1949) regarded these as the result of a bay-like delta forming as a result of Late Pleistocene rise of sea level. Some Levallois flakes and cores, and bout coupé hand-axes are associated (Fig. 42), but others have been found in small numbers at higher levels and it is difficult to interpret any sequence. However, on the basis of technology alone it

Colour Plate 1 Reconstuction of a periglacial landscape in lowland Britain. Typical mammalian fauna as shown are mammoth in the foreground with hyaenas nearby. A red deer stands by the river, on the other side of which is a woolly rhinoceros and horses in the distance. From a painting by Nick Arbor, Castle Museum, Norwich

Colour Plate 2 (left) The Cromer Ridge in 1990 seen from Kelling Heath, Norfolk. This is a glacial moraine deposited during the retreat of a major ice sheet, considered to be that of the Anglian Stage

Colour Plate 3 The east end of the Henley Gorge, taken from Winter Hill looking north-east in 1969. The terrace flats seen on the other side of the river remain from the original course of the River Thames when it flowed through the Vale of St Albans before being diverted by the ice of the Anglian Stage

Colour Plate 4 A fossil ice-wedge cast formed during periglacial conditions, exposed in a section of the Upper Sequence at Hoxne, Suffolk, 1973

Colour Plate 5

Colour Plates 5–7 Thames Terraces (left)

5. The west end of the Henley Gorge as seen from the Lynch Hill Terrace at Remenham in 1967

6. Bluff of the Corbets Tey Terrace seen from the floodplain of the Lower Thames at Gun Hill, West Tilbury, 1994

7. The Lynch Hill Terrace between Cookham and Maidenhead in the Middle Thames Valley. The level of the Boyn Hill and higher terraces form the horizon. This photograph ws taken in 1969; the area in the foreground is now mainly quarried away

Colour Plate 6

Colour Plate 8 Gravel of the Lynch Hill Terrace as exposed at the Cannoncourt Farm pit in 1977. This SSSI, now mainly covered by houses, was one of the richest Palaeolithic sites in the Middle Thames Valley

Colour Plate 7

Colour Plate 9 Reconstruction of an interglacial landscape in lowland Britain. Typical mammalian fauna as shown depict spotted hyaenas feeding on a pig, with a giant deer in the water behind them. Giant deer and fallow deer are on the other side of the river, and straight-tusked elephants on the floodplain in the background. From a painting by Nick Arbor, Castle Museum, Norwich

Colour Plate 10 Corbets Tey Gravel exposed during building of the M25 London Orbital Motorway in 1979. The dark band within the gravel is an interglacial organic deposit. Hand-axes and flakes came from the gravel immediately above this band

Colour Plate 11

Colour Plates 11 and 12 Boxgrove, West Sussex. Plate 11 (above right) shows a section of the 40 m, Raised Beach beneath Slindon Sands and chalky head deposits. At the far end is the remains of the Chalk cliff which, during the time of the Palaeolithic occupation, would have been as high as the modern Beachy Head. Plate 12 (below right) is of excavations in progress in 1996. Palaeolithic artefacts and faunal remains in primary context occur on top of and within the Slindon Silts. Note the great thickness of head deposits overlying the silts. Precise horizontal and vertical controls, meticulous excavation techniques, and wet sieving have given rare and valuable insights into the activities of the people who were present, probably about half a million years ago

Colour Plate 12

Colour Plate 13 Hoxne, Suffolk, 1974. One of several 'stone clusters' found on the Clay muds of the Upper Sequence, where evidence indicates that Palaeolithic occupation, mainly still in primary context, took place beside the edge of the silted up lake. Such clusters, containing natural stones, occasional flakes, bone fragments, and specks of charcoal, can only have accumulated by human agency, but they remain enigmatical. Note the small deer metapodial bone on the right side

Colour Plate 14 The Swanscombe Skull. Consisting of the two parietal bones and occipital, but unfortunately lacking the frontal bone and mandible, this is the most complete skull of any individual found in Britain of Middle Pleistocene age. It is dated to the Hoxnian Stage, about 400,000 BP, and represents one of the 'Ancients', possibly from which the Neanderthalers developed.
Photograph courtesy of the Natural History Museum, London

Colour Plate 15 (left) Broken, pointed end of wooden spear found at Clacton-on-Sea, dated to the early part of the Hoxnian Stage, about 410,000 BP and made of yew. Coupled with the good evidence from Boxgrove, it supports active hunting as part of the Lower Palaeolithic subsistence economy. Other, complete spears of about the same date have recently been cound at Schoningen, Germany. Neither Clacton nor Schoningen is associated with hand-axes.
Photograph courtesy of the Natural History Museum, London

Colour Plate 16 (right) The Thames Barrier at Greenwich. This is a dramatic reminder that the relative movements of land and sea during the Pleistocene, mentioned frequently in this volume as part of an ever-changing process, are just as active today. There are several estimates of the present rise of levels in the Thames estuary, but it could be as much as 25 mm per century

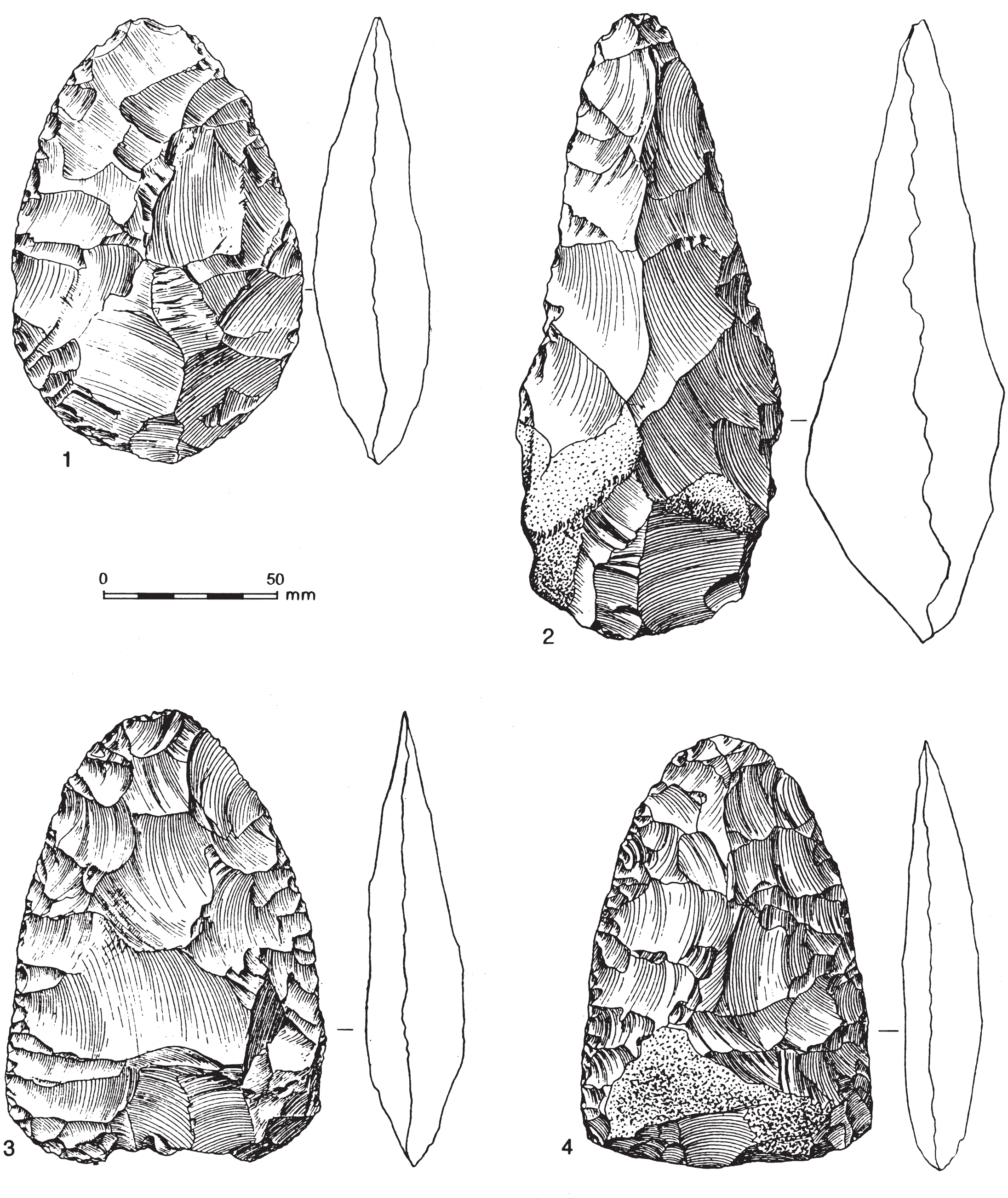


Figure 42 Palaeoliths from Bournemouth Gravels. 1–2) hand-axes from pits at Corfe Mullen, probably the earliest artefacts in the area; 3–4) two bout coupé hand-axes from low level gravels in the Muscliff and Christchurch districts, probably of Devensian age. Source: Calkin and Green 1949, 33

is clear that there was some occupation in the area during Period 3.

To the west, the Rivers Frome and Piddle might be regarded as minor survivals of part of the upper course of the ancestral Solent. Extensive deposits of Higher Terrace Gravel remain and are dug on a large scale at West Knighton, Moreton, and Crossways and at least 70 hand-axes have been found in them. This suggests there may have been considerable occupation higher up the ancestral Solent, but further upstream little remains of any terrace deposits which might relate to this lost river and nothing is known from the Frome terraces between here and Charminster. A recent study of the Solent river by Bridgland (1996) gives a valuable

Bristow et al. (1991) (Bournemouth Memoir)	*Clarke and Green (1987) (QRA Field Guide)*	*Clarke (1980) (Mineral Assessment Bournemouth)*	*Kubala (1980) (Mineral Assessment Fordingbridge)*	*Calkin and Green (1949) (Proc. Prehist. Soc.)*
	As this volume		As this volume	Redundant terminology for higher gravels, related to Thames Terrace Deposits
Terraces T11–T14	Older River Gravels 1–5	Older River Gravels	Older River Gravels	
Older River Gravels of Proto-Solent	Thin, dissected gravel spreads in highest part of New Forest	T8–10	Five main levels	
		All above 80 m OD	85–127 m OD	
	All above 90 m OD			
Terraces T9–T10	T5–T10	T5–T7	T6–T10	
Terrace gravels of established Avon and Stour	Middle Terraces of Avon	Dissected plateau features	River Terrace Deposits	
	All below 90 m OD		30–85 m OD	
T6–T8	Remnants capping interfluves on west side of New Forest			
Terrace Gravels related to present Avon				
Terraces T1–T5	T1–T4	T1–T4	T1–T5	Muscliff Terraces
Probably of Devnsian Age	Lower Terraces below Fordingbridge	Lower Terrace Deposits	Lower or Valley Terrace Deposits	Deltaic deposits and drowned valleys associated with oscillating sea levels, only present below Fordingbridge
	Below 40 m OD			
	Within main valley of present river			
	T1–T2 largely concealed beneath floodplain			

Table 9 Alternative correlations of the terraces and their deposits as recognised in the Lower Avon Valley. The numbering rather than naming of individual terraces is confusing, eg, St Catherines Hill near Christchurch is T8 of Clarke (1980) and T12 of Bristow et al. *(1991)*

NB: Terrace numbering on Map 24 is those of Clarke and Green (1987) and Kubala (1980) which are in agreement

assessment of this complex area and the relation of the terraces with their contained palaeoliths to the lost drainage pattern. It also concludes, from the differing long profiles of the later terraces, west and east of Poole Harbour, that the Frome was probably a separate tributary of the Channel River.

Southwards, from what is now Poole Harbour to the Needles, the Chalk ridge of the Purbeck anticline may have been accessible from the Bournemouth–Christchurch area and be a further example in southern England of a concentration of Palaeolithic sites in proximity to chalk lands. In this respect it is interesting to note that there are few known sites of palaeoliths up the Avon from Christchurch, apart from one at Wood Green, until Salisbury is reached. Wood Green has produced over 400 hand-axes and numerous flakes, ample evidence for human activity in the area at some stage. It is in Terrace 7 Gravel and close to the strike of the Chalk in the upper part of the Hampshire Basin. At Salisbury itself, there is proliferation of sites on Milford Hill on the east side of the city, and also at Bemerton on the west side. Both areas are on Higher Terrace Gravel and this, again, is a classic example of rich accumulations of discarded palaeoliths at the confluence of rivers in chalk country. The Wylye and the Nadder both join the Avon here. Upstream of all three rivers, little has been found. There may be other reasons but it is tempting to see the Avon in particular as a corridor from the Bournemouth–Christchurch area up on to Salisbury Plain, the Marlborough Downs, and so into the Kennet.

Map 24 shows the successive course of the ancestral Solent between Terraces 2–9 as it moved southwards down the dip-slope of the Hampshire Basin as it adjusted to lower levels. Submerged deposits indicate courses during low sea levels up to the present day. Large numbers of palaeoliths have been found at Barton-on-Sea, eroding from the terrace gravel capping the cliffs there and several around New Milton and Milford-on-Sea. Between these sites and Calshot only a sparse scatter of palaeoliths have been found. During these successive course it is evident that the hinterland to the north of the river would have been several kilometres of older gravels, as still existing in the New Forest. The river itself was probably fairly wide this far down its valley and any movement into the chalk lands of the Isle of Wight and the lost area between there and Purbeck would probably only have been easy much further up the valley. Priory Bay and Bleak Down on the Island have produced large numbers of palaeoliths and show that there was occupation there during Period 2 or perhaps earlier.

Southampton Water must relate to the drainage of the Rivers Test and Itchen for it extends north of the gravels of the ancestral Solent. The Test was the major stream, but the Dun and Itchen existed to judge by the size of their present valleys. During Period 2 they had confluence with the ancestral Solent probably just below the present city of Southampton (Edward *et al.* 1987). At this confluence, over an area of several kilometres, palaeoliths have come from the terrace gravels, with many prolific sites, especially at Dunbridge Hill, Kimbridge pits, Romsey (Cupenham or Chivers, Belbin's, Test Road, Luzborough, and Ridge Pits). Numerous sites are known in the bounds of the city itself, particularly on the Common and in the district of Shirley (Dale 1896).

Very little is known from the upper parts of the Test and Itchen valleys. There are isolated finds such as a couple of hand-axes and flakes from a pit at Longparish and similar stray finds. The only relatively rich site is at Colden Common in the Itchen Valley.

As noted, there is very little if anything that indicates human occupation during Period 1, anywhere in this whole area of the Hampshire Basin. The only contenders might be hand-axes and flakes that are known to have been found in the Older River Gravels of the Solent or Hampshire Avon. A hand-axe from Vereley Hill in Collins Hill Pit (SU 196049 (A)) has a good claim, assuming it is not an intrusive or surface find (Swanson 1970). Similarly, there are several discoveries of Levallois cores and flakes and bout coupé hand-axes which indicate some human activity here during Period 3 but, for the most part, restricted to stray finds.

In the whole of Southampton, there is only one Levallois flake from Highfield. Conversely, isolated Levallois flakes and at least one core are recorded from several of the Bournemouth sites among the hand-axes in the higher terraces, mainly T-10: at Poole, Corfe Mullen, Redhill Common, West Howe Council's Pit, Kinson Cemetery, Talbot Woods, Queens Park, Kings Park, and Winton Farm. It is not known how to interpret these Bournemouth finds, in the absence of good dating evidence for the terrace gravels or their precise context. There are also several hand-axes regarded as of probable Mousterian type by Tyldesley (1987), from St Catherine's Hill, Southbourne, Pokesdown, Boscome, Castle Lane, and Talbot Woods. At Warsash, Levallois material is more plentiful (Burkitt *et al.* 1939) and it may be significant that the terraces are at lower levels than those producing so many hand-axes in Southampton. However, there are also very many hand-axes from the Warsash gravels. There are two important sites on the Isle of Wight: Afton Farm at Freshwater, with 7 Levallois cores and 34 Levallois or retouched flakes, and a couple of hand-axes (Roe 1981, 249–55). The most important Middle Palaeolithic site is at Great Pan Farm, near Newport. There is a large assemblage of about 50 hand-axes, including one bout coupé, 2 Levallois flakes, a well-struck tortoise core and, numerous retouched flakes, all consistent with a Mousterian type industry (Shackley 1973). They come from a pit with deposits associated with marine sand (See Chapter 4). Certainly, there were people around during Period 3. The absence of rich Levallois sites in the lower level terrace gravels as at Warsash and Christchurch could, of course, merely reflect a local unavailability of suitable or sufficient quantity of flint for the somewhat extravagant technique.

3.5.2 The Solent: Poole to Southsea

There have been so many changes in this part of the south coast of Britain during and even since the Middle Pleistocene that any reconstruction of the landscapes as experienced by the earliest and Late Palaeolithic occupants is only possible in the broadest manner. A major river certainly existed, flowing west to east from the outcrops of Lower Cretaceous rocks north of Lyme Bay, probably the truncated valley system of a much more ancient drainage pattern. West of Bournemouth, where this great river once flowed, the minor streams of the Piddle and Frome are all that remain of it. Below Poole, across the southern part of the New Forest and all the way to the other side of Southampton Water, great spreads of high level gravels denote its former courses (Maps 23–5). For the purpose of this survey some attempt is necessary to relate the prodigious quantity of evidence for Palaeolithic occupation to the palaeogeography, especially to the other valleys which converge upon it in the Bournemouth and Southampton areas. It has to be visualised that the Isle of Wight was, until much more recently, part of mainland Britain except, perhaps, during periods of high sea level. The northward flowing rivers on the Isle of Wight would have joined the ancestral Solent where there is sea today, as would have done all the other rivers which were once its tributaries: the Avon, the Lymington and Beaulieu rivers, the combined Test, Itchen and Hamble, the Meon (Map 24), and other smaller streams. Only the Dorset Stour (Map 25) and the Wiltshire/ Hampshire Avon had a confluence which can be discerned in the gravel terraces between Bournemouth and Christchurch. All others lie submerged or eroded away.

MAPS 23–5. SOLENT: POOLE–WARSASH

As can be expected there has been a long history of study by geologists of this impressive lost river (especially by Reid 1902; White 1915; 1917; Bury 1923; Green 1946; 1947; Everard 1954; Small 1964; Clarke 1980; Keen 1980; West 1980; Clarke and Green 1987; Allen and Gibbard 1993; Destombes *et al.* 1975). In spite of this wealth of study and information, much remains that is not understood: the reason for the unusually high number of identified terrace levels, the interglacial deposits below modern sea level, let alone its original source. Possibly the best starting point is to accept the classification of the Plateau and Terrace Gravels as described in the Bournemouth Memoir of the BGS (Bristow *et al.* 1991) which makes the following divisions:

- Terraces 11–14 Older Terrace Gravels to the south and east of the Proto-Solent, higher than those which can be related to the present day system.
- Terraces 9–10 Terrace Gravels dating to the time of the establishment of the Rivers Avon and Stour.
- Terraces 1–8 Terrace Gravels related to the present day River Avon.

The only present river which relates directly to the Proto-Solent valley is the Stour. Map 23 shows the distribution of sites in the Bournemouth District where gravels of the two systems coalesced some time after the major glacial stage of the Anglian, from each side of the higher terrace gravels of T-12 and T-13. Bury (1923) emphasised the bluff between the higher ground and the lower terraces (his ‘150 ft bluff’) could well represent erosion at the end of OIS-12, but there is nothing to confirm it. However, it would be reasonable to assume that this astonishing spread of Palaeolithic sites over a distance of some 10 km indicates human occupation on a large scale at times during Period 2. Sites in or associated with the lower terraces (T-1–T-5), unless just derived artefacts, are presumably of later date.

As will be noted, there is good reason to suppose that at least some are. Similarly, sites associated with terrace gravels above T-10 might be earlier. The most obvious candidates for the latter would be the rich sites at Corfe Mullen. These sites are shown as on T-12 but Green (1947) interprets the palaeoliths there as being in bluff deposits and therefore more recent than the deposition of the terrace gravel. Thus, a Period 1 date is unlikely. There is also the problem of the relatively prolific sites higher up the Frome Valley at Moreton Crossways. These are mapped as in ‘Higher Terrace Gravels’ of the proto-Solent. At least 70 hand-axes are known from this or nearby pits. A Period 2 date is likely but cannot be demonstrated, but is more likely to be earlier than later.

The low terraces (T-2–T-4 of Bristow *et al.* (1991)), each side of the Stour–Avon estuary at Bournemouth and Christchurch, are certainly deposits of those rivers, cutting through the old Solent gravels. They are regarded by Calkin and Green (1949) as a ‘bay delta’, formed at a level of about 9 m OD during successive rises of the sea level (or subsidence of the land) and partly replaced by normal river terrace gravel to form their Christchurch Terrace (= T-1, T-2, and T-3) on the Christchurch side of the river. Some of the hand-axes figured by Calkin and Green are of elegant bout coupé form, and there is a Levallois flake, but they mainly appear to have come from bluff deposits elsewhere and not from these deltaic or low level river deposits. Shackley (1981) only records Levallois material from Warsash in a raised beach deposits (see Chapter 4) where they occur with large numbers of hand-axes.

The small numbers of isolated hand-axes found in the terrace gravels between Hordle and Lymington (Map 24) come from Terraces 5, 6, and 7, in successive courses of the Solent River, as shown by Mathers (1982b, fig. 3). The terrace numbering is not the same as that of Bristow *et al.* (1991) but would probably equate broadly with Terrace 10 of the Bournemouth area (Table 9). South-east of Southampton are the rich Palaeolithic sites at Warsash (Map 25), placed in Terrace 3 by Mathers (1982a). There is certainly a Levallois element in the palaeoliths from Warsash (Burkitt *et al.* 1939; Shackley 1981) but how they relate to the large numbers of hand-axes is unknown.

It has to be concluded that although there is so very much to indicate the human occupation of this area along the course of the old Solent River there is great difficulty in relating it to different periods or to contemporary landscapes. One thing that is generally agreed is that the course of the ancestral Solent through what is now Spithead has not changed (see Fig. 40). Offshore channels of the Solent have been traced round Nab Head. This, if the dating is correct, exemplifies the rapid erosion of Chalk and gives some idea of the great changes which must have taken place in the coastal geography of the English Channel during the Pleistocene. In this area, at least, much land has been lost which would almost certainly have been occupied.

3.5.3 The Isle of Wight

As mentioned above, it is almost certain that the Isle of Wight was normally part of the mainland well into the Late Pleistocene. Its main rivers, the Medina, the Western, and the Eastern Yar (Maps 26–7), would have been tributaries of the Solent River and had their sources to the south of the Chalk ridge which is the spine of the present island. Just how far to the south of the existing coastline was that of the Middle Pleistocene is unknown, but probably several tens of kilometres. Nothing is obviously known of any Palaeolithic human occupation of this lost land, but there is enough evidence on what remains to show that parts attracted people during both Periods 2 and 3. Deposits of the Steyne Wood Clay near Bembridge have been correlated with Boxgrove (Preece *et al.* 1990) but no palaeoliths are recorded in it.

MAPS 26 and 27. SOLENT: ISLE OF WIGHT

The most prolific Palaeolithic site on the Island at Priory Bay (Map 26, No. 7) is not far from the above site. Although some 300 or more hand-axes have been found on the beach (Poulton 1909, 39–41; Basford 1980), not until a section was cut in the gravel at the top of the cliff in 1986 at an elevation of 29–33 m was it indicated that the palaeoliths on the beach had been derived from this gravel (Preece and Scourse 1987). The height could well reflect uplift during the Anglian Stage and a Period 2 occupation is indicated in spite of its height OD (Bridgland pers. comm.). The only other relatively prolific site of palaeoliths on the Island, presumably also of Period 2, is that on Bleak Down (Map 27, No. 3), which has produced at least 72 hand-axes (Poole 1932). These come from old gravel pits at 80 m OD and must represent a Middle Pleistocene course of one of the northward flowing Solent tributaries. A Levallois flake is recorded from the same site, but it could be intrusive and is hardly definite evidence for human activity there during Period 3. However, one of the most important Period 3 sites in this part of southern England is at Great Pan Farm, Newport (Poole 1925).

At least 64 hand-axes and 16 Levallois flakes come from a gravel pit about 8 m above the River Medina, and the presence of beach sand within the gravel deposit has prompted correlations with raised beaches at Cams, Fareham, and other places, apart from the Palaeolithic gravels at Warsash and Christchurch (Shackley 1973, 542–54; Tyldesley 1987, 82–4; Roe 1981, 258–9). Dating is unsure (see Chapter 4) but the assemblage can certainly be accepted as of Mousterian type and good evidence for Palaeolithic occupation during Period 3. Hand-axes have also been found on the beach at Bembridge and may have been derived from the Raised beach exposed there in the cliff. About eight hand-axes have come from Head Deposits overlying Steyne Wood Clay in the grounds of Bembridge School (Holyoak and Preece 1983). but other location spots on Maps 26–7 indicate a sparse scatter of mainly isolated artefacts.

3.5.4 Valleys of the Rivers Test and Itchen

The River Test has its source at Overton, just south of the area of the Hampshire Downs which has produced a considerable quantity of surface material (Chapter 6). There is no evidence for Palaeolithic activity in the upper reaches until Longparish, which has only produced two hand-axes (one broken) and a couple of flakes. Three hand-axes have also come from the tributary Bourne River at St Mary Bourne. Another couple come from the tributary River Anton, but 15 from Chilbolton at its confluence with the Test. A similar number come from Kings Somborne. These sites are to the north of Map 28 and are in great contrast to the profusion of prolific sites slightly further downstream (as shown on Map 28) at Mottisfont, Dunbridge, Kimbridge, Romsey, Southampton, and Warsash. It is the same in the Itchen Valley with only a few isolated hand-axes but one relatively rich site with *c.* 65 hand-axes at Colden Common, close to the strike of the Chalk. All the prolific sites are beyond the Chalk and during the Middle Pleistocene it would have been much the same, with gravel plateaux and sandy terrain bordering the river valleys. It is difficult to know why this was such a favoured area; the only feasible explanation is the confluence of the old Solent River with these minor valleys of the Test and Itchen.

A particular problem is the further difficulty of not being able to reconstruct the palaeogeography of this area of great gravel spreads now so close to marine influence up Southampton Water. It is hard to believe that the Test brought down so much gravel, but spreads 2–3 km wide occur at Longparish, and this must represent considerable out-wash from the Chalk downs. Dunbridge to Southampton all seem too far north of the main spread of old Solent Gravels so there must have been a far greater out-wash of material from the Chalk during the cold stages than usually envisaged. Whatever is the reason, this is one of the richest areas of prolific Palaeolithic sites in Britain, in fact the Dunbridge Pits alone have produced about 1000 hand-axes.

MAP 28. RIVERS TEST AND ITCHEN: DUNBRIDGE–ROMSEY

Other notable sites with many hundreds of palaeoliths between them are the Kimbridge Pits and the Luzborough, Test Road. Chivers, Belbins, and Ridge Pits at Romsey (MacRae 1991). At Southampton, the suburb of Shirley has produced the most, with many more recorded from other pits at Southampton Common, Portswood, and Highfield. Warsash has yielded large numbers from Dykes Pits at Chilling and Hook Lane, Dibles Pit, and Fleet End, and many more with only a general Warsash provenance.

There is no satisfactory dating evidence for any of these sites. It can only be assumed with some confidence from their position in the terrace staircase that the vast majority of the hand-axes represents occupation during Period 2. Levallois material is virtually absent from Dunbridge, Romsey, and Southampton (one flake at Highfield, Southampton), but Fleet End, Warsash, has produced 11 Levallois flakes and 2 cores, so there is some evidence for people being around in Period 3.

The numbering of the terraces on Maps 25 and 29 is based on the recent detailed mapping by the BGS in the Southampton area (Edwards and Freshney 1987). It may be significant that most of the hand-axes in the Southampton area are in their Terraces 3 and 4, whereas those from Warsash are in Terraces 2 or 3, hence perhaps more recent, which may explain the Levallois element. At present it is not possible to make any definite correlations between the terrace numbering system in this area and that of Bristow *et al.* (1991) and others in the Bournemouth area and the Avon, Test, and Itchen Valleys (but see Table 9).

3.5.5 Valley of the Wiltshire–Hampshire Avon

Upper Woodford to Fordingbridge

To the north of the area covered by Map 29 there are few Palaeolithic sites recorded from the gravels of these upper reaches of the Avon Valley. At Wilcot, in a spread of gravel that could relate to the original source of the river, just north of Pewsey, a few 'palaeoliths' are reputed to have been found, and there is a more convincing record of a hand-axe from gravel at Pewsey Station. This suggests some human presence in the area and, interestingly, there are five surface sites on the Chalk or Clay-with-flints of the neighbouring downs. Otherwise there is very little known in the valley above Old Sarum, where two hand-axes were found, but only with general provenances, so not necessarily from the valley itself. Figheldean, just north of the map, has certainly produced one from Avon gravel, some 20 m above the present stream. The same is true in the tributary valleys of the Nadder, Wylye, and Winterbourne which are all confluent at Salisbury: just a few surface sites fringing the valleys and sparse discoveries of hand-axes from terrace gravels. There is one from the railway cutting at Dinton in the Nadder Valley, none in the Wylye Valley and only one from gravel at Winterbourne, according to the notebooks in Salisbury Museum (Stevens 1870, 47). A few others in this area above Salisbury only have general provenances.

There is no reason to consider that the Middle Pleistocene landscape of the Avon was much different to the present day. Above Salisbury, where it is known as the Upper Avon, it must have flowed in a relatively steep-sided narrow valley in the Chalk as it does now. There are no remnants of older gravel spreads to the east or west of the gravels flanking the river, so there has been a long history of vertical erosion. Lateral erosion has been minimal so little was ever left of one cycle of deposition after the next one. Thus, the river of the Middle to Later Pleistocene periods was merely some 20 m or so higher than it is now and perhaps less so as it is traced upstream. There are several small side valleys now, and there would have been so then. Millennia of sub-aerial weathering will have reduced the Chalk downs to some extent, but movement along the valley or up on to the higher ground would have been easy.

The paucity of Palaeolithic evidence in the Upper Avon and its tributaries is remarkable in contrast with the prolific concentration of sites at Salisbury. There are two rich areas: one between the Avon and the Nadder at Bemerton, and one on Milford Hill between the Avon and the Winterbourne. In both cases the palaeoliths come from gravels about 20 m above the present floodplain and rest on Chalk. In spite of the precise locations for most of these sites, as recorded by Stevens of the Blackmore Museum in the 19th century, very few notes or section drawings exist of the many exposures there would have been in the old pits or excavations for house cellars. Providentially, a recent building development at the Godolphin School gave an excellent opportunity for examining the deposits on Milford Hill and recovering some artefacts *in situ* (Harding and Bridgland 1998). These included a hand-axe, a retouched flake, and three cores. It was evident that the deposit containing them was fluviatile, but had received much chalky solifluction material that had sludged down from the valley sides, now eroded away. Decalcification of the Chalk in the gravel had destroyed most of the signs of bedding, but it could be concluded that this was a former course of the Avon, laid down during a cold stage.

As can be seen from the map, a cluster of sites are within a low terrace at the southern foot of Milford Hill. The artefacts therein are very likely to have been brought down the slope by solifluction from the prolific sites above. Unfortunately, detailed mapping of the Avon terraces in the 1970s by the British Geological Survey when preparing Mineral Assessment Reports (Clarke 1980; Kubala 1980) did not extend up the valley above Hale. The Salisbury area has not yet received the attention it warrants so it is not possible to correlate the Palaeolithic-rich gravels at Bemerton and Milford Hill with the sequence below Hale. However, on the basis of altitude and similar finds of palaeoliths lower down the valley, correlation with the gravels of Terrace 7 or 8 is almost certain.

MAP 29. WILTSHIRE–HAMPSHIRE AVON: UPPER WOODFORD–FORDINGBRIDGE

What does this rich concentration of sites at Salisbury mean in terms of human occupation? There can be little doubt that the confluence of four rivers was the attraction, with the facility of movement it gave in different directions, apart from the usual necessities of fresh water and game to hunt. The hinterland of Chalk downland with woodland on the Clay-with-flints, at least during temperate zones, could and probably did support large herds of gregarious mammals. A favoured area visited by small groups at numerous times during the millennia of an interglacial seems more likely than a few long-stays of bigger groups.

Below Salisbury the river is still restricted to a relatively narrow valley, but with all the additional volume of water from the tributaries it is not surprising that it begins to widen. It would have been the same in the Middle Pleistocene. At present there are steep sides to the valley, especially on much of the east side. This was probably not quite so marked in the past, as below Downham there are remnants of much higher terraces on the east side, so in the Middle Pleistocene there would have been a more distinctive series of bluffs and flats than they are today.

There are only younger terraces (T5, T6, and T7, Table 9) on the west side. As the river meets the sands and clays of the Tertiary formations which lie in the Hampshire Basin, so the character of the valley and the adjacent landscape changes. There is also the complication that the river eventually cuts through old gravels of the Proto-Solent as remaining on the higher parts of the New Forest. This is more evident to the south of Map 29 in particular and on Map 30. However, there is one key site at Woodgreen which demonstrates that humans were present this far down the valley.

The site (No. 32 on Map 29) was extremely rich in hand-axes. Roe (1968, 117) records 409 of them, making it the most prolific Palaeolithic site in the Avon Valley. It is also the best documented site in the Avon Valley, for a section was cut in 1986 by Bridgland and Harding (1987, 45–9). A small hand-axe was found *in situ* in the course of the excavation. The site equates with Terrace 7 of the Kubala sequence (Table 9) but none of the Middle Terraces of the Avon can be dated with any more precision than generally Middle Pleistocene. A date corresponding to OIS–10 or OIS–8 is likely, but could not be substantiated.

Fordingbridge to Christchurch

As can be seen from the map (Map 30) there are only a few find-spots in the Middle Terrace Gravels of the Lower Avon below Fordingbridge. These are of isolated hand-axes and their main interest is that they are only found, few as they are, on the east side of the present valley. There are wide well-preserved terrace flats on the west side but not a single Palaeolithic flake or hand-axe has been recorded as having been found in the associated gravels. This is probably more a matter of the lack of commercial exploitation not giving any opportunity to examine the gravels, but it could possibly denote that the hinterland on the east side of the valley was generally a more favoured area. This would have been much as it is now, with old Solent gravels of the New Forest producing wide flats which, if subject to the browsing and trampling of large herbivores could have been reduced to open heathland and their presence could have been detected by hunters from a great distance. Conversely, on the west side of the valley below Ringwood there is less gravel remaining and the outcrops of Tertiary sands and clays of the Bagshot, Bracklesham, and Barton Beds may have been more densely vegetated with boggy areas which had to be avoided. This is, of course, pure speculation and does not take into account the effects of major climatic changes on the landscape, but such conditions could have existed at times corresponding to human movement in the region.

Only 15 sites on Maps 29 and 30 can be related to the terrace sequence of Kubala (1980). Two others, just off and to the east of Map 30 have each produced a hand-axe and can be added: Bransgore on Terrace 8 (SZ 195980 (E)) and Hinton Admiral on Terrace 7 (SZ 205960 (E)). They are distributed thus:

Terrace 8: 7 sites
Terrace 7: 7 sites
Terrace 6: 1 site
Terrace 5: 2 sites

There is only one hand-axe that is reputed to come from the Older Terrace Gravels. This was at Collins Hill Pit at Vereley Hill in the parish of Burley (SU 196049 (A)), just off Map 30 (Crawford *et al.* 1922). If this was a genuine constituent of this gravel it could have the claim to represent an older occupation of the valley before any of the sites in the Middle Gravels. There are one or two similar provenances for hand-axes in the old Solent gravels of the New Forest, but they could be surface finds or intrusive. Just where and when the Avon was confluent with the Proto-Solent is unsure. The hand-axe at St Catherine's Hill in Terrace 8 Gravel suggests the Avon had cut through the older gravels of the Proto-Solent by then and was confluent with the Middle Pleistocene Solent, and it is possible that this was after the Chalk of the south bank of that river had been breached by the sea, for there is a very gentle profile between St Catherine's Hill and several kilometres upstream.

MAP 30. WILTSHIRE–HAMPSHIRE AVON: FORDINGBRIDGE–CHRISTCHURCH

However, it is more likely that the Solent River at this time had its estuary well to the east of what is now the Isle of Wight. Marked changes in the sea level could still have had their effect as far upstream as the Bournemouth–Christchurch area. Terrace 10 shows a similar almost level profile in its lower reaches. This could also explain the removal of all the Middle terrace Gravels in what is now the estuarine part of the valley. St Catherine's Hill remains as an isolated outlier. Certainly, the Lower or Valley Terrace Deposits of T1–T4 at least do show clear indications of erosion at times of low sea level, and thick aggradations during following periods of rising sea level. Such aggradations grade to the sea level at the time and work upstream until they meet the longitudinal profile of the river, eg, Terrace 5 at Christchurch is 9 m above the river but meets the floodplain at Fordingbridge. At times, this lower part of the Avon has been a veritable delta. The archaeology is summarised in the general summary at the beginning of this section.

Maps 30 and 31 show the evidence for occupation within the valley during the Middle Pleistocene, probably between OIS–11 and OIS–8 (423,000–245,000 BP) showing the estimated area covered by courses of the river during that period. Surviving terrace deposits of T5–T10 as per Kubala 1980 are coloured red. Palaeolithic sites as numbered on map.

3.6 The Midland Rivers

3.6.1 Summary

Only in the terrace deposits of the River Trent around Hilton, Willington, and Beeston have palaeoliths been found in fair numbers, but this does not necessarily mean that the occupation of this part of England was very sparse. As noted below, there are many geological reasons which could have caused the reworking of river deposits on several occasions with the resulting dispersal of the lithic evidence. The Trent is the main river of the Midlands, but the Warwickshire Avon, the Soar, and the Severn, although not strictly in the Midlands, also need to be considered.

This area of the Midlands is of great importance for ascertaining how far north towards the highland fringes Palaeolithic people may have roamed. When Evans published his first edition of *Ancient Stone Implements* in 1872 he was unable to record any palaeoliths from it, but in his second edition he could include the quartzite hand-axe found at Saltley, Birmingham, in 1890 (Evans 1897, 580). This prompted his much-quoted statement that 'the absence of palaeolithic implements in Britain north of an imaginary line drawn from about the mouth of the Severn to the Wash ... may be due to their not having as yet been found, and not to their non-existence.' It is now clear that he was correct. Palaeoliths in river deposits are sparse but there are enough to show that people were active in the area at times during all the three Periods as defined in this survey.

There are several ways in which this area differs from the drainage areas of adjacent regions.

i) It is beyond the geographical limits of readily available flint, if any at all, thus other less tractable stones generally had to be used. Quartzite was the best and most commonly found alternative. Hand-axes and other artefacts made of quartzite, especially when subjected to abrasion and damage in actively eroding rivers, are often less easy to identify than their flint counterparts. Hence, fewer are recognised and found except by those well-experienced in stoneworking technology.
ii) There is growing evidence that Professor Straw's long conviction that a major glaciation occurred during the Wolstonian Stage of the conventional chronology may be at least partly correct. Such would have covered much of the Midlands by an ice sheet (Fig. 43).

iii) This same ice sheet would only have reached the north-west coast of Norfolk and thus made no major changes to the drainage pattern of East Anglian rivers as imposed after the Anglian Stage of OIS–12.

iv) This same ice sheet would have modified if not obliterated the drainage pattern of the Midland Rivers as imposed, like those of East Anglia, after the Anglian Stage. Thus, for the second time during the Middle or early Late Pleistocene, a very different drainage pattern may have evolved.

If it is accepted that there was this further Middle Pleistocene glaciation then the rivers of the Midlands as seen today presumably represent the drainage that was superimposed on the landscape after the recession of that ice sheet. It seems that occasional remnants of deposits from earlier periods did survive, and the most surprising and archaeologically fortunate is an organic channel found beneath the glacial till at Waverley Wood Farm Pit, south of Coventry. The glacial till in question is dated to the Anglian Stage (OIS–12), so the discovery in the channel of three hand-axes made of andesite tuff and a couple of flakes, in very fresh if not mint condition, is unequivocal confirmation of a human presence here during Period 1. The andesite is considered most similar to that which outcrops in the Lake District. This raises two points: either the hand-axes were made from a block of andesite found in the locality, in which case it would have to have been a glacial erratic, or the hand-axes were made elsewhere and brought in by human agency. As the till which overlies this organic channel at Waverley Wood farm is thought to be of Anglian age and no other earlier glaciation is known in the area, this suggests that the latter is more likely. Another hand-axe made of andesite was also found at the Pools Farm Pit, only a few kilometres away, possibly in the same gravels which overlie the Waverley Wood Farm organic channel (Maddy 1989; Maddy *et al.* 1994).

The same gravels have been traced across Leicestershire and Lincolnshire and into Norfolk and Suffolk, where they underlie the Anglian till. No other palaeoliths are known in the Midlands from these gravels or channels within them, but there are rich sites in this stratigraphical position in Norfolk and Suffolk. This so-called Bytham River after its type site at Castle Bytham was the major river draining the Midlands before its obliteration by the Anglian ice sheet. It is described in more detail in Section 3.8.

A Proto-Trent was initiated after the recession of the Anglian ice and a special study has been made of its deposits by Drs Brandon and Sumbler (1988; 1991). As stated, the only relatively rich sites with hand-axes along the Trent are those in various pits at Hilton, north of Burton upon Trent. These have now been recognised as in disturbed but genuine river gravels and tentatively related to OIS–8. Others occur at Willington in the same gravels. These certainly appear to belong to Period 2 occupation, but it is difficult to know whether the hand-axes found in the lower terrace gravels at Beeston are really of Devensian age (Table 10). Various other isolated finds of hand-axes occur in Trent gravels, and in some of its tributaries such as the Soar, cannot be dated with any confidence. The only other area yielding hand-axes in small numbers but consistently in a particular river gravel is south-east of Lincoln between North Wykeham and Norton Disney. This gravel, known as the Balderton Sand and Gravel pre-dates the last interglacial deposits (Ipswichian Stage: OIS–5e) at Tattershall Thorpe and has been related to OIS–6. This was a very cold period and all but one of the known hand-axes are very rolled and presumably derived, although a flint example from Tattershall Thorpe is only slightly rolled. Whether these hand-axes belong to this period or, perhaps more likely, are derived from earlier deposits, is unknown.

The complexity of the geological events in this part of the Midlands is exemplified in the fact that the Balderton Sand and Gravel shows that the Trent was then flowing through the Lincoln Gap prior to being diverted into its present south–north course to the Humber. The present Witham now flows over this Balderton Sand and Gravel.

There is a very thin scatter of palaeoliths in river deposits of the Soar and Wreake, including a hand-axe at Ratcliffe on the Wreake and another at Huncote. These became incorporated in gravels pertaining to the present River Soar, which prior to the Anglian Stage was the upper part of the valley of the Bytham River (Fig. 44). The Anglian ice completely blocked this Proto-Stour. When the ice receded there was an entirely different drainage pattern. Today's remnant of the Proto-Soar now joins the Trent near Nottingham, and the present Warwickshire Avon flows south-eastwards partly down its previous valley: a classic case of reversed drainage. Thus, it can safely be concluded that of the five terraces which have been recognised of the Warwickshire Avon (Fig. 45), none can be earlier than the ice which destroyed the former pattern of the Soar/Bytham River drainage.

A scatter of single finds of hand-axes come from deposits of Terraces 2 and 4 of the Warwickshire Avon. A few others relate more to glacio-fluvial gravels or Head Deposits. Only further down the valley towards Tewkesbury, where the Avon is confluent with the Severn, are there a few sites that have yielded palaeoliths in slightly greater numbers: 12 hand-axes from the Twyning Pits (Whitehead 1992), 15 from Aston Mill Pit at Tiddington, and 5 from Beckford. With so many radical changes in the geography during the later Middle and Late Pleistocene it would be


WHITBY
KIRMINGTON
WELTON-LE-WOLD
DEVENSIAN OIS-4
"WOLSTONIAN" OIS-8 OR 6
PONTNEWYDD
ANGLIAN OIS-12
NARBERTH
RHOSSILI
ABBOTS PILL
WATCHET
BROOM PITS
ST BURYAN

Figure 43 (opposite) Ice limits of the Anglian and Devensian Stage glaciations of Britain. Also shown is the more controversial limits of a further 'Wolstonian' Stage glaciation and an extension into north Somerset, probably during the Anglian. The find-spots of palaeoliths around the fringes of the highland zone are also shown which suggest that they represent sites more recent than the Anglian and older than the Devensian (ie, mainly Period 2). Pontnewydd Cave is shown as it is a unique example of archaeological material being preserved within a cave, undisturbed by later ice sheets flowing past it

hazardous to try and reconstruct the landscape as experienced at any one time by the people who unquestionably had been in the area. As has been noted above, evidence for occupation in Period 1 is certain, if it is accepted that the glacial sequence above the vanished Bytham River was of Anglian age, the Hilton and Willington sites confirm that during Period 2, and there is evidence from the occasional records of Levallois flakes and cores, that there was some occupation during Period 3. Such have come from the same river terrace deposits at Twyning as the hand-axes in No. 4 Terrace, and at Beckford in No. 2 Terrace. Geological dating of the terrace deposits is controversial, but it is now confirmed that the terraces of the Warwickshire Avon descend in temporal order without any reversal of the lower ones as originally thought (Maddy *et al.* 1991).

The present correlations of the terraces of the Avon and the Severn are shown on Figure 45. Very few palaeoliths are known from the terrace deposits of the Severn. There is a hand-axe found below the river cliff at Sedbury, near Chepstow, which could have fallen from the gravel of Terrace 4 above, and three hand-axes with two Levallois flakes from gravel beneath the estuarine alluvium at Caldicote. Apart from a hand-axe and a flake from Terrace 3 at Worcester, there are a few hand-axes and flakes from Gloucester, and some at Easton-in-Gordano and Portbury, both well into the estuary. Those from Gloucester are of especial interest as they are in fan gravels from the Cotswold escarp-

Conventional Quaternary Stages	*OIS*	*Lower Soar*	*Trent (above Nottingham) and Lower Dove*	*Trent (Newark–Lincoln)*	*Approx age Ky*
FLANDRIAN	1	Floodplain deposits	Hemington Terrace Deposits Floodplain deposits	Floodplain deposits	11.5
	2 3 4 5a–d	Syston Sand and Gravel Wanlip Sand and Gravel	Holme Pierrepoint Sand and Gravel Beeston Sand and Gravel	Holme Pierrepoint Sand and Gravel Scarle Sand and Gravel	110
IPSWICHIAN	5e	Allenton Crown Inn Beds of Lower Derwent		Fulbeck Sand and Gravel of River Brant	130
	6	Birstall Sand and Gravel	Egginton Sand and Gravel	Balderton Sand and Gravel	186
	7			Thorpe-on-the-Hill Beds	245
	8	Knighton Sand and Gravel	Etwall Sand and Gravel	Whisby Farm Sand and Gravel	303
HOXNIAN	9 10 11				423
ANGLIAN	12	Oadby Till Thrussington Till	Eagle Moor Sand and Gravel Findern Clay Oadby Till Thrussington Till Hathern Gravel	Eagle Moor Sand and Gravel Skellingthorpe Clay	478

Table 10 Correlation of the terrace deposits and glacial tills of the River Trent, Soar, and lower Dove (based on Brandon and Sumbler 1988; Brandon 1996)

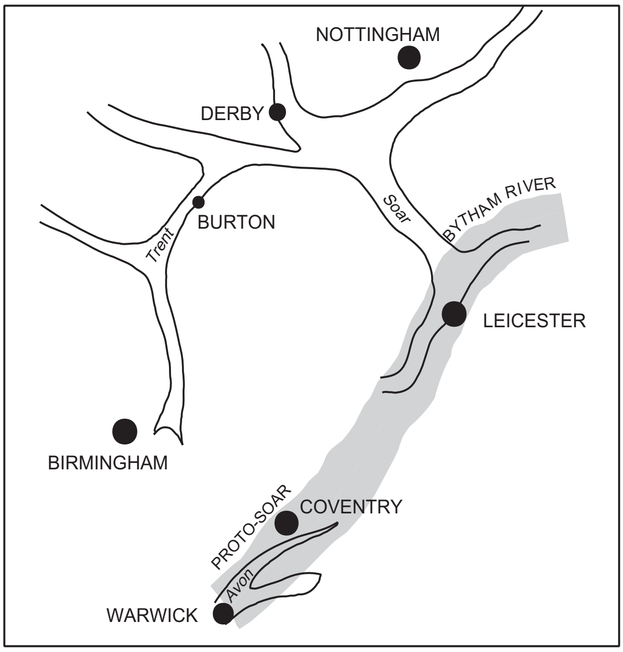


Figure 44 Pre-glacial drainage of the Midlands superimposed on that of the present day

ment which interdigitate with Terrace 3 deposits. As with so much of this area, such climatic episodes can only be very broadly dated as Middle or Middle–Late Pleistocene. The lists of sites throughout the region which follow can at least give some idea of where people were if not exactly when.

The Hilton sites (Map 32) are all in the Etwall Sand and Gravel, as is the village pit north of the railway at Willington. The remainder are in the Egginton Sand and Gravel except for the County Council Pit at Egginton which is in the Holme Pierrepont Sand and Gravel at floodplain level. This terminology for the terrace deposits is that resulting from the recent surveys of Brandon and Sumbler (1988; 1991) and Brandon (1996). It was found necessary to use different terminology for the Trent above and below Nottingham in order to avoid possible misleading correlations; similarly for the Lower Soar. Table 10 gives the current correlations and it can be seen that there is a higher Eagle Moor Sand and Gravel. This is regarded as outwash from the melting of Anglian glacial deposits. No palaeoliths have ever been recorded from this gravel. Also shown on this table are the names given to the various glacial deposits (tills) of the Anglian Stage. Occupation of the area during Period 1 has been shown by the hand-axes found in a river channel of interglacial age beneath the Thrussington Till at Waverley Wood Farm, at SP 365715 (A) (Shotton and Wymer 1989; Shotton *et al.* 1993).

Professor Shotton never accepted the conclusion by others (Bristow and Cox 1973; Perrin *et al.* 1979) that the glacial deposits were not of the Wolstonian Stage but of the older Anglian Stage, equating with those of East Anglia (Shotton 1953). Furthermore, Professor Straw has constantly maintained that there was a Wolstonian ice sheet which crossed the Lincolnshire Wolds and also came down from Humberside and covered the East Midlands (Straw 1979; 1981; 1983; Clayton 1953; 1979).

MAP 32. TRENT VALLEY: HILTON–WILLINGTON

	RIVER SEVERN				*RIVER AVON*	
OIS	*Environment*	*Terrace numbering and nomenclature*			*Environment*	*OIS*
		Higher Alluvium	1	First		
		Worcester	2	Second	^{14}C at Flatbury *c.* 38 Ky	
					Hand-axes and Levallois at Beckford and Aston Mills	
		Main	3	Third	Temperate fauna with Hippo at Eckington	5e
		Kidderminster	4	Kidderminster	Basal gravel glacial at Twyning	6
					Temperate fauna and hand-axes in upper gravel at Twyning	7
					Gravel at Ailstone	8
9	Temperate fauna at base	Bushley Green	5	Bushley Green	Temperate fauna at Pershore	
10	Upper gravel					
11						
12	Glacial outwash	Woolridge	6			

Table 11 Probable dating, environment, and sequence of terrace deposits of the Rivers Severn and Avon

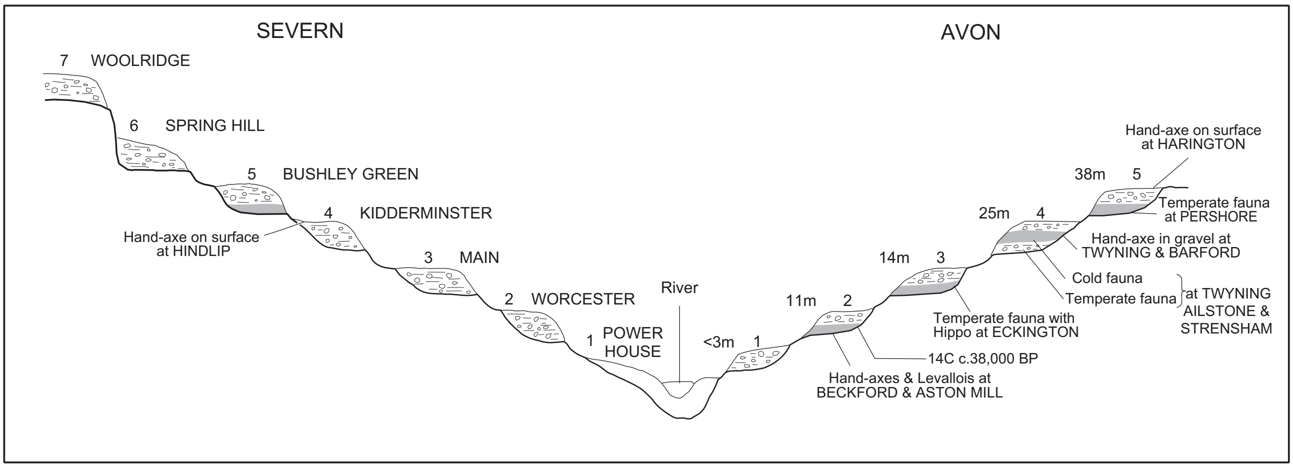


Figure 45 Diagrammatic section across the Terraces of the Rivers Avon and Severn to indicate the present interpretations of correlations and positions of palaeoliths in relation to the stratigraphy (based on Whitehead 1988; 1989; Maddy et al. *1991; in press)*

This has not generally been accepted, but more recently an ice margin has been claimed just south of Stourbridge and Kidderminster and considered to correlate with OIS–6 (Maddy *et al.* 1995). This could suggest an extensive ice sheet over the Midlands between the Anglian and Devensian Stages. This would obviously have had much influence on occupation of the area at a time when people may have been present further south during the more clement early and late glacial phases, or even during the summer months when periglacial climate was tolerable.

Thanks to the considerable study that has been done on the Palaeolithic collections that have been made since the finding of the first quartzite hand-axe at Saltley, Birmingham, in 1890, it is possible to obtain some knowledge of the movements of people during all three periods as defined in this survey. The most detailed and profusely illustrated account was made by Posnansky (1963), with a further assessment by Toms (1995). The majority of sites are listed in Roe's *Gazetteer* (1968). A major contribution is the description and gazetteer of the non-flint stone tools of the Palaeolithic in Britain edited by MacRae and Moloney (1988). This has a particular relevance to the Midlands as little flint is available in the region and what there is was brought in by one of the Anglian ice sheets. Thus quartzite or various tractable volcanic rocks had to suffice.

Before listing the various locations of Palaeolithic sites and their relation to the identified glacial stages, there are two important sites in Birmingham that should be considered: Quinton and Nechells (Kelly 1964; Horton 1974; Jones and Keen 1993, 87). At both sites there are interglacial deposits identified as those of the Hoxnian Stage (OIS–11 or OIS–9) above glacial till or fluvioglacial deposits of the Anglian Stage and, significantly, covered by later tills and gravels. The two sites are at different heights OD and there is controversy as to whether the overlying tills are *in situ* or are Anglian deposits displaced by solifluction. The former seems more likely, especially at Quinton, and if so this is further confirmation of a Wolstonian glaciation over the Midlands. Another recently discovered site which is relevant to this matter is at Frog Hall Pit, near Coventry. Organic deposits there are above the main glaciation (Anglian Stage OIS–12) of the Midlands and have been dated by amino acids method to OIS–9 (Keen *et al.* 1997). They consider that the most likely explanation is that a channel was cut at the end of the cold stage of OIS–10 and filled with organic deposits during the following interglacial.

3.6.2 Palaeolithic Sites in the Trent Valley Upstream of Nottingham

Sites below those on Map 32.

From Etwall Sand and Gravel or Egginton Common Sand and Gravel

None

From Beeston Sand and Gravel

BEESTON AND STAPLEFORD, Stoney Street Pit (SK 530370 (A)) 4 hand-axes
Tottle Brook Pit (SK 535375 (A)) 16 hand-axes

BASSINGFIELD, Gravel pit (SK 626377 (E)) hand-axe

From Holme Pierrepont Sand and Gravel

HOLME PIERREPONT, Hoveringham Gravel Pits (SK 623395 (E)) hand-axe

From Hemington Terrace Deposits

BEESTON AND STAPLEFORD, Attenborough Pits (SK 520349 (E)) hand-axe

From Alluvium

GUNTHORPE, Gunthorpe Lock (SK 688438 (A)) hand-axe

BEESTON AND STAPLEFORD, Attenborough RMC Pit (SK 517344 (A)) hand-axe

3.6.3 Palaeolithic Sites in the Trent Valley Downstream of Nottingham

From surface of channel below Balderton Sand and Gravel

THORPE-ON-THE-HILL, Redlands Aggregate Pit (SK 898661 (A)) Hand-axe

From Balderton Sand and Gravel

NORTON DISNEY, Norton Bottoms Pit (SK 866589 (A)) hand-axe

THURLBY, Butterleys Aggregate Pit (SK 886613 (A)) Levallois flake

DODDINGTON AND WHISBY, Whisby Quarry (SK 915675 (A)) 2 hand-axes

NORTH HYKEHAM, Redlands Aggregate Pit (SK 935675 (A)) hand-axe and core

From Thorpe Sand and Gravel of River Bain

TATTERSHALL THORPE, Bain Aggregates Pit (TF 230602 (A)) hand-axe

3.6.4 Palaeolithic Sites in the Valleys of the Soar and Wreake

From unspecified terrace gravel

RATCLIFFE ON THE WREAKE, Shipley Hill (SK 625138 (A)) hand-axe

From edge of Terrace 2 or Alluvium

HUNCOTE, Narborough (SP 520967 (E)) hand-axe

From Alluvium

SYSTON, Wanlip Gravel pit (SK 605115 (E)) hand-axe

BARROW UPON SOAR, Quorn Gravel Pit (SK 569166 (A)) hand-axe

ENDERBY, Found at Glenhills Boulevard, Leicester, but (Tyldesley 1987, 102) thought to have been brought from NGR given (SP 559999 (E)) hand-axe

3.6.5 Palaeolithic Sites in the Locality of Birmingham

From 1st Terrace Gravel

SHENSTONE, West of Birmingham Road (SK 111054 (A)) hand-axe

BALSALL, Rileys Pit (SP 202753 (A)) hand-axe (Shotton 1937)

From deposits mapped as Glacial Sand and Gravel

BIRMINGHAM, Erdington (SP 102936 (A)) hand-axe
Saltley, College Road (SP 101875 (A)) hand-axe of quartzite; first to be found in the Midlands
Saltley, Alderley Road (SP 095875 (A)) hand-axe
Edgbaston, junction of Harborne and Brook Roads (SP 044851 (A)) hand-axe

3.6.6 Palaeoliths Found in the Valleys of the Warwickshire Avon and Sowe

See Figure 45 and Table 11

From deposits of Terrace 4

BAGINTON, Baginton Park (SP 342745 (A)) 2 hand-axes

BISHOPS TACHBROOK, Heathcote (SP 309621 (A)) hand-axe

BARFORD, Pit (SP 280617 (A)) hand-axe

BIDFORD-ON-AVON, centre village (SP 100520 (A)) 2 flakes

TWYNING, gravel pits (SO 894364 (A))
12 hand-axes
Levallois core
Levallois flake

From deposits of Terrace 2

WARWICK, Priory Park (SP 284653 (A)) hand-axe

STRATFORD-UPON-AVON, Tiddington (SP 214553 (A)) hand-axe

HILL AND MOOR, Lower Moor (SP 978467 (A)) hand-axe

BECKFORD, pits south of Bredon Hill (SP 984362 (A)) 5 hand-axes
Levallois core
Levallois flake

KEMERTON, Aston Mill Pit (SO 943353 (A))
15 hand-axes
Levallois core
Levallois flake

From Alluvium

BURTON HASTINGS, Anker Bridge (SP 416888 (A)) hand-axe

BAGINTON, Bed of River Sowe (SP 333749 (A)) hand-axe

HANLEY CASTLE, Bed of stream (SO 833430 (E)) hand-axe

BREDON, Hardwick Bank (SO 918348 (E)) hand-axe

3.6.7 Palaeolithic sites in the Severn Valley

See Figure 45 and Table 11

From gravel of No.4 (Kidderminster) Terrace
TIDENHAM, foot of Sedbury Cliff
(ST 559933 (A)) hand-axe, presumed to have fallen from top

From gravel of No.3 (Main) Terrace
WORCESTER Henwick, Himbleton Road
(SO 837558 (E)) hand-axe
St John's Nursery (SO 835441 (A)) retouched flake
BROCKWORTH, Ermin Street (SO 895162 (E)) hand-axe
GLOUCESTER, Lillies Field Pit (SO 864175 (A)) 2 hand-axes
40 Acre Farm Pit (SO 865179 (A)) 11 flakes
Wellspring Road (SO 851197 (A)) hand-axe

From gravel of No.2 Terrace
EASTON-IN-GORDANO, Ham Green
(ST 535759 (A)) hand-axe
Ham Green Farm (ST 529757 (E)) flake

From gravel of No.1 Terrace
PORTBURY, N. of Sheepway village
(ST 492769 (E)) 3 hand-axes
Sheepway Farm (ST 494764 (A)) 6 'implements'

From gravel beneath estuarine alluvium
CALDICOT, Sudbrook foreshore (ST 501865 (A)) 3 hand-axes
(ST 499869 (A)) Levallois flake
(ST 493866 (A)) Levallois core

3.7 The Great Ouse

3.7.1 Summary

This is the fifth longest river in Britain and one of the largest drainage basins. For this section, only Palaeolithic sites in the western and southern part of the basin will be considered. All of the main tributary rivers involved (Ouzel, Ivel, Cam, Granta, Kennett) drain, with the Ouse itself, into the present Fens and Wash. So do those rivers on the west side of Norfolk (Lark, Little Ouse, Wissey, and Nar) and are part of the same Ouse basin, but for archaeological purposes it is more convenient to deal with them separately in the next section on East Anglia.

There is no lack of evidence for human activity in this large area, especially along the Ouse itself and the Nene, which is also included in this section as it also drains into the Wash from the west. There is very little in the Ouzel, Ivel, and the other tributaries now flowing through Cambridge. However, there is so much that is not understood of the evolution of the drainage system that it very difficult, if not impossible, to relate the Palaeolithic occupation to any reliable sequence, let alone contemporary environment. The large numbers of hand-axes of normal types as found at Biddenham, Kempston, and Peterborough presumably belong to Period 2 and the Levallois flakes and cores and probably many of the small and bout coupé hand-axes to Period 3. Apart from this identification by lithic technology, it would be very difficult to date them by any other method, although a Devensian date for some of the Period 3 occupation is fairly certain.

The reasons for these difficulties and uncertainties are mainly a result of two major factors: the proximity to possibly two ice sheets after the Anglian Stage (definitely one), and the effects of changing sea levels in the lower part of the basin. Similar events were noted in the previous section on the Midland rivers in their lower reaches. All that can be done is to attempt to relate some of the evidence for occupation to the little that does seem certain about the evolution of the Great Ouse drainage basin since the recession of the ice at the end of the Anglian Stage, presently dated to about 423,000 BP. There is nothing to indicate any occupation of the area before this major glaciation of Britain, but little if anything could be expected to be preserved, although it was seen in the previous section that pre-Anglian deposits with evidence for a Palaeolithic presence were found near Coventry.

Thus, it is generally accepted that the drainage pattern of the present system originated from that superimposed on the post-Anglian landscape of till plains and out-wash valleys. At the other end of the time scale there is strong evidence of increased fluvial activity into the Wash embayment, in the formation of Terraces 1 and 2 in the lower reaches of all the rivers, with great spreads of deltaic fans of gravel and sand in the estuaries. This could include the March Gravels which occur as islands or ridges protruding through the recent fen deposits, or such spreads of gravel over 3 km wide at Kennett and Kentford. The majority of these deposits are considered as Devensian, even though some of them, such as at Kentford, contain large numbers of palaeoliths. Others such as at Stoke Goldington, even though virtually at floodplain level, could date back to the pre-Ipswichian interglacial thought to relate to OIS–7. They must be the result of a succession of geological events in the Late Pleistocene, linked to fluctuating sea levels, with massive erosion of higher deposits and much reworking from one millennium to another. The Palaeolithic debitage of Periods 2 and 3 seem to have been jumbled together in the process.

What can be discerned of the vast interval of time between the Anglian and the Late Pleistocene? The answer is very little. There are interglacial deposits beneath the prolific site at Biddenham, but the date of them is unknown. There are interglacial deposits at Somersham in which a few Levallois flakes have been found but there is controversy as to whether it is an interglacial of OIS–5e or OIS–7.

Interglacial deposits at Barrington contain numerous hippopotamus bones so can be accepted as Ipswichian (OIS–5e) but there are no palaeoliths with them. The only earlier, dated interglacial deposits are the Woodston Beds at Peterborough, which are dated to the Hoxnian, although with an amino acid date suggesting OIS–9. Unfortunately, there is no archaeology associated, but this is not surprising as they were estuarine and presumably under water. Ostracods and molluscs indicate that the sea level at the time was between 14 m and 11 m. This is one of the biggest problems in the whole area and there is still no explanation why the Hoxnian Nar Valley Beds on the other Norfolk side of the Wash embayment as it was then should rise to a height of 23 m OD. Are the latter the sea level of the Hoxnian of OIS–11, and the Woodston Beds that of OIS–9?

It is also puzzling that the gravel of Terrace 3 overlies the Woodston Beds and has produced some 36 Levallois flakes, one actually being recorded as being found on the top of the beds in mint condition, but if the gravels were deposited during the latter part of OIS–8 this would not be surprising. The surface of Terrace 3 of the Nene at Peterborough is at 15 m OD, and the present Nene almost at sea level. The easiest explanation is that most of the terrace deposits in the whole of the lower part of the Great Ouse basin are of Late Pleistocene age and very little of the Middle Pleistocene has survived. This is the conclusion of several geologists (eg, Marr 1926; Bristow 1990). It is difficult to explain away the concentrations of artefacts, few as they are such as at Woodston and Kentford, but it is even more difficult to find an alternative.

Perhaps one factor which needs to be taken into account, is the effect on the drainage of a possible further ice sheet after the Anglian but before the Devensian. As has been mentioned several times, particularly in the section on the Midlands, what had previously been regarded as Wolstonian in the Midlands, is demonstrably Anglian. This has tended to give acceptance to all the tills in the Midlands being of that age, but there is mounting evidence this not so. Straw has for long put forward a case for a Wolstonian glaciation which at least came as far as the east Midlands. Gravels at Tottenhill, still in the Ouse basin but on the Norfolk side of the Wash, are now accepted as being deposited by glacial melt-water at the eastern margin of the Fenland (Gibbard *et al.* 1992). Maddy has identified till possibly of OIS–6 at Kidderminster (Maddy 1997a).

There is thus mounting evidence for such a glaciation, possibly during OIS–6. Coupled with the Devensian ice sheet which is considered to have reached north Norfolk, it is easy to imagine the effect of ice-dammed lakes if not an actual ice sheet on the landscape.

It is impossible to know what effect these real and postulated events may have had on the people who discarded their flint tools along the rivers. The prolific sites of Biddenham and Kempston must relate to the interglacial period represented by the organic deposits underlying the gravel at the former site, although some almost certainly pre-date it. Presumably this is occupation during Period 2, but the apparent presence of some Levallois flakes suggests Period 3 as well. However, which interglacial is involved is unknown. About the only site that gives reasonably certain dates for Middle Palaeolithic occupation is the one at Little Paxton, probably of Middle Devensian date, while that at Somersham is likely to be of the interglacial period of OIS–7. If the latter should prove to be of Ipswichian date (OIS–5e), then it will be the first site in Britain to indicate definitely that there was human occupation here at that time.

Apart from the large numbers of hand-axes at Kentford in the gravel fan in the lower part of the valley of the River Kennett, and the Peterborough sites, there is little evidence in the other tributaries to show there was much movement along them. Nothing is known in the Welland. The Ouzel has a few find-spots of palaeoliths at Bletchley and Leighton Buzzard. There is nothing definitely from river terrace deposits along the Ivel until its confluence with the Great Ouse between Blunham and Tempsford, although there are rich lacustrine sites near its source (see Chapter 5). There are a few stray finds in the low level terraces of the Cam and Granta and, although four terraces have been identified around Cambridge, the conclusion is that, as with the Peterborough area, they are all of Late Pleistocene if not Devensian age. This seems very unlikely. They contain a few palaeoliths, but considerable numbers have come from the higher Observatory Gravels at Girton at about 26 m OD. These are in Head Gravels but must represent occupation in the area during Period 2.

Similarly, on each side of the River Granta, sometimes known as the Lin, at Hildersham and Little Abington, palaeoliths have come from high level gravels and also probably represent occupation along this valley during Period 2. These gravels are mapped as glacial gravels but are more likely to be river terrace deposits much contorted by permafrost during later cold stages.

It has to be concluded that there are enough palaeoliths found in this part of the Great Ouse basin to show it was visited and possibly well-favoured, but geological events have so disturbed the evidence that at present little can be stated of exactly when and where.

3.7.2 Great Ouse: Bedford to Earith

The old gravel pits on either side of the Bromham Road at Biddenham, on the outskirts of Bedford, have the distinction of being the first prolific Palaeolithic sites to have been discovered in England. This was in 1861, by James Wyatt. He found hand-axes *in situ* and beds rich in temperate, mainly aquatic, shells at the base of the deposits on Oxford Clay, together with elephant tusks and organic beds. He recorded his findings with admirable precision and detail (Wyatt 1861; 1862; 1864).

Most of his later finds were made in the Deep Spinney Pit, now designated a Site of Special Scientific interest, on the south side of the road. He was soon finding other Palaeolithic sites in the district, especially at Kempston on the other side of the river, but apparently in the same terrace deposit. Unfortunately, when Roe produced his invaluable *Gazetteer of Palaeolithic Sites* he was unable to relate the great majority of the material from Biddenham preserved in numerous museums to particular pits. However, the 304 hand-axes listed by him as coming from the general provenance of Biddenham almost certainly came from these pits (Roe 1968, 2). Over the years, the various pits at Kempston have also produced large numbers of palaeoliths, eg, 65 hand-axes from Foulke's Pit and 445 with just a general Kempston provenance (Pinder 1988).

These rich sites around Bedford remain the only known prolific sites in the whole of the valley of the Great Ouse from its source to the Wash. Others may still await discovery but, at present, it is puzzling. The Biddenham sites are on Terrace 3, which is the highest terrace in the valley. Dating is difficult, but a trial re-excavation of the deposits in the Deep Spinney Pit in 1986 (Harding *et al.* 1992) relocated the shell bed and found two flakes and a core lying directly on the Oxford Clay. The valley is cut through Boulder Clay which is taken to be of Anglian age, so the Biddenham gravels must be more recent.

As there are no higher terrace deposits, the interglacial represented by the shell bed could well be Hoxnian (OIS–11) or OIS–9. As interglacial deposits at Stoke Goldington (Green *et al.* 1996) are almost at the level of the floodplain and have been assigned by U/Th dates and amino acid geochronology to the temperate episode of OIS–7 the Biddenham deposits must be considerably older. This would accord well with Period 2 occupation in the valley. As can be seen from the maps, there is a scatter of sites along the valley but there are none known in the upper reaches west of Newport Pagnell.

If a postulated glacial event of OIS–8 or OIS–6 did actually spread over the Jurassic escarpment into the Midlands, there is little to indicate or suggest that it ever came so far west or south as Bedford. However, the absence of higher terraces may be relevant. Interpretation of the terrace deposits along the whole valley are hampered by the lack of published work. There is no BGS 1:50,000 Bedford sheet yet available, although survey work in the Bedford and surrounding area is of great value (Horton 1970; Horton *et al.* 1974). Only two low terraces have been identified above Newport Pagnell and both are considered to be of Devensian age. Downstream of Bedford there is a third higher terrace at up to 13 m above the floodplain of the Ouse but it is difficult to distinguish this from the lower terraces as they are only divided by a break of slope. Hence, Maps 33 and 34 only show undifferentiated terrace deposits. Similarly, Terraces 1 and 2 below Bedford cannot usually be distinguished by their visual topography.

MAPS 33 and 34. VALLEY OF THE GREAT OUSE: BEDFORD–EARITH

The Stoke Goldington site mentioned above is perhaps the most informative so far investigated, although unfortunately it has no archaeological element. However, it exemplifies the complications of attempting to produce chronological sequences of deposits at other sites without the application of multidisciplinary techniques to available or purposely dug exposures. The lower channel at Stoke Goldington of OIS–7 was cut into a gravel deposited during cold conditions (OIS–8?) and filled with temperate organic beds. This was then truncated and covered by further gravel deposited under cold conditions (OIS–6?). A further episode of downcutting produced the upper channel which was infilled during the latter part of the Ipswichian Stage interglacial (OIS–5e). The whole sequence was partly eroded away during the Devensian Stage. There is no reason to think that past sequences during earlier glacial–interglacial stages were any less complex.

The only other site in the valley of the Great Ouse that has been investigated by similar methodical multidisciplinary techniques is at Somersham, just off Map 34 at TL 375798. Temperate sediments were below the gravel of a former course of the Ouse. They were laid down by brackish water under tidal conditions. The overlying gravel were deposited during a cold stage and show freshwater, brackish, and marine conditions (West *et al.* 1994).

The temperate sediments were regarded as of Ipswichian age (OIS–5e). However, Keen (1990) is of the opinion that the presence of shells of *Corbicula* *fluminalis* as found in the temperate deposits are indicative of an interglacial (OIS–7) earlier than that of the Ipswichian (OIS–5e). Associated with them were a few diagnostic Levallois flakes. This will be considered below, but first there is the question as to whether people ever occupied this area during the early Middle Pleistocene in Period 1.

The Valley of the Ouse is clearly cut through Boulder Clay, taken to be that of the Anglian Stage. No deposits pre-dating this till have ever been found in the area so there is nothing to show that people were ever in the valley before this glaciation. If they had have been, which is very likely, the passage of Anglian ice may have destroyed any sites that once existed. Yet, as seen in the buried channel of the lost Bytham River near Coventry (Section 3.6) there were people in that part of the Midlands during Period 1, so there is no reason why they should not have been in the valley of the Great Ouse.

The dating of the human occupation of Britain in the Late Pleistocene has been a controversial matter for many years, partly because of the difficulties, as noted above in respect of the Somersham site, of relating the interglacial episodes represented by sediments with unequivocal temperate flora and fauna with the Oxygen Isotope Stages. This is especially true of the 'Last Interglacial' which is the Ipswichian Stage of the conventional chronology. There has been doubt from some time that no interglacial existed between the Hoxnian and the Ipswichian. Now, it would seem most likely that the Hoxnian can be represented by the interglacial deposits at Swanscombe and Hoxne (OIS–11), and that there were two other interglacial periods (OIS–9 and OIS–7) between the Hoxnian and the Ipswichian; also that the Ipswichian Stage should be restricted to sediments that can be equated with the type site at Bobbitshole near Ipswich and Trafalgar Square in London (OIS–5e).

Other Pleistocene interglacial sites such as Marsworth, Stanton Harcourt, and the Stoke Tunnel Beds at Ipswich would, mainly on the basis of amino acid dating and faunal assemblages, relate to OIS–7 (see Jones and Keen 1993, 119–22, for a summary of these problems). They are particularly relevant to the deposits in the drainage area of the Great Ouse. Ten years ago Wymer (1988) could not be confident that any of the Ipswichian sites accepted as being of OIS–5e date had any evidence to show that Britain was occupied at all. Nothing has yet been discovered to show this was otherwise. However, several sites with interglacial river sediments regarded as of OIS–7 did contain Palaeolithic artefacts that were contemporary, eg, Crayford, Stoke Tunnel, Stutton, West Drayton, and probably Stanton Harcourt. Only Crayford was a prolific site and it remains an archaeological enigma why virtually all the other sites are represented by very few artefacts.

Those in the valley of the Great Ouse are no exception. However, there are numerous sites in the lower terrace deposits that have produced one or just a few Levallois flakes or cores, and an occasional bout coupé hand-axe. In most cases they are associated with normal hand-axes. A recent paper on the radiometric dating of the Middle Palaeolithic tool industry at Pin Hole Cave, Derbyshire (Jacobi *et al.* 1998) concludes that Britain was recolonised during OIS–3 (*c.* 50–38 Ky). In the Lower part of the Ouse valley there are extensive spreads of deposits which date to the Late Pleistocene so, although much further work needs to be done upon them, enough has been conducted to warrant giving a special consideration to the associated palaeoliths. Thus, the individual sites in the lists for Maps 33 and 34 have * put beside them if they have produced any artefacts of Levallois technology.

It is significant that of all the sites in the lists that have yielded Levallois artefacts, they come from Terraces 1–2 or Alluvium. The only exceptions are 4 cores and 19 flakes from a general provenance at Biddenham, a flake from Foulkes pit, and another at Bunyan Road, both at Kempston, and a core and 9 flakes from a general provenance at the same place. This does indicate a Levallois element in Terrace 3. This could mean that Levallois artefacts pre-date OIS–7, or that Terrace 3 at Biddenham and Kempston is more recent than OIS–7 or could be partly of the latter part of OIS–8.

This would conform with evidence from the Thames Valley, where present knowledge suggests that Levallois technique appears at the end of the cold period related to OIS–8. As the artefacts in question at Biddenham and Kempston are mainly unprovenanced it would not seem wise to make any conclusions from them.

There are at least two unpublished Levallois flakes from the Somersham site mentioned above which come from a probable OIS–7 context and that some others from terraces mapped as Terraces 1–2 are probably of the same age. Those from the alluvium (St Ives, junction of new and old rivers; Fenstanton, close to Great Ouse and Swavesey, from the Great Ouse) could be also the same age or Devensian. People were certainly in the area at times during Period 3.

Bout coupé hand-axes have come from the following sites:

FENSTANTON, pit south of Cambridge–
Huntingdon Road (TL 307685 (A))
Close to Great Ouse, in near mint condition
(TL 317700 (A))
St IVES, Meadow Lane Pit (TL 324710(E))
LITTLE PAXTON (G)
HEMINGFORD GREY, Marsh Lane Pits
(TL 303695(A))
BEDFORD (G) (Refs.: Tyldesley 1987; Roe 1981)

Apart from Biddenham, the only Palaeolithic site that has been recorded in any detail by archaeologists is that at Little Paxton, near St Neots (Tebbutt *et al.* 1928; Paterson and Tebbutt 1947). Some of the hand-axes are of or approach bout coupé types. The 'Levallois' flakes described and figured by Paterson resemble hand-axe thinning flakes but there is at least one Levallois flake-blade. Professor Marr, in his note on the geology with Tebbutt's report, comments that the Little Paxton gravels are more recent than a deposit at a higher level at Brampton, further down the valley, which contained mammalian remains including hippopotamus.

If this is so, then the Little Paxton terrace deposits, virtually at floodplain level, would in present terms be of Devensian date. The palaeoliths would certainly fit in with what little is known of what might be regarded in Britain as an insular version of Mousterian of Acheulian Tradition. Some, perhaps the majority, of the Period 3 sites mentioned above could also be of this date. Roe (1981, 224) is of this opinion.

Also very relevant to the past environment and chronology of Period 3 occupation in this lower part of the Great Ouse drainage basin, now the Fens, are the so-called March Gravels. They occur in a broad belt mainly between Peterborough and Manea, protruding as low ridges or islands through the relatively recent fen deposits. They contain a very mixed fauna, both freshwater and marine.

There have been many interpretations of them since Baden-Powell (1934) produced a valuable list of all the exposures then visible. He saw the 'islands' as relics of gravelly sandbanks 'which would have dry at low tide like those in the existing Wash.' Others thought they may have partly been fans of fluvial material deposited in shallow water (Gallois 1988). Current interpretation favours the March Gravels as being the seaward extensions of the terrace deposits of rivers draining into what is now the Fens (Castleden 1980; Gallois 1988; Horton 1981; 1989). The importance of these deposits for this survey is that, sparse as they are, Palaeolithic artefacts have come from several sites where March Gravel has been dug. Baden-Powell (1934) refers to and figures a couple of flakes from Manea and Wimblington.

In a further paper on the palaeoliths from the fen district (Baden-Powell 1950) he records hand-axes from the March Gravels at Whittlesey, Grays Moor near March, and at New Park, March. Of the few flakes he also records, none is definitely Levalloisian.

It is unfortunate but none of the palaeoliths can be certainly related to the temperate deposits underlying the March Gravels, except those from Somersham mentioned above. Neither is it conclusive as to whether the temperate deposits relate to OIS–5e or OIS–7, or both. There were no archaeological discoveries found during recent investigations in the March Gravels at Northam Pit, Eye (Keen *et al.* 1990) and, although there was excellent palaeoenvironmental evidence recorded, there is still some doubt as to which interglacial was involved. Pollen analyses indicate a high rise of *Carpinus* (hornbeam) in the profile which is characteristic of the Ipswichian Interglacial (OIS–5e), but as is emphasised, not one complete pollen diagram yet exists for the earlier one of OIS–7.

If the March Gravels could be correlated with the terraces of the Nene, a more definite date for them might be forthcoming. Terrace 1 of the Nene is thought to be more recent than the March Gravels and this is corroborated by the radiocarbon dates obtained from mammalian bones found in this Terrace 1 at Great Billing near Northampton of 28,225±330 BP (Brown 1983). Furthermore, interglacial deposits in Terrace 1 of the Welland have produced a pollen profile considered to be Ipswichian but, as stated above, this cannot be considered conclusive (French 1982).

If the March Gravels are correlated with Terrace 2 of the Nene, a pre-Ipswichian date would be most likely for some if not all of them. More recently, further investigations of March Gravels at Chatteris, March, and Wimblington have produced Ipswichian pollen diagrams (West 1987; West *et al.* 1995) below March Gravels considered to be Devensian. They suggest that the term March Gravels should be restricted to such Devensian Gravels, 'while the Ipswichian marine-influenced sediments are placed in a separate unit, the Wimblington Beds.'

In view of the complexity and uncertainty of the Late Pleistocene sequence in the lower part of the valley of the Great Ouse, this more precise terminology should prevent confusion between the gravels with reworked marine fauna and the *in situ* marine fauna of the interglacial sediments. The palaeoliths may be sparse but there is some evidence to suggest that there was human occupation around the edges of a former Wash during the interglacial of OIS–7, and possibly during OIS–3 or OIS–4 of the Devensian Stage.

3.7.3 River Cam: Cambridge

The City of Cambridge is on the edge of the Fens. Four terraces have been recognised (Marr 1920; Worssam and Taylor 1969) and, as with the Nene and Kennett, all are considered to be of Late Pleistocene age although this seems very unlikely. There are no sites in river terrace deposits in Cambridge with reliable provenances that have yielded more than a couple of hand-axes and the few there are have come from deposits of Terraces 2, 3, and 4.

The only relatively prolific Palaeolithic sites are in the Observatory Gravels (Marr 1920) but as these are regarded as Head Gravels they are noted in Chapter 6. Map 35 of the sites in Cambridge is given in view of the

MAP 35. RIVER CAM: CAMBRIDGE

considerable literature devoted to them resulting from their proximity to the university.

3.7.4 *River Nene: Northampton*

As with the Ouse there are only low terraces in the upper parts of the valley of the Nene, mapped as Terraces 1 and 2 and rarely very discernible except by a break of slope. Such is the case at Northampton. Geological studies by various investigators (especially by Castleden 1976; 1984; Holyoak and Seddon 1984) have all concluded that both terraces are of Late Pleistocene date and some parts certainly Devensian as a radiocarbon date of 28,220±BP was obtained from organic clays in gravel at Ecton, just west of Northampton (Morgan 1969).

The scatter of few hand-axes and flakes found in these terrace gravels may well contain artefacts derived from the higher and older terraces which have presumably been eroded away. Others could be contemporary with the deposition of them and perhaps indicate some occupation in the area during Period 3. Of those sites shown on Map 36 for Northampton all are from areas mapped as Alluvium. It has to be realised that very late Pleistocene or Holocene alluvium may be covering Nene deposits of various somewhat older periods. There are three hand-axes from the Weedon Road Pit, one from the Cattle Market, two from Cow Meadow, and flakes from the Castle and Cow Meadow.

The greatest number of hand-axes found at one site is only five from the pit at Little Houghton. There were also five from Duston but only from a general provenance and not necessarily from river deposits. Posnanksy (1963, 382–3) lists most of these sites but does not figure any of the artefacts. This is insufficient evidence from which to deduce much about any Palaeolithic occupation along this part of the river and, coupled with the little that is understood about the evolution of the valley from its inception after the recession of the Anglian ice, little more can be written. The river was cutting through a great mantle of Boulder Clay on the land and no reconstruction of the landscape at any particular time is possible, other than from Late Pleistocene times it was probably not so very different to that of the present day. However, there are two sites at Northampton which give a glimpse of past human activity, one of which is astonishing although there are no palaeoliths directly associated with it.

At a gravel pit between Great Billing and Ecton (No. 12 on Map 36) animal bones were found which had been dredged out by commercial gravel workings (Brown 1983) but, from the silt adhering to them, could be related to similar organic silts as had been found previously with plant and beetle remains indicative of a cold climate (Morgan 1969). The animals were identified as horse, mammoth, reindeer, and woolly rhinoceros: a typical Pleistocene cold climate assemblage.

Artefacts were also retrieved, but not necessarily associated with them, consisting of a possible Levallois flake, five flakes with one retouched, and a small ovoid hand-axe. Most were abraded so may have been derived from eroded land surfaces earlier than the radiocarbon date. The report cautiously suggests they broadly resemble the 'Levallois and Mousterian flints found in the Nene second terrace at Woodston near Peterborough.' This could be of the same age, so there is some support for occupation in the valley during Period 3.

MAP 36. RIVER NENE: NORTHAMPTON

An unusual site was discovered at a pit near Little Houghton (No. 10 on Map 36). At the base of the floodplain gravels a depression was revealed containing organic clay (Smith 1995). There were mollusc, beetle, and ostracod remains which indicated a cool but not glacial climate. Around this depression were large numbers of broken bones, tusk, and teeth of reindeer, woolly rhino, bison, mammoth, and straight-tusked elephant. This, by comparison with what is known of modern waterholes, especially in Africa, prompted the convincing interpretation that this was a uniquely preserved waterhole. Furthermore, a sunken linear feature with a compressed base, was interpreted as a pathway as used by numerous beasts to waterholes. Nothing of this nature has ever been recognised and recorded before. There may be some connection here with the mapping of glacial lake deposits in patches along the floodplain of the Nene by Northampton. The straight tusked elephant, *Palaeoloxodon antiquus* is not known in Britain after the Ipswichian Stage (Stuart 1982; Sutcliffe 1985) so, as the deposits are not interglacial, then this intriguing feature may be Late Ipswichian–Early Devensian or earlier. Also, it may not be coincidental that five hand-axes are recorded from this pit.

3.7.5 *River Nene: Peterborough*

Palaeoliths occur in all of the three terraces recognised in the Peterborough area as described in the BGS *Memoir* (Horton 1989). Of special interest are the interglacial deposits found on the south side of the Nene in the old Hick's Brickyard. These are known as the Woodston Beds and have been fully investigated and recorded (Horton *et al.* 1992). The importance from the archaeological aspect is that the Woodston Beds have been dated as Hoxnian (Ho II Early-temperate) and they underlie Terrace 3 gravels which contain hand-axes.

This is not surprising as post-Hoxnian gravels are the usual source of hand-axes. However, there are not only 18 hand-axes recorded from Hick's Pit but also 36 Levallois flakes including one found on clay at a depth of 4.5 m, presumably on top of the Woodston Beds (M. Gillespie, pers. comm.).

Elsewhere in this area south of the Nene from Woodston to Orton Longueville, the majority of stray finds of hand-axes and Levallois flakes come from Terrace 2 deposits. The only other fairly prolific site is also at Woodston: Baker's Pit with 14 hand-axes and numerous flakes including 10 of Levallois type. The few hand-axes from Orton Longueville found in pits at Longueville Park and north of Church Drive are on areas mapped as Terrace 2 or 3. Similarly, on the north side of the river, the occasional finds of hand-axes and Levallois flakes come from Terrace 2.

The exceptions are one hand-axe from Newark Cemetery, from Terrace 3, and possibly another from New England. There are also a few Levallois flakes and hand-axes from Terrace 1, and a few others from March Gravels at Whittlesey, just off Map 37. With such a spread of material from deposits at different levels, what can be made of the periods when this lower part of the Nene valley was occupied before the maximum of the Last, ie. Devensian Glaciation? The Levallois material clearly indicates occupation during Period 3 as defined in this survey, but exactly when and in what sort of environment?

MAP 37. RIVER NENE: PETERBOROUGH

The Woodston Beds do give a starting point to the above questions. They represent the estuary of a Proto-Nene into an embayment which was initiated during the Anglian Stage and during the Hoxnian resembled something like the present Wash. Unfortunately, apart from the Levallois flake found apparently on the top of it in Hick's Pit, nothing Palaeolithic is known from these Woodston Beds. However, they appear to be the earliest deposits known after the great sheet of till which covered the area and upon which the present pattern of drainage was eventually imposed.

This till is accepted as of Anglian age but, as has been noted in the section on the Midlands and the Great Ouse, ice may have entered this part of England during a later part of the Wolstonian of the conventional chronology. Although the till beneath them must be earlier than the interglacial Woodston Beds, it could perhaps be a more recent till than that of the Anglian Stage. If so, this would infer that the Woodston Beds were more recent than the Hoxnian type site, in spite of the strong evidence from the Mollusca, micro-mammals, ostracods, and pollen which support the correlation.

It will be seen in the next section on East Anglia that recent work has concluded that the Nar Valley Beds, dated to OIS–11 on the basis of the Hoxnian pollen sequence, have U/Th dates which suggest they are more recent and deposited during OIS–9. This also infers that there are seemingly two temperate stages with palynological affinities. This is supported by amino acid dates of the Woodston Beds and therefore everything else from Terrace 3 to the present Alluvium would post-date it.

Another major problem which has been mentioned in the summary for the whole area of this western half of the Great Ouse basin is the fact that the level of the marine influence in the Woodston Beds is between 14.0 m and 11.0 m OD, yet on the other side of the present Fens, the Hoxnian Nar Valley Beds are found between 2.50 and 23.0 m OD. Horton *et al.* (1992, 162) suggests three possible reasons for this 10 m discrepancy: height differences of the land either side of the embayment controlling the areas of deposition from the marine incursion; different effects of high spring tides on either side of the embayment; and differential warping or tectonic movement since the Woodston Beds were formed. The latter can perhaps be ruled out as the terraces of the Nene have uninterrupted seaward gradients.

An alternative could be that the Woodston Beds were originally much thicker and reached the same levels as their counterparts on the opposite side of the embayment. What is seen now may be the eroded remnant of such an aggradation. Horton notes that the top of the Woodston Beds are eroded and apparently interdigitate with the fluviatile deposits of Terrace 3. This would suggest enormous changes in the landscape since the Hoxnian. With the evidence for a post-Hoxnian pre-Devensian glaciation presented by the outwash gravels at Tottenhill (Section 3.8.3) on the east side of the Fens and perhaps 100,000 years or more between the Woodston Beds and Terrace 3, this could seem less remarkable.

It could mean that the top of the Woodston Beds was a land surface during the time of occupation of Period 3, from which Levallois material was swept off into the Terrace 3 Gravels, which also brought in hand-axes from older gravels being eroded away. Terrace 2 Gravels would also incorporate derived artefacts, although some might be more recent. This is speculative and all that really can be stated is that the numbers of abraded hand-axes must almost certainly include a high proportion derived from Period 2 surfaces or deposits. Also, that people must have been in the vicinity of this estuary of the proto-Nene during Period 3.

It would seem that a somewhat similar situation exists in the minor tributaries that drain into the southern part of the Great Ouse Valley: the Cam or Granta, Cam or Rhee, Granta all uniting just south of Cambridge, and the Kennett which is confluent with the Lark just west of Mildenhall.

From the Palaeolithic aspect the Kennett is the most interesting valley for considerable numbers of palaeoliths have been found in the gravel pits at Kentford. At least 150 hand-axes come from deposits of Terrace 4, and another 102 from Kennett or Kentford with just a general provenance.

Others come from Terrace 3. As with the Nene and Great Ouse, these Kennett gravels form a great fan into what was presumably an earlier embayment than the Wash. Bristow (1990) does not regard any of these gravels as being older than the Devensian Stage. It is difficult to reconcile this with the large assemblages of hand-axes at Kentford and Kennett but there is a record of hippopotamus from these higher terrace deposits (not known in England after the Cromerian Stage except in the Ipswichian) and a few Levallois flakes mixed with the hand-axes if the records are correct.

Again, this is very unsatisfactory for the purpose of this survey, for it is impossible to understand any sequence of events or reconstruct any former landscape beyond something like the Wash today during interglacials. In glacial periods there must have been torrents of meltwaters from snow-covered hills that reworked the terrace deposits, spreading them out in the fans that remain today. Yet, it seems odd that the palaeoliths around Kentford were not more dispersed.

Moving into the River Granta, downstream of Linton there are patches of gravels, mapped as glacial sand and gravel, well above the river on either side of the valley (Marr 1909, 534). Two of them on the north side have produced palaeoliths: 11 hand-axes, 5 cores, and 23 flakes from a gravel pit on Furze Hill (TL 552488 (A)); and a hand-axe and a flake from a pit at Little Abington (TL 542500 (A)). Perhaps these deposits escaped the drastic erosion of the landscape, but it is impossible to date them.

A few hand-axes have come from river terrace gravels in the upper reaches of the Cam or Granta, particularly at the Vineyard, Saffron Walden (TL 531392 (E)); the Bordeaux Pit at Littlebury (TL 513413 (A)); and at Vintners, Great Chesterford (TL 503427 (A)).

3.8 The Rivers of East Anglia

3.8.1 Summary

All of the river valleys in this section represent a drainage superimposed on a till plain; that is the detritus of clay, sand, and gravel left on the glaciated landscape after last melting or recession of an ice sheet or ice sheets. Previous pre-glacial drainage patterns have been obliterated and sub-glacial valleys and the scourings of glacial melt-waters initiated new courses which eventually found their way to the sea. Pro-glacial lakes formed where drainage was restricted, gradually to silt-up during ensuing interglacials. This is the inevitable consequence of the cycle of glacial and interglacial periods, which has been noted for all the rivers in the sections in this chapter where the land has been glaciated. In East Anglia, such events have left behind them a wealth of deposits and features that have made it the most studied region for the Quaternary history of Britain. Most of the stage names for the conventional chronology of the Geological Society (Mitchell *et al.* 1973; see Table 12) are named after type sites at East Anglian localities, eg, Cromerian, Hoxnian, Ipswichian in the Middle to Late Pleistocene, let alone Anglian for the stage in which the ice sheets reached further south than any known previously or later.

There are many Palaeolithic sites in this region which can be placed in this conventional or other form of chronology, or give some light on the contemporary environment and activities, limited as it may be, of the early occupants. However, much is not yet understood and there are many controversial matters. Even the number or extent of actual glacial episodes is queried by some, and correlations from one site to another may be disputed. It is not intended to suggest that such healthy questioning is more evident here than with similar problems elsewhere in the country; it is merely that so much is preserved of geological events from the very beginning of the Pleistocene that the chances of unravelling it is more likely.

On the other hand, the more there is the more complex it becomes, emphasising the dangers of interpreting what appear to be simple sequences elsewhere. What is missing in the geological record may be more significant than what is present. For the purpose of this survey, these matters will be restricted to those which directly relate to the people who were here. So, it would seem best to consider things chronologically, starting at the earliest known time for a human presence in East Anglia, ie, that part of Period 1 before the Anglian Stage. For this, there is plenty of evidence.

First, what can be surmised of the landscape at that time? Two major rivers flowed from west to east across

NETHERLANDS (Cromerian Complex & correlation with OIS (Zagwijn 1996) *Chronology*	*OIS*	*Deposits/Sites*	*Type localities*	*West (1980)*	*Turner (1996b*
		Arctic Freshwater Bed	Mundesley and Bacton		
Interglacial IV	11	Freshwater Beds at West Runton, Overstrand, Mundesley, and Ostend		CR IV	CR III–IV
Interglacial III	13	*Leda Myalis* Bed (marine) at Bacton, Mundesley, and Paston		CR III	long hiatus
		Mundesley Clay	Mundesley		
Interglacial II	15	Division between marine sediments and freshwater sediments below			
		Freshwater Beds	West Runton	CR II CR I	CR I–II
		Bruhnes/Matuyama palaeomagnetic reversal			
Interglacial I	21				

Table 12 Alternative interpretations of the chronology of the Cromer Forest Bed Formation
The stratotype of the Cromerian Stage is at West Runton. There are various interpretations of the succession in Britain and the sequence of glacial and interglacial periods of the Cromerian Complex in the Netherlands cannot, as yet, be correlated with it with any certainty. West (1980) suggests that the succession may relate to one interglacial; Turner (1996b) sees a long hiatus between CR I–II and CR III–IV; Meijer and Preece (1996) consider that the early part may relate to one stage and the late part to the late and post-temperate stages of a completely different interglacial. NB: no correlation is implied in this table between the four identified interglacials of the Netherlands and the four sub-stages of the Cromerian

East Anglia, the ancestral Thames, and the lost Bytham River from the Midlands. Their actual courses are controversial (see below). The Thames may have flowed across to near Aldeburgh and deposited the Kesgrave Sands and Gravels, or it may have flowed farther north to what is now the north Norfolk coast. The Bytham River made a wide loop up from Bury St Edmunds towards Lowestoft and deposited the Bytham Sands and Gravels, or it may have been a right bank tributary of the proto-Thames (Fig. 46). Whatever is eventually concluded, these rivers presented easy routes along their gravelly valleys into the area, the Midlands and elsewhere.

Where from? The southern North Sea of the present time would have been mainly dry land with the coastline much further north, probably running in an east–west line with continental rivers debouching into it (Gibbard 1988). No previous lowland glaciation is known so there would have been no till plains. The Chalk escarpment which still makes such a conspicuous feature on the west side of the Chilterns would probably have been even more impressive, cut through by the Bytham River, giving access to the Midlands. Much of the upper Tertiary rocks through which the ancestral Thames would have flowed have been eroded away, but even with lesser areas of London Clay outcropping, the southern part of East Anglia was probably undrained and forested.

This is the Cromerian Stage and the time of the formation of the famous Cromer Forest bed, with its freshwater and marine sediments that can be traced at about present sea level in the sea cliffs from Weybourne to Southwold (West 1996). They contain a rich temperate fauna of elephants, deer, and other large mammals. Some different interpretations of the sequence of the formation of the Forest Bed are shown on Table 12. Suffice, for this survey, to note that some of the Forest Bed would have formed during the time when people of Period 1 were about. Clays and muds were still forming about half a million years ago, when the climate was gradually cooling and the arctic ice sheet would eventually advance and reduce the landscape to a polar desert. However, before this happened, it would have seemed that this was a very favourable area for Palaeolithic occupation, yet not a single totally acceptable flint artefact has ever been found in the Cromer Forest Bed. Past claims for rostro-carinates, eoliths, and suchlike can be ignored. There are a few possible pieces, but something definite is required before a human presence can be confirmed. The famous site at Boxgrove, in Sussex, is dated to this period (OIS–13) or perhaps earlier, and there are other sites in East Anglia of this time which can now be mentioned. The evidence at these latter sites is for relatively intense occupation to judge by the large numbers of palaeoliths the people left behind them.

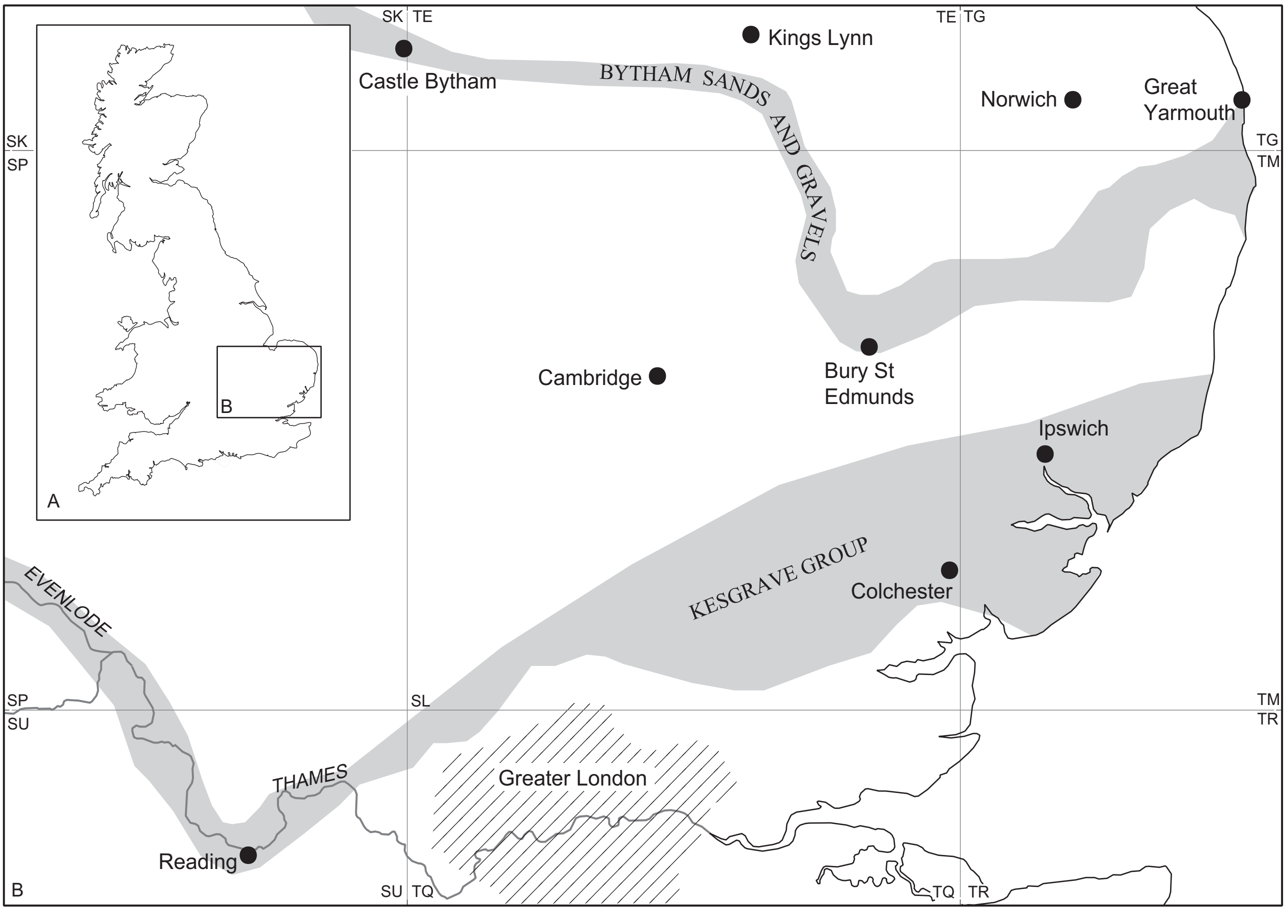


Figure 46 Courses of the Bytham River from the Midlands and the ancestral Thames, represented by the Kesgrave Sands and Gravels. Both river systems were diverted by the ice sheet of the Anglian Stage; the Thames into its present valley below Bourne End and the Byham River totally obliterated. No palaeoliths have been found in the Kesgrave Sands and Gravels but many have come from the Bytham Sands and Gravels in East Anglia. As mapped by the British Geological Survey (Hamblin and Moorcock 1995)

The absence of anything to denote their presence in the Forest bed area remains a puzzle.

The courses of the Bytham River and the ancestral Thames, as shown on Figure 46, produced considerable controversy as it was at variance with previous interpretations with the Bytham River joining the proto-Thames just north of Bury St Edmunds, and the proto-Thames flowing north-east across Suffolk and Norfolk (Hey 1980; Whiteman and Rose 1992). Green and McGregor (1996) maintained that the northerly course of the proto-Thames towards the north Norfolk coast was proven by the presence of rock types in the Kesgrave Sands and Gravels in Norfolk which had their source in the Weald. Hamblin *et al.* (1996) could not accept this as the erratic rocks in question were found in coastal marine sediments. They had not been transported by the proto-Thames but by tidal currents. However, Rose *et al.* (1996) claimed that the Kesgrave Sands and Gravels did occur in Norfolk and fulfilled all the lithological criteria for their identification. A further reply from Hamblin and Moorlock (1996) questioned these criteria and maintained that the two rivers were always separate, with a watershed between them, and flowed as per Figure 46.

The importance of the courses of these two pre-Anglian rivers is that there are several sites in the Bytham Sands and Gravels: at Feltwell, Hockwold, Lakenheath, Brandon, Mildenhall, and Icklingham. All have produced hand-axes of various forms; in great numbers at Brandon and Warren Hill at Mildenhall (Fig. 51, below). The latter is one of the richest sites for hand-axes in Britain. In the research for his gazetteer of Palaeolithic sites Roe (1968, 276) actually saw just over 2000 hand-axes and many more must have been found but have no adequate record of provenance. He also records four cores and three flakes indicating Levallois technique, but this seems at variance with what is known of flint technology during Period 1. He also includes a Levallois flake from Shrub Hill, Feltwell.

The most significant and investigated site for this Period 1 in East Anglia is High Lodge, Mildenhall (Fig. 50, below). Several excavations have been conducted

Plate 6 *The Cromer Till exposed in the cliff at East Runton, Norfolk. A massive raft of Chalk with its layers of flints still intact has been thrust by glacial action into the body of the till. At high Lodge, Mildenhall (Section 3.8.5) a raft of interglacial silts containing palaeoliths has been moved in a similar manner*

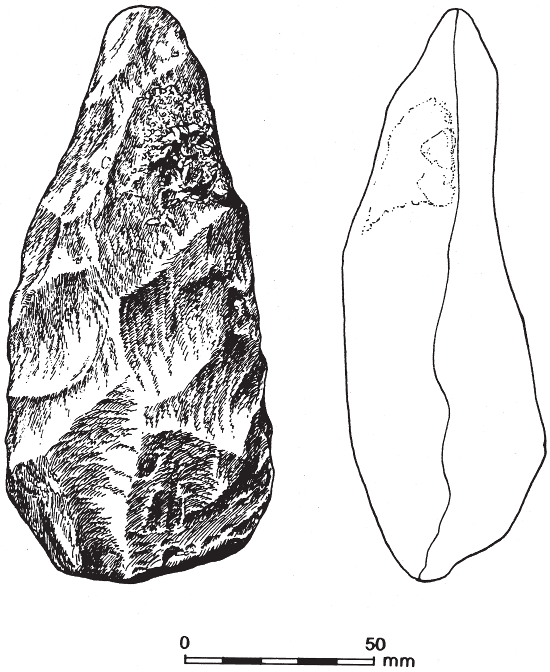


Figure 47 Stibbard, Norfolk. Hand-axe found in the Anglian till. In very rolled condition, made of quartzite, with a small patch of angular quartz gravel grains cemented on to it. This hand-axe may have actually been transported from the Midlands in the Anglian ice sheet. Source: Wymer 1985, 21

there, but it was not until the final work of the British Museum during 1962–8 and 1988 that this remarkable site was at last understood. Its history and full references are finely presented in the resulting monograph (Ashton *et al.* 1992). This is virtually a primary context site, with flint artefacts contained in the clayey-silt of a river's floodplain, associated with rhinoceros, elephant, horse, and deer. Pollen, charcoal, and insects indicate an interglacial climate. A forest of spruce and pine bordered the river. However, the clayey-silt is not where it was deposited but has been picked up by moving ice and become incorporated as an intact raft in glacial till. The till is Lowestoft Till of the Anglian Stage so a pre-Anglian Period 1 occupation is indisputable. Plate 6 shows a huge raft of chalk in the till exposed in the cliffs between Cromer and West Runton, transported in a similar way.

The sites in the Bytham Sands and Gravels are conclusive evidence for human occupation along this river during Period 1. Those sites in areas mapped by the BGS as Kesgrave Sands and Gravels are less convincing but, as noted below, they are not all surface discoveries of hand-axes; a few have actually been recorded as coming from the gravels. The surface finds have to be suspect. Similarly, a few palaeoliths have been found associated with the intra-Anglian Corton Formation, but only one is recorded from the deposits themselves at Covehithe. Claims have also been made for hand-axes being in the till itself. The majority are surface finds and probably just from the sub-soil and thus of any age contemporary or later than the till. One from Stibbard (Fig. 47) does seem to be a genuine constituent of the till in which it was found at a depth of just over a metre, for it is a quartzite hand-axe with a patch of quartzose gravel cemented upon it, typical of the Midlands from whence it may have been transported.

There is another problem with the large number of sites in East Anglia where material is reported from Glacial Sands and Gravels. Some, unquestionably, have come from gravels mapped as such; others may be surface discards, or the gravel is not really glacial but fluvial. This is particularly relevant to the palaeoliths found in the out-wash gravels south of the Cromer Ridge. These form wide plains or sandurs and can be traced as far as Norwich (Boulton *et al.* 1984), but are considerably dissected farther away from their source of the melting ice sheet lying along the Cromer Ridge. The out-wash plains of Kelling Heath are particularly impressive(Colour Pl. 2).

A thin scatter of hand-axes have been found which may be associated with this glacial out-wash: at Wells (TF 923430 (A)), Fulmodeston (TF 994310 (A)), Hempstead (TG 100375 (A)), Gresham, Stonepit Hill (TG 151380 (E) (plus a flake and a hand-axe from two other sites at Gresham allegedly in Till), East Beckham (TG 158403 (E)), and probably others for which there are no suitable records. A major problem is that, even if it can demonstrated that they have come from truly out-wash gravels, they would represent occupation during Period 1 if the out-wash is accepted as of late Anglian age, as per West (1968; Boulton *et al.* 1984) and others, but occupation during Period 2 if it is accepted as 'Wolstonian' as per Straw (1979). In view of the doubts concerning the exact contexts from some of these sites, they will be included here with Period 2 together with other palaeoliths apparently from Glacial Sands and Gravels.

There is also the problem of differentiating between glacial sands and gravels and fluviatile sands and gravels, and in their mapping the BGS have been very aware of it. Furthermore, the planation of a terrace surface does not necessarily imply that the deposits beneath it are all of the same age or geological episode. This is very evident in the valley of the River Lark. Thus, as hand-axes can represent human occupation in Periods 1, 2, and 3, it is impossible to relate many of the sites in East Anglian river gravels to a particular Period.

It seems ironical that the evidence for the date and presence of people during Period 1 is far more conclusive than than that for Period 2, although the latter was probably more prolonged and extensive. At the other end of the temporal scale, it is again possible to be confident of relating several sites to Period 3. This is because of the preservation of some primary context sites in the valleys of the Gipping and the Stour, which can be dated by stratigraphy, fauna, and flora. The problems of Period 2 obviously relate to at least two major glaciations over much of East Anglia. It would seem that glacial ice came no further south than the north Norfolk coast during the last Devensian Stage glaciation, hence the preservation of such sites as Stoke Tunnel, Maidenhall, Brundon, Stutton, and Harkstead.

Period 1

Palaeoliths in the Kesgrave Sands and Gravels

There are three sites at Braintree which have a hand-axe apiece reported from them, just off Map 47 for Essex Rivers at Straits Mill (TL 768245 (E)), Sweetings Farm (TL 766246 (E)), and Notley Road Pit (TL 760220 (E)). These gravels outcrop in many places, especially along the edge of the lower Blackwater Valley and along the Waveney, also as a more continuous belt on the lower slopes of the Yare and Bure (Arthurton *et al.* 1994, 38–43), yet nothing else is known apart from a few surface finds. It has to be realised that these ancient gravels of the proto-Thames span a very long period of time and most of them were probably deposited in the Early or early Middle Pleistocene before Britain was occupied. The same may be true of the Bytham Sands and Gravels, but the number of prolific sites between Shrub Hill and Warren Hill (Map 43) suggests that those preserved in this part of the Bytham River were nearer to the time when the Anglian ice would eventually advance and obliterate the whole drainage pattern, fortuitously leaving these isolated spreads.

As for the claims of occasional palaeoliths coming from the till of the Anglian or perhaps later stages (eg, Rowe 1892), only the one from Stibbard (TF 982282 (A)) has any strong claim for being a genuine constituent of the till. If it is, then, as stated above, it may well have come from anywhere as far as the Midlands. Other hand-axes reported from a depth of a metre or more in till are from High Easter, Felstead, Weybourne, Gresham, and Blaxhall. They may be palaeoliths derived from Period 1 occupational surfaces. In any case palaeoliths in till give no information on the whereabouts of any occupation, In view of the earlier gravels containing hand-axes it would be surprising if some did not become incorporated in the ice. Many probably found their way into glacial sands and gravels when the ice sheets melted. The same is true of the few palaeoliths which may have come from the Corton Formation.

Period 2

The difficulties of relating palaeoliths found in the East Anglian river terrace gravels and glacial sands and gravels have been mentioned above. At least one hand-axe has been found under controlled conditions in what is mapped as glacial sand and gravel, and that is from the old railway cutting at Maldon (Bridgland 1994, 367). However, the gravel is now considered to be a terrace gravel of the Chelmer (Bridgland pers. comm.). Nevertheless, the large number of sites with hand-axes over much of East Anglia is consistent with intermittent human occupation for nearly the 200,000 years of Period 2. The prolific sites known to date from this time must act as patterns for what must have once existed over much the region. There are three in the Yare Valley: at Keswick and Carrow Road in Norwich, and Whitlingham just outside the city. Redhill at Thetford and Broomhill, Weeting, are both in the Little Ouse. Another rich site in the same valley is at Barnham Heath. There is the Grindle Pit at Bury St Edmunds in the valley of the Lark, and Gant's Pit at Harwich in the estuary of the Stour. The most informative sites are mainly associated with pro-glacial lakes (see Chapter

5), eg, Barnham East Farm, Hoxne, Elveden, Witham–Kelvedon, Beech's Pit, West Stow. There are also sites suggestive of coastal occupation in the Nar Valley Beds which are noted in Chapter 4. Taken altogether, it can be seen that there has been much human activity in East Anglia during Period 2.

Several hand-axes have been found on the beaches of north Norfolk and, although they have obviously lost their original context, those in the Cromer–West Runton area must relate to the various deposits which form or cap the cliffs. Further south-east around the coast they have come from Overstrand and Sidestrand, and in slightly greater numbers from Bacton, Sea Palling, Horsey, Lessingham, and Happisburgh.

Further down the coast into Essex, several have come from Stone Point, Walton, and Clacton, where they tend to be mixed with later prehistoric flintwork. In most cases it is impossible to know whether the Palaeolithic artefacts are being eroded from the adjacent cliffs or being washed in from submerged deposits.

Period 3

This period is well represented, including one of the only sites in Britain where there is a site with a Mousterian-like industry found in the same gravel as artefacts of early Upper Palaeolithic type. Both are derived and unlikely to be contemporary, but in a low river terrace of the Gipping at Ipswich which is considered to be Devensian. The Middle Palaeolithic industry consists of small hand-axes and flakes, many of which have been removed purposely from cores by Levallois technique. Other sites in the Ipswich area have yielded the same but on a smaller scale. At the earlier OIS–7 end of Period 3 is the primary context site at Brundon in the Stour Valley, and Levallois flakes in the brickearth at Stutton and Harkstead in the estuary of the same river. Sites of the same interglacial at Stoke Tunnel and Maidenhall in Ipswich give a wealth of information on the environment of the time.

Middle Palaeolithic artefacts in the form of bout coupé hand-axes have been found at Saham Toney/Little Cressingham (TF 888005 (A)) (Lawson 1978) and Lynford (TL 820946 (A); Tyldesley 1987, 20 and 37). Occasional Levallois flakes have come from low terrace gravels of the Gipping, and some of the other rivers but only in very small numbers. Some have come from gravels associated with Period 2, such as at South Acre, Barnham Heath, and Weeting. Two came from a later prehistoric excavation on Micklemoor Hill at Harling (TL 974858 (A); Burkitt 1954, 39–40), and one allegedly from Terrace 4 of the Waveney at Weybread but may have been a surface find. However, it is well-rolled. There are very few surface finds so it would seem, on present evidence, that the Middle Palaeolithic occupation of East Anglia in Period was restricted to river valleys.

3.8.2 The Rivers Wensum and Yare

Both these rivers, and their tributaries, the Tud and Tiffey, appear to have their origins from melt-waters of a westerly receding ice margin. This is particularly evident with the Wensum which can be traced back to the out-wash plains south of the Cromer Ridge around Burnham, as the Bure does to the west from similar plains or sandurs at Kelling (Straw 1979; 1983; Sparks and West 1964). Major valleys were established or re-established possibly in sub-glacial depressions. Whether the glaciation in question was of the Anglian Stage or the 'Wolstonian' is not firmly established, for Straw would correlate it with the Marly Drift, which he contends is 'Wolstonian', but the BGS (Cox *et al.* 1989) regard it as the major Anglian ice sheet.

There are no high terrace gravels and palaeoliths are not known from many sites along either river or their tributaries. They only occur in low terrace deposits variously mapped as Valley Gravels, undifferentiated or Terrace 1. However, four hand-axes, a flake, and a core were found in a shallow pit on Mousehold Heath at a much higher level in Glacial Sand and Gravel. The only prolific sites are those at Keswick Mill Pit and at Whitlingham Sewage Farm. The Keswick Mill site yielded at least 175 hand-axes, numerous flakes, and at least one Levallois core and two flakes (Wymer 1985, 62, 384).

Whitlingham was discovered in 1926 by J.E. Sainty and H.H. Halls and they conducted excavations there the following year (Sainty and Halls 1927; Sainty and Clarke 1946; Wymer 1985, 62–8). Much of the material is very fresh and, if not actually *in situ*, cannot have been moved far. At least 200 hand-axes were found there, but there is no record of any Levallois artefacts.

MAP 38. VALLEYS OF THE WENSUM AND YARE: LYNG–WHITLINGHAM

The only other hand-axe site of consequence, in Norwich, between Keswick and Whitlingham, is at the Carrow Works of Messrs Reckitt and Colman, where there were five hand-axes, several flakes, and one Levallois flake (Sainty 1933). They came from low terrace gravels banked up against and virtually cut into a steep chalk cliff. This suggests a more catastrophic aggradation by the river rather than a gradual one.

Coupled with the presence of a few Levallois artefacts, it seems most likely that the gravels of the Wensum and the Yare were deposited during a high energy episode commensurate with out-wash during the late stage of a glaciation, probably at the end of OIS–8. Occupation during Periods 2 and 3 could be represented. This is somewhat supported by a few finds in Terrace 1 from the Lenwade Pits at Great Witchingham: 3 Levallois flakes among about 13 hand-axes (Wymer 1985, 56). The only other evidence for Period 3 is a Levallois flake from just south of Slough Bottom in Norwich, apart from a possible bout coupé hand-axe among the Mousehold Heath collection. Interglacial deposits are known at Swanton Morley (Coxon *et al.* 1980) but no palaeoliths have been recorded there.

A few hand-axes and flakes from Wymondham and Great Melton, mainly south of Map 38 show that some people did occupy the area of the headwaters of the Yare at times, but they are mainly from the surface of glacial sands and gravels or boulder clay. The exception is some pits north of Tuttle Lane at Wymondham, which produced three hand-axes and nine flakes from gravels mapped as Terrace 1.

Whether this area of East Anglia was occupied during Period 1 is unknown. There is just one hand-axe from a site mapped as Kesgrave Sands and Gravels: at Langley Green (TG 358032 (A)) but it was found in a front garden. As the Kesgrave Gravels in Norfolk are probably Lower Pleistocene it is very likely that this hand-axe from Langley is a surface discard.

3.8.3 Nar Valley

It is difficult to relate the sparse scatter of mainly single hand-axes that have been found along the Nar Valley to the complex geological events since the Anglian ice retreated some 400,000 years or more ago. During an ensuing interglacial the sea level eventually rose to at least 23 m OD. A large, shallow lake with marginal marsh and fen gradually filled with marine clay. These deposits are well preserved at Tottenhill, below later gravels, and pollen analysis of organic sediments indicated that this occurred during the Early and Late-temperate zones of the Hoxnian (Stevens 1959; West and Whiteman 1986). These fen-like conditions are not likely to have been an hospitable environment for human occupation. There are no palaeoliths that can be definitely associated with these Nar Valley Beds at Tottenhill but, as Map 39 shows, a few have come from upper levels of these beds at East Winch, West Bilney, and Gayton that could date to the latter end of that interglacial, when estuarine beds were giving way to fluviatile sands and gravels as a precursor of the Nar was established. This would have been when the sea level had dropped to about 15 m OD, to judge from the fine hand-axe (Fig. 48) found at the British Gas Station about 1971 in silty gravel. Another from West Bilney was at about the same level and possibly associated with the marine shells found with it. Thus, people may have occupied this lower part of the Nar Valley close to the coast.

There has been considerable study of these Nar Valley Beds since Dr L.A. Stevens published his findings from the deposits at Tottenhill, especially by Dr P.A. Ventris (1986). Much remains controversial but, as far as this survey is concerned, it can do no more than comment on the problems and consider the dating and environment of some of the events and periods that could have affected human occupation of the valley.

Interpretations as per Gallois (1979)	*STRATIGRAPHY AS PER GALLOIS (1978; 1979)*	*Interpretation as per Straw (1979)*	
Last Glaciation	HUNSTANTON TILL COMPLEX	)	DEVENSIAN
Glacial		)	
		)	
	UPPER TOTTENHILL GRAVEL	)	
			)
Temperate	HUNSTANTON RAISED BEACH	Late	)
			)
			) IPSWICHIAN
Glacial	LOWER TOTTENHILL GRAVEL		)
			)
	NAR VALLEY CLAY		)
	NAR VALLEY FRESHWATER BEDS	Early	)
			)
			)
Upper Chalky Till Jurassic Till (confluent ice sheets)	CHALKY JURASSIC TILL COMPLEX		Marly Drift
			'WOLSTONIAN'
Correlating with Lowestoft Till	Upper Jurassic and Lower Cretaceous Rocks		

Table 13 Alternative interpretations of the Quaternary stratigraphy of north-west Norfolk

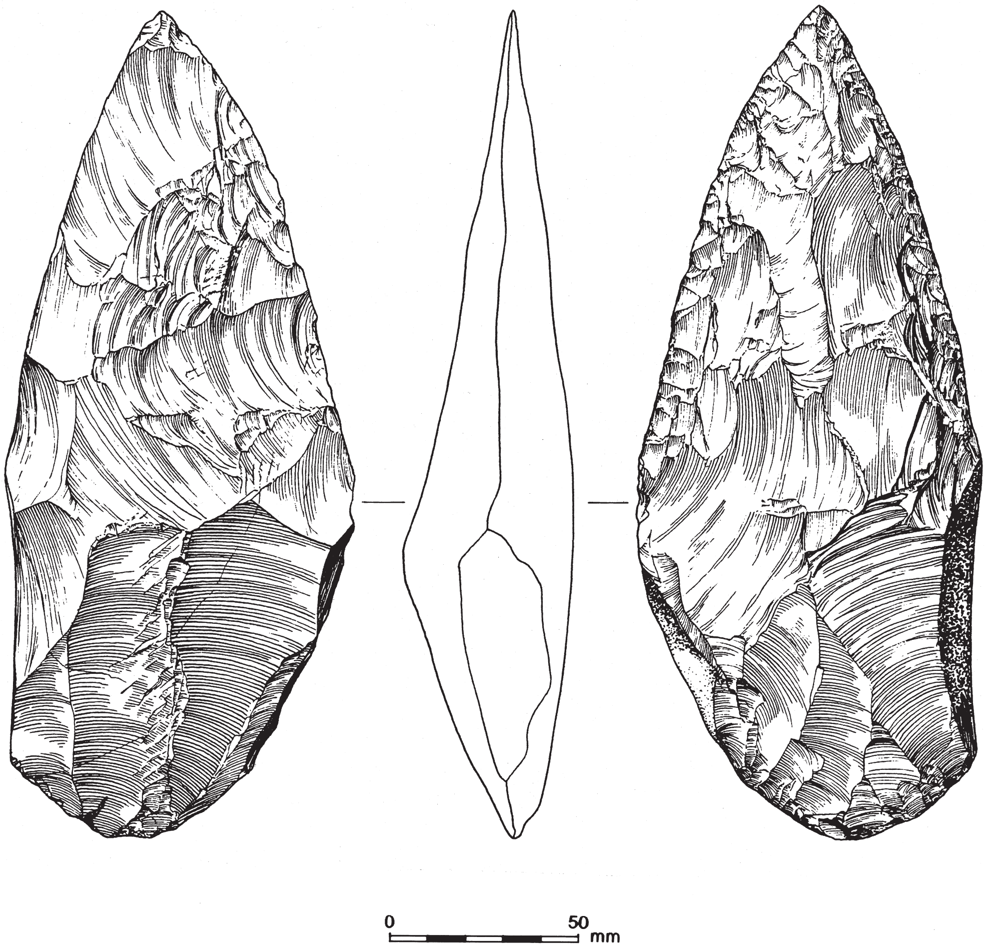


Figure 48 Hand-axe from East Wynch in the Nar Valley

Ventris (1986, 26) cautiously admits that the sequence he described 'probably represents a gross simplification of the environment between the Hoxnian and Ipswichian interglacials.' There is the contention by Straw (1979) that the Nar has cut through the Marly Drift, which he maintains is of the Wolstonian Stage. Thus he regards the Nar Valley Beds as more recent than this event and probably Ipswichian. Likewise, he doubts the Anglian age of the till underlying the Nar Valley Beds at Tottenhill.

This is not a persuasive argument and further work by Ventris confirms that the pollen record at Tottenhill is so similar to that of the Hoxnian type site that it is difficult to refute it. Also, as noted below, the age of the South Acre gravels is very questionable. Upstream, the valley was certainly occupied or visited at times, for the river gravels between South Acre and West Acre have yielded a considerable number of palaeoliths.

Although only a dozen hand-axes could be attributed to these gravels at the time of the English Rivers Survey (Wessex Archaeology 1996b, 117) recent observations by Mr R.J. MacRae has produced at least double that number and numerous flakes, one of which was *in situ.* Furthermore, a Levallois flake and a struck core have also been found (Fig. 49). This suggests that previous interpretations of this gravel as being Anglian out-wash (Ventris 1986, 19) are probably mistaken.

The glaciations of this part of north-west Norfolk have been the subject of much study and there is still no general agreement as to their interpretation. The sequence of the conventional chronology of the Geological Society (Mitchell *et al.* 1973) and earlier work by West (1963) accepted three glacial stages: Anglian, Wolstonian, and Devensian.

The conclusions of the BGS that the tills of the Anglian and Wolstonian from East Anglia to the Midlands were the result of one glacial stage (the Anglian) (Bristow and Cox 1973) effectively reduced the number to two. As noted above and elsewhere in this survey, Straw (1979; 1983) could not accept that some of the tills in this part of Norfolk, Lincolnshire, and the Midlands did not represent a separate glacial stage between the Anglian and the Devensian. Very relevant to his contention is the presence of gravels at Tottenhill (Map 39, No. 18) that have been recognised as being deposited by glacial melt-waters (Gallois 1994; Gibbard *et al.* 1992). These Lower Tottenhill Gravels

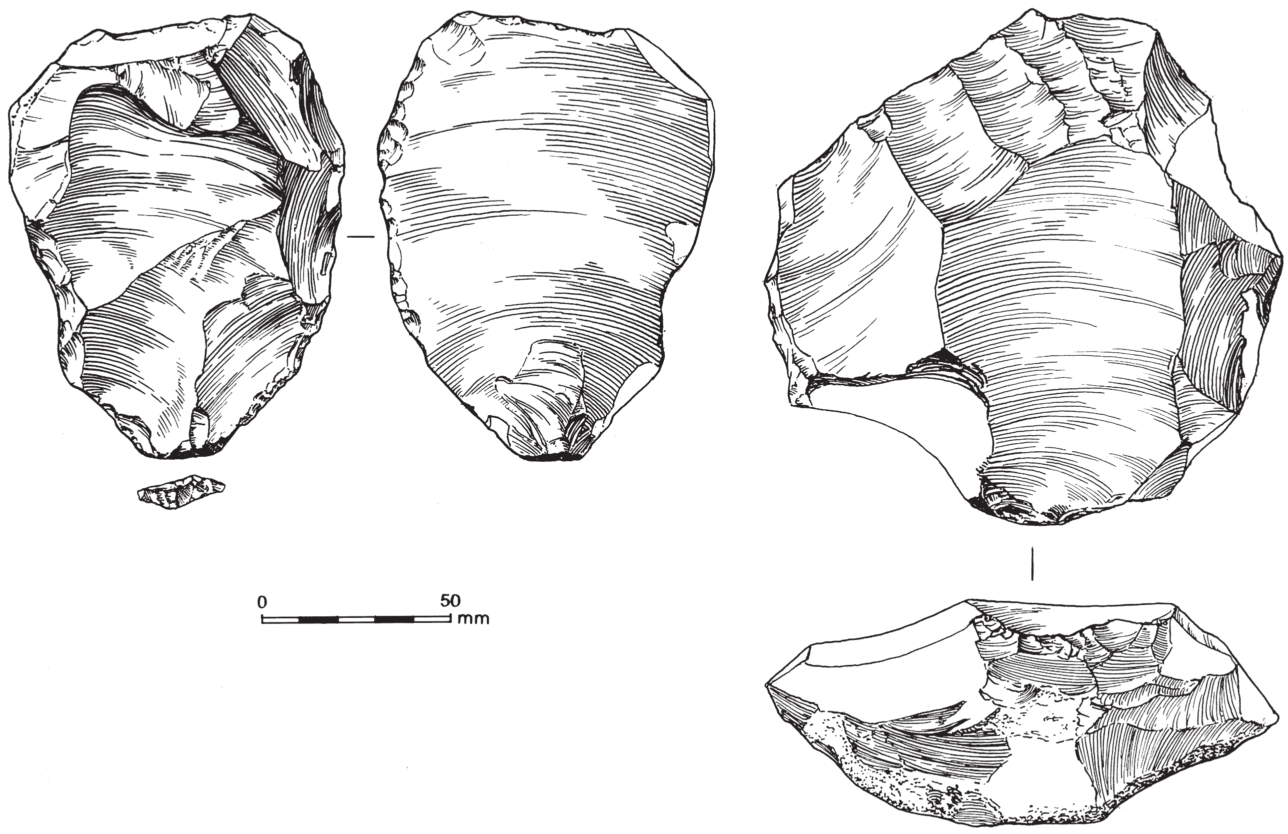


Figure 49 South Acre. Levallois flake and core from gravels of the Nar Valley

directly overlie the Nar Valley interglacial beds (Table 13).

Recent work mentioned already in connection with the Woodston Beds at Peterborough (Section 3.7.5) has raised considerable doubts on accepting the Hoxnian pollen profile as only belonging to one interglacial stage (ie, OIS–11 of the type site at Hoxne). U/Th dates of the Nar Valley Beds at Tottenhill are given as 345–289 Ky (Rowe *et al.* 1997) which suggests correlation with OIS–9 in spite of the Hoxnian affinities of the pollen profile. Further dates in the same time range and amino acid ratios obtained from off-shore deposits support this more recent date for the Nar Valley Beds (Scourse, pers. comm.; forthcoming).

MAP 39. NAR VALLEY: LEXHAM–KINGS LYNN

Several hand-axes have come from gravel at Tottenhill, but it is not known whether they came from the Lower or Upper Tottenhill Gravels. The latter seems more likely and, if so, give further evidence for human activity around the lower part of the Nar Valley probably during Period 2. Other finds of one or two hand-axes from this area at Blackborough End and Congham come from gravel mapped as glacial and are presumably derived from some previous period. At least five hand-axes come from the sites at South Wootton from gravels mapped as Older Beach Deposits and there are a few surface sites also shown on Map 39. There is nothing to show there was any occupation of this area in Period l, but with the passage of the Anglian ice sheet it would be surprising if anything had been preserved. The only finds of Middle Palaeolithic artefacts in river deposits of the Nar Valley are the core and flake from South Acre mentioned above. However, there is strong evidence for occupation during this Period 3 in Head Gravels at Bartholomews Hills, just on the edge of the Nar Valley at South Acre (see Chapter 6).

3.8.4 Valley of the River Waveney

Although the famous Palaeolithic site at Hoxne is described in Chapter 5, it is shown on the map as investigations there have done much to clarify the sequence of terrace deposits along the river itself (West 1956; West and McBurney 1955; Sparks and West 1968; Coxon 1993). There are no well-preserved flights of terraces and the higher ones, especially, are represented by little more than remnants on the valley slopes. The terminology used in the BGS *Memoir* for Diss (Mathers *et al.* 1993) is given below.

Terrace	*Elevation above present floodplain*	*Terrace name*
4	5.0–9.0 m	Homersfield Terrace
3	3.0–4.0 m	Broome Terrace
2	1.0–3.0 m	
1	0.5–1.0 m	Floodplain Terrace

All these low terraces are cut through Lowestoft Till of the Anglian Stage, almost to the bottom of the valley between Hoxne and Billingford. Apart from Hoxne, the only interglacial deposits actually in the valley are of the Ipswichian Stage at Wortwell (Sparks and West 1972). Coxon (1984) interprets the Homersfield Terrace gravels as out-wash at the end of the Anglian Stage, and the Broome Terrace also as being deposited in cold conditions of the Wolstonian Stage. High level gravels above these terraces are considered as possibly outwash gravels but 'discontinuous, varied and sometimes uncertain nature.'

MAPS 40. VALLEY OF THE WAVENEY: HOXNE–BUNGAY

No Palaeolithic sites are known in the valley above Hoxne, apart from a flake in a gravel pit at Oakley, and a hand-axe from the same parish but with just a general provenance. As can be seen from Map 40, they are very sparse as far as Bungay, and similarly off the map down the valley to Lowestoft. Although Hoxne demonstrates considerable human activity in that place during Period 2, there is nothing elsewhere in the Waveney to support it or give any indication of the duration of occupation. There would appear to have been much reworking of terrace deposits for the stray hand-axes that have been found come from every one of them, as listed below:

Terrace 4 Homersfield Terrace
WEYBREAD, garden in old pit, hand-axe, Levallois flake
Shotford Heath pits, hand-axe, 2 flakes

Terrace 3 Broome Terrace
HOMERSFIELD, pit east of church, hand-axe in mint condition
BUNGAY, Outney Common, hand-axe

Terrace 2
BROOME, heath pits (TM 348916 (A)), flake found *in situ*
HOXNE, by White Bridge, hand-axe

Terrace 1 Floodplain Terrace
SYLEHAM, pit beside river, hand-axe, flake
WEYBREAD, marsh, hand-axe
GELDESTON, close to Wherry Inn (TM 389919 (A)), hand-axe

Alluvium
HOMERSFIELD, river bed, hand-axe

Corton Formation
NORTH COVE, Mutford or Cottage Farm (TM 467886 (A),) hand-axe

Glacial Sand and Gravel
EYE, Moor Hall (TM 143730 (E)), hand-axe
WORTWELL, surface of field, hand-axe
ELLINGHAM, park (TM 359928 (E)), hand-axe
ALDEBY, Atlas Aggregates Pit (TM 434931 (A)), 3 hand-axes
NORTH COVE, near Covehall Farm (TM 467898 (A)), hand-axe
LOWESTOFT, brickyard (TM 535939)), hand-axe
CORTON, cliff (TM 545970 (G)), 'worked flint' recorded in section

Grid references are given in the above lists for sites which lie to the south and mainly to the east of Map 40.

Very few useful conclusions can be made from this mixture of contexts. If the hand-axe from North Cove really did come from the Corton Beds, which are of mid or late Anglian Stage, then it is the only evidence for Period 1 occupation. It may, however, have been a surface find of any later date. It seems unusual that the majority of the palaeoliths along the Waveney Valley, few as they are, come from Glacial Sands and Gravels. The same can be said of the sites around Bury St Edmunds and Ipswich elsewhere in East Anglia. The classification as such for this survey is based on early editions of BGS published maps, of which some are outdated, and perhaps should be considered in light of Coxon's remarks quoted above.

The single Levallois flake from Weybread is hardly enough to be justified as evidence for Period 3 occupation, likely as it would have been considering the wealth of evidence in the Ipswich area. No bout coupé hand-axes have been recorded from the Waveney Valley.

3.8.5 Valleys of the Lark and Little Ouse

These valleys contain more known Palaeolithic sites than anywhere else in East Anglia, including some of the most prolific in Britain. There are several key sites among them and there is a long history of their investigation, study, and publication. Coupled with the parallel study of the Quaternary geology in this part of Britain and the more recent and ongoing archaeological excavations at High Lodge, Barnham, and Elveden, the results form much of the basis of the present understanding of the Palaeolithic period in this

KEY SITE

MILDENHALL
Map 43, No. 2

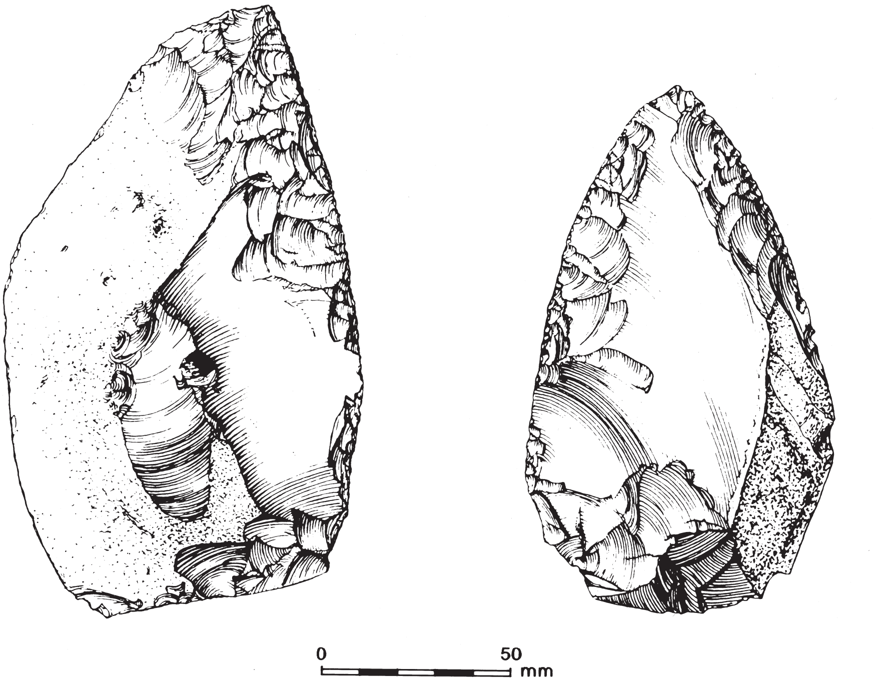


Figure 50 Elegant scrapers from High Lodge made on large flakes found in a great raft of interglacial deposits thrust into the Anglian Stage glacial till. They probably represent human activity in the preceding Cromerian Stage along the Bytham River. Overlying gravels contain numerous hand-axes, mainly of ovate form, resembling those found at Warren Hill about 1 km to the east. Source: Ashton et al. *1992*

Locality: High Lodge Brickearth Pit

History: Flint artefacts, especially elegant scrapers in mint condition, were first found in this pit at the end of the 19th century. A description of the site by Skertchly was contained in the Geological Survey *Memoir* for Mildenhall published in 1891. This initiated a controversy on the interpretation of the deposits which was not resolved until the conclusion of the British Museum excavations in 1988.

Excavations by Professor Marr in 1920 had concluded that the flint artefacts were within a brickearth which was sandwiched between two boulder clays, whereas as early as 1911 W.A. Sturge had accepted the explanation of Professor Sollas that the gravel and brickearth had been pushed over the boulder clay by the action of ice. Such an early date was contradicted by the correlation that was made between the type of scrapers and those found in much more recent Mousterian industries. It is now evident that high quality flintworking can be found at any time in the Middle Pleistocene.

The many seasons of excavation at High Lodge were initiated by G. de G. Sieveking of the Quaternary Section of the Department of Prehistoric and Romano-British Antiquities of the British Museum. These were concluded by N. Ashton and J. Cook of the same department in 1988, in collaboration with numerous Quaternary specialists. It was demonstrated that the brickearth was a large raft of interglacial sediments that had been thrust bodily into the boulder clay by, as Sollas had stated, the action of ice.

Archaeology: An industry of simple cores but with retouched flakes of refined workmanship occur in the brickearth (Fig. 50). Prolific numbers of hand-axes, mainly of ovate form, occur in the overlying gravel.

Context: The brickearth is a Clayey-silt, interpreted as a floodplain overbank deposit, either in a lacustrine environment or, more likely, of the lost Bytham River from the Midlands.

Associated material: Mammalian remains were very sparse and poorly preserved, but animals identified include rhinoceros, horse, straight tusked elephant, deer, and *bos*/bison. Insect remains were also poorly preserved but suggest an environment contemporary with the archaeology of fluvial channels and a cool-temperate climate.

Dating: The Clayey-silt is earlier than the Anglian Stage glaciation and the presence of *Stephanorhinus*

KEY SITE

MILDENHALL
Map 43, No. 2

hundheimensis, which is not known after the Cromerian Stage, supports this. The artefacts are therefore of Cromerian age or earlier.

Significance: Evidence for occupation of East Anglia along the Bytham River, before the Anglian glaciation, and illustration of how archaeological typology is generally unsuitable for assessing chronology.

Major references: *General summary*: Wymer 1985, 86–89; Roe 1981, 188–9; Ashton *et al.* 1992, 1–50, 169–90. *Excavations*: 1920: Marr *et al.* 1921; 1962–8; 1988: Ashton *et al.* 1992. *Geology*: Whitaker *et al.* 1891, 55–6; Lewis 1992, 51–94. *Archaeology*: Ashton *et al.* 1992, 124–68. 190–2.

Numbers and locations of artefacts: Roe 1968, 275

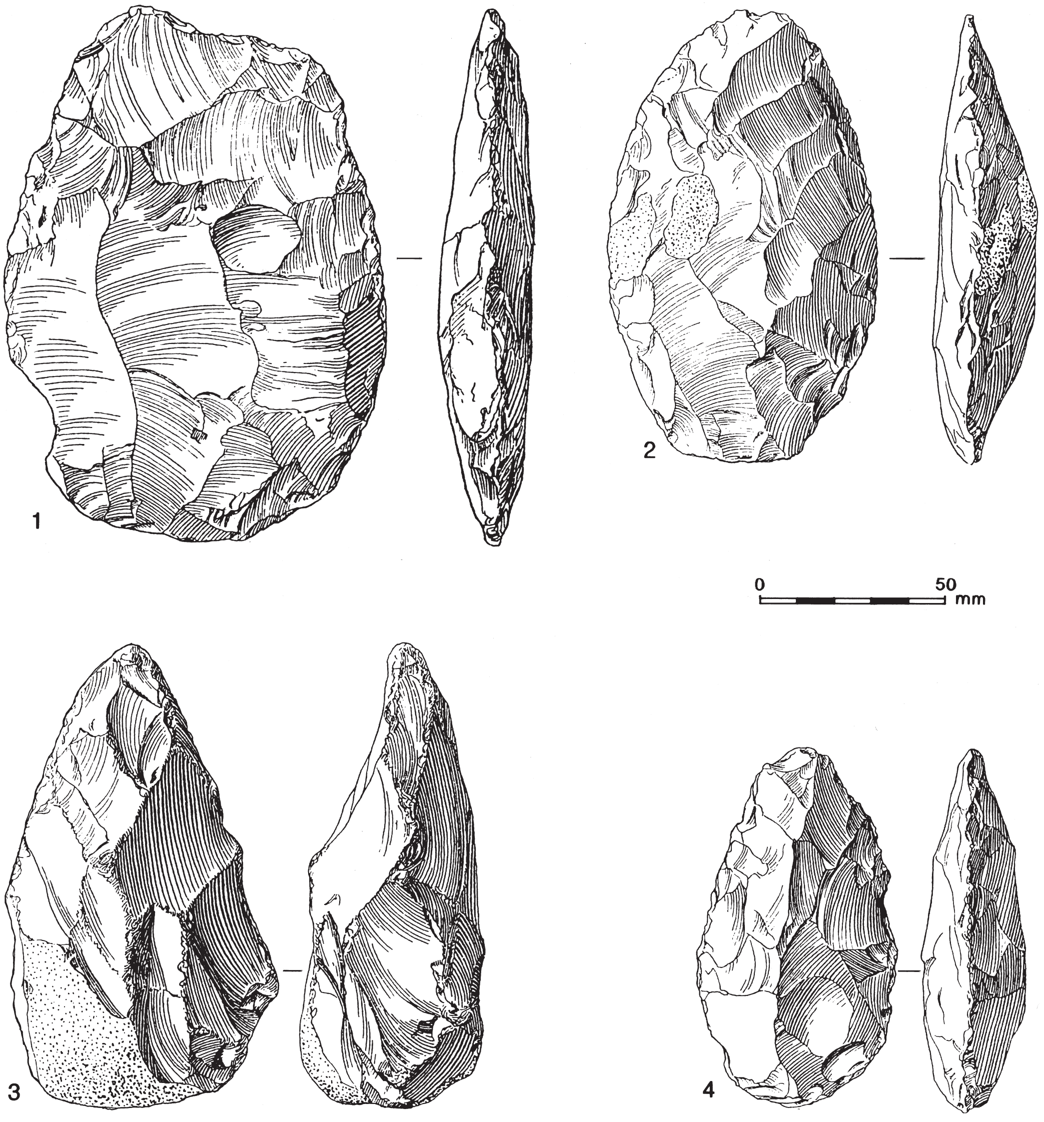


Figure 51 Mildenhall, Warren Hill. Hand-axes found in gravel workings, mainly in the late 19th century. One of the most prolific sites for hand-axes in England. The gravel is considered to belong to the Pre-Anglian Bytham River. Most of the hand-axes are elegant ovates, but a number of cruder, stone-struck hand-axes (eg, No. 3) in a more rolled condition, may represent another industry. Source: Smith 1931, Sturge Collection 23, 24

country. For the purpose of assessing what this means in terms of human occupation it would seem best to consider separately each of the three periods as defined for the purpose of this survey. There is much here to confirm extensive occupation in Period 1, that is before the end of the Anglian glaciation. Period 2 is represented by several sites later than the same glaciation, although most are difficult to interpret in terms of dating or the agencies responsible for their deposition. Period 3, however, lacks any major sites and, as so usual in most of southern England, can only be recognised by a thin scatter of occasional Levallois flakes and the less definite bout coupé hand-axes.

Period 1

No evidence has yet been detected for any glaciation of East Anglia before the Anglian, although the deep sea core oxygen isotope chronology would seem to indicate that this was very likely. In the absence of anything to the contrary, the pre-Anglian landscape would be one of chalk downland and forest, with spreads of terrace gravels along existing rivers. There would have been a steep chalk escarpment on the west side and no fen embayment beyond it. The major river flowed from a source in the west Midlands, reached East Anglia just south of Kings Lynn. There it ran southwards by the chalk towards Mildenhall and then flowed east down the dip slope and probably through the Lopham gap into what is now the Waveney Valley (Rose 1989; 1994; Hamblin and Moorlock 1995; 1996; Hamblin *et al.* 1996; Rose *et a*l. 1996) (see Fig. 45).

Palaeoliths have been found in the Bytham Sands and Gravels at Feltwell (Shrub Hill Farm and Frimstone Pits), Lakenheath (Maids Cross Hill), Brandon Fields, Icklingham (Warren Hill and Rampart Field). At these sites the palaeoliths are normal constituents of the fluviatile deposits of this river, but at High Lodge a great raft of interglacial silt containing *in situ* palaeoliths has been thrust by glacial movement into the till.

Warren Hill is renowned for its large numbers of palaeoliths, including a high proportion of very finely made ovate hand-axes (Fig. 51), reminiscent of those from Boxgrove, Sussex, which may be of similar age. Roe (1968, 226) records at least 2000 hand-axes from Warren Hill. More than one industry may be present, as cruder and much more rolled hand-axes have been found. There are numerous quartzite pebbles in the Bytham Sands and Gravels, obviously derived from the Triassic beds of the Midlands, but only three hand-axes made of that stone are known. Clearly, in a region of prolific fine quality flint people made little use of other rocks for their tools. Four quartzite pebbles, however, had been used as hammerstones.

Over 200 hand-axes come from Shrub Hill, Feltwell, but far fewer at Lakenheath and Rampart Field. At all these sites, ovate hand-axes predominate over pointed ones which, in view of the flint available, does give support to Dr White's contention that the size and quality of the flint is a major factor in determining the shape of the hand-axe to be made (White 1995; 1998).

Period 2

Apart from the pre-Anglian sites mentioned above, all of the others sites listed for Maps 41–3 have produced palaeoliths in contexts thought to pre-date OIS–7, but dating is very tenuous in most cases. The contexts are variable and very few hand-axes can be certainly attributed to terrace gravel deposits of the River Lark. Apart from the Geological Survey South Sheet Quaternary map at 1:625,000, the maps are based on the one 1:50,000 BGS sheet available for this area (sheet 189 Bury St Edmunds) and this places most of the hand-axes found in Bury itself as coming from Glacial Sand and Gravel below Boulder Clay. As no other Boulder Clay is recognised in this area than that of the Anglian Stage, all these sites would be early or pre-Anglian and perhaps should be with the note above on Period l. This conclusion would indicate a virtual absence of human occupation during Period 2 in this part of the Lark Valley and, by inference elsewhere in the area. This seems very unlikely, and is probably a case of the gravels in question being fluviatile, reworked Glacial Sands and Gravels banked against Boulder Clay.

MAPS 41–3. VALLEYS OF THE LITTLE OUSE AND RIVER LARK: BARNHAM–HOCKWOLD

Along the lower part of the valley of the Lark, unless there are published records such as in the excellent early Geological Survey *Memoir* for Mildenhall and Thetford (Whitaker *et al.*1891), or the latest BGS *Memoir* for Bury St Edmunds (Bristow 1990) it is almost impossible to predict just what is to be found beneath terrace levels. For instance, between West Stow and Mildenhall, Terrace 2 is at about 10 m above the present floodplain and at the same level at Beeches Pit the surface is underlain by brickearth, at Weatherhall Farm by glacial deposits, and at Warren Hill by Bytham Sands and Gravels. Beeches Pit is particularly important and is noted further below (Section 5.2.4).

The Little Ouse Valley is different. Numerous hand-axes have come from gravel pits between Thetford and Brandon. The most prolific site was Broomhill at Weeting, where Roe records 83 hand-axes. However, there are no well-preserved terrace levels between Thetford and Brandon, as if the thick deposits of gravel represent one aggradation with some subsequent erosion. These certainly appear to have cut through the Anglian till and it seems reasonable to accept the hand-axes from the sites along the Little Ouse valley as containing palaeoliths discarded by people during Period 2.

The following sites (Maps 41–3) have palaeoliths associated with lacustrine deposits, brickearth, or are surface finds. These are considered in the relevant Chapters 5 and 6. Those remaining, excluding pre-Anglian sites, are probably valley deposits of Period 2.

Lacustrine:
SICKLESMERE: Oak Kiln Pit
BARNHAM: East Farm
ELVEDEN: Brickyard
SANTON DOWNHAM: Little Lodge Farm

Brickearth:
BURY ST EDMUNDS: Westley Road and Shepherds Cottage Pit
CULFORD: brick pits
WEST STOW: Beeches Pit
ICKLINGHAM: Devereux's and Weatherhall Farm Pits
WEETING-WITH-BROOMHILL: Botany Bay Brickyard and Broomhill Cottage Brickyard
MILDENHALL: Brickyard
BRANDON: near Brickkiln Farm

Surface or unknown:
ELVEDEN: Sketchfar and Rakes Heath
THETFORD: Barnham Cross Common and London Road, Fison's Way, the Warren and near Croxton Park
WRETHAM: Fowlmere
WEETING-WITH-BROOMHILL: Grimes Graves
MILDENHALL: West Row, Hill Farm, Jude's Ferry, Thistley Green, Beck Row, Frog Street, Holywell Row, Wilde Street, Dragaway Farm
ERISWELL: Rake Heath
LAKENHEATH: possibly various of the unlocated sites
HOCKWOLD CUM WILTON: north-east of Brickkiln Farm
ELY: Shippea Hill, Burnt Fen

Note: the large number of surface sites in the fens is almost certainly partly due to the use of gravel from local pits in the Lark and Little Ouse valleys for the metalling of tracks and roads.

Period 3

There are no sites in this area that can be confidently dated as Late Pleistocene which have produced distinctive assemblages with Levallois technology and possibly small ovate or cordate hand-axes, particularly of bout coupé form. However, many of the sites as listed below that have produced hand-axes have also, according to the records, produced an occasional Levallois flake or core. Some, such as those from Warren Hill (4 cores and 3 flakes) clash with anything that is so far known from Period 1 and are best tentatively regarded as intrusive or falsely recorded, but if the others are genuinely contemporary with the hand-axes, then it might suggest that some of the gravels had been reworked at the end of OIS–8 when, as far as it can be seen on the present evidence, Levallois technique appeared. However, there are very few of them relative to the number of hand-axes. At the sites listed they are just individual pieces, mainly a single flake; only at Barnham Heath are there 5 cores and 3 flakes, which is more significant. There is very little to show to really prove there was any Period 3 occupation along the Lark and Little Ouse, except perhaps for Barnham Heath. Neither are there any convincing bout coupé hand-axes. Tyldesley (1987) could only find possible examples at Thetford, Elveden, Icklingham Warren, and Santon Downham. All of these only have general provenances.

Sites from which Levallois flakes or cores have been recorded:

GREAT WELNETHAM: Andrew's Pit
BURY ST EDMUNDS: Grindle Pit and Thingoe Hill (latter is an isolated find)
ICKLINGHAM: (G)
BARNHAM HEATH: pits
THETFORD: (G)
FELTWELL: Shrub Hill
SANTON DOWNHAM: Little Lodge Farm Pit
WEETING-WITH-BROOMHILL: Broomhill Gravel Pit
MILDENHALL: West Row, Hill Farm

3.8.6 The Gipping–Orwell: Bramford to Ipswich

Map 44 clearly shows the distinction of the distribution of palaeoliths between those found in the high level sand and gravel mapped as Glacial on the early Geological Survey maps, before the Kesgraves had been identified and those from the low-lying terraces of the Gipping. The Glacial Sand and Gravel forms a great plateau at about 37 m OD at Ipswich, sloping gently down eastwards towards the estuary with only some minor irregularities. It spreads as far as Woodbridge and is only dissected by two small tributaries of the Deben: the River Flynn and the Mill River. This general uniformity of level is certainly the same surface height at Kesgrave and Waldingfield as those of the pre-Anglian Thames, the former being the type site of the Lower Kesgrave Sands and Gravels (Allen 1984).

The palaeoliths known from this area may be surface discards which became incorporated into these

KEY SITE

IPSWICH

Map 44, No. 13

Plate 7 The scattered skeleton of a mammoth as found in the Stoke Tunnel Bone Bed, Maidenhall. The bones of a few smaller beasts are also present, including the femur of a small wolf (left of centre). Great numbers of mammoth bones occur in this deposit, yet very few Palaeolithic artefacts are associated with them

Location: Stoke Tunnel and Maidenhall

History: Numerous mammalian remains were found when the Eastern Union Railway was extended from its original terminus in the 1840s through Stoke Hill to its present one. They were found on the east side of the cutting just south of the tunnel entrance, at about the same level or just below that of the track. Whitaker noted these discoveries in his Geological Survey Memoir for Ipswich and records that Professor Prestwich collected 'several baskets' of elephant bones and teeth. In 1908 Nina Layard relocated the site and recovered bones of mammoth, aurochs, bear, a small wolf, horse, deer, and bird; also three Palaeolithic 'implements' and flakes. She found more bones in 1919 when the locomotive depot was extended towards Croft Street. More were found in 1948 when H.E.P. Spencer examined drainage tunnels dug through the southern slope of Stoke Hill. An excavation was made at the north end of the locomotive depot in 1975 by J.J. Wymer, and the bone bed was found at about a metre below the track level. Pollen was extracted by Dr C. Turner and pronounced interglacial. During the next year, deep drainage trenches dug for the new school at Maidenhall, about 400 m south of Stoke Tunnel, exposed many elephant bones and tusks. A further excavation was undertaken and mammalian remains included much of the scattered skeleton of one elephant with its two front feet articulated in the silty clay (Pls 7 and 8).

Archaeology: Very few artefacts have been found in the Stoke Bone Bed. Apart from some, including a small discoidal core, found by Layard, there were only two flakes from the 1975 excavation, both in fluviatile sandy gravel above the bed. Similarly, at Maidenhall, there was only one proximal end of a broken blade in mint condition with the bones.

Context: The Bone Bed is at 8 m aOD and is a fluviatile deposit of the Orwell, covered at Stoke Hill by *c.* 20 m of Head deposits and, to the west, banked against London Clay and Reading Beds.

Dating: The presence of horse and mammoth and no hippopotamus indicates a pre-Ipswichian interglacial. The bench level is 10 m above that of the type site of the Ipswichian Stage at Bobbitshole, only 2km further south. An interglacial related to OIS–7 is indicated.

Significance: A well-dated pre-Ipswichian interglacial deposit with sparse but definite evidence of a human presence, probably people using Levallois technology.

Major references: *General summary*: Wymer 1985, 227–35. *Historical*: Whitaker 1885, 93. *Excavations*: Layard: 1912; 1920. 1975-6: Wymer 1985, 227–35

*Plate 8 The articulated foot (*in situ*) of the mammoth skeleton shown in Plate 7*

much earlier gravels by reworking or periglacial agencies. There is no record of any Levallois artefacts from them and, although there are no prolific sites, the several sites as shown on the map have yielded individual, occasionally a couple, of hand-axes and can be accepted as evidence for the presence of people at some time during Period 2. This is adequately confirmed by the important site at Foxhall Road where numerous palaeoliths (78 hand-axes at least) were found and excavated by Nina Layard at the beginning of this century. They were found at various levels in Brickearth, some definitely in primary context, either in a lake or an abandoned river course which was silting up. This site is described more fully in Chapter 5, but the sediments are above Anglian till so must belong to Period 2 occupation.

A few hand-axes have come from similar Glacial Sands and Gravels at Stowmarket, from pits at Danecroft on the east of the town (TM 045584 (A)), off and to the north of the map, but it is the low lying terrace deposits of the Gipping which are of great interest. Mapped on the BGS sheets as River Terrace Deposits or undifferentiated sand and gravel, rarely rising more than 2–3 m above the floodplain, they give some of the best evidence in East Anglia for human occupation during Period 3, especially during the latter part of it. Hand-axes have been found in small numbers at nearly all of the sites shown on the map along the valley, but there is a Levallois element in many of them: off the map at Barking (Bosmere TM 098545 (A)), and at Barham (Broomfield and Eastalls Pits TM 119518 (A) and TM 120512 (A)) and, in Ipswich as shown on the map at Bramford Road, Hadleigh Road, Constantine Road, Stoke Tunnel, and Maidenhall. The latter two sites show that the area was occupied during the interglacial equated with OIS–7, and the others during a cold period of the Devensian Stage, probably OIS–3. It is also relevant that the type site of the Ipswichian Interglacial of OIS–5e is at Bobbitshole, only a kilometre south of the Maidenhall sites at TM 150414 (A) and no Palaeolithic artefacts have been found there.

Bramford Road pit produced a large quantity of artefacts collected, it would seem, mainly from below the water table. Roe (1968, 270) lists minimal totals of 134 hand-axes and several hundreds of flakes, amongst which he identified 20 of Levallois technique. Further work on the collections by Wymer (1985, 213–6, 395) suggested that many more of the flakes indicated a flake industry as apart from being hand-axe debitage. Many were struck from single platform cores, of which some survive, and could be broadly described as flake-blades. Together, with the numerous small ovate and cordate forms of hand-axes, including bout coupé hand-axes it is one of the best examples known in the country of an insular development of a Mousterian of Acheulian Tradition. The industry and other apparently contemporary sites in Ipswich are well described by Tyldesley (1987, 32–5). Furthermore, the Middle to Late Devensian dating is corroborated by the inclusion in the same gravel, as far as can be judged, by some leaf points of Upper Palaeolithic type (Moir 1930; Campbell 1977, 149–50, figs 106–7). Such leaf points have been dated by association with unmodified bone from various British cave sites, with dates clustering around 30,000 BP (Aldhouse-Green and Pettitt 1998, 93). Also, mammalian remains from Bramford Road are of typical cold Devensian species: mammoth, woolly rhinoceros, and reindeer.

MAP 44. GIPPING VALLEY: IPSWICH

A similar industry was found on a smaller scale in the gravel from the Hadleigh Road pits on the other side of the Gipping to Bramford Road, but seemingly the same terrace deposit. Here, however, in the same mainly slightly rolled condition are also a large two-platformed blade core and some long blades identical to those from the not very distant site at Sproughton (Wymer and Rose 1976). These are of later Upper Palaeolithic type and are most unlikely to be associated with the Mousterian industry. A small hand-axe also comes from the gravel beneath the Late-glacial site at Sproughton.

Yet another significant site at the head of the present tidal waters of the Orwell at Constantine Road is represented by some artefacts and bones found in loam beneath what has been recorded (Moir 1918; 1930) as about 6 m of fluvial gravel. Little has been preserved of what was apparently a primary context site, but two bout coupé hand-axes, a small hand-axe and two large Levallois flakes (Wymer 1985, 217; Tyldesley 1987, 32) indicate a similar Mousterian industry. Bones of mammoth and reindeer were also found.

A buried channel of the Gipping–Orwell is known in this part of the valley and must add to the geological complexities of the deposits under what is now mainly the Floodplain Terrace. Thus, it is not perhaps surprising that occasional hand-axes have been found on the river bed (Seven Arches Bridge and Halifax shore at Ipswich, and a couple of possibly Levallois flakes on the muddy shore of the Orwell 2 km downstream). Nothing else is known from river deposits of the Orwell below here.

3.8.7 *Valley of the River Stour: Long Melford to Harwich*

The small number of sites along the river does not justify a distribution map, but there are three important sites related to occupation during Period 3, one prolific site of Period 2 and a couple of hand-axes that could possibly date to Period 1. All the known sites are listed below:

LONG MELFORD, Withendale Pit
(TL 858442 (A))
SUDBURY, Brundon, Jordan's Pit (TL 863417 (A))
GREAT CORNARD, West Hall Primary School
(TL 889399 (A))
MIDDLETON, Henny Lane (TL 880390 (G))
LITTLE CORNARD, (G))
BURES HAMLET, Colne Road
(TL 903338 (A)/TL 903338 (A))
MOUNY BURES, Close to the Mount
(TL 905326 (A))
GROTON, Near Groton church (TL959418 (A))
STOKE-BY-NAYLAND, Thorington Street pit
(TM 010351 (A))
DEDHAM, Jupes Hill (TM 060330 (G))
EAST BERGHOLT, Flatford Lane
(TM 070338 (A))
(G))
BRANTHAM, Hall Pit (TM 117335 (A))
STUTTON, East and west of Stutton Ness
(TM 150330 (A))
HARKSTEAD, Foreshore (TM 191333 (A))
WRABNESS, Foreshore (TM 164320 (A))
HARWICH, Dovercourt, Gant's Pit
(TM 241313 (A))

As with the Gipping Valley, there is very little but for stray finds of hand-axes which may relate to occupation during Period 2. Nor do higher terrace deposits which might well have contained some of the evidence for this period remain except in very few minor remnants. The Stour has cut through Boulder Clay and Glacial Sands and Gravels regarded as belonging to the Anglian Stage, and also through pre-Anglian Kesgrave Sands and Gravels of the proto-Thames. Three terraces have been recognised in the latest geological surveys (Hopson 1982; Pattison *et al.*1993), as:

Terrace 1. 1–4 m above the floodplain
Terrace 2. 5–10 m above the floodplain
Terrace 3. 10–12 m above the floodplain

As noted above, Terrace 3 is hardly represented and nothing Palaeolithic is known from the small remnants that are. Terrace 2 is not found above Stoke by Clare and neither Terraces 1 nor 2 are well preserved until near Sudbury, for this is where the river leaves the Chalk and flows across soft Tertiary clays and sands. Hence, below Sudbury, especially in the Bures, Nayland, and Dedham areas there are well-preserved spreads of both Terraces 1 and 2. Terrace 2 is of major interest because of the site at Brundon (Moir and Hopwood 1939), where an interglacial deposit of the Stanton Harcourt Interglacial (OIS–7) with some artefacts in primary context is covered by later head gravels.

The other important sites of this Period 3 occupation is further down the valley in its present estuary, between Stutton and Harkstead. Although the low cliff on the north side of the river between these two localities is only marked as alluvium, there is a complex of minor channels and sandy silts and fine gravels naturally exposed in it. Much of this is broadly encompassed in the term 'Stutton Brickearth.' Although listed above as two separate sites, it is best to consider them together. They were observed and studied for a long period by H.E.P. Spencer of Ipswich Museum, who found artefacts in the so-called brickearth of Stutton, some *in situ*, mammalian bones and Mollusca (Spencer 1953; 1958; 1970). He also found hand-axes and other artefacts on the foreshore in the gravel underlying the Stutton Brickearth, together with mammalian bones including what may have been the whole skeleton of a mammoth (Spencer 1961; 1970).

Other people have collected flints and bones from this area and it is not always easy to determine whether they have come from the Stutton Brickearth or the underlying gravel exposed at Harkstead. Levallois material in the latter could, of course, have been derived from the eroding brickearth in the cliff, where there is certainly a small but definite Levallois element. The following can, with reasonable confidence, be related to the Stutton Brickearth: 3 hand-axes (one mint at least), 8 flakes, and 7 Levallois flakes. Minimal totals for the Harkstead foreshore are 9 hand-axes, 4 flakes, 1 Levallois flake, and 1 Levallois core. Mammalian remains from Stutton are rich and dominated by horse, with rhino, lion, and bear. This is the characteristic fauna of the OIS–7 Interglacial, also supported by a molluscan fauna with *Corbicula fluminalis*. Dates of 230,000±30,000 BP and 174,000 BP (Szabo and Collins 1975) give additional support. The underlying gravel is probably of the preceding cold period of OIS–8.

Apart from the evidence for occupation during Period 3, the Stutton and Harkstead sites place the only other significant site yet known in this valley (and there must be more to be found) at Dovercourt into its geological context. Gant's Pit is on a small patch of gravel banked against the Oakley Gravel of Bridgland (1988), which is part of the Kesgrave Group, ie, the pre-Anglian proto-Thames. It is thus more recent than the Oakley Gravel and the mammalian remains found include beaver, rhino, fallow and red deer, ox, and straight-tusked elephant. This is clearly an interglacial assemblage of the post-Anglian, and from the altitude of Gant's Pit at 27 m OD must be earlier than the Stutton Brickearth, and unequivocal evidence for human occupation in this part of Essex in Period 2.

The site has been well recorded by several observers and collectors (Whitaker 1877; Underwood 1911; 1913; Warren 1932; Roe 1981, 176; Wymer 1985, 237–9; Bridgland 1988, 298). Roe (1968, 60) lists 208 hand-axes and numerous other artefacts including a Levallois core and two Levallois flakes. The latter seem at variance with Period 2 but may be explained by the usual problem of intrusion during later periglacial climates. In terms of numbers of hand-axes, Gant's Pit is the richest site in Essex.

There is little more that can be added other than to comment on the various stray finds of palaeoliths from elsewhere along the Stour Valley. Period 1 may be represented by two hand-axes from Bures as listed above. Both were found where Kesgrave Sands and Gravels have been mapped, but it cannot be certain that they were found within the gravel and contemporary with it or were later intrusive or surface discards. Single finds of hand-axes have been made from Glacial Sands and Gravels at Dedham, East Bergholt, and possibly Brantham. 'Implements' are recorded from Long Melford in Terrace 2, and a hand-axe from Thorington in same terrace.

A few flakes and two cores from the foreshore at Wrabness appear to have been derived from a low, gravelly cliff that may equate with the Stutton–Harkstead sites on the other side of the estuary. Great Cornard and Middleton have produced a hand-axe apiece from Terrace 1 and a Levallois flake was found on the floodplain at Jupes Hill, Dedham.

It can be concluded that this valley was certainly occupied during much of the Middle and Late Pleistocene (Period 2 and 3) but only a small proportion of the evidence for it has survived or not yet been found.

3.8.8 The Rivers of Central Essex

All the main rivers of central Essex, the Blackwater, Brain, Chelmer, and Colne drain into the present estuary of the Blackwater. Terraces are best preserved in the Blackwater and the Colne and along the Chelmer to the east of Chelmsford. For the most part the rivers have cut down through the Kesgrave Sands and Gravels of the ancestral Thames so that they now flank the sides of the valleys (Pl. 9). There are three sites off Map 44 at Braintree and Bocking: Straits Mill (TL 768245 (E)), Notley Road Pit (TL 760220 (E)), and Sweetings Farm (TL 760220 (E)) which have each produced a hand-axe. They come from gravels mapped as Kesgraves and, if they really are from that deposit

Plate 9 Great Waltham, Essex. Anglian Till overlying Kesgrave Sands and Gravels, exposed by commercial quarrying. Note the weathering of the upper part of the till. This was originally thought to be a separate deposit, referred to as the Gipping Till, but is clearly not so.

and not intrusive, then they could indicate occupation during Period 1.

Otherwise, there is nothing known from the Blackwater gravels except between Witham and Kelvedon. These are listed in Chapter 5 as, although they are finds from river terrace gravels, their location in relation to known interglacial lacustrine deposits is such that it seems more appropriate to consider them there. Only at Springfield (TL 732069 (A)) and the Hoemill Gravel Pit at Woodham Walters (TL 817082 (E)) have hand-axes been found in gravels of Terrace 2.

One hand-axe comes from White Colne: found during excavations in alluvium by Nina Layard (1927). Apart from the great interest of the lacustrine deposits at Witham–Rivenhall End–Kelvedon, Marks Tey, and Copford, the few other palaeoliths that have been found come from a variety of contexts such as Head or Boulder Clay. There is no record as to whether they were on the surface or actually in the deposits in question. All those on the lists of sites in Chapter 5 from Colchester come from Glacial Sands and Gravels. There is very little information to be gained on any of these sites, although the few hand-axes give some support for occupation during Period 2. Only one Levallois flake is recorded, coming from Head or Head Gravel in Beach's Pit at Writtle.

4. Beside the Sea

4.1 Introduction

There is no doubt that people frequented sea beaches at various times during the Middle and Late Pleistocene periods, but any general assessment of what they were doing, or when and where, is hampered by the inadequacy of the geological record. Coastal erosion, rising or falling sea levels, subsidence or uplift of the land, have all contributed to the removal of the greater part of the evidence. There are locations along the present shore line, such as at Bembridge in the Isle of Wight, where deposits of ill-sorted beach pebbles can be seen in the cliffs well above any modern storm beach. They often contain marine shells and are clearly the remains of much earlier beaches. They are found at various levels and are referred to as Raised Beaches. The occasional hand-axe found in such deposits can hardly have become otherwise incorporated unless it had been left on the beach by someone. Thus, if the date of the Raised Beach in question is known, that would be the date of the person being on the beach.

It could be argued that if the sea was eroding against an earlier deposit which contained hand-axes, such could then be washed out of it into the Raised Beach. This so rarely seems to be case in the few Raised Beach deposits with hand-axes that, in the absence of anything of this nature, it is reasonable to assume their contemporaneity. On the other hand, it is essential to know the exact context; to be absolutely sure that anything Palaeolithic that is found is really from such a Raised Beach deposit and not any overlying one.

Bembridge, again, exemplifies this, for at least 11 hand-axes have been found on the modern beach there (Preece *et al.* 1990), apparently derived from the Raised Beach. However, none has been found *in situ*, and it is more likely that they have been derived from the overlying soliflucted or Head Brickearth, in which at least one hand-axe has been found *in situ* and illustrated by Evans (1897, 626). Furthermore, an organic deposit which stratigraphically intervenes between the Raised Beach and the overlying Head Brickearth is present at Bembridge Foreland. Recent investigations by Preece and Scourse (1987, 142–8) have shown this organic deposit of clays and silts has a pollen profile which equates with an Ipswichian Stage which, on the grounds of an independent TL date of 110 Ky, suggests OIS–5e. This puts the beach gravels into the Devensian Stage.

It is unfortunate that erosion has removed virtually all the evidence for past shorelines between Lincolnshire and East Sussex. As this part of south-east England was probably the most intensely occupied area of Britain during much of the Palaeolithic, it can be assumed that much archaeological evidence has been lost. Further north up the east coast Raised Beaches are better preserved, although the majority are of Late Pleistocene age and devoid of any known archaeological evidence for Palaeolithic occupation. There is one site at Sewerby, near Bridlington in Yorkshire, where interglacial deposits occur beneath Till or Glacial Sand and Gravel. What may be a Levallois core is thought to have come from the interglacial deposits

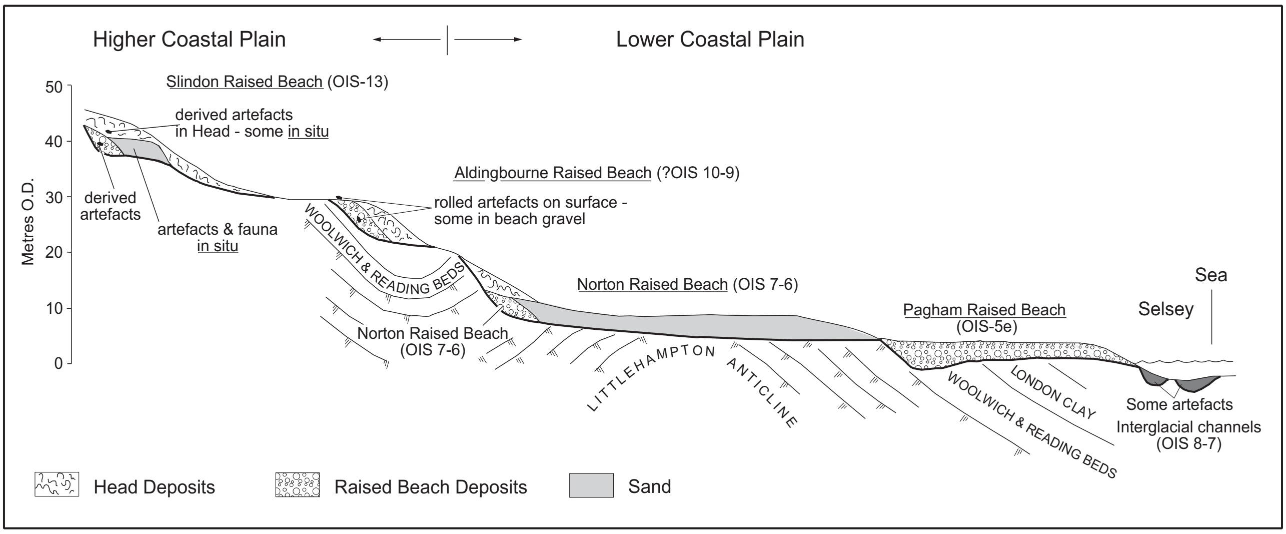


Figure 52 Raised beaches of the West Sussex Coastal Plain. Not to scale (after Bates 1998; Bates et al. *1998; Parfitt 1998a; 1998b; Roberts 1998)*

KEY SITE

BOXGROVE

Map 46, No. 6

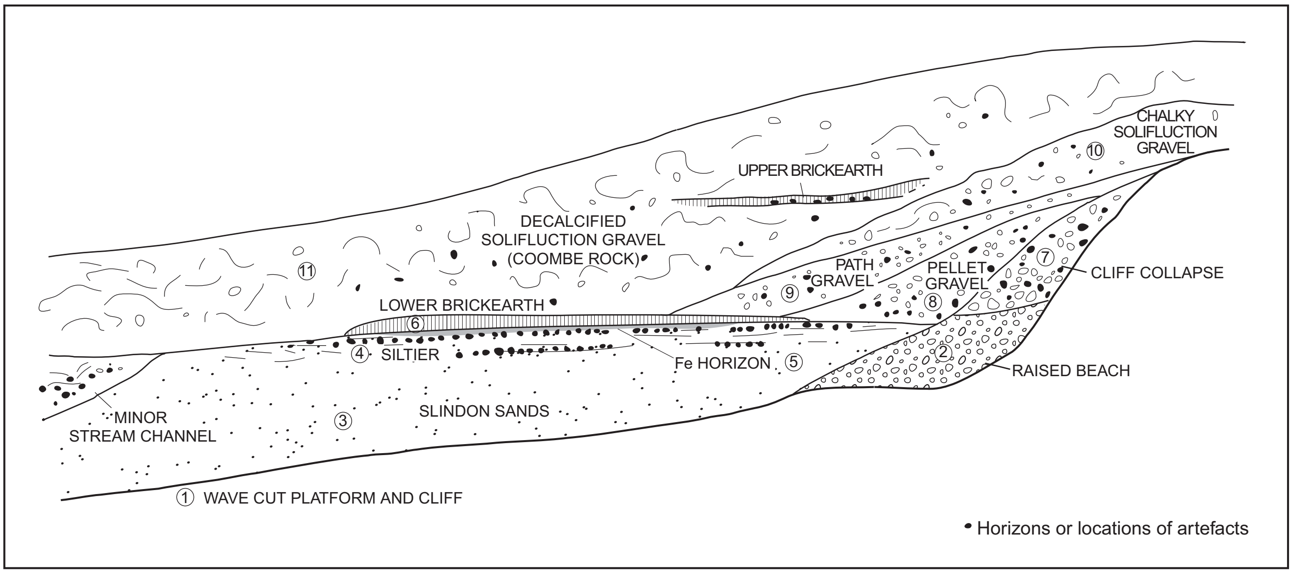


Figure 53 Diagrammatic section of the Higher Raised Beach and associated deposits at Amey's Eartham Pit, Boxgrove (after Woodcock 1981; Roberts 1986, 216–24). The ringed numbers are those given by Roberts (1986) for three groups of Units as a basic division of the sequence. The succession is numbered stratigraphically with No. 1 representing the earliest phase.

A) Marine sequence*: 1. Cliff and platform cutting; 2. pebble beach; 3. Slindon Sand; 4. Upper Slindon Sand. Regression phase sub-divided into 4a and 4b*

B) Terrestrial sequence: *4c. Upper Slindon Sands, terrestrial phase; 5. Ferruginous/manganese layer (Fe/Mn); 6. lower brickearth.*

C) Rock debris and solifluction: *7. Chalk cliff collapse; 8. Chalk pellet gravel; 9. Path gravel; 10. chalky solifluction material; 11. decalcified solifluction gravel*

Location: Amey's Eartham Pit

History: This large quarry on its north side cuts into the Slindon Raised Beach of the Higher Coastal Plain (Fig. 52). It was watched and investigated in the 1970s by A.G. Woodcock, in conjunction with E.R. Shephard-Thorn, for his doctorate thesis. He recovered mint condition palaeoliths and mammalian remains at the base of the Lower Brickearth on the upper part of the Slindon Sands. He also found palaeoliths in the Coombe Rock (solifluction deposit) and Middle Brickearth. The importance of the site was apparent and, with the threat of further quarry extensions, in 1983 the Field Unit of the Institute of Archaeology of the University of London set up the Boxgrove Lower Palaeolithic Project, funded by the Historic Buildings and Monuments Commission and, later, by English Heritage.

Work continued on an increasingly large scale intermittently until 1997 and has revealed the most extensive and best-preserved landscape with Palaeolithic material and faunal remains in primary context for any site in Britain. It has the additional advantage of not being covered by a palimpsest of tools and bones from a succession of visits, but for the most part at least, the unmixed or disturbed remains from single episodes. There is a complex but clear stratigraphical succession, with other archaeological material levels at several identifiable levels within it, from the Raised Beach at

KEY SITE

BOXGROVE
Map 46, No. 6

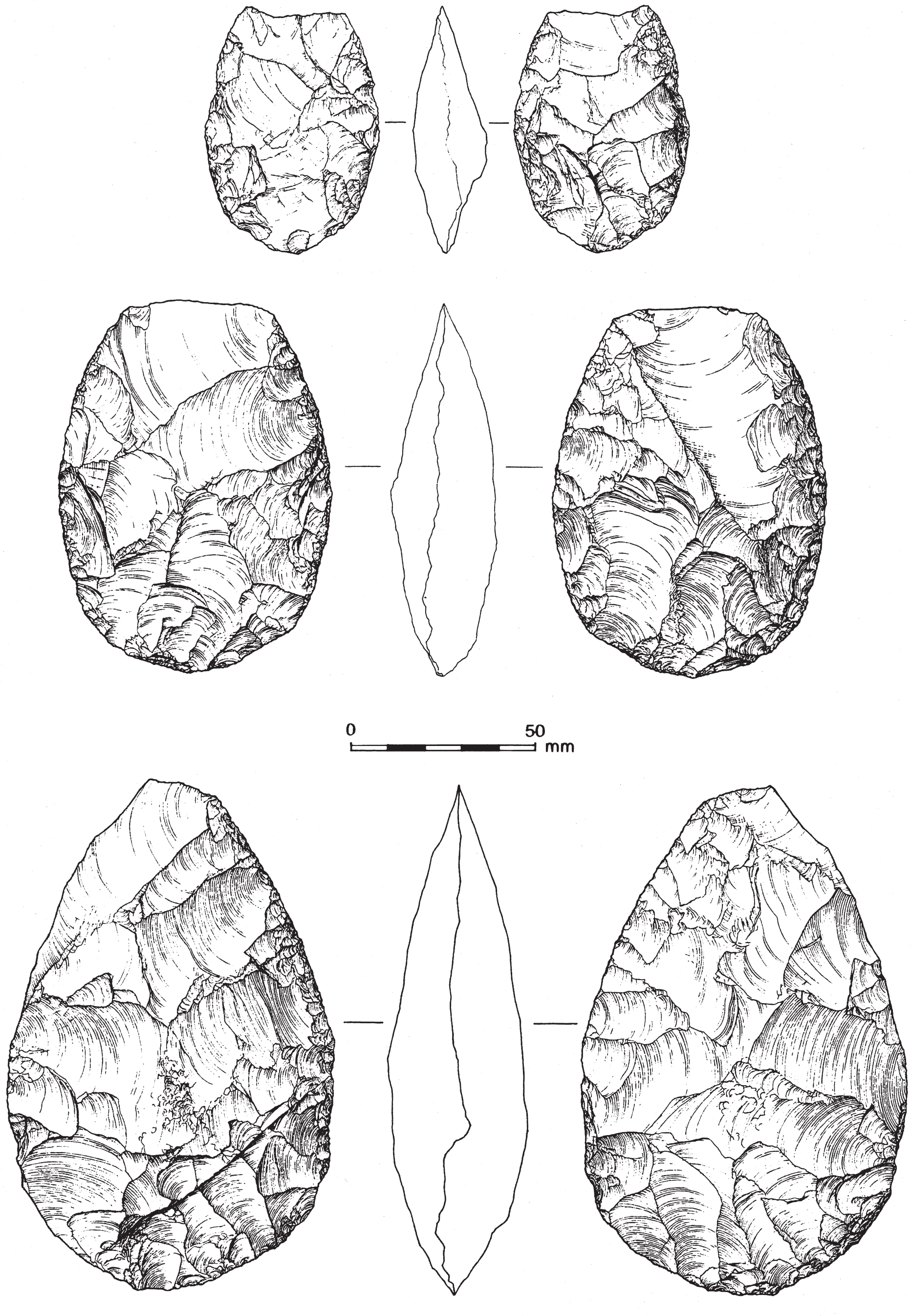


Figure 54 Hand-axes from Boxgrove Site Q2/C. Source: Roberts et al. *1997*

KEY SITE

BOXGROVE
Map 46, No. 6

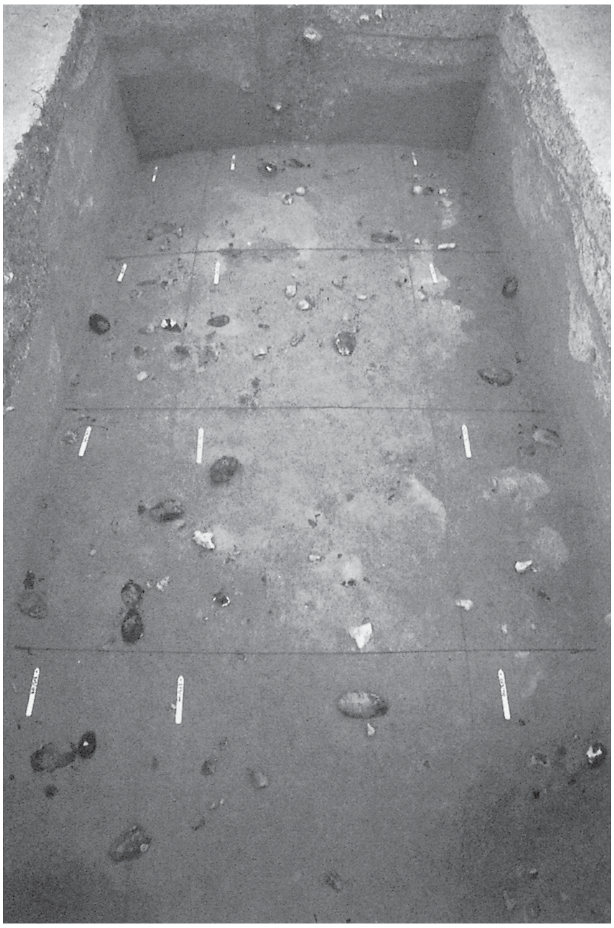


Plate 10 Excavation of the original land surface at the top of the Slindon Silts. Hand-axes and flint debitage remain where discarded, associated with the butchery of large mammals. Photo: M. Roberts

40 m OD, in the Slindon Silts to the solfluction deposit and the middle and upper brickearths. Final publication is in press.

Archaeology: On the buried land surface at the top of the Slindon Silts there is evidence for the collection of raw material from the nearby Chalk cliffs, roughing out on the spot and conveying the pre-forms on to the coastal strip where they were flaked into hand-axes (Fig. 54). The knapping scatters remain and butchery of large mammals took place nearby (Pl. 10). Valuable information has been retrieved to illustrate the curation of some objects and infer that there was hunting by organised human groups.

Refitting material in the solifluction deposit indicates occupation during what is likely to have been cold conditions. A human tibia and some teeth emphasise the possibility of finding further more diagnostic remains of what is assumed to be *Homo heidelbergensis.*

Dating: Biostratigraphical data based on a rich faunal assemblage, containing mammals not found after the Cromerian Stage, indicates a date of that time or earlier. This is at variance with amino acid ratios which suggest a post-Anglian date of OIS–11.

Significance: A World Heritage site for the Lower Palaeolithic.

Major references: *General summary*: Woodcock 1981, 105–8; Roberts *et al.*1997, 303–13; Roberts 1998. *Excavation*: Roberts 1986; Roberts *et al.*1997; Roberts and Parfitt in press. *Artefacts*: Woodcock 1981, 108–47; Roberts 1996, 234–41; Roberts *et al.* 1997, 334–45. *Geology*: Woodcock 1981, 18–53; Roberts 1986, 220–3. *Dating, amino acids*: Bowen *et al.* 1985; Bowen and Sykes in Roberts and Parfitt, in press. *Biostratigraphy*: Parfitt 1998, 129. *Mammalian fauna*: Roberts *et al.* 1997, 346–53; Parfitt 1998.

(Earnshaw and Manby 1963, 4; Gilbertson 1984). However, it was not found *in situ* and its provenance must be suspect.

More informative is the site at Kirmington, south of the Humber and several kilometres inland. Here, beneath 2 m of Devensian Till, occurs a sequence interpreted as a storm beach lying on estuarine silts and a thin layer of peat. About 70 mainly large, rolled and battered flint flakes have been found in the storm beach (Burchell 1931; 1932; Boylan 1966). Boreholes put down in 1905 revealed 25 m of deposits. The interpretation was that there had been a marine incursion into a sub-glacial valley, likened to a fiord. This gradually filled with sediments with a rising sea level and, eventually, interglacial estuarine conditions. The sea was considered near enough to produce the storm beach containing the flint flakes, although some may have been produced by natural percussion. This certainly seems good evidence for people having been on the beach and probably knapping beach pebbles. Dating is inconclusive, but the peat below the storm beach is considered to be Hoxnian (Shotton 1981, 143).

There are a few concentrations of surface Palaeolithic sites close to the present coastline such as on the downs around Eastbourne and Dover (see Chapter 6) but, when occupied, these were probably several kilometres away from the coast. This is, of course, a result of the relatively rapid erosion of the Chalk along the eastern part of the English Channel. However, coastal erosion has been much less active in the Highland zones because of the resistance of Palaeozoic strata.

Thus, the few palaeoliths found on the surface in Cornwall around the Lizard (see Chapter 7) may have resulted from occupation there because of the proximity of the sea. Similar, a few palaeoliths including a possible Levallois artefact were found in the Head Gravels which debouch from a steep coombe on to the shore at Kingswear in Devon. There is also a hand-axe found on the beach at Rhossili at the west end of the Gower Peninsula. It was presumably derived from the low cliff of Head Gravels that may have spread over an early marine platform.

Firmer evidence comes from East Anglia, with some hand-axes and flakes recorded from the upper levels of the Nar Valley Beds at East Winch (Fig. 48, above), Bilney, and Gayton. These are marine and estuarine deposits. Their locations are shown on Map 39. The March Gravels in the Fenland are also partly marine or estuarine. It seems that a precursor of the modern Wash at the estuary of the Great Ouse drainage system existed during much of the Middle Pleistocene. The Nar Valley Beds are dated to OIS–11 or OIS–9 (Section 3.8.3), so this is evidence for occupation in a coastal region during Period 2.

Returning to the English Channel, from about Brighton westwards, there has been much less erosion of the Chalk. To some extent this may have been due to the influence of the Old Solent River, when its right bank may have extended several kilometres east of Spithead. Whatever the reason, there is a spectacular exposure of a Raised Beach with its base at about 8–11 m OD at the foot of the cliff at Black Rock, Brighton. This is buried by some 20 m of coarse Head Gravel with Chalk rubble that has flowed down a coombe from the downland behind.

A much-abraded ovate hand-axe was found in the Raised Beach here (Woodcock 1981, 285–7). Faunal remains have been found in both the Head Deposits and the Raised Beach itself, although much of it is recorded as solely 'Black Rock' and therefore cannot be ascribed to the stratification. Recent investigations have done much to remedy this and, coupled with a study of the deposits, the Mollusca and amino acid dating, it is concluded that the Raised Beach is of an interglacial age related to OIS–7, with the overlying Head Deposits being OIS–6 and the upper layers of it probably of Devensian age.

Thus, there is tentative evidence for people on the beach here during Period 3. Some of the hand-axes recorded in the Head Gravels around Brighton, such as the one found at Portslade Station Pit, may have been derived from land surfaces of the same as that of the Black Rock interglacial beach.

In contrast to the tenuous nature of most of the evidence for coastal occupation of the sites so far mentioned, there are remarkably well-preserved sites in West Sussex, from near Arundel to Chichester, with outliers in Hampshire. The finest and most informative of all is the archaeologically famous site at Boxgrove. All of them indicate considerable human activity on or near the sea shore during Period 1.

Boxgrove is a site associated with the highest Raised Beach in the area, at 40 m above modern sea level. It is 15 km from the sea at Selsey and the intervening area is divided into a Higher Coastal Plain and a Lower Coastal Plain. Four levels of Raised Beaches, including the Slindon Raised beach of Boxgrove, have been recognised and are shown in the accompanying simplified diagram (Fig. 52).

The majority of the evidence for human occupation in the Raised Beaches or associated deposits is found in the higher Slindon and Aldingbourne ones. Only sporadic finds have been reported from the Norton Raised Beach, none from the Pagham Raised Beach and just a few from some interglacial channel deposits at or below modern sea level at Selsey. Known sites are shown on Map 46 with accompanying lists. The archaeology of each of these five levels is considered separately below.

4.2 The Slindon Raised Beach

The location of sites along the ancient cliff line preserved behind the beach itself can be clearly seen on Map 46. There is no surface expression of this feature now. The general basic sequence is a marine platform cut into the solid geology (Chalk here) with overlying marine deposits (Beach gravel and sands) with the formation of land surfaces after a minor recession of the sea, all eventually to be covered by a thick mantle of Chalky Head Gravel slumping off the high downland behind it. Only the Boxgrove site in Amey's Eartham Pit has been thoroughly investigated and revealed a wonderfully preserved long and complex history of marine and terrestrial deposition.

MAP 46. SUSSEX RAISED BEACHES: SELSEY–SLINDON

The sequence at the second most well-known and prolific site at Slindon Park is similar but with Brickearth rather than gravelly Head overlying the marine sands and some later disturbance. The site has a long history of investigation, by Curwen (1925), Calkin (1934), and Woodcock (1981, 182–245). The latter reference has the most detailed and illustrated information on all of the other sites in the Slindon Raised Beach between Slindon and Chichester, apart from the later work at Boxgrove, although there is also much information on that site as well. At least 35 hand-axes, rough-outs, and nearly 300 flakes have come from the Slindon Park site. Most are in very fresh condition and are unequivocal evidence for human activity along the shoreline.

The other sites with similar evidence but in lesser quantity are Everyman's and Marshall's Pits, West Stubb's Pit, and Penfold's Pit. There is a fair quantity of hand-axes from sites at Lavant (66 hand-axes from two old pits alone, north-west and south-east of the village) but the stratification here seems to have suffered disturbance from both solifluction and the passage of the only river of any consequence that cuts through the Higher Coastal Plain between Chichester and Arundel. Other sites shown on the map north of the estimated cliff line are individual surface finds of hand-axes, presumably derived from the Head Deposits.

4.3 The Aldingbourne Raised Beach

The only site which has yielded any quantity of palaeoliths is the one at Aldingbourne itself, from the Council Pits or on the surface of fields nearby. No figures are available but probably 50–60 flakes and cores may approximate to what has been found. They are mainly, if not entirely, in a very rolled state. This suggests that they were constituents of the Raised Beach as was once exposed in the pit. One hand-axe may have come from here, but two are definitely known to have been found in the Pear Tree Knap Pit at Tangmere, from beach deposits below 'Coombe Rock' (ie, Head Gravels). There is at least one hand-axe, a core, and a flake from Easthampnett Pit, and flakes were found during roadworks at the junction of the A27 and A2024.

Although the cliff line of this beach cannot be traced much further to the west, hand-axes have come from the Oving and Portfield Gravel Pits nearer Chichester. The deposits at both places are thought to be of the Aldingbourne Raised Beach, or possibly the Norton Raised Beach. The Portfield Pit hand-axe was found at a depth of 2.5 m from the surface below the top of the Head Deposits and is in fresh condition and may have been associated with an actual beach. Very few faunal remains have been found in any of the Aldingbourne Raised Beach Deposits and dating is questionable, but in view of its altitude it could well span OIS–10 and OIS–9.

4.4 The Norton Raised Beach

This is a relatively recent discovery made by geophysical prospecting and boreholes and is best described in the Quaternary *Field Guide* (Murton *et al.* 1998). It is the highest of the Raised Beaches on the Lower Coastal Plain and, so far, only some sporadic artefacts have been recovered. Its great interest lies in its correlation with the Raised Beach at Black Rock, Brighton. It now seems that the Brighton Raised Beach can be traced some 50 km from Black Rock to Chichester. There is strong evidence for dating the deposits at Norton, as at Brighton, as belonging to the interglacial of OIS–7 or, to be more precise, late OIS–7 into the cold episode of early OIS–6. This dating is based on mammalian and molluscan fauna, corroborated by amino acid dating. The faunal dating is partly based on the recognition of a group of distinctive mammals which occur at Norton, Brighton, and Portslade, and also at other sites in Britain such as Marsworth, Buckinghamshire. They are all thought to belong to this late phase of the interglacial: a small horse, a small bison, and a large northern vole (Parfitt 1998). It is suggested that environmental conditions may have produced this unusual assemblage. As is so often the case with sites of this age, the archaeological content is very small but generally present. Apart from the hand-axe from Black Rock already mentioned, another is recorded from the Station Pit at Portslade, Hove.

4.5 The Pagham Raised Beach and the Selsey Channels

Nothing has yet been found in the deposits of the Pagham Raised Beach which could indicate a human presence during the period to which it is dated: OIS–5e, ie, the Last (Ipswichian) Interglacial. This is in accord with the mounting evidence for Britain being uninhabited during this time.

Between Chichester Harbour and Selsey Bill, coastal erosion occasionally exposes interglacial channels at or just below present sea level. The most important one was the channel near the Selsey Lifeboat Station that was investigated by Professor R.G. West and colleagues (West and Sparks 1960). It yielded pollen, molluscs, and plant macrofossils as well as a few flint artefacts including a hand-axe, Levallois core, and some flakes. The channel was originally dated to OIS–5e, but is now assigned to OIS–7 on the basis of the presence of horse (not considered to be present in the Last Interglacial) and the mollusc *Corbicula fluminalis* also considered not then to be present, but typical of OIS–7 (Parfitt 1998). This dating is supported by amino acid dating. A hand-axe from the Long Acres Pit at Selsey comes from Head Deposits, and a broken hand-axe on the beach may have been derived from the channel noted above. The hand-axe at Aldwick was found in modern beach shingle but no source is known for it.

There is another exposure of the Slindon Raised Beach to the west and off Map 46, on Ports Down at Fort Wallington, but no palaeoliths are known from it. However, one other significant site that must be associated with the Higher Coastal Plain is at Red Barns, Porchester (Gamble and ApSimon 1986). This is a site at 30 m OD on the Chalk above what is now Portsmouth Harbour, and excavated by C. Draper and A. Woodcock in 1974. Nodules of good quality flint were being grubbed from the Chalk and worked on the spot. At least 20 hand-axes, 5000 flakes, and 150 cores spread over the slope of the hill for about 185 m testify to considerable human activity. Many of the artefacts were in mint condition, sealed beneath a veritable calcrete. These were covered by 1–2 m of variable solifluction deposits with other artefacts throughout them which had presumably been caught up in the soil movements from higher up the slope. It is difficult to date this episode. It is several metres below the height of the Slindon Raised Beach and must be more recent than it. Just how much so is impossible to know but, from the technology alone, some time in Period 2 is most likely.

Thus, in spite of the restricted evidence in Britain for a human presence along sea shores, the sites along the Sussex Coastal Plains show what probably existed elsewhere. There is the surprising preservation of the evidence for the earliest occupation during Period 1, material in the Nar Valley Beds of Norfolk and perhaps the flakes from the Aldingbourne Raised Beach for Period 2, and a little for Period 3 at Brighton and Selsey (see also notes of marine beds along the Solent and on the Isle of Wight (Section 3.5.2)).

Only at Boxgrove can we obtain some idea of what people were doing when they were beside the sea. There is nothing to show that they were exploiting marine resources such as shellfish, stranded fish, or any of the sea birds. It seems that they were just butchering large animals as they would have done anywhere else, and that the littoral location was accidental. It just happened that the animals had probably come down on to the old beach for the fresh water and either died there or, more likely, were killed by Palaeolithic hunters. The flint in the Chalk cliff was a bonus.

It may be that the evidence remaining from any exploitation of the marine resources might not be discernible, and people at this time *were* exploiting them. However, this has to be considered against the fact that nothing has ever been found in this earlier part of the Lower Palaeolithic anywhere in the world to suggest it was otherwise. Certainly in southern Africa, during what would correspond with the Period 3 of this survey, marine resources were being used, but no sites are yet known in Britain where any evidence for it exists.

5. Around Lakes

5.1 Introduction

It is self-evident that hunters or foragers of any period would be attracted to freshwater lakes. Unless these were surrounded by swampy land there was likely to be easy access to the water's edge. Apart from having a similar attraction for numerous large and small mammals to constitute a reliable food supply, waterfowl and fish were there at all times. Thus it is not surprising that where commercial or other excavations reveal Post-glacial Quaternary lake sediments, Palaeolithic sites are sometimes revealed as well. There is no conclusive proof in the form of remains of shelters, hearths, or the characteristic concentration of litter and debitage which archaeologists would regard as occupational soil, but it cannot be ruled out that people may have occasionally made more than casual visits; some form of temporary settlement could have occurred. Several of the known Palaeolithic lakeside sites have yielded material in primary context and give tentative support for such a conjecture. They represent a very important category of site.

Without exception, all the known Palaeolithic lacustrine sites are within the southern part of the glaciated areas of Britain. None is far from the known limits of glaciations, and with only one possible exception, they were those of the major Anglian Stage glaciation. Not one of the known sites has any present surface expression, let alone still a lake. A brief consideration of how they formed and developed will give some idea of the type of dating and environmental information they can impart upon the material left behind by those who occupied the lakesides.

For the most part these lakes are in so-called 'kettle holes'. These are hollows formed by the subsidence of rafts of 'dead ice' within the till of the ice sheets or glaciers as they melted. These hollows remain as basins after the landscape is totally free of ice. Obviously they fill with melt-waters at first and then by normal precipitation. A 'modern' analogy is the Mesolithic site at Star Carr in the Vale of Pickering, Yorkshire (Clark 1971). This was beside a lake formed by small kettle holes within a basal moraine of the last glaciation. It is now totally infilled with natural sediments and become arable land. Originally the lake was about 500 m wide and 10 m deep in the middle.

Other lakes remain after the recession of an ice sheet, perpetuating the pro-glacial lakes and sub-glacial features which are active as it advances or recedes. Melt-waters are trapped between ice fronts behind and high ground in front of them. Water levels rise until the lowest ground is breached and another lake may form ahead. Sometimes melt or overflow waters may find or cut a deep channel and escape seawards. Other channels may be cut by water flowing under the ice, often under great pressure. The result is that when the ice sheet in question eventually goes, there will be various hollows or channels in the landscape which may become lake basins or the precursors of rivers or both. It is only at this stage, after the ice had gone, that people were likely to be anywhere near such glacial features. Recent work in Suffolk in the Woodbridge–Aldeburgh area has shown that channels formed on the edge of the receding Anglian Stage ice sheet gradually filled with lacustrine deposits into the middle of the following Hoxnian Stage interglacial.

There is a general similarity in the history of these Post-glacial lakes, broadly in that the lacustrine sediments rest on till and fine clays. Silty sediments accumulate slowly from erosion around them. These usually contain fossil pollen and give valuable, unbroken sequences of the vegetation surrounding the lake shores. They rarely indicate stagnate conditions. This could indicate an ecological balance between algal formation and molluscan activity. Sometimes there is evidence for gently flowing water entering the lake. This could suggest that the lake was part of some minor drainage system that had developed on the landscape. In most cases they eventually become covered with fluviatile gravels and sands and cease to be lakes.

From the archaeological aspect, the lake shores would be expected to preserve the evidence for human activity. Unfortunately, these seem to be the areas that suffer most from fluviatile erosion when any such basin becomes incorporated with a major river system. Thus, it is not surprising that Palaeolithic artefacts are sometimes found in such river deposits, occasionally, as at Hoxne in considerable numbers. The artefacts will always be in a somewhat rolled condition as they will have been washed some distance from their original place of discard on a shore which no longer exists.

5.2 Notes on Sites

There are fewer than a dozen known sites in Britain where palaeoliths can be directly associated with such lakesides. Only a few of these do have well-preserved spreads of flint-working and faunal remains in either primary context or with only minor disturbance. Six of these sites are in East Anglia, all of which are apparently of Hoxnian age (OIS–11 or OIS–9), as are two others without, unfortunately, any archaeology. There are a couple in the Chilterns, and another possible one in the Midlands. A few others only have reference to

KEY SITE

HOXNE
Map 40, No. 1

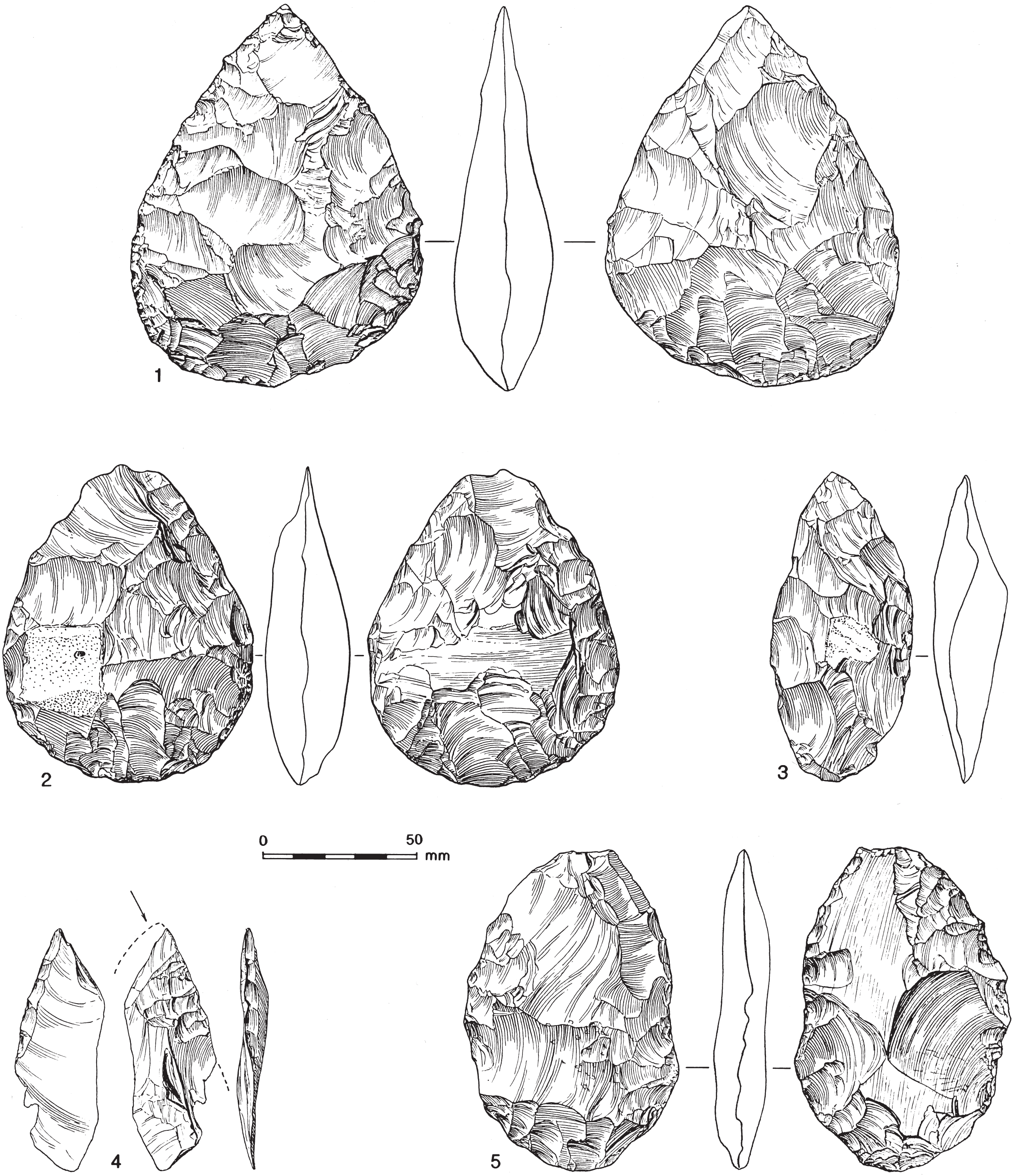


Figure 55 Hoxne Lower Industry. Ovate and cordate hand-axes. No. 4 is a finishing or resharpening tranchet flake. Source:Wymer 1983

KEY SITE

HOXNE

Map 40, No. 1

Location: Brickearth pits, each side of the Hoxne–Eye Road.

History: Renowned for being the first Palaeolithic site to be recognised in Britain, if not the rest of the world, as evidence for the immense antiquity of the human species, as John Frere noted in 1797: 'even beyond that of the present world.' Also, the first place in Britain that Evans and Prestwich visited after their return from Abbeville in 1859, in order to locate a site with flint implements associated with 'antediluvian' fauna, as they had seen in France.

The first methodical excavations were conducted by Clement Reid for the British Association in 1896, in order to determine whether the palaeoliths had been made by people living before or after the major glaciation represented by the boulder clay. The result was conclusively the latter. Subsequently there has been a long series of investigations and excavations. Reid Moir of Ipswich Museum was active from 1920–34. Intensive stratigraphical and palynological studies were made by Professor West and Dr McBurney in 1951–4, and large scale excavation by the University of Chicago in 1971–4 and 1978.

Archaeology and context: The University of Chicago excavations established a Lower and Upper Sequence of deposits above the Lowestoft Till, with a hiatus in between them, but probably of only short duration (Table 14). All of the archaeology was restricted to the Upper Sequence, although a few flakes in the upper part of the lacustrine beds of the Lower Sequence may not have been intrusive, as surmised.

The Lower Industry (Fig. 55) was mainly in primary context but some of the artefacts were not in mint condition and had clearly moved, probably by minor flooding, as per Schick (1986). Sporadic artefacts within the silt of level 5 may have been casual losses during the gradual aggradation of the flood plain sediment, but the Upper Industry was in primary context on its surface (Fig. 56).

Associated material: Mammalian bones and teeth associated with the Lower Industry were mainly fragmentary. Cut marks on some indicated human activity. Small clusters of bone were associated with the Upper Industry, and enigmatical stone clusters with the Lower Industry. A stone emplacement was found within the silty clay of the upper sequence. Pollen and insect remains in the lower sequence relate to the contemporary environment through time.

Dating: There is clear stratigraphical evidence that the whole lower and upper sequence of deposits are more recent than the Lowestoft Till beneath, of the Anglian Stage. Palynology shows a continuous fossil record with no apparent break between the till and the sedimentation of the lacustrine beds of the ensuing interglacial. The human occupation was during the Late-temperate zone of the Hoxnian Stage, of which this is the type site. Other age determinations have been made. TL of burnt flint has given dates of 298±16 Ka and 330±27 Ka. The average of Uranium series and ESR dates is 319±38 Ka. These dates correspond to estimated dates for OIS–9, which was the result obtained from amino acid ratios of shells.

However, the presence of *Trogontherium* and other biostratigraphical considerations (Schreve forthcoming) suggests the earlier date of OIS–11. This seems to equate better with the stratigraphy, in spite of the evidence of a cool period represented by the 'Arctic Bed' between the Lower and Upper industries.

Significance: Of importance for the history of archaeology. Type site of the Hoxnian Stage Interglacial. Stratigraphical separation of two, probably three, periods of occupation. Much of the flintwork in mint condition and suitable for microwear analysis. Stone clusters and a stone emplacement can be regarded as the earliest archaeological 'structures' in Britain.

Major references: *General summary*: Wymer 1983; 1985, 143–78. *Historical*: Frere 1800; Evans 1860. *Excavations*: 1895: Evans *et al.*

KEY SITE

HOXNE

Map 40, No. 1

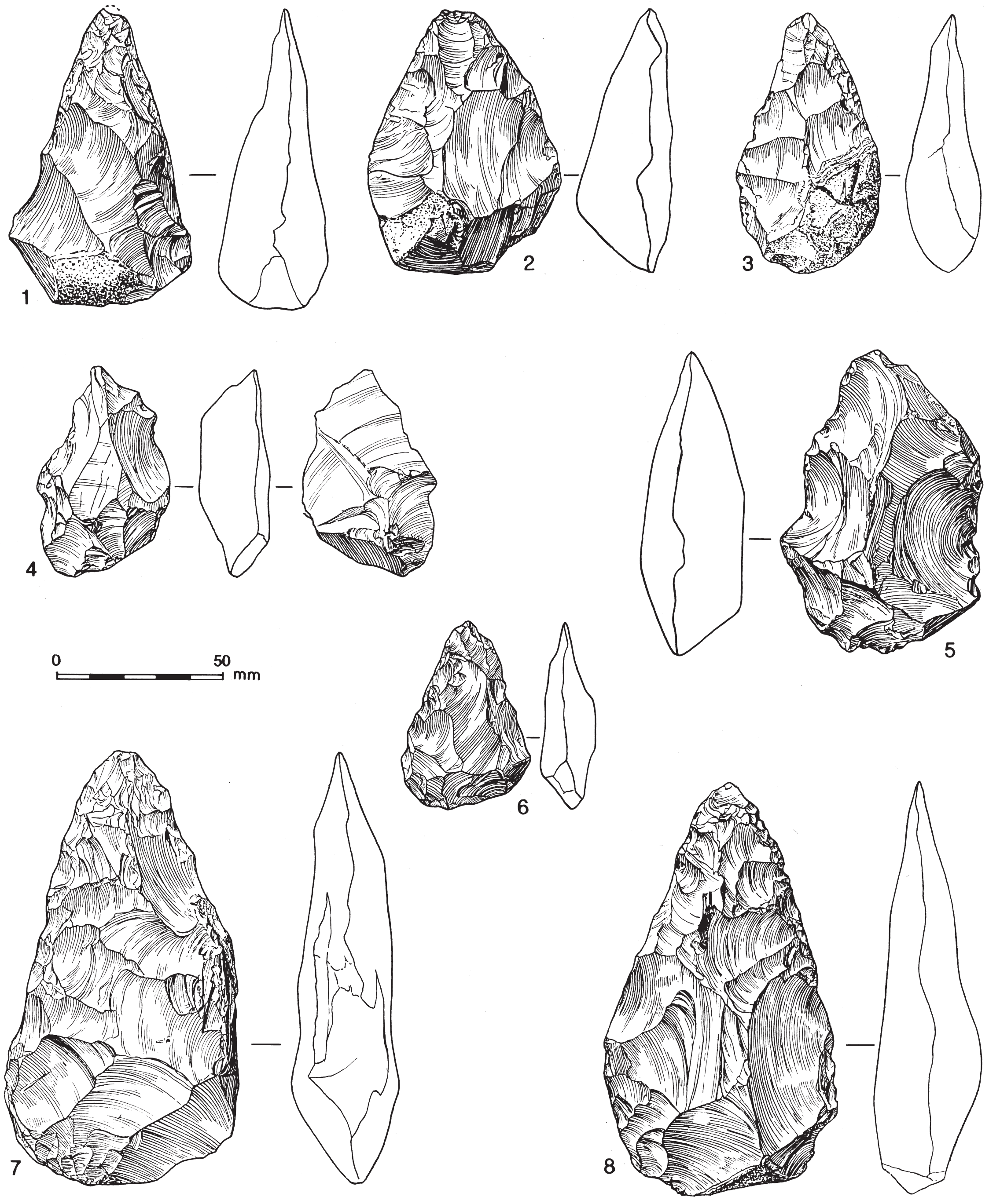


Figure 56 Hoxne Upper Industry. Pointed hand-axes, apart from No. 4 which is a roughly retouched flake. Source: Wymer 1983

1896; 1920–34: Moir 1926; 1934; 1935; 1951-4: West and McBurney 1954 or ?55; West 1956; 1971–4/8 Singer *et al.* 1993. *Geology*: West 1956; Gladfelter 1993; Coxon 1993. *Artefacts*: Wymer and Singer 1993. *Micro-wear*: Keeley 1980, 125–65; 1993. *Mammals*: Stuart *et al.* 1993; Stopp 1993. *Palynology*: West 1956; Mullenders 1993. *Dating*: Gladfelter *et al.* 1993; Bowen 1992

KEY SITE

HOXNE

Map 40, No. 1

	STRATIGRAPHY	*CLIMATE*	*ARCHAEOLOGY*	*BEDS (Gladfelter 1993; 1998)*	*STRATA (West 1956)*	*Bowen et al. (1989)*	*Shreve (in press)*
UPPER SEQUENCE	Solifluction	Cold	Derived artefacts	9	A		
			?Major hiatus				
	Fluviatile gravel with ice wedges	Cold		8			
	Fluviatile gravel			7			
			Major hiatus		B		
	Coarse gravel		Derived artefacts	6			
	Floodplain silt	Warmer	Upper industry on top of and within silt	5			
					C		
	Chalky flint gravel		Middle Industry at top	4			
			?Hiatus ... Arctic Bed				
	Chalky gravel, fluviatile sands and silts			3	C		
						OIS–9	OIS–11
	Clay muds	Cold	Lower industry near base	2			
				1			
			Hiatus				
LOWER SEQUENCE	Peaty detrital mud				D		
		Late temperate (Ho III)					
	Lacustrine clays muds	Early temperate (Ho II)			E	OIS–9	OIS–11
		Pre-temperate (Ho I)			F		
		Late-glacial					
	Lowestoft Till						

*Table 14 The sequence of deposits and flint industries at Hoxne related to the climate and interpretations of the chronology. The Lower Sequence is the type site of the Hoxnian Stage of the conventional chronology. The correlation by amino acid dating to the Lower Sequence and part of the Upper Sequence to OIS–9 conflicts with the biostratigraphical dating of the same to OIS–11. In either case it would thus seem to be an hiatus of short duration. The other hiatuses are unconformities of unknown duration. The presence of the giant beaver (*Trogontherium*) with the Lower Industry and its presence also at Swanscombe and Clacton supports the OIS–11 dating*

geological stratigraphy. Those listed below show plainly that some people in Period 2 were using the lakesides, even if it is not possible to prove they were exploiting its resources. It would be strange if they were not.

5.2.1 HOXNE, Suffolk, Brickearth Pits TM 176769 (A)

This famous site has a long history, from the time when John Frere first realised the great antiquity of what we now know as hand-axes which were being dug out of the pit by workmen. This was in 1797, long before such thoughts concerning human evolution were generally accepted. By the middle of the 19th century it was different and from that time the site received much attention from Sir John Evans, Joseph Prestwich, the British Association, Reid Moir of Ipswich Museum, and others. It was not until the early 1950s that a more scientific approach was made by Professors West and McBurney of the University of Cambridge. The lithostratigraphy and pollen analysis that was applied made this the type site of the Hoxnian Stage of the

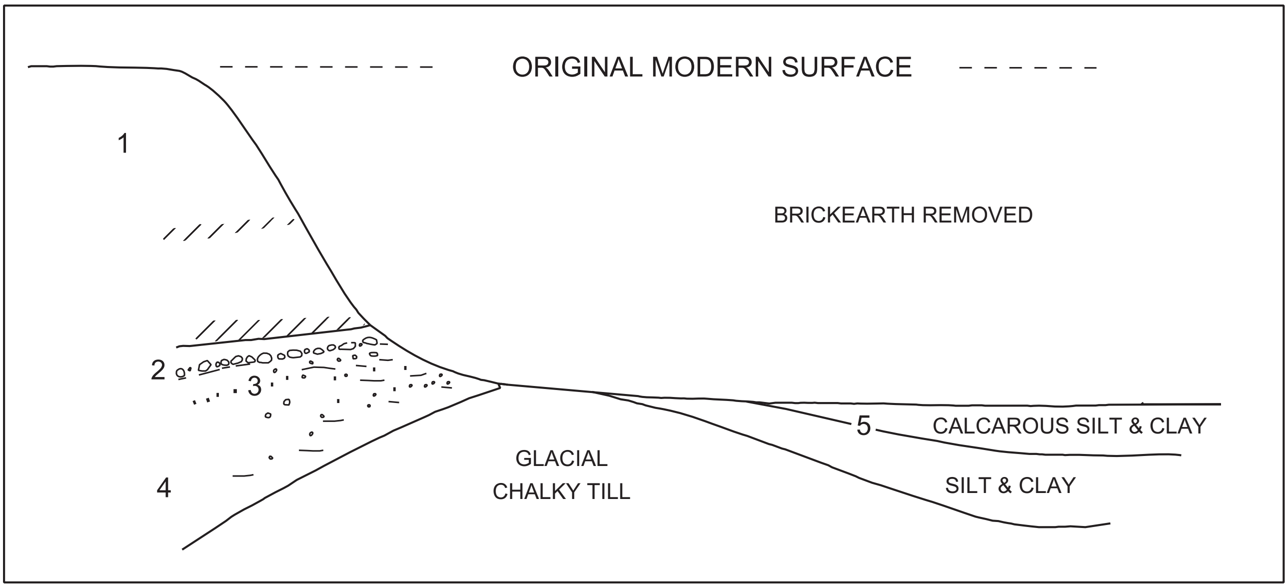


Figure 57. Diagrammatic section across deposits and Barnham East Farm Brickyard (after Peterson 1937; Ashton et al. *1994). Not to scale but some 5–6 m of brickearth removed commercially.*

1) Brown clayey silts with dark bands (= brickearth). a few hand-axes and flakes recorded from here. One hand-axe found in situ *in lowest dark band in 1992 excavation by the British Museum.*
2) Grey silty sand and cobble layer. Old land surface with numerous simply-flaked cores and flakes, together with thinning flakes and at least one hand-axe.
3) Gravel containing numerous flakes and cores, mainly rolled and some striated. No hand-axes recorded. Gravel probably a combination of movement downslope and river sorting of underlying deposit.
4) Gravel in very deep (c. 20 m) channel cut into underlying chalky till of Anglian Stage glaciation. No artefacts known.
5) Lake Beds. The upper calcareous silts and clays with rich fauna of molluscs, fish, amphibians, reptiles, small mammals, and remains of some larger ones such as rabbit, bear, lion, and fallow deer. No artefacts known

chronological framework for the British Quaternary following the major glaciation of the Anglian Stage (West 1956; West and McBurney 1955; Mitchell *et al.* 1973). Thereafter, in the 1970s, large scale archaeological excavations were conducted by the University of Chicago to examine the archaeology in relation to the environment and stratigraphy. Three episodes of occupation during the latter part of the Hoxnian interglacial were found, and are summarised briefly in the Keysite text, above.

5.2.2 *ELVEDEN, Suffolk, Elveden Brickyard TL 805805 (A),* Map 41, No. 3

This site has a long history of investigation, particular lyby T.T. Paterson and B.E. Fagg (1940). It is currently being excavated by N. Ashton for the British Museum. Up to 13 m of deposits exist here, filling a depression in the Anglian till and probably resulting from one or a series of kettle holes. Organic lake muds with pollen and shells rest on the till with some gravel at the base containing a few derived flakes. The pollen indicates an early Hoxnian date for the lake muds. During the same interglacial a river channel cut through these sediments, with gravel lenses that contained palaeoliths, some of which are apparently on a land surface in primary context. The current excavations will do much to clarify the sequence of occupations at this site. At least 80 hand-axes have come from the earlier investigations and it seems most likely that the derived material may represent lakeside activity, whereas the material on the newly-found land-surface must have bordered a stream. All would presumably belong to Period 2, although Tyldesley (1987, 22) records a bout coupé hand-axe from the site.

5.2.3 *BARNHAM, Suffolk, East Farm Brickyard TL 875787 (A),* Map 41, No. 1

Like the Elveden site above, excavations were conducted here by Paterson in the 1930s (Paterson 1937) with further work by N. Ashton during 1989–92 (Ashton *et al.* 1998). The composite cross-section across the site (Fig. 57) shows a deep glacial channel cut through the Anglian till. Silts and clays fill a wide depression above both the channel and the till and are regarded as the result of deposition in still and periodically slow flowing water. This basin probably formed in an over-deepened part of the old 'sub-Glacial' valley. It certainly created a lake which attracted human occupation (West and Gibbard 1995). The upper part of the lake beds with its rich faunal remains is thought to be contemporary with the old land surface (grey silt and cobble layer as shown on Fig. 57).

There can be little doubt that all the fresh artefacts on that surface were dropped by people moving around on it beside the lake. However, it could be argued that different people were there at different times, some making hand-axes, others just knapping flakes off the mainly poor quality flint nodules. The latter would certainly not have been very suitable for making well-shaped hand-axes and this could be the reason for so few hand-axes being found in proportion to the simpler core and flake technology. However, it is odd that there is apparently nothing related to hand-axe manufacture at all in the reworked, possibly periglacial, gravel beneath this land surface. Many of the flakes in this deposit are very worn, rolled and even scratched by soil movements under pressure. This material must represent an earlier episode, having been discarded by people who had discovered the lake in the first place, presumably during the early part of the interglacial. Perhaps this was during a Late-glacial phase when periglacial winters would have caused soil movement.

This site is thus very important for assessing the relationship between hand-axe and non-hand-axe assemblages of palaeoliths. Dating of the site as Anglian–Early Hoxnian (OIS–12 to OIS–11), *c.* 400 Ky is based on amino acid dating of shells from the base of the calcareous lake muds. The mammalian fauna is also very similar to that from Swanscombe, which has a similar date.

5.2.4 WEST STOW, Beeches Pit TL 798719 (A), Map 42, No. 29

This is another East Anglian site which is currently being excavated (1994–8). Work conducted so far by Professor J.A.J. Gowlett of the University of Liverpool has already revealed a complex site with good evidence for human occupation during fully temperate conditions and some of the most convincing evidence yet found in Britain for associated fires. A small burnt area and associated burnt natural and artefactual flints, and burnt bone fragments could, perhaps very tentatively at present, be regarded as resulting from an actual hearth. Similar burnt material was recorded in the 19th century (Whitaker *et al.* 1891, 79).

The current interpretation of the gravels, clays, and tufaceous sediments is that 'a glacial channel gradually silted up in the succeeding interglacial so that there was a pond of undocumented dimensions' (Andressen *et al.* 1996). Such justifies the inclusion of the site in this chapter. The small mammals and molluscs recovered show a transition from a predominantly wooded environment to open grassland. It is not inconceivable that this was caused by the intentional lighting of fires in order to attract game. What is certain is that people were around this body of water making hand-axes. A few have been found in primary context together with numerous flakes, 80 of which could be refitted.

The site lies directly on Anglian till, and a date of OIS–11 is supported by a Uranium Series date of 380–400 Ky (P. Rowe pers. comm.) and the presence of a molluscan fauna containing snails only known from this stage (Preece pers. comm.). It also happens that this rich site has produced a molluscan fauna with a greater number of species for a site of this age than any other in the whole of the British Isles, a list of which can be found with a general description of the site in Preece *et al.* (1991).

5.2.5 SANTON DOWNHAM, Suffolk, Gravel pit nr Little Lodge Farm TL 841867 (A), Map 41, No. 18

This pit is historically renowned for producing numerous hand-axes when commercially worked in the 19th century. Some are described by Evans (1897, 556) as 'the finest instances of the skill of the palaeolithic period which have been found in Britain.' There is one bout coupé hand-axe (Tyldesley 1987, 22) and a Levallois flake recorded. Many more artefacts probably exist in museum collections, but only with the vague provenance of Santon Downham recorded upon them.

Little was known about this pit until recent forestry clearance gave an opportunity for some investigations. These were conducted in 1996 by Dr M. White of the University of Cambridge. Only a few Palaeolithic flakes were found, but beneath a thin spread of gravel which contained the flakes were laminated lake clays. The palaeoliths may therefore have been derived from a nearby lakeside, possibly since eroded away. It is interesting to note that a typological assessment of the hand-axes known to be certainly from this site (Wymer 1985, 389) shows that pointed hand-axes and ovate hand-axes occur in nearly equal numbers. This does little to support the notion that raw material dominates the choice of shape of hand-axes, as contended by White (1995; 1998) and Ashton and McNabb (1994). However, it does not necessarily negate it.

5.2.6 *IPSWICH, Suffolk, Foxhall Road or Derby Road Brickyard TM 185439,* Map 44, No. 18

This site lies within one of the narrow strips of brickearth as shown on the BGS 1:50,000 geological map, Sheet 207 for Ipswich. It would seem that the fine sediments commercially dug as brickearth had accumulated in an abandoned glacial channel within an area of glacial sand and gravel at about 40 m OD (see Map 44). This is on the east side of Ipswich and the sediments occupy a hollow some 200 m wide. Reginald Smith (1921) thought it was part of an old river that had silted up, but Boswell and Moir (1923) considered that the deposits filled a basin and were lacustrine. There are a few derived artefacts which may have been washed off the sides of this body of water during the last stages of its infilling, but artefacts were found in apparently primary context at various levels up the sequence. However, rolled artefacts occur in small numbers within thin lenses of gravel within the brickearth, perhaps indicating occasional flooding. Fluctuating water levels may have produced temporary dry shorelines. At least 134 hand-axes are recorded from various levels but nothing of Levallois technology. As with the sites noted above, the deposits lie directly on Anglian Stage till, so OIS–11 seems a likely date. Certainly, it is good evidence for occupation around what was ostensibly a lake during Period 2.

The earliest investigations were made by Nina Layard (1904; 1906) and later by Reginald Smith, Boswell and Moir. See Wymer (1985, 220–4) for summary of findings and references.

5.2.7 *KELVEDON, WITHAM, and RIVENHALL END TL 890200 to TL 810130 (E)*

Map 47, for the rivers of central Essex, shows the estimated limits between Kelvedon and Witham for what was probably one or perhaps a series of inter-glacial lakes. This was first recognised by Dr C. Turner at Rivenhall End (noted in his work on the Marks Tey site and area, see below). There is nothing archae-ological that can be connected definitely with the lake sediments that have been located by various boreholes and temporary exposures, but it seems more than coincidental that some nine find-spots of palaeoliths occur in terrace gravels above them. There appears to have been a lake or lakes for a distance of some 10 km, presumably occupying a glacial channel after the recession of the Anglian ice sheet. Its position could explain the right-angled bend of the River Blackwater at Kelvedon, where it ran into the channel, emerging at the Chelmsford end. The lake inevitably silted up and the Blackwater had to adjust itself and flow as a normal river and deposit its gravel over the lake beds. It seems that, in the process, palaeoliths that may have been scattered around the original shore of the lake were washed into the gravels.

This is somewhat speculative, but sufficiently plausible to justify an entry in this chapter. There is a report (Whitaker *et al.* 1878) of a hand-axe from an old gravel pit that existed near Witham railway station. Some 4.5 m of shelly marl in a well section nearby was probably part of these lacustrine deposits.

A very unusual occurrence of a large number of palaeoliths in this area was encountered at the Ivy Chimneys Building site near Witham Lodge in 1977. Here 32 hand-axes, 2 rough-outs, and several flakes were found as part of cobbling at the base of what is interpreted as a ritual pool associated with a Romano-British shrine (Turner and Wymer 1987). These were clearly brought to the site and placed in the pool at the time of its making, probably in connection with the worship of Jupiter. Hand-axes may well have been regarded as his 'thunderbolts' but it is odd that people at the time should have also picked out cores and flakes. Perhaps they saw them as debitage from his production of them, in which case it was a somewhat twisted archaeological observation!

More pertinent to this survey is the question of from where they may have come. It seems more likely that they were found in the locality, but none is known. The palaeoliths in question are not in very fresh condition, but all have the aspect of flints found in river gravels, ie, rolled or abraded to some degree. A few are made of the bi-zoned flint that is characteristic of north Kent but that is not much of a clue. They are clearly not from any primary context site that might have been associated with the nearby lacustrine deposits, but could perhaps have been from gravels containing palaeoliths derived from such.

5.2.8 *MARKS TEY, COPFORD, and COLCHESTER, Essex Brickyards*

Brickyards at the above places have all revealed lacustrine sediments resulting from the infilling of hollows on the landscape left by pro-Glacial lakes or melt-water channels. There is nothing Palaeolithic directly associated with them, but Marks Tey has the distinction of being the only other site in Britain, apart from Quinton, where the laminated lake clays contain a pollen record of the vegetation throughout the whole of the Hoxnian Interglacial (Turner 1970). If Hoxne had not been discovered first it would have become the type site for this stage. Map 47 shows the location of one hand-axe found on a path by the brick pit. There is nothing to indicate exactly whence it came, and it is in a very rolled condition. Another more likely candidate for is a hand-axe in Colchester Museum recorded as just 'Marks Tey' and is in sharp condition with traces of buff clay adhering to it. Dalton (1880) refers to remains of red deer at this pit, associated with a peaty, organic deposit. It seems very likely that some rich Palaeolithic site could exist around the edges of the lacustrine deposits, awaiting discovery.

MAP 47. RIVERS AND LAKES: NORTH-EAST ESSEX

No palaeoliths are known from the nearby lacustrine site at Copford but in the 19th century it produced a rich mammalian assemblage of elephant, red deer, bear, bison, aurochs, and the giant beaver (*Trogontherium*) (Dalton 1880). The latter is not known in Britain after the Hoxnian Stage. Other old pits in the Colchester area have produced mammalian remains (Shotton *et al.* 1962).

5.2.9 HITCHIN, Hertfordshire Jeeve's Pit, Ransome's Pit and other brick pits at Hitchin.

For localities see Map 52. Considerable numbers of palaeoliths have come from brick pits in this area, where the Hitchin Gap bisects the Chiltern Hills. This gap is the result of sub-glacial erosion during the retreat of the Anglian ice sheet. Melt-water was trapped between the ice front to the north and a terminal moraine to the south and overflowed to form the gap. Lakes formed in the hollows that remained in the deglaciated landscape, partly filled with sand and gravel. Fine sediments gradually infilled the lakes and it is in these that have been found the palaeoliths discarded by people who were active around the shores. There was probably a large lake in the middle of the gap where the present town of Hitchin now stands, and numerous smaller ones south of the gap towards Stevenage, formed by kettle holes in the 'dead ice' of the Anglian till. This would have been a topography not so very different to that of today, with the Chalk escarpment to the north considerably planed away by the ice sheet, but with numerous small lakes on the southern slopes. The silty clays of such infilled lakes makes good brickearth, hence the number of large and small pits that once existed in this area. The recent Geological Survey *Memoir* for Hitchin (Hopson *et al.* 1996) contains much valuable information on these deposits that is very relevant to the Palaeolithic sites concerned.

The most prolific sites was Jeeve's Pit (64 hand-axes), and a few palaeoliths are known from Ransome's Pit and old brickyards at Highbury and Benslow Lane. Fisher's Green pit at Stevenage produced four hand-axes but the other sites of isolated palaeoliths as shown on Map 52 in this area are mapped as coming from fluvio-glacial gravels. Palaeobotanical analyses place the lacustrine deposits with their contained palaeoliths into the Hoxnian Stage. Period 2 occupation is thus well represented in this part of the Chilterns.

5.2.10 GREAT WHELNETHAM, Suffolk, Sicklesmere, Oak's Kiln TL 874609 (A)

The location of this old brick pit and kiln, just south of Bury St Edmunds, is shown on Map 42. Lake deposits have been exposed resting on a peaty detritus mud with a surface level of 53 m OD and have been examined by West (1981) and attributed, by pollen analysis, to the latter part of the Hoxnian Interglacial. It is difficult to envisage the changes that have taken place in the landscape since then. The site overlooks the wide valley of the River Lark to the east and there must have been higher ground between these lacustrine deposits and the valley otherwise the water would have drained away. Presumably, this land has been eroded away during subsequent periods. There are four hand-axes in Bury St Edmund's Moyse's Museum just marked Sicklesmere. There are other known sites at Sicklesmere as can be seen from Map 42, but these hand-axes are in mint condition and look unlikely to have come from any gravel or surface site. They may well have come from this pit and, if so, an important site may be somewhere in its vicinity.

5.2.11 NORTHAMPTON Floodplain

Lacustrine deposits as shown on Map 36 have been identified in the floodplain of the River Great Ouse at Northampton. Little is known of them, nor have any palaeoliths ever been recorded from them, but a few hand-axes have come from nearby in the floodplain and may have some association. Some recent observation by K.A. Smith (1995), as previously noted (p. 126), may have some relevance. She refers to a depression beneath the floodplain gravels about 50 m across and up to 70 mm deep. This was filled with weathered clay, much organic material including molluscs, ostracods, and beetles. These indicated a large, muddy pond surrounded by dry grassland. The molluscs suggested a cool period, possibly an interstadial.

Around the perimeter of this depression were large numbers of unrolled but fragmented bones, tusks, and teeth of large herbivores: straight-tusked elephant, mammoth, woolly rhinoceros, and bison. This assemblage suggests a pre-Devensian age, OIS–5e or even earlier. The sunken feature is interpreted as an animal water hole. Furthermore, a sunken, linear feature, some 2 m wide and 0.20 m deep, was traced from it for about

300 m southwards, and interpreted as an animal track. Smith describes good African parallels and it is very convincing.

The gravel pit is No. 10 on the map and it may be no coincidence that five hand-axes are known from there. Eight hand-axes come from the Hardingstone Pit further upstream. Three others from Weedon Road have been found on the edge of lacustrine deposits. Three more have been found at Earls Barton (No. 16) but other finds in the area are on the surface of the till of one or two hand-axes. However, apart from a hand-axe, the Ecton Gravel pit has produced a possible Levallois flake.

Although not prolific, there are more sites here than one might have expected in the upper reaches of the Nene and the presence of lakes and ponds may have attracted occupation, but whether that was in Periods 2 or 3 is not possible to know at present. The latter seems more likely for at least some of it.

5.2.12 General Note

There are two sites with Hoxnian interglacial lake sediments in the Birmingham area: Nechells and Quinton. Another is at Trysull, south-west of Wolverhampton (see Jones and Keen 1993, 87 for summaries). These have important environmental aspects and for the glacial chronology of the Midlands, but no Palaeolithic archaeology is known at any of them.

There are also other areas on the chalklands of the Chilterns where hand-axes have come from deposits filling hollows which have sometimes been interpreted as lakes or ponds. These exist especially around Luton, Caddington, Whipsnade, as well as at Westley near Bury St Edmunds in Suffolk. Some may be, but it is more generally accepted that they are the results of dolines, that is the collapse of underlying Chalk through solution to produce water-filled hollows which gradually infilled with colluvial sediments. As with lakes, these attracted people and large mammals. Such sites are included with the variety of situations described in Chapter 6 that indicate the movement of Palaeolithic groups on the downs, plains, and hills above the river valleys.

6. On the Downs, Plains, and Hills

6.1 Summary

Previous chapters have concentrated on the evidence for Palaeolithic occupation found in Quaternary deposits of a particular nature, such as fluviatile, lacustrine, or marine. This has enabled what has been found within them of an archaeological nature to be translated into the past presence of people who were frequenting river valleys, lakesides, or sea shores. Few of their discarded imperishables (99% stone!) remain exactly where they were left, but their contexts can sometimes give a general idea of when it was and the contemporary environment. A few sites have given, with the aid of associated pollen, molluscan, and mammalian remains, a vivid impression of what people may have seen around them. Rare as these sites are, they must suffice for the more biologically impoverished sites.

It is very unlikely, and there is nothing that does or perhaps could show for it, that people ever ventured on to or crossed ice sheets, although there is now some evidence that they may have foraged or hunted around the edge of them. There would have been, in these cold periods, plenty of large and small nutritious animals on the adjacent tundra. Mammoths, woolly rhinos, and arctic hares were well adapted to such surroundings. Men and women may not have had thick, hairy bodies to protect themselves from the climate, but they had enough intelligence to make their own adaptive coverings. Their very presence must show that they could not have been there otherwise. Conversely, during interglacial periods there would at times in certain places have been dense woodland, virtually impenetrable, and large areas of marshy swamps on the river floodplains.

However, it is clear that people did not confine themselves to river valleys, let alone to lakes and coasts. It seems that they went wherever they could, wherever it was advantageous for collecting edible nuts, fruits, and roots, and generally scavenging, foraging, and hunting. They have left ample evidence to demonstrate it in the form of discarded flintwork which occurs over much of the unglaciated area of Britain. It is obvious that, with rare exceptions, little if anything is going to survive the destruction of land surfaces from the passage of glaciers or ice sheets. Elsewhere, the discarded flint tools and debitage left in places beyond the effects of fluvial agencies on high places, such as on the Chalk downs or old out-wash plains or river terraces, have been subjected to the relentless wearing down of the landscape (Pl. 11).

During interglacials, there was rain, snow, frost, and wind; during glacial periods periglacial rock-heaving and mass movement of soil down slopes by solifluction as well. Yet, some land surfaces escaped and artefacts upon them virtually remain where they were dropped or left. Others, through the agencies of solifluction, hill-wash, and soil creep have sludged down into coombes, valleys, or depressions to end up in head deposits. Sometimes the head deposits formed on floodplains and were reworked by the river, so artefacts within them became incorporated in the terrace gravels. Some artefacts lay buried in coombe deposits, others on chalklands may have collapsed into solution hollows.

It would be meaningless to take each type of deposit in which palaeoliths are found in turn, so this chapter will consider the main areas where palaeoliths survive in some numbers on preserved or partially preserved ancient land surfaces, or in deposits originating from such surfaces. By 'surface' it must be emphasised that nothing is likely to be a totally undisturbed land surface, for worms alone transport objects downwards, as does the movement of soil during permafrost. Ploughs, however, tend to bring them up again! Many find their way into the subsoil of a normal profile. Obviously, if the substratum beneath is a Quaternary deposit, then there is the possibility that any palaeolith found on it may have been derived from it. Palaeoliths found in the upper levels of Glacial Sands and Gravels present such a problem. There is no such problem when the bedrock is of a geological age prior to the Quaternary, before humans existed!

The most prolific areas are those of the Chalk downlands, so these will be considered first. There are many good reasons for thinking that this is not a coincidence of chance or discovery, but reflects a genuine choice of this type of landscape when conditions were suitable by people during various times during the three periods of occupation as defined in this survey. The following areas are noted separately:

1. The North Downs (from Farnham to Dover) and the Weald;
2. The South Downs (from Eastbourne to Chichester);
3. The Berkshire and Hampshire Downs and Salisbury Plain;
4. The Chilterns.

For each area, the known concentrations or clusters of sites where palaeoliths have been found on the surface, or in some numbers within head deposits, are

Plate 11 Wessex downland. On the left, Woodborough Hill, on the right Picked Hill, 4 km west of Pewsey, Wiltshire, just above the head of the Salisbury Avon. Hand-axes are occasionally found on the surface of the Chalk or Clay-with-flints. Some, especially on the Clay-with-flints, may be little removed from their place of discard, but it is difficult to estimate the amount of dissolution or erosion of the Chalk. The typical downland shown by Woodborough and Picked Hills may not have looked so very different in the late Middle Pleistocene. A hand-axe is recorded from between these two hills

briefly described. Where the numbers of sites justify it maps are provided, with lists of known sites. The sporadic scatter of individual surface finds would add very little and they are only mentioned when they seem to have some significance for the area concerned. East Anglia is not given separate attention as there is so little there that can be interpreted with any confidence. This is surprising in view of East Anglia being one of the most prolific areas for Palaeolithic sites in Britain, with much evidence for human occupation during all three periods as defined in this survey. The few finds on the south side of the Cromer Ridge, from the surface, in head deposits or in glacial sand and gravel have already been noted in the Section 3.8. Likewise, the palaeoliths found on the beaches of north-east Norfolk, or in the glacial sands and gravels east of Ipswich.

Much of Norfolk and Suffolk is a dissected till plain of the Anglian Stage glaciation. No clusters or concentrations of surface palaeoliths have been found upon this surface of varying boulder clay, sand, and gravels, all mainly chalky. Neither are there more than two or three isolated finds of hand-axes from it: one at Belchamp Otten and another at Broomfield, both in Essex, and one at Bildeston, Suffolk. There may be a few other contenders but, apart from the Midlands, either artefacts have just not been searched for and found, or the till plains were not favoured occupation areas, or the old land surfaces were eroded away. During interglacials, they were probably undrained and forested, if not dangerous with lurking carnivorous predators.

However, there is another aspect that is worth considering, although it may not be relevant. The till plains are very chalky and flint patinates white within one or two millennia, sometimes less. If the soil is very calcareous, this process of surface change on broken flint, such as an artefact, may continue until the edges and ridges become dulled and somewhat difficult to discern. This is what the famous flint collector, Dr Allen Sturge used to refer to as 'worn white.' If this continues for two or three hundred thousand years an artefact may become unrecognisable as such. This is almost certainly the case at Westbury-sub-Mendip, where several amorphous, patinated flints among recognisable artefacts caused some contention among archaeologists. There is one particular published flake from this site (Bishop 1975) that has its bulb and striking platform dulled but identifiable, although the other end of the flake has nothing preserved on it that would allow it to be identified as having been humanly struck. Flint is not so imperishable as is generally believed! L.W. Carpenter, who was responsible for most of the Palaeolithic discoveries on the North Downs around Banstead Heath and Kingswood

Common (see below) often pondered on the deeply patinated, flattish, pointed or ovoid pebbles, as to whether they may once have been hand-axes.

There are just three sites in head deposits in East Anglia that require a mention: Allington Hill in Upper Hare Park (TL 583593 (E)) with 59 hand-axes; the Traveller's Rest Pit at Cambridge (TL 429602 (A)) with at least 40 hand-axes and numerous flakes; and pits at Bartholomews Hills, South Acre (TF 816132 and 818130 (A)). These all depict drastic changes in the landscape during some early glacial episode. The latter site is a finely preserved example of such soil movements. The humpy topography remains at the foot of a wide dry valley coming off the till plain, being the rock waste that sludged down the valley by solifluction. Investigations by J.E. Sainty in the 1930s of the commercial exploitation of the gravelly deposit produced 31 hand-axes, various cores, large numbers of flakes and, significantly, three Levallois cores and nine Levallois flakes (Sainty and Watson 1944). These must have all been brought off the till plain to the east at the top of the dry valley. So, at least that part of the till plain was occupied during Period 3. This serves as an example for the various head deposits noted in the sections below.

6.2 The North Downs (Farnham to Dover) and the Weald

There is nothing more than a couple of stray surface finds of hand-axes along the line of the Chalk between Farnham and the Mole Gap. The first concentration of surface sites is on the Clay-with-flints of Banstead and Walton Heaths in the parishes of Banstead and Walton-on-the-Hill (Fig. 58). The most prolific site was near Rookery Farm (TQ 244540 (A)) and at least 71 hand-axes, 20 broken hand-axes, 120 flakes, and other miscellaneous pieces have been recorded (Carpenter 1960; Walls and Cotton 1980). There appear to have been two separate concentrations. Four hand-axes came from near Pintmere Pond (TQ 224537 (A)) with several flakes and two hammerstones, but just one or two hand-axes from the other ten sites recorded. This area lies at the head of several dry valleys which drain towards the Hogsmill Stream and this may be a reason for it. The discoveries were made when marginal land was taken in for arable farming during the last war. It has now reverted mainly to heath or is a golf course.

Proceeding eastwards there is only a very thin scatter of stray finds at Ewell, Purley, and Croydon on the Chalk or Clay-with-flints until West Wickham and Cudham are reached in the London Borough of Bromley. The West Wickham site was on Church Field (TQ388649 (A)) and the Cudham one in the vicinity of Snag Farm (TQ 452628 (E)). Both are alleged to have produced large numbers of surface palaeoliths in the 19th century, but have been greatly dispersed and few can now be found or identified as coming from the locations recorded.

A few other finds have been made from the surface nearby but as the valley of the River Darent is approached there is the greatest number of surface finds of palaeoliths known in Britain. They not only occur on the Chalk and Clay-with-flints, but on the east side of the Darent also south of the Gault Vale, where they are in even greater numbers on the Lower Cretaceous sands and Head Deposits. This is particularly unusual as, apart from here, the Wealden area between the North and South Downs is almost entirely devoid of anything but a few surface finds of hand-axes. Such as these are, they are mainly on the Lower Greensand of Surrey.

This concentration of surface palaeoliths from the west side of the Darent to just east of the Bourne, roughly Chelsfield to Borough Green, justifies the inclusion here of two distribution maps (Maps 48–9). Much of this distribution is the result of the years of searching by Benjamin Harrison of Ightham around the turn of the century. Research into his notes and maps held at Maidstone Museum has made it possible to prevent any inclusion of his 'eoliths' which would not now be regarded as the product of any human agency.

MAP 48. THE NORTH DOWNS: RIVER DARENT

The even distribution of the locations of the palaeoliths gives an impression of considerable activity on this high ground above the valleys, but the majority of the sites have only produced fewer than four hand-axes, to take an arbitrary number. On Map 48 there are 11 sites which have yielded more than ten hand-axes (Nos 11, 23–5, 29, 32, 36, 40, 48, 53, and 56) and all but two of these sites have general or estimated provenances, implying that they were not necessarily from any minor concentrations. However, No. 24 (Lullingstone Park Gate, with 15 hand-axes) and No. 29 (Ramsden, with 12 hand-axes) do have accurate provenances. The richest area seems to have been Ash-cum-Ridley, where at least 76 hand-axes have been found. Flakes have also been recovered, usually in very small numbers, but there were 18 from Swanley, Wood Street and 13 from Maplescombe. A Levallois core was found at Highfield, Shoreham, and two Levallois flakes at Ash-cum-Ridley. There is a bout coupé hand-axe from Hextable Agricultural College (Tyldesley 1987, 52). If their identity can be accepted, Period 3 might be indicated, but there is nothing whatsoever to date the numerous hand-axes, which could be of Periods 1, 2, or 3.

The situation is very similar in the Ightham area (Map 49) although, thanks to Harrison's records, there

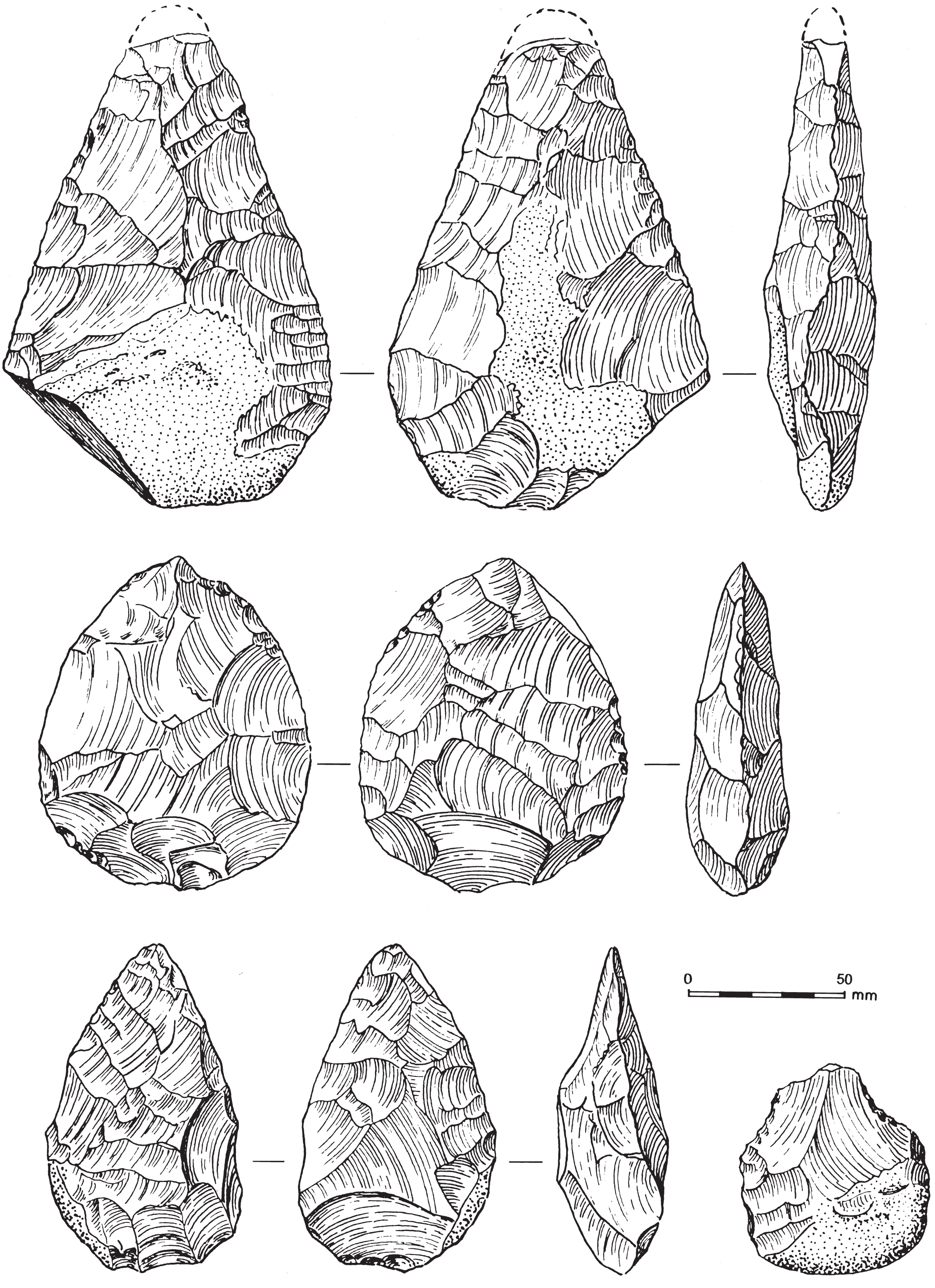


Figure 58 Hand-axes found on the surface of the Clay-with-flints at Walton and Bansted Heaths. Source: Carpenter 1960

are many more sites with accurate provenances. Eight sites have produced more than 20 hand-axes (Nos 11, 13, 17, 18, 20, 43, 98, and 99), all but two of which have accurate provenances. Fane Hill, Ightham, has yielded some 66 hand-axes, but not all from one place. The two sites at Patch Grove Field, Ightham, have yielded 40 hand-axes each. Only one Levallois flake is recorded: from Belle View, Ightham. Tyldesley does not refer to any bout coupé hand-axes, although J.N. Carreck (pers. comm.) thought Harrison had found some at Ivy Hatch.

There is an outlier of the above sites just off Map 49, to the south of Plaxtol, with a scatter of individual hand-axes found on the surface in the parishes of Shipbourne and West Peckham. One general locality at Dunks Green (TQ 613527 (G)) has, however, produced three hand-axes and two Levallois flakes.

MAP 49. THE WEALD OF KENT: IGHTHAM

Sporadic finds of hand-axes occur along the downs, mainly on Head Deposits, as far as Elham, where several have come from at least four sites. A little further east at Littlebourne, in a pit dug into gravelly Head Deposits (TR 201570 (A)), a dozen hand-axes were found, presumably derived off the higher ground. Not until the area between Dover and Sandwich is reached are there greater numbers of known localities, mainly due to the searchings by several archaeologists.

Of particular importance is one discovered by K. Parfitt and G. Halliwell at Wood Hill, Whitfield (TR 294449 (A)), for when this was investigated by J. Scott-Jackson in 1993 a hand-axe and flint debitage were found on the surface of the Clay-with-flints in small concentrations. This is the most convincing evidence so far obtained for these surface discoveries being Palaeolithic material lying where it had been discarded, either *in situ* or with only minimal movement. The detection of minute spalls of flint among the debitage shows that knapping had been conducted on the spot (Scott-Jackson 1994; 1997). Some burnt flints were also found and, in view that no later intrusive material was seen, may well be contemporary with the palaeoliths. Full publication is awaited. The position of the site is shown on Map 50 (No. 8) together with other nearby surface finds of hand-axes.

Returning westwards south of the escarpment or down the dip-slope of the Chalk, there are several prolific sites of a very different nature to those so far described. For the most part they represent material which has been derived from higher ground, almost certainly during periglacial episodes. Solifluction down the valley sides of rivers, into coombes or just down slopes, has left variable types of Head Deposits over much of what is now downland. This obviously implies that the present landscape in these areas has changed considerably since Palaeolithic people moved around, unlike the undisturbed Clay-with-flints parts, where the topography has altered very little.

The first place to mention is just south of the Chalk escarpment in Surrey at Limpsfield, where gravels lie above the Lower Greensand or Weald Clay. These gravels are very mixed, being composed of material slumped down off the Chalk escarpment and mainly reworked by fluvial agencies, together with ironstone and other rocks from the Weald. The general surface level is about 135 m OD. Palaeoliths have been found in these gravels in considerable numbers, at about twelve different localities.

MAP 50. NORTH DOWNS: DOVER

The most prolific sites were at Limpsfield Common Pit (TQ 412529 (A)) with 42 hand-axes, and at Ridlands Farm (TQ 422522 (A)) with over 200 hand-axes. Those on the latter site were mainly found on the surface. The great interest of this site is its position at the head of the Darent and also one of the Medway's headwaters. Any reconstruction of the topography during the Middle Pleistocene is fraught with difficulties, but it can be accepted that there were valleys at that time, running southwards and eastwards, and the Chalk escarpment was near. Gossling (1940) has shown that the Darent used to flow through this area off the central Weald. The large numbers of artefacts that eventually found their way into these gravels suggest this was a well-frequented place at times possibly for these reasons.

The only suggestion of any date for the occupation of this area is that there is no evidence for any Levallois technology, and these gravels must have been deposited before the present valleys existed. Period 2 or even 1 is most likely. A recent detailed reinvestigation of this important locality and the palaeoliths from it has been made by Field *et al.* (in press).

There are two major sites in the valley of the Medway where it cuts through the Chalk (Map 19): Cuxton and Frindsbury. The Cuxton site lies on the west side of the river at about 18 m OD at the point where it is joined by a dry valley from off the downs. Although the gravels at the surface have been mapped by the Geological Survey as Head, archaeological excavations by Tester (1966) and later by Cruse (1987) demonstrated that they overlay fluviatile terrace gravel of the Medway. In a very small area Tester found 199 hand-axes, 366 flakes, and other pieces, whereas Cruse dug at a lower level and found fewer.

The predominate form of the hand-axes is pointed, and the assemblage has a remarkable resemblance to that from the not very distant Middle Gravels of Swanscombe. Some of the artefacts are so sharp that they appear to be in primary context. Others are somewhat rolled and stained. This suggests occupation at different times with movement of artefacts by fluvial activity, but it is unlikely that many have moved far. There are some flakes with well-prepared platforms but nothing to denote any definite use of Levallois technology.

The difficulty of correlating the river terraces of the Medway below Chatham with those in the Hoo Peninsula has already been commented upon (Section 3.4.2). If the bench level for Cuxton is taken as the height of the area excavated by Tester (18 m OD) then a correlation with the Barling Gravel of Hoxnian age is feasible. Aylesford is only at 15 m OD and 8 km upstream from Cuxton, so could be more recent (but see comments on the Aylesford site, Section 3.4.2).

Four kilometres downstream from Cuxton is the site of Frindsbury. This lies at the top of the steep Chalk cliff on the left bank of the Medway (now quarried away), at 30 m OD. The Chalk was covered by 2 m of what was described as 'chalky drift and clayey loam,' lying on what may have been the same terrace bench level as at Cuxton. However, there is no question of this being a terrace gravel, for it is clearly a Head Deposit subjected to permafrost in a periglacial climate. Large numbers of hand-axes were found in association with what the excavators described as flint heaps (Cook and Killick 1924). There were hand-axes, massive cores, large numbers of flakes, and quartzite hammerstones. Flakes could be refitted. This was clearly a very much disturbed knapping site of Period 2. Nodules of flint were being grubbed out of the Chalk and possibly placed in heaps, but owe their position as found to frost-heaving and not human emplacement. The site was presumably covered by a slope deposit at an unknown time after its use and then subjected to permafrost.

Another site, in the Dartford area, that warrants a mention is at Wilmington (Map 11). At least 50 hand-axes come from some pits which were exploiting Boyn Hill Gravel that had slumped down slope and then became overwhelmed by Coombe deposits. Smith's Pit in Warren Road (TQ 542725 (A)) produced the majority (Dewey 1959).

Another prolific site was at Twydall near Gillingham (TQ 805677 (A)). At least 91 hand-axes have come from a quarry dug into Head gravel. The surface level is about 20 m OD. Presumably, this is another instance of occupation on the downs above the river, with the discarded palaeoliths slumping down the slope towards it during some later cold phase. On the other hand, little is known of this deposit and it is possible that Head Deposits overlie normal river terrace gravel.

There are other records of occasional hand-axes and even Levallois flakes coming from Head Deposits around Gillingham. The most informative was a site at Stonecross, Luton. Thirteen hand-axes, some rough-outs, and numerous flakes were found beneath about 2 m of brickearth, in what has been described as a 'flint bed above the loamy layer', which in turn was above a thin layer of Clay-with-flints above the Chalk (Turner 1928). The site was regarded as a workshop and none of the artefacts was rolled so, if not exactly in primary context, they had probably moved very little.

This Luton site introduces another new aspect to this part of the North Downs, for much of north-west Kent is covered by so-called brickearth, which has a windblown component referred to as loess. This is a very fine grade deposit left after the recession of glaciers and distributed by wind. Ancient land surfaces are often, therefore covered gently by this fine deposit and can present superbly preserved primary context sites. The calcareous nature of loess is also conducive to the preservation of bones.

It is well represented in this part of Kent and other parts of the south east coast because of the proximity of the continent. A site of this nature was found at Bapchild near Sittingbourne in the 1920s in a large area each side of a dry valley that was being excavated for brickearth (TQ 938624 and 931627 (A)). A prolific Levallois assemblage of Baker's Hole, Northfleet, type was found and investigated by H.G. Dines of the Geological Survey (Dines 1928; 1929). Levallois flakes and cores came mainly from Coombe Rock beneath about 2 m of brickearth. Some were sharp, others were abraded. It was concluded that they had become incorporated in the chalky deposit as it sludged down the hill from a nearby working place. At another part of the brickearth pits, artefacts of the same type were found in sharp condition on Chalk at the base of the brickearth. These were probably in primary context. There is a reference in the report to bones of goat, pig, and deer being found with the flakes, but these may have been intrusive as there was no methodical archaeological excavation of the material.

Other sites of this type must exist and await discovery. Nine Levallois flakes came from Head Deposits at Ospringe (Garraway-Rice 1911) near the old Union House (TQ 001614 (A)) but no details are known of their exact context. Other finds of Levallois flakes with small hand-axes have come from recent searching at Swalecliff, near Herne Bay (TQ 135673 (A)) (T. Allen pers. comm.). These are eroding from brickearth deposits occupying the buried valley of a small stream. Mammalian remains have been found in the past (Worsfold 1926) and two assemblages have been identified indicative of possibly OIS–5e and OIS–7 (Green *et al.* 1998).

It can be concluded with confidence that there was considerable human activity over certain areas of the North Downs in Periods 2 and 3. There is nothing that can be taken to support occupation anywhere during Period 1, but Limpsfield could be a contender.

6.3 The South Downs: Eastbourne to Chichester

There is only a very thin scatter of palaeoliths from along the coast and its hinterland between Folkestone and Bexhill, where Wealden clays and sands outcrop

Plate 12 The Cuckmere River in 1993 meandering across its floodplain near its estuary at Seaford, East Sussex. It is typical of the Sussex rivers flowing into the English channel, cutting through the Chalk of the South Downs. These rivers originate in the Weald and, as a result of superimposed drainage, would already have produced wide, steep-sided valleys through the Chalk by the Middle Pleistocene. Several palaeoliths have been found on the surface of the Chalk or Clay-with-flints between the Cuckmere and Eastbourne

between the escarpments of the North and South Downs. Once on the Chalk at Eastbourne, hand-axes have been found at several places. Between that place and Seaford, and inland as far as Wilmington, is the only cluster of known sites on the South Downs. This is the area of the downs where the Rivers Cuckmere and Ouse and other Sussex rivers have cut their way through the Chalk to the sea. The Cuckmere approaches the sea in a series of spectacular meanders (Pl. 12) but no high river terraces are preserved along either river except for a small patch near Lewes. Only a few palaeoliths are known from the lower terraces of any of these Sussex rivers, but higher terraces would have been there during the Middle Pleistocene. The sea was probably considerably distant, to judge by the present erosion of the cliffs around nearby Beachy Head. It is significant that of the few sites that have accurate provenances, they are either on or very close to deposits of Clay-with-flints. Others have been specifically recorded as coming from that same deposit.

These include:

Crapham Down (TQ 579977 (A)), hand-axe
Wilmington Hill (TQ 545035 (A)), 3 hand-axes, 2 flakes

Folkington Hill (TQ 553027 (E)), 4 hand-axes, core, 4 flakes
Snap Hill and area (TQ 545005 (E)), 15 hand-axes, Levallois core
East Dean village (TQ 555980 (E)), hand-axe
North of Seaford (TQ 491012 (A)), hand-axe
Seaford Head (TQ 494978 (A)), 2 hand-axes

Others come off the Chalk. It seems that there has been much erosion of the Clay-with-flints. Many dry coombes lead down to the coast or the rivers. When Palaeolithic people occupied the area it is likely that the Clay-with-flints covered a much larger area of relatively level ground. Clearly, it was an attractive area with freshwater in the valleys, distant views of the Channel and plenty of available flint as a bonus. Only a few kilometres to the north, views from the escarpment would have enabled animal herds to be observed over considerable distances.

These chalkland sites are well described by Woodcock (1981), as well as the few sites in the valleys of the Adur, Arun, and Ouse, and at Black Rock, Brighton. This has already been mentioned in Chapter 5 for the exposure in the modern cliff of the raised beach at 8–11 m OD dated by its mammalian fauna and amino acids to OIS–7. As can be seen so clearly in the cliff section, this raised beach is covered by 18 m of chalky gravels which totally infill a coombe cut through the Chalk. Current assessments (Parfitt 1998) put the filling of this coombe in the cold period of OIS–6 and some finer head gravels at the top into later stages, possibly even the Devensian. These Head Gravels represent sweepings off the Chalk downs to the north of Brighton. It was once known as the elephant bed on account of the numerous remains of mammoth found in it. Smith (1926, 66) records a hand-axe from this Head Deposit, often referred to as Coombe Rock because of its chalky composition. Whether the hand-axe from the Raised Beach itself, and the one in the Head are discards of OIS–7 or earlier occupation cannot be assessed.

Proceeding westwards there are a few individual finds of surface palaeoliths but nothing of note until the River Arun is crossed. The marine aspect of the magnificent site at Boxgrove has already been mentioned (Section 4.2) and Figure 53 shows the decalcified solifluction gravel overlying Lower Brickearth and marine Slindon Sands. This is a deposit that has sludged off the slopes of the Chalk downs immediately to the north of the site, bringing with it large numbers of hand-axes left behind by people who had been occupying the area. There is no reason to consider there is any long hiatus between the occupation on the Raised Beach deposits beneath.

The faunal evidence conclusively dates this occupation to an interglacial earlier than the Hoxnian, which thus must be the Cromerian or earlier. The most likely date would be OIS–13, as favoured by the excavators (Roberts *et al.* 1997; in press). This places the solifluction gravels in the Anglian Stage (OIS–12) and it is reasonable to assume that the hand-axes and flakes within it represent occupational material from above the beach or a little distance inland, contemporary with that on the beach. This deposit is part of the Upper Gravel Member of the Eartham Formation and Roberts (1998, 210) refers to the Palaeolithic artefacts within it. A remarkable discovery in the latter stages of the excavation was the presence of palaeoliths in this gravel that had not been derived but were in primary context: in mint condition associated with refitting flakes. This appears to be the most convincing evidence yet found for the occupation of this part of Britain during very cold conditions, but a full report is awaited before this can be confirmed.

Interestingly, there are no Head Deposits immediately behind the buried cliff line of the 40 m Raised Beach at Slindon, but five hand-axes have been found on the surface of the Chalk very close to it: two near the waterworks, one at 'The Bellows' and two at Madehurst. Perhaps these are hand-axes of Period 1 which remained where they were discarded on the edge of the now buried cliff, but it could just be a coincidence.

The Boxgrove site shows that the South Downs were occupied during Period 1, and the one rolled hand-axe in the Brighton Raised Beach at Black Rock and another in the Coombe Rock above it, are tenuous evidence for Period 3. It is impossible to state more than that the various hand-axes and flakes found on or in the Clay-with-flints found sporadically on the surface of the South Downs are of Period 2, but it seems very probable.

6.4 The Berkshire and Hampshire Downs and Salisbury Plain

This is a very large area but it only includes one major concentration of sites around Basingstoke, two small clusters at Holybourne and on Hackpen Hill, and one very important site in Head Gravel at Knowle Farm, Savernake. Elsewhere, there are records of sporadic finds of usually single hand-axes from the surface of Clay-with-flints or Chalk. One or two are worthy of mention. In Berkshire there is very little apart from a few in the Pangbourne–Basildon–Whitchurch area. Similarly, there is very little known in Wiltshire but there are three sites on Clay-with-flints on hills overlooking the Vale of Pewsey: Milk Hill, Golden Ball Hill, and Martinsell Hill. These hills may not have been so high above the level of the Plain in the Middle Pleistocene, but Milk Hill is 294 m OD. This is about

40–50 m above the present general level of the Plain in this area and it hardly seems possible that erosion has been of that magnitude. It is one of the highest find-spots for a palaeolith in southern England. The general paucity of find-spots of surface palaeoliths in Wiltshire, and probably elsewhere in the other counties, may be reflecting more that they have not been found rather than they are not there. In this respect it could be relevant that methodical fieldwalking along the line of the A36 Salisbury Bypass in 1992 produced on the surface of gravel or Clay-with-flints two hand-axes, a cleaver, and a flake (Harding 1995).

Dorset also has only a few isolated finds of hand-axes from the surface of the Chalk or Clay-with-flints. Hampshire fares considerably better, with a small group of sites around Popham, and a cluster around Holybourne, near Alton. These are on either Chalk or Clay-with-flints with only a single hand-axe from each of eight localities except for one on Holybourne Down at SU 721435 (E). This is on the edge of the Clay-with-flints and has produced 24 hand-axes and about 50 flakes. One of the hand-axes is regarded as a bout coupé by Tyldesley (1987, 54) but she notes that it is in a very fresh condition compared to the 'worn and patinated Acheulian material.'

There are nine other sites a little further to the north, on or just off the spreads of dissected Clay-with-flints between South and North Warnborough. There are only one or two hand-axes from most of the localities, but it may be significant that three of the sites cluster around what is now the source of the River Whitewater or Bidden Water. They have six to eight hand-axes apiece. In this respect it is interesting to note that four hand-axes were found on the Clay-with-flints near the source of the River Test at Overton, and a few others in the vicinity. Five kilometres to the south there is a small cluster of five sites at Popham on the Clay-with-flints. One, unfortunately with only a general provenance, has yielded four hand-axes, a core, and two Levallois flakes.

MAP 51. SOUTH DOWNS: BASINGSTOKE

It should be mentioned that the Isle of Wight also has a few surface sites including a few at Bembridge and, in the grounds of Bembridge School, eight hand-axes from a Head Deposit. The only known concentration of surface sites in this great area of Hampshire chalkland that justifies a map (Map 51) to show the 40 listed sites is around Basingstoke. Without exception, all the sites are on Chalk or Clay-with-flints. Most of the sites have from one to half a dozen hand-axes, but three have yielded greater numbers:

CLIDDESDON, Winslade, Swallick Farm (SU 643478 (A)), 37 hand-axes, 1 rough-out, 3 cores, 4 flakes
White Hill (SU 638479 (A)), 11 hand-axes
ELLISFIELD, Cow Down Gate (SU 628457 (A)), 1 hand-axe, 1 rough-out, 108 flakes, 1 Levallois core

Other Levallois artefacts come form sites Nos 25 and 30. Tyldesley (1987) does not list any bout coupé hand-axes from any of these sites, but a Period 3 occupation of the downland might be accepted for some if not all of the artefacts on the slender basis of the Levallois flakes and core.

The other cluster of sites that justifies noting is that on the Marlborough Downs, two to three kilometres north-east of Avebury on Rough Hill and Hackpen Hill. Five of the sites are on Clay-with-flints and two on the Chalk. This is a very high part of the downland at around 270 m OD. The one on Hackpen Hill at the highest point (SU 125740 (E)) has produced at least six hand-axes, ten flakes, and a core. The other have only yielded single hand-axes but for Winterbourne Monkton Downs (SU 113724 (A)) at least two: one of the hand-axes being made from sarsen stone, which abounds in the area but is very intractable. Another of sarsen was found with just the general provenance of Winterbourne Bassett, but probably Hackpen Hill. These are the only known hand-axes made of this very hard stone and it is curious to know why such was used in an area of reasonably plentiful flint.

The final site to note for this area is of a very different nature to anything else known in the whole of area concerned. It is one of the most prolific Palaeolithic sites in southern England with over 2000 artefacts, mainly hand-axes, recorded. This is at Knowle Farm, Savernake in the parish of Little Bedwyn (SU 256676 (A)). The discoveries were made when gravel was commercially worked on the farm at the beginning of this century. (For the history and description of the site see Froom 1983). The gravel that was exploited fills the bottom of a dry valley which runs from the top of the gravel plateau into a valley which in turn runs into the main Kennet Valley as shown on Map 16. This is apparently a Head Deposit that has formed by solifluction down the now dry valley, but it could possibly have once been occupied by a stream and the palaeoliths result from nearby occupation in the valley. If not, and as it has flowed into a valley cut down through the Late Anglian Silchester Stage Gravel it is probably more recent than the Anglian Stage.

Roe (1968, 311) lists the palaeoliths but does not record any Levallois material, so a Period 2 date is likely (?OIS–10 or OIS–8). They may have been derived from the plateau, but no sites of any comparable nature have ever been found up there, either on gravels, Clay-with-flints, or Chalk. Perhaps it is an indication that erosion of the Chalk downs has been far greater than has been suggested here and the vast majority of the palaeoliths, if they ever existed, have been dispersed by various natural agencies. It could also mean that the human occupation of the downland was at some time far more extensive than generally believed.

6.5 The Chilterns

As on other areas of the Chalk already discussed, there is a sparse scatter of find-spots of hand-axes that have been found on the surface. They are on high ground but there is a difference resulting from the proximity of the Chilterns to the limits of the Anglian ice sheet. The distribution of the till remaining from it shows that ice came through the Hitchin Gap and divided into two: one arm moving down through the Vale of St Albans, which eventually diverted the Thames, and the other to the west of the present Lea Valley, as far as north London. To the south-west of Hitchin, however, the ice failed to override the Chalk escarpment. Much of the Clay-with-flints (of greater antiquity than the Anglian Stage) survived, but much of it was also eroded or disturbed by glacial melt-waters or periglacial agencies and solifluction. Palaeoliths have been found in or on all of the deposits left by these episodes of glacial or periglacial activity during the later part of the Anglian Stage (OIS–12) and to some extent during later periods.

Clay or brickearth caps large areas of the Chilterns between Luton and Dunstable. This brickearth is thought to have 'been deposited by a combination of wind action and solifluction … and accumulated preferentially in topographic depressions' (Hopson *et al.* 1996). It is probably of several ages: post-Anglian and later, even Devensian. Its importance for Palaeolithic archaeology is that artefacts have been found in many of these depressions, in or beneath the brickearth. Some were in primary context and are unequivocal testimony to human occupation on the Chilterns during Period 2 and possibly Period 3. They are noted here as 'Chiltern brickearth sites.' There is another series of sites in a great fan of Head Gravel that spread off the top of the downs and sludged down the escarpment on to the clay lands below. These are noted here as the Wallingford Fan Gravel sites. Both of these sites are briefly described below, but mention must be made first of some of the surface sites.

There is a scatter of surface sites with one or two hand-axes apiece on the Winter Hill and higher gravels on the north side of the Ancient Channel between Caversham and Henley (see Map 3). They are mainly around Kidmore End and seven hand-axes have been recorded from between Gallowstree Common and Sonning Common. These uneroded terrace surfaces would, of course, have been land surfaces from any time after their deposition and the hand-axes left on them date accordingly. However, their proximity to the rich sites in the 'Ancient Channel' and the Caversham–Reading area suggests that they may date to the same time as those found in the lower terrace gravels. A few have been found in the coombes that have cut through the Clay-with-flints and river deposits at a later date.

Further east on the dip-slope of the Chalk, above Burnham, is an unusual site in a brickearth quarry at Dorney Wood (SU 937857 (E)) in which were found 17 hand-axes and three flakes associated with decayed mammalian bones. This is on the edge of glacial sand and gravel. Dean's Pit at Marlow (SU 849879 (E)) was dug in solifluction gravel above Winter Hill Gravel and produced two hand-axes and two Levallois flakes. Also from solifluction gravel, in a pit at Pinkney's Green near Maidenhead (SU 865830 (A)), there were found 4 hand-axes and 11 flakes. Such sites are notoriously difficult to date but do indicate a human presence at some place not very far away at some unknown period.

There are several palaeoliths from Glacial Sand and Gravel on the fringes of the Colne Valley. A few hand-axes come from localities at Watford and St Albans in the same deposit. The only cluster of sites found on the surface of these Glacial Sands and Gravels are six localities around Chorley Wood, which produced ten hand-axes between them and a Levallois flake. A few others come from Chalfont St Peter. High up on the Chalk in Buckinghamshire J.F. Head (1955) has noted hand-axes from Bledlow and Skirmett, and on high level gravel terraces Beaconsfield, Gerrards Cross, and Seer Green. The rich sites at Croxley Green and Rickmansworth also come from what is mapped as Glacial Sand and Gravel but have already been included in the section on the Colne Valley in view of their apparent association with the terrace stratigraphy.

6.5.1 Chilterns Brickearth Sites

There are various sites shown and listed on Map 52 between Luton and Dunstable, numbered 1–26. Nearly all of them were discovered by Worthington G. Smith in the latter part of the 19th and early part of the 20th centuries, when many local small and large pits were exploiting the brickearth. His earlier discoveries are described and illustrated in his book *Man the Primeval Savage* (Smith 1894). He interpreted his sites as being occupation around temporary lakes and ponds that formed in depressions from rainwater because of the impervious nature of the clay beneath, and later sealed by slope deposits. The richest area was Caddington. There were six localities (Nos 1–6 on the map) known and investigated by him. Roe (1968, 3) lists some 150 hand-axes and more than 3500 flakes between them, divided between those in primary

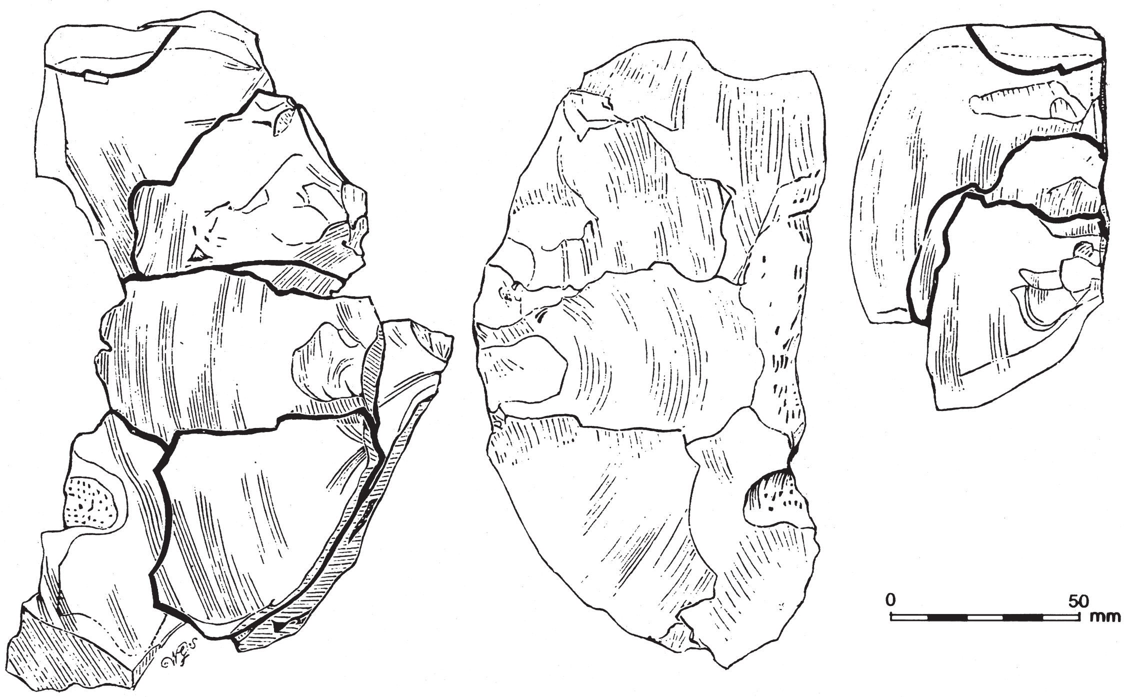


Figure 59 Refitting flakes from Caddington, probably from hand-axe manufacture. The central figure is a plaster cast, indicating one edge of such a tool. Source: Smith 1894, 150

context (Smith's 'floors') and those in derived contexts. There was a fair proportion of Levallois flakes and cores. The most prolific site was probably the Cottage site (No. 3). A re-investigation of this site was conducted in 1971 but no primary context site was located, emphasising the localised nature of the concentrations (Sampson 1978). Smith records refitting flakes (Fig. 59) and piles of flint nodules obviously selected for knapping.

MAPS 52 and 53. RIVERS LEA AND MIMRAM: THE CHILTERNS and THE WALLINGFORD FAN GRAVELS

Dating of these sites is very difficult as there are no faunal or floral remains. Studies of the brickearth by Catt (Catt and Hagen 1978, 41–6) demonstrated the loessic component, but were unable to discern whether it was of any particular stage. The only clue is the presence of Levallois material, suggesting a late OIS–8 or OIS–7 date, which would certainly testify to occupation during Period 3, but it cannot be ruled out that the sites could be of very different ages.

Other archaeologists have tried to locate undisturbed primary context sites in the pits examined by Worthington Smith (Wymer 1980) and J. McNabb in 1994, both with no success. A recent paper reassessing the Chilterns brickearth sites by White (1997) gives a valuable account of the sites and present interpretation of them. It is likely that cool and open conditions prevailed during the sedimentation of the brickearth and that the depressions were localised dolines, that is solution hollows in the Chalk into which the overlying deposits have collapsed.

6.5.2 Sites in the Wallingford Fan Gravels

These sites are a clear indication of early occupation of the Chilterns, during Period 1 on the basis of the geological interpretation. Eight are known, as shown and listed on Map 53. The most prolific site was found at Turner's Court (No. 7) at the end of 19th century and produced 52 hand-axes. About 50 hand-axes come from the Ewelme sites, and lesser numbers from the others (Fig. 60). These are all palaeoliths which must have been derived off the slopes or crest of the Chalk escarpment, which still makes an impressive feature today. The deposits are fully described by Horton *et al.*(1981), who conclude that they accumulated by solifluction and partly by fluviatile deposition in a tributary valley of the Thames (Pl. 13). This was under sub-arctic conditions. The latter is confirmed by an organic deposit found in the Goulds Grove site. The

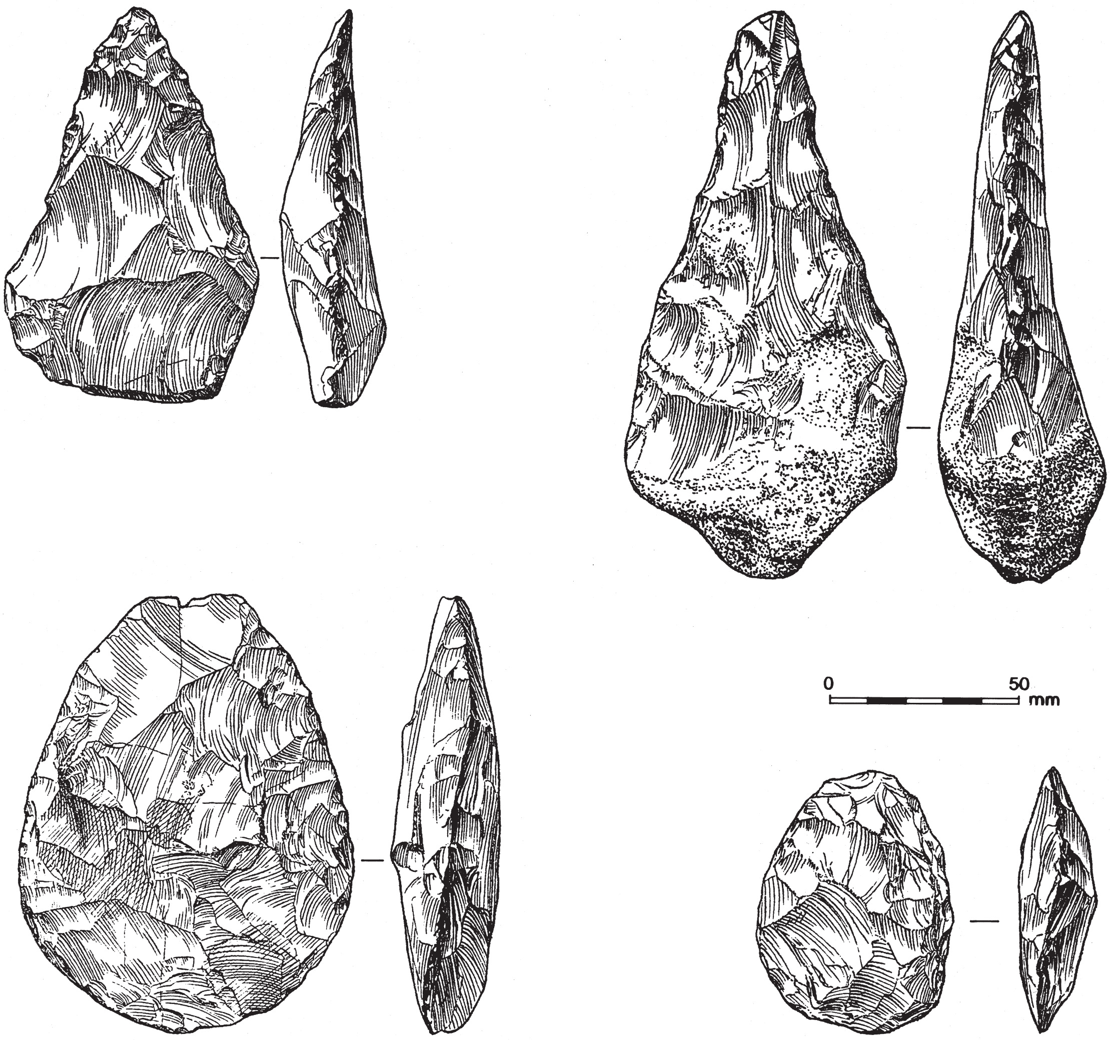


Figure 60 Hand-axes from the Wallingford Fan Gravels

Plate 13 The Wallingford Fan Gravels exposed in a pit at Ewelme, Oxfordshire. These gravels have soliflucted or washed off the Chilterns, only a few kilometres to their east. Numerous hand-axes contained in them presumably represent occupation on the Chilterns prior to the conditions which produced these deposits

chalky gravels grade into patches of gravel considered to correlate with the Upper Winter Hill Terrace of the Thames, so an Anglian Stage date (OIS–12) is indicated. These fan gravels are some 50 m above the present River Thames which now flows at right angles to them and no trace of a tributary remains.

6.6 The Midlands

There is only one area in the whole of the English Midlands where enough sites have been found on the present surface in such numbers as to justify a map to show them. In other areas, almost all the Palaeolithic sites are confined to deposits within the river valleys. It has already been shown in Chapter 3.4 that, at present, there are relatively few known Palaeolithic sites along the Midland Rivers, apart from the Great Ouse. There are only sporadic finds along the Warwickshire Avon, Soar, Slea, and Witham. Only the Trent has one area around Hilton, Etwall, and Willington with numerous

Solid rock formation	River Soar		River Trent		West Midlands
Carboniferous Millstone Grit or Dolomitic Limestone			Hopton: Wetton:	1 hand-axe 1 hand-axe	
Permo-Triassic Limestone			Shirebrook:	1 hand-axe	
Triassic Keuper Marl or Mercian Mudstone	Coalville: Markfield:	1 hand-axe 1 hand-axe	Caunton: Cropwell Bishop: Church Broughton:	1 hand-axe 1 hand-axe 1 hand-axe	Burntwood: 1 hand-axe Shenstone: 1 hand-axe
Trussington or Oadby Till	Hinkley: Barrow-on-Soar:	5 hand-axes 1 roughout 3 cores 6 flakes 1 ?Levallois flake	Thorpe-in-the-Glebe:	3 flakes	

Table 15 Palaeoliths found on the surface within the catchment of the River Trent

Deposit	Soar catchment		Trent catchment	West Midlands	
Head	Sutton Cheney:	1 hand-axe 2 flakes (retouched)			
River Gravels	Huncote: Leicester: Ratcliffe-on-the-Wreake	1 hand-axe 3 hand-axes 1 hand-axe			
Glacial Sand and Gravel				Drayton Bassett: Erdington: Saltley: Edgbaston: Balsall:	1 core 1 hand-axe 1 hand-axe 1 hand-axe 1 hand-axe

Table 16 Palaeoliths found in Head or undifferentiated gravels in the Midlands

hand-axes from river terrace gravels. There is the same problem here as in the previous section on the Chilterns, in that the geological sequence and the general topography has been much affected by the proximity of ice sheets after the Anglian Stage. Even the few hand-axe sites from deposits mapped as Glacial Gravels, such as at Saltley, Edgbaston, and Balsall seem to be associated with present or past drainage systems rather than glacial out-wash.

The same problems, as has been stated, have been met with in East Anglia. However, the one large cluster of sites near Coventry does much to redress the balance of what may be an impression of sparse occupation. It is perhaps more a matter of poor preservation of the evidence coupled with a lack of methodical searching. As for the surface sites away from the valleys that have been found, only those shown on the tables below have been recorded. Sites on the Triassic Marl or Mercian Mudstone predominate, but with such small numbers this may not have significance. However, it does show that there is evidence for people once being present on these areas (Tables 15 and 16).

There is virtually nothing on the great plains of glacial till in Leicestershire and Bedfordshire, although it is worth mentioning two locations at Hinckley on Wolston Clay and Silt (see below) which produced 3 hand-axes, 3 cores, and 6 flakes. A Levallois flake was found in a pit on Kenilworth Common (SP 297730 (A)). It may have come from the Dunsmore Gravel that was being dug, but equally could have been intrusive or found on the surface.

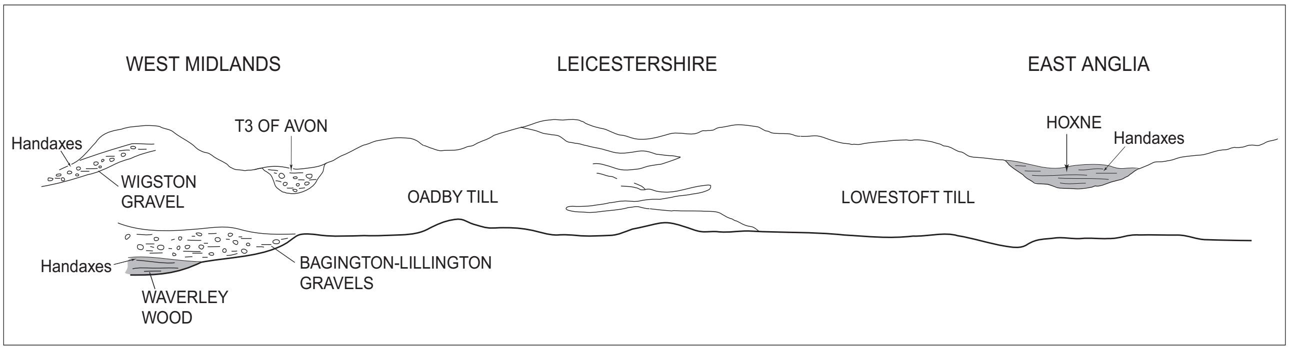


Figure 61. Diagram to illustrate relation of deposits with palaeoliths to the till of the major glaciation of the Midlands and East Anglia of the Anglian Stage considered probably to equate with OIS–12.
Faunal remains confirm a date of the Cromerian Stage (OIS–13 or earlier) for the channel at Waverley Wood containing hand-axes. Amino acid ratios support this early date. The Baginton–Lillington Gravels represent the former course of a major tributary of the ancestral Thames (Bytham River) which flowed across what is now the Fens and across West Norfolk (see Fig. 46). Palaeoliths have been found in gravels in Norfolk and Suffolk considered to be of this river (based on Sumbler 1983; Rose 1989; Shotton 1988; Shotton et al. *1993; Lewis 1994; Sumbler 1995)*

6.6.1 Wolvey, Warwickshire

A remarkable concentration of surface finds of palaeoliths occurs a few kilometres north-east of Coventry, centred around Bramcote, Burton Hastings, and Wolvey. This is the result of many years of surface fieldwalking by one man, Mr R. Waite (Saville 1988). Their distribution is shown on Map 54. The two most prolific sites are at Bramcote Hill (No. 4) with 20 hand-axes and 50 flakes, and Copston Spinney at Wolvey (No. 22) with 20 hand-axes and numerous flakes. Both are close to the edge of the Dunsmore Gravel which overlaps the Oadby Till. All are surface finds, although two flakes were found in a lens of gravel exposed in a drainage ditch at 1.40 m below the surface at Bramcote Mains (No 12), together with four hand-axes and 34 other flakes from nearby on the surface. There are 12 hand-axes from the general provenance of Bramcote but most of the find-spots have just produced one or two hand-axes, and none more than seven. Several of the hand-axes are made of quartzite and nothing of Levallois type has been recorded. This rich scatter of palaeoliths over a fairly extensive area is clear evidence of human occupation, but not *in situ*. Many of them are rolled, some considerably, and thus they cannot be taken as discarded material on the present surface. Their condition and the general distribution as shown on the map gives every indication that they have been derived from the Dunsmore Gravel. Thus, if this is accepted, they must be contemporary with its deposition or, much more likely, be earlier, washed off the surface of the till. Thus, unlike most surface sites, they can be related to the local stratigraphical succession and give some date for this occupation.

In Section 3.4 reference was made to the reassessment of the age of the glaciations in the area of the type site of the Wolstonian Stage. It was claimed that the Wolstonian Stage tills were indistinguishable from the Anglian Stage tills and actually interdigitated when traced from the Midlands to East Anglia (Fig. 61).

MAP 54. THE MIDLANDS: WOLVEY

This is now generally accepted and the local succession given by Sumbler (1983) puts all the Wolston deposits above the basal Baginton Sand and Gravel as components of the Oadby Till, which is equated with the Anglian Stage glaciation. This includes the Wolston Clay and Silt. The Dunsmore Gravel being above the Oadby Till (formerly known as Wigston Sand and Gravel), it is interpreted as out-wash from the Oadby Till ice sheet. There is clear evidence for people being present in the area before this glaciation, in the organic channels beneath the Baginton Sands and Gravels at Waverley Wood Farm (see p. 115) so how can this spread of palaeoliths in the Wolvey area be interpreted in terms of the human occupation? Is it the derived material from people living not far away before the arrival of the ice sheet, perhaps at the same time as those around Waverley Wood, or does it represent an unknown warmer interstadial period in the latter part of the Anglian Stage, with the artefacts washed off some eroded land surface on the return of glacial conditions? It may suggest a considerable human presence during Period 1 of this survey and raise the question as to what else has either been unpreserved or not yet discovered.

7. Towards the Fringes of the Highlands

7.1 Summary

The Highlands of Britain can be defined as that part of Britain where the main outcrops of rock are those of the Palaeozoic era. These give rise to a varied landscape, often mountainous, with large tracts of moorland, boggy ground, deep gorges, and fast-flowing rivers. There are also plains and vales. In spite of the ice sheets and glaciers that have scoured the landscape at least twice, the same characteristic features would have existed during the interglacial periods. There is no reason to think it was any more inhospitable in parts than it is now, either for animals or humans.

The question is whether people did at times during the Palaeolithic venture into it. Also, if they did, would anything survive to show they had? The answer is yes, but there is so little evidence that it is impossible to know whether it was on a very small scale, or otherwise. Figure 43 (above), expresses the problem visually. Two things are immediately apparent: the almost total absence of find-spots of palaeoliths within the whole area that was covered by ice during the last glaciation of the Devensian Stage, and yet the clustering of them on the edges of the known limits of that ice sheet. It is also apparent that there is no correlation between the distribution of these palaeoliths on the fringe of the highlands and the limits of the Anglian ice sheet. With rare exceptions it can be assumed that these sites represent the discarded flintwork of people after the Anglian Stage. The only conclusion is that the ice sheets of both the Anglian and Devensian Stages have, with rare exceptions, destroyed the evidence for any human occupation that may have existed during Periods 1 and Periods 2 and 3 respectively.

The more controversial limit of the so-called Wolstonian Stage ice sheet is also shown on Figure 43, but it is impossible to know what effect this had on the distribution. Yet, the break along the line of the Devensian ice limits is so marked that it is difficult to believe that occupation did not once continue beyond it. There is certainly evidence for occupation in Devon and to a lesser extent in Cornwall, where the ice never reached. There is also some in the very south of Wales. Although the occupation of caves and rock shelters will be covered in the next chapter, they are very relevant to this matter. First, it seems best to look briefly at the various areas around the limits of the Devensian.

7.2 East and West of the Pennines

North of the Trent and the Midlands there are several isolated surface finds of hand-axes in Lincolnshire, Humberside, and Yorkshire. In Lincolnshire a small group of a couple of hand-axes and a few flakes comes from the surface of the Spilsby Sandstone around Tetford and Fulletby, at Salmonby and Castcliffe Hill. Two others come from the same rock formation at West Keal and Halton Holegate. Being on high ground, they probably escaped dispersal by glacial agencies and are good contenders for confirming occupation in this area. Other hand-axes have come from the surface at Legbourne and Bishop Norton, and at Holton on glacial sand and gravel. Similarly, there are sparse surface finds from Humberside and Yorkshire. The latter county, now North Humberside, had the distinction of yielding, at Huntow, what was, at the time of its discovery in the late 19th century, the most northerly palaeolith known in Britain. Since then, another hand-axe has come off the Yorkshire Wolds, at Rudston, and one a little further north at East Ayton.

There is also some evidence that people moved westwards towards the higher ground, for hand-axes have been found on Risby Warren and nearby Sheffield Hill, at Sinnington, and well into the Pennines on Lee Moor (two hand-axes) and Lake Lock (just a flake) in the parish of Lofthouse with Carlton. The Sinnington hand-axe is made of sandstone, as a reminder that any suitable stone would be used for tool-making if no flint was available.

There are in this area, apart from these surface sites, a few important sites in useful geological contexts that have escaped being eroded away by glacial ice or melt-waters. At Welton-le-Wold, 5 km west of Louth in Lincolnshire (TF 282884 (A)), four hand-axes and remains of straight tusked elephant, horse, and deer have come from a river gravel on bedrock, covered by 13 m of till (Wymer and Straw 1977). The river was in a valley draining eastwards. The fauna is clearly a temperate one but the sands and gravels are considered to have been deposited during very cold conditions, so the palaeoliths and the animal remains must have been derived off some earlier interglacial land surface. Dating is dependent on the age of the overlying tills, for there is a lower till (Welton Till) and an upper one (Calcethorpe Till). This is controversial, but the Welton Till is likely to be earlier than the Ipswichian Stage (OIS–5e), so the occupation was either in the interglacial of OIS–7 or OIS–9. However, Bridgland (pers. comm.) queries the date of the Welton Till and

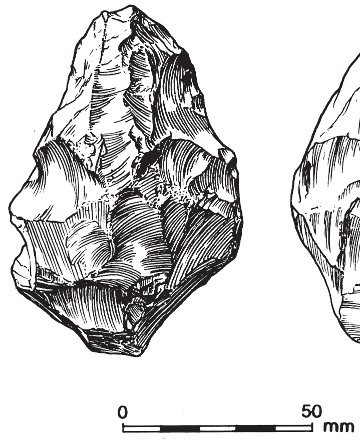


Figure 62 Hand-axe from Keyingham, Humberside. Found in the Kelsey Hill Gravels, probably a glacial esker of Devensian age

considers that the underlying gravel could be OIS–12 or earlier.

Another well-investigated site with unusual stratigraphy is at Kirmington, Humberside (TA 105117 (A)), exposed in old workings for gravel and brickearth. About 2 m of Devensian till overlies estuarine and marine deposits, as has been noted in the previous chapter on coastal sites. The 70 mainly large flakes from here could be the same age as the hand-axes from Welton-le-Wold. Certainly it is more evidence for people being in the area, both inland and by the sea.

A hand-axe from Keyingham (Fig. 62) comes from gravel of the so-called Kelsey Hill Beds. It was found in Ken Hill gravel pit (TA 243255 (E)). These Kelsey Hill Beds are probably an esker of Late Devensian age, with sinuous ridges of gravel running for about 3 km through the parishes of Keyingham and Burstwick. They are sometimes on till, or under it. An esker is a deposit left by a sub-Glacial channel under or in the ice. The mammalian remains and molluscs found in it would have been derived from earlier eroded deposits or swept off land surfaces. Thus, it is not surprising that the animals are of species found in both warm and cold climates. Numerous shells of *Corbicula fluminalis* suggest derivation from an earlier interglacial deposit or surface, possibly OIS–7. There is, of course, no way of relating the Ken Hill hand-axe to any particular date.

A further site to note is a retouched flake from Newbiggin Farm near Whitby in North Yorkshire (NZ 840077 (E)). It was found at a depth of 1.30 m in till and, although objects can sometimes work their way downwards in clay, there seems no reason to doubt the authenticity of this find to judge from its condition. It is figured by Lacaille (1946) together with the Huntow hand-axe. It takes over from the latter in being the most northerly acceptably provenanced palaeolith in England so far found. Nothing of Levallois technology or of Middle Palaeolithic type has been recorded from any open site in this whole area apart from two possible Levallois flakes from the Kelsey Hill Gravels.

There is nothing known on the West side of the Pennines except for one hand-axe recorded from Dent (SD 705870 (G)) and another from Caldbeck Fell (NY 705870 (G)), both in Cumbria. Dent is in one of the highest parts of the Pennines, and Caldbeck Fell rises to nearly 300 m OD. It seems difficult to accept these as accurate provenances, especially as the Caldbeck hand-axe is of flint and looks remarkably fresh. If true, they would certainly place human occupation right into the Highlands, but verification is required before using them to confirm it. The only artefact with a reliable provenance is one retouched flake from the city centre of Chester, found in alluvium, but considered to be Palaeolithic. More recently, a large hand-axe has been found at Nutford in Cheshire (J. Collen pers. comm.).

7.3 The Vale of Evesham and the Lower Severn

The Warwickshire Avon leads directly into the lower Severn Valley and towards Herefordshire, Monmouthshire, and the Welsh mountains. There is a scatter of palaeoliths in the terrace gravels down the Warwickshire Avon. They come from Barford, Charlecote, Stratford-upon-Avon, Welford-on-Avon, Bidford-on-Avon, Aston Cantlow, Hill and Moor, Evesham, Beckford, Conderton, Harvington, and Hanley Castle, all in the upper reaches of the Avon. Only the site at Little Alne Farm at Aston Cantlow (SP 136609 (E)) has produced any number of artefacts: 10 hand-axes of which 6 are made of quartzite. These were all found on the surface.

Only in the lower reaches of the Warwickshire Avon as it nears the Severn are there rather more prolific sites in the terrace gravels. This may be due to the wider spreads of gravels near this confluence of two major rivers and the extensive commercial exploitation of them. The Aston Mill Pit at Kemerton (SO 943353 (A)) has yielded 15 hand-axes and a Levallois flake and core. The Twyning Pits (SO 894364 (A)) 10 hand-axes, also a Levallois flake and core, and at (SO 896359 (A)) just a couple of hand-axes. A gravel pit at Beckford, south of Bredon Hill, (SO 984362 (A)) has 5 hand-axes and, again, 1 Levallois flake, and 1 Levallois core. Above Tewkesbury in the Severn Valley there is nothing recorded until Worcester, where two hand-axes have been found. Surface sites in this area are sparse. East of the Severn there is a hand-axe from Charlton Abbots, one on Bredon Hill, and one at Woverley and Cookley.

Although there are no sites which could be termed prolific, there is enough evidence in the terrace gravels and the surface sites to show that people were in this area, within sight of the Welsh highlands. There are a few surface sites in Herefordshire and Shropshire with individual finds of hand-axes at Norton Canon, Claverley, Colwall, and Welsh Newton. Following the Severn downstream there are a few hand-axes and flakes recorded from around Gloucester. The tidal reach of the Severn was probably some distance downstream when people of Period 2 and 3 were here. The river could be crossed and the north bank followed into Wales. If not crossed the south bank could be followed along the estuary into what is now the counties of Avon, Somerset, and further. Enough palaeoliths have been found to show that both sides of the Severn estuary were occupied at times.

7.4 South Wales

All the known Palaeolithic open sites in Wales are shown on the location map, Map 55, and listed in the Gazetteer (Green 1984; Green and Walker 1991). No others are known in the rest of Wales which is not surprising, in view of the extensive glaciation over virtually all of it. It is unsatisfactory to revert to negative evidence, but the sparse distribution of palaeoliths may just be some of a much more prolific one that has survived the denudation of the landscape by melting ice sheets. The coastal plains of the Middle Pleistocene may well have been a favoured area as they are now. Whether people ventured up the valleys is unlikely, and even more so that they went into the mountainous areas.

MAP 55. OPEN PALAEOLITHIC SITES IN SOUTH WALES

The only site that might indicate some movement up one of the valleys is the flint hand-axe found at Blaenavon. It is difficult to believe this is a true provenance, but it is equally difficult to believe it could be a collector's 'throw-out'. It just does not seem possible it could have survived the swirling melt-waters that must have scoured the valley. The Rhossili hand-axe found on the beach had probably eroded out of the head deposits exposed in the low cliff. The Narberth hand-axe is a fine flint hand-axe in surprisingly fresh condition, found in clay near the surface. Most of the few hand-axes are made of flint and may be imports as it is unlikely that suitable pieces of flint would have been available on the beaches. The hand-axe from Pen-y-lan, Cardiff, is of quartzite. Another from Cardiff was of chert, suspiciously like that from the pits at Broom, Dorset, which was used for railway ballast. As it was found at the base of a railway embankment it is regarded as a modern import and not shown on the map.

There is no means of dating any of these hand-axes other than that they are Palaeolithic from their typology, but the inclusion of a couple of Levallois flakes in the small group of palaeoliths found at Sudbrook suggests some occupation in Period 3 (Green 1989). This may equate with the date for the Mousterian occupation of Coygan Cave (Chapter 8) which was during the Devensian Stage. Radiocarbon dates range around 39,000–38,000 BP, but this is so near to the limit of the method that it is estimated at between 64 Ky and 38 Ky (Aldhouse-Green *et al.* 1995).

7.5 The West Country

The suggestion was noted above that the Palaeolithic occupation on the north side of the Severn estuary and Bristol Channel was possibly from a crossing of the river above somewhere upstream not far from Gloucester along the coastal plain of the time. Similarly, people could have made their way along the south side of the estuary to the sites which are known there. Alternatively, there could have been a convenient corridor between the head waters of the rivers Kennet and Hampshire Avon to the Bristol Avon in the area that is now the Vale of Malmesbury. It is only a distance of about 20 km between these two drainage areas. Also the South Dorset Downs were probably a relatively open landscape affording easy movement towards the

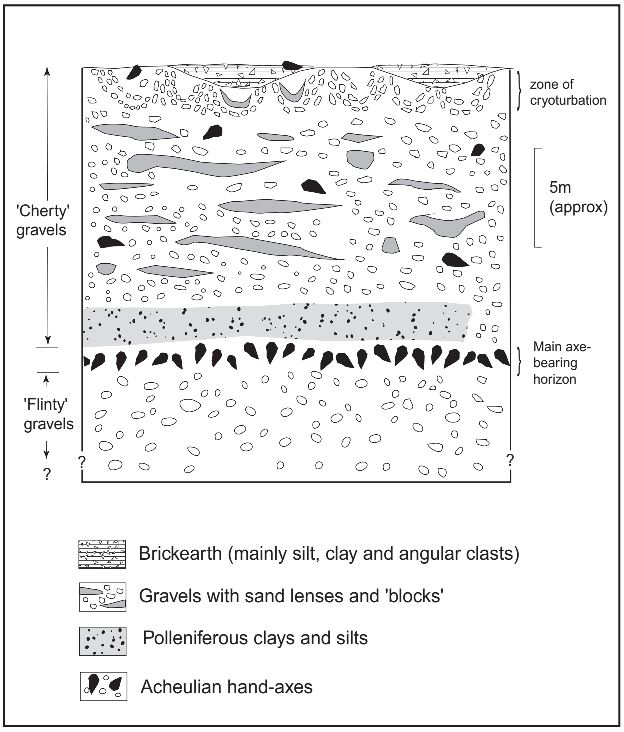


Figure 63 Section at Broom, Dorset, showing position of palaeoliths in upper part of the flinty gravels. The fine quality chert from which the palaeoliths were made was presumably exposed nearby. Source: Shakesby and Stephens 1984)

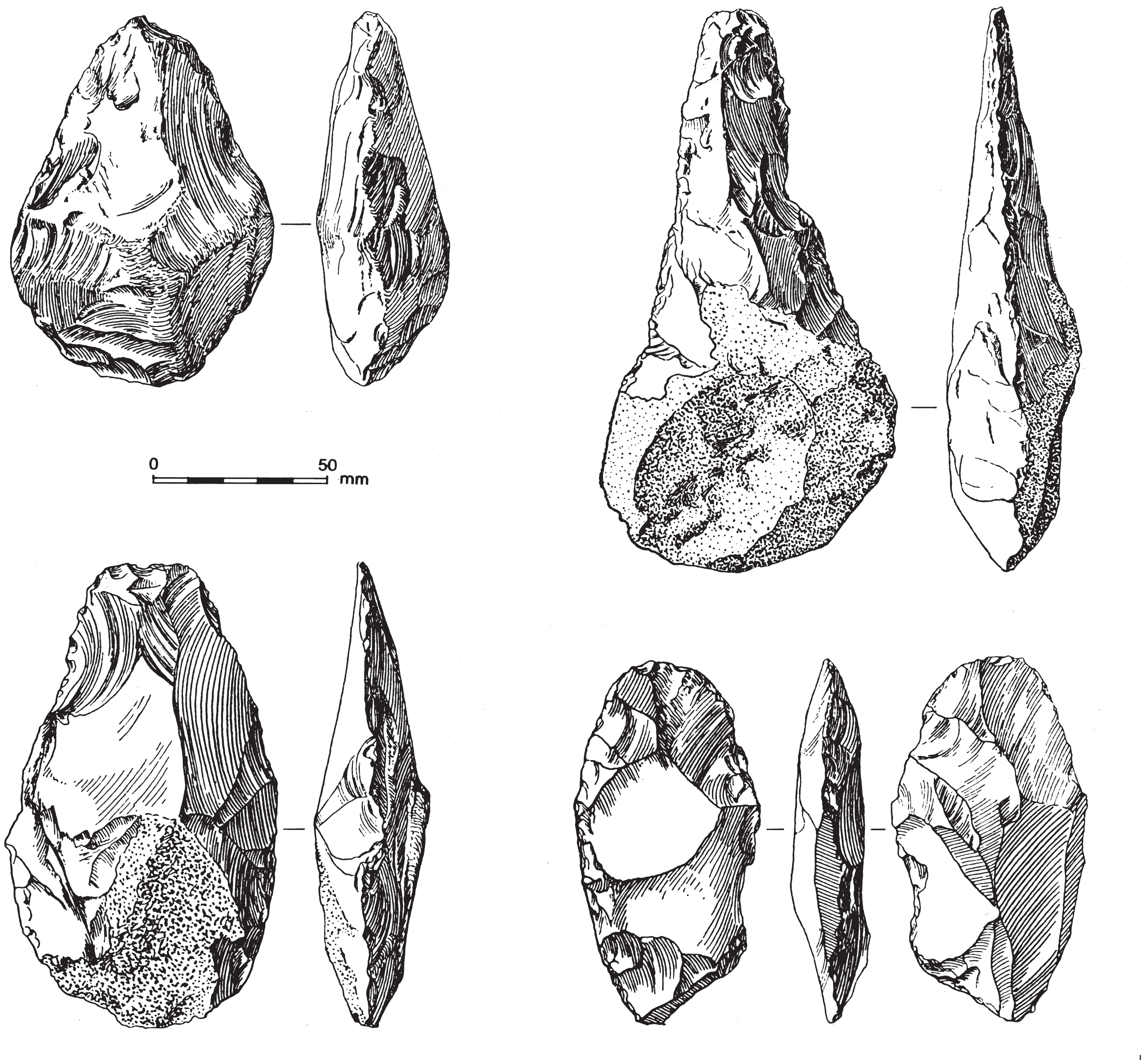


Figure 64 Thorncombe, Dorset. Hand-axes of chert from Broom pits. Source: Smith 1931, 111

valley of the River Axe. Thus, the evidence for occupation along those two rivers, the Bristol Avon and the Axe, is worthy of consideration in this respect. First, however, a short digression is necessary on how the area may have been affected by the major glaciation of the Anglian Stage.

The map showing the glacial limits of the Anglian Stage glaciation (Fig. 43, above) gives the normally accepted limits as shown by the distribution of the boulder clay or till that remained after the recession of the ice. In the West Country it is apparent that it did not come south of the Bristol Channel, or so it seemed in spite of the reservations of several geologists that thought it may have come further. Claims had been made for boulder clay and pro-glacial lakes in north Devon, but it was not until large exposures were made by the construction of the M5 Motorway in 1960, near Clevedon, that this was confirmed. A buried channel was discovered, filled with glacial out-wash.

Furthermore, drainage work at Kenn Pier in Somerset revealed a glacially striated boulder of Carboniferous Limestone over half a ton in weight. Only a glacier could have transported it there. Hence, a dashed line has been added to the map of Figure 43 to give the probable line of the ice limit in Devon and Somerset. The significance of this for Palaeolithic archaeology will be seen when trying to explain the formation of the impressive Clifton Gorge at Bristol, and the astonishing spread of chert-laden gravels of the River Axe south of the Chard Gap. The sites along the latter will be noted first.

The River Axe contains one of the most prolific and unusual series of sites in the West Country, if not in Britain, in the parishes of Thorncombe and Hawk-

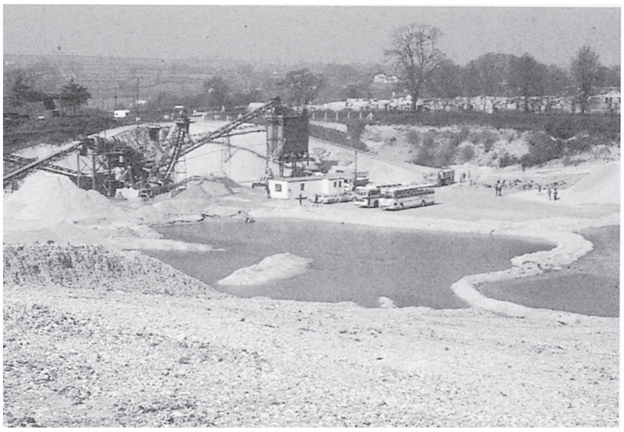


Plate 14 Thorncombe, Dorset. Chert-rich gravels of the River Axe exposed in the Croyde Junction Pit. These gravels have produced several hand-axes made of the fine quality Upper Greensand Chert (Fig. 65). The most prolific Palaeolithic sites occur a few kilometres down the valley at Broom

Plate 15 Kilmington, Devon. Exposure of chert-rich gravels of the River Axe. The accumulation of these wide and thick deposits may have been caused by glacial outwash through the Chard Gap, but there are arguments for and against this. What is evident is that, at some stage, this chert was exploited by Mode 2 hand-axe knappers as a veritable 'factory'. Occasional hand-axes made of this chert, found elsewhere, may indicate human movement across the landscape

church, a few kilometres up the river from Axminster (Map 56). The pits in question are those known as the Broom (Figs 63 and 64), Pratts Old and New, and Kings Pits, in Thorncombe parish, centred around ST 328025, and the Railway Ballast Pit in the parish of Hawkchurch at ST 326020 (A). At least 1800 hand-axes have been found between them, some *in situ*, some only slightly moved from a primary context, others in rolled condition (Green 1988). This was undoubtedly a working area where high quality Upper Greensand chert was being exploited. This is the only known site in Britain where non-flint stone was found and worked in such quantity. It can only be assumed that the chert was exposed in the river gravel when the Axe was flowing at a higher level (Pl. 14). The top of the gravel deposit is, however, only some 15 m above the present level of the river, and was usually about 12 m thick, although in one pit the base was lower. The pits were active mainly at the end of the 19th century and in the 1930s, and more recent investigations have confirmed that there is a tripartite division of the deposits (Fig. 63). There is a lower flinty gravel and an upper cherty one, both containing derived palaeoliths (Shakesby and Stephens 1984). The fresh ones come from the top of the flinty gravel beneath interglacial clays and silts. This can be accepted as a land surface.

MAP 56. RIVER AXE: SOUTH CHARD–AXMINSTER

The question is whether this was a hand-axe 'factory' exploiting a veritable quarry of chert, or a well-favoured place visited at intervals over a long period of time. It is suggested here that it was the latter, for if it had just been a known place to go and just make hand-axes, they would have been taken away. Some, certainly may have been taken away, for the chert is of a very fine-grained even texture and a distinctive even honey-pink colour. Hand-axes of such material have come from other sites in the West Country, if not elsewhere, and this may have been their source. Mineral analysis might determine this.

The great thickness of gravel and the even greater thickness of it at the Kilmington sites downstream at the confluence of the Axe with the Yarty (25 m) needs accounting for. One theory is that there was a pro-glacial lake above the Chard Gap, and the gap was actually made by it overflowing and sending a catastrophic quantity of gravel into what had been a minor valley. An objection to this theory is the total lack of far-travelled rocks in the Axe gravels which might have been discharged by glaciers in the north. Such a powerful discharge of water, cutting through the chert-rich Upper Greensand of the area, would certainly explain the quantity of chert in the valley below Chard (Pl. 15).

The same gravels are exposed in the pits by the old Chard railway junction but only about 10 hand-axes are known from them (Fig. 65). Several others with just the general provenance of Chard have been recorded, including two Levallois flakes. Among the vast quantity of material from the Broom sites there is one Levallois core and two flakes. This seems very tenuous evidence for claiming an occupation during Period 3. A suggested interpretation of the dating is to accept the

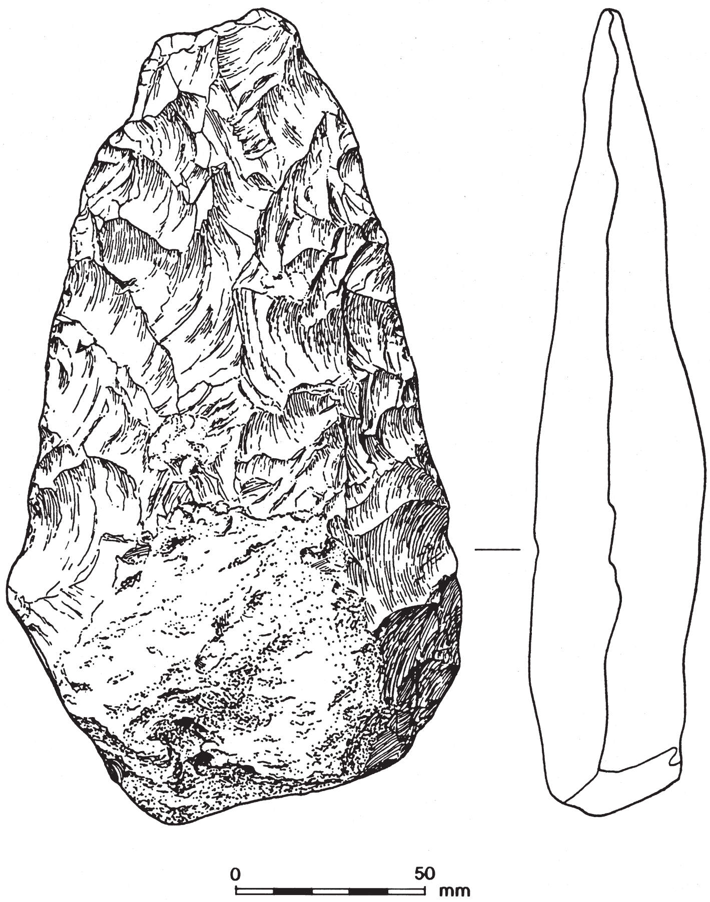


Figure 65 Hand-axe from Chard Junction Pit. Source: Wymer 1977

theory of the discharge from the pro-glacial lake as an event of the Late Anglian bringing down chert-laden gravel which mixed with the flinty gravel already there. During the stable conditions of the following interglacial the top of this gravel was an occupied land surface. People grubbed chert nodules off the beach of the actual river at a slightly lower level and knapped them in quantity when required. This could have continued until late in the interglacial a rising water table rendered the place uninhabitable. Periglacial conditions during the next glacial stage (OIS–10?) reworked gravels containing many artefacts, depositing them over the interglacial beds and rolling them considerably in the process. This interpretation would put the occupation of this part of the Axe Valley into the Hoxnian Stage of OIS–11, ie, Period 2 of this survey.

There are only about 10 hand-axes from the Kilmington pits. Surface sites of mainly individual hand-axes are scattered thinly over this part of the West County, where the counties of Devon, Somerset, and Dorset are contiguous. Some, at Whitestaunton, Wambrook, and Membury are on Clay-with-flints-and-cherts. At Chardstock and Tatworth they have been found on the Upper Greensand. Others at Lyme Regis, Shute, Seaton, and Weymouth only have general provenances. One hand-axe at Charmouth is said to come from river gravel. A couple on Portland were found on the Purbeck Beds. Surprisingly, only two hand-axes are known from Bere where, at present, there is a rich flint outcrop in the sea cliff; presumably not so during Period 2.

There are couple of hand-axes form the surface of Lower Oolite at Batheaston on Little Solsbury Hill, and single finds of surface hand-axes on the same deposit at Hilperton and on Farleigh Down at Montkton Farleigh. Some hand-axes have also come off the surface of Palaeozoic rocks at Keynsham. There are eight hand-axes from what is mapped as Head at St Anne's Estate on the east side of Bristol. There are no known sites of palaeoliths in the terrace gravels of the Bristol Avon until the Severn side of the Clifton Gorge is reached. This does not give support for any idea of the Bristol Avon being a corridor of movement for people between the Salisbury Plain area and the southern side of the Severn estuary. The great interest at Bristol, however, is the Clifton Gorge itself and the prolific surface finds of palaeoliths at Shirehampton and Abbot's Leigh at the northern end of it. There, hand-axes, cores, and flakes have been found on Terrace 2 of the Bristol Avon (Fig. 66; Lacaille 1954). This terrace is composed of Head Gravel, but it has been shown that river terrace gravel underlies it on each side of the Avon, but only well away from the river (Table 17).

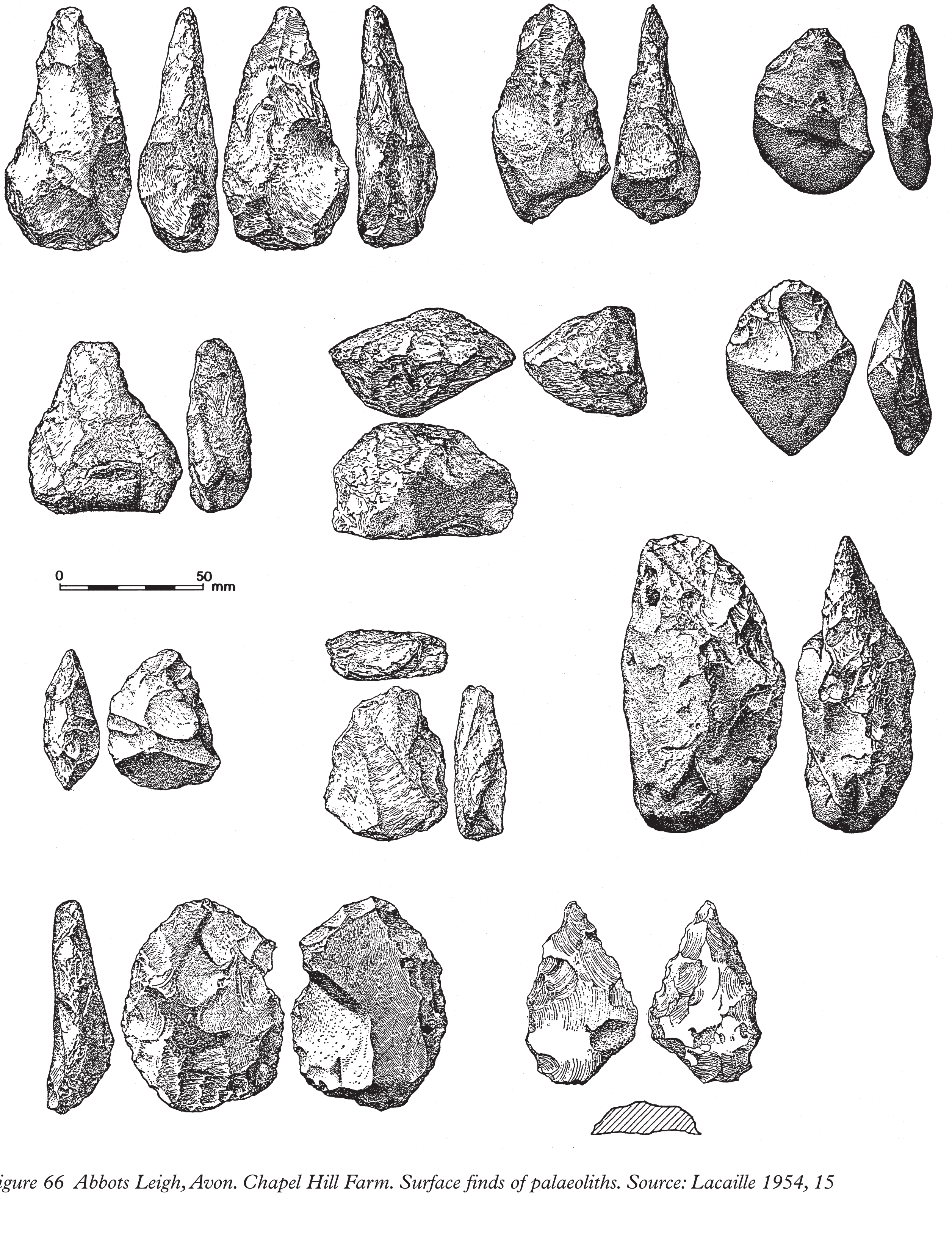


Figure 66 Abbots Leigh, Avon. Chapel Hill Farm. Surface finds of palaeoliths. Source: Lacaille 1954, 15

The sites listed at Shirehampton on Map 57 have produced only one or two hand-axes each at least, mainly perhaps because of the restricted nature of the exposures (drainage ditches, buildings sites, cemetery for the most part), but methodical collecting at Abbots Pill and the nearby continuation of the spread at Ham Green has yielded at least 230 hand-axes, 46 cores, and 340 flakes, as well as 3 Levallois cores and a Levallois flake. Terrace 2 is at 30 m OD and it seems very unlikely that any artefacts that have come out of or been derived from it by the solifluction which produced the Head Gravel would belong to any other

British Quaternary Stage	*OIS*	*Climate*	*Estimated years BP*	*Major Quaternary events or features in south-west England*
DEVENSIAN	2–5a-d	Cold		Ice sheets over south Wales but not east of Severn ?Local ice caps on Cotswolds Terraces 1–3 of Bristol Avon and Severn
			110,000	
IPSWICHIAN	5e	Temperate		Burtle Beds Kenn Marine Sands Raised beach deposits
			120,000	
	6	Cold		Head ?Glaciation of Midlands and south Wales
			210,000	
	7	Temperate		Kenn Church interglacial deposits above till
			260,000	
	8	Cold		4th Terrace of Severn Head
			302,000	
HOXNIAN	9–11	Temperate with cold intervals		Wave-cut platform at 14 m OD
			428,000	
ANGLIAN	12	Cold		Ice sheets as far south as Gloucester Glacier blocks Bristol Channel Overflow channels Kenn Gravels and Till
			472,000	
CROMERIAN	13	Temperate		Plateau Gravels

Table 17 Major Quaternary events or features in south-west England. Sources: Kidson 1970; Hawkins and Kellaway 1971; Hawkins and Tratman 1977; Whittaker and Green 1983; Andrews et al. *1984*

period but Period 2. Material in the Head Gravel could be later (?the Levallois) but it would seem certain that the majority would be contemporary with the deposition of the underlying Terrace 2 Gravel. The great interest of this concentration of artefacts is what it might mean in connection with the gorge. As the Terrace is about the same height as the top of the gorge, there could not have been anything like the impressive feature as seen today, but there would still have been a steep and narrow valley. Even now the land each side of the present precipitous cliffs slopes up to between 40 and 60 m OD. It might not be fanciful to see this north end of the gorge at the time of human occupation as a place through which herds of animals could be driven through from the other end to be caught at the other. Unfortunately, no mammalian remains are associated to test this supposition.

There are a few hand-axes from the lower Terrace 1 at Portbury, but otherwise only a few scattered surface finds mainly in the Clevedon area along the south side of the Bristol Channel, until Watchet is reached. Here, along the foreshore between Watchet and West Quantoxhead (ST 090432–ST 115434 (A)) palaeoliths have been found on the beach, having fallen

Plate 16 Watchet, Somerset. Doniford Head Gravels exposed above Lias in the sea cliff. Several hand-axes, cores, and flakes have been found in these gravels, and must represent sweepings off the adjacent landscape

out of the Head Gravel on top of the cliff, known as the Doniford Gravel. There are at least 24 hand-axes, 29 cores, and 148 flakes and one Levallois core. Just inland, at Watchet and Williton, single hand-axes have been found in Doniford Gravels (Pl. 16). This is good evidence for occupation at some time during Period 2 or possibly Period 3.

MAP 57. BRISTOL AVON: KEYNSHAM–PORTBURY

Two palaeoliths have come from the edge of alluvium in the valley of the River Tone at Bradford-on-Tone, and others on the surface of the hills just south of Taunton.

West of the River Otter there is a very sparse distribution of palaeoliths with only a few surface sites before reaching the River Exe. Here, at least, in Magdalen Street, Exeter, a hand-axe was found *in situ* in river gravel of the Exe, some 21 m above its present level, but from here westwards the geology is very different and terrace gravels are non-existent or very poorly preserved. The Exe, the Teign, and the Dart all have their sources on high land on Exmoor or Dartmoor, between 450m and 500 m OD. Thus they have very steep gradients in their descent to the sea and correspondingly cut narrow, gorge-like valleys. The result is that as such rivers cut down they leave nothing of their previous deposits. Occasional derived hand-axes are found near the bottom of such coombes, as at Thorverton. Rolled hand-axes in present alluvium could be of any date. Three hand-axes come from the Teign Valley: Kingsteignton, Haccombe with Combe, and Teignmouth. All three were in alluvium.

Between Tiverton and Halberton, methodical fieldwalking has found two hand-axes on the surface of river gravel of a tributary of the Exe at Tiverton, and eight hand-axes and a fragment of another at Halberton on the surface of Palaeozoic rocks. At Thorverton a hand-axe was found near the bottom of a steep coombe cut through Permian rocks.

Terrace deposits are better preserved in the Valley of the Otter but nothing is definitely from them. Of the seven known locations of surface sites below Ottery St Mary, a hand-axe at Wigginton was on the edge of terrace gravel, and another was on the edge of Terrace 5 Gravel at Tidwell Mount, Budleigh Salterton. One at Mutters Moor, Sidmouth, was on head gravel. The remaining other single finds of hand-axes along the valley at Newton Poppleford and Harpford, Woodbury and Budleigh Salterton were all on Palaeozoic rocks. There is no indication of the date of the occupation these surface scatters represent, but a Period 2 seems most likely. One further surface site is worthy of note: a hand-axe on Brent Moor at SX 650650 (E) at 476 m OD (Worth 1931). This must have the distinction of being the highest discovery of a palaeolith in Britain!

In Cornwall there are now 11 locations where palaeoliths have been found. This area may be referred to as real Highland zone so, sparse as the finds are, it does emphasise that people did leave the lowlands at times. When the various caves and rock shelters are noted in the next chapter it will be seen how the information from them does much to enhance this conclusion. As for the Cornish discoveries they are all shown on Map 58 and listed below.

MAP 58. CORNWALL

1 CONSTANTINE, Trewardreva SW 730303 (E), hand-axe
2 GRADE RUAN, on moorland SW 768186 (E), hand-axe
3 LADOCK, riverbank SW 893505 (A), pointed end of broken hand-axe
4 LANDEWEDNACK, Lizard Downs SW 695135 (G), hand-axe
5 SW 704129 (A), broken hand-axe
6 SW 679129 (A), tip of hand-axe
7 SW 707129 (A), bifacial fragment
8 LANHYDROCK, Bodmin Bypass SX 077636 (A), broken hand-axe
9 St BURYAN, Lower Leah Farm SW 405276 (A), hand-axe
10 St KEVERNE, Coverack SW 725205 (G), hand-axe
11 Higher Polcoverack Farm SW 769188 (A), struck Levallois core

In every case except the hand-axe fragment from Ladock, the artefacts are in a very worn and stained condition. The staining is so distinctive and different from anything seen on later Mesolithic or Neolithic flints that a further eight flakes and a bifacial fragment found at St Keverne can also be identified as Palaeolithic. These, and the Landewednack finds, are the result of methodical fieldwalking for the Lizard Research Project (Smith 1987). They are all made on chert or flint, which is impossible to differentiate when they are so patinated. The Ladock pointed end of a broken hand-axe is of very elegant workmanship. The Levallois core is small but, from its condition, must be Palaeolithic. Thus it might be regarded for occupation during Period 3. The remainder could be of any Period.

8. Caves and Rock Shelters

8.1 Summary

With only one exception, the only known occupied caves or rock shelters during the Lower and Middle Palaeolithic periods in Britain are in the highland zones of Britain. Apart from some outcrops of sandstone in the Weald of Kent, caves and rock shelters are restricted to Palaeozoic strata, mainly the Carboniferous Limestone. All those that have produced evidence of occupation prior to about 40,000 BP are shown on the map, Figure 67. It can be seen that they are not numerous, but they add considerably to the sparse information concerning the presence and movements of people during Period 3. One, possibly two, cave sites extend the known movements of people during Period 1. The surprising fact is that there is nothing to show that any of these caves or rock shelters were occupied by anyone during Period 2.

Unfortunately, nearly all these sites were investigated in the 19th–early 20th century with less regard to stratigraphy and realisation of the value of associated environmental material than would be given today. Records were mainly inadequate, lost, or unpublished and many of the excavated archaeological finds and faunal remains have been dispersed or disappeared. More recent attempts to remedy this situation have generally found too little left of the archaeological deposits to justify it.

In spite of their importance, as stated, not one of them could be regarded as a major archaeological site of the Middle Stone Age. The paucity of occupation for this part of Period 3 is emphasised by comparison of such a Mousterian site as Combe Grenal in south-western France, near Domme, close to the Dordogne River. There, under a large rock shelter there are 13 m of archaeological deposits with 66 recognised occupation layers! The only cave sites that have ever been investigated in exemplary fashion are two in Wales: Coygan Cave and Pontnewydd. Work at Coygan Cave, commenced by Dr C. McBurney and completed by Dr S. Aldhouse-Green has placed the sparse occupation within it firmly in the middle of the last glaciation (Devensian Stage) and confirmed that elegantly made hand-axes of bout coupé form are certainly characteristic of that period.

The cave at Pontnewydd, also excavated by Aldhouse-Green has been dated by TL and U–Th methods and the human occupation was during some time in OIS–7 interglacial, probably the latter part at around 225,000 BP. The stone tools consist of hand-axes and flakes, mainly made with local rocks and, in spite of their somewhat intractable nature, Levallois technique was also used. However, the critical aspect of the Pontnewydd site from the aspect of this survey is that it gives strong support to the contention expressed here that parts of the highland zones of Britain were occupied during Period 3, and that the lack of evidence for it is the result of the obliteration of surface sites by the later passage of glacial ice across the landscape. Pontnewydd remarkably preserves part of it, as the archaeological material slid from the cave mouth down a slope under periglacial conditions into the cave. There it remained, as later glaciations blocked the entrances and passed it by. Notes on the various sites are given below.

Figure 67 Map of caves which have yielded evidence of Lower and Middle Palaeolithic occupation

8.2 Cave sites of Period 1 Occupation

8.2.1 WESTBURY-SUB-MENDIP, Somerset Limestone Quarry ST 506504 (A)

This was the first site in Britain to be dated confidently to a pre-Anglian Stage, by Dr M.J. Bishop (1975). At least 15 m of deposits fill fissures in the limestone and are interpreted as sediments washed in from a cave mouth or mouths, long since eroded away with no surface expression. They are divided into an upper Calcareous Group and a lower Siliceous Group. Faunal remains are abundant in the Calcareous Group and associated with a sparse assemblage of flint or chert artefacts, none of which is particularly distinctive of any style of flintworking. Many are so rotted by chemical action that they are hardly recognisable.

The fauna includes *Stephanorhinus hundheimensis* and other animals, including micro-mammals, that became extinct after the Cromerian Stage. Flecks of charcoal could represent intentional use of fire, but nothing is *in situ*. Excavations have been conducted by the British Museum (Natural History) since the original discoveries were made and their report is awaited.

8.2.2 TORQUAY, Devon Kent's Cavern SX 934641 (A)

This famous cave, open to the public, was extensively excavated by William Pengelly in the 19th century. There is a very complex stratigraphy, which was reinvestigated by Campbell and Sampson in the late l960s. In the lower part of the sequence is a breccia which contains a Cromerian Stage type fauna including a Sabre tooth. At least 14 hand-axes are known from the site and, although the records are insufficient to accept with certainty that they were found in the breccia and associated with this fauna, it is most likely that they were. For recent surveys of the stratigraphy see Straw (1995; 1996).

A similar flint hand-axe to those found in Kent's Cavern was found in the Windmill Cave at nearby Brixham (see below) and may be of the same age.

8.3 Caves and Rock Shelter Sites of Period 3

8.3.1 PONTNEWYDD CAVE, Clwyd SJ 013710 (A)

The cave was first excavated by Professor Boyd Dawkins in the 1870s, and later by Professor McKenny Hughes. Artefacts and fauna were recorded, but no large scale methodical work was undertaken until Aldhouse-Green conducted a research programme on the Palaeolithic settlement of Wales for the National Museum. Initial excavation at the Pontnewydd Cave in 1978 revealed a complex site which justified further work. Intensive excavations took place between until 1983, with a monograph published on the results in 1984. Further work has since been conducted at an entrance to the cave discovered behind several metres of rock scree (Green 1984).

Human settlement in the cave is dated, as noted above, to 250–225 Ky. This would equate with OIS–7. The artefacts comprise hand-axes and flakes. Levallois technique was used to produce some of the latter. Some 10% of the artefacts are made of flint but the remainder from local rocks, in the sense that they were glacial erratics but probably collected locally. Thirty-two hand-axes are recorded, complete or fragmentary, some Levallois flakes from discoidal cores, and various retouched flakes. Although found in various deposits they are thought to originate from one level and represent occupation from one period.

This is one of the only three sites in Britain to have produced human skeletal remains of the Lower or Middle Palaeolithic. They consist of teeth, mainly of children, fragments of a maxilla and a mandible, and part of a thoracic vertebra. Two of the teeth have fused roots (taurdontism) which is characteristic of some Neanderthal dentition.

Furthermore, this important site demonstrates occupation of at least this part of the highland zone during an interglacial period. It is also the only cave in Britain known to have evidence of human occupation during the interglacial of OIS–7.

8.3.2 LAUGHARNE, Dyfed, Coygan Cave SN 285092 (A)

This cave in Carboniferous Limestone, now destroyed by quarrying, has been explored and investigated by several people. The last was directed by Dr Charles McBurney and John Clegg in 1963 and 1964, prior to its destruction. No report had appeared because of the untimely death of Dr McBurney, but this has now been rectified by a combination of specialists. The importance of the site in respect of this survey is that it demonstrates the occupation of this part of south Wales during the Devensian Stage by people making or using bout coupé hand-axes (Fig. 68).

Dating by radiocarbon and Uranium series methods puts the human occupation within in a time span of 64–38 Ky; most likely during the earlier part of this range before 50 Ky. Hyaenas and not humans are thought to be responsible for the rich assemblage of typically Devensian Stage faunal remains (Green 1986; Aldhouse-Green *et al.* 1995).

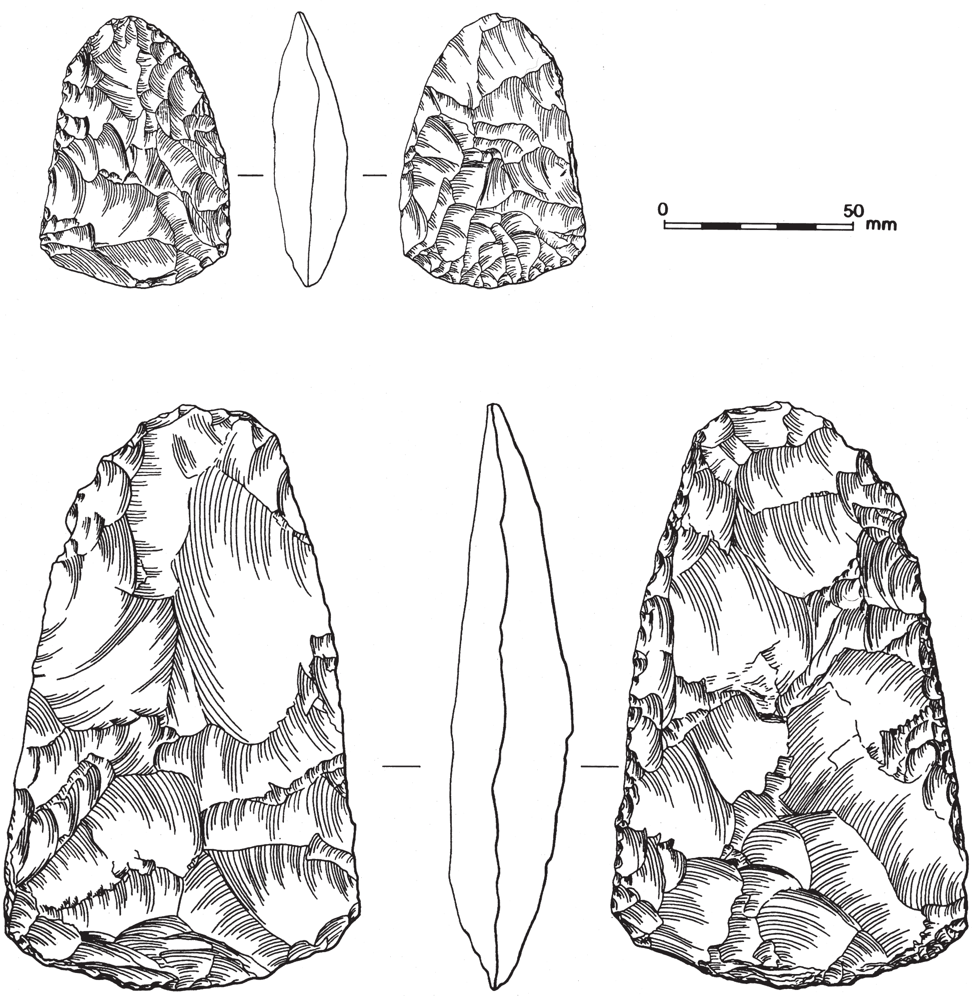


Figure 68 Bout coupé hand-axes from Coygan Cave. Source: Aldhouse-Green et al. *1995, 72*

8.3.3 TORQUAY, Devon, Kent's Cavern SX 934641 (A)

Deep in the cave earth which overlies the breccia noted above in respect of earlier Palaeolithic material from this site, artefacts have been found of Mousterian type. In their reassessment of the material from this cave, Campbell and Sampson (1971) were only able to attribute 45 artefacts out of a much larger number recorded from earlier investigations to this stratigraphical position. However, of the finished forms there are five hand-axes of which three were cordiform and two of bout coupé form.

Another bout coupé hand-axe comes from the Windmill Cave at Brixham, but nothing is known of its context.

8.3.4 WOOKEY, Somerset

Rhino Hole ST 532479 (A)

Excavation in this small cave by Professor Tratman produced a rich Devensian Stage fauna. At the base of these deposits was a thin bed of fluviatile silts and sands in which were a bout coupé hand-axe and four flakes. In the same deposit it was also claimed that there were some remains of hippopotamus. This would have put the occupation of the cave into the Ipswichian Stage (OIS–5e). The identification of these hippo remains has been disputed and a broadly Devensian Stage date is now postulated.

Hyaena Den ST 532479 (A)

Adjacent to the Rhino Hole is a cave, known as the Hyaena Den, which was completely cleared out by Boyd Dawkins in the 19th century. Eleven 'bifaces and related forms' were found. Five have survived, one of which is of bout coupé type (Tratman *et al.* 1971). The bulk of the faunal remains are typical of the Devensian Stage so, with Rhino Hole, it can be accepted that people using Mousterian artefacts were in this area during this time.

8.3.5 WESTON-SUPER-MARE, Somerset, Uphill Quarry ST 316548 (A)

Excavations in this quarry have revealed 13 caves and fissures. One of these (No. 8) produced some artefacts including one hand-axe fragment and retouched flakes from a deposit with a typical Devensian Stage fauna (Harrison 1977).

8.3.6 CRESWELL CRAGS, Derbyshire

Robin Hood's Cave SK 534742 (A)

Excavations were made by A.L. Armstrong in the 1930s and he found some artefacts which may have been Mousterian, including a few hand-axes and others of a more dubious nature made of quartzite (Fig. 69) or ironstone. A reinvestigation of the site by Campbell in 1969 found others in a spoilheap.

Pin Hole Cave SK 534472 (A)

At the nearby Pinhole Cave Armstrong claimed three levels of Mousterian and, from the faunal remains, thought that the lowest one was associated with moderately warm conditions. None of this has been substantiated but a Devensian date has recently been established by the Uranium series method of less than 64 Ky for the sediments and greater than 40 Ky for the faunal remains. ESR dating gives 38–50 Ky for the latter, so there is good agreement (Jacobi *et al.* 1998).

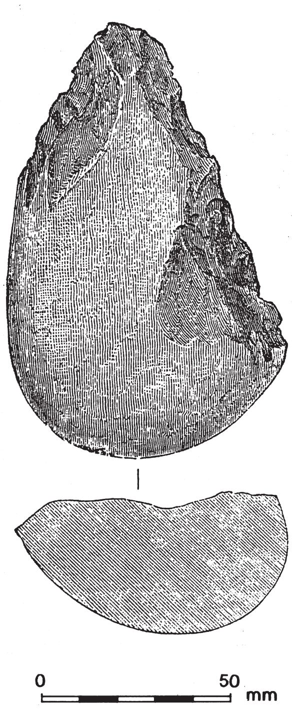


Figure 69 Creswell Crags, Derbyshire. Quartzite hand-axe from Robin Hood's Cave. Source: Evans 1897, 522

8.3.7 IGHTHAM, Kent, Oldbury Rock Shelter TQ 584568 (A)

Oldbury stone is a medium-grained sandstone which occurs sporadically in the Lower Cretaceous Folkestone Beds in north Kent. Only at Oldbury Hill itself does it outcrop as a scarp with narrow, shallow 'caves' and overhangs which can be regarded as rock shelters. The site has been known for many years for its relatively large numbers of artefacts of Middle Palaeolithic or Mousterian type. They were first found by the indefatigable Benjamin Harrison of Ightham. They were surface finds, but their proximity to the rock shelters strongly suggested a connection.

Excavation of a series of test holes was made by D. and A. Collins in 1965 slightly beyond the rocks and produced similar Mousterian material (Collins and Collins 1970). There is justification in referring to it as 'the richest Mousterian assemblage in Britain.' At least 45 hand-axes are known from here, five of which are of bout coupé form.

Unfortunately there is no dating evidence or any useful context or associations, but there seems no reason to doubt its attribution to the Middle Palaeolithic. A possible explanation is that the Oldbury Stone is not very resistant to weathering and the face of Oldbury Hill has receded in 50,000 years or so. The assemblage may have been under or near a genuine rock shelter that no longer exists.

9. Future Research Agenda

9.1 Introduction

Palaeolithic archaeology is one aspect of Quaternary studies. In many respects it is dependent on the work of specialists for chronological and environmental evidence that can be related to human activity. No major undertaking of research in this period can be conducted without the full cooperation of such specialists, either as consultants or, when excavation is involved and where relevant, as members on site with the work team. That this is now standard practice can be seen from the more recently published reports of projects on sites of outstanding importance for Palaeolithic archaeology in this country. It was not so two or three decades ago. The results from Hoxne, Clacton, Caddington, Boxgrove, Barnham, High Lodge, and other sites, some still in progress, have produced a solid basis for future research. Conversely, some geological reports contain specialist reports on associated flora and fauna and Palaeolithic artefacts, such as that on Waverley Wood in Warwickshire.

Any large scale research project can only be justified when there is good reason to believe that it may answer specific questions. Thus, it is necessary to consider just what questions need to be asked. What do we wish to know? Some of the more obvious are listed below. They are divided between those of purely archaeological nature and those concerning chronology and environment, although they are so inter-related that the division is really an artificial one.

9.2 Archaeological Questions

i) When was the earliest occupation of Britain?

Although it is unlikely, from what is known in the whole of north-west Europe, that there was any occupation of Britain much before 500,000 BP, this may not be true. There is always the possibility that Palaeolithic artefacts might be found in contexts that can be dated earlier, especially in the older levels of the Kesgrave Sands and Gravels of the ancestral Thames. Thus, commercial quarrying of these gravels warrants watching.

ii) Was there a presence of Modern Humans prior to 40,000 BP?

There is adequate evidence in the Near East that anatomically modern humans (*Homo sapiens*) and Neanderthalers (*Homo neanderthalensis*) were contemporary there about 100,000 BP. Could this have been the same here? This need not imply that they could be identified by characteristic types of stone tools. Some human skeletal remains from the Late Pleistocene are desperately needed.

iii) What size were human groups?

At present this can be estimated by little more than guesswork and ethnographical parallels. It is impossible to judge whether sites such as Warren Hill with at least a couple of thousand hand-axes represent a few visits by large numbers of people, or a large number of visits by few people. Even on primary context sites such as Hoxne, it is certain that the spread of bones and artefacts around a lakeside or the abandoned meander of a river is a palimpsest of material over an unknown period. Boxgrove has convincing demonstrations of one-time events, but nothing is known what other people were doing elsewhere along the beach at the same time. Only the area excavation of primary context sites which could be interpreted by spatial analyses as one short period might give some answer to this problem.

iv) Was fire made and controlled; if so, for what purposes?

Flecks of charcoal have come from several excavated sites, such as Hoxne, Swanscombe, and Boxgrove, but could well have just been traces of natural conflagrations. There were no calcined bones at these sites, or more than one or two possibly burnt flints. The only site in Britain so far that has yielded a 'combustion area' that is associated with some burnt bone fragments and flint flakes is that of Beeches Pit at West Stow. This could perhaps be a hearth. If so, this would revolutionise one's perception of these groups of the Ancients. TL measurements have been made on what has been identified as burnt material and the report is awaited.

v) Artefactual typology. What is implied by different technologies?

How does the available raw material influence what could be an imposed form? To take these matters in order, although they are interconnected, the identification of different technologies can be viewed in several ways. Assemblages of material produced by similar technologies with identifiable types can be regarded as 'industries' or just particular modes of tool-making as per Barton (1997; as used in this survey) ie.:

Mode 1: flakes and cores produced by hard hammers. No standardised flake tools

Mode 2: Symmetrical bifacial tools (hand-axes) produced by hard and soft hammer technique. Some standardised flake tools and a minor component of Mode 1.

Mode 3: Levallois technique of striking flakes from prepared cores, of radial, pointed or blade forms. Hand-axes as Mode 2 but generally smaller and some distinctive bout coupé types.

Mode 1 dominates assemblages from Clacton and the Lower Gravel at Swanscombe. A few hand-axes have been claimed to be associated. None has been found in excavations at Clacton. Only river gravel flint was available at either of these two particular sites, yet hand-axes occur at large numbers of similar river gravel sites as described in this volume. It is difficult to believe that raw material accounts entirely for this, if at all. Current interpretations by some suggest that it does. It is certainly not a question of chronology, for Mode 2 was practised well prior to the Mode 1 sites mentioned above and may have also been contemporary. Excavation of the Clacton Channel, if ever possible, may resolve the matter.

Raw material has also been considered as a major factor in the typology of hand-axes. Ovates, with their all-round cutting edges may have been more desired than heavy-butted pointed hand-axes, to take two extremes of hand-axe typology. Ovates, it has been argued, could only be produced with suitably-sized nodules or flakes of good quality flint. Narrow, often rather cylindrical nodules or river pebbles could only be used for making pointed hand-axes. This is a reasonable proposition, but many large pointed hand-axes are made on raw material that could well have been used to make an ovate one.

There is also the undeniable distinctive grouping of hand-axes by metrical analyses made by Roe (1981, 152–64). This seems to override the raw material aspect. It is easier to believe that there were traditional ways of making hand-axes of particular shapes as learnt and passed on from one generation to another (ie, imposed forms) but always subject to modification dependent on raw material, time, ability, and other human factors.

The excavation and study of hand-axes and the debitage of manufacture at primary context sites, in relation to the availability of flint in the locality, should do much to determine what balance there was between inherited ideas and immediate circumstances. The question is methodically examined by Dr M. White (1998) and his suggestion is that the tradition merely conveyed the *concept* of a biface/hand-axe, the style and shape of which was dependant on the quality and size of the raw material available. This has much to recommend it, certainly as a major, if not the only, factor.

9.3 Chronology and Environment

i) Dating frameworks

The sequence of Quaternary events as established by the analyses of deep sea cores and Greenland ice-core records offers an unbroken time scale of climatic oscillations (Tables 1 and 2). At present, apart from the latter part of the last glacial episode, there are only two of at least 23 Oxygen Isotope Stages in the marine succession that can be unequivocally correlated with terrestrial events: OIS–5e = the Last Interglacial (Ipswichian Stage) as represented at the type site of Bobbitshole; and OIS–20 as represented in African lake sediments where the change in palaeomagnetism can be recognised between Matuyama reversed and the present Brunhes normal. This change is dated by the K/Ar method to about 780,000 BP.

Other forms of dating for the Middle Pleistocene which is the concern of this survey, allow tentative correlations to be made, as does subjective relating of the various glacial stages to the order and intensity that seems apparent in the marine record. The refinement of TL and U/Th dating techniques will be helpful in this respect, so burnt material from Palaeolithic sites has especial importance. The present chronology for Britain, as used here, equates the Anglian Stage with OIS–12, but it has to be stressed that this can be questioned. The confirmation or otherwise of this correlation is imperative.

Biostratigraphy is the most reliable form of relative dating. Organic deposits with micro- and macro-mammalian remains, molluscs, beetles, fishes, birds, reptiles, ostracods, or suchlike can produce distinctive assemblages through time. Their collection, sampling, and analysis is essential wherever they are found, for dating and environmental information.

Amino acid dating generally gives excellent results, especially in placing deposits at specific sites in correct order of sequence, but may be unreliable with deposits older than OIS–7. For instance, the amino acid dates for Boxgrove are at variance with the biostratigraphical dating.

ii) How many glacial episodes, if any, occurred between the Anglian and the Devensian Stages?

If OIS–12 really equates with the Anglian Stage, it would be odd if the cold marine stages of OIS–10, 8, and 6 had not caused drastic deteriorations of climate and some glaciation. There are considerable difficulties in identifying episodes of glacial deposition purely by the rocks contained in their tills, for ice could move across the same bedrock during entirely different stages. A glacial till could well become interdigitated with one from an earlier stage. This is a geological problem which has and is receiving much attention. Evidence is mounting in the Midlands for at least one further glacial advance. The present assessment of the various ice limits are shown on Figure 43. Doubts have been expressed on all of the Anglian till belonging to just one glacial stage (Sumbler 1995).

iii) How reliable is an interglacial pollen sequence as a chronological indicator?

The distinctive pollen diagrams for the Cromerian, Hoxnian, and Ipswichian Stages, when found in a stratigraphical sequence, have been used for several decades for correlating interglacial deposits. As such, apart from the information they give on contemporary environments, they are of great value. However, as it is becoming apparent that the sequence of geological and climatic events during the Palaeolithic period is more varied and complex than hitherto realised; one part of an interglacial or interstadial period may be very similar to another of a different stage. Unless the profile has been obtained from a deposit with an unbroken sequence through all four vegetational biozones, which is very rare, corroborative dating by some other method is probably necessary.

Consideration of such questions and problems as outlined above need to be taken into account for any planned research projects in the Palaeolithic period. Clearly, the most informative sites will be those where material is in primary context, or has only been subjected to minor movement by natural agencies. Sites of this nature, as emphasised above, are rare and generally only exposed in the first place by commercial quarrying. The only recently planned excavation projects in the Lower Palaeolithic have been based on the re-evaluation and extension of known sites, originally investigated prior to the full introduction of modern inter-disciplinary techniques.

The East Anglian Project by the Quaternary Section of the British Museum Department of Prehistoric and Romano-British Antiquities is an exemplary example. Excavations, as recorded in this survey, have been conducted at High Lodge and Barnham with positive results, two monographs published, and Elveden currently being excavated. This is a regional study that is transforming knowledge of the human occupation and landscape of part of East Anglia during the earlier part of the Middle Pleistocene.

The Boxgrove Project is another planned project brought to a highly successful conclusion that gives confirmation to human activities that were hitherto debatable, ie, organised hunting and the curating of specialised tools, apart from a wealth of associated environmental, bio-stratigraphical and chronological evidence. Similar research of great value has been conducted in Pontnewydd Cave by the National Museum of Wales.

A few others could be cited but, as stated, all have been conducted on known sites. Many other primary context sites must exist but await discovery. For instance, one of the entrances to the Pontnewydd Cave was totally obscured by rock scree. If the upper entrance had not still been open, the site would not be known. Others of equal importance could exist in the highland zones, totally hidden. Open sites in primary context must survive in deposits sealed and preserved within or beneath river gravels. There is also much to learn from derived material in river sediments, as noted above. Contained palaeoliths provide evidence of human occupation in the locality, and can usually be given a minimum date if not a more precise one.

As with all other archaeological periods, the resources for systematic planned research have to be balanced against those required to observe and possibly evaluate discoveries of Palaeolithic sites exposed by chance or the mineral exploitation of sensitive areas. The latter can be assessed to some degree from the information contained in the reports of the Southern Rivers and English Rivers Palaeolithic Surveys. This can be done at minimal expense with worthwhile results, as exemplified by the on-going visits, collecting, and recording conducted at the Dunbridge pits in Hampshire (Bridgland and Harding 1993b).

The Prehistoric Society and English Heritage, especially, have been greatly concerned with the preservation of Palaeolithic sites and the necessity for an overall policy on regional research frameworks for this period. Numerous other organisations, both national and county, have held conferences and published accounts of current knowledge and proposed research strategies. This is all comprehensively reviewed in *Frameworks for our Past* published by English Heritage (Olivier 1996). This, of course, concerns all aspects and periods of prehistory, but there has been a significant increase in the last two decades in the attention given to the Palaeolithic.

The Prehistoric Society (1984) stressed the necessity to preserve sites of the period and recommended particular attention to the 'brickearths and sands of southern England' (ie, primary context sites) as well as open sites, caves, and rock shelters. This report was expanded to emphasise the regional nature of research in the period, with an emphasis on landscape studies (Prehistoric Society 1988). A recent draft from the Archaeology Division of English Heritage (1997) stresses the vulnerability of sites through mineral extraction and is considering 'the potential of predictive modelling for improving the management of this precious resource.'

A recent draft plan for an archaeological framework for the Thames Estuary by Kent County Council (1998) in conjunction with Essex County Council, has a thematic approach, from the Palaeolithic to historic defences, industry, and transport. This critical area for Palaeolithic research receives informed, balanced treatment, and, to give an example of a particular progressive item, is initiating a survey of the Crayford brickearth in order to locate the extent of surviving deposits associated with the Middle Palaeolithic sites of that area.

This is all a great advance on hopefully-disappearing attitudes by some past prehistorians that, somehow, the Palaeolithic was not part of the continuum of the evolution of human society. Future research frameworks will certainly need careful planning within the general themes of prehistory. Professor Gamble's crusade to 'demistify the Palaeolithic' (Gamble and Lawson 1996) has worked.

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Note: references in italic denote illustrations

This volume presents a synthesis based on a comprehensive seven year survey of the Palaeolithic archaeology of England and Wales. That survey sought to identify the findspots and plot the distribution of Lower and Middle Palaeolithic artefacts in relation to the deposits containing them. This volume is concerned not only with artefacts but with people; when and where they moved through the land we now know as Britain and in interpreting, where possible, what they were doing during the half million or so years of their occupation.

It begins with a brief introduction to the period, the nature of the archaeological resource, and a history of Palaeolithic research. This is followed by detailed considerations of the geological and climatological background, the formation and importance of river terraces, of the people themselves, and of fauna and flora that existed alongside them.

The main thrust of the report is a landscape based review of the evidence, beginning with a journey along all the main river valleys. The evidence is then reviewed for occupation beside the sea, around lakes, on the downs, plains, hills and fringes of the highlands, and in caves and rock shelters. It concludes with a future research agenda which poses a number of questions. The report is accompanied by a separate volume of colour maps summarising all the major distributions by area.

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