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Lower and Middle Palaeolithic Leicestershire and Rutland: progress and potential

by Anne Graf

Drawing on archaeological and geological research, recent finds, museum collections and borehole evidence, this paper describes the changing local landscape and environment round the Cromerian-period Bytham river valley, possibly the major early entry route to Britain from Europe; the succeeding pro-glacial Lake Harrison and present-day post-glacial rivers; and highlights deposits with Palaeolithic archaeological potential.

Palaeolithic tools of quartzite, comparable with other Midlands raw materials, and of andesitic and Charnian tuff may suggest occupation from around 600,000 BC, while flint tools suggest at least intermittent post-Anglian occupation, followed by probable abandonment from after 160,000 BC until possible Devensian re-occupation by Neanderthalers post-60,000 BC.

Introduction

The last twenty years have seen very exciting results for the Palaeolithic period in Leicestershire and Rutland. This paper discusses these results, which are placed in the contexts both of the local landscape changes, and of the growing national understanding of key Palaeolithic issues. The paper aims to provide a summary of current knowledge of the Lower and Middle Palaeolithic occupants and their environments and landscapes in these two counties, and to highlight potential for further investigation.

The local, and many national, sites, to which references can be found in the bibliography, are presented in the timechart in illus. 1, with their relative positions within current archaeological and geological divisions and phases. Throughout the timechart and the rest of this paper 'thousand [years] ago' will be abbreviated to 'ka', while the oxygen isotope stages now used for international date correlations (see below) will also be abbreviated, so that, for example, OIS-16 indicates oxygen isotope stage 16.

There are many limits to the inferences which can be drawn from chance surface finds on ploughlands and elsewhere. Unfortunately, such finds constitute the bulk of the evidence to date for human activity in the Lower and Middle Palaeolithic periods in these two counties. However, these finds do at least offer evidence for presence or absence, and perhaps some indication of density, of occupation in the broad periods deducible from their typology. They also illustrate transport and use of raw materials, and changing technology, and can point to areas where follow-up work should be considered.

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1. Timechart of Palaeolithic landscapes and archaeology, with special reference to Leicestershire and Rutland

Epoch	*Stage*	*Climate*	*OIS (see Note)*	*Date (see Note)*	*Sites and Events (Leics. and Rutland sites in **BOLD** type)*
Holocene	Flandrian		1	10ka	Development of post-glacial environments
Late Pleistocene	Devensian	Mainly cold			10ka **LAUNDE**
	10.8-.3 ka Loch Lomond Stadial				Britain abandoned 12-11ka Hengistbury Head 12.6-12ka Creswell Crags
			2		Gough's Cave burials, Cheddar
	13-10.8ka Windermere Interstadial				**BRADGATE** 12.6ka Britain re-occupied
	16-14ka Dimlington Stadial 18ka Last Glacial Maximum			24ka	18ka Ice sheet in Lincolnshire; Leicestershire periglacial 23ka Britain abandoned
	30-25ka: rapid climate oscillations				*c.*26ka: Paviland Cave burial
					By ?30ka Neanderthals extinct. *c.*31ka Kent's Cavern human fossil
	40-25 ka Upton Warren Interstadial Complex		3		35-30ka Earliest evidence of modern humans *c.*40-30ka **GLASTON** *c.*60-35++ka Britain re-occupied by Neanderthals.
				57ka	*In-situ* deposits and surface finds feasible throughout area from Middle and Upper Pal. periods - no further icesheets.
		Cold	4	71ka	
		Cold	5d-a	110ka	
	Last Interglacial Complex: Ipswichian Interglacial	Warm	5e	127ka	*c.*160-60ka No evidence of human occupation.
Middle Pleistocene		Cold	6	186ka	Further ice sheet?
	Saalian ("Wolstonian") Complex: Stanton Harcourt Interglacial	Warm	7	242ka	225ka Neanderthals(?) at Pontnewydd Baker's Hole
		Cold	8	301ka	Further ice sheet?
	? Hoxnian Interglacial	Warm	9	334ka	
		Cold	10	364ka	Further ice sheet?
	Hoxnian Interglacial	Warm	11	427ka	*c.*400ka: *Homo sp.* at Swanscombe Many sites
	Anglian Glaciation (or OIS-14 or 10)	Cold	12	478ka	Many artefacts in **HINCKLEY** area. Major glaciation: ice over Leics. and Rutland, leaving transported artefacts from north. Potential *in-situ* occupation deposits, from earlier riverside, or from summer visits to early lake shoreline, sealed under gentle silting of final larger Lake Harrison?
	Cromerian Complex: Cromerian s.s?	Warm			High Lodge. *Homo heidelbergensis* at Boxgrove.
	(Cromerian s.l. Interglacial IV - see note)		13	528ka	Surface find of andesite handaxe at **REARSBY**, adjacent to proposed **BROOKSBY QUARRY**. 'Brooksby Group' organics in **BROOKSBY QUARRY** evaluation. Organics + quartzite and andesite artefacts, at Brandon and Pools Farm Pits and Waverley Wood Farm Pit, Warks, in "Brooksby Group" channel(s) below Baginton Sand and Gravel (and/or in OIS-15: see below).
		Cold	14	568ka	Further ice sheet?
	Cromerian s.l. Interglacial III	Warm	15	621ka	Westbury-sub-Mendip. Kent's Cavern. Suggested amino-acid date for Waverley Wood Farm Pit ('Brooksby Group') organics with quartzite and andesite artefacts (and/or in OIS-13).
		Cold	16	659ka	Ice sheet?
	Cromerian s.l. Interglacial II	Warm	17	712ka	
		Cold	18	760ka	
	Cromerian s.l. Interglacial I	Warm	19	787ka	
Early Pleistocene					Palaeo-magnetic polarity reversal

Note: OIS = Oxygen Isotope Stage, from deep-sea cores showing alternating cold glacial (even numbers) and warm interglacial periods of the Ice Ages.
ka = thousand (years) ago
s.s. = *sensu stricto:* in the strict sense of the word, the 'Cromerian s.s.' Interglacial itself may be OIS-13 only.
s.l. = *sensu lato:* in a broad sense, 'Cromerian s.l.' is used for the complex of periods OIS-19-13 before the Anglian in the Middle Pleistocene.

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Technology; Raw Materials	*Leicestershire and Rutland Landscape Changes*	*Period and Palaeolithic divisions*	
	Floodplain deposits	Mesolithic to present	
'Long Blades' Archery, Federmesser. Penknife points Creswellian: Cheddar points	Syston Terrace of river Soar. **HEMINGTON QUARRY** Late glacial channels of river Trent.	Upper Palaeolithic ?35-10ka	Epi-Palaeolithic Final Upper Palaeolithic Late Upper Palaeolithic
30-24ka Gravettian Aurignacian II Blades (Mode 4). Art Leafpoints British Mousterian: 'bout coupé' handaxes	Periglacial effects: potential nearly-*in-situ* preservation of Middle/Upper Pal. deposits on higher ground through slumping/cambering/gulling; or beneath soliflucted/ colluvial deposits.		Early Upper Palaeolithic Earlier Palaeolithic Period 3 (Wymer 1999)
	Wanlip Terrace of river Soar	Middle Palaeolithic ?250-30ka	
	Possible nearly-*in-situ* occupation deposits in or adjacent to fine channel sediments within terraces.		
	Birstall Terrace of river Soar		
Levallois (Mode 3) prepared core technology	River terrace gravels deposited with transported derived Levallois and Acheulian artefacts, often at base.		
	Knighton Terrace of River Soar		Earlier Palaeolithic Period 2 (Wymer 1999)
Flint now available locally (often small and frost-cracked)	Rivers Soar, Wreake and Avon created in former Bytham valley at ice melt.		
	First flint deposits brought by ice in boulder clay (till) over whole area Wigston Sand and Gravel glacial outwash, with derived artefacts in Warks. Bosworth Clays and Silts (Lower Wolston Clay) form in Lake Harrison. Bytham River, dammed by ice, forms Lake Harrison over whole of SW. Leicestershire.	Lower Palaeolithic ?600-250ka	Earlier Palaeolithic Period 1 (Wymer 1999)
Acheulian (Mode 2): handaxes, scrapers; Clactonian (Mode 1), flakes, cores, choppers: of local quartzites and of tuffs (Charnian and andesitic); no flint raw material in this area.	Fossil ice-wedges in top of Baginton Sand and Gravel, deposited by Bytham River(proto-Soar) in cooling climate. **BROOKSBY** Sands and Gravels (8m thick) laid in ?channel beneath later Bytham River Baginton deposits during"substantial" time-period, with 2 separate organic-rich temperate sediment deposits (and/or OIS-15- see below)		
	Possible date for 'Brooksby Group' deposits (and/or OIS-13: see Waverley Wood Farm Pit, left).		
	Major Bytham River (proto-Soar) flowing NE from Worcs. along future Soar and then Wreake valleys via E. Anglia to North Sea.		

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Very little systematic work, other than at Hemington Quarry, Castle Donington, in the Trent valley (Beamish 2000; Cooper and Ripper 2001) and at Cossington and Syston near the Soar/Wreake confluence (Sturgess and Ripper 2000; Higgins 2001), seems to have been carried out in this area to search gravel quarry floors, sections and reject heaps, (with appropriate permission and due safety precautions), along the lines, for example, of that by Terry Hardaker and 'Mac' MacRae (2000; MacRae 1982; 1999; MacRae and Moloney 1988) in Oxfordshire, and now in East Anglia. Their work has produced remarkable samples of the artefacts once in use in those regions, to which can sometimes be assigned a *terminus ante quem* date from their geological contexts in particular terrace gravel deposits.

No opportunities have yet arisen for any excavation of *in situ* remains of earlier Palaeolithic sites in Leicestershire and Rutland, although on the Wing-Whatborough pipeline a Palaeolithic flake was excavated from a cryogenic feature (Cooper, L., 2002a). Important Upper Palaeolithic remains have been found in the study area (Cooper 1997; 2002b; Thomas and Jacobi 2001), but these are beyond the scope of the present paper. However, faunal and other environmental evidence is available for some earlier and later parts of the local Lower and Middle Palaeolithic, from which details of those environments can be reconstructed using a multi-disciplinary approach. Moreover the recent exciting geological work provides a background of the changing topography in our counties during these periods, and fresh interpretations of its chronology, against which can be set the growing understanding of the history of human occupation learned from major archaeological excavation sites elsewhere in the country in recent years.

The objective of this paper is to combine relevant elements of this national archaeological picture with the recent geological information on the local landscape changes, to set the local archaeological finds in an overall context and create a coherent history of developments throughout the earlier Palaeolithic. The paper will cover the periods from the earliest occupation of this region, possibly around six hundred thousand years ago (600 ka) or before, through possibly sparse and intermittent subsequent occupation, until the advent of modern humans perhaps around 35 ka.

The Palaeolithic background will first be indicated, namely the human species present, their tools and lifestyle and the important questions for which answers are sought. This will be followed by a summary of recent advances in archaeological and geological knowledge. The main part of the paper then follows, that is, a chronological discussion of the evolving local landscape settings and their human occupants.

The superficial landscape changed drastically during the periods under consideration, transformed by the overwhelming overburden of ice in at least the Anglian, and maybe other, glaciation(s). Recent geological discoveries of the antiquity of the local pre-Anglian Bytham river system and its importance as possibly the earliest route of human entry into Britain from the continent will first be discussed.

Then will follow consideration of a remarkable concentration of Palaeolithic artefacts in south-west Leicestershire and north Warwickshire, possibly associated in the latter area with the late-pre-Anglian or early-Anglian period. Other recent finds will briefly be presented, and raw material use will be compared with that elsewhere in the Midlands.

The extensive landscape effects of the glaciation(s) will then be described, with the potential for preservation of remains in various topographical situations, particularly certain types of elevated site. The evidence for later occupations and environments will be considered, up to the arrival of anatomically-modern humans.

Finally, there will be discussion of some suggestions for future investigation of areas of Palaeolithic archaeological potential.

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The Palaeolithic Period

In this Palaeolithic period, the 'Old Stone Age', we focus on the vast span of time from the earliest evidence of human activity, over half a million years ago in this region, to the final thaw of glacial ice around ten thousand years ago (Wymer 1999; see illus. 1). During this period dynamic developments in human evolution led from *Homo ergaster* and *erectus* in Africa, through tall, well-built archaic *Homo sapiens (Homo heidelbergensis)* at Boxgrove, West Sussex, and later at Swanscombe, Kent and Pontnewydd Cave, Clwyd; and later still, Neanderthal man *(Homo neanderthalensis)*; to the arrival here of anatomically modern humans *(Homo sapiens)* like ourselves around 35-30 ka (Barton 1997), and the disappearance of the Neanderthalers.

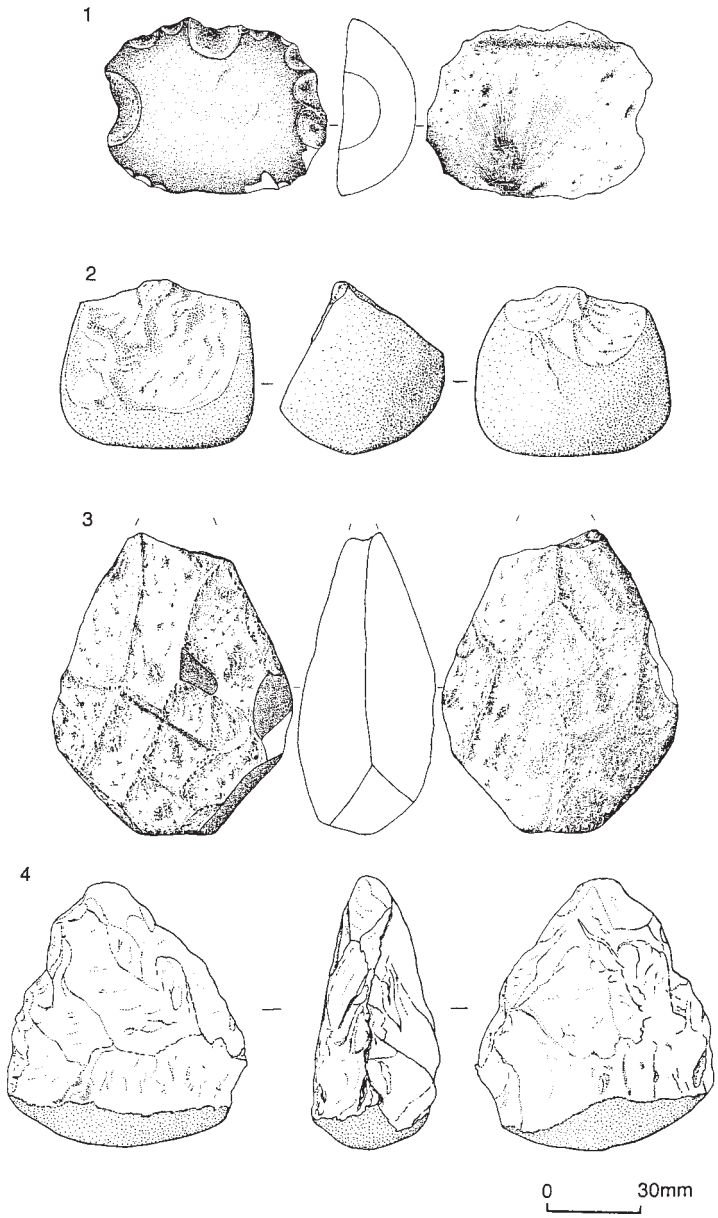
The way their stone tools were made, and the types of tool produced, also changed during the Palaeolithic period (Bordes 1961; Barton 1997; Wymer 1999, 6-12; and table 1). From the elegant, high quality finds at Boxgrove, West Sussex (Roberts and Parfitt 1999) and High Lodge, Suffolk, (Ashton *et al.* 1992) it has in recent years become clear that an early date is not necessarily associated with crude workmanship. Beautiful scrapers were being made at High Lodge around half a million years ago, while at Boxgrove fine ovate handaxes with delicate soft-hammer and tranchet flake finishes were made to be carried away for anticipated and planned-for future use elsewhere, showing both the manual dexterity and forethought of their creators.

Table 1. Modes of manufacture: Palaeolithic artefacts (see illus. 2-6)
(After Barton 1997, 19-24; Wymer 1999, 6-12)

Period	Mode	Stone Tools
Lower Palaeolithic	***Mode 1*** ('Clactonian')	*Flakes* struck from *cores* by hard hammers, either as core shape allowed, or by systematic *alternate flaking*, using the scar of one flake as the striking platform for the next, removed in the opposite direction. Some *flakes retouched* as tools, with hard hammers. Occasional *rough bifacially-shaped pieces* on pebbles, e.g. *core-choppers/chopping tools*; but few or *no* handaxes.
	Mode 2 ('Acheulian')	*Handaxes* (bifaces) made with hard or soft hammers, flaked round the majority of the perimeter, to create a working edge. *Retouched flake tools*, some in standard forms (e.g. *scrapers)*. Some alternately struck cores. More elaborate symmetrical tools.
Middle Palaeolithic	***Mode 3*** ('Levallois')	*Levallois flakes* from prepared discoidal or prismatic *cores. Retouched flake tools*. Some *handaxes*, including 'bout coupé' forms (flat-based cordate-shaped).
Upper Palaeolithic	***Mode 4***	Composite tools from narrow *blades*, in many different forms. Handaxes absent.

Research is still needed to understand the relationship of the different modes of manufacture and tool use, to the lifestyles, environments, culture and evolution of their makers. It is not clear, for example, whether tools of Modes 1 and 2 were broadly contemporary but made for different functions, or just by peoples with different stone-working traditions or with different raw material constraints on their form (see White 1995, 1998, 2000; and illus. 2-6). The size and nature of the rock source is an important, but not the only, governing factor in this respect. Prepared-core Mode 3 technique ('Levallois') does not seem to be in use before the end of OIS-8, around 250 ka (see illus 3.2; 6.2). This technique requires plentiful raw material, so is perhaps likely

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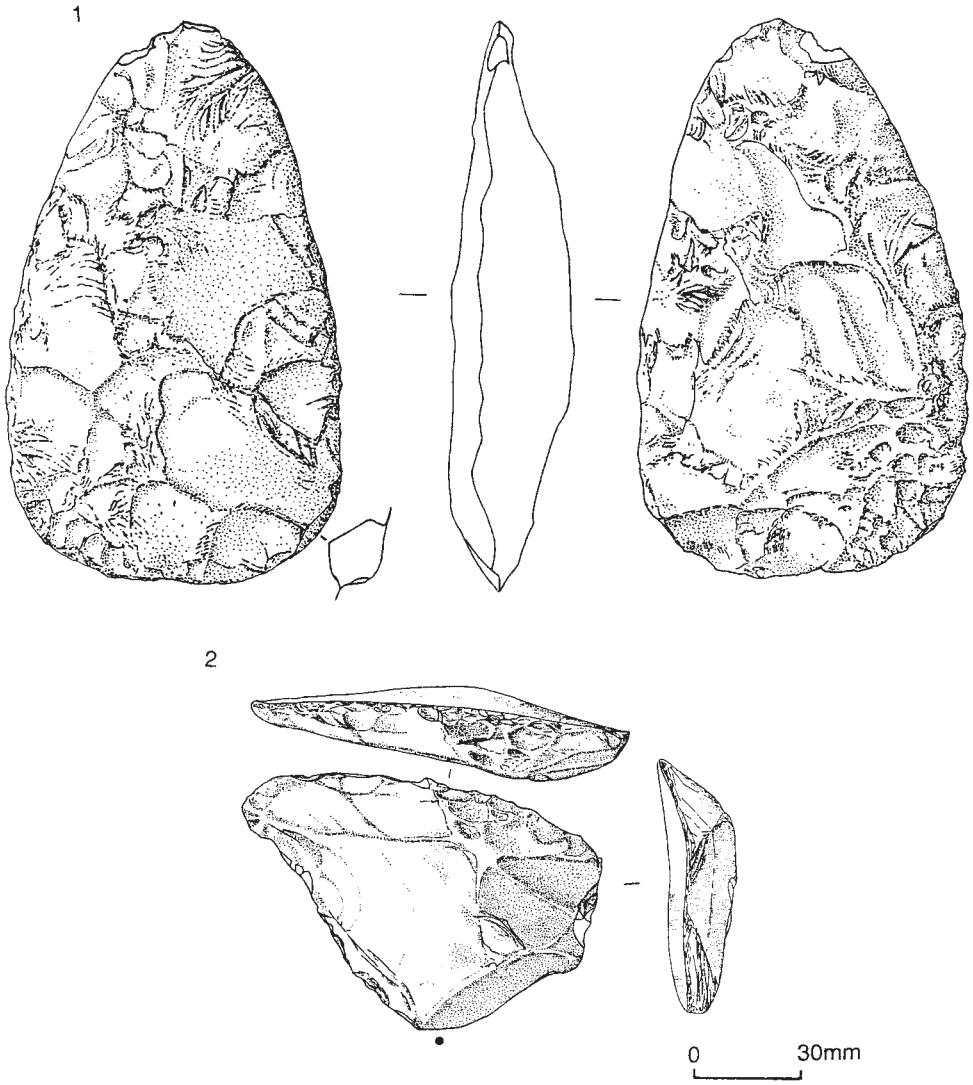
2. Selected surface finds of Quartzite Palaeolithic artefacts from Leicestershire:
Museum refs. in brackets.

Mode 1 manufacture:
1. retouched flake (?denticulate) from Burbage (X.A71.2001.2)
2. bifacial chopper-core from Higham-on-the-Hill (X.A91.2001.7)

Mode 2 manufacture:
3. handaxe from Sheepy (X.A19.1999.1)
4. handaxe from Sutton Cheney (L.A73.1995.3)

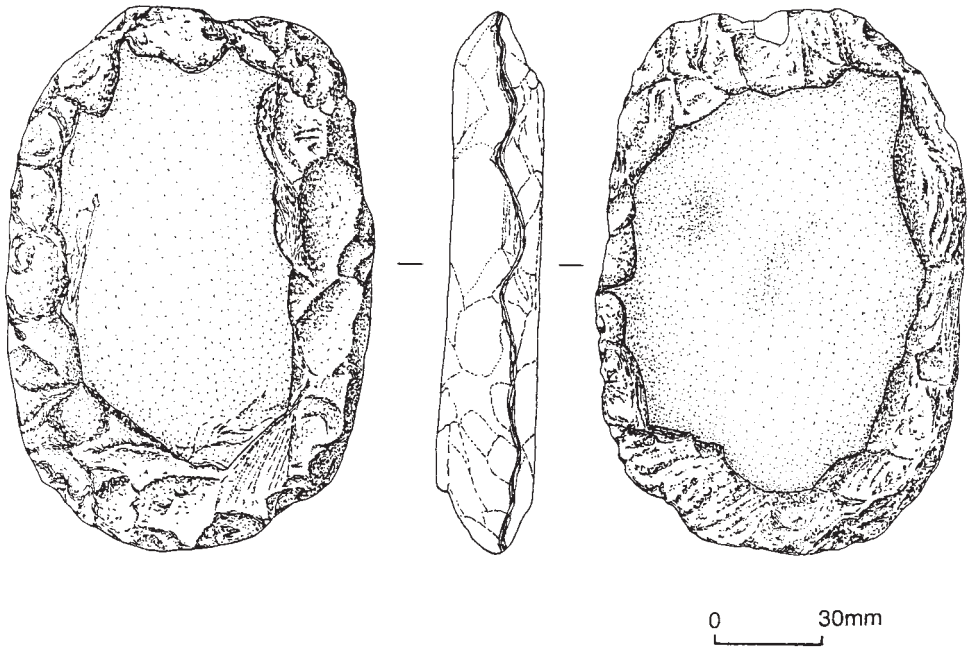
illus. H. Jacklin (1,3); R. Knox (2,4)

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3. Surface finds of Andesitic Tuff Palaeolithic artefacts from Leicestershire:
Museum refs. in brackets. • = bulb of percussion.
Mode 2 manufacture: 1. handaxe from Rearsby (private collection)
Mode 2 or 3 manufacture: 2. scraper from Sutton Cheney on possible Levallois flake (L.A14.1995).
illus. R. Knox

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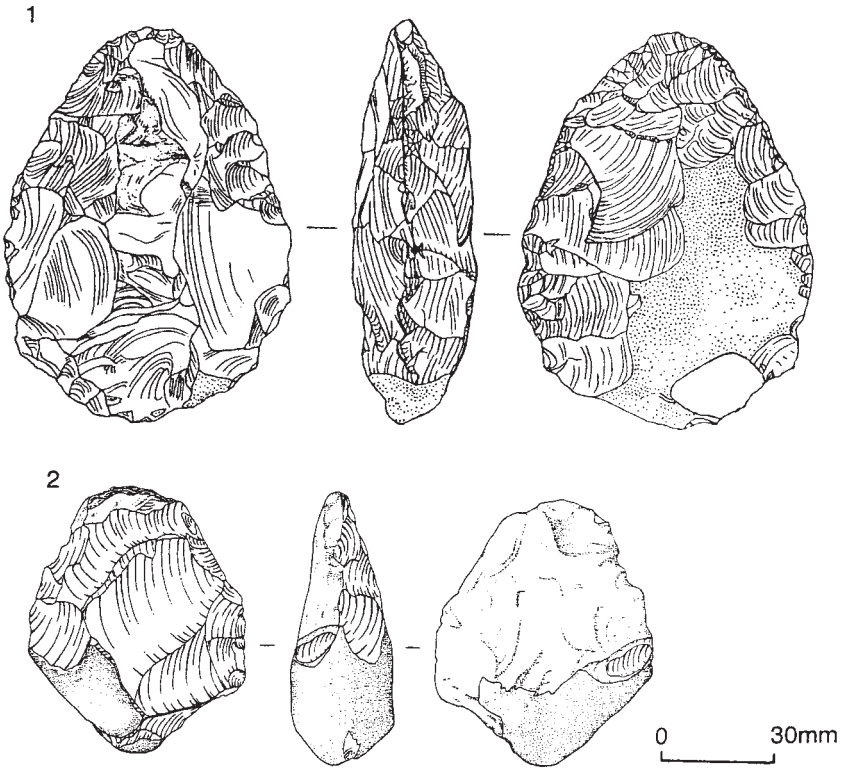
4. Surface find of Charnian Tuff Palaeolithic handaxe from Leicestershire:
Mode 2 manufacture: Handaxe from Burbage (L.A6.1997)
illus. R. Knox/H. Jacklin

to be rarer where flint is scarcer or of small size, (Bridgland 1996), as it is in Leicestershire and Rutland (Henson 1983). Small, slim, flat-based curved-sided handaxes (termed 'bout coupé' in this country) came, it appears, with the reoccupation of Britain about 60 ka by Neanderthalers (see illus. 6.2). Blade tools of Mode 4 were gradually introduced, and developed into many forms with the arrival of modern man.

Stone tools are the most common surviving evidence of these early populations, with rarely any other evidence of their hunting and gathering lifestyles. At this time it seems human populations were part of the natural order, at one with the environment, with sufficient to eat and a social order that worked. As Wymer has pointed out (1999, 39) revolutionaries were neither needed nor probably welcome for much of the Palaeolithic period.

All these peoples had to live through the regular, slow, but extreme fluctuations in climate of the ice ages, from periglacial tundra and steppe, to warm or even semi-tropical forests at times. Britain was the most northerly territory occupied by early humans. There will have been limited times when most of the area was actually under an ice sheet (see illus.1), but for the vast majority of the time Leicestershire and Rutland will have been habitable, even if periodically close to the southern edge of such ice sheets and enduring periglacial conditions, as in the later stages of occupation at Boxgrove (Wymer 1999, 18, 150, 165 and 172). During the warm interglacials, during the even longer warming or cooling transitional periods before and after them, and during mild summers in interstadials in the glaciations, pollen evidence suggests

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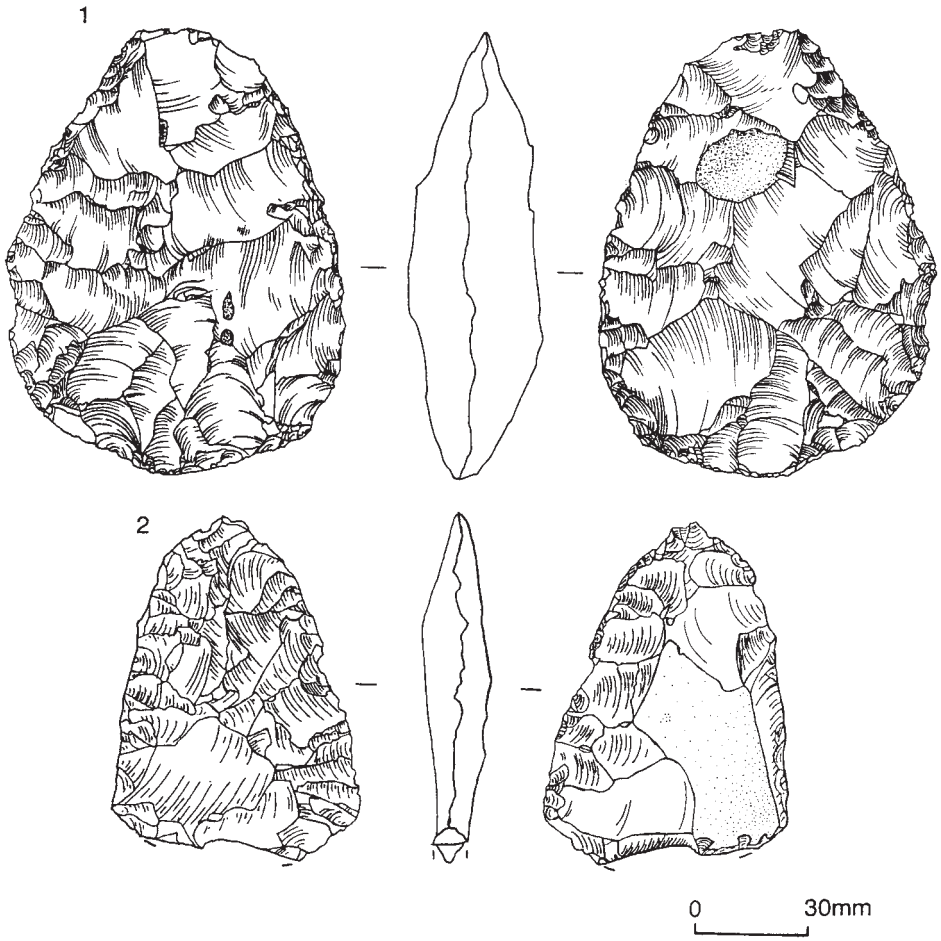


5. Selected surface finds of Palaeolithic flint handaxes from Leicestershire:
Museum refs in brackets.
Mode 2 manufacture: 1. from Coalville (private collection);
2. from Medbourne (L.A125.1987)
illus. S. Mitchell (1); R. Knox (2)

perfectly tolerable, even at times pleasant conditions by modern standards (West 1977).

Populations will therefore have ebbed and flowed gradually with the cycle of the changing climate, and the movement of the animal herds which were their (main?) food source, supplemented by a wide variety of foraged plant foods (Wymer 1999, 35-9). Organic remains of foods, and of all daily clothing and equipment made of skins, fur, leather, bark, wood and fibres, rarely survive, but bones at Boxgrove, West Sussex (Pitts and Roberts 1997; Roberts and Parfitt 1999) show scars of spearmarks and butchering cuts. Butchering was identified from microwear analysis at Hoxne, Suffolk (Singer *et al.* 1993) and wooden spears of this date have been found at Schöningen in Germany and Clacton in Essex (Thieme 1996; Barton 1997, Plate 7; Wymer 1999, Plate 15). Evidence at Boxgrove shows humans were not the scavengers, but had priority over other carnivores at the kill site (Stringer 1996). Hunting large dangerous beasts such as rhinos and bovids would have required social communication and co-operation, as would combining for defence against large predators, and searching for carcases to scavenge (Gamble 1996; 1999). People probably lived in nomadic extended family

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6. Selected surface finds of Palaeolithic Flint handaxes from Leicestershire:
Museum refs in brackets.
Mode 2 manufacture: 1. from Huncote (private collection);
Mode 2 or 3 Manufacture: 2. possible flat-based cordate-shaped ('bout coupé') from Stanton-under-Bardon (L.A17.1992).
illus. R. Clark (1); R. Knox (2)

groups of up to fifty men, women and children, perhaps with an occasional 'home base' for more extended stays. Shelters were constructed of branches, skins and leaves (Wymer 1999, 37). Scrapers were used to prepare skins for such shelters, and for clothing. Favourite frequently-visited locations were on riversides or lakes, and it is in such locations that remains are often found today. However, a wider geography is also recognised, as upland finds throughout Leicestershire and Rutland demonstrate (see below).

The Midlands, including Leicestershire and Rutland, are now proving to have important evidence of these early inhabitants, near their geographical limits, which can contribute to fundamental questions:

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- Where may the people have come from who ventured this far to the north-west frontier of the continent?
- What was their lifestyle and environment?
- What remains of their camps, hunting and working areas survive, buried or on the surface, after all these years?
- How did people, their tools and equipment change during the ice age?
- What overlap was there between *H. neanderthalensis* and modern humans?

It has become clear that there is a great further potential from future investigations targeted to particular location types in Leicestershire and Rutland.

Recent advances

Twenty years ago John Martin (1982) lamented the lack of local evidence in Leicestershire, for want of skilled fieldworkers, and through the mechanised processes of gravel extraction. The picture has changed dramatically in recent years, both in the amount of surface finds, (see illus. 2-6 and 9), and in our understanding of the subsurface archaeological information in sediments, reflecting the vast changes in the Leicestershire landscape and environment in this period (see illus. 7 & 8). Researchers into the Palaeolithic, nationally and in Leicestershire and Rutland, are at the frontiers of both archaeological and geographical knowledge (Bridgland 1996).

Palaeolithic archaeology is inevitably bound up with its physical and environmental context in geology, here the Middle and Late Pleistocene (see illus.1), and requires multi-disciplinary studies across regional and indeed national boundaries to understand the local picture. In the last twenty years there have been refinements in dating, by analysis of the stratigraphy of sedimentary sequences, (e.g. Bateman and Rose 1994; Bridgland 1996) of changes through time in related groups of flora and fauna (e.g. Currant and Jacobi 1997; Meijer and Preece 1996) and by improvements in a variety of radiometric, thermoluminescent and amino-acid dating techniques (Aitken 1990; Jacobi *et al.* 1998; Smart and Frances 1991; Wymer 1999). These have started to clarify the numerous stages of ice age temperature change, reflected in the changing balance of oxygen isotopes detectable in deep sea and ice cores, referred to as Oxygen Isotope Stages (OIS), an important step towards combining the various sources of evidence.

Since 1980, correlations of deposits in Leicestershire and the Midlands with the East Anglian tills, and river terrace studies, have modified and extended the timescale of human activity here (e.g. Rose 1989; Maddy *et al.* 1993; Sumbler 1995; Keen 1999). The local 'Wolstonian' sequence of deposits and their related evidence of human presence are now seen to be linked to the *Anglian* glaciation, between OIS-14 and 10, (probably OIS-12), ie much earlier in the Pleistocene than previously suspected (see illus.1).

Archaeological understanding, too, has advanced nationally, with Roe's studies (1968 & 1981) followed by reviews such as those assembled by Collcutt (1986), Gamble & Lawson (1996), and above all, by the English Rivers Palaeolithic Survey (Wessex Archaeology 1996; 1997) and John Wymer's resulting two-volume magisterial study (1999). The last two decades have also seen the publication of many major Palaeolithic excavations to a high standard such as Boxgrove and High Lodge; Westbury, Pontnewydd, Coygan and Paviland Caves; Barnham, Swanscombe, Clacton and Hoxne (see bibliography), and technological studies such as those of Cook and Jacobi (1998). The five counties of the East Midlands have recently benefited by studies for a regional

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Research Framework (Cooper, N., (ed), 2002), aided by English Heritage (see Knox 1998) which has resulted in McNabb (2001) highlighting our region's important potential contributions to Palaeolithic archaeology. With these advances in knowledge it is now possible to begin to reconstruct the changes in the local landscapes in which the earliest inhabitants moved and lived, and lost or abandoned their stone tools.

Early occupation: the Lower Palaeolithic (pre-?600 ka - 250 ka)

Pre-Anglian (pre-?478 ka)

Despite Roe's belief in only limited forays into the north and west by occasional visiting groups (1996, 4) the Midlands region was, as May describes (1976), probably just as favourable for human occupation as south-eastern England. Such major river valleys as the Midlands Bytham river (illus. 7) usually produce evidence of Lower Palaeolithic occupation (Wymer 1999, 41). Wymer (*op. cit.*, 323) suggests that evidence from southern and eastern Britain gives every reason to believe that human occupation of Britain before the Anglian glaciation was 'no less intense ... than it was afterwards.' He feels (*op. cit.,* 132) that the sparseness of distribution on maps of some areas probably does not reflect the true state of affairs, of which the quality and variety of finds, and the richness of the few identified concentrations, may provide hints. Such may be the case in Leicestershire and Rutland.

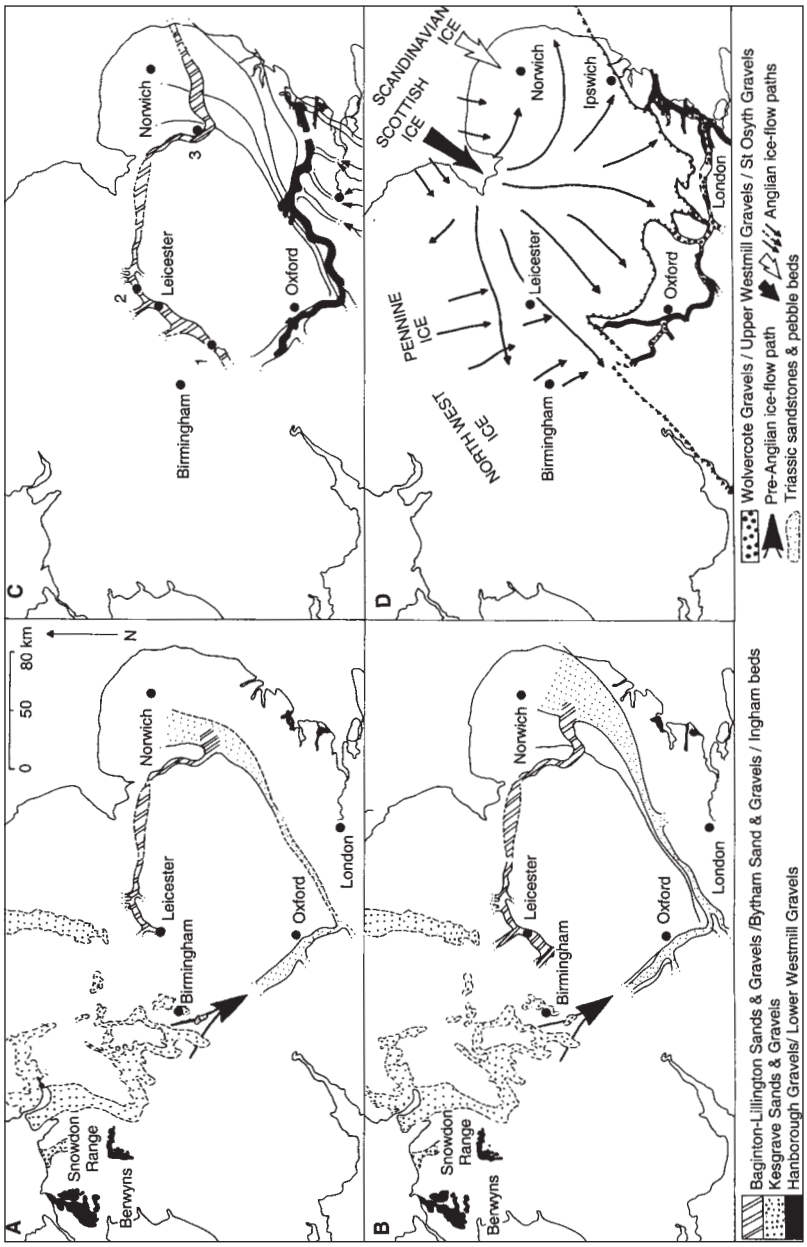
By pre-Anglian times the morphology of Leicestershire and Rutland had already been broadly blocked out, and the major underlying fundamentals of the physical landscape were much as today (Rice 1968a and 1972), with due allowance made for subsequent ice erosion and mantling with surface deposits. The earliest visitors to the area would then, as now, have found areas of high ground to east and west, separated by the broad central valley now occupied by the Soar, then by the 'proto-Soar' or Bytham River (illus. 7; 8.1). This will have afforded a wide north-south communication zone between the higher relief each side (Pye 1972) with communication also into tributary valleys and onto interfluves each side. The edges of high ground overlooking river and stream valleys will have served as vantage points for hunting and game monitoring in all periods, and findspots reflect this pattern (see illus. 9).

The varying landscape relief was based on soils and rocks of equally varied underlying strata, which will have afforded a rich and wide selection of environments and ecological resources in the changing climates of the Middle and Late Pleistocene.

To the north-west were the hills of Breedon limestone and the uplands of the Leicestershire coalfield, surrounded by quartzite Bunter Pebble Beds (now Sherwood Sandstone). The Precambrian igneous and metamorphic tors of Charnwood Forest passed to Mercia Mudstone and the hills of the granodiorite intrusions in the Mountsorrel area, which continued at intervals into south-west Leicestershire as far as the high ground of the Caldecott volcanics and Hartshill quartzites south of Hinckley near Nuneaton.

On the east Leicestershire uplands were the west-facing Jurassic limestone hills and scarps. To the north-east lay the rolling wolds, and a major east-west ridge of high ground between the Wreake Valley and the Vale of Belvoir to the north (see illus.9 and below). This ridge connects with the main Jurassic uplands occupying the east and south-east of the two counties. These uplands provided regional connections, both north to today's Lincolnshire and Yorkshire, and south to Northamptonshire, the Cotswolds and the Mendips, along limestone hills and high ground. These, with

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7. Suggested development of the Leicestershire landscape before the Anglian glaciation: the Bytham River (proto-Soar) and associated sites (after Rose 1989)
   A,B Early stages of the Bytham River through Leicestershire: tributary to the ancestral Thames.
   C Bytham River takes over and dominates Midlands drainage before the Anglian glaciation: significant associated sites:
      1. Waverley Wood and Brandon, Warwickshire
      2. Brooksby, Leicestershire
      3. High Lodge and Warren Hill, Suffolk
   D Ice-sheets of the Anglian glaciation bury and obliterate the river and its gravels

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their presumably lighter soils, may perhaps have had thinner tree cover in warmer periods, or even been maintained as open ground by the numerous herds of large grazing mammals, as Wymer (1999, 15) hypothesises for many places.

In Rutland, Rice (1968a, 333) describes a series of drift-filled former river valleys of closely-spaced streams, in a different drainage pattern transverse to modern rivers, flowing east towards the coast. The region was thus also open to the east for access to and from the broad land-plain of the southern North Sea, as it was then in times of reduced sea level: Coles' 'Doggerland' (1998). Human occupation in East Anglia as early as OIS-16 or before is currently under investigation (Rose & Wymer 2001, pers. comm; Denison 2002a; Henderson 2002). The river valleys leading east from Leicestershire probably had broad riverside terraces of gravel and provided convenient routes along flat terrain, accompanied by rich waterside resources of animal and plant life.

A 'proto-Trent' Ancaster river may have flowed along the Vale of Belvoir in the north of the county, to the Ancaster gap in the Jurassic scarp, now occupied by the river Slea (Rose 1987). However, both the course and date of the 'Ancaster River' are still somewhat controversial, and it may in fact be post-Anglian (McNabb 2001).

The importance of the Bytham River

The central and dominant feature, then as now, of the Leicestershire landscape was another such river, (illus. 7; 8.1), now lost after obliteration by the Anglian ice: the 'proto-Soar' or 'Bytham River' already mentioned. It flowed east through a more southerly gap in the Lincolnshire limestone escarpment, at South Witham and Castle Bytham, South Lincolnshire, and hence is now called the 'Bytham River'. Originally identified as the 'proto-Soar' by the late Professor Shotton (1953), it was further defined in Leicestershire by Rice (1968b, 1981a and c, and 1991), and Brandon (1999), and is now seen as the major river of the whole of the Midlands by Cromerian times. Associated archaeological finds are discussed below.

The Bytham River drained via the Fens and East Anglia to the North Sea (Rose 1987; Lewis 1993), forming at first a tributary to the ancestral Thames, (see maps A and B, illus. 7), which is thought to have drained Wales and the Midlands from at least the Early Pleistocene period, pre-800 ka (Sumbler 1983; Rose 1989; Lewis 1994; Rose 1994; Keen *et al.* 1997). Later, as the ancestral Thames moved south, the Bytham River cut back its headwaters, certainly to between Stratford and Buxton (Bateman and Rose 1994), and perhaps as far as Breedon Hill, Worcestershire (Shotton 1953), so that it became the major drainage of the northern Midlands in the Cromerian period (see map C in illus. 7). The area now drained by the Avon in the reverse direction thus once formed part of the catchment of this proto-Soar. It has left a broad buried belt of a characteristic suite of quartz and quartzite-rich sands and gravels, which reflect, lithologically and in other respects, their transport from the West Midlands and South Pennines but survive only as this discontinuous body of sediment filling sections of the buried valley (Bateman and Rose 1994, 33-4).

The Bytham River deposits have a potentially crucial role in the history of the earliest humans in the British Isles, and in correlation between the sequences of deposits in central and eastern England (Bateman and Rose 1994). They are also associated with a major revision of the glacial sequence of Britain. The Bytham deposits immediately underlie those of the Wolstonian sequence, which were formerly thought to be post-Anglian in date, but are now seen to be those of the Anglian glaciation itself. The term

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'Wolstonian' therefore, referring to that sequence of deposits, can no longer be used in a chronological sense for that part of the post-Anglian period around OIS-8 to 6 (Rose 1989). The Bytham River's discovery also, Rose suggests, (1989), has significant implications for the Palaeolithic in the whole of Britain, as it was a major unit in the Midlands and eastern England through a long period of Palaeolithic time, to the early Anglian.

In Britain, as in Africa and elsewhere, rivers, lakes and wetlands have often been seen to be the foci for surviving early Palaeolithic sites (Deacon *in* Ashton *et al.* (eds), 1998, 23; Wymer 1999, 41). Along the course of the Bytham River, in the west there are pre-Anglian organic deposits and fine-quality artefacts below the main body of river sediments, in the Waverley Wood area, Warwickshire (see below, and illus. 7.C.1). In East Anglia the river's sediments contain abundant Palaeolithic artefacts derived from intense occupation on earlier land surfaces (Rose, quoted in Denison 1995; MacRae 1999; Hardaker and MacRae 2000), for instance at Feltwell, Lakenheath, Brandon and Warren Hill (Wymer 1999, 129). The river is also associated with the remarkable excavated site of High Lodge (Cook and Ashton 1991; Ashton *et al* 1992; illus. 7.C.3), again with fine-quality artefacts, of probably OIS-13 date (Rose, *in* Denison 1995). As McNabb (2001) points out, 'the potential for East Midlands Bytham sediments to contain organic materials critical to our understanding … is very high indeed'.

Rose (Denison 1995) concludes that there was certainly pre-Anglian occupation along this river, though not along the ancestral Thames. To him this suggests that it was the Bytham, rather than the Thames, that formed the early entry route for humans to these regions from the continent. This could have been by the eastern route via the North Sea and East Anglia, as already described.

Alternatively, as Wymer (1999) suggests, a western route from France across the dry land of the future Channel seems equally feasible, with Kent's Cavern, Torquay, Devon; Westbury-sub-Mendip, Somerset and Waverley Wood, Warwickshire (see below) all producing remains of early date and all in westerly locations (Campbell & Sampson 1971, cited in Wymer 1999, p190; Andrews *et al* 1999). This western route could have led, along the Bristol Channel or overland, to the Vale of Gloucester and Evesham, and the headwaters of the Bytham River, and thence to the Midlands and further east. McNabb (2001) points out the possible future potential for valuable study of contrasting cultures, if differing characteristics can be identified in the evidence for groups of people originating from diverse areas of the rest of the continent, whether in the same or different periods of pre-Anglian time.

The Bytham and its tributaries in Leicestershire

In south Leicestershire the Bytham River followed roughly the valley of the present River Soar (illus. 8.1). The river is known to have flowed north-east past Coventry and through Leicestershire via Huncote, Aylestone, the former gravel quarries near Leicester Abbey, and Thurmaston, to Syston (Rice 1968b, 1991). Here it turned east along the Rearsby Brook (south of and parallel to the River Wreake), turned north and then east past Melton Mowbray, (Brandon 1999) and on to the buried gorge through South Witham and Castle Bytham.

In East Anglia evidence for the long duration of the Bytham River survives, in the form of different river terrace levels, from at least four different glacial stages, the last of which is pre-Anglian (Lewis, *in* Ashton *et al* 1998, 43). In Leicestershire however the picture is as yet less detailed, but Brandon (1999, 26 & 35-6) indicates the presence of Bytham Sands and Gravels occurring at higher levels, representing former river terrace

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deposits. In particular buried, or partially buried, terrace remnants have been mapped (Brandon 1999, figs. 5-7) in the Wreake Valley, e.g. near Rotherby, Hoby and Rearsby, that are older than both the Brooksby Sand and Gravel and the Baginton Sand and Gravel forming the main body of the Bytham River deposits in this area, described below.

There were two known major tributary rivers in Leicestershire flowing south-east into the Bytham. The southern, along the 'Hinckley Valley' (Douglas 1980, fig. 3), came from the area of the Bunter Pebble Beds and Derbyshire/Leicestershire Coalfield, along the former deep broad valley between the heights of Charnwood Forest and the Hartshill quartzite ridge and Bunter Pebble Beds near Nuneaton. This tributary joined the Bytham south of Hinckley (see illus. 7, map C), feeding characteristic materials into the Bytham sands. The northern tributary also brought a sudden additional influx of Carboniferous material, including much chert from the south Pennines, and joined the Bytham at Syston, flowing probably in a reverse direction to the present down what became the later lower valley of the Soar (Bateman and Rose 1994). This tributary is now known as the 'Derby River' (Brandon 1999, 28), and has a surviving terrace remnant at Hathern (Brandon, *op.cit.*, 35).

The deposits now occurring in the Bytham River valley represent only the last cycle of aggradation before the Anglian glaciation. The valley was two or three kilometres (between 1 and 2 miles) wide at Huncote, between the limestone scarp on the south-east, and the rising bedrock of Charnwood Forest, granodiorites and the Trias on the north-west (Rice 1991; illus. 8.1). It contains 8m depth of cross-bedded fluvial sands of the 'Baginton Formation', coarser gravels only being present in the deepest parts of the valley (Shotton 1976).

These sands at Huncote are high-energy sediments of a cool-to-cold environment, and not likely to contain within them a primary archaeological site or faunal or floral assemblage (Collcutt 1999). Nevertheless Challis and Howard (1999) report identification of organics within the Baginton sands in some of the Brooksby evaluation boreholes, consisting of (dry) peats, possibly from minor channels of a braided river form, again with cold-stage affinities.

Although no artefacts are known from within these sands and gravels of the river channel itself (Collcutt 1999), even in cooling to cold environments with steppe or tundra vegetation the adjacent riverside may still have been a corridor for occasional summer-visiting groups of hunters following herd movements, who may yet prove to have left some traces. There was a prolonged period of periglacial conditions in the early Anglian in East Anglia (Gibbard and Zalasiewicz 1988, 27). The Baginton deposits in Leicestershire and Warwickshire are the very latest in the history of the river here, before its obliteration under the Anglian ice-sheets. The sands show fossil ice-wedge casts in their uppermost levels, and are then immediately overlain, conformably and with no disruption of the fine and delicate sand-grain patternings, by the first ('Thrussington') till from the Anglian ice-sheets (Rice 1981a and c; Lewis 1996; Collcutt 1999). These sands were thus mostly deposited in (probably prolonged) early Anglian cold climate conditions (Rose 1989).

Earlier ice?

Apart from the above-noted terraces, little evidence survives of the river's previous history in this area. In Warwickshire, Shotton (1988) remarked on a considerable unconformity at the base of the Baginton-Lillington gravel at Waverley Wood Farm Pit,

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which he thought indicated a considerable break during which a long lapse of time must have passed. The pre-existing landscape there, he concluded, had been thoroughly scoured by wholesale erosion before these late, early-Anglian gravels were laid down. These immediately overlay and cut into the Mercia Mudstone bedrock, there as in Leicestershire (Rice 1991). Any and all previous channel deposits of the long, intervening periods were totally removed, with but two areas excepted, around Waverley Wood, Warwickshire and Brooksby/Rearsby, Leicestershire (see below).

A previous ice-sheet to the Anglian has not been documented in Warwickshire or Leicestershire (Douglas 1980, 280), to cause such wholesale erosion, but the deep-sea core evidence of global temperatures shows that one at least is very likely (Barton 1997, illus 15; Wymer 1999, table 1 and p. 140), probably in the severe cold of OIS-16, when Hamblin *et al.* (2000) suggest that there was a Scandinavian ice-sheet, in at least parts of East Anglia. Despite this there is a possibility of human presence at this early period (Rose and Wymer 2001, pers. comm; Denison 2002a; Henderson 2002).

The Brooksby Landscape

The only traces known of the deposits immediately prior to this Baginton Formation occur in the two areas mentioned, around Waverley Wood in Warwickshire, and around Brooksby and Rearsby in Leicestershire. Collcutt (1999) hypothesises that the sands and gravels of the Baginton Formation may have started deposition in an older, narrower palaeovalley. Such channels have been found in the two areas mentioned above, and have given us remarkably detailed information on the Cromerian environment.

The earliest-known detailed landscape information in Leicestershire has been recovered from borehole evidence south of the present river Wreake in the Rearsby Brook valley round Brooksby (illus. 9) described by Rice, (1968b and 1991), Challis and Howard (1999) and Howard (1999).

Rice reported a borehole which contained 7-8m depth of sand and gravel water-laid 'Brooksby' deposits, sealed below the Baginton, cut into Mercia Mudstone bedrock, perhaps in a fairly narrow meander, rather than a broad valley (Brandon 1999, 35). In this borehole were two separate deposits, an earlier and a later, of organic-rich horizons within the Brooksby sand and gravel, with pollen, insect and plant macrofossil remains from a slow-moving river, deposited in the mild climate of a warm interglacial or interstadial period, as opposed to the cold periglacial conditions of the overlying Baginton Formation. Collcutt (1999) speculates these deposits may have been in [incipient] oxbow lakes, or in channels of a meandering river system.

In Rice's view (1991) their stratigraphic position on bedrock below the Baginton Formation, and the depth of the sediments, require a substantial period of time during the Cromerian period of more one than climatic phase before the Anglian glaciation for their deposition, not a single short-lived event.

The landscape in the pleasant climate of this river valley contained much woodland (hazel, birch, spruce, pine and fir), with oak in the earlier period. Water-loving willows, alders, sedges, bulrushes and reeds were present, with some open ground, and heaths and heathers, violas, valerian and potentillas (Rice 1991). Plants related to the buttercup family grew in the grassland on river banks, in damp ground or waterside marshes (Howard 1999), and active erosion somewhere in the area is suggested by other plant remains in this later adjacent borehole, drilled for archaeological evaluation of the proposed Brooksby quarry. The bedrock contours in the quarry area have now been

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mapped (Brandon 1999), and a digital terrain model produced (Challis and Howard 1999). A major bedrock channel containing the 'Brooksby sand and gravel' has been defined, close to the boreholes of Rice (1991), in a trough at 53-54m OD, along the northern edge of the proposed extraction area, containing the organic-rich fluvial sediments described above. There is much potential for further detailed information of great importance, in due course, on the environmental setting for Lower Palaeolithic human activities, for which recording provision is being made during the forthcoming extraction (Howard 2000).

Professor David Keen (Challis and Howard 1999) draws attention to the affinities of some of the molluscan and other evidence from the Brooksby evaluation and earlier boreholes, with that from two channels at Waverley Wood Farm Pit, Warwickshire (Shotton and Wymer 1989; Wise 1993; Shotton *et al.* 1993) which are in a similar stratigraphic position to the Brooksby deposits, below the Baginton Formation. This site, and nearby Pool Farm Pit and Brandon, Warwickshire, (Fennell and Shotton 1977; Maddy *et al.* 1993), have produced Palaeolithic andesite and quartzite tools, one *in situ* in the channel deposits. Animo-acid dating on molluscs from the two channels at Waverley Wood suggests OIS-15 and/or OIS-13 for their deposition, perhaps towards the end of a temperate stage, or in two separate temperate stages (Meijer and Preece 1996). Roberts *et al.* (1995) accepted a correlation for Waverley Wood with the date of remains at Boxgrove, then the earliest-known occupation of the British Isles, until the current discoveries in East Anglia (Denison 2002a; Henderson 2002).

The three andesite handaxes from Waverley Wood are some of the earliest dated Lower Palaeolithic finds from the Midlands, and bear a striking resemblance to the finely-made andesite handaxe (illus. 3.1; Knox 1992) found on the surface in 1991 in Rearsby, Leicestershire, probably an area where the 'Brooksby Group' deposits outcrop at the surface (Collcutt 1999; Rice 1968b, illus 14; Brandon 1999). The rock source of the Rearsby handaxe is the fine volcanic tuff of the Lake District (Leicestershire Museums Earth Sciences identification), used also much later by Neolithic people for their axes. It was probably locally worked in Leicestershire from a glacial erratic (*pace* Wymer 1999, 115). No local flint sources are thought to have been available at this time, but andesite's magnificent quality and fine grain allows refined secondary working and production of first-class tools (MacRae, in MacRae and Moloney 1988, 95-102). Rarely encountered, however, probably through the scarcity of erratic boulders as a rock source, andesite's use by Palaeolithic man has been recorded outside the Leicestershire and Warwickshire finds only at Hilton, Derbyshire; Beckford, Worcestershire and Berinsfield, Oxfordshire (MacRae, *op. cit.*) though reportedly also in Lincolnshire (S. Membery, n.d.). Although the exact provenance of the Rearsby andesite handaxe is unknown, its presence suggests early human activity such as that in Warwickshire may be associated also with the Brooksby deposits, and that this location may have been an important early routeway for human movement (Challis and Howard 1999).

These early temperate organic deposits, both in Brooksby and in the Waverley Wood area in Warwickshire, lie immediately beneath the cool-to-cold-period sands and gravels of the Baginton Formation (Rice 1991; Shotton *et al.* 1993; Maddy *et al.* 1994). In the intervening gap of nearly 50 kilometres (over 30 miles) between Warwickshire and Brooksby no further occurrence of similar deposits, or any physical link other than the overlying stratigraphy between the two known sets of deposits, has yet been observed. The only site in Leicestershire currently extracting the Baginton sands and gravels is the Huncote quarry, where no organics have been observed in either the

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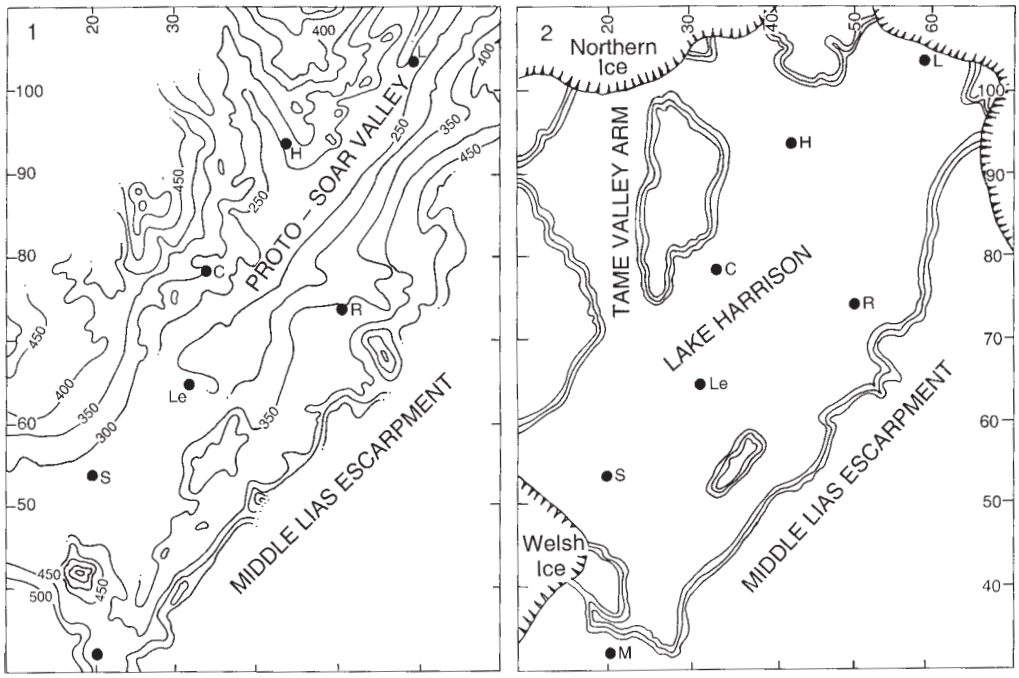
currently-worked northern area, or in the scant four site-investigation boreholes drilled to date in the extensive south-western area, permitted years ago and recently reviewed for future extraction (Collcutt 1999). Here, however, further preliminary archaeological survey boreholes have been recommended, to test for any presence of organic deposits or other remains beneath the Baginton sands and gravels and overlying the bedrock, and provide for their investigation if found.

The Anglian glaciation (?478-427 ka)

The upper levels of the Baginton sands at Huncote have already been mentioned, passing upwards uninterruptedly into the earliest glacial deposits. Shotton (1976) explained the fineness and level bedding of the uppermost beds as a result of declining energy, from ponding-up of the river waters in front of the Anglian ice sheet advance through Leicestershire from the north (see map D of illus. 7). This Anglian ice-sheet blocked the Bytham River flow downstream to the (future) Wash and produced local ice-dammed lakes (Rose 1989).

Lake Harrison

The lake which formed in this way south of Leicester, known as 'Lake Harrison' (illus. 8.2), has been calculated to have dominated this part of the Leicestershire landscape for



8. The Leicestershire landscape during the Anglian glaciation: the evolution of Lake Harrison compiled from Shotton (1953) and Bishop (1958). Marginal numbers are 10km. squares of the National Grid (after Rice 1968a).

C = Coventry: H = Hinckley L = Leicester Le = Leamington
M = Moreton R = Rugby S = Stratford

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possibly ten thousand years, from the depth and number of annually-varved clays, the 'Lower Wolston Clay', with the 'Bosworth' and the 'Rotherby' Clay, which gradually accumulated in its depths to a thickness of around 40m in parts (Shotton 1976; Douglas 1980, 282). The initial Anglian 'Thrussington' trans-Pennine ice-sheet from the north-west stalled and retreated to just north of Leicester, and in the interval before the next ice advance, this time from the east-north-east, the impeded drainage resulted in the ponding-up of the Bytham River waters into Lake Harrison. The fluctuating ice margin resulted in varying water levels and shorelines at different times, for example as the lake later re-formed afresh during the final Anglian ice-retreat (Douglas 1980, 282). The bench cut along one such eastern shoreline along the Middle Lias scarp has been traced south from Somerby and Tilton, through Tur Langton and Shearsby, to beyond Rugby (Rice 1981b).

Lake shorelines at Hoxne (Singer *et al.*1993) and Barnham East Farm (Ashton *et al.* 1998), both in Suffolk, were both scenes of human occupation. The shores of Lake Harrison, even though so near the ice-front, then just north of Leicester, but more definitely the previous Bytham riverbanks, will potentially have been favoured visiting-places for the early population. Any occupation remains not disturbed by the first ice advance may be preserved beneath a protective blanket of the fine later lake deposits, slowly and gently accumulating in the lake waters. Similarly, shores of the final-Anglian version of Lake Harrison may not have been disturbed since, unless there was indeed a further ice-sheet over this region (see below). It would seem valuable to investigate both riverside and lake edges if future opportunities arise. Even close to ice fronts, plenty of mammals, both large and small, e.g. mammoth, musk ox and arctic fox, frequented the tundra (Wymer 1999, 19) and may have been pursued by human hunters.

To the north of the first Lake Harrison, and over-riding the silted-up lake deposits to the south eventually, there was an outwash meltwater plain (*sandur*) of gravels (Douglas 1980, illus 11), before the ice front of the glacier, in the lengthy period while it was almost stationary north of Leicester (Shotton 1976). At times this deposit, the Wigston or Cadeby sand and gravel, extended 45km from north to south (Douglas 1980, 271, 279). This gravel transported with it the melted-out contents of whatever had been caught-up by the glacier on its way south, which must have included anything (both artefacts and the waste products of manufacture) lying on the previous surface in the path of the ice advance. Eventually the ice front resumed its advance from the ENE, vigorously and disruptively in places (Shotton 1976; Rice 1991). It overran both these Wigston or Cadeby gravels, and the clay and silt sediments of Lake Harrison, leaving behind the Oadby till, which brought flint into the area for the first time. This till overlies all previous deposits in many areas of Leicestershire and Rutland. The Bytham River was completely infilled by glacial deposits and its river system destroyed, at this time (Brandon 1999, 27).

South-West Leicestershire: The Waite Collection

However, still present is a remarkable concentration of Palaeolithic surface finds, largely of quartzite, in the area round Hinckley and Nuneaton (illus. 2; 3.2; 4; 9; Saville 1988). Their distribution has been mapped by Professor Shotton (1988) in Warwickshire, and there appears closely related to the distribution of early-Anglian Wigston sand and gravel in that area, (contrary to the mention of the later, final-Anglian outwash 'Dunsmore sand and gravel' in Wymer 1999, 178). Around Hinckley the pattern is not

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so clear, and further mapping may be useful to test this distribution. It is perhaps noteworthy that this concentration of finds lies on the line of the valley of the major southern tributary river flowing past Hinckley to join the Bytham River (see illus.7B and C) and that there is a nearby quartzite rock source in the Hartshill Quartzites outcrop near Nuneaton. The lack of any such artefact concentrations elsewhere in the two counties, even where systematically fieldwalked, may tend to confirm a geological basis for the distribution in this area.

To Wymer, this concentration of finds suggests a considerable human presence in this area, (perhaps at least from repeated revisiting), during the pre-Anglian period or a milder interstadial of the Anglian. McNabb however points out (2001) the possibility of the artefacts dating from deposits of a later period, since eroded away, leaving the finds on the surface of the earlier deposits where they have been found, perhaps transported some distance. Attention is also drawn by Green (*in* Ashton, Healy and Pettitt 1998, 142) to the possibility of apparent concentrations being merely the product of hydraulic accumulations or lag gravels. Whatever the explanation, and even though this phenomenal grouping of Palaeolithic artefacts may be a palimpsest representing different, not contemporary, episodes of occupation, it certainly shows the immense value of and need for, fieldwalking of ploughlands and inspection of even temporary shallow exposures, especially, for the Palaeolithic period, as Roe has pointed out (Gamble and Lawson 1996, 1-6), if studied in relation to associated geological deposits.

The mere possibility that the artefacts around Hinckley and Nuneaton may be of Anglian age or before makes them of particular interest, as Wymer observes (Gamble and Lawson, 1996, 7-23). Until *in situ* primary sites can be identified, such finds offer our only source of information on the extent and density of early occupation (Hardaker and MacRae 2000). They can illustrate transport and resource use of raw materials, technological range and typological change (McNabb *in* Ashton, Healy and Pettitt 1998, 16).

The collector of these artefacts is Mr Ron Waite of Nuneaton, who, as Saville points out (1988), has single-handedly 'multiplied many times over the available evidence for the earliest prehistory of the region'. As Inskeep has noted (*in* MacRae and Moloney 1988, 239), 'if fieldworkers can develop an eye for unlikely-looking objects in non-flint materials the pattern of occupation may well be changed in an interesting way. …there is no obvious reason why archaeological evidence of Lower Palaeolithic occupation should be limited to lowland Britain, as is largely the current case'.

Mr Waite has donated many of his finds to the museums of Warwick and Leicestershire. Out of over 300 lithic objects of all periods he has donated to Leicestershire Museums, up to 100 are potentially Palaeolithic, but still require detailed examination and classification before this can be confirmed. Mr Waite has apparently retained or donated elsewhere other Leicestershire material, on which it is not yet therefore possible to comment. A brief review of previous documentation and of fresh donations in the summer of 2001 confirms that the overall picture described by Savile (1988) for the Warwickshire material is true also of that from Leicestershire, where the finds come from the seven parishes of Burbage, Higham-on-the-Hill, Hinckley, Sharnford, Sheepy, Sutton Cheney and Witherley (Leicestershire and Rutland Sites and Monuments Record (hereafter SMR); illus. 9).

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Raw materials

Tuffs

Whilst some are of flint, a few of chert, and a few fragments (probably not artefacts) of yellow quartz, by far the largest proportion of the donations are of quartzite, with just two artefacts of tuff.

The latter are particularly interesting, and comprise a scraper on a large flake from a discoidal core of andesitic (North Wales) tuff (illus. 3.2); and what seems to be the first recorded example of the use of Charnian tuff for handaxe manufacture (illus. 4). The siliceous volcanic tuff of this handaxe is very similar to the Precambrian Charnwood rocks of the 'Beacon Beds', highly siliceous tuffs, at Beacon Hill, Leicestershire, though other Charnian localities are possible sources (G. Weightman, Assistant Keeper, Earth Sciences, Leicestershire Museums Id, 06.02.1997). The secondary silification (?or hydration: S. Collcutt, 2002, pers. comm.) has bleached the surface of the dark grey tuff interior, visible in two small modern removals, to a creamy yellow colour. Working is confined to the perimeter, which has been completely alternately-flaked to give a sinuous cutting edge. Both surfaces, largely unretouched, utilise the flat bedding-planes or cleavages of the tuff, which was originally deposited as fine-grained sediments on the sea floor. In this, the handaxe bears some resemblance to one face of the andesite handaxe from Abingdon, Oxon (MacRae and Moloney 1988, 123-154, figure 5). This Charnian tuff handaxe, the andesite scraper and the handaxe from Rearsby already mentioned are the only Palaeolithic items of tuff known in the counties to date.

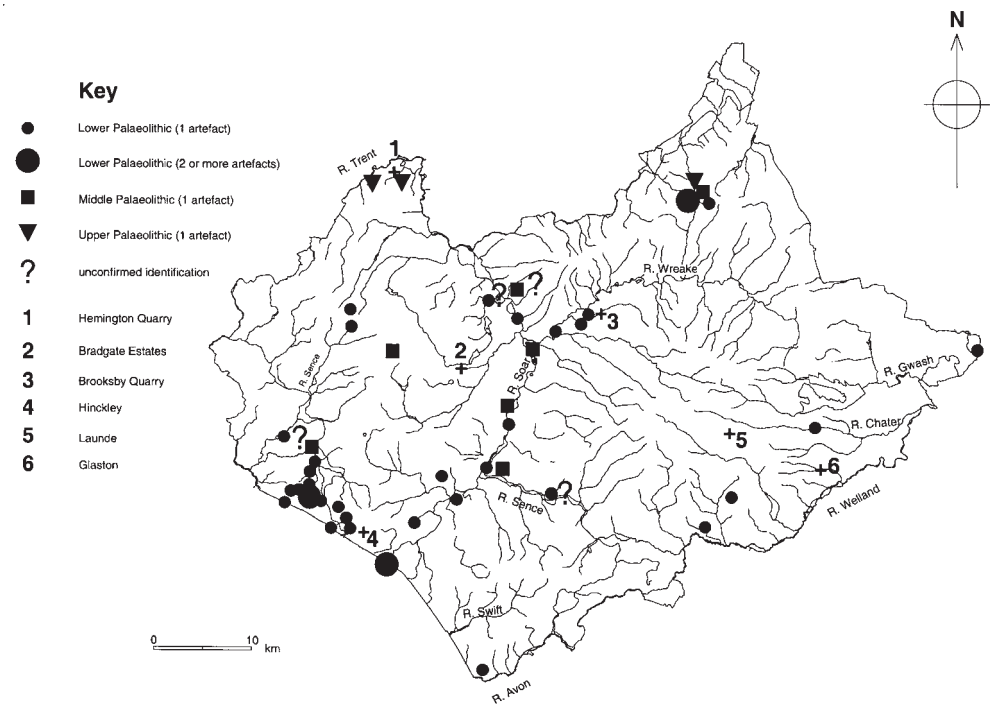
Charnwood Forest potential

The use of material from the rocky tors and outcrops in Charnwood Forest for handaxe manufacture suggests a potential for further investigation of that area. In many parts the bedrock is at, or close to, the surface, and has prevented or restricted any cultivation. These and limestone outcrops may offer some of the few potential locations for former rock shelters in the county, and any such shelters, with any adjacent surface remains, may have been sealed and protected by continuing, sometimes stratified, accumulations, of degraded regolith (loose rock fragments and soil) and broken rock 'clitter' around their bases, through the many millennia of periglacial weathering and glacial plucking before the end of the ice ages (Ford 1968; Martin 1976). Rice notes that these surrounding surface-spreads are not always apparent, but that such a layer is almost invariable down-slope from the crags (*in* Douglas, 1981, 44 and 46). It would seem possible for earlier remains to survive protected beneath such later debris, or even on the surface, as shown by finds of probable Devensian date at Stanton-under-Bardon, and recently in the Bradgate estates (illus. 9; Cooper, L., 2002b, below).

Quartzites

Quartzite rock sources in the Triassic Bunter Pebble Beds are widely distributed west of the Soar in north-west and south-west Leicestershire; in adjacent areas such as the Hartshill Quartzite ridge already mentioned, and in the Bytham River gravels (Rice 1972; Rose 1989). Whilst not as easy to work as high-quality flint imported to the county from chalk areas further east, quartzite was found in experiments to be very hard and resistant to knapping, but better than small poor quality local drift flint, producing a much stronger, though not necessarily as sharp or as long, a cutting edge,

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9. The Leicestershire landscape after the latest glaciation, with Palaeolithic findspots and sites.
Source: Leicestershire and Rutland Sites and Monuments Record.

for which only partial perimeter flaking was needed, thus economising on time taken to produce a useful 'ad-hoc' tool (Moloney *et al. in* MacRae and Moloney 1988, 39-40). Flint was absent here until the main Anglian Oadby till (the 'Chalky Boulder Clay') (Douglas 1980), but quartzite was plentifully available, and filled an important role in hunter-gatherer subsistence, its main drawback being internal flaws, undetectable till they fracture and spoil the work (Hardaker and MacRae 2000). Small thick quartzite pebbles can only make choppers, but pebbles split into thin halves can easily make handaxes (Moloney *in* MacRae and Moloney 1988, 49-66) and flake tools (Whitehead, 1988). However the fractured or flaked surfaces less clearly show the bulbs of percussion and other features of the conchoidal fracture familiar from worked flint (Moloney, *op. cit.*) and are less easy to identify, especially if rolled and abraded (Wymer 1999, 114).

Mr Waite's Warwickshire quartzite bifaces were found by Saville (1988) to be small, slim, pointed, often made on split pebbles, and with the rounded pebble surface left as the butt. A large proportion (29%) of his collection were of quartzite. This trend continues in the Leicestershire material, with 11 quartzite handaxes reported amongst his finds (Leicestershire SMR; illus. 2.3-4). The handaxe has been described as the all-purpose 'Swiss army knife': a throwing hunting-weapon, and a tool for carcass butchery, scraping skins and hides, working wood, digging roots and tubers and preparing plant foods and fibres, (MacRae, *in* MacRae and Moloney

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1988, 123-154), with protection on the hand-grip provided perhaps with a lump of clay (Barton 1997, 62-3). Other tools for cutting, chopping and scraping could be made more simply (e.g. illus. 2.1-2) by minimal modification of pebbles to create chopping tools and scrapers, and potential examples of these form a large part of the Leicestershire material from Mr Waite. Rolled and abraded, however, as they must be if genuinely Palaeolithic, they are difficult to recognise, and Roebrooks for example discusses in another context seeming artefacts which he dismisses as pseudo-artefact 'possibi-liths' (1996). Saville (1988) adopted the strict criteria of two or three identifiable flake scars or a definite striking platform or bulb of percussion, in addition to rolled, abraded scar edges, before accepting an object as probably Palaeolithic. The Leicestershire material still requires close examination with these criteria in mind. Therefore in preparing the following analysis all other artefact categories have been excluded except handaxes, as these can usually be identified with some confidence.

Regional raw materials

In Leicestershire and Rutland around fifty findspots of all types of Palaeolithic tools are now known (see illus.9), to complement environmental evidence in buried deposits. In some areas, especially round Hinckley, near Leicestershire's border with Warwickshire, and Eaton in the north east, many objects have been retrieved from the same locality. The latter, like the Hinckley area finds, await full examination. Elsewhere isolated finds have occurred singly. Most are Lower Palaeolithic, Modes 1 and 2 types, but seven may be Levallois tools or the later 'bout coupé' handaxes; whilst five sites are later still, using Mode 4 blade technology (illus. 9; Cooper, L., 1997; 2002a; forthcoming; Cooper and Jacobi 2001; Thomas & Jacobi 2001; Cooper, L., 2002b below).

Table 2. Previously Unpublished Biface Finds in Leicestershire and Rutland, not in the Waite Collection or The English Rivers Palaeolithic Survey Report No. 3, 1996-7.

Parish	**Findspot**	**Comment**	**Grid Ref.**	**SMR Ref.**
Coalville	E. of Snibston Grange Nature Reserve	Flint. Cordiform. Private collection. illus. 5.1	SK 418 138	LE9038
Eaton	E. of Hill Top Farm, nr. Eastwell	Two flint bifaces; possibly 1 other; core and retouched flake. Private collection	SK 7687 2850	LE6072
Eaton	W. of Eastwell	Flint, ?'Levallois'? + Upper Palaeolithic flint core. Private collection	SK 7718 2864	LE6070
Enderby	S. of Ratby Meadow Lane	Brown flint, butt corticated, lopsided. A45.1928	SP 5554 993?	LE6041
Huncote	W. of Forest Road	Black flint, ovate. Private collection. illus. 6.1	SP 511 984	LE9037
Medbourne	Back Field	1993 Testpit. Flint. A125.1987. illus. 5.2	SP 789 931	LE -

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Table 3: Biface Raw Materials from Leicestershire and Rutland
(Source: Leicestershire and Rutland Sites and Monuments Record)

Raw Material	**Number**	**(%)**
Flint	16	(45.7%)
Other:	13	(37.1%)
Quartzite	11	(31.4%)
Andesitic Tuff	1	(2.85%)
Charnian Tuff	1	(2.85%)
Undocumented	6	(17.2%)
Total	**35**	**(100%)**

The majority of non-flint handaxes (13) in Leicestershire and Rutland are of quartzite (11: c.84.5%), with just two examples of tuff (see table 3). This is consistent with results from the Lower Avon Valley, where 87.5% of non-flint tools are of quartzite (Whitehead 1988). In other regions away from flint-bearing chalk (see table 4) similar use is made as in Leicestershire and Rutland of other raw materials, of which the best and most commonly-found is quartzite (Wymer 1999, 114). As Green points out (1988), quartzite tools have largely been overlooked until recently, though so commonly present. Certainly it is only one man's work, Mr Waite's, that has brought to notice the Palaeolithic use of quartzite in Leicestershire.

Table 4: Regional Non-Flint Artefacts

Region	**Non-Flint %**	**Reference**
Leicestershire and Rutland (bifaces only)	37.1%	Table 3 (above)
Nuneaton area (bifaces only)	29%	Saville 1988
Trent Valley (all artefact types)	10%	Posnansky 1963
Avon Valley (all artefact types)	24%	Whitehead 1988
West Midlands (all artefact types)	32%	Posnansky 1963
Upper Thames Valley (all artefact types)	34.8%	Hardaker in Milliken and Cook 2001, 180-198

A post-ice-sheet landscape (post-?427 ka or ?127 ka)

Most other Palaeolithic artefacts in Leicestershire and Rutland (illus.5, 6 and 9) may have been deposited during the numerous climatic cycles that are now known to have succeeded the Anglian glaciation (see below and illus.1). Some finds come from uplands once covered by ice, others from river terrace gravels, others again from areas with a blanket of glacial deposits from the ice-sheet or its aftermath (Wymer 1999, 15-7).

The Anglian ice has been calculated to have been at least 2,000 feet (610 m.) thick (Rice 1972, 78), and caused immense changes to the land surface, creating an entirely new superficial landscape in its wake. Till (boulder clay) from beneath the ice, (whose

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present mapping also includes stratified marls, silts and clays: Rice 1972, 61ff), covers large areas of these two counties, and is likely to have then become at times heavily vegetated, and to have been ill-drained (Wymer 1999, 113). Nevertheless many of the south-west Leicestershire finds come from the surface of till or other glacial deposits, as did single finds from Ratcliffe-on-the-Wreake, Sutton Cheney, Sapcote, Glenhills Boulevard (Leicester) and Barrow-on-Soar (SMR; Wessex Archaeology 1996; 1997).

The end of icy temperatures may have come fast, probably within a few decades, if the Anglian can be compared with the rapid end of the most recent, Devensian, glaciation demonstrated by beetle remains, species which respond quickly and strongly to thermal changes (Coope *in* Shotton 1977, 55-68). Vast meltwaters carried and deposited huge areas of final outwash sands and gravels (the 'Dunsmore' sand and gravel), but were then ponded up against the Welsh ice still blocking their path south-west, forming a renewed Lake Harrison. This eventually overflowed and finally escaped when the western ice sheet retreated. It carved its path down towards the Bristol Channel, thus creating a new river, the Avon, flowing in the reverse direction to the now buried Bytham River (Bishop 1958, quoted in Rice 1968a; Sumbler, in press).

Similarly the eastward-flowing river Welland and its Eye Brook, Gwash and Chater tributaries originated at this time (Keen 1999), and also the Soar, the two rivers Sence and the River Wreake. The former Bytham and Derby River drainages were thus reversed north of Syston, and the whole of the Trent, as well as the Avon, drainage was created afresh (Brandon 1999, 27). The Vale of Belvoir had been carved out by the deep ice-scouring (Rice 1972, 61 & 77), which elsewhere had cut massive channels in the bedrock, for example in Central Leicestershire (Rice 1972, 73 & 77). It may have been a block of stagnant ice left persisting in the Vale which prevented the Trent from resuming its earlier course through the Ancaster Gap, and sent it north to flow, at least temporarily, through the Lincoln Gap (Rice 1968a, 344).

The high plateau south of Husbands Bosworth thus became a main English watershed, with the new rivers draining south-west, east and north away from it to the Irish Sea and Atlantic Ocean (Avon) and the North Sea (Welland, Soar and Trent) respectively.

River terrace formation

All these new river systems gradually eroded their channels, perhaps migrating laterally within their floodplains, and deepened their valleys over succeeding millennia, with the recurring changes of the climatic cycle. In cold interstadials coarse gravels and sands accumulated from braided shifting river channels, which dispersed artefacts over the frequently-flooded valleys (Brandon 1999). With gradual warming as each glacial period ended, vast discharges of meltwaters cut down to a new channel level (Wymer 1999, 117; Bridgland 1996; 2000), leaving on each side these former floodplain gravel accumulations 'high and dry' as terraces on the valley sides (Briggs 1988, 167-178; Lewis 1996, 2).

The need for the river to cut down to a steeper gradient on its way to the sea comes from the continuing, albeit intermittent, tectonic rise that is taking place in the land surface of central England, at an average rate which has been calculated at 70mm per thousand years (Maddy 1997), while the bed of the southern North Sea is also sinking at an average rate of 250mm per thousand years (Wymer 1999, 18 & 24). By the time snow and ice were melted and released after a glaciation of, say, 50,000 years, the land would be up to four metres higher in relation to sea level, even without taking into

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account the falling North Sea bed and the isostatic deglaciated land rebound. This cycle would be repeated many times, with the river each time cutting its channel deeper and starting to create a new lower floodplain on which sediments, coarse at first, then fine, built up.

During warm interglacials a broad, gentle river would migrate and meander over the floodplain, sometimes leaving fine organic sediments in cut-off meanders or ox-bow lakes. Any waterside occupation remains would be gently silted up and buried by the regular overbank flooding and deposition of equally fine alluvial deposits. Former channels of the Trent have been recorded in Hemington Quarry, Castle Donington (Beamish 2000; Cooper and Ripper 2001), while channels with organic silts lie below the floodplain gravels at the Derwent/Trent confluence (Jones, *in* Douglas 1981, p 48).

During cooling towards the next glaciation, increased rainfall would erode soils exposed in increasingly sparse vegetation, and this higher discharge would disturb the fine interglacial floodplain deposits, as coarser gravels started to build up again over them, until activity diminished under frozen full-cold conditions. Re-warming would bring a fresh cut-down to a new lower level, and the repeat of the whole process.

Each terrace would therefore contain basal coarse gravels after the initial end-glacial downcut, followed by finer deposits of the next interglacial, topped by coarser gravels of the returning cold. Any artefacts carried away and then deposited with the gravels will tend to be at the base of such cold-period gravels, close to bedrock (Briggs 1988, 178-80). All artefacts in the gravels will be derived from elsewhere, though occasional channel 'lag' concentrations can perhaps reflect original groupings.

In or adjacent to any finer interglacial channel sediments within each terrace, on former adjacent land surfaces (river banks or lakesides) there may occasionally be a chance for original *in situ* deposits and occupation or activity remains to survive, perhaps where sealed by valley-edge solifluction, affording a precious opportunity for investigation.

River terraces are able to be correlated with Oxygen Isotope Stages, which allows broad dating of the artefacts contained, and assists archaeological conclusions (Bridgland *in* Ashton *et al* (eds) 1998, 29). It appears that so-called 'Clactonian' deposits (see table 1) may be restricted to OIS-11 to 10, and that 'Levallois' technique was not used till towards the end of OIS-8 or in OIS-7 (see illus. 1), following which Britain may have been abandoned from OIS-6 until Neanderthal 'Mousterian' re-occupation in OIS-3.

The highest and therefore earliest terrace of the Soar is thought to date to OIS-8 (Rice 1972). The three succeeding main terraces are the Birstall (10 metres above alluvium), Wanlip (4 metres), and Syston (1 metre) (see illus. 1), with a Quorndon terrace in the lower reaches only. Typically the fill of each terrace above the bedrock cut is 2-3 metres thick (Lewis 1996, 2). The terrace gravels contain significant proportions of flint, confirming their post-Anglian origin (Lewis 1996, 2-3).

Artefacts have been recovered from riverside deposits at Huncote (near Elms Farm); Leicester (Jarrom Street/Great Central Station; Blackbird Road); 'Wanlip' Gravel Pit in Syston parish; 'Quorn' Gravel Pit in Barrow-on-Soar (Wessex Archaeology 1996, 144-6); and possibly Rearsby (illus. 3.1).

Faunal remains are frequent, with mammoth and palaeochannels recently recorded at Meadow Lane pit, Syston, and mammoth at Platts Lane, Cossington (Sturgess and Ripper 2000; Higgins 2001). Many mammoths are on record from floodplain pits in the Syston terrace, and mammoth and woolly rhinoceros at Barrow-on-Soar (Rice 1968a, 350; 1972, 79; Brandon 1999, 65). An intriguing find from OIS-7 or before,

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below Birstall sand and gravel, was a mammoth molar of particularly small size, from the smaller species then present in Britain (Brandon 1999, 61).

Peat deposits at Pontylue pit, Syston, came from a cold treeless environment with related plant, insect, mollusc and mammal remains, radiocarbon-dated to *c.*37, 420 BP (Rice 1972, 79).

The River Welland has a series of terraces comparable to those of the Soar and Wreake (Rice 1968a, 350), as does the Trent, with particularly rich sites producing hundreds of artefacts just north of Leicestershire at Hilton and Willington, in the Etwall sand and gravel (Wymer 1999, 114-7). This gives an impression of the richness of Palaeolithic occupation to the north, and by inference, possibly also in Leicestershire and Rutland.

Further ice-sheet(s)?

Whilst it is thought likely that the Anglian glaciation was in OIS-12 (see illus. 1), this is not yet proven, and a date of OIS-10 is also possible (Keen 1999, 164-6), as Hamblin *et al.* (2000, 40) suggest. It is also uncertain whether subsequent cold stages in OIS-8 or 6 produced another ice-sheet covering the Midlands, as Professors Straw (1979, 1981, 1983) and Shotton always maintained (Wymer 1999, 114, 164 and 194), with further effects on the landscape. As McNabb points out (2001, 16) known major diversions of the rivers Trent and Witham could be said to posit such an ice-sheet. Furthermore it is unclear how the Hoxnian-age deposits cut into the underlying Anglian glacial sequence at Nechells and Quinton in Birmingham (Jones & Keen 1993, 87; Horton 1989) come to be covered by a subsequent sequence of glacial deposits, except presumably from another such ice-sheet. It therefore seems an extensive ice-sheet may indeed have covered Leicestershire and Rutland, probably in OIS-6 (Wymer 1999, 118-9; Maddy *et al.* 1995; Hamblin *et al.* 2000, 39). No further ice then overwhelmed the counties, as the Devensian ice in OIS-2 came no nearer than the Pennines and the Lincolnshire Wolds (Wymer 1999, figs. 5 and 43).

Whatever the date of the final Midlands ice-sheet and its re-arrangement of the rivers and landscape, each warm and cold stage, even if not causing an ice-sheet here, will have had extensive effects on life and the environment. The prolific animal herds and with them, the humans, will have moved with the changing vegetation to follow their preferred habitats, whether steppe grasslands, boreal forests, lush temperate deciduous forest or savannah grasslands (Briggs 1988). Each rapid or lengthy fluctuation or oscillation in temperature (Wymer 1999, 23-4; Brandon 1999, 56) produced fundamental environmental changes, but the majority of the time 'cool' was normal, and full glacial or interglacial extremes the exception (Roe 2000, 397-403). These long, cool, transitional periods at the beginnings and ends of glacials/interglacials may have produced open ground conditions perhaps more favourable to hunting, and perhaps preferred by the human populations (Wymer 1999, 41). Indeed it would appear that adaptation to a closed, wooded environment does not occur until the very end of the Pleistocene (Cooper, L., forthcoming).

The pollen records for each environmental stage, while characteristic of that stage, are not always complete enough or distinctive enough to date remains with confidence. New studies of the changing population balances are making great progress, studies not just of plants, but of animals, their extinctions and the new species making up the faunal group characteristic of each period (Barton 1997, 32-8; Wymer 21). The bones and teeth of small rodents such as voles and wood-mice show their sensitive and rapid

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reactions in evolutionary terms to environmental change. Sites with calcareous soils, such as those in the Jurassic areas of East Leicestershire and Rutland, can offer the vital preservation of bone and shell that can give complementary dates, from amino-acid racemisation of teeth and molluscs, for example.

Periglacial effects and potential preservation

Any such remains, and those of all human occupation of these counties *after* the latest ice-sheet will potentially still lie where they were left, virtually *in situ*. Their survival will be governed by the nature and preservation of the deposits in or on which they lie, and the positive or negative effects on those deposits of the ubiquitous periglacial phenomena of each cold stage, described by Worsley (*in* Shotton 1977, 205-219) and Rice (1968a; 1972), amongst many others. Each type of location will have been subject to different effects on their deposits and any associated remains.

The vertical and perhaps lateral incision of the *river valleys*, and the alluviation of their floodplains, 6 m deep in places on the Trent (Rice 1968a, 350), have already been mentioned. Preservation of earlier remains is likely under later alluviation, and under colluvial soil-wash, landslides, fan gravels and 'head' solifluction deposits down the valley sides onto the rear of terraces or the edges of floodplains. Fan-like spreads of eroding Keuper Marl (now Mercia Mudstone) from the Soar Valley sides were recorded at Wanlip Sewage works, interdigitating with the gravels of the lowest (Syston) terrace (Rice 1972, 80-1). The gravels themselves can show the 'frost patterning' produced in frozen ground by 'fossil ice wedges', into whose cracks surface material and artefacts can drop and be preserved. Limestone rubble chokes the floors of dry valleys on Inferior Oolite dip slopes and could seal earlier remains (Rice 1968a, 352).

Fine *loess* dust, carried by cold winds off the glaciers, and re-worked by water action as *'brickearth'*, is mapped in parts of the two counties (Rice 1972, fig. 14). Wymer (1999, 196) points to the amazing preservation potential for pristine archaeological remains in such deposits, as at Caddington, Beds. (Wymer 1999, 174-5), which should be surveyed and targeted for investigation opportunities.

On *slopes* everywhere freeze-thaw, soil heaving and impeded drainage over an impermeable base caused any artefacts contained in deposits to be carried down in mass soil movements (Wymer 1999, 167). Upper Lias clays are particularly subject to such landslides (Rice, *ibid*.). These however may seal and preserve earlier remains at the slope foot. 'Head' deposits (of soliflucted earth and rock fragments) 3m deep occur below Middle Lias rock outcrops and the eroding cuestas and bluffs of the scarp, and similar effects below the tors of Charnwood have already been discussed (Rice 1972, 80). Breccia also occurs, under more recent glacial deposits, on slopes in the Lincolnshire Limestone areas (Rice 1972, 80-1). All may seal earlier remains.

Plateaux and interfluve ridges are subject to several archaeologically-significant effects. Polygonal ground-patterning, with subsidence of surface materials into underlying 'fossil ice-wedges', occurs in such situations on limestones (Rice 1968a, 352), which can also contain fissures and solution hollows causing collapses and subsidence hollows (Wymer 1999, 165). One such in Little Casterton, Rutland, was found to contain prehistoric human remains, and associated artefacts, though of a much later date (SMR). A small slot excavated through such a feature on a ridge-top, in advance of the Wing-Whatborough pipeline, produced a large flake with 'incipient basket-work patina', of probable Palaeolithic date (Beamish 1997; Cooper L., 2002).

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In both western and eastern areas of the two counties, the Carboniferous and Jurassic systems contain hard, massive rock beds overlying softer, less competent deposits of clays or sands (Rice 1968a, 352). The differential loading from periglacial erosion and the valley downcutting each side of a ridge can produce unstable and extended deposits, especially noted in Northamptonshire Sandstone and Middle Lias Ironstone in the Gwash and Welland valleys (Douglas 1981, 23). The result is valley bulging, cambering and gulling, dip and fault structures, whose archaeological potential has already been highlighted at Beedings, W. Sussex (Jacobi *in* Collcutt (ed.) 1986, 62-8). These structures can enshrine and preserve nearly-*in situ* archaeological and environmental remains, as has recently been demonstrated at Glaston, Rutland (illus. 1 and 9: Thomas and Jacobi 2001), where the additional benefit of calcareous deposits enabled bone preservation. The highly important potential of such situations for preservation of Palaeolithic remains of any post-ice sheet date has been described and emphasised by Collcutt (2001). These situations have a similar potential for post-glaciation periods in our regions, as do the upland clay-with-flints deposits in the south of England for those and other periods, studied by Dr. Scott-Jackson (1997).

Artefacts of probable post-Anglian date have been discovered in Carboniferous areas in or adjacent to igneous or Charnwood Forest uplands at Coalville (two handaxes) and Stanton-under-Bardon (formerly Markfield parish), whilst Jurassic areas to the east at Blaston, Medbourne, Essendine, Wing and Eaton (Goadby Marwood and Eastwell) have all produced bifaces (illus. 9; SMR; Wessex Archaeology 1996, 144-6).

The concentration at Eaton is noteworthy, lying on the major east-west ridge already mentioned above as potentially significant for regional communications. The wide-ranging typology of the finds, from Acheulian, through possible Levallois, to Upper Palaeolithic, may show this upland ridge as a persisting favourite routeway or hunting-ground. Unfortunately the area has reportedly been extensively quarried for ironstone in the past, but would surely repay verification of the extent of disturbance, and survey of any intact areas.

Evolving lifestyles: towards the Middle Palaeolithic

After the Anglian glaciation lifestyles within given climatic environments appear to have changed little, and hunters still pursued large game and small, such as deer, ox, elephant, rhinoceros and horse, to supplement their vegetable diet. Major sites excavated in south or eastern England at Swanscombe, Kent; Clacton, Essex; Hoxne & Barnham, Suffolk (Wymer 1968, 334-46; Singer *et al.* 1973; Singer *et al.* 1993; Ashton *et al.* 1998) however raise unresolved questions on the use or rarity of handaxes, in warm, wooded or cold and bare environments (Bridgland *et al.* 1999).

In such colder times one change possibly introduced around this time will have been greatly appreciated, namely, the use of fire, which had been known in Africa from possibly around one million years ago (Barton 1997, 43). Evidence at Beeches Pit, West Stow, Suffolk (Andresen *et al.*, 1996) may indicate a cooking hearth, of OIS-11 date. In addition to heat, light and protection from predators, fire would have extended the range and improved the safety of possible foods. Parasites in meat are killed when roasted, frozen carcasses can be scavenged and thawed for consumption, and poisonous toxins in plants and seeds broken down by heating (Barton, *ibid.*).

The human population too was changing, gradually and slowly, from *Homo heidelbergensis* at Boxgrove before the Anglian period. Both at Swanscombe, around 400 ka, and Pontnewydd, around 225 ka (see illus. 1) the human remains show early

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Neanderthal-like traits (Wymer 1999, 35), and the Swanscombe skull had a brain capacity close to that of modern man (Wymer 1999, 37).

Levallois and discoidal finds (post-250 ka)

Mental agility, planning and manual dexterity to control and predict flake shape are required by the major technological changes to Levallois and discoidal techniques, the former first registered in OIS-8 or the start of OIS-7 (Bridgland *in* Ashton *et al.* (eds) 1998). The dating and process of this change from 'Lower' Palaeolithic, and whether any earlier 'proto-Levallois' can be recognised, are under investigation (Stringer & Ashton, pers. comm., 2001). It is possible that a new population from North France or the Low Countries may have been responsible for the introductions (Wymer 1999, 50).

These more complex techniques involve the shaping and preparation of a domed 'tortoise' or discoidal core surface, as at Baker's Hole, Kent (Wymer 1999, 45, 83, 86) or Oldbury, Kent (Cook & Jacobi, 1998). From this surface radial, pointed or blade-like flakes can then be removed for use as tools (Wymer 1999, 193-4). Discoidal technology can be used to process small, poorer or non-flint raw materials (McNabb 2001, 22), whereas the Levallois technique does require plenty of fine quality raw material, (Wymer 1999, 49), a scarce commodity in Leicestershire (Henson 1983). The occupants of Pontnewydd Cave in North Wales (Green 1984; 1986; 1988) made use of a wide variety of local rock types in the absence of local flint sources (Green 1988).

This does not appear to be the case in Leicestershire and Rutland, however, where the scarcity of such finds may perhaps reflect limited occupation (Wymer 1999, 33-5), by wide-ranging mobile hunters. Only a handful of Levallois or possible Levallois or discoidal artefacts are known from the two counties, from both river valleys and uplands (Wessex Archaeology 1996; 1997). The former type of location has produced a scraper from Blackbird Road, Leicester and a Levallois flake from 'Wanlip' Gravel Pit in Syston. Another from high ground east of Barrow-on-Soar church was rejected by Posnansky (1955), while two further upland candidates are a reported ovate biface on a Levallois flake from west of Eastwell (Eaton parish); and the transverse scraper from Sutton Cheney recorded in illus. 3.2. All these are of flint except the latter, which is a rare example of the use of andesite, originally from North Wales, and is a fine implement, though showing signs of chemical weathering (S. Collcutt, pers. comm., 2002), which has produced the type of blue-grey crust noted by MacRae (*in* MacRae & Moloney 1988, 123-154). It is rather rolled, but might resemble a Mousterian-type 'racloir déjeté' scraper if the left edge is also worked rather than damaged (R. Jacobi, pers. comm., 1995).

The adoption of Levallois technology from about 250 ka has been viewed as reflecting a cognitive leap connected with increasing cultural complexity in the Middle Palaeolithic (Foley & Lahr 1997, discussed in Aldhouse-Green 2001, 115). The perfectly-adequate means of communication of the archaic humans at Boxgrove probably did not include modern patterns of speech vocalisation, or indeed more than a prototype stage of language (Barton 1997, 67). It is thought that, based on brain size and possible social group size, modern speech capabilities may have started to develop after around 250 ka, though possibly later (L. Aiello, quoted in Barton 1997, 67).

Aldhouse-Green discusses (*ibid.)* many other cumulative modifications that show progress towards 'modern' human behaviour, occurring long beforehand in early-Neanderthal behaviours, before the last glaciation. The increased brain size and

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incipient physical Neanderthal traits by 225 ka have already been noted. These were accompanied by the innovations described above in lithic technology, introducing triangular flake points, hafting into spearshafts, blades, and eventually new handaxe types. The first surviving evidence of use of caves at this time may show a wider range of landscape use and choice of residence location, and the first adoption of graves and formal deposition of the dead also took place in such caves in this period, although not yet evidenced in Britain. Symbolic use of colour-differentiated ochres and pigments for art and ritual in body-painting is also first recorded, albeit elsewhere, at this time. Aldhouse-Green sees a pattern of gradual behaviour developments precursing those of modern *H. sapiens* taking place over a long period of time at the close of the Middle Pleistocene.

The great divide (c. 160 - 60 ka)

All appear to have come to a halt, and Britain to have been abandoned, with the mini-glaciation of OIS-7b and the severe cold period of OIS-6, when the ice-margin may have crossed the Midlands, with a bare polar desert adjacent and permafrost beyond (McNabb 2001, 15). From around 160 ka there is no evidence of human occupation here, nor during the succeeding semi-tropical Ipswichian warm stage of OIS-5e (Currant & Jacobi 1997), when July temperatures were 3°C warmer than today (Coope, *in* Shotton 1997, 55-68). When Britain was eventually re-occupied it was by a different population with a different technology (McNabb 2001, 19).

The severe cold of OIS-6 may have passed the limits of human tolerance and ability to adapt. Driven south by the cold, the population may have left Britain when the falling sea level due to snow and ice formation allowed the breached land-bridge beneath the channel to re-emerge. Britain then once again became the peninsula of Continental Europe it had originally been until the overflow of the ice-dammed North Sea cut its way through between Dover and France, perhaps in OIS-12 (Wymer, *in* MacRae & Moloney 1988, 11-24), or maybe OIS-8 (Ashton & Lewis, pers. comm., 2001). The Channel width would have gradually been increasing during mid-late Pleistocene (Wymer 1999, 54). The exposed bed forming the land-bridge would have been re-submerged when the ice melted during the Ipswichian, raising the sea-levels dramatically again (Barton 1997, 35-6; McNabb 2001, 16). This may have made return impossible until the fall of sea-levels in the renewed cold of the Devensian.

Ashton and Lewis (pers. comm. 2001) postulate that the Ipswichian semi-tropical oceanic habitat may not by then have been the preferred environment of the human population. From river terrace finds densities they calculate that the population may already have been dwindling in OIS-8 and 7, when few occupation sites are known. They speculate that a more specialised life-pattern may have developed by then, involving fewer but larger social groups needing larger hunting territories and following large animal herds based on a cool, dry climate and the rich pickings of the 'mammoth steppe' grassland. As the grasslands vanished in the north with increasing cold, the herds and humans drifted south onto the remaining grasslands, then with returning warmth and re-afforestation, perhaps east and north where steppe still prevailed. Not till the cooling at the end of the Ipswichian did grasslands and perhaps the herds and humans, again return to Leicestershire (Hall 1981). Horse and mammoth, probably the 'preferred prey' of the human population, are not known in Britain during the Ipswichian. This would perhaps tend to support Ashton & Lewis's theory.

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During construction of an Anglian Water treatment plant at Wing, Rutland, important evidence was found for the developing flora of the region during and following OIS-5e, the Ipswichian interglacial. This is summarised by A.R. Hall (1981). A closed basin 100 m. across had been cut by ice action or a sub-glacial stream into the rock bed of Northamptonshire Sand-Ironstone over Lias Clay. The till, peat and lake clay fills perhaps 17 m. deep gave a continuous core for pollen analysis of the interglacial and succeeding early glacial deposits. A dense mixed oak forest surrounded and overhung the basin in the interglacial, and included maple, ash and elm. This was succeeded by an acid raised bog across the basin, with a sudden and massive increase in grass and herbs in the late stages of the interglacial. Climatic deterioration and renewed inundation marked the ensuing cold stage. This pollen core, the longest Ipswichian sequence to date in Britain, gives significant local information, enhanced by details of the Ipswichian mammalian fauna present and recorded at Barrow-on-Soar (Rice 1968a, 349). The average prevailing warmth of this period was, however, subject to the usual oscillations and fluctuations in temperature (McNabb 2001, 17).

Neanderthals and the Mousterian (post-60 ka)

These climatic fluctuations continued through the overall cooling of OIS-5d to 5a and OIS-4. Any artefacts in terrace gravels laid down in this Early Devensian period must be derived and redeposited (McNabb 2001, 17), as Leicestershire and Rutland then still consisted of an emptied landscape, with no remaining human population. By the end of OIS-4 or OIS-3 Britain was re-colonised (Aldhouse-Green, *in* Ashton *et al.* (eds) 1998, 137ff). The OIS-3 climate provided short cool arid episodes alternating with warmer periods (McNabb 2001, 22), such as the Upton-Warren Interstadial (see illus. 1), when a rapid climatic amelioration arrived too fast for many tree species to spread here from further south on the continent, but offered a typical Western European temperate climate, with dwarf willow fauna (Coope, *in* Shotton 1977, 64-6). Dry grassland steppe had spread west again from Russia by this time, and as the mammoth herds returned west, perhaps Neanderthal people too ventured into this fresh territory; or perhaps they were driven here by the advent of modern humans into Southern Europe (Pettitt 1999, cited in White and Jacobi 2002).

Neanderthal human remains have not been found in this country, but they are known from evidence elsewhere not to share the same DNA as anatomically-modern humans (Stringer and Gamble 1993, 136-7 & fig.45; Palmer 2000, 37). They were big meat-eaters, with massive muscularity, who lived fast and died young, suffering many physical traumas and broken bones (Stringer 1996). Strong social groupings meant they cared for the sick and injured, and buried their dead, perhaps with ceremony, mourning the lost (see also Mellars 1996).

Their occupation remains in Britain are scarce (McNabb 2001, 18) and frequently occur as isolated surface finds. These perhaps represent accidental losses or discards by a few highly mobile hunting groups arriving on a temporary seasonal basis (McNabb 2001, 20-2), perhaps from mainland base camps, for example in the Low Countries (Aldhouse-Green, *in* Ashton *et al.* (eds) 1998, 137 ff). The Neanderthal occupation of Britain was impoverished, short-lived and insignificant by European standards (Roe 1981, 252). Their tool kit was of the type 'Mousterian of Acheulian tradition', with flat-butted cordate ('bout coupé') handaxes (see illus 6.2), but fewer flake tools, often not of Levallois prepared-core origin (White and Pettitt 1995, cited in White and Jacobi 2002). An important excavation near Linford, Norfolk, has recently recorded a unique

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Neanderthal butchery site with mammoth and other steppe-tundra organic remains, associated with many flints, including 'bout coupé' handaxes (Denison 2002b).

The so-called 'bout coupé' handaxe does still seem to be a distinctive local variant of the continental Mousterian in Britain (Tyldesley 1987; Wymer 1985; Roe 1968, 81). These flat-butted cordiforms are strongly associated with the 'Late Middle Palaeolithic' in OIS-3 (White and Jacobi 2002), but there may be a few of earlier date, and care should be taken in using isolated surface finds as invariable indicators of Mousterian occupation in Britain (Wymer 1999).

The only two Leicestershire specimens were unfortunately examples of such isolated finds. That from Glenhills Boulevard near Aylestone in Leicester (Cookson [née Graf] and Tyldesley 1985) has differential weathering suggesting long freedom from disturbance in one position. A more recent find (Liddle 1992; illus. 6.2) comes from Stanton-under-Bardon (formerly in Markfield parish), and may also be a 'bout coupé', but part of its base is broken, making confirmation unsure. The flint is in fresh condition, again possibly indicating that it has not been moved far from its original loss site. Both finds come from uplands, the former on the edge of the high plateau overlooking the valley of the river Soar, the latter on the slopes of the granodiorite outcrop of Cliffe Hill overlooking adjacent valleys: both good hunting/viewing stances. The Cliffe Hill location perhaps re-emphasises the continuing interest of the Charnwood Forest area in the Middle Palaeolithic period.

Towards the end of the Middle Palaeolithic, around 40 ka, reindeer were being processed at Creswell Crags on the present Nottinghamshire/Derbyshire border, as shown by a recent radio-carbon dating programme (Jacobi, *in* McNabb 2001, Appendix 1). The Mousterian tools found at the Creswell Crags caves included local quartzites and ironstones in their raw materials (McNabb 2001, 20-1), with frequent choppers and chopping tools (Jenkinson 1984; MacRae and Moloney 1988, 233). Perhaps the quartzite tools from south-west Leicestershire in the Waite Collection should be examined with the Creswell Crags material, and the proximity of the Nuneaton Hartshill quartzite rock source, in mind, though a distribution indicating a possible pre-Anglian origin has been suggested for some of these finds (see above). The almost complete absence of recovered Levallois or discoidal pieces from the Waite Collection (the sole possible exception being the Sutton Cheney andesite transverse scraper, illus. 3.2) may also be a consideration.

An end and a beginning

The Neanderthal population appears to have had exclusive occupancy of Britain, if limited in extent and intensity, until at least 40 ka (McNabb 2001, 22). At some time after that, anatomically-modern humans reached Britain, with the earliest human remains those in Kent's Cavern, Torquay, Devon (see illus.1). The Neanderthalers may well have hung on until after the arrival of modern humans (Aldhouse-Green *in* Ashton *et al.* (eds) 1998, 137ff), before slowly dying out and disappearing, the reasons for which are still debated. Perhaps there was an overlap of as much as ten thousand years between the two populations (Wymer 1999, 35).

It is not impossible that the flint leaf-point and other remains excavated by the University of Leicester Archaeological Services at Glaston, Rutland (Cooper 2001; Cooper and Thomas 2001) were the work of a Neanderthal hunting group, rather than of modern humans. The interstadial date of 40-30 ka suggested for the Glaston remains could place them with either cultural affinity, such points having been found in both

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Hungary and Czechoslovakia with Neanderthal remains (Thomas and Jacobi 2001; Cooper, L., forthcoming). The flint point was most probably used as a spear tip, and was accompanied by a blade core and other knapping debris. The site was also (separately) used by hyenas as a den for their young, and contained a mass of woolly rhinoceros and other bone.

However both types of human population, *Homo neanderthalensis* and *Homo sapiens*, were probably so sparse, in Leicestershire and Rutland as in the rest of Britain, that they may never have encountered each other, the one gradually but inexorably disappearing and the other increasing and multiplying and filling the earth.

Discussion: an agenda for action

The evidence from multi-disciplinary sources, and inferences from work elsewhere, suggest at least sparse and intermittent human occupation in Leicestershire and Rutland for over half a million years, possibly from around 600 ka, during oxygen isotope stage 15, or before. However, concentrations of surface artefacts, particularly of quartzites, around the Hinckley-Nuneaton area, possibly associated in Warwickshire with early Anglian deposits, together with the presence of large numbers of bifaces in some post-glacial Trent terraces, may suggest much greater density of occupation in this region at certain periods. Several examples of artefacts in andesitic tuff are now supplemented by the first recorded biface of Charnian tuff, perhaps from the Beacon Hill area.

The Midlands are at the north-western limits of known human occupation during the Palaeolithic, and can offer important information on the extent of human tolerance and exploitation of different environments, with opportunities for further information from particular types of deposit and topographical situation in these two counties which seem to offer potential preservation of early remains, as follows.

In the pre-Anglian period this area was drained by the major Bytham River system through the Midlands to East Anglia, early terraces of which survive in parts of Leicestershire. A former channel of this river at Brooksby contained buried organic remains with high archaeological potential, which is to be investigated further during forthcoming extraction (Howard 2000).

For ten thousand years at the start, and again for some time at the end, of the Anglian glaciation, eastern Leicestershire was on the shores of a pro-glacial, or meltwater lake, respectively, Lake Harrison, which varied in extent, and whose fine later silts may seal and preserve earlier lakeside occupation remains.

Parts of the early drainage system were later reversed to form the present-day post-glacial rivers, whose terraces and buried floodplain channels have produced both faunal, artefactual and environmental evidence, and which would be likely richly to repay further systematic investigation on the lines of that already carried out in limited areas on the Soar, Wreake and Trent.

The sparseness of examples in Leicestershire and Rutland of Levallois technology, probably dating from late- or post-oxygen isotope stage 8, around 250 ka onwards, may reflect the relative scarcity locally of large nodules of good-quality flint. From around 160 ka it is then likely that the whole of Britain was abandoned, even during the succeeding Ipswichian interglacial of oxygen isotope stage 5e, when local borehole evidence shows there was a warm climate with a dense mixed oak forest.

The return of periglacial conditions to this region during the Devensian period brought renewed effects of erosion and disturbance to the landscape, but associated with these also came side-effects tending to preservation of both surface, sunken and

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buried remains. The few 'bout coupé' handaxes found in these counties may indicate the returning presence of Neanderthal people using Mousterian-type technology, from around 60 ka until their final disappearance, possibly 35 ka. This perhaps coincided with, but was maybe unrelated to, the advent of modern *Homo sapiens* to this area. Excavated artefactual and environmental remains at Glaston, Rutland, come from this period, which is crucial to study of the relationship, if any, between these two human species. Further remains may be forthcoming in that area or in similar topographies of ridge-top cambering and gulling.

The foregoing has shown the integral role of Quaternary studies in Palaeolithic research, and the need for archaeologists interested in the Palaeolithic to work closely with Quaternary geologists. In order to keep track of new work and changing ideas, McNabb (2001, 32 and 34) has suggested establishment of a web-based East Midlands Palaeolithic/Pleistocene discussion network, with invited contributions on active work on Pleistocene deposits.

This paper has attempted to point out Pleistocene deposit types in the two counties with potential for Palaeolithic archaeology, to assist targeting locations for investigations. The aim of such research is to build a history of human cultural change and continuity in relation to the developing climatic events and landscapes of the Pleistocene, and the resulting deposits. A 'whole landscape' approach is critically important (McNabb 2001, 34), and the crucial need is for accurately-dated deposits in all periods of the Palaeolithic, to build this archaeological framework. Such dating can only come from the extremely rare biological evidence of pollen, molluscs, large and small vertebrates and other organic data. In themselves these deposits may be sterile in terms of directly-associated cultural remains; nevertheless, as Dr. Wenban-Smith points out (Wenban-Smith and Hosfield 2001, 2), one such deposit may provide relative dating for the whole sequence within which it lies, and also crucial correlations with other deposits containing cultural remains. Even if no such correlation is yet known, any dating evidence may later prove vital in the light of future discoveries, and should always be investigated and recorded.

Any deposit with dating potential, therefore, for the Palaeolithic period, whether or not it is yet directly-associated with human cultural remains, has to be an integral part of the archaeological record, and of archaeological study of the period. Dr. Wenban-Smith also rightly stresses that all such deposits are therefore worthy of protection, and of mitigation of disturbance, under current planning controls. Prospecting for, and discovery and investigation of, such deposits in areas of likely potential should form an essential part of Palaeolithic research strategy and of all site evaluations.

In the first instance, existing detailed geological mapping and dating evidence should be studied for river terraces. These may contain artefacts, albeit derived, from prior periods and, occasionally, fine sediments with organics, dating potential and *in-situ* remains. Such terraces should be sought out on the pre-Anglian Bytham River and its Hinckley and Derby tributaries; on the post-glacial Soar, Wreake, Welland, Avon, two rivers Sence, and of course on the Trent, and opportunities for investigation identified.

Mapping of the former shorelines (e.g. along the Middle Lias scarp), water levels and silts of early- and late-Anglian Lake Harrison, and also of 'brickearth' cover deposits elsewhere in the counties, should be pursued, as lake silts and brickearths have a very high preservation potential.

All these areas should be systematically surveyed, any surface exposures, especially where temporary, examined, and any opportunities taken to record deposits at depth, for example by regular inspection of any quarry floors, sections and reject heaps. As

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Wenban-Smith (2001, 1) points out, comparative artefact densities in different terrace gravel units can provide data on broad demographic trends and landscape exploitation in different periods.

Such mapping should be registered on the Leicestershire and Rutland SMR as a mapping layer on the Geographical Information System, together with other deposit types or topographical situations with Palaeolithic potential, even when no cultural remains are yet known in the vicinity, to ensure their future testing or sampling for such remains. Ridges, hilltops or interfluves in hard/soft deposit contact areas, particularly with calcareous substrates; and slope-foot accumulations with potential to seal buried remains, should also all be noted in this way. Their importance is stressed by Collcutt (*in* McNabb 2001, Appendix 2).

In connection with the latter type of potential, slope-foot areas of Lincolnshire Limestone, of Middle Lias scarps and rock outcrops, and equally those surrounding Charnwood Forest rock tors, are known to have accumulated slope-foot rock debris deposits which may seal and preserve buried remains. The growing evidence for continuing multi-period Palaeolithic interest in the Charnwood Forest area, its potential for former rock-shelters, coupled with its zones of relatively-slight modern cultivation, make this an area of high potential.

McNabb (2001, 33) feels there is also a need to review and refine existing data in the SMR, and to ensure it is synchronised with regional and national records, and with criteria for the Palaeolithic. Most urgently, environmental data and dating evidence should be included and indexed, for the Palaeolithic as for later periods.

Similarly, previous finds and existing museum collections, for instance the Waite Collection, should be revisited, the recording of their typological and technological character updated to modern standards, the findspot geology and condition checked and recorded (as per Wessex Archaeology 1996 and 1997) and any potential value in follow-up action assessed. As Knox (1998) has suggested, such action seems immediately called for in the cases of the Eaton/Eastwell, and still more so, the Hinckley area.

In the case of the Waite material from the more mixed geology of the Hinckley area, Professor Shotton's (1988) hypothesis of the geological associations of Mr. Waite's Warwickshire material with an early-Anglian outwash gravel should be tested by careful geological mapping and comparative fieldwalking on and away from potentially-significant deposits.

All the above-mentioned types of area of surface potential should be systematically field walked for artefacts, not just of flint, but also of quartzite and other raw materials. Recognition of human workmanship in such materials should be included in training programmes for fieldwalkers. All exposures, especially if temporary, should be examined, particularly in areas not subject to arable cultivation, such as in parts of Charnwood Forest.

Assessment of all proposals for development should always include consideration of the Palaeolithic potential as discussed in this paper and elsewhere, however small the site, as the Glaston excavation, on a site for just four proposed houses, has demonstrated, and as Collcutt (*in* McNabb 2001, Appendix 2) outlines. The methodology of site evaluation, as for example at Purfleet, Essex, and Brooksby, Leicestershire, and the provision of finds and other specialists, will need to be adjusted as appropriate for this Palaeolithic potential (Bates *et al* 1998; Challis and Howard 1999; Bates 1998; Bradley 1998; Collcutt *in* McNabb 2001, Appendix 2).

Even where no Palaeolithic finds are yet known in a vicinity, this study has

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demonstrated the importance of the Palaeolithic potential of a wide variety of deposits and topographies in Leicestershire and Rutland to the early history of humankind in these counties.

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