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Neanderthals and their predecessors Lower and Middle Palaeolithic

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THE
PREHISTORY
OF THE
NETHERLANDS

VOLUME 1

Edited by

L.P. Louwe Kooijmans



The Prehistory of the Netherlands

Volume I

Edited by

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Note on the dates used in this book

Dates before 50,000 are based on various physical dating techniques, other than radiocarbon, and expressed as 'years ago'.

Dates in the period 50,000-10,000 years ago are based on uncalibrated radiocarbon dates and expressed as 'years ago' or 'years BP' (= Before Present).

Dates in the last 10,000 years are based on calibrated radiocarbon dates and expressed as 'years BC'. Only these dates can be equated with calendar or solar years.

See chapter 1, section 'periods and dates' for the principles of radiocarbon dating.

5 Neanderthals and their predecessors Lower and Middle Palaeolithic

Wil Roebroeks

THE NETHERLANDS AS A FIND AREA

Through the ages, the national frontiers of the Netherlands have undergone many changes, but the same can be said of the country's natural frontiers when viewed on the geological time scale: the proportions of land and sea and the course of the coastline varied considerably from one geological period to another. In the coldest phases of the Pleistocene, for example, such large volumes of water were locked up in the vast ice caps that the sea level was repeatedly many dozens of metres lower than it is today. Large parts of the North Sea Basin were then dry and Great Britain formed part of the Continent. The tremendous quantities of bones of mammoths, reindeer, horses and other large mammals that fishermen on the North Sea have recovered in their trawl nets are reminders of this 'North Sea land' that was actually submerged by the sea only during the interglacials, which together spanned not more than 10% of the overall Pleistocene period. Besides the submersion of the North Sea Basin there are several other geological factors (see chapter 3) that greatly reduce our chances of recovering finds from the early phases of the Palaeolithic in large parts of the Netherlands. However, there where old land surfaces were not covered with younger sediments or where overlying deposits have disappeared owing to later erosion, we are able to collect Lower and Middle Palaeolithic finds at the surface.

To obtain a somewhat coherent picture of the earliest occupation of the Netherlands we must also consider the evidence from surrounding areas. We must bear in mind that this chapter discusses the archaeological record of highly mobile groups – small groups of hunter-gatherers with 'no fixed abodes' – whose archaeological visibility in the form of artefacts and features is very poor; apart from being few in number, those artefacts and features have moreover suffered the ravages of time for many tens of thousands of years. We indeed have concrete evidence demonstrating that these groups covered large distances, from for example the chalk hills of southern Limburg to the Neuwied Basin near Koblenz. The evidence for the earliest occupation of what is now the Netherlands will therefore be presented within the context of the history of occupation of Northwest Europe and throughout this discussion reference will be made to sites in England, northern France, Belgium and the adjacent parts of Germany, too.

THE EARLIEST OCCUPATION

Artefacts and pseudo-artefacts

How to determine when a particular region was first occupied has always been a subject of heated discussions. In archaeology, these discussions usually revolve around two issues. The first concerns the nature of finds: does a particular piece of chipped stone show unambiguous signs of human activity? The second relates to the finds' exact age. More than a century ago, the existence of Tertiary man was a

c. 500,000-35,000 years ago

source of a furious controversy among European Palaeolithic archaeologists. Eoliths, 'stones from the dawn' of humankind, proved that the history of humankind extended very far back, argued the eolithophiles. Their adversaries, the eolithophobes, maintained that the stones in question were not related to human activities, but owed their distinctive shape to natural processes. The fierce debate engendered extensive surveys and experiments intended to demonstrate how objects resembling artefacts may have been formed naturally. The results are described in well-known handbooks from the beginning of the twentieth century, such as Obermaier's *Der Mensch der Vorzeit* (1911), Sollas' *Ancient hunters and their modern representatives* (1911) and Boule's *Les Hommes Fossiles* (1921). One of the conclusions of these discussions was that it is indeed possible for natural processes to transform pieces of flint and other stones so as to make them resemble artefacts. In the early twentieth century the British antiquarian Warren maintained that, in view of these resemblances in shape between natural stones and artefacts, the onus of proof should always lie with those who wished to interpret such ancient stones as the products of human workmanship.¹ The stones in question should moreover not constitute a relatively small sample of 'artefacts' from an extensive lithic complex lacking clear evidence for knapping by humans. It was essential that the lithic material be studied and interpreted in its geological and spatial contexts in its entirety. There are indeed often quite acceptable explanations in terms of natural processes for seemingly unusually shaped stones. Because of this problem and the continuing quest for ever older tools, the question of 'pseudo-artefacts' has never really disappeared from the archaeological agenda.² Another issue that is still a matter of debate today is the exact age of occupation remains; the new dates recently obtained for the earliest occupation of Java have caused quite a stir in the palaeo-anthropological world³ and the dates of the earliest occupation of the New World and Australia are also topics of never-ending discussions.⁴

fig. 5.1
Schematic survey of well-documented
Palaeolithic sites in northern Europe (north
of 49° N) and their climatological context.

period	interglacial context	intermediary context	'cold steppe' context
Late Pleistocene			Gönnersdorf
Upper Palaeolithic			Andemach
			Mainz-Linsenberg
			Sprendlingen
			Maisières
			Lommersum
Late Pleistocene	Neumark-Nord	Sedln	Becksteinschmiede
	Grabschutz	Wallertheim	Belve
	Rebutz	Tönchesberg	Kartslein
	Gröbern	Königsau	Salzgitter-Lebenstedt
Late Middle Palaeolithic	Lehringen		Ariendorf 3
	Vellheim		
	Taubach, Weimar, Burgloma		
Late Middle Pleistocene	Stuttgart-Bad Cannstatt	Blache-Saint-Vaast	Achenheim 'Sol 74'
	Ehringsdorf		La Cotte de St. Brelade
	Maastricht-Belveldère		Schweinskopf / Wannan
			Ariendorf 2
Early Middle Pleistocene	Bilzingleben	Cagny-l'Épinette	Ariendorf 1
	Cladon-on-Sea	Hoxne	Meslin IV
	Barnham	Schöningen	
	Miesenheim I		
	Boxgrove		

Until recently, most experts considered about one million years a good estimate of the age of the earliest evidence for occupation in Europe,⁵ although some even suggested two million years.⁶ According to a new 'short chronology', Europe was not colonised by hominids until a relatively late stage, not much more than about 500,000 years ago. Since the introduction of this short chronology, the European evidence has played an important part in the discussion about the earliest occupation of the regions outside Africa, the cradle of humankind.⁷ The adherents of the short chronology are of the opinion that the finds from sites like Kärlich A and B in Germany, Le Vallonet in France and Prezletice and Stránská skála in the Czech republic, which were previously believed to date from before 500,000 years BP, do not constitute sound proof of early occupation because they do not include convincing artefacts. Other sites, such as Isernia in Italy, which have yielded what are assumed to be unmistakable artefacts, are in their opinion actually younger than often claimed. An argument supporting the short chronology, which is not in any way connected with the discussion concerning the natural or artificial nature of lithic assemblages, is that not one human fossil with an age of over 500,000 years has been found anywhere in Europe,⁸ whereas fossil human remains have frequently been found in Middle Pleistocene deposits younger than 500,000 years (fig. 5.1).

This scenario leads to an entirely different view on the colonisation of Europe than the various longer chronologies. According to the models based on the latter chronologies, the colonisation of Europe was essentially a gradual process, in which the newcomers had sufficient time to adapt to their new surroundings. The short chronology is based on the assumption that hominids lived in the immediate surroundings of Europe for a fairly long time – as testified by the finds from Dmanisi (Georgia) and 'Ubeidiya (Israel) – before finally penetrating into Europe itself around 500,000 years ago, after which they spread across it at a fairly high rate. In this model the earliest occupation of northern Europe, documented at sites like Boxgrove (southern England) and Miesenheim I (near Koblenz), is more or less 'contemporary' with that of southern Europe, that is, within the limits of the chronological resolution of our dating methods. But if this model is correct, the question is *why* those hominids should have waited several hundred thousand years at Europe's gates before passing through them around half a million years ago.⁹

With their biostratigraphically founded ages of around 500,000 years, Boxgrove and Miesenheim I are among the oldest sites known in Europe. Boxgrove is actually a former coastal plain at the foot of a limestone cliff with a length of several dozen kilometres, where various scatters of bones and stones have been remarkably well preserved. Throughout an interglacial, about half a million years ago, and for the early part of the subsequent colder phase, groups of hominids regularly visited a lagoon at the foot of the cliff, where they found flint for manufacturing tools, but also an abundance of game. The remains of these groups, excellently preserved by the fine sand and loam that were later deposited on top of them, inform us that these groups collected blocks of flint at the foot of the limestone cliff, which they transported to a nearby location, where they transformed them into tools, often carefully finished hand axes. Those tools they used to butcher animals like rhinoceros and horse. In spite of the excellent preservation conditions, no features of huts or hearths were found at Boxgrove. The remains appear to represent a series of many brief, episodic visits to the former coastal plain. This impression is entirely in keeping with the pattern known from other sites from these early periods, for example those along the former courses of the Somme in northern France, on the shores of lakes in the vicinity of present-day Hoxne in England and



fig. 5.2

One of the oldest human remains ever found in northern Europe is this tibia, which came to light during excavations at Boxgrove (southern England) and has been dated to around 500,000 years ago. A recent study of this find showed that it belonged to an individual who died when he was around 50 years old and had a relatively robust, stocky physique, adapted to cold conditions. The remains of the earliest Europeans north of the Alps and Pyrenees already show evidence of adaptation to the colder conditions that prevailed in those areas, marking the beginning of a process that ultimately resulted in the 'classic Neanderthal man'.

near the travertine deposits of Bilzingsleben in former East Germany. Those sites are actually small 'windows' through which we catch glimpses of former landscapes, including their flora and fauna, and – occasionally – the activities of the first people to have wandered across them.

At the end of 1993 a tibia of a very robust individual with an estimated length of 1.80 m was found at Boxgrove (fig. 5.2). This British fossil is one of the scarce remains of the earliest occupants of Europe, which also include the lower jaw that was found at Mauer (near Heidelberg in Germany) in 1907 and the richer assemblage from Atapuerca TD6 (Spain).¹⁰ These hominids differ from both *Homo erectus*, of which no unambiguous remains have been found in Europe, and the later occupants, the Neanderthals. According to some specialists these earliest Europeans showed so many distinctive features as to deserve a separate name: *Homo heidelbergensis*.¹¹

The well-preserved mammal remains from the fill of the La Belle Roche cave, near Sprimont in the Belgian Ardennes,¹² probably date from the same period as the Boxgrove and Mauer remains. Bear (*Ursus deningeri*), panther (*Panthera gombaszoegensis*) and lion (*Panthera leo fossilis*) are among the animals represented in the faunal sample of this highly important palaeontological site, which was excavated in a campaign that lasted for many years. The fills of the karst fissures of this 'cave' also yielded several dozen stones, some severely eroded, which the excavators interpreted as artefacts, in other words, as evidence for human occupation. Other archaeologists however class the stones as pseudo-artefacts.¹³

It has been suggested that another ancient find, a primitive 'core' from the high terrace gravels of the Meuse near Halembye (Haccourt, Belgian province of Liège), may likewise be a pseudo-artefact.¹⁴ So all in all, no incontestable evidence for human occupation in the Lower Palaeolithic has so far been found in the Benelux, but finds recovered in the surrounding countries make it likely that remains from 500,000 years ago will some day come to light here, too.

THE MIDDLE PALAEOLITHIC

The oldest unmistakable artefacts recovered in the Netherlands date from about 250,000 years ago,¹⁵ i.e. from the beginning of the Middle Palaeolithic (fig. 5.3). This period is characterised by the frequent use of the Levallois technique for manufacturing stone tools (see feature A). Hand axes were still used, but tools made on (Levallois) flakes, in particular scrapers, points and denticulate tools, became far more common than in the Lower Palaeolithic.

The Levallois technique made its appearance in large parts of Europe between c. 300,000 and 250,000 years ago, and this appearance marks the beginning of the Middle Palaeolithic. The youngest Middle Palaeolithic assemblages date from approximately 35,000 years BP, although even younger finds are known from Spain. In the Low Countries, both early Middle Palaeolithic artefacts have been found and artefacts dating from the late Middle Palaeolithic, the period of the 'classic' Neanderthal, which spanned the first half of the last, Weichselian, glaciation.

The Neanderthals

Fossil human remains from the early Middle Palaeolithic are still rare in Europe. Nevertheless, the number and quality of the available remains allow us to conclude that by the beginning of the Middle Palaeolithic hominids had evolved into

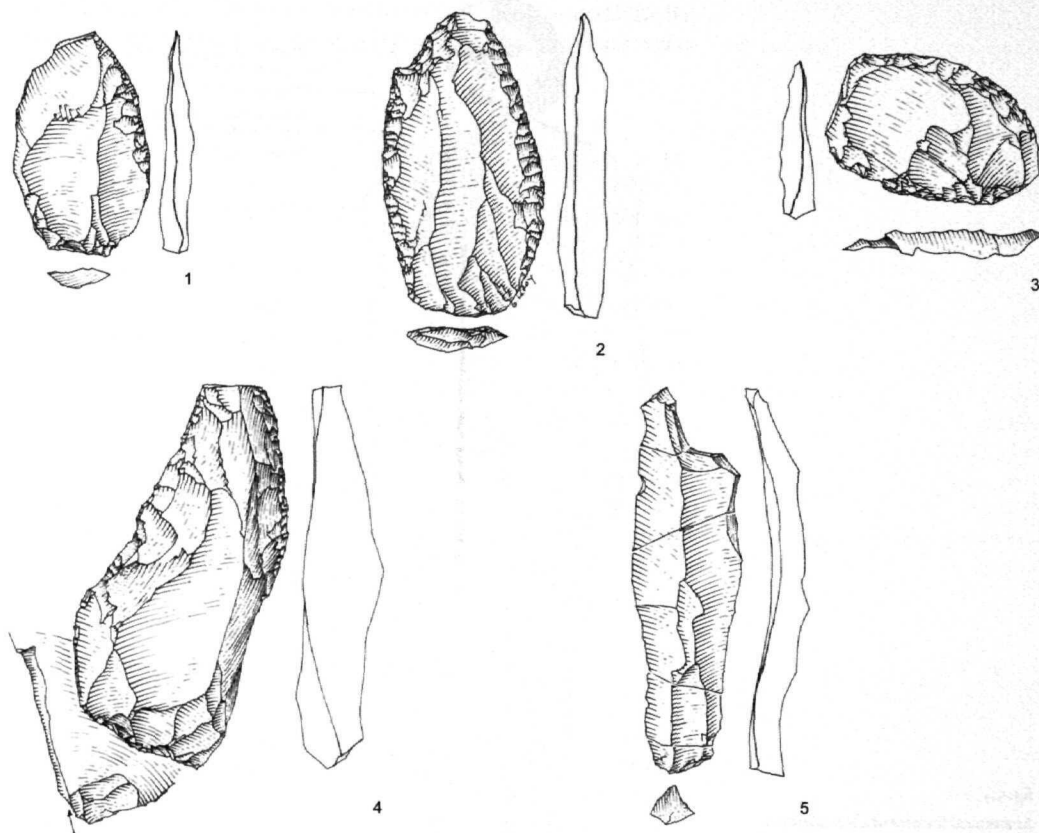


fig. 5.3
Typical Middle Palaeolithic artefacts found at
site N, Maastricht-Belvédère. Scale 1:2

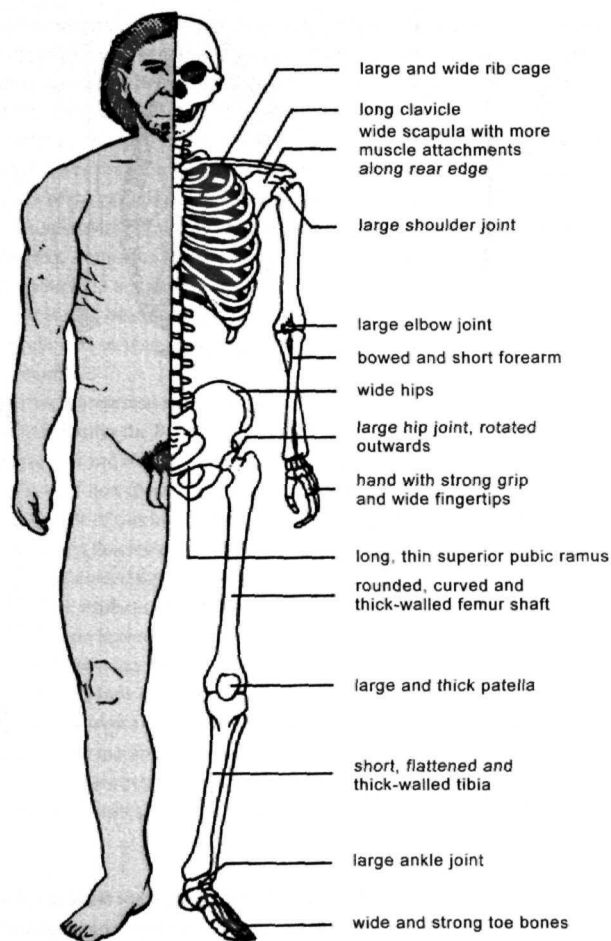
- 1 single convex side scraper
- 2 double convex side scraper
- 3 single convex side scraper
- 4 double concave/convex scraper
- 5 blade consisting of refitted fragments

the direct ancestors of the well-known Neanderthals. Important fossil remains of these early Neanderthals are known from more or less contemporary sites like Biache-Saint-Vaast (northern France), Swanscombe (at the mouth of the Thames) and Ehringsdorf and Steinheim (Germany). The hominids of the Maastricht-Belvédère site in the Netherlands, who are known to us only through their artefacts, probably also belonged to this group.

The Neanderthals 'proper', or 'classic' Neanderthals, lived in the second half of the Middle Palaeolithic, between 120,000 and 35,000 years ago; they were a distinctively European phenomenon (fig. 5.4). The Neanderthals are generally classed as a subspecies of *Homo sapiens*: *Homo sapiens neanderthalensis*, although some specialists regard them as a separate species, *Homo neanderthalensis*.

The species/subspecies problem broached above involves far more than the classification of fossils alone, namely also the question as to whether the Neanderthals represent an evolutionary dead-end, having been replaced by modern humans some 35,000 years ago, or whether, on the contrary, they are largely ancestral to anatomically modern humans. Those in favour of the latter view see Neanderthals as a simpler version of modern humans, whereas their opponents postulate major differences between the two populations, also in terms of their behaviour. They emphasise for example the lack of clear indications of the use of symbols before the appearance of modern humans and the lack of evidence for the long-distance contacts that are so typical of the behaviour of many present-day hunter-gatherers and also that of their Upper Palaeolithic predecessors.

fig. 5-4
Anatomical features of a Neanderthal skeleton. Neanderthal man was far more robust and stocky than *Homo sapiens sapiens*, 'modern' man.



Sites

A survey

Since the nineteenth century, amateur archaeologists have been finding Middle Palaeolithic artefacts in ploughed fields in many parts of the Netherlands, in particular in the south, for example on 'De Heij' near Sint-Geertruid (plate 8C),¹⁶ but also in the east and the north. The absence of overlying deposits makes it difficult to place such surface finds in a geological-chronological framework: most Middle Palaeolithic artefact types remained in use for long periods of time throughout the entire Middle Palaeolithic, which lasted for 250,000 years. Exceptions are the perfectly triangular hand axes from the beginning of the last glaciation and the leaf points from the end of the Middle Palaeolithic. Having been exposed for such long periods, sometimes tens of thousands of years, many of those surface finds, like the hand axes from Wijnjeterp and Anderen, are severely patinated and show frost cracks (fig. 4.4 and plate 8A).¹⁷ Such finds testify to the presence of Middle Palaeolithic people in these areas, but they tell us next to nothing about when those people lived here and under what climatological and ecological conditions or what they did at the different locations. For answers to such questions we must turn to

the evidence from the well-preserved sites that have been found embedded in fluvial and loess deposits and from the cave sites discovered in the *Mittelgebirge* to the south and east of the Netherlands.

Cave sites in the Belgian/German *Mittelgebirge*

The Belgian cave sites have yielded very few finds dating from before the last interglacial, between 125,000 and 115,000 years ago. The vast majority of the finds date from the first half of the last glaciation, the period of Neanderthal man 'proper'.

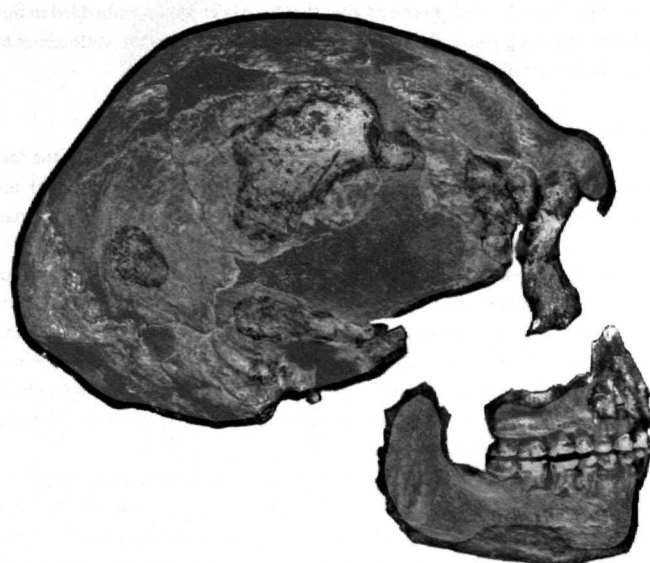
Unfortunately, most of the cave sites in the Ardennes were excavated many decades ago, as a result of which we now have only little information on the contexts of the many finds. This makes it very difficult to make statements on how and why the caves were occupied: when were they used and were the sites 'settlements' proper or simply transit camps where people spent the night while moving from one area to another? Such questions can regrettably no longer be answered on the basis of the old excavation data.

Good examples of cave sites that were excavated a long time ago are the series of sites from the second part of the Middle Palaeolithic near Huccorgne, a few kilometres northwest of Huy in Belgium. The majority of those sites were all discovered and investigated in the nineteenth century. They comprise several open-air sites and ten cave and rock-shelter sites situated closely together in the steep slopes of a narrow, deep valley through which the river Meuse passes before flowing into the Meuse, and in the slopes of the valley of the river's tributary the Rœux. The best-known of these sites are the Grotte de l'Hermitage and the Grotte du Docteur. Among the finds from the former are fine, regular Levallois flakes and a fair number of hand axes, many of which are heart-shaped. The site's faunal assemblage included remains of hyena (*Hyena spelaea*), bovids (*Bos primigenius*), horse (*Equus caballus*), rhinoceros, cave bear, giant deer and mammoth. The absence of reindeer could imply that this site was occupied fairly early in the last glaciation.¹⁸

Present-day research a short distance to the east of Namur has shown how informative well-excavated cave sites can be. The fill of the cave Scladina near Sclayn¹⁹ was found to contain several Middle Palaeolithic assemblages. The oldest finds date from shortly before the last warm phase, the Eemian interglacial, which means they are more than 125,000 years old. The youngest assemblage is about 40,000 years old and hence dates from the middle of the Weichselian glacial and the end of the Middle Palaeolithic. The cave's fill, then, constitutes a record of at least 80,000 years of human activity. The composition of the assemblages and the provenance of the chipped stone show that the cave was used predominantly – but not exclusively – as a shelter for brief periods of time during movements between the Hainaut, the Belgian province of Brabant and the Ardennes. According to the excavators, the faunal sample comprised predominantly remains of hunted animals, in particular chamois, deer, reindeer and ibex.

Two caves that are known all over the world for the more or less complete Neanderthal skeletons that were found in them lie fairly close to the Dutch border: in the Neanderthal near Düsseldorf and at Spy near Namur (fig. 5.5). It was in the Feldhofer Grotte in the Neanderthal that the holotype of the 'classic' Neanderthal was found in 1856. These remains excited a heated debate about their meaning: did they represent a primitive ancestor, an 'antediluvian man', as some claimed, or had they belonged to a relatively recent 'degenerate' individual? When more such finds began to crop up in ancient deposits it soon became clear that the remains indeed derived from early hominids, in particular when, in 1886, excavators from

fig. 5.5
Neanderthal skull from the cave of Spy near
Namur, where remains of two Neanderthal
individuals were found in 1886. These finds
played an important part in the ultimate
classification of Neanderthal man as an early
hominid.



Liège discovered two almost complete Neanderthal skeletons in a cave near Spy in Belgium.

Camp sites buried beneath loess

To the north of the *Mittelgebirge*, Middle Palaeolithic occupation remains are in many places buried beneath thick layers of fluviatile deposits or loess and sand laid down by the wind in the coldest phases of the glaciations. It was indeed in such a geological context that the oldest sites known in the Netherlands were discovered: Maastricht-Belvédère and the sites in the central part of the country, such as those at Rhenen. They were all embedded in deposits, predominantly fluviatile deposits of the Meuse and the Meuse/Rhine, respectively. The sites near Maastricht have been soundly dated to about 250,000 years BP. Those in the central part of the country may be of the same age; we know for sure that they date from before the arrival of the Saalian glaciers here, about 150,000 years ago.²⁰

The finds from Liège-St. Walburge also date from before the advance of the Saalian ice sheets. This rich Middle Palaeolithic site was discovered in a gravel quarry in 1911 by the French archaeologist Victor Commont. Further research by other excavators, among whom were De Puydt and Hamal Nandrin from Liège, yielded some 8000 Middle Palaeolithic flint artefacts buried beneath a thick layer of loess. Thanks to Commont's detailed description of the soil sections we now know that this loess dates from the last and penultimate glaciations. That makes the finds – many simple flint flakes, but also beautiful Levallois flakes, scrapers and hand axes – at least 150,000 years old. Unfortunately the way in which the finds were recovered precludes any statements about the former significance of this location. Another sad fact is that no faunal remains had been preserved in the decalcified loess. The latter also holds for the Middle Palaeolithic sites that were excavated in a loess quarry near Rheindahlen in the adjacent German Rhineland, where a series of assemblages of flint artefacts spanning the entire Middle Palaeolithic have survived the ravages of time.²¹

'Absolute' dates (Ka)	Lithostrat. units	Stratigraphical position of sites and isolated finds (*)	'Soils'	Chronostratigraphy
TL 17.2 ± 3.5 TL 17.5 ± 3.4	VII		Holocene Luvisol	WEICHSELIAN
TL 13.3 ± 3.0	VI-E		'Nagelbeek horizon'	
	VI-D	*		
	VI-B/C			
	VI-A	J E	'Wameton'	SAALIAN
TL > 75	V-B	*	'Rocourt' Luvisol	
	V-A	*	Luvisol	
TL 270 ± 22 ESR 220 ± 40	IV-C-III	A D F H K		
	IV-C-II			
	IV-C-I	B C G		
	IV-B			
	IV-A			
	III-B			
	III-A	*		

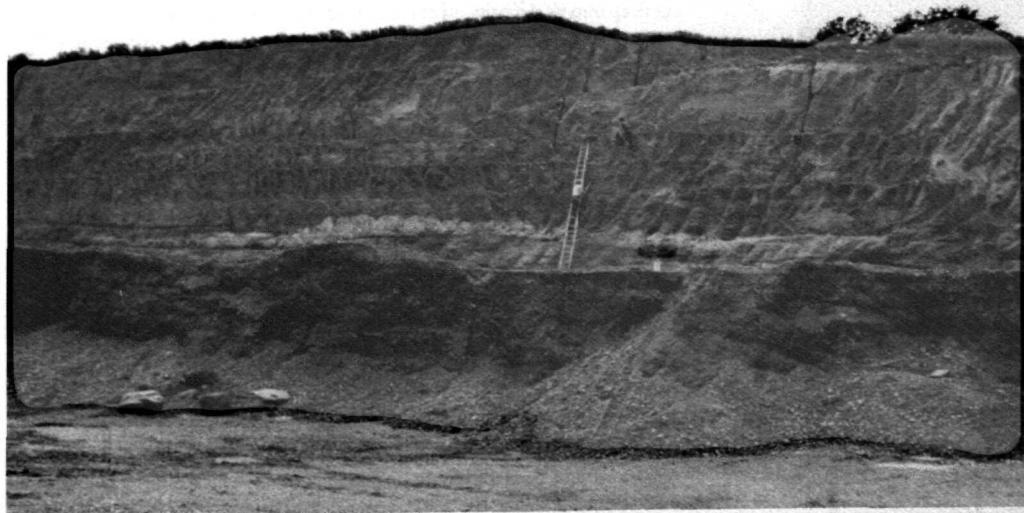


fig. 5.6

Stratification of the Belvédère quarry near Maastricht.

Top: idealised sequence of the various geological units indicating the stratigraphic positions of the various findspots. Overlying the Meuse gravels of Unit III are the fine sands and clays representing the most important find horizon (Unit IV). Above lie deposits laid down during the penultimate glacial (Unit V) and the last glacial (Units VI and VII). The uppermost unit (VII) consists of loess, which was deposited between around 20,000 and 16,000 years ago.

Bottom: section showing the stratification; the light band is the calcareous tufa of Unit IV.

Maastricht-Belvédère

The loess and gravel quarry Belvédère near Maastricht was subjected to thorough geological and archaeological research in the 1980s (fig. 5.6 and plate 8E).²² Between 1981 and 1990 twelve 'sites' were investigated in an area of about 6 hectares. The most important archaeological and palaeontological assemblage was embedded in fine-grained deposits laid down by the river Meuse and was covered by a thick layer of loess-like sediments dating from the penultimate and last glaciations.

About 250,000 years ago, the area where the quarry lies today was a densely vegetated backswamp of the sluggishly meandering Meuse. This landscape, transected by many former river courses that were then slowly silting up, was surrounded by deciduous forests and tracts of more open land in the higher parts. The remains of twenty mammal species and more than seventy mollusc species were identified in the excavations. The mammal remains tell us what animals roamed across this landscape. They included straight-tusked elephant (*Elephas antiquus*), steppe rhinoceros (*Dicerorhinus hemitoechus*), giant deer (*Cervus giganteus*), bear and bison. The archaeological remains show that humans, too, populated this landscape.

Thanks to the detailed geological research that has been carried out in the quarry, and the use of various relative and absolute dating methods, we are well informed about the age of the most important occupation phase (fig. 5.6a). The fluvial deposits in which the archaeological remains were embedded form part of a sequence of river terraces. After laying down loam and fine sands, the Meuse cut deep into its deposits on at least two occasions. The archaeological remains were moreover covered with layers of loess in two separate cold periods. This stratigraphic evidence yielded a first rough indication of the date of the occupation period. A more accurate date was provided by the rich faunal remains contained in the deposits: the remains of small rodents (mice and water vole), for example, were found to derive from more primitive individuals than those found in the ice-pushed ridges in the central part of the Netherlands. And as the Belvédère fauna dates from an interglacial, the archaeological remains could consequently be dated to a warm phase before the advance of the Saalian ice sheets. The absolute date of this interglacial has been determined with the aid of, amongst other evidence, thermoluminescence dates obtained for burned flints recovered in the excavations. These flints yielded a TL age of 250 ± 22 Kyr for the important oldest assemblage.²³ This assemblage – which will be discussed in greater detail below – hence dates from an interglacial around 250,000 years ago.

The quarry contained several more assemblages. Of a slightly older date are a few artefacts recovered from the underlying gravels, which were laid down in the preceding cold phase. The several thousands of artefacts that came to light in an excavation at the base of the loess dating from the last glaciation (site J) are 'only' 80,000 years old. After the most important assemblage had been covered with sediments, the river cut many metres into its bed; site J was hence originally situated not in the river plain, but on its high edge.

The remains of human activity in the former river valley consist of concentrations of debitage, stone tools, bones, charcoal and, at one site, haematite (red ochre). The latter may have been imported from the Ardennes via the Meuse valley. Most of the assemblages are the remains of very brief visits. Highly spectacular is the way in which the assemblages have been preserved for a quarter of a million years: lying in the floodplain of the Meuse they were covered with a thin layer of sediments every time the river flooded its banks and so they very soon became 'sealed'.

What makes these sites in the Belvédère quarry, so perfectly preserved by Palaeolithic standards, so unusual is their short time span combined with their practically undisturbed spatial patterns. Excellently preserved by geological processes, they provide snapshots of the lives of hunter-gatherers in a distant past. One of the finest sites in Northwest Europe that have provided similar snapshots is Boxgrove, which we have already come across above.

On closer inspection, the excavated Belvédère flint scatters proved to differ considerably from one another. Some consisted of the debris formed in the knapping of a single flint nodule, whereas others comprised several spatially distinct scatters, each from a different lump of flint. A few included several tools and/or burned flint and bone besides debitage. None however included the features of spatial structures such as hearths or huts. Nevertheless, certain spatial aspects of human behaviour could be reconstructed at some of the sites. At site K, for exam-

fig. 5.7

The sites in the Belvédère quarry were covered by sediments so shortly after the period of occupation that even the finest debitage was found in exactly the same place where it was discarded 250,000 years ago. Visible at site C were the areas where flint nodules, picked up in the surrounding hills, were knapped on the bank of the river. Some of the flakes were used at the site itself. The lines connect flakes that could be refitted.

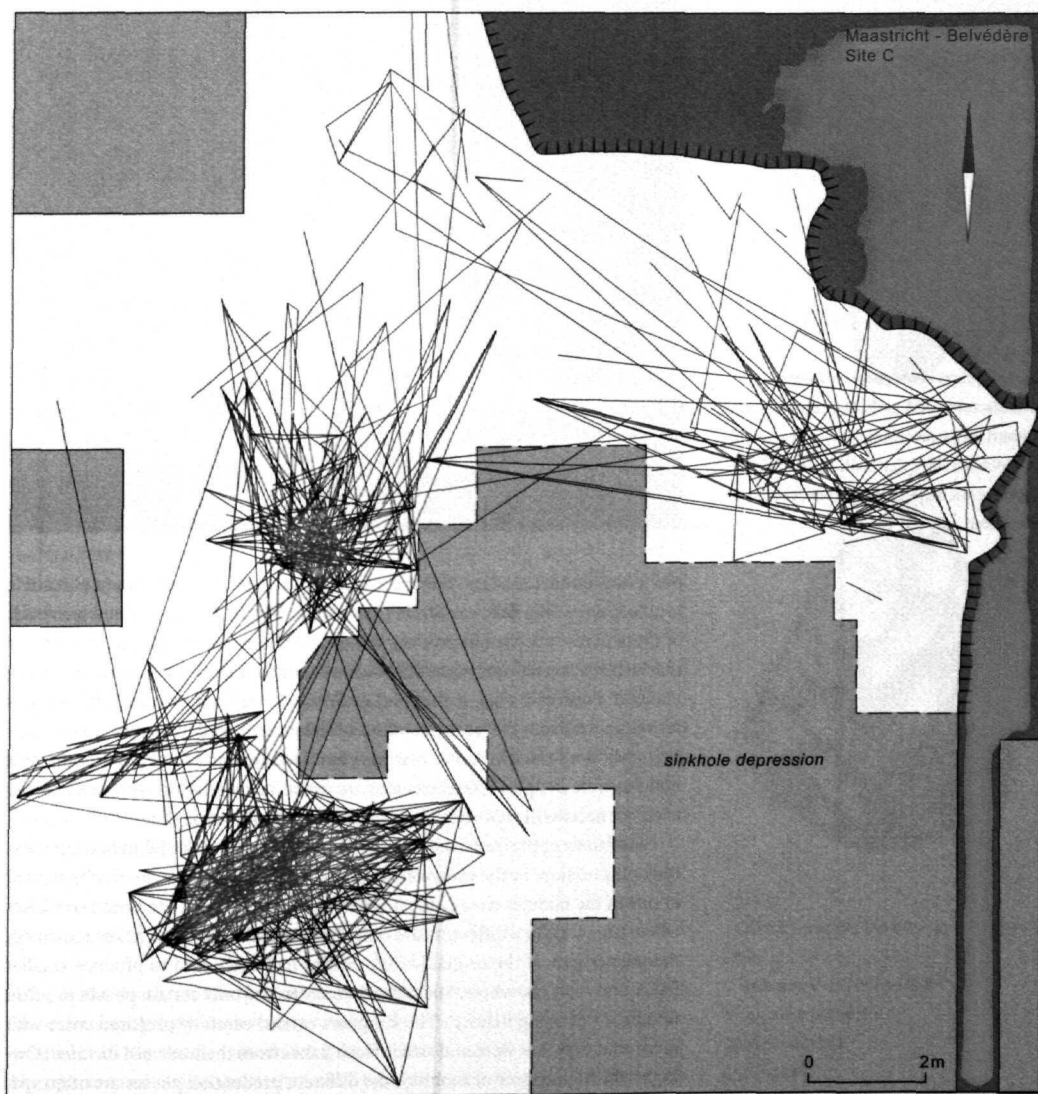
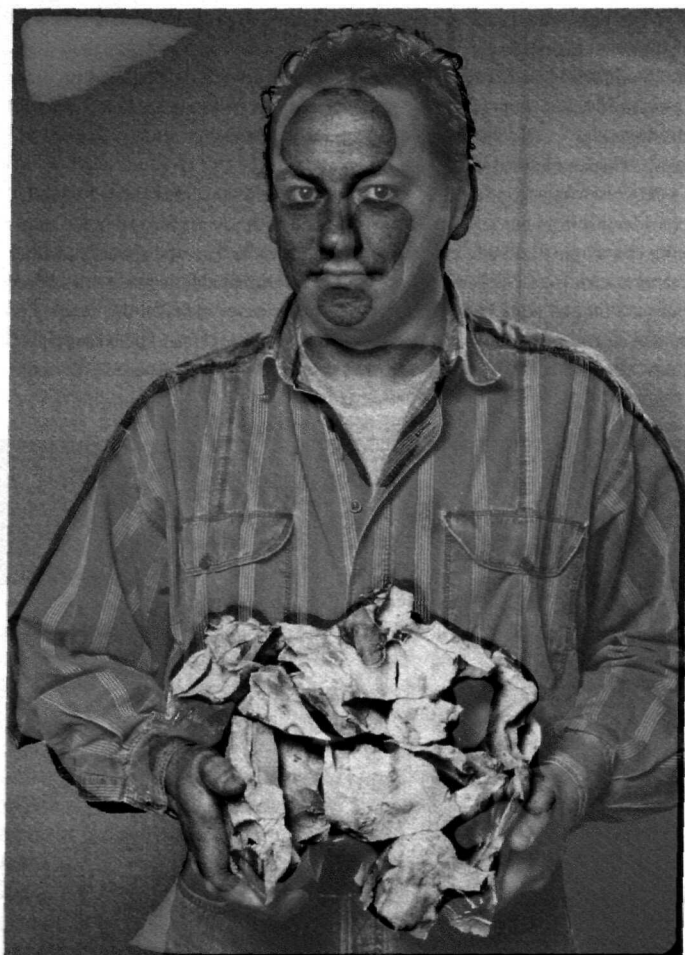


fig. 5.8

Refitting shows how people in former days manufactured their tools. Here the researcher Dimitri DeLoecker shows a set of 162 pieces of flint from site C that could be refitted. The core was not found; it was evidently taken elsewhere.



ple, it was found that a large number of flint nodules had been taken to a particular location, where the flint was divided into coarse blocks – cores – after which each of these cores was used to produce flakes at different locations. The many tools that were discovered at this site did however not derive from these cores; they were made of a different type of flint and could not be refitted to any of the nodules reconstructed from the large quantities of debitage. These tools must hence have been produced elsewhere and may have been left behind before or after the flint nodules were knapped. Artefacts that are found in association with one another need not necessarily have been produced or used at the same time.

Close study of the flint from site C showed that each block of flint had left a distinct 'impression' in the excavated area (fig. 5.7). For example, all that remained of one of the nodules were cortical flakes; the resultant core had been taken elsewhere (fig. 5.8). In a different case only the core and a few large flakes remained; the greater part of the original block of flint had been used to produce smaller flakes and tools elsewhere. Such sites actually record only certain phases in a flint nodule's 'knapping history'. The knappers carried carefully prepared cores with them wherever they went and struck fresh flakes from them as need dictated. Owing to the high degree of mobility, the different production phases are often spa-

tially separated, as a result of which we are usually able to reconstruct only parts of a nodule's 'biography'.

The fine-grained fluvatile deposits of Belvédère moreover almost everywhere contained artefacts representing a kind of 'background noise'²⁴ in the form of very sparse scatters of about one tool per several dozen square metres. This background noise was dominated by tools like knives and scrapers, but also included a few small series of flakes that could be fitted together. They indicate that a core was used very briefly to produce flakes at that particular location. Such finds are perhaps to be seen as representing primarily the use of tools, while the richer sites with their large quantities of debitage represent essentially the production of tools. A good example of the use of tools produced elsewhere is provided by the 'background noise' site G, the only investigated Belvédère site whose faunal remains could with some degree of certainty be interpreted as the remains of butchering (see below).

Finds from the ice-pushed ridges in the central part of the Netherlands

Somewhat less informative are the many thousands of Middle Palaeolithic finds that have been discovered by amateur archaeologists since the second half of the 1970s in various sand and gravel quarries in the central part of the Netherlands, in particular near Rhenen and Veenendaal (fig. 5.9). Those flint artefacts come from fluvatile deposits pushed up by the Saalian ice sheets and consequently have a clear *terminus ante quem*: they must date from before the Saalian glaciation, i.e. from before 150,000 years ago. Remains of this so-called Rhenen industry seem to occur at all outcrops of the coarse fluvatile deposits of the Urk formation.²⁵ The flint finds include Levallois flakes, blades and cores, scrapers and a small number of hand axes (plate 8B). A few choppers and chopping tools were made on quartzite pebbles from river gravels. The greater part of the Rhenen industry however consists of flint debitage, washed away from 'workshops' on the former banks of the Rhine and Meuse. An important question concerns the number of different geological phases spanned by these Rhenen artefacts. It would seem that this question cannot yet be satisfactorily answered. Many of the artefacts were found embedded in coarse-grained sediments which also contained fossil mammal remains. Those remains included both 'cold' and 'warm' elements. Typically 'warm' animals are for example straight-tusked elephant (*Elephas antiquus*) and hippopotamus (*Hippopotamus* sp.), while the 'cold' elements include mammoth (*Mammuthus primigenius*), woolly rhinoceros (*Coelodonta antiquitatis*) and musk ox (*Ovibos* aff. *moschatus*). The biostratigraphic contexts of the different species confirmed that faunal remains from different periods had become mixed. The great majority of the remains seem to date from the Saalian, but the remains of hippopotamus and the beaver *Trogotherium cuvieri* must date from an earlier (warmer) phase. Just as the faunal sample constitutes a mixture of remains from different chronological units, so too may the Rhenen industry be the result of different occupation phases, washed together by the river and turned into a large palimpsest spanning many tens of thousands of years in the gravelly sand matrix of the Urk formation.

MIDDLE PALAEOOLITHIC 'LIFESTYLES'

One of the most important tasks of Palaeolithic archaeologists is to combine the information from such widely divergent sites so as to obtain an impression of the life of the Middle Palaeolithic people who, during their movements across Europe, roamed across the Netherlands, too. For such a synthesis we cannot re-

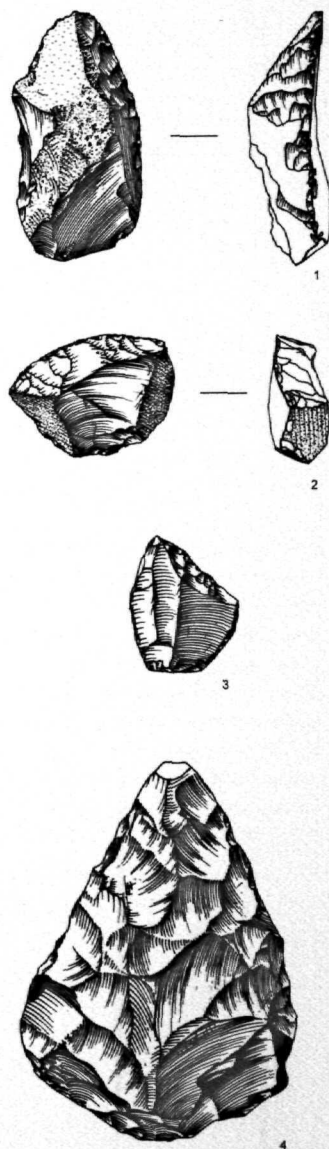


fig. 5.9

Artefacts recovered from ice-pushed ridges.

Scale 1:2.

- 1 end-scraper made on a flake
- 2 large side-scraper
- 3 truncated flake
- 4 hand axe

strict ourselves to the narrow confines of the Netherlands and its immediate surroundings, but must expand our view to encompass the whole of Europe. Much of present-day Palaeolithic research focuses on three subjects: the natural environment and the great changes it underwent, settlement systems and subsistence. In the current scenarios for the role of the environment in the evolution of mankind, the natural surroundings are always the driving force behind changes: those surroundings are thought to determine human behaviour and inspire innovations. Early humans were considered as slaves to nature, constantly engaged in a struggle for survival. Nature to a large extent determined what resources were available where and when, and the settlement system ensured that those resources were exploited as efficiently as possible. The primary aim of special task groups was to exploit the natural surroundings and it was for this purpose, too, that camps were moved from one area to another. At odds with this view is a more cultural-anthropological approach based on the assumption that the lives of present-day groups of hunter-gatherers are governed primarily by their relations with other groups and moreover by a fundamentally different contact with nature, which is often conceived quite differently than as the supplier of protein of the model described above. A good example of such a different conception of nature is provided by the Australian Aborigines' well-known Dreamtime view of their surroundings. In that Dreamtime, mythic beings shaped the landscape, as it were, leaving behind conspicuous tangible evidence of their forces. Those traces of their actions still play an important part in present-day Aboriginal belief. They for example serve as landmarks in the 'songlines' that guide the Aborigines through their animate surroundings. It should incidentally be borne in mind that such an outlook is ultimately rooted in the ability to symbolize, a capacity which many experts regard as unique to modern humans and which Neanderthals and earlier hominids are believed to have lacked.²⁶

NATURAL ENVIRONMENT AND OCCUPATION

The natural environment plays an important part in the discussions about the history of the occupation of northern Europe, a region in which the climatic fluctuations of the Pleistocene had a major impact on the physical world.²⁷ As already briefly mentioned in chapter 3, extremely cold (full-glacial) or warm (interglacial) phases were actually rare in the Pleistocene. The Pleistocene was predominantly characterised by 'intermediary' conditions that favoured lush steppe vegetations and large herds of grazing animals, a unique interaction of flora and fauna which has been described as a 'mammoth steppe'.²⁸ These intermediary conditions are thought to have been ideal for pre-modern humans, as large herds implied large quantities of game for groups who in these northern regions obtained their livelihood from a combination of hunting and scavenging. The proportion of plant food is believed to have been far smaller in these regions than further south. In the more extreme phases, activities had to be far more efficiently planned owing to changes in the range of available food resources. In the coldest phases of the Pleistocene the great biotic diversity of the mammoth steppe declined to some extent, while the extremely low temperatures implied further difficulties for the occupants of the northern regions. No large herds of game were to be found in the dense interglacial forests and the successful 'harvest' and storage of plant resources in such an environment demanded efficient planning of activities and the integration of large groups of individuals. According to many experts, only modern humans are capable of such behaviour. They believe that this is demonstrated by the history

of the occupation of northern Europe, which seems to have been uninhabited in interglacials until modern humans made their appearance. In their opinion the large number of Holocene findspots prove that it was only in the Mesolithic that man managed to successfully adapt to forested environments.

Some however disagree with this view and maintain that various northern European sites convincingly demonstrate that there are no good grounds for assuming major differences in ecological tolerance between 'modern' and 'pre-modern' hominids. There are interglacial sites dating from the very first time of occupation onwards that falsify the above view, such as the aforementioned Boxgrove site, while a few Middle Pleistocene sites demonstrate that these regions were also occupied under extremely cold conditions. The evidence from these sites seems to show that early hominids were familiar with a broad ecological range, but this of course does not necessarily mean that their way of life, for example in forested environments, was comparable with that of modern humans. As we shall see below, archaeological evidence indeed shows that their lifestyle differed in important respects from that of Upper Pleistocene and Holocene hunter-gatherers.

In spite of the considerable ecological tolerance of the Lower and Middle Palaeolithic groups, the plains of northern Europe were not continuously occupied. Settlement showed a kind of ebb and flow pattern: at the beginning of extremely cold phases these regions were gradually abandoned (their occupants moving further south?), to be recolonised by new groups when the climate ameliorated. Only the southern parts of Europe were probably more continuously occupied.

SETTLEMENT PATTERNS

Camps

Palaeolithic archaeology has always concentrated more on the analysis of individual sites than on the way in which early hunter-gatherers wandered across the landscape. That is not so surprising, considering the specific nature of the archaeological evidence. A prerequisite for integrating individual sites within a wide spatial framework is some understanding of such factors as the contemporaneity of sites and, at the level of the site itself, the problem of palimpsests, i.e. the possibility that artefacts found lying close together at a particular site were actually left behind there in different phases and are consequently not contemporary. Archaeological 'time' is entirely different from the concept of time of for example anthropologists, who are able to observe living groups.

Many well-preserved Middle Palaeolithic sites represent short phases of episodic use of locations. At sites such as the aforementioned Boxgrove and Belvédère, short-term activities can sometimes be reconstructed, but no sites have provided evidence for more long-term consistent use of a location as a base camp with dwellings from which a group operated for some time. As already mentioned above, the spatial behaviour of many Lower and early Middle Palaeolithic groups can best be characterised as brief, episodic and highly mobile. We have virtually no indications of structures such as hearths and/or huts for these groups. The scarce features of structures all date from the later phases of the Middle Palaeolithic. This almost complete absence of unambiguous evidence for structures is in marked contrast with the relatively large amount of such evidence that is available for the Upper Palaeolithic. This considerable difference cannot be exclusively attributable to differences in site preservation. A spectacular Middle Palaeolithic exception is Molodova I, in the Russian Plain, where excavators discovered an arrangement

of mammoth bones enclosing an oval area measuring 8 by 7 metres, which they interpreted as the remains of a dwelling.²⁹ This interpretation has however been disputed, one of the grounds being the fact that fifteen hearths were found within and inside the wall of the presumed dwelling. What those hearths do prove beyond doubt is that this site was used on several occasions. Another possible exception is the site Buhlen, near Marburg in Germany, where a ring of dolomite blocks with a diameter of about five metres was discovered in a late Middle Palaeolithic layer. At the centre of this circle was a hearth, which the excavators claim was used at the time when the structure was occupied. In an independent analysis of this structure Stapert recently arrived at the conclusion that the remains indeed represent a 'hut', which in various respects even bore a surprisingly close resemblance to the hut known from the (much later) Magdalenian site Gönnersdorf near Neuwied.³⁰

Mobility

Whereas in the past individual sites tended to attract more attention than settlement systems, in the course of the past decade a number of studies have shifted the emphasis more towards 'landscapes'. Data have become available on the distances over which, in the course of the Pleistocene, raw materials were transported from their sources.³¹ From the still scarce data from Western and Central Europe we may infer that groups travelled over distances ranging from 80 to more than 100 kilometres in the early phases of the Middle Palaeolithic (fig. 5.10). These distances are based on straight lines, drawn between an artefact's findspot and the source from which the flint was obtained. Such raw material lines run from, for example, the flint area of southern Limburg and Belgium to the Neuwied Basin near Koblenz, i.e. from the Mittelgebirge to the edge of the vast North European Plain. Similar raw material lines connecting two different geographic units are known in central Europe too, some covering distances of no less than 200-400 km, for example from the southern edge of the Polish Plain to the mountains in the north of Hungary.³² The fact that the transport distances in Central Europe are greater than those further west may be attributable to differences in climatic conditions between the two regions and their consequences for the spatial distribution of food resources and hence for the distances covered by hunter-gatherers.³³

fig. 5.10

Tools made of flint from the southern part of Limburg that were found in the Neuwied Basin near Koblenz. Such finds show that during the penultimate glacial, more than 150,000 years ago, groups were already migrating within territories with a diameter of at least 100 kilometres. The illustrated artefacts were found during an excavation in the Schweinskopf, the crater of a former volcano. The fills of the craters of the extinct volcanoes in the Eifel region have yielded many Middle Palaeolithic finds. Actual size.



Such raw material lines give us a vague impression of the size of the 'territories' in which people lived. Within those territories certain locations were repeatedly visited, over periods that sometimes spanned thousands of years. La Cotte de St. Brelade (Jersey)³⁴ and Biache-Saint-Vaast (northern France)³⁵ are but two examples of the many sites at which assemblages from different occupation phases have been found. Biache is a rich site from the temperate beginning of the penultimate glaciation, a little younger than Belvédère, and like Belvédère well-preserved in the higher parts of fine-grained calcareous fluvial deposits, in this case of the Scarpe, a tributary of the Scheldt. The site has yielded a vast abundance of flint and bone from different levels, indicating that this location was frequently visited.

An unusual site is La Cotte de St. Brelade, in the southwesternmost tip of the Channel Island Jersey. La Cotte is a T-shaped crevice in a 50-metre-high granite headland projecting into the sea. The fill of this crevice yielded tens of thousands of artefacts which together span almost the entire Middle Palaeolithic. The site's environmental situation was greatly dependent on the sea level, which varied considerably throughout the alternating glacials and interglacials. In most of the interglacials Jersey was an island, as it is today, but when the sea level dropped 15 to 20 metres, the surrounding land emerged from the sea and the island became a peninsula. When the sea level was even lower, La Cotte lay at the centre of a vast plain, several kilometres from the coast. The distance to the coast was very important with respect to the availability of raw materials for the manufacture of stone tools. During interglacials, fresh flint was constantly washed from the surrounding deposits, but in cold phases flint had to be imported from sources 10 to 15 kilometres away. The fill of La Cotte, formed over many tens of thousands of years, clearly shows how the occupants responded to these fluctuations in the availability of raw materials, for example by intensively resharpening used tools in periods in which fresh flint was scarce.

A debatable question is whether such frequently visited sites constituted well-known, fixed points in a settlement system: locations that were known to people, to which they kept returning for specific reasons. The latter seems to have been the case with La Cotte de St. Brelade. It could even be argued that the knowledge about the raw materials in the site's surroundings was passed down from generation to generation, so that every new group knew where they could obtain their flint. That is not so surprising in itself: we know of several sites where many hundreds or even thousands of cores show that sharp flakes that were intended for use elsewhere were produced on a massive scale (i.e. over long periods of time).³⁶ Such flint procurement sites were undoubtedly fixed, well-known points on the mental maps of early hominids. If some of the other sites were indeed also fixed dots on such 'maps', well-known places within a large area, then it would be logical to assume that people knowingly planned and undertook journeys between these points, for reasons which we will never be able to fully apprehend. Knowledge about the food and raw material resources within the area would be an obvious reason for the adherents of the 'economic' model, but for those who believe that Middle Palaeolithic humans saw their landscape rather like the Dreamtime landscape of the Australian Aborigines, the end point of the raw material lines extending from southern Limburg to the Neuwied Basin could be an interesting source of inspiration: in the latter area the flint artefacts that had been transported over such long distances ended up in the fills of extinct volcanoes, some of which still dominate the surrounding landscape today.³⁷

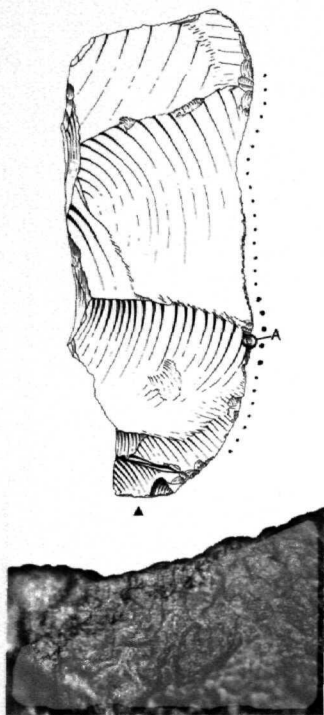


fig. 5.11

A large backed knife (scale 1:2) that was found during the excavation of site G, Maastricht-Belvédère, showing use-wear traces possibly formed in slaughtering a pachyderm. A photo indicating the use-wear traces is shown below (200x enlarged).

It has already briefly been mentioned above that some experts believe that the subsistence patterns of Neanderthal man and earlier hominids comprised a good deal of scavenging. Indeed, it is usually impossible to ascertain on the basis of archaeological evidence whether an animal was killed by hunting. Among the remains of a young rhinoceros found at Belvédère site G was a large flint knife with micro-wear polishes indicating that it had been used to cut open an animal with a thick skin (fig. 5.11).³⁸ This is a good argument for assuming that the presence of the rhinoceros bones is associated with butchering, but it is impossible to say whether the butchering was done by hunters or scavengers. Juvenile animals are the easiest prey for hunters and the most frequent prey for scavengers. Even a highly exceptional find context such as that encountered at Lehringen (northern Germany),³⁹ where a yew spear was found among the bones of a straight-tusked elephant, can be interpreted in different ways. The remains had been preserved in lake deposits from a warm phase some 125,000 years ago, the Eemian interglacial. Some regard this assemblage as clear evidence of hunting. Others however see the spear as a weapon that was used to kill an old, dying animal (a kind of 'active' scavenging), whereas yet others believe that the 'spear' is in fact not a weapon, but a kind of probe, used by Neanderthal scavengers to search for carcasses buried beneath the snow.⁴⁰ The interpretations that are ultimately derived for such assemblages are largely rooted in preconceptions about these hominids' capacities.

A recently published number of assemblages from Middle Palaeolithic sites throws a surprising new light on those capacities. The assemblages of these sites, among which are Wallertheim (Germany), Mauran (France) and Ils'kaya (Ukraine),⁴¹ are dominated by the remains of many dozens of bison which were indisputably killed by human activities. At Mauran, in the foothills of the French Pyrenees, excavators found the bones of 83 bison concentrated within an excavated area of only 25 m². This assemblage showed a remarkable resemblance to assemblages known from various North American bison kill sites.⁴² It seems that the majority of the animals were driven over a natural cliff in late summer or autumn, after which the animals were butchered in a fairly standard manner. In the 1000 m² still to be investigated the excavators expect to find the bones of about 4000 more bison, the remains of repeated use of this natural trap.

The sites mentioned above all date from the last glaciation: Wallertheim from its earliest phase, while Mauran is probably about 40,000 years old. But we also know of older sites for which recent research has yielded convincing evidence of hunting. The approximately 200,000-year-old site Biache-Saint-Vaast in northern France, for example, yielded numerous bones of bear, aurochs and rhinoceros bearing many cut marks which show that these bones ended up at this site as a result of human activities, most probably active hunting considering the predominance of remains of juvenile-adult animals.⁴³ The excavators are of the opinion that the composition of the bear remains indicates that these animals were hunted for their fur. Whereas it is often difficult to make sound statements about the involvement of hominids in the formation of faunal assemblages at Lower Palaeolithic sites, we know of many Middle Palaeolithic sites whose bone assemblages provide clear evidence for human activities in the form of cut marks and indications of the deliberate splitting of bones. Together with earlier finds like those from Lehringen, the approximately 350,000-year-old wooden spears that were recently found at the German site Schöningen show with what kind of – archaeologically virtually undetectable, for highly perishable – weapons large mammals may have been hunted (fig. 5.12).⁴⁴



fig. 5.12

In the years 1995-'99 some unique objects came to light in the large lignite quarries near Schöningen, in the easternmost part of Lower Saxony: six complete javelins with lengths of between 1.8 and 2.5 m and two parts of such weapons, all made of pinewood. They were found among the remains of slaughtered horses in 400,000-year-old lacustrine deposits. The weapons were made not from a branch, but from the hardest wood of the tree-trunk, and were well-balanced and beautifully designed. These advanced spears came as a shock to our views on humans in those days.

TO CONCLUDE: ARCHAIC VERSUS MODERN

When we lump together the scarce evidence from 500,000 years of occupation in an attempt to typify 'the' Lower and Middle Palaeolithic we arrive at an 'episodic' use of locations and, at least from the Middle Palaeolithic onwards, a high mobility combined with a broad ecological range and sound indications of the systematic hunting of large mammals. Raw material transfers show that by the Middle Palaeolithic, if not earlier, people were covering large distances, probably between known, fixed points on the hominids' mental maps. The distances over which the raw materials were transported were however much smaller than in some phases of the Upper Palaeolithic, in which for example Mediterranean shells made their way to sites in the German Rhineland. The great distances covered in the Upper Palaeolithic most probably reflect contacts between groups within exchange networks that embraced vast areas. The lack of evidence for such contacts in the Middle Palaeolithic has led some specialists to assume that Middle Palaeolithic humans led a more 'local' existence, in fairly closed communities.⁴⁵

A point that should be borne in mind with respect to what has been said above is that such comparisons can only be made by lumping together the relatively scarce Middle Palaeolithic data from many tens of thousands of years, gathered over vast areas, and setting them alongside the record of 'Upper Palaeolithic humans', who, like their Middle Palaeolithic predecessors, were also active in diverse contexts, over a period of 30,000 years in Europe alone. The American archaeologist M. Conkey coined the term 'spatiotemporal collapse' for such an approach.⁴⁶ She pointed out the risk involved in it: by subordinating what were undoubtedly substantial diachronic and synchronic variations within Middle and Upper Palaeolithic communities to a way of thinking in simple contrasts like Middle versus Upper Palaeolithic, 'archaic' versus modern, such pigeonholing in fact sustains our periodisations. The aforementioned divisions are indeed nothing more than working

hypotheses, aids in ordering data and presenting archaeological evidence, means for obtaining a better understanding of unknown periods of many thousands of generations ago. Discussions of this kind are all the more emotionally charged in the case of such early periods, because at the end of the day the aforementioned contrasts revolve around one of the most important conceptual differences within our Western culture, namely the difference between human beings and animals, which each time raises questions not only about the past, but also about our own identity.⁴⁷

NOTES

- 1 Warren 1920.
- 2 See for example Toth 1991.
- 3 Swisher *et al.* 1994; Lewin 1994.
- 4 For a discussion of this issue see Meltzer 1994.
- 5 For example Rolland 1991; Gamble 1993.
- 6 See for example various contributions in Bonifay/Vandermeersch 1991.
- 7 Roebroeks 1994; Roebroeks/Van Kolfschoten 1994; Dennell/Roebroeks 1996.
- 8 The recently published palaeomagnetic data for the Atapuerca-TD sequence (northern Spain) suggest, however, that the abundant human remains from what is known as the TD6 layer are to be placed below the Brunhes-Matuyama boundary, i.e. that they are older than about 780,000 years (cf. Carbonell *et al.* 1995; Parés/Pérez-González 1995). Earlier palaeomagnetic research had placed the change in polarity much deeper in the sequence and had yielded a date of around 500,000 years BP for the TD6 layer. The great similarity between the fauna of this layer and that of approximately 500,000-year-old sites in other parts of Europe strongly suggests that TD6 was formed around this time (cf. Roebroeks/Van Kolfschoten 1995b; Dennell/Roebroeks 1996). The latter publication also contains a detailed discussion of the finds from the surroundings of Orce in the extreme south of Spain, which are allegedly more than one million years old, cf. Gibert *et al.* 1994).
- 9 For speculative answers to this question see *e.g.* Gamble 1995.
- 10 Boxgrove: Roberts *et al.* 1994; Gamble 1994. Atapuerca: see note 8.
- 11 Roberts *et al.* 1994.
- 12 Cordy 1980 and 1981; Cordy/Ulrix-Closset 1981.
- 13 According to Roebroeks and Stapert (1986), it is extremely doubtful that these stones are artefacts. There is moreover a straightforward, natural explanation for the stones' shapes. They may very well come from an older deposit known from other parts of the Ardennes, which has in the past already yielded many impressive pseudo-artefacts. The stones recovered from the cave fill were found in secondary association with the faunal remains.
- 14 De Heinzelin 1977; Roebroeks 1989.
- 15 Peeters *et al.* 1988 have presented a series of finds that allegedly date from earlier phases, but in the author's opinion those finds are a curious combination of pseudo-artefacts and artefact assemblages that have been assigned too early dates.
- 16 Roebroeks 1980 and 1981; Wouters 1980.
- 17 See Stapert 1976 for a survey of such natural surface transformations.
- 18 Ulrix-Closset 1975.
- 19 Otte 1990.
- 20 Franssen/Wouters 1978; Stapert 1981 and 1987.
- 21 See *e.g.* Thieme 1981; Thieme *et al.* 1981.
- 22 See Roebroeks 1988; Roebroeks *et al.* 1993; De Loecker 1992; Van Kolfschoten/Roebroeks 1985; Vandenberghe *et al.* 1993.
- 23 1 Kyr or 'kilo year' = 1000 years.
- 24 This topic is discussed in Roebroeks *et al.* 1992.
- 25 Stapert 1987; Van Kolfschoten 1981 for faunal remains.
- 26 See for example Chase/Dibble 1987; Gamble 1993.
- 27 For a survey of these discussions see Roebroeks *et al.* 1992 and the comments of other workers appended to this *Current Anthropology* article.
- 28 See *e.g.* Guthrie 1990.
- 29 See *e.g.* Klein 1973.
- 30 Stapert 1992a.
- 31 Geneste 1985 and 1988; Roebroeks *et al.* 1988; Rensink *et al.* 1991; Féblot-Augustins 1993.
- 32 See *e.g.* Roebroeks *et al.* 1988; Stringer/Gamble 1993.
- 33 Callow/Conford 1986.
- 34 Tuffreau/Sommé 1988.
- 35 An example is the quartzite findspot Reutersruh in Hessen (Germany), published by Luttrupp and Bosinski (1971). The 'De Hej' findspot near Sint-Geertruid was probably a similar, smaller-scale, flint procurement site.
- 36 See *e.g.* Bosinski *et al.* 1986.
- 37 Van Gijn 1989.
- 38 Thieme/Veil 1985.
- 39 Gamble 1987.
- 40 Gaudzinski 1995; Farizy 1994; Hoffecker *et al.* 1991, respectively.
- 41 Farizy/Jaubert 1994.
- 42 See *e.g.* Auguste 1988.
- 43 Thieme 1997.
- 44 See *e.g.* Gamble 1992 and 1993.
- 45 Conkey 1985.
- 46 See *e.g.* Roebroeks 1994. Since the writing of this chapter a large number of studies have appeared dealing with two important issues

discussed here, 1) the debate on the earliest occupation of Europe and 2) the subsistence strategies of Lower and Middle Palaeolithic hominids. For an up-to-date review of these two topics the reader is

referred to Roebroeks 2001, with abundant references to the most recent relevant literature.