



Universiteit
Leiden
The Netherlands

A marginal matter: the human occupation of Northwestern Europe - 30,000 to 20,000 bp

Roebroeks, J.W.M.

Citation

Roebroeks, J. W. M. (2000). A marginal matter: the human occupation of Northwestern Europe - 30,000 to 20,000 bp. In . Leiden University, Leiden. Retrieved from <https://hdl.handle.net/1887/10010>

Version: Not Applicable (or Unknown)
License: [Leiden University Non-exclusive license](#)
Downloaded from: <https://hdl.handle.net/1887/10010>

Note: To cite this publication please use the final published version (if applicable).

HUNTERS OF THE GOLDEN AGE

THE MID UPPER PALAEOLITHIC
OF EURASIA 30,000 - 20,000 BP

EDITED BY WIL ROEBROEKS, MARGHERITA MUSSI,
JIŘÍ SVOBODA & KELLY FENNEMA



UNIVERSITY OF LEIDEN 2000

Northwestern Europe has yielded only few traces of occupation in the 30 to 20 kyr bp time period, and their study is limited by the early date at which most key sites were excavated. The area was severely affected by Late Pleistocene climatic fluctuations; occupation was intermittent, as illustrated by recently reported dates from Paviland Cave (Wales), and may have taken place within far-flung hunting and collecting excursions from base camps situated in the south and southeast of the area at stake here. In these excursions, marine resources may have played a more significant role than hitherto acknowledged.

1. Introduction

This paper gives a short survey of the traces of human occupation of northwestern Europe, taken here to include Great Britain, the Low Countries and northern France. The richest area is the southern part of Belgium, and most data presented here come from that area, though AMS dating has recently put Britain firmly on the gravettian map too (Aldhouse-Green and Pettitt 1998). We will see that traces of occupation are rather meagre in northwestern Europe, and that they are basically limited to the southern rim of the northern plains. The paper first addresses the palaeoenvironment of the area, then focuses on the history and quality of the archaeological record and moves from there to a discussion of the chronological evidence. Next, raw materials, burials and art come into focus, and these combined data are put to use in a series of inter-site comparisons. The pattern thus established will be discussed in the final part.

2. Palaeoenvironment

The northwestern part of Europe was severely affected by Late Pleistocene climatic fluctuations, and the land-sea division was significantly different from the actual one. As extensive ice sheets accumulated during the period at stake, the sea level was 75 to 125 metres below the present level, with Britain attached to the European mainland and much of the North Sea dry land, as testified by the large amounts of Weichselian mammal bones recovered from the bottom of the North Sea in the nets of present-day fishermen (Kolfshoten and Laban 1995). The course of the rivers

Rhine and Meuse continued southwest from their present mouth, and ended, joined by the waters of the Thames, somewhere between the extreme southwest of present-day England and Brittany (cf. Zagwijn 1975).

The sedimentary and vegetational records from this area are discontinuous, and most represent rather short time intervals only. Kolstrup (1995) has recently used the various data from vegetational records, frost wedge casts, aeolian and other periglacial processes to make inferences on palaeoenvironmental conditions in northern Europe during the 50 to 10 kyr bp time period (see also Huijzer and Vandenberghe 1998). In most cases, the vegetations from this period represent pioneer stages, with a dominance of plants that tolerate or prefer raw soils associated with unstable soil surface conditions. Often, time simply seemed too short for the establishment of a stable and continuous plant cover that could protect the soil against erosion and provide a soil development where for example trees could thrive (Kolstrup 1995: 41). The mean July temperatures reconstructed from various plant taxa are about ten degrees Celsius for many intervals, but other parts may have been a few degrees warmer as deduced from plant and beetle remains. A recent estimate of the mean temperature during the coldest month in the 27-20 kyr bp interval, based on periglacial and Coleoptera data, suggests a temperature of between -25 and -20 degrees Celsius. The same data yielded estimates of the mean annual temperature from about -8 to -4 degrees Celsius (Huijzer and Vandenberghe 1998).

The 30 to 20 kyr bp interval is characterised by the regular occurrence of frost wedge casts and hence permafrost, while slope deposits with cold soil surface conditions occur in the latter half of this interval. This part of the interval also sees the onset of the Pleniglacial loess deposition, which had a very high rate around the formation of the Eltville tephra layer, at about 16 kyr bp (Juvigné and Wintle 1988; cf. Bosinski, this volume). Kolstrup stresses the swift environmental changes that occurred through time, and the high diversity of subenvironments even over short distances. In spite of a generally dry environment, there was enough water for plants to grow – as testified by the large number of mammalian remains recovered from deposits of the 30 to 20 kyr bp range. The interaction of these Pleistocene

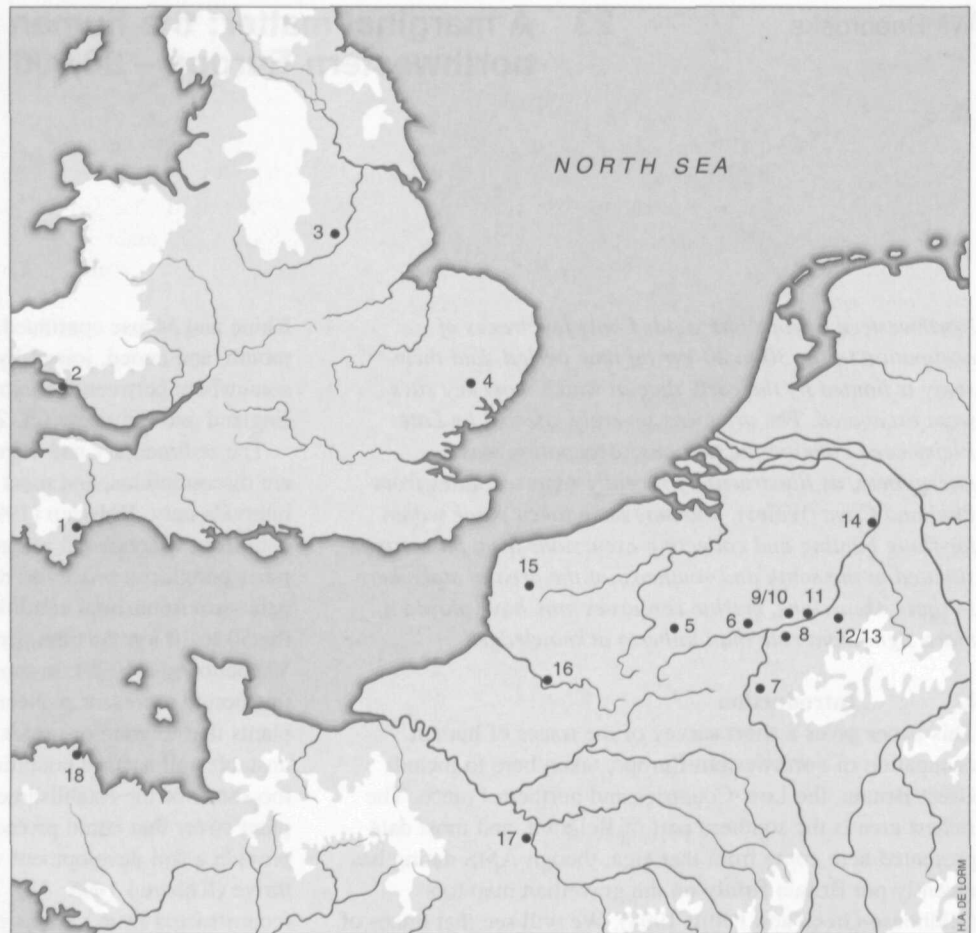


Fig. 1. Mid Upper Palaeolithic sites in northwestern Europe, mentioned in the text:

1. Kent's Cavern; 2. Paviland cave;
3. Pin Hole; 4. Bramford Road;
5. Maisières-Canal; 6. Spy; 7. Trou Magrite; 8. Goyet; 9. and 10. Trou du Chena (Moha) and La Station de l'Hermitage (Huccorgne);
11. Engis; 12. Fonds-de-Forêt;
13. Grotte Walou; 14. Venray;
15. Elnes; 16. Renancourt-lès-Amiens; 17. Le Cirque de la Patrie (Nemours); 18. Plasenn-al-Lomm (Ile-de-Bréha).

environments with the diverse animal community (Guthrie and Van Kolfschoten, this volume) created a unique Pleistocene mixture that Guthrie (1990) has described as the Mammoth Steppe.

Apart from these general data on the palaeoenvironment of the area between 30 and 20 kyr bp, specific information on the environmental background of the Gravettians' presence is limited to the Belgian open air sites of Maisières-Canal and Huccorgne and the faunal evidence from some of the cave sites. For Maisières the faunal remains indicate a kind of steppe-tundra environment, with open wooded areas along water courses. The rich mammal fauna includes remains of brown bear, polar fox, mammoth, horse and reindeer (Gautier *et al.* 1973). The last three species were also recovered during the recent excavations at Huccorgne (Otte *et al.* 1993).

The absence of provenance data for most cave finds makes it difficult to characterise the faunas associated with the gravettian occupation, though reindeer and horse are among the animals Otte (1979) was able to assign to the cave

Gravettian. Compared to the Aurignacian, mammoth and woolly rhino are rare in the Belgian caves (Otte 1979: 625). Mammoth was present during the whole 30-20 kyr bp interval though: recently excavated mammoth remains from the open air site of Huccorgne (Straus *et al.* 1997) date from the first half of the interval, while at Paviland (Wales) they are said to occur up to 21-22 kyr bp (Aldhouse-Green and Pettitt 1998). Finally, Larsson (this volume) shows that mammoth was present further north almost throughout the 30-20 kyr bp range. Beside mammoth, Paviland cave has yielded quite a number of large mammals from the period 30 to 20 kyr bp, e.g. bovids, horses, hyaena, wolf and bear (Aldhouse-Green and Pettitt 1998: table 1).

3. The archaeological record

The area reviewed here attracted attention from antiquarians in a very early phase of the development of the discipline of archaeology, and many sites of relevance to the period at stake had already been excavated before the end of the nineteenth century. Thus, in 1823 Buckland uncovered a

human skeleton associated with bone and ivory artefacts in Paviland Cave (South Wales), which became known as the "Red Lady of Paviland". John MacEnery dug at Kent's Cavern between 1825 and 1829, and systematic excavations took place from 1865 to 1880 there by William Pengelly. The Belgian cave sites Fonds de Forêt and Engis (both with gravettian levels) were dug by Schmerling from 1829 onwards, while Ed. Dupont excavated an important series of cave sites in the Meuse basin in the second half of the nineteenth century. In fact, he uncovered the second palaeolithic female statuette ever at Trou Magrite in 1867, three years after the *Venus impudique* from Laugerie Basse was found by De Vibraye (Delporte 1993: 67). The important site of the Grotte de la Betche-aux-Rotches at Spy, well known for its Neanderthal finds, was excavated in the period 1885-1886 by De Puydt and Lohest, and yielded, above the mousterian and aurignacian layers, a gravettian assemblage with Font Robert and Gravette points. Reliable data on stratigraphy, palaeoenvironment and typological composition of an assemblage are only known from the open air site of Maisières-Canal, excavated in 1966 (De Heinzelin 1973) and the recent excavations at Huccorgne (Otte *et al.* 1993; Straus *et al.* 1997). Recent field work shows that the Upper Palaeolithic record from this area is far from exhausted, and that major new discoveries are still possible (Straus and Otte 1995; Straus *et al.* 1997).

As most sites were excavated in the late 19th-early 20th century, the quality of the work done and the resulting database is in general poor (cf. Dewez 1985). In his major survey of the Belgian record, Otte (1979) mentions a total of 26 gravettian sites, eight of which are certain and testify to what Otte (1976) has called "une occupation", while 18 others have only yielded a small number of traces of gravettian presence, such as isolated finds from quarries. With Grotte Walou (Trooz) being a recent addition to the number of certain sites (Dewez 1992; Draily 1998), there now are nine, seven of which are in an abri/cave setting in the Meuse basin: Engis, Fonds-de-Forêt, Grotte Walou, Goyet, Spy, Trou Magrite (Pont-à-Lesse) and the Trou du Chena at Moha. Two are large open air sites, both situated near a river: Maisières-Canal and la Station de l'Hermitage (Huccorgne), where recently new excavations have been undertaken (Otte *et al.* 1993; Straus *et al.* 1997).

The record from other countries is poorer: in Great Britain, Kent's Cavern has yielded dates of around 28,000 bp for bones 'associated' with an Upper Palaeolithic industry with leaf points and a fragment of a tanged point, also known from Paviland Cave, by far the most important site in Britain (Aldhouse-Green and Pettitt 1998). A large tanged point from Pin Hole, in the Creswell Crags, is the only complete specimen from the British Early and Mid Upper Palaeolithic caves so far (Campbell 1977), while the open air

site of Bramford Road (Ipswich) yielded an assemblage with unifacial leaf points similar to those from the caves with "a fairly convincing, large tanged "point", more or less comparable to that from Pin Hole" (Campbell 1977: the specimen is however not pointed, but rounded, see Campbell 1977: fig. 107). Northern France has two open air sites attributed to the *Périgordien supérieur* by Fagnart (1988), although the assemblages are not very diagnostic: Renancourt-lès-Amiens (Somme, Commont 1913; Fagnart 1988) and Elnes (Pas-de-Calais, Baudet 1960; Fagnart 1988). A few isolated Font Robert points furthermore document a gravettian presence in Luxembourg (Ziesaire 1998). Though outside the area at stake here, it is worthwhile mentioning that the nearest gravettian sites further south are in the Île-de-France (Paris Basin), e.g. the rich site of Le Cirque de la Patrie, near Nemours (Schmider 1971, 1990). Finally, the Belgian gravettian presence can be followed eastward into the German Rhineland (Bosinski, this volume), and northward through the Meuse valley in the Netherlands, where a broken Font Robert-like point from Venray (Driessens 1982) forms the only trace of gravettian groups at the rim of the northern plains. Northern Germany and Poland also fit into this 'empty' pattern (see Mania 1981, Feustel 1989, and Bosinski, this volume, for finds from the neighbouring German Rhineland, and also Scheer, this volume).

The relative scarcity of gravettian (and aurignacian) finds in this area is not a matter of lack of research, as is obvious from the history of archaeological investigations. Despite the high intensity of investigations of the loess sections in the area, occupation traces from the EUP and MUP are scarce. In the loess sections an important erosional level just below the so-called Nagelbeek tongued horizon (Haesaerts *et al.* 1981; Juvigné and Wintle 1988) testifies to a major erosion during the Last Glacial Maximum. In the corresponding stone line (reworked) Middle Palaeolithic artefacts are a common phenomenon, but the extreme rarity of diagnostic Upper Palaeolithic artefacts also testifies to the marginal character of gravettian and earlier Upper Palaeolithic occupation.

4. Chronology

Most of the sites mentioned above have no good dating evidence, neither relative – because of the absence of data on the stratigraphic context of the assemblages – nor in terms of absolute dating work. Two decades ago, Campbell concluded on the basis of the radiocarbon age estimates for bones 'associated' with Upper Palaeolithic artefacts that "the Earlier Upper Palaeolithic was possibly current in Britain, however sporadically, from about 38,000 to 18,000 B.P., but mostly round about 28,000 B.P." (Campbell 1977: 80). This assessment was based on a series of conventional

Table 1. Selected Oxford Radiocarbon Accelerator Unit dates (in years bp) for British Upper Palaeolithic sites mentioned in the text (source: Hedges *et al.* 1996; Aldhouse-Green and Pettitt 1998).

Kent's cavern	Human bone	30,900±900	OxA-1621
Paviland Cave	Charred bone	29,600±1900	OxA-365
Paviland Cave	Humics from OxA-365	28,000±1700	OxA-366
Paviland Cave	Charred bone	28,860±260	OxA-7789
Paviland Cave	Charred bone	27,780±320	OxA-7877
Paviland Cave	Modified bone	26,350±550	OxA-1815
Paviland Cave	'Red Lady' bone	25,840±280	OxA-8025
Paviland Cave	mammoth ivory pendant	24,140±400	OxA-7111
Paviland Cave	bone spatula (horse)	23,670±400	OxA-1790
Paviland Cave	bone spatula (cervid)	22,780±320	OxA-7081
Paviland Cave	modified mammoth ivory	21,100±550	OxA-7112
Hyaena Den	bone/antler point	24,600±300	OxA-300

radiocarbon dates of around 28 kyr bp for bones found in close association with artefacts at Kent's Cavern and Robin Hood's cave (Campbell 1977: table 4; but see Pettitt, this volume, for the dating of Kent's Cavern). Now, twenty years later, a recent series of AMS dates of definitely humanly modified samples shows that there were various 'blips' of human activity (Gowlett 1986) in the range 31,000 to 21,000 bp, as very well illustrated at Kent's Cavern by a dated human maxillary (Table 1), a bone/antler point from Hyaena Den and the recently published Oxford accelerator dates for Goat's Hole, Paviland (Aldhouse-Green and Pettitt 1998). A series of dates unambiguously pertaining to human activities at the site (Table 1) shows that 1) there was (aurignacian?) occupation around 29,500 to 28,000 bp, 2) that the 'Red Lady' (see below) died at around 26 kyr bp, and 3) that further short visits or brief occupations occurred around 23.5 (bone pendant and spatula) and 21 (ivory working) kyr bp (but see below)¹.

From the 1970's onwards, Otte has repeatedly linked the British early Upper Palaeolithic sites with the assemblage from Maisières-Canal, because of typological characteristics – the presence of points "à face plane" and of tanged points – and because of the widely quoted conventional radiocarbon age for Maisières-Canal of 27,965 ± 260 bp (GrN-5523). At Maisières, the archaeological assemblage was embedded within the lower third of a humic soil developed within loamy colluvial deposits, and the date was obtained for humic extracts from a sample taken "immédiatement sous l'horizon d'occupation" (De Heinzelin 1973: 45). The Groningen date was corroborated by an age of 30,780 ± 400 bp (GrN 5690) for humic extract from a lower horizon. However, dates obtained by the Louvain laboratory

for humic extracts from and around the archaeological horizon (Table 2) gave results that were indeed incoherent and at odds with the stratigraphy ("des résultats discordants, non interprétables", Otte 1976: 335). The dates ranged from c. 36,000 to 23,000 for humic sediments in and around the archaeological level, with four dates clustering around 24,000 bp. The problems with the Louvain dates were ascribed to the calcareous matrix in which the samples were collected (Gilot 1971), but this surely has to apply to the two Groningen dates as well. In actual fact, Gilot (1984) has stressed the extreme reservations one should have against these ¹⁴C dates of soils, even if the dates are stratigraphically correct, as in the case of the Groningen humic samples. The 28,000 date makes Maisières contemporaneous with the Périgordian IV of France, though Font Robert points are common at Maisières and not known before the Périgordian V in the Périgord itself. Indeed, "si la date C14 est fiable (26.000 BC), il serait contemporain du Périgordien IV et contiendrait donc les premières pointes pédonculées d'Europe" (Otte 1979: 627; but see Djindjian, this volume)².

The gravettian sites of Spy and the Station de l'Hermitage at Huccorgne have published ¹⁴C-dates in the range of 20 to 23 kyr bp (see Table 2), but the reliability of the measurements based on the used fractions is not high (see Gilot 1984: 120, and Pettitt, this volume, and also: Dewez 1989: 139). The gravettian levels from Grotte Walou have conventional radiocarbon dates of 23 to 26 kyr (Dewez 1992; Draily 1998; see Table 2), while a possibly humanly modified bone from Goyet-Mozet/Gesves has an accelerator date of around 24 kyr bp (Table 2). Accelerator dates on individual mammoth bones from the recent excavations at Huccorgne have led Straus *et al.* (1997) to infer that there

Table 2. Radiocarbon dates (in years bp) for Belgian gravettian sites mentioned in the text (source: Gilot 1971, 1984 and 1993, Dewez 1989, Eloy and Otte 1995, Straus *et al.* 1997; Draily 1998).

Maisières-Canal	Humus findlevel	27,965±260	GrN-5523
Maisières-Canal	Humic extract findlevel	31,080+2040-1620	Lv-304/1
Maisières-Canal	Humic extract findlevel	30,150+1890-1540	Lv-304/2
Maisières-Canal	Humic extract findlevel	35,970+3140-2250	Lv-305/1
Maisières-Canal	Humic extract findlevel	24,100+650-610	Lv-305/2
Maisières-Canal	Humic extract findlevel	25,280+1040-920	Lv-353
Maisières-Canal	Humus below findlevel	30,780±400	GrN-5690
Maisières-Canal	Humic extract below findlevel	24,400+700-600	Lv-306
Maisières-Canal	Humic extract below findlevel	23,160+550-510	Lv-307
Trou Walou	Antler	22,800±400	Lv-1651
Trou Walou	Bone fragments	24,500±580	Lv-1837
Trou Walou	Bone fragments	25,860±450	Lv-1867
Goyet	Bone	24,440±280	OxA-4926
Moha	Fractured <i>C. elaphus</i> bone	22,840±420	Lv-1625
Spy	Burnt bone	22,105±500	IRPA-132
Spy	Bone carbonate fraction	20,675±455	IRPA-202
Huccorgne	Bone collagen bulk sample	23,170±160	GrN-9234
Huccorgne	Mammoth bone stratum 4	26,300±460	OxA-3886
Huccorgne	Mammoth bone stratum 4	28,390±430	CAMS-5891
Huccorgne	Mammoth bone stratum 4	24,170±250	CAMS-5893
Huccorgne	Mammoth bone stratum 4	26,670±350	CAMS-5895

were at least two phases of gravettian occupation of that flint-rich location: one around the time of the Maisières-oscillation (28-26 kyr bp) and one around 24 kyr bp, during the Tursac interstadial. However, the mammoth bone accelerator dates from the archaeological stratum display a range of c. 24 to 28 kyr bp (see Table 1), and it remains to be established how the dated bones actually relate to the excavated flint material from the site, i.e. whether they have any archaeological significance. In terms of the Maisières discussion, it is useful to know that the new excavations at Huccorgne have not yielded a tanged point yet, though at least one is known from older collections from this site (Otte 1979).

In sum, the British evidence shows various episodes of human presence in the period at stake here, especially at Paviland, even up until 21,000 bp (but see below). The current radiocarbon evidence for Belgium is not unproblematic. After the Aurignacian, gravettian occupation took place, but its chronology is unclear because of the problems mentioned above. Pettitt's (this volume) examination of the distribution of ¹⁴C dates in the 30-20 kyr range shows that there is some clustering of dates which might represent various intermittent pulses of occupation on a European

scale. Otte's interpretation of the Belgian radiocarbon evidence suggests that this was also the case there (see below), but more research is necessary to test the chronometric solidity of such a suggestion, preferably along the lines of Aldhouse-Green and Pettitt (1998) or Housley *et al.* (1997), whose dating programme focused on samples which unequivocally carried information on human activities, such as bones with cut marks or tools made on antler or bone. Finally, a few more words on the dating evidence from Paviland cave are in order, i.e. the archaeological significance of the AMS dates of round 21,000 bp for worked ivory from the site. According to Aldhouse-Green and Pettitt (1998), this ivory working reflects the last phase of a series of 'pilgrimages' to this important site. However, Street and Terberger, using a large sample of radiocarbon dates, show elsewhere in this volume that there probably was an absence of human occupation of northern and central Europe – one of the source areas for the visits to Paviland – between 23 and 20,000 bp. This strongly suggests that the 21 kyr date on ivory – a notoriously problematic material for ¹⁴C dating – may not reflect the age of a human visit to the site: a 23 to 24 kyr bp date for the last pre-LGM activities at Paviland – as suggested by the next to youngest series of

dates from the site – fits much better into the wider geographical pattern described by Street and Terberger (this volume).

5. Raw materials

Compared to the Aurignacian, the Belgian Gravettian sees a focus on a variety of high quality fine-grained raw materials, which were necessary for the production of large well-prepared cores typical for these industries (Otte 1979)³. Such 'Perigordian' cores are quite common in the Belgian Gravettian sites, and many seem to have been transported over quite large distances, of up to 60 km (see Scheer 1993, and this volume, for comparable observations on Southern Germany). While phtanite was commonly used, in the eastern part of the distribution the focus was on gray flint from the Maastrichtien outcrops, while black Obourg-type flint from the Campanien (Hainaut) is dominant in the western occurrences. Phtanite was transported over distances of 40 to 60 km (Caspar 1984) and comparable distances apply to the *silex noir* dominant at Spy and to the Maastrichtien flint in the east. Most materials were obtainable within shorter distances from the sites though, usually within a 10 km range. Interestingly, according to Floss (1994), Belgian raw materials, and especially the western flint, seem to have been transported to Gravettian sites in the German Rhineland, over distances of up to 200 km (cf. Bosinski, this volume). The German Rhineland on the other hand may have been the source area for the perforated fossil (Miocene-Oligocene) shells found at Spy (Otte 1979: 302, footnote 50) and the black rock used to produce the pearls also found at Spy (Otte 1979: 300, footnote 47). The (southern part of the) Paris Basin is another possible source area for the fossil shells, at a comparable distance from the Spy location. Finally, Otte (1977) has suggested that two fossil *coquilles* found in the Upper Palaeolithic levels at Spy, were possibly imported from the southeastern part of East Anglia, Britain, the nearest exposure of sediments containing these fossils⁴. The British raw material data have been summarized by Campbell (1977), who does not mention distances comparable to the Belgian ones. The good quality flint used at Kent's Cavern may have been readily available in the English Channel Plain (where according to extant finds mentioned above, a rich faunal community must have been present too – and possibly a comparable archaeological record – see below)⁵.

6. The Red Lady of Paviland

The only burial known from the Mid Upper Palaeolithic of northwestern Europe is the Red Lady of Paviland, in actual fact the skeleton of a c. 25 years old and 1.70 m tall male individual. It was documented about 175 years ago, remarkably detailed for that period, but insufficient for an

actual reconstruction of how it became interred. Though Buckland's (1823) description left little doubt that bone and ivory tools and ornaments were found in very close association with the skeleton, the results of the recent reassessment of the burial and its context show that the bone and ivory objects do not reflect a single activity associated with the interment (Aldhouse-Green and Pettitt 1998). Parts of the skeleton were missing, probably due to erosion, while the remaining bones, "in their natural order of contact", were covered in red ochre, "all of them stained superficially with a dark brick-red colour, and enveloped by a coating of ruddle, composed of red micaceous oxyde of iron, which stained the earth, and in some parts extended itself to the distance of about half an inch around the surface of the bones. The body must have been entirely surrounded or covered over at the time of its interment with this red substance. Close to the part of the thigh-bone where the pocket is usually worn, I found laid together and surrounded also by ruddle about two handfuls of small shells of the *nerita littoralis* in a state of complete decay, and falling to dust on the slightest pressure. At another part of the skeleton, viz. in contact with the ribs, I found forty or fifty fragments of small ivory rods, nearly cylindrical, and varying in diameter from a quarter to three-quarters of an inch, and from one to four inches in length...Both rods and rings [i.e. fragments of a bracelet, see endnote 1, WR] as well as the nerite shells, were stained superficially with red, and lay in the same red substance that enveloped the bones; they had evidently been buried at the same time with the woman" (Buckland 1823: 89).

7. Art

In this domain there are but few traces of the 'Golden Age' of hunter-gatherers – apart from the Paviland Cave material – and the assignment of some of these to the Gravettian is not certain (Otte 1979). At Maisières the excavations yielded an ivory pin and fragments of an ivory *plaquette* with a lozenge-shaped decoration (De Heinzelin 1973), while a decorated antler is known from Huccorgne. Apart from these finds, Otte (1979) formerly ascribed two *artefacts* to the Gravettian, both from Trou Magrite (Pont-à-Lesse), both found during Dupont's extensive excavations there, both in the same level. It concerns an engraved basal part of a shed reindeer antler and the famous ivory anthropomorphic statuette (see Otte 1979: 163-166 and Delporte 1993), uncovered in 1867. As described by Otte (1979), parts of the statuette display a high gloss – especially its face – probably as a result of long and intense manipulation of the small object. The statuette shows some resemblance to the small schematic anthropomorphic figurine from the Vogelherd in Germany, also made of ivory but dating to the Aurignacian (Bosinski 1982; Delporte 1993: 128-129), and to a statuette

Table 3. Presence of characteristic artefact groups in Belgian gravettian sites (data from Otte 1979. The *pointes à retouches plates* are of the Maisières-type).

	<i>Pièces à dos</i>	<i>Pointes de la Font Robert</i>	<i>Pointes à retouches plates</i>
Maisières-Canal	4	120	119
Spy	124	71	76
Goyet	318	13	5
Huccorgne	2	1	1
Fonds de Forêt	9	2	4
Trou Magrite	13	13	7
Engis	61	0	0
Trou du Chena	0	1	1

from Předmostí – made from a mammoth metapode, one in a series of comparable statuettes (Delporte 1993: 150, fig. 158). On the basis of a re-evaluation of the stratigraphy at Magrite and stylistic arguments, Dewez (1985) has suggested that both finds derive from the aurignacian layer at Magrite, an interpretation now shared by most Belgian workers (Otte 1995; Lejeune 1997; Otte in press).

8. Inter-site comparisons

In terms of their location in the landscape, the Belgian cave and abri sites display a remarkable and probably significant consistency. All eight are very close to a (often small) river, with their entrance at 10 to 40 metres above the present water level. All but one are situated within 1 to 2.5 km from the confluence with a major river: the Meuse, the Vesdre and the Sambre. The small cave of Trou de Moha lies at 4 km north of the confluence of the Méhaigne with the Meuse, and 1 km south of the open air site of Station de l'Hermitage (Huccorgne), in the same river valley. The two open air sites are both near a river, Hermitage on an elevation in a meander bend of the Méhaigne, Maisières-Canal on the right bank of the Haine, an affluent of the Escaut, at a strategic location for the observation of animal movements (De Heinzelin 1973: 42).

The British cave sites appear to have a topographical setting comparable to the Belgian sites: Kent's Cavern lies about 1.5 km east of Torquay harbour, in the western slope of a small valley, which terminates about 0.8 km south of the cavern entrances – interestingly 180 km due north of a rare gravettian site on the other side of the (then dry) Channel, Plasenn-al-Lomm on the northern rim of the Ile-de-Bréha (Brittanny, Monnier 1980), also with a great view over the Channel plain, where the combined Rhine, Meuse and Thames found their way into the sea. Paviland Cave faces south with an excellent view over the (by then dry) Bristol Channel (plain), and lies adjacent to a ravine which provides easy access to the plateau of the Gower peninsula (Campbell 1977). Pin Hole is a narrow fissure-cave in the western end

of the northern side of the Creswell Crags, a ravine through which a small stream flows.

As to the size of the British assemblages, Campbell (1977) remarks that the total number of extant artefacts from definite Early and Mid Upper Palaeolithic contexts he was able to trace is 5,860, a totality heavily dominated by 4,464 stone waste products from Paviland Cave (1977: 141). And these numbers apply to the total of aurignacian and gravettian artefacts. Paviland had 554 Early and Mid Upper Palaeolithic stone tools, again both aurignacian and gravettian.

The finds from many of the Belgian sites have since their discovery been distributed over a large number of collections – material from Spy, for instance, over 5 public museums which keep various collections and over at least 8 private collections. Much of the material has disappeared, which makes inter-site comparisons highly problematic (Otte 1979). Moreover, most cave sites also contained aurignacian (and magdalenian) finds and as the stratigraphical position of most finds was not recorded, a comparison of sites in terms of numbers of artefacts is necessarily limited to 'type fossils'. Table 3 gives a survey of the numerical presence of such artefact groups from the Belgian gravettian sites, compiled on the basis of data published by Otte (1979). On the basis of the differences in proportions of tool types and the radiocarbon evidence then available, Otte suggested that the gravettian presence can be divided into three (chronological) facies, with Maisières forming the first one, characterised by pieces with flat retouch, the above mentioned *pédonculisation* and dihedral burins. In the second facies, present in caves (Spy, Trou Magrite), and in the open air (Huccorgne) the techniques of flat retouch and *pédonculisation* persist, parallel to the appearance of backed pieces (gravettes and micro-gravettes) and *burins sur troncature*. The last facies unites the sites dominated by backed pieces (Goyet, Engis, Fonds-de-Forêt and Grotte Walou, cf. Eloy and Otte 1995).

With respect to the radiocarbon evidence discussed above, one could doubt the value of the ^{14}C data on which this

three-partition is based. The evidence from Paviland clearly shows that various episodes of occupation took place there, and it is very probable that the Belgian sites document a complexity of recurrent visits which exceeds the Paviland data; simply more chronometric data are needed here in order to reject the possibility that the differences between the Belgian assemblages reflect site context and use⁶ rather than anything else, apart from their formation history over the last hundred odd years. With the chronology being unclear, an alternative explanation might be that most to all sites are related, both in terms of chronology and 'settlement-system'. The argument is as follows. At Maisières-Canal, a site situated near a good flint source, the assemblage contains more than 400 cores, most of which have two opposed platforms and are of the Perigordian type as described by Bordes (1967) for the Upper Perigordian site of Corbiac. These opposed platform cores yielded straight blades, according to Bordes (1967) especially suited for the production of Gravette points. Gravette points are absent at Maisières-Canal, but occur at Spy, 60 km to the east, together with 28 cores of the Corbiac-type; some of these are made from black flint, "certainement le même matériau que celui utilisé à Maisières-Canal" (Otte 1979: 204). This imported flint also happens to be the material from which one third of the non-patinated backed pieces (including Gravette points) is made, and half of the identifiable Font Robert points. Likewise, among the heavily patinated material from Goyet, Otte could ascribe Gravette points and points *à face plane* to the Maisières type (Campanien) flint. It is therefore perfectly possible that many sites were links in a chain of (embedded) raw material procurement and production (Maisières-Canal), use, and finally discard in one of the cave/abri sites. In such a scenario Maisières-Canal yielded much of the flint material for the western part of the cave/abri sites, while the flint occurrences exploited at Huccorgne, Station de l'Hermitage, were the beginning of a cycle that ended in the eastern half. This is undoubtedly a too simplistic scenario – easily falsifiable by the establishment of a solid chronology – but Scheer's (1986, 1993) refit data on the actual relationship between gravettian sites in the Ach Valley (Germany), show how brief settlement phases can be, and how site-assemblages may have been produced in actually contemporaneous or at least closely related episodes of use.

9. Discussion

The virtual absence of traces of occupation on the northern plains and the preference for the upland areas on the southern borders of the plains (southern Belgium, the Middle Rhine area, etc.) suggest that environmental and resource arguments played a significant role in the formation of the observed site distribution, both in chronological and

geographical terms (the distinct north to south climate gradient in northwest Europe during the period at stake must have been an important factor in this respect [cf. Huijzer and Vandenberghe 1998]). The striking consistency in site location indicates that activities were directed towards preferred pockets of resources: the dissected Meuse valley landscape and the topographical advantages that this landscape offered for hunting activities, combined with the presence of rich, high quality raw materials both to the east and the west of the main distribution. Comparable factors seem to have played a role in the case of the British distribution, where two sites have a dominating view over the formerly undulating plains of the British Channel.

The small number of sites and the small size of most assemblages indicates that the gravettian occupation of the area surveyed here was quite marginal. Art is rare, structures are unknown (though some 'hearths' are mentioned in the older literature), and so are burials, with the notable exception of the 'Red Lady'. Even for one of the most prolific sites, Spy, it has been argued that the gravettian cultural layer was thin, insignificant in both thickness and extension, not testifying to a long occupation or to frequent short intermittent visits (Otte 1979). The meagre record from the area does not seem to indicate that we are dealing with complete adaptive systems, with large residential base camps established in the area itself. Maybe one has to interpret these northernmost traces as the ultimate expansion of far-flung hunting and collecting excursions from base camps located to the south and southeast of the area. However, where then were those base camps? To the south and southeast the record is also pretty meagre, and the refits established by Scheer in the Ach Valley in southern Germany (see above) again stress the short intervals in which much of this archaeology may have been produced. Northern France, including the Paris Basin (Schmider 1990) and Brittany (Monnier 1980; Allard 1986) are also quite poor, so that in fact one is almost forced to return to the classic 'centres' of Upper Palaeolithic Europe, and in view of the 'western' facies of the gravettian occupation of the north more specifically to the southwest of France. Or is it a matter of being unable to identify a 'base camp' in these marginally occupied northern areas? The long semi-continuity of occupation in the classic centres, including the pavlovian core area, has created an extremely rich palimpsest incomparable to the record produced during the intermittent visits to the north. And indeed, if we omit sites like Pavlov, Dolní Věstonice and Předmostí, the central European record becomes a rather meagre one as well.

At this stage a comparison with the magdalenian occupation history of northern Europe may be of some help. In a paper dealing with the Late Glacial human recolonisation of that area, Housley *et al.* (1997) used a large series of

Table 4. Suggested differences in settlement and archaeology related to a two phase colonisation model for the Magdalenian in Northern Europe (source: Housley *et al.* 1997).

PIONEER PHASE	RESIDENTIAL BASE PHASE
One season use of the region only	More than one season of use of the region
Small faunal assemblages	Large faunal assemblages
Reindeer dominated assemblages	Reindeer, horse and bovid dominated assemblages
Small, medium artefact sites, refitting between sites	Large and small artefact sites, only refitting within sites
Open air hearths, tents	House structures, tents, pits
Art poor	Art rich
Burials in caves, usually male	Open site burials, both sexes

AMS dates to propose a general model of that process at a subcontinental scale. The resulting regular pattern of colonisation showed for each area the timing of the start of the *pioneer* phase and a few hundred years later the start of the *residential* phase, when large residential base camps were established from which the next pioneer phase was launched into previously unoccupied territories. The clear-cut differences in the archaeology of both phases is summarised in table 4, taken from Housley *et al.* (1997). With the obvious absence of data on faunal aspects (and hence inferences on seasonality), the archaeology of the region discussed here fits quite well into the Pioneer phase of Housley *et al.*, with the extra bonus of the lone male burial in Paviland Cave. But in contrast to the magdalenian record, there are no unambiguous archaeological traces of a 'Magdalenian-Style' Residential base phase for the gravettian presence in this area; in fact, to find an area that would classify as such we, again, would have to travel deep south or far to the east. In other words: where were the centres for these northern marginals? It is 750 km – as the crow flies! – from Paviland Cave to Laugerie Haute, to give an idea of the distances we are talking about. In the magdalenian colonisation pattern the distances between residential base areas and the pioneer zones vary from 200 to 400 km, i.e. less than half of the gravettian distances just mentioned. How can this difference be explained?

Obviously, one could evoke differences in taphonomic processes – always a spoiling argument when one finally has an interesting pattern in palaeolithic data, but one that has to be dealt with in the interpretation of prehistoric site distribution patterns. The taphonomy of the gravettian distribution is difficult to assess though. It is obvious that sites have disappeared: the unstable soil surface conditions and erosional processes of the Last Glacial Maximum must have had a detrimental effect, especially on open air sites. Had these processes acted on a dense distribution of sites, however, one would expect more gravettian traces in the stone lines below the Nagelbeek tongued horizon, as

discussed above. But apart from the destructive aspects of periglacial processes, we also have to deal with their effects on the visibility and accessibility of gravettian sites: the formation of slope deposits (Kolstrup 1995) and the high rate of loess sedimentation around and after the Last Glacial Maximum (Juvigné and Wintle 1988) must have covered and thus protected sites from erosion, at the same time making them invisible for the archaeologist (but the same applies for the earlier phases of the Palaeolithic, and thousands of Middle Palaeolithic sites are known from Germany, for instance, though from a much longer period!). In the Magdalenian of Northern Europe, occupation was more or less contemporaneous with the last pulses of loess sedimentation, which stopped at the beginning of the Bølling interstadial (Juvigné and Wintle 1988). Hence many open air sites are high in the Holocene soil-profiles. The Holocene erosion has certainly destroyed some magdalenian sites, but at the same time probably increased their overall visibility. So in sum, the gravettian sample has undoubtedly been more severely affected in terms of preservation and archaeological visibility than the Magdalenian. The missing base camps may simply have been situated in specific topographic settings that were either vulnerable to erosion or to coverage by thick layers of slope deposits and/or loess (cf. Bosinski's *Sessellage*, this volume).

Finally, when discussing such map formation processes, we have to realise that a significant part of the Gravettians' territory is missing: the large plains now hidden by the North Sea, and the former coastal areas themselves. These plains must have been filled with animals of the mammoth steppe (cf. Campbell 1977), and sea food procurement must have been an important activity for at least some of the Gravettians in the north: a recent analysis of the "Red Lady" by M. Richards (Aldhouse-Green and Pettitt 1998) showed a ^{13}C value of -18.4, indicative of a marine contribution to dietary protein of 15 to 20%. Together with the faunal remains from the North Sea bottom and the flint artefact recovered from North Sea sediments in a core

drilling (see endnote 5), this value illustrates the bias in our site spectrum and the loss of information as a result of sea level rise processes.

Parallel to these taphonomical processes, it is also perfectly possible that the northern Gravettians simply had another way of moving through these landscapes than the Magdalenians: not so much focused on residential bases, but more mobile, without the investment in site structures we know from German magdalenian sites such as Gönnersdorf, Andernach and Oelknitz. In this sense, the gravettian site spectrum may have resembled the aurignacian pattern, and for that matter, also the Middle Palaeolithic record from this area. Hence, our 'magdalenian' definition of a 'centre' simply may not work for the northern Gravettian. Do we indeed need art and structures at Maisières-Canal to qualify that rich (and only partly excavated) site as a residential base? And is Campbell right when he states that Paviland Cave "...can surely be regarded as an Earlier Upper Palaeolithic "base-camp" ... the centre of the most intense Earlier Upper Palaeolithic activity known thus far in Wales, if not in the whole of Britain"? (1977:144). Comparable interpretations could be developed for larger sites such as Le Cirque de la Patrie and Bilzingsleben, and indeed Bosinski (this volume) presents such a view for Mainz-Linsenberg. In such an interpretation we can treat the northern record as the traces of far-flung hunting and collecting excursions from base camps just to the south and southeast of the area at stake here.

In such a scenario, the northwest carries the traces of short and intermittent trips to the north, in which marine resources played a role; these trips were carried out from base camps which may have been different from the magdalenian ones, though the differences in processes of erosion and sedimentation between the gravettian and the magdalenian site distribution make this difficult to evaluate.

What we do know for sure is that when the Gravettians disappeared, probably around 23,000 years ago, this northern area became, once again, the exclusive domain of the diverse animals of the Mammoth Steppe, and a long interval of (virtual) human absence ceased about 13,500 years ago, with the arrival of the magdalenian pioneers⁷.

acknowledgements

I am grateful to Marcel Otte (Liège), who critically went through the manuscript, made some very valuable comments and furnished me with relevant and sometimes unpublished material on the Belgian Gravettian, as did his colleagues Pierre Noiret and Rebecca Miller (Liège). Sabine Gaudzinski (Monrepos), Margherita Mussi (Rome) and Alexander

Verpoorte (Leiden) commented upon an earlier draft of this paper, while Michael Baales (Monrepos) provided me with useful information and some unpublished data on sites mentioned in the text.

notes

1 That the burial might be gravettian was already assumed by Campbell (1977) on the basis of the similarity of the associated ivory bracelet fragments with three such rare items found at the Magdalenahöhle in the German Rhineland, just east of the area reviewed here, a site with a gravettian assemblage and a conventional radiocarbon date of $25,540 \pm 720$ bp (Bonn-1568, see Weiss 1978). In regard of this date, Street, Baales and Jöris (in press) remark that the archaeological relationship of the dated sample – a shed reindeer antler present in a concentration of antlers in a fissure in the cave – to the archaeological finds including the bracelets found deeper in the cave needs to be established. Finally, the bracelet from Paviland is both smaller and thicker – with a circular cross section – than the fragments from the Magdalenahöhle.

2 During the completion of this manuscript, Marcel Otte (pers. comm. 1999) informed me that new and yet unpublished ¹⁴C dates on bones from Maisières yield an age of around 28,000 bp.

3 Floss (1994) also mentions an increase of raw material transport in the German Gravettian as compared to the Aurignacian and the Middle Palaeolithic, while his provenance studies clearly show that the non-local materials in the German Gravettian were imported from other regions than in both the Middle Palaeolithic and the Magdalenian of the Rhineland.

4 The species are *Nassarius reticulatus* (Linnaeus) and *Trivia coccinelloides* (Sowerby). Both exemplars display a high gloss patina as a result of long periods of manipulation, and both contain traces of red sediment. It is however unclear whether they are to be associated with the aurignacian or with the gravettian material from Spy. In view of the Gravettian 'habit' of 'importing' objects over large distances, an attribution to the Gravettian might be probable (though this is, of course, a nice example of reinforcement!).

5 The remarkable discovery of a scraper fragment in a vibro core drawn from the northern North Sea, at 60.4 degrees north, between Norway and the Shetlands (Long *et al.* 1986), gives a hint of what the Late Glacial and Holocene rise of sea levels must have made inaccessible to archaeologists (cf. Larsson, this volume).

6 Cf. Scheer, this volume, with regard to the presence of Font Robert points in open air sites as opposed to caves.

7 This statement applies to the area at stake here, and until very recently this seemed also the case in Germany. Street and Terberger (1999), however, recently presented a series of AMS dates from the Upper Palaeolithic site of Wiesbaden-Igstadt in the northern Rhineland – southeast of the area reviewed here – which suggests at least a short presence of humans around the Late Glacial Maximum.

references

- Aldhouse-Green, S.,
P. Pettitt 1998 Paviland Cave: contextualizing the 'Red Lady', *Antiquity* 72, 756-772.
- Allard, M. 1986 Le gisement préhistorique de La Martinière à la Pommeraye (Maine-et-Loire). Mise en évidence de périgordien supérieur à burins de Noailles, *Bulletin de la Société Préhistorique Française* 83, 78-82.
- Baudet, J. 1960 Epipléistocène flamand. In: G. Freund (ed.), *Festschrift für Lothar Zotz. Steinzeitfragen der alten und neuen Welt*, 19-37, Bonn: Ludwig Röhrscheid.
- Bordes, F. 1967 Considérations sur la typologie et la technique dans le paléolithique, *Quartär* 18, 25-55.
- Bosinski, G. 1982 *Die Kunst der Eiszeit in Deutschland und in der Schweiz*. Bonn: Rudolf Habelt.
- this volume *The period 30,000-20,000 bp in the Rhineland*.
- Buckland, W. 1823 *Reliquiae Diluvianae: or Observations on the Organic Remains Contained in Caves, Fissures, and Diluvial Gravel and on other Geological Phenomena Attesting to the Action of an Universal Deluge*. London.
- Campbell, J.J.B. 1977 *The Upper Palaeolithic of Britain. A Study of Man and Nature in the Late Ice Age*. Oxford: Clarendon Press.
- Caspar, J.-P. 1984 Matériaux lithiques de la préhistoire. In: D. Cahen and P. Haesaerts (eds), *Peuples chasseurs de la Belgique préhistorique dans leur cadre naturel*, 107-116, Bruxelles: Patrimoine de l'Institut Royal des Sciences Naturelles de Belgique.
- Commont, V. 1913 Les hommes contemporains du Renne dans la vallée de la Somme, *Mémoire de la Société des Antiquaires de Picardie* 37, 207-646.
- De Heinzelin, J. 1973 *L'industrie du site paléolithique de Maisières-Canal*. Institut Royal des Sciences Naturelles de Belgique, Mémoire No. 171, Bruxelles.
- Delporte, H. 1993 *L'image de la femme dans l'art préhistorique*. Paris: Picard.
- Dewez, M. 1985 L'art mobilier paléolithique du Trou Magrite dans son contexte stratigraphique, *Bulletin de la Société belge d'Anthropologie et de Préhistoire* 96, 117-133.
- 1989 Nouvelles données sur le Gravettien de Belgique, *Bulletin Société Préhistorique Française* 86, 138-142.
- 1992 La grotte Walou à Trooz (province de Liège, Belgique), présentation du site. In: M. Toussaint (ed.), *Cinq million d'années, l'aventure humaine*, 311-318, Liège: ERAUL 56.
- Djindjian, F. this volume *The Mid Upper Palaeolithic (30,000 to 20,000 bp) in France*.
- Draily, C. 1998 Campagnes de fouilles 1996-1998 à la grotte de Walou à Trooz, *Notae Praehistoricae* 18, 25-32.

- Driessens, J.E. 1982 Ongebruikelijke jongpaleolithische vondsten uit Noord-Limburg, wijzend op Aurignacien, Perigordien en Magdalenien en kanttekeningen daarbij, *Archaeologische Berichten* 11/12, 93-108.
- Eloy, L.,
M. Otte 1995 Le périgordien de l'abri-sous-roche de Goyet (Namur, Belgique), *Bulletin des Chercheurs de la Wallonie* 35, 25-40.
- Fagnart, J.-P. 1988 *Les industries lithiques du Paléolithique supérieur dans le Nord de la France*. Revue archéologique de Picardie, numéro spécial 1988.
- Feustel, R. 1989 Ranis. In: J. Hermann (ed.), *Archäologie in der Deutschen Demokratischen Republik. Denkmale und Funde. 2. Fundorte und Funde*, 384-385, Leipzig/Jena: Urania.
- Floss, H. 1994 *Rohmaterialversorgung im Paläolithikum des Mittelrheingebietes*. Bonn: Rudolf Habelt.
- Gautier, A.,
P. Ballmann,
J. de Coninck 1973 *La faune du site paléolithique de Maisières-Canal*. Institut Royal des Sciences Naturelles de Belgique, Mémoire No. 172, Bruxelles.
- Gilot, E. 1971 Louvain Natural Radiocarbon Measurements X, *Radiocarbon* 13, 45-51.
- 1984 Datations radiométriques. In: D. Cahen and P. Haesaerts (eds), *Peuples chasseurs de la Belgique préhistorique dans leur cadre naturel*, 117-126, Bruxelles: Patrimoine de l'Institut royal des Sciences naturelles de Belgique.
- 1993 Liste des datations C14 effectuées sur du matériel de la Grotte Walou à Trooz. In: *Recherches à la grotte Walou à Trooz (Province de Liège, Belgique). Premier rapport de fouille*. Société Wallonne de Palethnologie, mémoire 7, 23-24. (Province de Liège, Belgique).
- Gowlett, J.A.J. 1986 Radiocarbon Accelerator Dating of the Upper Palaeolithic in Northwest Europe: a Provisional View. In: S.N. Collcutt (ed.), *The Palaeolithic of Britain and its Nearest Neighbours: Recent Trends*, 98-102, Sheffield: Department of Archaeology and Prehistory, University of Sheffield.
- Guthrie, R.D. 1990 *Frozen Fauna of the Mammoth Steppe*. Chicago: University of Chicago Press.
- Guthrie, R.D.,
T. van Kolfschoten this
volume *Neither warm and moist, nor cold and arid: the ecology of the Mid Upper Palaeolithic*.
- Haesaerts, P.,
E. Juvigné,
O. Kuyl,
H. Mûcher,
W. Roebroeks 1981 Compte rendu de l'excursion du 13 juin 1981, en Hesbaye et au Limbourg Néerlandais, consacrée à la chronostratigraphie des loess du Pléistocène supérieur, *Annales de la Société Géologique de Belgique* 104, 223-240.
- Hedges, R.E.M.,
P.B. Pettitt,
C.B. Ramsey,
G.J. Van Klinken 1996 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 22, *Archaeometry* 38, 391-415.
- Housley, R.A.,
C.S. Gamble,
M. Street,
P. Pettitt 1997 Radiocarbon evidence for the Lateglacial recolonisation of Northern Europe, *Proceedings of the Prehistoric Society* 63, 25-54.
- Huijzer, B.,
J. Vandenbergh 1998 Climatic reconstruction of the Weichselian Pleniglacial in northwestern and central Europe, *Journal of Quaternary Science* 13, 391-417.

- Juvigné, E.H.,
A.G. Wintle 1988 A New Chronostratigraphy of the Late Weichselian Loess Units in Middle Europe based on Thermoluminescence Dating, *Eiszeitalter und Gegenwart* 38, 94-105.
- Kolfschoten, T. van,
C. Laban 1995 Pleistocene terrestrial mammal faunas from the North Sea, *Mededelingen Rijks Geologische Dienst* 52, 135-151.
- Kolstrup, E. 1995 Palaeoenvironments in the north European lowlands between 50 ka and 10 ka BP, *Acta zool. cracov.* 38, 35-44.
- Larsson, L. this
volume *Plenty of mammoths but no humans? Scandinavia during the Middle Weichselian.*
- Lejeune, M. 1997 L'art mobilier du Trou Magrite (Pont-à-Lesse, Belgique): Aurignacien ou Gravettien?, *L'Anthropologie* 101, 238-247.
- Long, D.,
C.R. Wickham-Jones,
N.A. Ruckley 1986 A flint artefact from the northern North Sea. In: D. Roe (ed.), *Studies in the Upper Palaeolithic of Britain and northwestern Europe*, British Archaeological Reports, 55-62, Oxford: BAR.
- Mania, D. 1981 Eine Fundstelle des Perigordien/Gravettien von Bilzingsleben (Kreis Artern, DDR). In: J.K. Kozłowski and S.K. Kozłowski (eds), *Préhistoire de la grande plaine de l'Europe*, 89-93, Krakow-Warszawa (Archaeologia Interregionalis I).
- Monnier, J.L. 1980 *Le paléolithique de la Bretagne dans son cadre géologique*. Rennes: Université de Rennes.
- Otte, M. 1976 Observations sur l'industrie lithique de Maisières et sur ses relations avec les autres ensembles périgordiens de Belgique, *Bulletin de la Société Préhistorique Française. Études et Travaux* 73, 335-351.
- 1977 Deux coquilles, probablement d'origine anglaise, découvertes à Spy, Belgique. In: J.J.B. Campbell (ed.), *The Upper Palaeolithic of Britain. A Study of Man and Nature in the Late Ice Age*, 211-212 (Appendix 3), Oxford: Clarendon Press.
- 1979 *Le paléolithique supérieur ancien en Belgique*. Bruxelles: Musées Royaux d'Art et d'Histoire.
- 1995 Le sens de la stratigraphie du Trou Magrite. In: M. Otte and L.G. Straus (eds), *Le Trou Magrite. Fouilles 1991-1992*, 11-19, Liège: ERAUL 69.
- in press Art Aurignacien de Belgique, *Bulletin Soc. Prehist. Ariège-Pyrénées* 52.
1997
- Otte, M.,
L. Straus,
A. Gautier,
A. Martinez,
M. Newman,
C. Schutz,
P. Haesaerts,
P. Noiret,
J.-M. Leotard 1993 Fouilles paléolithiques 1992 en Belgique, *Notae Praehistoricae* 12, 15-31.
- Pettitt, P. this
volume *Chronology of the Mid Upper Palaeolithic: the radiocarbon evidence.*
- Scheer, A. 1986 Ein Nachweis absoluter Gleichzeitigkeit von paläolithischen Stationen?, *Archäologisches Korrespondenzblatt* 16, 383-391.

- Scheer, A. 1993 The Organization of Lithic Resource Use during the Gravettian in Germany. In: H. Knecht, A. Pike Tay and R. White (eds), *Before Lascaux: the complex record of the Early Upper Paleolithic*, 193-210, Boca Raton: CRC Press.
- this volume *The Gravettian in Southwest Germany: stylistic features, raw material resources and settlement patterns.*
- Schmider, B. 1971 *Les industries lithiques du paléolithique supérieur en Ile-de-France*, VIe supplément à Gallia Préhistoire, Paris: CNRS.
- 1990 The Last Pleniglacial in the Paris Basin (22500-17000 BP). In: O. Soffer and C. Gamble (eds), *The World at 18 000 BP. Vol. 1. High Latitudes*, 41-53, London: Unwin Hyman.
- Straus, L.G., M. Otte 1995 Stone Age Wallonia (Southern Belgium), *Current Anthropology* 36, 851-853.
- Straus, L.G., M. Otte, A. Gautier, P. Haesaerts, I. Lopéz Bayón, P. Lacroix, A. Martinez, R. Miller, J. Orphal, A. Stutz 1997 Late Quaternary prehistoric investigations in southern Belgium, *Préhistoire Européenne* 11, 145-184.
- Street, M., M. Baales, O. Jöris *in press* Beiträge zur Chronologie archäologischer Fundstellen des letzten Glazials im nördlichen Rheinland, in: *Festschrift W. Boenigk*, Köln.
- Street, M., T. Terberger 1999 The last pleniglacial and the human settlement of Central Europe. New information from the Rhineland, *Antiquity* 73, 259-272.
- this volume *The German Upper Palaeolithic 35,000-15,000 bp. New dates and insights with emphasis on the Rhineland.*
- Weiss, G. 1978 Magdalenhöhle, Vbgem. Gerolstein, Kr. Daun. In: St. Veil (ed.), *Alt- und mittelsteinzeitliche Fundplätze im Rheinland*, 104-105, Bonn: Habelt.
- Weniger, G.C. 1990 Germany at 18 000 BP. In: O. Soffer and C. Gamble (eds), *The World at 18 000 BP. Vol. 1. High Latitudes*, 171-192, London: Unwin Hyman.
- Zagwijn, W.H. 1975 De palaeogeografische ontwikkeling van Nederland in de laatste drie miljoen jaar, *K.N.A.G. Geografisch Tijdschrift* 9, 181-201.
- Ziesaire, P. 1998 *Der Aurignacien-Fundplatz Altwies-Laangen Aker in Luxemburg*, Luxemburg: Editions Société de Préhistoire de Luxembourg.

Wil Roebroeks
Faculty of Archaeology
Leiden University
P.O. Box 9515
2300 RA Leiden
The Netherlands