The relationship between Britain and mainland Europe during the early Middle Palaeolithic (MIS 8-6)

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Abstract

The major early Middle Palaeolithic sites from Britain and continental north-west Europe are summarised in terms of their technology, site function, associated environmental information and their dating. Similarities are recognised in the range of technology, site functions and the associated habitats. Levallois technology dominates, except in the west of Britain and possibly more western areas of France, where handaxe technology is still deployed. Various site functions can be recognised, suggesting a more complex organisation of technology across the landscape. Human habitats are dominated by open conditions, but in both cool and temperate climates. Although sites in continental north-west Europe can be dated to phases throughout this period (late MIS 9 to MIS 6), there appears to be a genuine paucity of sites after early MIS 7 in Britain. This is explained by the changing palaeogeography of Britain, in particular the progressive subsidence of the North Sea Basin.

Introduction

In recent years the beginning of the Middle Palaeolithic in northern Europe has been largely defined divided by the introduction of Levallois technology from about Marine Isotope Stage (MIS) 8 and has been subdivided into a pre-Eemian phase and a later post-Eemian phase (Roebroeks 1998; White and Jacobi 2003; White *et al.* 2006). On the continent the distinctions between the two phases, other than time, are not always clear. However, in Britain the division is quite marked partly due to the apparent gap in human presence from at least MIS 6 till perhaps the end of MIS 4 (Currant and Jacobi 1997; 2001; Ashton 2002; Ashton and Lewis 2002). This paper examines the character of the assemblages from the early Middle Palaeolithic across north-west Europe and how the continental record compares to that from Britain. It also addresses specific questions about Neanderthal technologies, habitat preferences and landscape use during the early Middle Palaeolithic.

Differences between Britain and continental Europe ought to vary according to the status of Britain as an island. There has been long debate over the timing of the breach of the Chalk to create the Straits of Dover with the original suggestion that this occurred towards the end of MIS 12 (Gibbard 1995). More recently it has been suggested that this might have occurred later, either at the end of MIS 8 or MIS 6 (Meijer and Preece 1995; Ashton 2002; Ashton and Lewis 2002) or that there have been two breaches in MIS 12 and possibly MIS 6 (Gupta 2007; Gibbard 2007). Similarities or differences in assemblages between Britain and mainland Europe ought to inform the debate over the timing of these possible breaches and during which temperate phases Britain became an island. The chronological span of the British sites also needs closer examination, as to whether humans are in Britain just in the earlier part of MIS 7, or throughout this stage. Again, comparison to the European data will inform about links between Britain and the mainland at this time.

There has been further debate about the habitat preferences of early Neanderthals and their forebears, with more open environments being suggested by Gamble (1987, 1992), while Roebroeks *et al.* (1992) recognised that a wider range of sites from forested environments to more open landscapes were exploited through this period. This model was refined by Ashton (2002), who suggested that there was increasing adaptation to more open environments through time, such environments being characterised by the mammoth-steppe; Neanderthals could be seen as part of the mammoth-steppe biota and only ventured into western Europe as this environment expanded from the east. This it was argued also had an effect on the human absence and presence in Britain. Recent reassessment of old sites (Scott 2006) and excavation of new sites (Whittaker *et al.* 2004; Locht *et al.* 2000) now enables a fresh look at the evidence for the environments that humans used during this period.

One of the characteristics that defines the Middle Palaeolithic has been argued to be a shift not just in lithic technology, but also the way in which that technology was deployed and organised around the landscape. Whereas in the Lower Palaeolithic assemblages tend to reflect a variety of activities, usually focussed on a raw material source, in the Middle Palaeolithic there seems to have been a more complex pattern of raw material procurement, knapping, use and discard, particularly reflected in the movement of Levallois products (Geneste 1985; Turq 1989; Roebroeks *et al.* 1988; Feblot-Augustins 1999). In Britain, greater complexity has been recognised through site specialisation in the early Middle Palaeolithic (Scott 2006). Therefore can direct comparisons be made with the early Middle Palaeolithic sites from the remainder of north-west Europe at this time?

In order to assess the evidence, the principal sites from north-west Europe are reviewed. These are limited to sites with good chronological controls, preferably with environmental data, and with assemblages of sufficient size to allow assessment of the principle technologies. Although the start of the Middle Palaeolithic is normally characterised by the first appearance of Levallois technology, in order to draw the broadest comparisons, some sites are also included that seem to date to MIS 8-6, but do not necessarily include Levallois products. The area reviewed is limited to Britain, northern France, Belgium, the Netherlands and the Rhinelands of France and Germany, and the sites are presented in broadly chronological order in the two regions.

Principle sites: Britain

Most of the principal British sites are located in the Thames Valley, where large Levallois assemblages have been recovered from within or on the surface of fluvial sediments laid down by the Thames or its tributaries. The dating of the sites is dependant on the interpretation of the terrace stratigraphy. Bridgland (1994) has produced a model for terrace formation and aggradation, which is directly linked to global climate change. Downcutting of the river occurred during the amelioration in climate at the end of a glaciation, followed by aggradation during the following warm and cold stages. The Lynch Hill terrace of the Middle Thames is therefore attributed to late MIS 10, MIS 9 and MIS 8, while the lower Taplow terrace is attributed to late MIS 8, MIS 7 and MIS 6. In the Lower Thames the corresponding units are the Corbets Tey and Mucking terraces respectively.

There has been criticism of this model, particularly as applied to the Lower Thames, where Gibbard (1994) has argued that the Mucking Gravel at the base of the Mucking terrace is late Wolstonian (MIS 6) and that interglacial sediments overlying this gravel are attributable to MIS 5e or later. Lewis *et al*. (2004) have also pointed to the stratigraphic complexity of the

Lower Thames, where sediments laid down under temperate conditions often abut or overlie much older terrace sequences, and have advocated caution in assigning temperate channel sediments to particular terrace formations. Despite these problems an increasing body of biostratigraphic data, work on amino acids and absolute dating tends to support the attribution of temperate sediments at sites assigned by Bridgland to the Mucking Formation as dating broadly to MIS 7 (Bowen 1989; Sutcliffe 1995; Preece 1995; Scott *et al.* in press). This scheme is therefore followed with caution in the discussion of sites below.

At Botany Pit (Purfleet, Essex) a slightly rolled assemblage of 'proto-Levallois' flakes and cores, together with handaxes and some "classic" Levallois material, was recovered from sediments that have been attributed to the Lynch Hill/Corbets Tey Formation (Bridgland 1994; White and Ashton 2003). They have been argued to come from gravels that form the upper part of this formation and therefore date to early MIS 8. It is unclear whether the handaxes are part of the same assemblage as the proto-Levallois material, there being little difference in their condition. The only hint comes from a Levallois flake that has been made into a simple handaxe.

One of the best known sites from the Lower Thames is Ebbsfleet (a complex of sites which includes Baker's Hole). Recent reanalysis of the collections from Ebbsfleet (Kent) has shown that two distinct Levallois assemblages were recovered from the lower units at the site (Scott *et al.* in press). The sequence consists of a series of channel deposits that are a tributary equivalent of the Taplow/Mucking Formation of the Thames (Bridgland 1994; Wenban-Smith 1995). The channel sediments can be divided into five depositional and climatic phases. One assemblage of Levallois artefacts comes from Phase I, which consists of basal 'coombe rock' laid down under cold conditions, and the other from Phase II, a series of fluvial sands and gravels aggraded under temperate conditions. Phase III (slope and aeolian deposits), Phase IV (fluvial silt with a fully temperate fauna) and Phase V (solifluction) all contain derived handaxe material. The latter probably originates from the adjacent Rickson's Pit, Swanscombe, which is part of the Boyn Hill/Orsett Heath Formation. The mammalian fauna associated with Phase I and II includes steppe mammoth (*Mammuthus trogontherii*), horse (*Equus ferus*) and woolly rhino (*Coelodonta antiquitatis*). The bench on which the channel sediments rest, is interpreted as being cut at the end of MIS 8. Phases I and II therefore are likely to date to late MIS 8 and the first warm episode of MIS 7 respectively (but see discussion below). Both assemblages reflect the selection and working of good quality, abundant flint raw material for the production of Levallois flakes. Although several Levallois flakes from the earliest assemblage have been bifacially worked, they can more easily be interpreted as elaborate flake tools, rather than typical handaxes.

The primary context Levallois assemblage from the Lion Tramway Cutting at West Thurrock (Essex) occurs towards the top of gravels, below a long sequence of fine-grained sediments that include fully temperate fossiliferous deposits (Bridgland and Harding 1994; Schreve *et al.* 2006). The site has been attributed to the Taplow/Mucking Formation with the archaeological assemblage dating to late MIS 8 or early MIS 7 and the temperate sequence to MIS 7. The assemblage is totally lacking in handaxes and appears to be a primary knapping location or workshop, large flint nodules being abundant in the gravel. A later human presence at the site during full interglacial conditions is attested by the presence of a cut-marked rhino jaw from the fossiliferous silts (Schreve *et al.* 2006)

In west London, Levallois assemblages from Creffield Road (Acton) and pits in West Drayton, Hillingdon and Yiewsley seem to have been collected from the surface of the Lynch

Hill Gravel and beneath the overlying slope deposits of silts and sometimes gravels, often termed the Langley Silt Complex. It is clear from the condition of the artefacts and archival information that any handaxe material within these collections comes from the underlying Lynch Hill Gravel. The reported position of the Levallois material on the surface of this gravel suggests a date of late MIS 8 or early MIS 7 (Bridgland 1994; Ashton *et al*. 2003). The material reflects a variety of Levallois techniques. Little fauna survives and none can be directly associated with the industries. There is unfortunately no other information that can be used to reconstruct the environment or the function of the sites at West Drayton, Hillingdon and Yiewsley.

The assemblage from Creffield Road came from a much more restricted area and consists of flakes from initial preparation, together with exhausted cores, and a series of Levallois points, often broken. The lack of the middle stages of the knapping process suggests that it was a location for initial core preparation, but that the cores were taken elsewhere for the production and use of Levallois points. Truncated-facetted pieces are well-represented, sometimes acting to thin pieces (perhaps to facilitate hafting), and sometimes to transform them into cores. The presence of exhausted cores and broken points at the site suggests that humans returned to re-equip themselves for activities in the broader landscape (Scott 2006).

The refitting Levallois assemblage from Crayford (London) comes from a long and laterally extensive sequence of sediments that are banked up against a cliff of Chalk and Thanet Sand (Spurrell 1880; 1884). Fluvial gravel at the base is overlain by up to 9m of fluvial sands and silts of the 'Lower Brickearth', in the upper part of which is a '*Corbicula* Bed'. This is overlain by the 'Upper Brickearth', which has previously been interpreted as colluvial sediment, although recent work suggests that it also has a fluvial input. The vast majority of the artefacts appear to come from a floor towards the base of the 'Lower Brickearth' (Spurrell 1884), or sometimes on the surface of the gravel (Chandler 1914).

The large assemblage of mammalian fauna is poorly provenanced and would seem to be mixed containing both warm and cold-adapted elements. It is, however, dominated by open-steppe species, such as steppe mammoth, woolly rhino and horse. This led Schreve (2001) to suggest a late MIS 7 age, which she argued is a phase characterised by open faunas. Currant (1986) and Sutcliffe (1995) preferred a date within MIS 6, due to the recovery of cold-adapted species such as musk-ox (*Ovibos moschatus*), Norwegian lemming (*Lemmus lemmus*) and collared lemming (*Dicrostonyx torquatus*). The molluscs, however, are better provenanced and clearly indicate a temperate climate for the 'Lower Brickearth' and '*Corbicula* Bed' (Kennard 1944). Bridgland (1994) attributes the sequence to the Taplow/Mucking Formation. In the absence of any marked hiatuses in the sequence, and the position of the artefacts towards the base of the 'Lower Brickearth', then the assemblage is best accommodated within the earlier part of MIS 7. Like the other Thames sites, the assemblage is lacking any handaxes. The extensive refitting suggests a workshop site, where elongated nodules of burrow flint were immediately available and used to produce pointed Levallois products, which were subsequently exported from the site.

Pontnewydd Cave (Clwyd, Wales) has produced a rich Levallois and handaxe assemblage primarily from the Lower Breccia (Green 1984; Aldhouse-Green 1995). This is interpreted as a debris flow and it has been suggested that the artefacts derive from outside the cave. TL and U-series dates indicate a minimum age of 220 kyr for the Lower Breccia. Giving a firm date for the archaeology is clearly difficult, and it is not necessarily all contemporary. However

there seem few grounds for splitting the Levallois material and handaxes into different assemblages. The associated fauna contains a mix of warm and cold adapted species.

Two further sites from western England should also be considered. Although they seem to be Lower Palaeolithic in character, recent dating suggests that they can be attributed to the same time-frame as other clearly Middle Palaeolithic sites in Britain. A newly discovered site at Harnham (Wiltshire) is dominated by handaxes, without any indication of Levallois technology. Biostratigraphy and OSL suggest a date in a cool phase towards the end of MIS 8 or early MIS 7 (Whittaker *et al.* 2004). The second site is that of Broom (Devon) where there has been recent reinvestigation of the context and dating of the large assemblages of handaxes collected from the gravel pits in the area. Here OSL determinations suggest an age within MIS 8 (Hosfield and Chambers 2002; Toms *et al.* 2005). Unfortunately there is no environmental data available from the site.

Principle sites: north-west Europe

The earliest Middle Palaeolithic assemblage from continental north-west Europe comes from Mesvin IV (Belgium) and was excavated from fluvial sediments. The assemblage was associated with a fauna dominated by mammoth, woolly rhino and horse (Van Neer 1986), interpreted as reflecting a cold, open environment and on the basis of U-series dates, probably dating to MIS 8 (Cahen and Michel 1986). The large flint assemblage contains some Levallois technology, some of which has been described as 'reduced Levallois' (Ryssaert 2006). As such, this has been compared to the proto-Levallois technology from Botany Pit, Purfleet (White and Ashton 2003). Handaxes and bifacial tools were also found, but as with Botany Pit, due to the fluvial context, it is not clear whether the Levallois technology and all the bifacial pieces are really associated (Cahen and Michel 1986; Ryssaert 2006). There is certainly a clear difference in condition between the handaxes and classic Levallois flakes from the site (pers. observ.). It is also difficult to assess the function of the site, although primary knapping was certainly taking place.

The Kesselt-Op de Schans quarry in the Belgian Limburg has produced primary context refitting sequences from a poorly developed soil sealed by loess correlated with MIS 8 (Van Baelen *et al*. 2007, Ann Van Baelen pers. comm.). The lithic material attests to discoidal reduction, though each flake removed has a carefully prepared butt. The limited development of the soil probably indicates a cold and open environment. The site is not yet fully understood, as investigations are ongoing (Van Baelen *et al*. 2007).

In the north of France, the site of Gouzeaucourt on a slope of the Muid Valley in the upper Scheldt Basin produced several handaxe dominated assemblages within which Levallois products are extremely rare and probably fortuitous (Lamotte 2001; Tuffreau *et al.* 2008). These were recovered from various levels within a thick loess sequence infilling a karstic depression in the Chalk, comprising gravel sealed by a dark-brown clay-silt, towards the top of which a palaeosol was apparent. This soil formation was related to MIS 7, through correlation with the regional loess sequence (Sommé 1975, Tuffreau and Bouchet 1985). The assemblages recovered from beneath this level (G,H, and I) have therefore been allotted to MIS 8, but no independent dating controls have been applied, and no environmental information has been recovered. An MIS 8 date, if securely established, would imply a human presence during cold and open conditions.

Two early Middle Palaeolithic occupations associated with a doline are apparent at the site of Le Pucheuil (Pays de Caux, Haute Normandie; Ropars *et al.* 1996). The occupations at the site have been dated by relating the soils and loess in the doline to the local regional sequence (Halbout and Lautridou 1996). The earliest artefact assemblage (Series A/C) reflects human occupation of the plateau, part of the assemblage being reworked into a doline as it formed. This part of the assemblage comes from a palaeosol correlated with the early Saalian (Elbeuf II), and may have been reworked from Saalian loess parent material; a late MIS 8/early MIS 7 date is therefore suggested (Delagnes 1996). This would indicate a human presence during cool conditions, or during the early warming limb of MIS 7. However, no independent controls on dating have been applied, and no direct environmental information was recovered. The assemblage reflects complete on-site reduction on locally available raw material, using uni- and sometimes bipolar recurrent Levallois techniques to produce large quadrangular flakes. There are few tools, most being truncated-facetted pieces, as at Creffield Road. Two irregular, summarily-worked biface fragments were also recovered from this level.

The site of Ranville (near Caen) lies on an elevated spur of land delimited by the confluence of the Orne and Aiguillion (Cliquet 2008). Sediments infilling a complex karstic system contained a faunal assemblage in association with over 300 artefacts. U-series and ESR determinations suggest an early MIS 7 age. The fauna reflects a mix of forested and open environments, but is dominated by red deer (*Cervus elaphus*) and a horse typical of semi-arid conditions (*Equus hydruntinus*). The assemblage consists of *ad hoc* core working (with only one Levallois core), handaxe manufacturing flakes, but very few handaxes. The site as a whole is interpreted as a butchery location during autumn.

The sand quarry of Tourville-La-Rivière, near Rouen on the right bank of the Seine, has produced an extensive faunal assemblage from an old meander bend of the Elbeuf (Guilbaud and Carpentier 1995). Here, fluvial deposits belonging to an intra-Saalian warm episode are correlated with MIS 7, and have produced a mixed faunal assemblage, including woodland species (roe deer and wild boar) as well as those typical of more open environments (horse, bovids, woolly rhino). Although the site has been excavated for over 25 years, lithic material is sparse in comparison with the faunal assemblage, but does include complete refitting sequences. One of these attests to laminar flake production from an elongated nodule, and the subsequent use within the site of some of these products, potentially in butchery (Vallin 1991).

Maastricht-Belvedere (Netherlands) consists of a complex of sites from fine-grained fluvial sediments containing fully temperate faunas, and probably attributable to MIS 7 (Roebroeks 1985; van Kolfschoten 1985; Meijer 1985). TL dates suggest an age between 250–290 kyr (Huxtable and Aitken 1985). Some of the sites (Site C) display Levallois technology, while at others (Site K) most of the knapping is from disc cores (Roebroeks *et al.* 1993). None of the assemblages have handaxes. Differences in the composition of the assemblages also suggest different site functions, from primary knapping locations to possible animal procurement and processing sites, as well as the sporadic drop-out of tools and rejuvenation waste as such material was transported around the landscape (Site N; Roebroeks *et al.* 1992).

In the west of the region, La Cotte de St Brelade (Jersey) has provided a series of archaeological levels that probably span MIS 7 and 6 (Callow 1986; Callow and Cornford 1986). It is argued that sterile horizons represent breaks in human occupation during extreme cold, or during fully temperate conditions when Jersey was cut off from the mainland. Most fauna comes from the loess deposits of MIS 6 and reflects cold, open conditions. The

assemblages consist of flakes, cores and flake tools with some use of Levallois. A few handaxes first appear in Layer C, which is interpreted as the end of MIS 7 or early MIS 6. The site can be interpreted as a home base.

A recently discovered site at Therdonne (near Beauvais) contains a rich Levallois assemblage (level 3), associated with a soil developed on aeolian sand, and has been dated by thermoluminescence (TL) to the end of MIS 7 (Locht *et al.* 2000; Herisson 2007). Fauna was poorly preserved, although two teeth of ground squirrel (*Citellus superciliosus*) suggest cool, steppe conditions. There are no handaxes directly associated with the Levallois industry, but several patinated and glacially striated handaxes were found towards the base of the same sand deposit. The site was certainly a knapping location and the abundance of burnt flint suggests a home-base. The large number of Levallois points and the reduced nature of the cores is similar to Creffield Road, although complete reduction sequences were undertaken on-site at Therdonne.

To the north of the Somme in the Scarpe valley a series of primary context assemblages were excavated at Biache-Sainte-Vaast (Tuffreau and Sommé 1988). They came from the upper part of fine-grained fluvial sediments and from the base of overlying loess. The molluscs and mammalian fauna suggest a change from fully temperate conditions from below the archaeological horizons, getting progressively cooler and more open during the human occupation. A date towards the end of MIS 7 or early MIS 6 is suggested. Levallois is an important component of the lower assemblages (IIa and base of II) together with a range of side scrapers. The later assemblages (D1 and D) contain fewer Levallois artefacts and show an increase in denticulates and notches. There are no handaxes in any of the levels. The composition of the assemblages and associated fauna suggests a range of activities in each of the different levels including primary knapping and butchery.

The second assemblage of artefacts from the doline of Le Pucheuil was in near primary context immediately beneath a palaeosol formed under cool conditions, and is therefore correlated with late MIS 7/early MIS 6. No lithic material was found in primary context within the interglacial deposits at the site, suggesting that humans may only have returned once cool and open conditions again prevailed. The large assemblage is extremely fresh and has extensive refits, predominantly reflecting complete on-site reduction of large nodules to produce Levallois points, which were then exported from the site. Other techniques were also used, and the assemblage includes two bifacially worked fragments and a sequence of seven refitting soft hammer flakes.

Oisiers à Bapaume, another doline site, on the Bapaume plateau between the Somme and Escaut basins, produced two artefact assemblages from within a Saalian loess divided by a cailloutis (Koehler 2008). The upper loess has been correlated with the final Saalian loess of northern France. Rolled artefacts (Series A) were recovered within the cailloutis and fresh artefacts (Series B) sealed beneath it. OSL determinations support the attribution of both lithic series to late MIS 7/early MIS 6, suggesting a cool and open environment, though no direct environmental proxies were recovered (Balescu and Tuffreau 2004). Although previously termed “Epi-Acheulean” and suggested to reflect *ad hoc* core working and handaxe production (Tuffreau 1972), re-analysis of the assemblage suggests that Levallois flaking was commonly employed in both series, and that a diverse range of strategies were used to produced the fresher assemblage (Series B; Koehler 2008). The few handaxes described in previous publications (Tuffreau 1972) have unfortunately been lost.

Further east in the Rhineland several early Middle Palaeolithic sites have been found, largely preserved within sediment traps formed by extinct volcano craters overlooking the plain of the Neuwied basin (Schweinskopf, Tönchesberg, Wannen). The loess and tephras preserved within these capture points have been used to construct a regional loess stratigraphy. These sites reflect repeated, fairly ephemeral occupation of such places during MIS 6, and would have acted as sheltered vantage points. All reflect cold-period occupation of an open loess landscape, and have produced cold-adapted faunas including horse, woolly rhino, mammoth and reindeer. The sites are dominated by the use of local raw material, with exhausted and heavily retouched tools, together with chips resulting from their rejuvenation (Conard 2001, 228). Particular sites were deliberately provisioned with raw material in the form of whole quartz cobbles (Tönchesberg 2a), and flint from the Meuse Valley was repeatedly transported over distances of 100km in the form of heavily retouched tools and, notably, a single Levallois blade at Schweinskopf (Schäfer 1995, 895). Most sites reflect fairly early access to carcases, potentially reflecting hunting of either single species (e.g. woolly rhino at Wannen V) or of several medium-large animals (Tönchesberg 1a; Connard and Prindiville 2000).

At Ariendorf 1 and 2 (Germany), loess sealing the Middle terrace of the Rhine has produced small numbers of artefacts, together with a mixed faunal assemblage of medium and large mammals. Ariendorf 1 has been correlated with MIS 8 and contains fauna considered typical of the older Saalian cold stage (Turner 1995), whilst the later occupation of the site (Ariendorf 2) reflects a human presence during MIS 6. The fauna from both levels, and the loessic deposits within which they are contained, reflect cold, open conditions. Both have produced small artefact assemblages on local raw material, and reflect butchery by hominids, though the means by which they procured these carcases cannot be definitively established.

Whereas the assemblages from these flint-impoverished occurrences rarely contain Levallois elements, more substantial assemblages were recovered from decalcified loess deposits overlying the younger main terrace of the Meuse (Rheindalen B1, B3 and B5; Bosinski 1995). The earliest human presence (B5) is attested by a Levallois core and retouched Levallois blade, together with other flakes, from the top of a soil sealed by loess. The most substantial assemblage comes from level B3, an interglacial soil higher up the sequence, and is dominated by Levallois flaking of Meuse gravel flint. Heavily retouched flake tools are common, especially convergent and pointed forms. A handaxe was recovered from the loess which seals this horizon, whilst a further substantial assemblage (B1) was recovered from the uppermost part of the interglacial soil, comprising small blades, many of which are retouched. Originally, the upper interglacial soil was correlated with the Eemian, but recent attempts to refine the regional stratigraphy suggest that these levels form part of the unique “Erft Solcomplex”, which luminescence dating places within MIS 7 (200 KBP; Holzkämper *et al*. 2008). No direct indications of environment have been recovered from any of these levels.

At Achenheim (France) a sequence of loesses overlying Rhine river gravels have provided several small, but more distinctive assemblages (Heim *et al.* 1982). Levallois first appears in MIS 8 and is argued to develop through a series of archaeological horizons (Junkmanns 1995). The assemblages are thought to date to both MIS 8 and MIS 6 and were probably made in cold, open environments. This is supported for some of the assemblages by a cold-adapted mammal assemblage excavated from loess attributed to MIS 6 (Heim *et al.* 1982). The final assemblage in MIS 6 contains a small handaxe on a flake. Little can be said about the function of the sites, but given the small numbers of artefacts and high proportion of retouched tools recovered, they may reflect the occasional discard of artefacts in the context of use.

Discussion

Comparison of the early Middle Palaeolithic records from Britain and the remainder of north-west Europe indicate many similarities, particularly in the nature of the lithic industries and the human habitats, but there also appear to be important differences in the dating (Table 1).

The two earliest sites in the region (Mesvin IV and Purfleet, Botany Pit) contain a similar array of technologies, in the form of proto-Levallois cores and flakes with the possible association of handaxes. Both sites probably date to late MIS 9 or early MIS 8. Thereafter most of the sites are dominated by Levallois technology, except in the absence of suitable raw material. All the sites in the Thames Valley, Pontnewydd, La Cotte, Maastricht Site C, Biache, Therdonne, Pucheuil, Oisiers à Bapaume, Rheindalen and Achenheim all have a clear Levallois input to the assemblages. The absence of suitable raw material at the Rhineland sites of Wannen, Tönchesberg, Schweinskopf and Ariendorf, may explain the lack of Levallois at these sites. A hint that Levallois technology was known in this area is provided by one Levallois blade from Schweinskopf that had been made on Meuse flint from over 100km away (Schäfer 1995, 895). Poor raw material has also been suggested for the lack of Levallois at Site K at Maastricht (de Loecker 2005). At Tourville-La-Rivière, in contrast, a carefully controlled but non-Levallois method of laminar flake production was adopted to reduce a cylindrical nodule (Guilbaud and Carpentier 1995).

A further pattern is the absence or near absence of handaxes at many of the sites. In the Rhineland sites it can again be explained by poor raw material, but this cannot be an explanation for the sites of Biache, Therdonne, Maastricht, Ebbsfleet, Crayford and Creffield Road. Minor exceptions to this are the sites of Le Pucheuil and La Cotte which record small numbers of bifacial pieces in some of their assemblages. At Pontnewydd they form a significant component together with Levallois technology, although at Gouzeaucourt, Harnham and Broom they dominate the assemblages with the absence of Levallois. All the British sites with handaxes lie towards the west of the area and might suggest a regional pattern. In continental north-west Europe this pattern is more difficult to discern, although those sites that do contain handaxes (sometimes in small numbers) tend to be in a more westerly location. There is therefore a hint of a western distribution of sites that contain handaxes, with or without Levallois, in contrast to the more easterly parts of the region.

Some of the variation in assemblage composition is clearly attributable to raw material considerations, but differences in the function of sites probably also plays a role. Simple knapping sites can be identified at Ebbsfleet and Crayford, where raw material was immediately available and there is an indication of finished products being transported away from these locations. More complex signatures can be identified elsewhere. At Biache the relatively high proportion of retouched tools in the various levels and the evidence for butchery suggest that a greater range of activities was taking place at the site. This may also be the case for Maastricht Site C. Complexity can also be seen at Creffield Road, where Levallois points (some broken), exhausted Levallois cores and limited knapping debitage suggest locations where re-provisioning was taking place. The similar assemblage from Therdonne also includes burnt flint, indicating that the site may have been used as a home-base. This is likely to have been the primary function of the cave sites of Pontnewydd and La Cotte de St Brelade. Overall, the range of functions across the region is similar, but tends also to show greater complexity in the use of sites than appears to be the case in the Lower Palaeolithic in this region.

Similarities can also be seen in the range of human habitats that were being used in the early Middle Palaeolithic. There is little doubt that humans were occupying habitats in both fully temperate and cool conditions, although the latter seem to dominate the record. What is also notable is that nearly all the sites suggest open landscapes, at least within the immediate locale. Most mammalian assemblages are dominated by a range of mammoth, woolly rhino and horse suggestive of open steppe. However, at some sites they are also associated with woodland species such as red deer, implying that the 'steppe fauna' was inhabiting open niches in a much more complex landscape and perhaps in warmer temperatures than might normally be expected.

One of the main differences between the Britain and the remainder of north-west Europe is the range of dates of the various sites (see Table 1). Nearly all the major British sites would seem to date to the first half of the early Middle Palaeolithic, ranging possibly from late MIS 9 to early MIS 7. One possible exception might be Pontnewydd, but as discussed above the archaeological assemblage is in a secondary context and the absolute dates suggest that it is no later than the middle of MIS 7. One other possible exception might be Crayford (see above) where more work is required to provide clearer dating for the archaeological assemblage, rather than relying on the confused signals coming from what is clearly a mixed mammalian faunal assemblage from several contexts. There are several much smaller assemblages from Britain, which have not been considered above, but that have been argued to date to late MIS 7 (Schreve 2001), such as the 'Bone Bed' at Maidenhall and Stoke Tunnel (Suffolk; Wymer 1985) or the channel at Selsey (West Sussex; Sutcliff 1995; Parfitt 1998). The argument for a late MIS 7 age for these sites has been based on the arguments of Schreve (2001), who suggested that more open mammalian faunas should be attributed to late MIS 7. However, this model is largely based on the faunal assemblages from the site of Aveley (Essex) where an open fauna occurs above one favouring more forested conditions. Other sites, such as Ebbsfleet, would argue against this model where open faunas can be attributed to early in MIS 7. Ebbsfleet and other sites suggest that there are more complex changes in faunas through this interglacial stage. Therefore, there is currently little evidence in Britain for the attribution of assemblages to after the middle of MIS 7.

The record on the continent is in marked contrast to that from Britain. In north-west Europe there is undoubtedly a record of human presence from MIS 8 through to MIS 6 (Table 1). This does not necessarily indicate continuous occupation, but a much broader range of dates exist, suggesting that humans were occupying these areas on a more regular basis, even in cool conditions during MIS 6. What is the reason then for these apparent differences in dating?

It has been argued for Britain that one of the reasons for the paucity of the archaeological record for the later part of MIS 7 is the lack of access to lithic raw materials, which were more prevalent during phases of increased erosion, such as the end of a glaciation and early phases of an interglacial (White *et al.* 2006). It has further been suggested that the type of technology and its logistical organisation in the broader landscape during the Middle Palaeolithic might also contribute to the visibility of lithic assemblages away from the raw material resources (White *et al.* 2006; Scott 2006). Although these factors undoubtedly contribute to the archaeological record, they do not appear to have been significant factors, as shown by the range and size of sites in continental north-west Europe throughout this period.

Preservation or a bias in collection may be alternative explanations, whereby in Britain sediments that date to later sub-stages of MIS 7 have rarely been exploited through quarrying,

unlike those attributed to early MIS 7. Again, this may contribute to the pattern, but where late MIS 7 sediments have survived and have been intensively investigated, such as the Phase III-V deposits at Ebbsfleet (Kerney and Sieveking 1977; Scott *et al.* in press) and two horizons at Marsworth (Buckinghamshire; Green 1984; Murton *et al.* 2001; Candy and Schreve 2007), no trace of contemporary human presence has been discovered. These examples add to the data from the Middle Thames, where there is a virtual absence of lithic archaeology from the gravels of the Taplow Terrace (Ashton and Lewis 2002; Ashton *et al.* 2003), which are widely attributed to MIS 6 (Bridgland 1994; Gibbard 1994). If artefacts had been present in any quantity on the floodplains or in the channels of the Thames during later MIS 7, then some evidence of this would be expected to have been recovered from within the gravels of the following cold stage on the Taplow Terrace.

A final explanation for the differences in dating between Britain and continental Europe is that the small size or possible absence of assemblages later in MIS 7 in Britain does actually reflect a diminishing or non-existent population. This is unlikely to be due to differences in environment, given the proximity of sites in Britain to those in north-west Europe. Therefore, does the changing palaeogeography of the North Sea Basin and Straits of Dover explain the low populations in Britain?

It has long been suggested that the Straits of Dover were created at the end of the Anglian glaciation (MIS 12) when a pro-glacial lake in the southern North Sea basin surmounted the Chalk of the Kent-Artois anticline and carved a passage between southern Britain and northern France (Smith 1985; Gibbard 1995). More recent work on bathymetry has suggested that a later, possibly greater flood occurred at the end of MIS 6, which may have significantly widened the Straits of Dover (Gupta *et al.* 2007; Gibbard 2007). Gibbard has suggested that a similar mechanism was involved, but that the pro-glacial lake was perhaps dammed against Anglian glacial moraines further north off the East Anglian coast.

Although these breaches would have impeded access to Britain in the Channel region, the initial effect on the access to Britain by humans is likely to have been limited. This was due to the relatively high floor of the southern North Sea Basin, which must have been close to the height of present-day sea-level during MIS 11. This is clear from the records at Swanscombe, Clacton and Tillingham (Ashton *et al.* 2008; Preece and Penkman 2005) where a slight fall in sea-level during fully temperate climate led to the Thames feeding directly into the Rhine and allowing molluscan faunas from the Rhine to colonise the Thames river system (Kerney 1971). It is apparent from this data that large areas of the floor of the southern North Sea basin would have been dry land for much of MIS 11, allowing easy access to Britain.

However, through time the North Sea basin has subsided, so in the present-day it reaches depths of up to 40m. Access to Britain was therefore controlled by increasing subsidence over time and by the climatically-driven lowering of sea-level. In MIS 9 a comparatively small cooling in climate would have been needed to open up the North Sea basin, whereas in MIS 7 a more significant cooling would have been required. By MIS 5 the floor of the North Sea basin was probably approaching modern depths, and therefore without a major cooling, access across the basin would have been difficult. This increased difficulty of getting to Britain is perhaps reflected in the suggested decline in population from MIS 11 (Ashton and Lewis 2002).

The Channel area and the southern North Sea basin provided slightly different challenges for colonising Britain. Even in times of high sea-level only comparatively short crossings would

have been needed in the Channel area up to perhaps MIS 6, when it was probably widened by the second breach. By contrast, by MIS 7 significant cooling in climate would have been needed to colonise across the southern North Sea basin. It can therefore be argued that these two regions provided different conditions for colonising at different times. It is also likely that these colonisations emanated from slightly different areas, with the river valleys of western France (such as the Seine and the Somme) feeding into the Channel area and linking in with the Solent Valley, whereas the more northerly rivers (such as the Meuse and Rhine) would have fed into routes across the North Sea basin and linking in with the Thames. It is suggested, therefore that possible differences in the archaeological signatures between east and west (at least in Britain) might be attributable to the differences in the access routes to Britain, and might explain the continued dominance of handaxe technology in this region. This suggestion needs more thorough investigation through better understanding of the subsidence of the North Sea Basin and better dating of the archaeological record.

Conclusion

Comparison of the early Middle Palaeolithic from Britain and the remainder of north-west Europe has highlighted several similarities and differences in the records. Both regions display a similar array of technologies with the occurrence of both proto-Levallois and fully-developed Levallois assemblages. The occurrence of handaxes is rare, although this technology does occur, particularly in the more westerly sites of Britain. Both regions also display similarities in the types of habitat, being dominated by open environments in both cool and temperate conditions. Equally, a more complex use of the landscape is indicated by the variation in site function, from workshop sites, butchery locations, re-provisioning areas and home-bases. The major difference is the lack of sites firmly attributed to later MIS 7 and MIS 6 from Britain, compared to the rest of north-west Europe. It is suggested that this is caused by changes in palaeogeography, with the creation of the Straits of Dover and the increasing subsidence of the North Sea basin both being important factors. Differences in the ease of access across these two areas at different times might explain some of the variation in the archaeological record.

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Site	MIS Age	Environment	Industry	Assemblage
Purfleet, Botany Pit	Late 9/Early 8?		Proto Levallois/handaxes	Workshop?
Mesvin IV	Late 9/Early 8?	Open, cold	Proto Levallois/handaxes	Workshop
Ariendorf 1	8	Open, cool	Cores, flakes	Butchery
Achenheim	8	Open, cool	Levallois	
Broom	8?		Handaxes	
Kesselt-Op de Schans	8?		Discoidal cores	Workshop
Gouzeaucourt (G, H and I)	8?		Handaxes	
Harnham	Late 8/Early 7	Open, cool	Handaxes	
Ebbsfleet	Late 8/Early 7	Open, cool and temperate	Levallois	Workshop
Lion Tramway Cutting	Late 8/Early 7		Levallois	Workshop
Le Pucheuil (A/C)	Late 8/Early 7	Open, cool?	Levallois/(handaxes ?)	Workshop
West Drayton/Yiewsley	Late 8/Early 7?		Levallois	
Creffield Road	Late 8/Early 7?		Levallois	Equipping
Crayford	Early 7?	Open?, temperate	Levallois	Workshop
Ranville	Early 7	Open, wooded	Handaxes/(Levallois)	Butchery
Pontnewydd	Earl/Mid 7?		Levallois/handaxes	Home-base
Maastrict (C and K)	7	Woodland and open areas, temperate	Levallois and discoidal cores	Workshop, butchery
Tourville-La-Rivière	7	Woodland and open areas, temperate	Blade production	Workshop, butchery
Rheindalen (B1, B3 and B4)	7		Levallois/(handaxe)/ blade production	
La Cotte de St Brelade	7 and 6	Open, temperate and cool	Levallois/(handaxes)	Home-base
Therdonne	Late 7	Open, cool	Levallois	Workshop, hearths?
Biache	Late 7/Early 6	Open, cool temperate	Levallois	Butchery, workshop
Pucheuil (B)	Late 7/Early 6	Open, cool?	Levallois/(handaxes ?)	Workshop
Oisiers à Bapaume	Late 7/Early 6		Levallois/(handaxes)	Workshop
Schweinskopf, Tönchesberg, Wannen	6	Open, cool	Undiagnostic (imported Levallois)	Workshop, butchery
Ariendorf 2	6	Open, cool	Undiagnostic	Butchery
Achenheim	6	Open, cool	Levallois	

Table 1. Sites from north-west Europe in broadly chronological order, showing suggested age, type of environment, industry type and possible site function. The grey shading denotes sites from Britain.

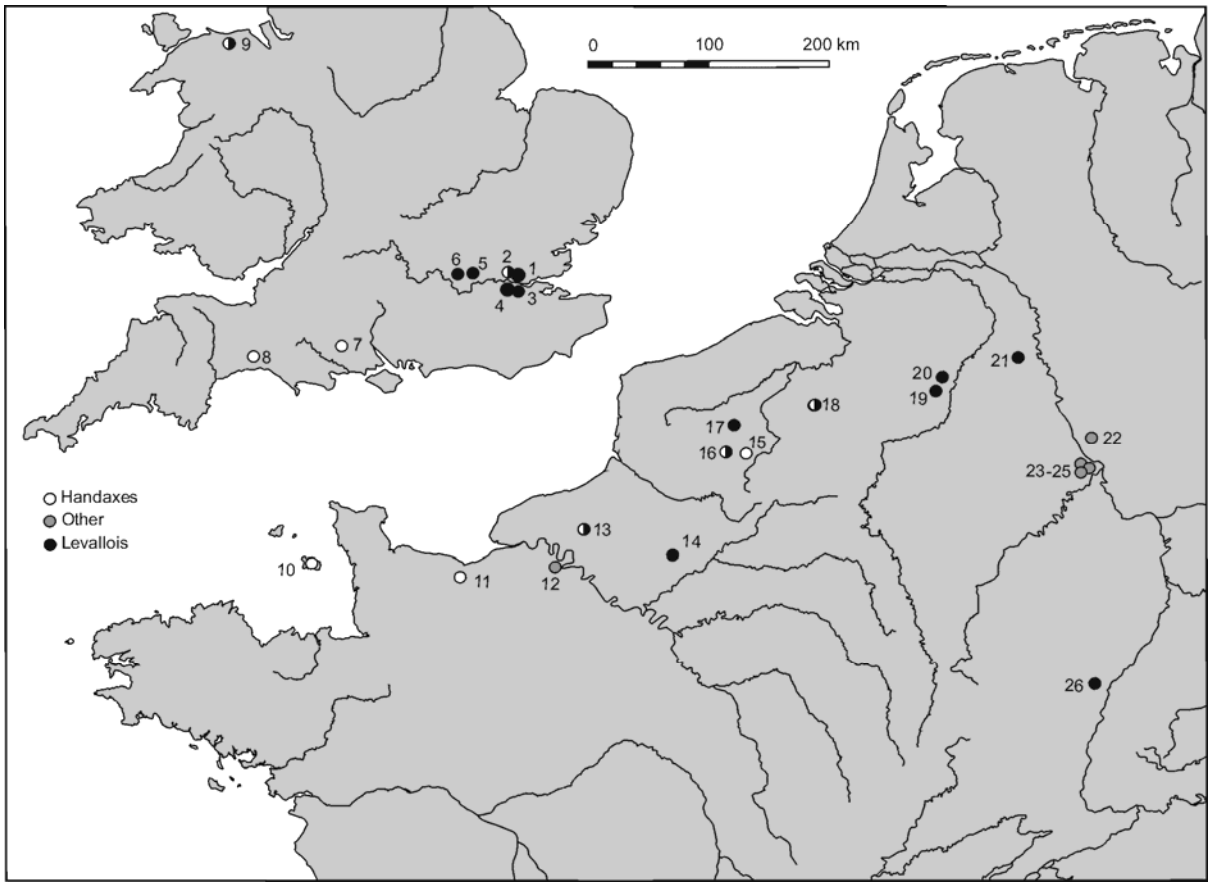

Figure 1. Map of north-west Europe showing sites discussed in the text. 1. Lion Tramway Cutting (Thurrock); 2. Purfleet (Botany Pit); 3. Ebbsfleet; 4. Crayford; 5. Creffield Road (Acton); 6. West Drayton/Yiewsley; 7. Harnham; 8. Broom; 9. Pontnewydd; 10. La Cotte de St. Brelade; 11. Ranville; 12 Tourville-la-Rivière; 13. Pucheuil; 14. Therdonne; 15. Gouzeaucourt; 16. Oisiers à Bapaume; 17. Biache; 18. Mesvin IV; 19. Kesselt-Op de Schans; 20.Maastricht-Belvedere; 21. Rheindalen; 22. Ariendorf; 23. Schweinskopf; 24. Tönchesberg; 25. Wannen; 26. Achenheim.