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Palaeolithic and Mesolithic

Robert Hosfield, Vanessa Straker and Paula Gardiner with contributions from Anthony Brown, Paul Davies, Ralph Fyfe, Julie Jones and Heather Tinsley

2.1 Introduction

The South West contains a diverse variety of Palaeolithic and Mesolithic archaeology of differing degrees of significance. This reflects the nature of the archaeological material itself, the histories of research in different parts of the region and, with regard to the Palaeolithic period, the differential preservation of Pleistocene landforms and deposits throughout the region. One of the key features of the Palaeolithic archaeology is the presence of a significant cave-based resource in south Devon and northern Somerset, which is unquestionably of national significance (see for example, Campbell and Sampson 1971; Tratman *et al.* 1971; Bishop 1975; Harrison 1977; Straw 1995; 1996; Andrews *et al.* 1999).

In terms of an open-landscape Palaeolithic record, there is an inevitable bias towards those areas with both appropriate deposits and a history of active research and collection. For example, the Pleistocene river deposits of the upper reaches of the now extinct Solent River and its western tributaries (Allen and Gibbard 1993; Bridgland 2001) in Dorset and Wiltshire provide a key (albeit secondary) context for Lower and Middle Palaeolithic archaeology and collection in these areas has been extensive (Wymer 1999; Hosfield 1999). In contrast, the Pleistocene deposits from the west of the region (river valleys such as those of the Exe, the Otter and the Avon) have received relatively little attention (but see Bates 2003; Hosfield *et al.* 2005).

The Mesolithic archaeology of the region is also geographically variable, with a particularly rich record in the Somerset area (reflecting a strong research focus upon both the Mendip caves and Somerset Levels) when compared to the more minor record from the west of the region (Devon and Cornwall).

For the Palaeolithic periods the open-landscape archaeology is dominated by lithic scatters (predominantly of deeply buried artefacts, frequently in fluvial deposits, and particularly true in the Lower and Middle Palaeolithic), although occupation sites such as Hengistbury Head (Barton 1992) and Kent's Cavern (Campbell and Sampson 1971) are also present. For the Mesolithic, there are greater numbers of excavated sites (especially from Somerset), although surface or shallow sub-surface lithic scatters are still common, especially in the west.

Overall, the Palaeolithic and Mesolithic archaeology of this region is generally rather poorly known, reflecting an absence of robust geochronological frameworks, the predominance of research into a handful of cave and open sites over the lithic scatter resource (whether located on the surface or deeply buried) and the absence of any major syntheses. It is hoped that this resource assessment will go some way towards addressing the last of these issues. The report is divided into period-based sections (Lower and Middle Palaeolithic, Upper Palaeolithic and Mesolithic), each of which provides an overview of the archaeology of the period and a summary of the key characteristics of the archaeological resource for the South West region. Preceding these is a short summary of the geochronologies of the Palaeolithic and Mesolithic and a review of the palaeoenvironments of the South West region, as currently known.

2.2 Chronology

The Palaeolithic and Mesolithic fall within the Quaternary Period, the most recent subdivision of the geological record. The Quaternary is divided into the Pleistocene and Holocene epochs, and the Late Upper Palaeolithic to Early Mesolithic transition at *c.*10,000 BP broadly marks the start of the Holocene. The chronology of the British Palaeolithic and Mesolithic is discussed here in terms of oxygen isotope stages (OIS, also known as marine isotope stages, MIS) for the Lower and Middle Palaeolithic (*c.*700,000–40,000 BP), while the Upper Palaeolithic and Mesolithic periods (*c.*40,000–5500 BP) are discussed with reference to named sub-stages of the Devensian and the Holocene, reflecting the nature of existing geochronological schemes.

The earliest occupation of Britain has typically been considered to date to *c.*500,000 BP, primarily reflecting the accepted chronology from Boxgrove (Roberts and Parfitt 1999). However, recent discoveries from the Cromer Forest-bed formation at Pakefield on the Suffolk coast (Parfitt *et al.* 2005) have indicated that the earliest hominin presence dates back to either *c.*680,000 BP (OIS 17) or *c.*750,000 BP (OIS 19). A date of *c.*700,000 BP is therefore accepted as the beginning of the British Lower Palaeolithic for the purposes of this resource assessment. The beginning of the British Middle Palaeolithic (and end of the Lower Palaeolithic) remains uncertain (reflecting dating difficulties and the varying criteria, including a decline in handaxes and the increasing frequency of Levallois technique, used for defining the start of the Middle Palaeolithic) but is taken here as *c.*250–200,000 BP (after Stringer and Gamble 1993, 148). The key periods can therefore be defined as follows:

Lower Palaeolithic	700,000–250/200,000 BP
Middle Palaeolithic	250/200,000–40,000 BP
Upper Palaeolithic	40,000–10,000 BP
Early Mesolithic	10,000–8500 BP
Later Mesolithic	8500–5500 BP

Table 2.1 on the next page outlines the OIS chronology for the Lower and Middle Palaeolithic periods, while Table 2.2 on page 26 outlines the sub-stage chronology for the Upper Palaeolithic and the Mesolithic. The tables also outline the main episodes of environmental change during these periods, with regard to the broad climatic and vegetational characteristics of the oxygen isotope stages and the sub-stages of the Middle and Late Pleistocene, and the Holocene. The major climatic fluctuations which characterise the Quaternary resulted in a series of warm and cold periods. Global sea levels were lowered during the coldest phases (dominated by glacial and periglacial conditions) when water was "locked up" in terrestrial ice-sheets, whereas the increases in melt-water during the warmer periods (interstadials and interglacials) caused the global sea levels to rise (eustatic sea level rise). These fluctuations continue to be the focus of research, particularly for the Holocene where they provide a time dimension for current predictions of the effects of global warming.

The Middle Pleistocene (*c.*780–125,000 BP) is characterised by a series of glacials (even-numbered OIS) and interglacials (odd-numbered OIS) with conditions generally alternating between wooded environments (associated with full interglacial conditions), open-steppe grasslands (associated with early glacial conditions) and glacial tundra (associated with full glacial conditions). The Late Pleistocene (*c.*125–10,000 BP) is slightly more complicated, reflecting the higher resolution records available for this period, as demonstrated by the recent Stage Three Project (van Andel and Davies 2004). In general the Late Pleistocene can be summarised as follows (after Stringer and Gamble 1993; Barton 1997):

Stage 5e (128–117,000 BP) Full interglacial conditions (oak/elm woodland, hot summers and mild winters).

Stages 5d–5a (117–71,000 BP) Generally cool temperate conditions with oscillations between warm interstadial (5c and 5a with forest habitats) and cool stadial environments (5d and 5b with tundra-type habitats).

Stage 4 (71–59,000 BP) Very cold conditions (although Britain was predominantly ice-free, open tundra habitats were dominant, with short, mild summers and long, cold winters).

Stage 3 (59–24,000 BP) Generally cold and dry conditions, although the period is characterised by sharply oscillating climates (indicated by ice-core records: see below), ranging between milder periods (featuring woodland development, although on a reduced scale compared to OIS-5c and 5a) and short cooling episodes, in which dry, grassland "mammoth-steppe" environments were dominant.

Stage 2 (24-13,000 BP) Full glacial conditions, with extensive ice sheets in northern England, Wales and Scotland, and barren, polar-desert type environments.

The glacial and interglacial cycles of both the Middle and Late Pleistocene resulted in dramatically fluctuating sea levels. For example, at the height of the last Late Pleistocene cold stage (the Devensian) around 21,000–18,000 BP (the Last Glacial Maximum or LGM), during which glacial conditions existed over much of Northern Europe (though not most of southern England), mean sea level was in the order of 130–140m lower than present (Heyworth and Kidson 1982). With specific regard to the South West, however, it is likely that there would always have been a significant barrier to the south, whether a sea barrier as in the present day, or a substantial Channel River system (including the tributaries that

OIS	Years BP	British Quaternary Stages	Climate	Archaeological Period (approximate)
2	24,000–13,000	Devensian	Predominantly Cold	Upper Palaeolithic
3	59,000–24,000			
4	71,000–59,000			Middle Palaeolithic
5a–d	117,000–71,000			
5e	128,000–117,000	Ipswichian	Warm	
6	186,000–128,000	Wolstonian	Cold	
7	245,000–186,000		Warm	
8	303,000–245,000		Cold	Lower Palaeolithic
9	339,000–303,000		Warm	
10	362,000–339,000		Cold	
11	423,000–362,000	Hoxnian	Warm	
12	478,000–423,000	Anglian	Cold	
13	524,000–478,000	Cromerian	Warm	

Table 2.1: *Chronology for the Lower, Middle and Upper Palaeolithic (Middle and Late Pleistocene), after Wymer (1999, table 2), Barton (1997, figs 15, 35–37) and Gamble (1999, fig 4.2).*

would have extended current rivers such as the Exe and the Axe out onto the coastal plain: see Antoine *et al.* 2003 for further details of the palaeogeography of the Channel River). Recent ice-core research (for example Meese *et al.* 1997; Stuiver and Grootes 2000; Johnsen *et al.* 2001) has also indicated that there were considerable short-term climatic fluctuations within the glacial/interglacial cycle of the Late Pleistocene, with dramatic shifts in temperature occurring over relatively short time-spans (centennial and perhaps even decadal). Other ice-core research (for example Petit *et al.* 1999) has also indicated that these short-term fluctuations probably occurred during the earlier Middle Pleistocene as well.

The Late Glacial period (after the Last Glacial Maximum at *c.*18,000 BP and the end of the full glacial conditions associated with OIS 2) is characterised overall by a dramatic warming. The period, however, is divided into several phases of climatic fluctuations prior to the onset of the Holocene. The north-western European tradition is to undertake this division on the basis of characteristic pollen zones (Zones I–III) but in Britain the Late Glacial is often more simply described using named biozones, principally the Windermere interstadial from *c.*13,000 BP to *c.*10,800 BP and the Loch Lomond stadial from *c.*10,800 BP to 10,000 BP, the approximate start of the Holocene. Reconstruction of high resolution climatic fluctuations during the Late Glacial is often based on beetle faunas (rather than plants), reflecting the generaly greater sensitivity of insects to climate change (due to their short generations, dispersal over large distances and colonisation of simple habitats, Robinson 2002). Insect (and other organic) remains are often recovered from organic sediments in cut-off and abandoned river channels (associated with migrating, braided rivers flowing within broad gravel floodplains), which provide suitable preservation conditions (Robinson 2002).

The initial Late Glacial warming at *c.*13,000 BP was very rapid (temperatures peak shortly after *c.*13,000 BP), with mean July temperatures thought to have risen by 9–10°C to a maximum of 17°C (Barton 1999; Atkinson *et al.* 1987). Winter temperatures may have remained low however, reflecting a more continental-style climate than those of the following Holocene. The second part of the Windermere interstadial, between *c.*12,000–10,800 BP, sees a decline in temperatures and often shows an increase in birch and willow woodland with continued open grassland and scrub species such as Juniper. It is at this period that the largest of the open-steppe mammals, the mammoth, disappears from the record; however, other large vertebrates such as elk, red deer, aurochs, horse (although to a lesser extent than previously, Barton 1999) and, possibly, roe deer continued.

The final stage of the Late Glacial period (Zone III, the Loch Lomond stadial, *c.*10,800–10,000 BP) was seasonally very cold with a partial thaw in summer. This zone marks a temporary return to cold conditions, with a glacial re-advance in northern England and Scotland. There was an estimated fall of 5–7°C in mean sea temperatures (Barton 1999). During the stadial, the vegetation was characterised by open tundra species and dwarf shrubs, with an absence of woodland trees. Several writers have also suggested that this stage (also known as the Younger Dryas) was very arid, which favoured the growth of steppe-type grasses, providing favourable grazing conditions for large mammals such as wild horses and reindeer. With regard to animal communities during this period it is perhaps significant that many radiocarbon dates on wild horse bones from the Upper Palaeolithic date to this period (Barton 1999). As with the

Radiocarbon years BP	British Sub-stage	Chronozone	Pollen zone	Archaeological Period
6900–6000	Holocene (Early Temperate)	Atlantic	VIIa	Late Mesolithic
9200–6900	Holocene (Early Temperate)	Boreal	V–VI	Early and Late Mesolithic
10,000–9200	Holocene (Pre-Temperate)	Pre-Boreal	IV	Early Mesolithic
10,800–10,000	Late-Glacial	Loch Lomond stadial	III	Late Upper Palaeolithic
13,000–10,800	Late-Glacial	Windermere interstadial	II	

Table 2.2: *Chronology for the British Late Glacial and Holocene (after Barton 1997, table 7).*

Palaeolithic and the Early Mesolithic in general, the evidence for the exploitation of plant foods during the Late Glacial is largely conjectural. Discussion of this issue is typically based on knowledge of the vegetation rather than on the finding of food remains. Barton (1999) has commented that boreal woodland ecosystems produce less biomass than steppe-grasslands, and the demise of the latter environments is thought to have played a major part in the reduction of the large mammal fauna in the Early Holocene.

The end of the stadial (indicated by temperature increases) occurred very rapidly around *c.*10,000 BP, and conditions continued to improve gradually over the course of the early Holocene: shifting from cool and dry conditions in the Pre-Boreal, through warm and dry conditions in the Boreal, to warm and wet conditions in the Atlantic stage (Barton 1997, 117–8).

Direct dates for the Middle and Late Pleistocene are relatively scarce in the South West, especially for river terrace and open-landscape deposits. This situation has however begun to change recently. Toms *et al.* (2005) produced a series of Optically Stimulated Luminescence (OSL) dates for the river terrace deposits (gravels, sands and organic clays) at Broom on the River Axe, spanning late OIS 9 and OIS 8. Two dates have also been obtained from terrace deposits associated with the River Exe (although these have not yet been published). At Five Fords by the River Culm (a tributary of the River Exe), an OSL sample on a river terrace sand deposit has yielded a date of 39,450±2930 BP (work by Tony Brown, University of Exeter). The geological map sheet associated with the terrace unit is currently being remapped by the British Geological Service (BGS), so the terrace remains undifferentiated at the time of writing. However it is likely to be a degraded remnant of Terrace 3 (Richard Scrivener, pers. comm. to Jenny Bennett, University of Exeter). At Washfield, by the River Exe, OSL dating on a bulk terrace sample has yielded a date of 27,500±240 BP (the work was conducted by Jenny Bennett, University of Exeter, as part of her doctoral research). The site lies on the Exeter map sheet, recently re-mapped in great detail by the BGS, and the terrace has been identified as Terrace 3. Further OSL dating of river deposits in the South West region is currently being undertaken as part of the Palaeolithic Rivers of South-West Britain project run through the Universities of Exeter (Tony Brown and Laura Basell) and Reading (Rob Hosfield). Finally, dates have also been obtained for the late Lower Palaeolithic site at Harnham, near Salisbury, where the application of OSL and Amino Acid dating has yielded dates for a buried tributary valley (of the Avon) of *c.*250,000 BP (Whittaker *et al.* 2004).

Dates for the cave deposits of the region are more widespread however, principally reflecting the presence of dateable materials, such as humanly modified animal bone. There is a radiocarbon date of 40,400±1600 BP from the Hyaena Den, Wookey Hole (OxA-4782), and there are 17 radiocarbon dates from Gough's Cave, ranging from 13,850–12,950 cal BP (OxA-3413) to 12,000–11,450 cal BP (OxA-2795, Jacobi 2000, 51). There is also a wide range of other Late Upper Palaeolithic radiocarbon dates for various cave sites in the South West, including Gough's Old Cave, Soldier's Hole and Sun Hole in the Cheddar region, and Kent's Cavern, Three Holes, and Pixies' Hole in Devon (see Section 2.5 on page 35 for further details). Recent work by Currant (2000) has also suggested non-absolute ages for the Banwell Bone Cave (OIS 4, the early Devensian), Hutton Cavern (late OIS 7), and Bleadon Cavern (OIS 7) on the basis of their faunas. Analysis of the artefact-bearing breccia at Kent's Cavern has suggested an age of OIS-10 or earlier (Proctor *et al.* 2005).

Assemblages have also been dated on the basis of the presence of diagnostic artefacts and comparisons with absolutely dated assemblages in other parts of Britain and the continent: for example, the presence of distinctive Creswellian (Cheddar points) or Final Upper Palaeolithic (penknife points and/or "long blades") assemblage artefacts (Barton 1997).

In general however, there is a clear need for further development of geochronological frameworks in the South West, especially with regard to the more widespread river terrace deposits that have the potential to yield both Palaeolithic and Mesolithic archaeology, and palaeoenvironmental and sedimentological data relevant to the understanding of palaeo-landscape evolution.

2.3 The Palaeolithic Environment

Scope and Methodology

It is not intended to review in detail all the environmental evidence that covers the Palaeolithic (below) and Mesolithic (on pages 40–48) periods in the region as this is being done as part of the English Heritage reviews of environmental archaeology, with individual specialists reviewing the different lines of evidence, in a period-based approach similar to this Research Framework. Instead, this Resource Assessment draws partly on past and current reviews that are published or available in draft form, to provide a general summary of past environments and environmental change for the region. The major sources are Bell (1984), Robinson (2002) and Scaife (forthcoming). In addition, new information has been added from unpublished specialist reports from recent projects and publications. Compared with later periods, there is less of a distinction between mainly "natural" and "cultural" datasets for the Palaeolithic and Mesolithic (especially the former) and consequently there is also much relevant introductory information in Section 2.2 on page 23 that is not repeated here. For the Palaeolithic, there are other useful references on Quaternary sequences in the region, such as Campbell *et al.* (1998).

Introduction

The general evidence for Palaeolithic environments during the Pleistocene is drawn from biostratigraphic studies relying mainly on analyses of molluscs, ostracods, insects and occasionally pollen (see also Section 2.2 on page 23). Some of the source data and specific evidence for the South West is summarised in more detail in this section.

The geology and geomorphology of the region is extremely varied and, as a result, the survival of sediments suitable for the preservation of biological remains varies considerably throughout the region. Much of the Middle Pleistocene evidence is from reworked chalk or limestone-derived fluvial deposits which favour the survival of molluscs, ostracods and bone, but limit the extent of interpretation possible. The *in situ* evidence from sites such as Harnham, Salisbury (chalk) or Twyford House in Bristol (limestone) is very valuable for understanding local environmental conditions but not the wider area. If pollen survives at all in largely calcareous deposits, differential preservation can limit its usefulness. In contrast, the Late Pleistocene record benefits from pollen data from waterlogged deposits.

Marine palaeogeography

Changes in sea level have resulted in major changes in the extent of the landmass and the character of its drainage. The history of earlier Pleistocene sea level fluctuations is extremely complex and will not be addressed here. As noted in Section 2.2 on page 23, mean sea level has risen some 130–140m since the Last Glacial Maximum (LGM) *c.*18,000 years ago, but understanding the change has to take account of a complex interaction of regional and local factors.

The palaeogeography of the submarine area around much of the South West is not as well understood as for the south and east coasts of England. However, as far as the Late Pleistocene/Early Holocene is concerned, in some areas a substantial portion of the land available to the Late Upper Palaeolithic population that recolonised England after *c.* 12,600 BP was flooded by the sea by *c.* 7000 BP (*c.*5990–5750 cal BC). Marine charts and core data give an idea of the bathymetry around the coast and offshore, though they cannot take account of offshore erosion processes or any isostatic effects. The coastline of South West England provides a rich resource for the study of sea level change, particularly for the Holocene. In the South West, mean sea level has risen 30–40m in the last 10,000 years. The rate of rise was greatest in the first four millennia, the shape of the present coastline being roughly accomplished by *c.*7–6000 BP, with mean sea level in the order of 4–6m lower than at present.

The main group of present-day offshore islands in the region is the Isles of Scilly, 45km west-south-west of Land's End. The sub-surface ace bathymetry between the Isles of Scilly and West Penwith suggests that the archipelago may have been surrounded by the sea as early as *c.*12,000 BP (*c.*13,130–12,700 cal BC). Rocks, such as the Seven Stones and one or two others, that are currently largely submerged, would have remained as islands for some millennia. This hypothesis has to be tested, but a possible Late Glacial or Early Postglacial separation raises interesting questions related to island biogeography. The unusual small mammal fauna goes some way to support early island status. Pernetta and Hanford (1970) and Turk (in Butcher 1978, 99) discussed the apparently relict Postglacial survival of the root vole (*Microtus oeconomus*) and the presence of the Scilly Shrew (*Crocidura suaveolens*), which is only found on the islands.

There are numerous remains of the Early to Mid-Holocene landscape and shoreline, in the form of forest beds and peat or organic saltmarsh deposits around the coast of South West England which are visible at low tide. In some areas, such as in the Isles of Scilly and Lyme Bay, fully submarine deposits have been reported by divers and are the subject of current research. Further reference is made to examples of intertidal exposures in relation to the Mesolithic environment on pages 41–43.

Pleistocene interglacials

Scaife (forthcoming) comments that there are few pollen data relating to Pleistocene interglacial or cold stages. He cites ongoing studies of palaeo-alluvial sediments from a terrace of the Axe at Broom which is showing evidence of pine woodland with a smaller component of oak, alder, hazel and ash, and some floodplain grassland. These results are similar to those from work on an earlier exposure of the Broom Railway pit sequence (Scourse in Shakesby and Stephens 1984) and while Scaife is content that these represent interglacial conditions (OIS 8/9), little other detail is currently understood (Scaife forthcoming; Toms *et al.* 2005).

Other evidence for interglacial vegetation comes from the heavily-cemented limestone Chadbrick gravels near Somerton. Hunt (1990) managed to extract well-preserved, though sparse, pollen from the sediments that is dominated by deciduous trees and shrubs. The pollen and mollusc evidence from the gravels is interpreted as indicating a meandering river flowing through a mainly wooded landscape. Alder and willow thickets and sedge marsh would have grown close to the river with herbaceous vegetation in open areas such as the tops of gravel bars in the river bed. Species-rich mixed oak woodland is suggested away from the valley floor. Planktonic algae confirm deposition in a fluvial environment. On the basis of reinterpretation of a previously published amino acid ratio, Hunt considers the deposits to compare with the Stanton Harcourt terrace deposits (dated to OIS 7), rather than Ipswichian interglacial age material.

A final example is from Honiton (summarised in Hosfield *et al.* 2005). During the construction of the Honiton bypass in 1965 a "mossy peat" deposit was revealed which included organic material, and bones thought to have been originally embedded in the peat, but possibly remobilised in mud flow and moved a short distance during the last glaciation (Turner 1975). Mammal remains from 17 individuals included *Hippopotamus amphibious* (which earned the site its name of the "Honiton Hippo Site"), *Palaeoloxodon antiquus* (elephant), *Cervus elaphus* (giant red deer) and *Bos primigenius* (ox). Pollen was analysed from samples of peat taken from both inside the animal bones and surrounding them. Sparse tree pollen from a range of species was present, with a high representation of herb pollen. The interpretation of the local environment based on the plant and mammal remains was of a rich marsh flora and grass landscape, occupied by grazing herbivores. It is now commonly attributed to the OIS 5e Ipswichian interglacial (for instance Edwards and Scrivener 1999).

Devensian

The earliest pollen evidence for vegetation in the Devensian is published by Scourse (1985; 1986; 1991) as part of his research investigating the extension of the Irish Sea glacier. Formerly, it was thought that glacial ice did not spread as far as the south of England in the last glacial episode but his research suggests that it clipped the northern edge of the Isles of Scilly. Scourse carried out pollen analyses on organic lenses thought to have accumulated in small lakes or ponds during the build up of solifluxion of granitic head on the Isles of Scilly. These are exposed in section at Carn Morval, Watermill Cove and Bread and Cheese Cove, and the pollen suggested open, largely grassland dominated herbaceous vegetation. Similar arctic tundra conditions were also identified in deposits from Porth Seal on St Martin's. Radiocarbon dates from Watermill Cove suggest that some of the sediments accumulated around $33{,}050^{+960}_{-860}$ BP (Q-2408), whereas at Carn Morval the sediments dated to $24{,}490^{+960}_{-860}$ BP (Q-2356) and $21{,}500^{+890}_{-800}$ BP (Q-2358). At Porth Seal, dates of $34{,}500^{+885}_{-800}$ BP (Q-2410) and $25{,}670^{+560}_{-530}$ BP (Q-2409) were obtained (Scourse 1986).

A further important record for the far south-west of the region comes from current work on Bodmin Moor. Recent pollen analysis by Kelly (2003) at Dozmary Pool has been supported by an OSL date of $23{,}900 \pm 3500$ BP. The results of radiocarbon dating on six samples from this sequence are expected in mid-2006, and they are anticipated to be of Last Glacial Maximum age. The only other results from the Devensian are Campbell's pollen analysis of Upper Palaeolithic deposits from Sun Hole and Wookey Hole on Mendip. The former indicates a cold open environment (Campbell 1977). The Sun Hole deposits are thought to extend into Early Postglacial levels, but Bell (1984) comments that the sampling interval used did not allow much detail to be obtained.

Prior to the Last Glacial Maximum, a number of mammals were exploited for food and raw materials (Barton 1999). The fauna included large mammals such as reindeer, horse, mammoth and aurochs.

Late Glacial (Zones I–III, *c.*13,000–11,300 BP)

In the Late Glacial period, small braided channels migrated across broad river floodplains (Robinson 2002) and rganic sediments accumulated in cut-off and abandoned river channels, which provided conditions suitable for the preservation of insect and other organic remains. Research on the lower Exe by Fyfe (2000) and Bennett (2005) has demonstrated channel patterns through the Late Glacial–Holocene transition. At the same time, freeze-thaw action on slopes created solifluxion debris resulting in extensive accumulation of deposits in many areas, although as noted above for the Isles of Scilly, the effects of solifluxion can also date to earlier in the Devensian. Examples include the fringes of Exmoor, where cemented sandstone head-deposits extend down slopes and on the northern side, into the Bristol Channel. At Brean Down, the exposure known as the sand-cliff, which preserves the extensive Holocene archaeological sequence, has accumulated above a thick cemented limestone breccia (ApSimon *et al.* 1961). Solifluxion deposits could preserve organic material beneath them in areas of impermeable bedrock. In the South West, for the Late Pleistocene/Early Holocene (Late Upper Palaeolithic and Early Mesolithic periods), the most detailed environmental information comes from insects and plant macrofossils, but pollen, which has been studied more often, is of major importance in providing a more general picture.

In Cornwall, insect assemblages typical of arctic/alpine conditions were found at Hawks Tor, Bodmin Moor (Coope in AP Brown 1977, 330). The staphylinid beetle *Olophrum boreale* which has an arctic distribution today was present on Bodmin Moor between 11,300–10,200 cal BC (Q-1016) and 9700–8400 cal BC (Q-1017). AP Brown (1977) reported on the vegetation history from the peats at Hawks Tor. Scaife (forthcoming) reports on this and earlier work by Connolly *et al.* (1950) at Dozmary Pool and Stannon clay pit, which reported on Late Glacial environmental history.

At Hawks Tor, the earliest date (stratigraphically) is 14,500–12,500 cal BC (Q-979). The sequence includes arctic tundra conditions at the end of the Devensian cold stage, the Windermere interstadial (Zone II) and the arctic conditions of the subsequent Loch Lomond stadial, with a reduction in tree cover after the warmer conditions allowing Juniper scrub and *Empetrum* heath to develop. These shrubs returned at the final transition to a Holocene sequence followed by an increase in tree birch (Scaife forthcoming). Thus, all three stages of the Late Glacial are represented, making this a very important sequence.

On Dartmoor, although there is as yet no full Late Glacial vegetation sequence, the Late Glacial/Holocene boundary is present at the base of a number of sites, the best example being at Black Ridge Brook in north Dartmoor (Caseldine and Maguire 1986; Caseldine and Hatton 1996). The open vegetation dominated by low-growing herbs and shrubs such as willow, juniper and crowberry is considered to date to the Loch Lomond stadial, *c.*11,000–10,000 BP, though it has not been radiocarbon dated.

The first evidence for the Late Glacial environment on Exmoor was identified in a recent study by Ralph Fyfe. Organic deposits in a spring mire at Exebridge on Exmoor's southern fringe show the Late Glacial/Holocene transition (Fyfe *et al.* 2003a).

Away from the main upland massifs of the west of the region, there are several further studies of the Late Glacial environment. In Devon, Fyfe *et al.* (2003a) published pollen evidence spanning the Late Glacial/Holocene transition from a palaeochannel at Lower Chitterley in the lower Exe valley, to the north of Exeter, thought to have started to accumulate at *c.*10,600 BP. A more complete section was re-sampled in 2003 and the stratigraphy suggests that the interstadial is also present. Work continues on this and includes some insect analysis as well as pollen. The full Late Glacial sequence is the subject of an undergraduate dissertation (Ralph Fyfe, pers. comm.).

The longest sequence is from the Gordano valley in north Somerset (Gilbertson *et al.* 1990) where the earliest radiocarbon date is 11,350–10,700 cal BC (SRR-3203). The pollen flora is of sub-arctic herbaceous vegetation, most likely related to the end of the Devensian cold stage. The long vegetation sequence charts the silting up of a freshwater lake.

Recent research in Dorset (The Cranborne Chase project, directed by Dr Charles French at Cambridge University) has identified some areas of floodplain peat and palaeochannels in the Allen valley. Pollen, molluscs and other techniques have been used to study landscape change dating from the Late Devensian/Upper Palaeolithic (French *et al.* 2003). Scaife's pollen analyses (in French *et al.* 2003) have identified open herb communities with scattered juniper and possibly birch scrub sometime before 11,360–10,870 cal BC (Beta-168611). This sequence continues in a second profile showing Early Mesolithic expansion of juniper, then birch and subsequent arrival of pine, oak, elm and hazel which is typical of the early woodland succession in central southern England. However, Scaife (forthcoming and in French and Lewis 2005) comments that the herb and scrub woodland percentages remained higher in this part of Dorset than elsewhere in southern England at a similar time. This is the only direct evidence for the Late Devensian prehistoric flora of the Dorset chalklands, so how rare this situation is for the Dorset landscape is not yet known. Further studies remain a high priority.

Although there is good insect evidence from the upper Thames valley, most is from Oxfordshire, outside the scope of this assessment, with the only evidence for Gloucestershire from Claydon Pike, near Lechlade (Robinson 2007). Robinson is of the view that the Thames valley landscape in the Gloucestershire/Oxfordshire border was tundra in the Late Glacial period. It was open, with sparse herb cover with dwarf birch (which can grow to 1m in height) in some areas. Sedges fringed the smaller pools, and the deeper pools supported algae such as Stoneworts (*Chara sp.*). Warming up of the climate, assumed to be at *c.*10,000 BP, is shown by the replacement of dwarf birch shrubs by a species of tree birch.

Further to the south in the Thames valley in Wiltshire, floodplain peat in gravels at Ashton Keynes has been dated to the Windermere interstadial (Zone II). The radiocarbon date from the lower part of the peat was 11,460–11,160 cal BC (Beta-115384, Lewis *et al.* 2001). The profile includes the transition to the cold conditions of the Zone III Loch Lomond stadial.

Finally, a stratigraphic sequence from Great Rissington in the Windrush valley in the Cotswolds gives further evidence for the Late Glacial landscape in Gloucestershire (Morton 1992; Wilkinson 1993). The general stratigraphic sequence comprised, from the base upwards, fluvial gravels which contained well-preserved large mammal bones including red deer and horse, overlain by organic deposits which in turn were overlain by alluvial silts. The sequence appears to have been laterally variable with tufaceous and other units in places. Some initial analysis (pollen, plant macrofossils, molluscs and sedimentology) and radiocarbon dating was funded by the developer Thames Water. Although limited in scope by funding, this work demonstrated potential to understand landscape change and vegetation development over possibly as much as 12,000 years. A Late Glacial date (10,940–10,440 cal BC, OxA-4150) was obtained on wood from an organic horizon interdigitated with the basal gravels. Open water, reed swamp and fen carr habitats were suggested by the pollen analysis. The authors suggest that the sequence accumulated between *c.*11,700 and 11,000 BP, in the Windermere interstadial and the early part of the subsequent Younger Dryas (Loch Lomond stadial, Branch and Lowe in Wilkinson 1993). The radiocarbon date was not from precisely the same stratigraphy as that on which pollen analysis was carried out, so the dates suggested are based on the pollen spectra and their similarity with other dated profiles of the period. This is a unique pollen record for the Cotswolds. The most detailed work was done on molluscs which demonstrated that a great variety of microenvironments existed in the sediments overlying the basal gravels and that a younger unit (5, organic silt to fibrous peat) was heterogeneous with different environments existing locally during its formation.

In areas of the region where pollen analysis is not possible due to poor preservation land snails from features such as periglacial involutions and tree-throw pits have given some insight into environmental conditions in the Late Devensian and Early Postglacial period. Periglacial involutions dating to the Late Devensian under South Street long barrow contained a typical Late Glacial restricted assemblage largely comprising *Pupilla*, *Abida* and *Helicella* (Ashbee *et al.* 1979). A Late Glacial marl at Cherhill, also in Wiltshire, similarly contained a restricted assemblage indicative of cold and open conditions (Evans and Smith 1983). The nature of the Late Glacial to Early Postglacial landscape development of the Wiltshire chalklands around Avebury has been demonstrated by excavation of the floodplain deposits of the Upper Kennet valley (Evans *et al.* 1993); Late Glacial marls and gravels were overlain by a Mesolithic to Neolithic soil.

To summarise, the South West preserves evidence for all stages of the Late Glacial environmental changes, however, it is thinly spread throughout the region and the resolution of the dating of the events is poor. The dated sequences are those summarised above from Cornwall (Hawks Tor), North Somerset (Gordano valley), Gloucestershire (Great Rissington), Dorset (upper Allen valley near Wimborne St Giles) and Ashton Keynes (Wiltshire). Most of the dates were obtained some years ago and greater resolution could be obtained by current methods. However there is potential to better understand the nature of this important period in landscape change across the region, a time when human recolonisation was taking place as climate ameliorated. Insect evidence demonstrates that there was very rapid climate warming around 10,000 BP (*c.*9660–9380 cal BC; pollen zone IV, pre Boreal) with a change from arctic conditions to mean summer temperatures similar to those of today in possibly as little as 50 years. This marks the onset of the Holocene. However, as with Zone III, the final stage of the Late Glacial period, the insect evidence for this rapid change is largely from the Oxfordshire part of the upper Thames valley gravels and not from the South West.

2.4 Lower and Middle Palaeolithic Archaeology (*c.*700,000–40,000 BP)

2.4.1 Summary

The Lower and Middle Palaeolithic archaeological record for the South West is, as is the case for the rest of the country, dominated by lithic findspots rather than sites, of which the majority are associated with fluvial deposits, typically river gravels. The record is richest in the east of the region, where there is a relatively dense concentration of findspots associated with the terrace landforms and deposits of the now-extinct Solent River and its upper tributaries: the Frome and Piddle, the Wiltshire/Hampshire Avon and the Stour (Wessex Archaeology 1993; Wymer 1999, fig 1). Unlike the Pleistocene Thames (for example, Bridgland 1994) there has been relatively little focus on the geochronology of the Solent River and its tributaries, although this situation is beginning to change (see Allen and Gibbard 1993; Bridgland 1996; 2001; Westaway *et al.* in press).

In the west of the region the Lower and Middle Palaeolithic resource decreases in the number, concentration and richness of findspots (many are single artefact finds), although there remain notable clusters in the Bristol Avon valley (Roe 1974; Bates 2003; Bates and Wenban-Smith 2005) and the Axe valley (Reid Moir 1936; Shakesby and Stephens 1984; Green 1988; Marshall 2001; Hosfield and Chambers 2002; 2004). The first two phases of the Palaeolithic Rivers of South-West Britain project (Hosfield *et al.* 2005) have also indicated that the resource to the west of the Axe valley may also be richer than has previously been claimed, although it is still apparent that the resource generally falls off along an east–west transect across the region.

The South West is of course distinctive for its Lower and Middle Palaeolithic-age caves, including Kent's Cavern (Campbell and Sampson 1971; Straw 1995; 1996), Windmill Cave, Brixham, the Hyaena Den at Wookey Hole (Tratman *et al.* 1971), Uphill Cave (Harrison 1977) and Westbury-sub-Mendip (Bishop 1975). As well as yielding lithic evidence for Palaeolithic occupation, many of these sites have also produced rich faunal assemblages, which have recently been re-examined and re-classified with regard to their potential as chronological indicators (for example by Currant 2000).

The chronology of the Lower and Middle Palaeolithic archaeology of the region is limited, because of a number of inter-connected factors.

- The majority of the lithic record for the Lower Palaeolithic, and some of the lithic record for the Middle Palaeolithic, is undiagnostic in terms of chronological affiliation (for example, handaxes in the UK span the period from the pre-Anglian Cromerian Complex (pre-500,000 BP to *c.*40,0000 BP).
- The number of surface scatters and individual finds in the region, which cannot be associated with a specific, dateable deposit.
- The general lack of absolute geochronologies associated with fluvial terrace deposits and other, dateable, Pleistocene sediments (see also Section 2.2 on page 23).

Nonetheless, there is some chronological evidence, principally relating to the region's cave deposits (based both on sediment dating and classification of faunal assemblages) but also to diagnostic lithic material such as the *bout coupé* handaxes that are associated with the Middle Palaeolithic period (Wymer 1999; White and Jacobi 2002).

Direct evidence for on-site hominin behaviour is very limited (with the principal exception of the Harnham site near Salisbury (Whittaker *et al.* 2004), reflecting the paucity of site-based evidence in the archaeological record. Nonetheless, there is off-site evidence for landscape use with regard to general occupation patterns of specific river valleys, upland/lowland contrasts, and the relationships between cave sites and open-landscape lithic scatters and findspots.

2.4.2 The South West Resource

The two richest areas of Lower and Middle Palaeolithic archaeology in the region are the extreme east of the region (where there is a rich open landscape archaeology associated with the Solent River system, see for example, Hosfield 1999; Wymer 1999; Wenban-Smith and Hosfield 2001) and the north of the region, where there is a rich archaeology associated both with the Somerset caves area (including both cave-based and open-landscape archaeology, Jacobi 2000; Norman 2000) and also the deposits of the Bristol Avon (Bates and Wenban-Smith 2005). To the west and south-west of these areas the archaeological record becomes more modest, although there remain occasional hotspots such as the Axe valley gravels (Green 1988) and the south Devon caves (Wymer 1999).

The region includes the upper reaches of the Solent River (its lower reaches flow through Hampshire), and its major western tributaries: Stour, Wiltshire/Hampshire Avon, Frome and Piddle (Allen and Gibbard 1993; Bridgland 1996; 2001). The archaeology here is characterised by a mixture of single artefact and small findspots, and a number of larger findspots, yielding hundreds of artefacts (for example, the findspots at Corfe Mullen in the Stour valley and Milford Hill in the Avon valley, Wymer 1999).

The Lower and Middle Palaeolithic archaeology of Wiltshire is dominated by open-landscape findspots associated with the Wiltshire Avon and its tributaries. The upper reaches of the Avon valley however are characterised by a general paucity of findspots associated with the gravels, with only sparse discoveries of handaxes from these terrace deposits, although there are also a small number of surface sites (on the chalk or clay-with-flints) fringing the valley. This pattern also characterises the tributary valleys of the Nadder, the Wylye and the Winterbourne, all of which are confluent with the Avon at Salisbury (Wymer 1999, 112). One factor behind this apparent paucity may be the nature of these streams, flowing in relatively steep-sided and narrow chalk valleys and whose long histories of vertical erosion with little or no lateral floodplain expansion would have resulted in little or no long-term preservation of older gravel deposits and their archaeology.

Whatever the explanation however, the paucity of archaeology above Salisbury is in marked contrast with

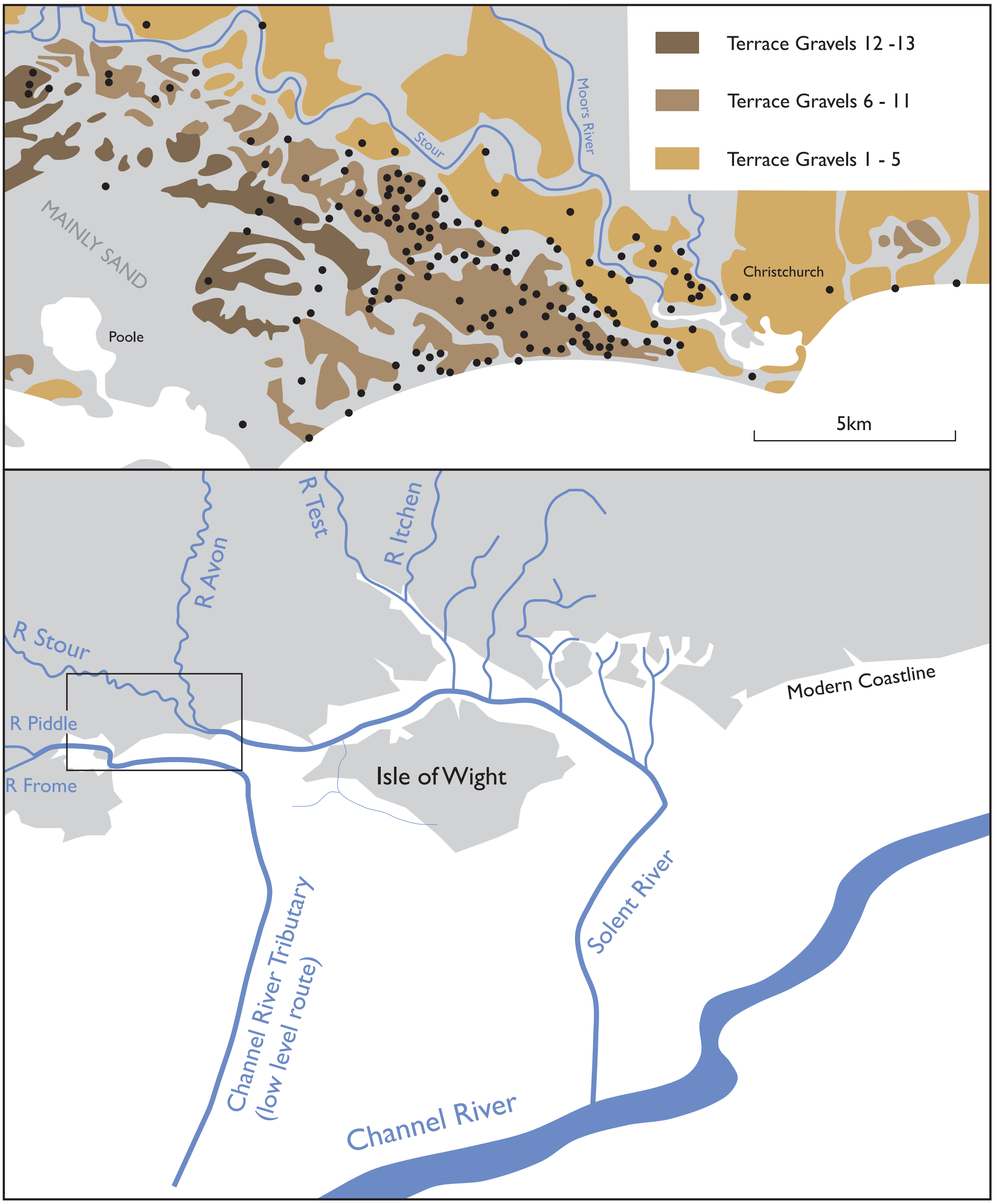

Figure 2.1: *Top: Lower and Middle Palaeolithic findspots associated with the terrace deposits of the Avon, Stour and Solent Rivers, in the Bournemouth region. Bottom: reconstruction of the Solent River and its tributaries, representing an "eastern" and "western" Solent River. After (Bridgland 1996, fig 3.8) and (Wymer 1999, map 23).*

the concentrations of findspots and artefacts within the city. The two key zones are Bemerton (between the Avon and the Nadder) and Milford Hill (between the Avon and the Winterbourne). In both areas the artefacts (*c*.500 from Milford Hill) were found in gravels *c*.20m above the current floodplain, and recent investigations (Harding and Bridgland 1998) indicated that the Milford Hill gravels were fluviatile and represent a former course of the Avon, although there was also a significant element of chalky, soliflucted material derived from the now-eroded valley sides (Wymer 1999, 112–113). The age of the gravels is still uncertain, and although Wymer (1999, 113) links them with the terrace 7 site at Wood Green, Hampshire, this terrace can also only be attributed with confidence to the Middle Pleistocene. To the south of Salisbury, the recent development of the Harnham relief road exposed buried river-valley deposits (up to 750m^2 of buried land surface), which have yielded animal bones and re-fitting lithic artefacts (Whittaker *et al.* 2004). Molluscan, mammalian and ostracod evidence all suggest an open, wet periglacial landscape, dating to *c*.250,000 BP. The artefacts include 44 handaxes and thousands of waste flakes and microscopic chips; the presence of the latter, along with re-fitting sets indicates the presence of undisturbed material at the site.

Wymer (1999, 113) has interpreted the Salisbury findspots as evidence for a focus of hominin activity, with groups attracted to the confluence of four rivers, and the facility of movement in different directions that it provided with respect to the river valleys and the chalk downland. There seems little cause to doubt this interpretation, although examination of some of the artefacts from Milford Hill (Hosfield 1999) suggests that they have been fluvially transported downstream and that valley locations upstream of Salisbury may also have been a target for hominin activity. Below Salisbury the vast majority of the Avon valley lies in Hampshire and is therefore beyond the scope of this resource assessment (the majority of the few findspots associated with it are also found on the eastern, Hampshire, side of the valley).

To the south of Salisbury on the modern south coast there is a series of relatively rich findspots (Figure 2.1 on the facing page), all associated with the fluvial deposits of the Stour (such as the Railway Ballast Pit at Corfe Mullen, producing nearly 200 handaxes) and the Solent River. In the Bournemouth region, where the gravels of the two river meet, there are rich findspots, yielding at least 50 handaxes, and occasional Levallois flakes in some cases, at Moordown, Kings Park, Queens Park and Winton, amongst other locations. All of this material is suggested by Wymer (1999, 106–11) to date between OIS 11 (i.e. post-Anglian) and OIS 8. The majority of the Bournemouth finds were casual discoveries, related to building developments and drainage work, although some of the larger findspots were related to aggregates extraction activity. The age of this material, and that of the Bournemouth region's terraces in general, remain uncertain, although continued applications of OSL dating to the Solent terrace deposits (Briant *et al.* in press) should help to resolve the problem. In the interim, detailed models have been suggested by Allen and Gibbard (1993), Bridgland (1996; 2001) and Westaway *et al.* (in press), although for the purposes of this assessment the simple division proposed by the British Geological Survey (Bristow *et al.* 1991) for the Bournemouth terraces is adopted.

Terraces 11–14: Older Terrace Gravels to the south and east of the Proto-Solent, higher than those which can be related to the present day drainage system.

Terraces 9–10: Terrace Gravels dating to the time of the establishment of the Rivers Avon and Stour.

Terraces 1–8: Terrace Gravels related to the present day River Avon.

At the estuary of the combined Avon and Stour (in the extreme south-east of the South West region), there are also Levallois flakes, cores and *bout coupé* handaxes associated with low-level terraces. The terrace sequence and age is controversial, but the material alone seems to be a clear indicator of a Middle Palaeolithic occupation (Wymer 1999, 106–7, 110). To the west of Bournemouth, the terrace deposits of the Frome and the Piddle have been commercially exposed and extracted, revealing a relatively rich handaxe assemblage at Moreton, and suggesting an occupation in the upper reaches of the Solent (unfortunately, the terrace deposits in the upstream reaches of the Frome and Piddle are poorly preserved and the age of all of these terraces is again uncertain, Wymer 1999, 107–8, 110).

The major concentration of artefacts in the Bristol area is at Shirehampton and Abbots Leigh, at the northern end of Clifton Gorge (Wymer 1999; Bates and Wenban-Smith 2005, fig 4). The artefacts have been recovered from terrace 2 of the Bristol Avon, on head gravels which overlie river terrace gravels. Although the Shirehampton findspots have only yielded small numbers of handaxes, this is likely to be due to the nature of the individual exposures (drainage ditches, building sites etc.) rather than the overall richness (or not) of the buried deposits (this is a common problem when evaluating the richness of the Lower and Middle Palaeolithic record, since archaeology from river terrace deposits is too often recovered via the aggregates industry and development projects rather than through controlled collection and/or excavation). This is confirmed by the methodical collecting at Abbots Pill and Ham Green, which has produced a minimum of 230 handaxes, 46 cores, 340 flakes, 3 Levallois cores and a Levallois flake. The age of the material is uncertain, although Wymer (1999, 185–6) suggests that is likely to date somewhere between OIS 11 and OIS 8. Small numbers of handaxes have also been recovered from head deposits at the St Anne's estate on the east side of the city, while there is a small number of handaxes from the lower Terrace 1 at Portbury to the south of the Avon, and a small number of scattered surface finds in the Clevedon area along the south side of the Bristol Channel (Wymer 1999, 186).

In Gloucestershire, the record is a very modest one, perhaps reflecting a paucity of research focus in this area, rather than a genuine absence of archaeology in the terraces of the Severn. It would certainly be interesting to know whether the small numbers of findspots and artefacts associated with the terraces of the Severn genuinely reflect the full extents of pre-Upper Palaeolithic occupation in the region. These include: two handaxes from Lillies Field pit, 11 flakes from the Forty Acre Field pit and a handaxe from Wellspring Road (all of which are associated with the gravels of the No. 3 (Main) terrace), and finds from the Upper Thames between Lechlade and Latton (Saville 1984c). The small number of finds from the Cotswolds (Saville 1984c;b; Hart and McSloy 2004, fig 3) and the Severn Estuary (Green 1989, 16) are also potentially significant in this respect.

To the south of Bristol is the key area of the Somerset caves (Figure 2.2 on page 38). These sites have yielded both lithics and rich faunal records, for example the Mousterian artefacts (including *bout coupé handaxes*) and distinctive Devensian faunas from Rhinoceros Hole and the Hyaena Den at Wookey Hole (Wymer 1999, 91; Jacobi 2000, 45–46), and also (to the west of this area) the Devensian Stage fauna and Late Middle Palaeolithic artefacts from Uphill Quarry. Also of critical importance to British Quaternary Studies is the site of Westbury-sub-Mendip, with its distinctive Cromerian fauna, found in association with a sparse assemblage of artefacts (Andrews *et al.* 1999).

Other parts of Somerset have also yielded a rich Lower Palaeolithic archaeology, with a series of important surface findspots identified in the Vale of Taunton at Kibbear, Norton Fitzwarren hillfort, and Cotlake Hill (Norman 2000). Nineteen greensand chert handaxes (from a total of *c.*100 artefacts) have been recovered from Norton Fitzwarren, and may be associated with the remnant of terrace 2 gravel which caps the hilltop and is thought to be of later Middle Pleistocene age (Norman 2000, 55). Cotlake Hill has yielded several hundred Lower Palaeolithic artefacts made in greensand chert, including at least 100 whole and broken handaxes (Norman 2000, 56–7). The artefacts were all recovered from head deposits, and weathering and frost damage suggests that the artefacts have been exposed at or near the surface for a considerable period. There is little evidence of fluvial transport, and while battering from downslope movement is evident, Norman (2000, 57) suggests that at least some of the assemblage may represent activity in the immediate area. Small numbers of artefacts have also been recovered from the alluvial deposits in the Tone valley at Bradford-on-Tone (Wymer 1999, 187). The only other major findspot of significance in Somerset is at Watchet, where the Doniford Gravels have yielded *c.*200 artefacts (including one Levallois flake and at least 24 handaxes and 29 cores), recovered from the beach and foreshore below the cliff exposures of the gravels (Wymer 1999, 186–7). Single handaxes have also been recovered inshore at Watchet and Williton, also from the Doniford Gravels.

The Lower and Middle Palaeolithic archaeology of Devon is perhaps best known because of the cave sites of Kent's Cavern, Torquay and Windmill Cave, Brixham (Figure 2.2 on page 38). Kent's Cavern has produced evidence of both Lower and Middle Palaeolithic occupation. Although the complex stratigraphy and the nature of the records deriving from William Pengelly's 19th-century excavations make interpretation difficult, it is likely that the handaxes recovered from the cave (a minimum of 14) originate from a breccia deposit in the lower part of the sequence which has also yielded a Cromerian-stage fauna (Wymer 1999, 190). The archaeology would therefore be *c.*500,000 years old, and represent part of the pre-Anglian-glaciation Palaeolithic occupation of Britain. This is also broadly supported by recent redating work, where re-examination of the sequence suggested correlation of the artefact-bearing breccia with OIS 10 (*c.*362–339,000 BP) or earlier (Proctor *et al.* 2005). In a cave-earth overlying the breccia, Mousterian (Middle Palaeolithic) artefacts have been found. Although Campbell and Sampson (1971) reduced the number of artefacts (to 45) that could be confidently assigned to the cave-earth, these artefacts include three cordiform and two *bout coupé* handaxes, strongly suggesting a Mousterian/Middle Palaeolithic age (Wymer 1999, 191). A handaxe with parallels to the Lower Palaeolithic examples at Kent's Cavern has also been recovered from Windmill Cave at Brixham.

A small number of Levallois artefacts have been recovered from Cow Cave, Chudleigh. This material has been suggested to be of early Middle Palaeolithic age, although there are also claims of Upper Palaeolithic material from the site (Section 2.5 on the next page), and a handaxe tip of probable Lower Palaeolithic age (Roger Jacobi pers. comm.). A wide range of faunal remains have also been recovered, but unfortunately none of the remains appear to have come from a known stratigraphical context.

In comparison with the county's cave archaeology, the open-landscape findspots in Devon generally reflect a relatively minor resource. Of these, the majority are associated with the Exe and Otter rivers, reflecting the preservation of the Pleistocene-age terrace deposits of these rivers. Little is known of the age of these deposits, although recent work by Jenny Bennett (Exeter University) has produced Devensian ages for terrace deposits of the River Culm and the River Exe (see also page 26). The artefacts are predominantly single artefact surface finds, either associated with terrace gravels (for example at Wigginton, and Tidwell Mount, Budleigh Salterton in the Otter valley, and at Tiverton in the Exe valley) or with pre-Quaternary bedrock (such as the handaxe finds on Palaeozoic rocks at Halberton, Newton Poppleford and Harpford, Woodbury). Artefacts recovered from within the gravels are rarer, with the handaxe at Magdalen Street, Exeter one of the few examples. To the west of the Exe, river gravels are relatively poorly preserved (due to the steep river gradients and the tendency of rivers such as the Teign and the Dart to cut narrow, gorge-like valleys) and artefacts are correspondingly sparse. Where they do occur it is most usually as derived handaxes, either at the base of coombes (as at Thorverton) or within modern floodplain alluvium (for example at Kingsteignton, Haccombe with Combe and Teignmouth in the Teign valley, Wymer 1999, 187).

The one exception to the above rule is the rich Lower Palaeolithic archaeology found in the east of Devon, on the River Axe and the border with Dorset. The key findspots here are located at Broom (Pratt's Old and New Pits in Dorset, and the Railway Ballast Pit in Devon). These pits yielded *c.*1800 artefacts, the majority of them handaxes. It has been suggested that there is a land surface at Broom and that at least some of the artefacts are in primary context (Wymer 1999, 183), although analysis of the artefacts by Hosfield and Chambers (2004; Chambers 2004) has led them to suggest that the assemblage was transported by the river, although perhaps only over relatively short distances. Recent OSL dating (Toms *et al.* 2005) suggests an age of *c.*300–250,000 BP for the Broom gravels, while pollen analysis by Rob Scaife (from the organic clays that are sandwiched by gravels at Broom) suggested a boreal, floodplain environment with stands of pine woodland (Hosfield and Chambers 2004, 44). There are other findspots in the Axe valley (such as at Kilmington and Chard Junction), although these have only yielded handfuls of artefacts.

In general, the Lower and Middle Palaeolithic archaeological evidence further west is characterised by a background scatter of single artefact and small (fewer than ten artefacts) findspots. These low-level background scatters are dominant in the extreme west of the region, where there is little other evidence for Lower and/or Middle Palaeolithic occupation. In Cornwall for example, Wymer (1999, 187–88) documents 11 findspots, dominated by single-artefact finds of handaxes and handaxe fragments, with one Levallois core. The majority of the artefacts are highly worn and stained, enabling similarly stained/worn (and non-diagnostic) flakes and a bifacial fragment from St Keverne to be identified as Palaeolithic. A key contribution to the Palaeolithic archaeology of Cornwall has been made by the Lizard Research Project (G Smith 1987) which has identified a number of finds in the St Keverne and Landewednack areas. With the exception of the Levallois core (probably Middle Palaeolithic in age), the material could be of any age within the Lower and Middle Palaeolithic periods.

Overall, the Lower and Middle Palaeolithic archaeological record of the South West is a diverse one, varying between rich deposits and findspot concentrations in some areas, to very poorly represented zones, particularly in the far west. There is however considerable scope for improved understanding of the record and the resource, including the integration of cave and open landscape archaeology, landscape-orientated approaches to the relative use and occupation of the region's lowland and upland areas, the development of robust geochronological frameworks (especially for river terrace sequences and deposits), and explicit evaluations of the "an absence of evidence or a genuine evidence of absence" issue.

2.5 Upper Palaeolithic Archaeology (c.40–10,000 BP)

2.5.1 Summary

The Upper Palaeolithic archaeology of Britain can be effectively divided into an Early Upper Palaeolithic phase (EUP, prior to the Last Glacial Maximum at *c.*18,000 BP) and a Late Upper Palaeolithic phase (LUP, post-Last Glacial Maximum), and this approach is adopted here. While there is clear artefact and fossil evidence for an Early Upper Palaeolithic occupation of the South West (i.e. prior to the Last Glacial Maximum), as with the remainder of the country detailed information on the dating and sequences of the three artefact based sub-divisions that have been identified to date is generally lacking.

The first of the technologies is characterised by bifacial and unifacial leaf points, which were probably hafted as spear tips: some of the British examples have impact fractures. Leaf points have been found at both cave and open-air sites. All those from the South West are from caves – for example Soldier's Hole, Badger Hole, Kent's Cavern, Windmill Cave and Bench Tunnel Cavern. The last of these sites is important for the reported discovery of a unifacial leaf point beneath a mandible of spotted hyaena. The mandible has been radiocarbon dated to 36,800±450 BP (OxA-13512). This determination agrees reasonably well with a date on wood charcoal from the cave of Nietoperzowa at Jerzmanowice (Poland), the type-site for this technology in northern Europe. It is not known whether leaf points were produced by the last Neanderthals to have occupied the British Isles or by the earliest anatomically modern humans – or possibly by both.

The oldest human fossil from the South West consists of fragments of a maxilla found in March 1927 in the vestibule of Kent's Cavern. Recent radiocarbon dating of bones from this excavation suggests an age for it of between 37–35,000 BP, which is significantly older than previously suspected (Jacobi *et al.* 2006). Unfortunately, not enough remains to attribute the maxilla to a human type, and likewise there are insufficient artefacts found with it to assign these to a specific technology, although it is clear that they are Upper Palaeolithic.

The Aurignacian is probably the Upper Palaeolithic technology which follows that with leaf points and it is believed by many to have been the oldest European technology made exclusively by anatomically modern humans. Intriguingly, it is found only in western Britain within the UK and is best represented in the South West at Kent's Cavern. The lithic industry associated with this technology includes nosed and shouldered scrapers, and beaked burins (*burins busqués*). A partial lozenge-shaped bone or antler point from Uphill Quarry, near Weston-super-Mare, is important as the only clearly Aurignacian organic artefact from the British Isles. It has been directly radiocarbon dated to 31,730±250 BP (OxA-13716). A bone or antler point from the Hyaena Den at Wookey Hole has a very similar age (31,550±340 BP, OxA-13803) and together the two determinations, both from the Axe valley, document a human presence contemporary with the Aurignacian of western Europe – a correlation supported by the typology of the stone tools.

The third of the typologically distinctive Early Upper Palaeolithic technologies to be found in the British Isles is the Gravettian. This is represented by stray finds of stemmed points (Font Robert points), the earliest examples of which may have appeared about 29,000 years ago. Only a small number have been found in Britain, the examples from the South West coming from Kent's Cavern and from the Severn valley at Forty Acre Field, Barnwood on the outskirts of Gloucester (Clifford *et al.* 1954).

Britain appears to have been wholly abandoned during the Last Glacial Maximum (LGM). When humans ceased to visit Britain remains contentious, but the most recent uncontroversial radiocarbon date for such a presence is from a human humerus from Eel Point on Caldey: 24,470±110 BP (OxA-14164, Schulting *et al.* 2005). Re-colonisation after the Last Glacial Maximum appears to correlate closely in time with the beginning of the Windermere interstadial at about 13,000 BP. Housley *et al.* (1997) argued that this Late Upper Palaeolithic (LUP) re-settlement of northern Europe was staggered, involving pioneer and residential phases, but there is no clear evidence from the British Isles for such a pattern.

There are probably over 200 findspots in the British Isles which fall within the Windermere interstadial and this is the earliest period from which evidence of a human presence in Scotland survives (Saville 2004b). The majority of findspots are identified by a presence of distinctive, abruptly modified (backed) lithic tool forms and it is clear that these changed during the interstadial. During the first half of the interstadial they take the form of Cheddar, Creswellian and shouldered points and these are sometimes associated with bone, antler and ivory artefacts identical to those of the contemporary continental Magdalenian. This technology is sometimes referred to as the "Creswellian" and is well-represented in the cave sites of the region such as Kent's Cavern, Three Holes Cave, Gough's Cave, Soldier's Hole and Sun Hole. There are numerous radiocarbon determinations on human remains, butchered animal bones and organic artefacts which date the Creswellian to between 13,000–11,800 BP (Jacobi 2004). The technologies of the second half of the interstadial are less easy to define, but the abruptly modified component includes curve- and straight-backed blades and points. Most distinctive amongst these are "penknife points", curve-backed points with additional basal retouch. Lithic material likely to belong to the most recent part of the interstadial comes from caves in the Torbryan and Chudleigh valleys in Devon (Barton and Roberts 1996) and from Aveline's Hole. The richest open-air Late Upper Palaeolithic site in the region, at Hengistbury Head, also clearly belongs somewhere in the second half of the interstadial and its tool assemblage is unusual with the presence of a small group of tanged points (Barton 1992).

The Late Glacial archaeological record for Britain was probably interrupted by a short period of abandonment during the extreme cold of the Younger Dryas (Loch Lomond) stadial. Humans appear to have returned to Britain at about 10,200 BP, and evidence for their activity during the closing centuries of the Pleistocene and the very beginning of the Holocene comes almost exclusively from south-eastern and eastern England. A characteristic of the lithic industries of this time is the production of long straight blades (frequently over 12cm in length) from alternately worked opposed platform cores, themselves often abandoned when still of large size (Barton 1997). Blades from knapping scatters often have battered margins (so-called "bruised blades": *lames mâchurées*). This bruising may be a result of flint-on-flint contact, perhaps from the blades being used to adjust the edges of the striking platforms of cores (Froom 1965). As yet, evidence of a human presence in the South West during those centuries remains to be identified.

Key themes for the archaeology of this period (after Barton 1997) include raw material use and issues of mobility. Flint from Gough's Cave has been shown from its microstructural fabric to have been transported over 70km from the northern part of Salisbury Plain (Jacobi 2004). The source of the high quality flint used at sites in Devon to produce the long slender blades characteristic of the Creswellian is unknown, but is unlikely to be local. The absence of the early stages of the blade core reduction process from Three Holes Cave also indicates pre-transportation processing of the raw materials (Barton 1997, 124–5). Trace element analysis of flint used in the Creswellian at Robin Hood Cave at Creswell Crags appears to demonstrate an origin in south-western England (Rockman 2003) suggesting surprisingly large-scale movements of people during the earlier part of the Lateglacial interstadial. North Sea (Baltic) amber found at Gough's Cave (Beck 1965) has further highlighted the potential mobility of the hunter-gatherers of the time.

Assemblages from the more recent part of the interstadial are characterised by the use of local raw materials, as at Pixies' Hole where an entire river cobble reduction sequence is represented. In general Final Upper Palaeolithic retouched tools are made on smaller, thicker blades than those used in the Creswellian, perhaps reflecting the habitual use of local (and often poorer quality) raw materials. Barton (1997, 126) suggests that this may reflect changes in the Lateglacial landscape (such as increased forest growth) which reduced the ease of mobility (and perhaps also the ease of raw material availability and extraction). However the South West region does provide a possible exception to this rule, since at the site of Hengistbury Head artefacts were produced on relatively long blades (although the evidence for the entire *chaîne opératoire* suggests that they were still using local raw materials, albeit ones that were better than average for this period, Barton 1997, 126).

Horse remains at Gough's Cave (Parkin *et al.* 1986) have also indicated the intensity of carcass processing and usage during the Creswellian, with cut mark evidence indicating meat filleting, the removal of marrow and soft tissues (the tongue and the brain), skinning (for hides), and the removal of tendons (to produce sinews) and hooves (for producing glue). Tooth eruption data also provide seasonality evidence, with the red deer at Gough's Cave killed in winter or early spring, perhaps suggesting seasonal occupation and use of sites (possibly in-keeping with the suggestions of considerable mobility during this period). Cut marks and breakage of human bones, and their disposal amongst the remains of other species interpreted as food debris, strongly suggest that cannibalism took place at Gough's Cave (Andrews and Fernández-Jalvo 2003).

There is relatively little evidence for Upper Palaeolithic art in Britain although, recently, art in the form of engravings of animals and stylised females has been found on the walls of Church Hole at Creswell Crags (Ripoll *et al.* 2004). Similar evidence from the South West is being keenly sought. Groups of incisions, of an unknown significance, exist on a hare-tibia awl, a length of rib bone and what may be fragments of mammoth ivory from Gough's Cave. The Upper Palaeolithic site at Hengistbury Head has yielded a refitted flint core with abstract engravings on the cortex (this has parallels with identically incised flints on contemporary sites in the Netherlands and France). Hengistbury Head has also yielded red ochre in association with end scrapers and other tools, perhaps reflecting the use of ochre in hide-working activities (the ethnographic record documents the practical uses of ochre in leather working as a vermicide). It is also worth recording here that the forepart of a horse on a fragment of bone from Sherborne is a forgery (Stringer *et al.* 1995).

2.5.2 The South West Resource

In general the region is dominated by its cave sites in terms of the quality of its Upper Palaeolithic archaeology (for example, evidence for raw material usage and subsistence strategies), although numerically the open-air findspots represent (as with the Lower and Middle Palaeolithic) the majority of the record and are of particular significance where diagnostic artefacts can be identified at these sites. Unlike the distribution for the Lower and Middle Palaeolithic, the east of the region has a relatively minor Upper Palaeolithic record (with the obvious exception of the Hengistbury Head site), and in that respect is similar to both the extreme west and the extreme north of the region which also show a minor archaeological presence for this period. The key zones are instead those of south Devon and central Somerset (Jacobi 2000; 2004), and in both of these areas it is the cave archaeology which is predominant.

The Upper Palaeolithic record in Devon is dominated by cave sites, of which the majority have been formally excavated at various different times. The recovered assemblages indicate occupation during both the Early Upper Palaeolithic (for example, the Aurignacian assemblage from Kent's Cavern) and the Late Upper Palaeolithic (the Creswellian assemblages from Kent's Cavern and Three Holes Cave). Late Upper Palaeolithic deposits (including human remains, charcoal fragments, fauna and a single flint core) have also been, controversially, claimed from Worth's

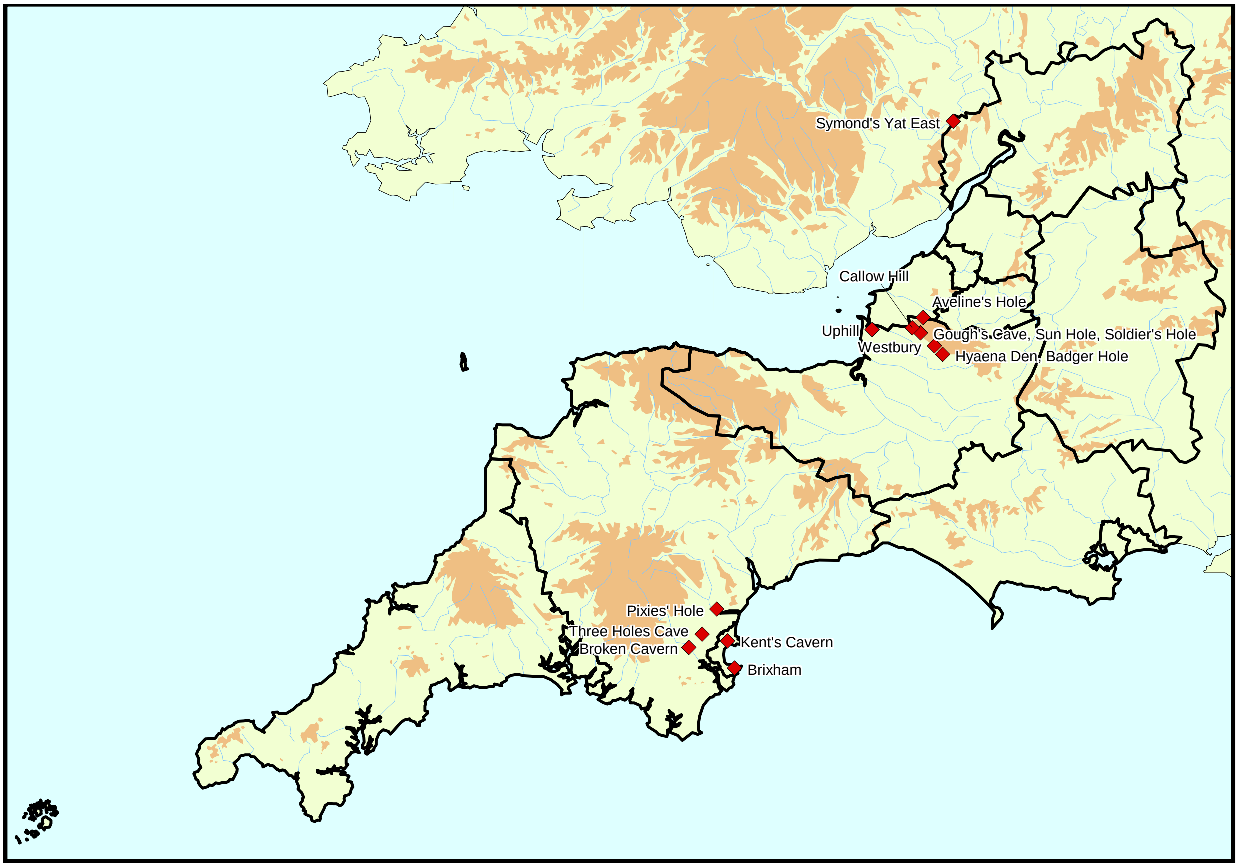

Figure 2.2: *Lower and Middle Palaeolithic caves sites, and Upper Palaeolithic findspots from the second half of the Lateglacial interstadial (after Barton 1997, fig 100; Wymer 1999, fig 67).*

Cattedown Bone Cave (Vanessa Straker pers. comm.). Although human fossil material was collected in the 19th century, the cave's real age and significance is impossible to assess today, and there are similar problems with the species' identifications claimed for the faunal material (Roger Jacobi pers. comm.).

With regards to the Early Upper Palaeolithic, Jerzmanowice leaf blade points have been found at both Bench Tunnel Cavern and Kent's Cavern, with the latter site also producing a large Aurignacian assemblage and a Gravettian Font Robert point. Post-dating the Last Glacial Maximum, Creswellian assemblages have been recovered from Kent's Cavern (radiocarbon dates for Late Upper Palaeolithic activity at this site range from 13,000 to 11,850 cal BP, OxA-1789, 5692, 7994, 8002, Jacobi 2004, 53) and Three Holes Cave (radiocarbon dates associated with the Creswellian artefacts range from 12,900 to 11,680 cal BP, OxA-3890, 3891, 3208, 3209, Jacobi 2004, 51). Penknife points have also been recovered from the Devon caves, specifically Pixies' Hole, Broken Cavern and Three Holes Caves. This area also includes a small number of open landscape findspots, all of which are characterised by fewer than ten artefacts. The Upper Palaeolithic caves are predominantly distributed in the south of Devon, although it is perhaps noticeable that the open-landscape findspots are distributed in the centre and north of the county.

As with Devon, the Upper Palaeolithic record in Somerset is characterised by a small number of both cave sites and open findspots. Amongst the cave sites (all of which have been excavated at different periods), many have yielded multiple assemblages from different phases of the Upper Palaeolithic (such as at Soldier's Hole), with some also yielding Middle Palaeolithic age assemblages and faunal remains (see also page 34).

The Somerset caves have yielded fully bifacial (for example at Soldier's Hole) and part-bifacial, blade-based (such as from Uphill Cave and the Hyaena Den and Badger Hole in the Wookey Hole ravine) leaf-shaped points from the Middle to Upper Palaeolithic transition. The significance of the typological difference remains uncertain, although it is possible that the fully bifacial leaf points are older than the blade-based points. The makers are also unidentified at present, although it is possible that the leaf points actually relate to the terminal Neanderthal occupations of Britain (Jacobi 2000, 47). Such Early Upper Palaeolithic leaf point assemblages include the artefact assemblage at Badger Hole (at just 21 artefacts this is the largest sample of Early Upper Palaeolithic artefacts in Somerset). It is worth stating here that the bone fragments thought to identify a hearth in front of the cave are stained and not charred, and that the human bones previously thought to be of Early Upper Palaeolithic age are actually (on the basis of radiocarbon dating) Mesolithic (Jacobi 2000, 47). Unambiguous modern human occupations in the Somerset caves region are indicated by the Aurignacian bone point from Uphill Cave/Quarry.

Following the short occupation hiatus associated with the Last Glacial Maximum, the Somerset caves were again widely occupied during the Late Upper Palaeolithic (see Jacobi 2004, appendix, for a recent summary). The most significant is the Creswellian assemblage at Gough's Cave, comprising over 1000 artefacts, while there is also evidence for a Creswellian occupation at Sun Hole and Soldier's Hole (at both of which there is evidence for the *en éperon* technique of butt preparation, apparently associated with the Creswellian, while a human ulna from Sun Hole has yielded an age of 12,900–11,800 cal BC (OxA-535), extremely similar to the dates from Kent's Cavern and Three Holes Cave), Aveline's Hole and Badger Hole. As indicated above, Gough's Cave has produced evidence for a wide range of activities including raw material procurement and usage, organic tools (including needles, awls and *bâtons*), and animal processing (Jacobi 2000, 49 and see also Jacobi 2004 for further details). During the final stages of the Late Upper Palaeolithic, the distinctive backed blades (known as Azilian points or *Federmesser*, which initially occur as bi-points, before changing into "penknife points") occur in Somerset, both in cave sites (there are bi-points and penknife points from Aveline's Hole and bi-points from Gough's Cave), and also from the open findspots: there are two penknife points from Callow Hill near Axbridge (Jacobi 2000, 51; Jacobi 2004, 83). These open findspots are both small in number and tend to be characterised by single or small numbers (fewer than 10) of artefacts. The majority of the open findspots are distributed around the Cheddar region (reinforcing the apparent significance of this area during the Late Upper Palaeolithic occupations), although there is also one very minor find at Doniford on the north Somerset coast.

The geographical extremes of the region are all characterised by an apparently minor Upper Palaeolithic presence, although a key question for future research should address the issue of whether this simply represents an absence of research. Cornwall for example is represented by just a handful of small findspots (some of which are controversial), although it is perhaps noticeable that the majority of these are distributed in the extreme south-west (for example the Lizard, St Buryan, and Gwithian – a possible Final Upper Palaeolithic flint working site), suggesting that an Upper Palaeolithic presence in central and eastern Cornwall could be expected (and whose demonstrated absence might indicate the importance of now-submerged coastal routes of access into the far west). A second question of specific relevance to Cornwall relates to the apparent association of backed blades with Mesolithic assemblages in this county, despite the fact that elsewhere in the country they are a significant element of Late Upper Palaeolithic assemblages (Berridge and Roberts 1986; Steele 1988). Finally with respect to taphonomic issues it is worth noting that: (i) the large scale of past tin streaming activity in many of Cornwall's river systems complicates the interpretation of finds from riverine contexts (this also applies to Lower and Middle Palaeolithic artefacts) and (ii) while no Palaeolithic cave/rockshelter sites are known from Cornwall, this may reflect a combination of factors including sea level rise, the limited potential for early deposits in present sea caves (Rose 2000) and the absence of archaeological investigation of those upland natural outcrops that could have served as rock shelters.

The Upper Palaeolithic record in the north of the region is also very minor, although diagnostic Upper Palaeolithic artefacts have been recovered from Forty Acre Field pit, Barnwood (a Gravettian Font Robert point), and Symond's Yat East (a Final Upper Palaeolithic penknife point) in Gloucestershire (Barton 1997, figs 83, 88, 99 and 100). The association of other Gloucestershire findspots with gravel pits (such as Lillies Field, Barnwood, and Hatherop Castle), also re-emphasises the link between the aggregates industry (which has a generally minor presence in the south-western part of the region) and the recovery of Palaeolithic archaeology.

The east of the region is of course dominated by the key Late Upper Palaeolithic site of Hengistbury Head, interpreted as a well sheltered and concealed residential hunting location, with excellent views over the flat landscapes to the south. The site has yielded a major Late Upper Palaeolithic assemblage, characterised by straight-backed blades, bladelets and large tanged points; an association that interestingly has no parallels in Britain's Creswellian assemblages (Barton 1997, 124; 1992, 273). Thermoluminescence dating together with lithic distribution and re-fitting evidence has indicated that there is only a single Late Upper Palaeolithic occupation at Hengistbury Head, while the lithic materials have provided evidence for the spatial separation of activities (such as the primary production of tool blanks in a peripheral zone away from the hearths), knapping and blade production sequences, and raw material procurement and use (Barton 1992, 273). It is notable, however, that away from this site the area is relatively poorly represented. Five single artefact findspots, all around Bournemouth, have yielded Upper Palaeolithic blade technology, including a *Grossklinge* blade core from Queen's Park Avenue, while the principle findspot of interest in Wiltshire is Churchfields, Salisbury, which has yielded a very small Final Upper Palaeolithic "long blade" industry of seven blades and retouched flakes.

In general the Upper Palaeolithic record in the South West is dominated by its cave sites, with the obvious exception of Hengistbury Head. There is however again scope for developing understanding of the records of both the Early and Late Upper Palaeolithic occupations of the region. This might include evaluation of the apparent current absence in the South West record of open-air Creswellian sites which are needed to complete the picture of Late Glacial settlement patterns and lifestyles (for the remainder of the country, these form approximately 30% of all Creswellian sites, Roger Jacobi pers. comm.). It might also involve the re-examination of open-landscape findspot assemblages with regards to the possible presence of diagnostic Upper Palaeolithic artefacts from all periods, an assessment of the spatial relationships between cave and open sites during different periods of the Upper Palaeolithic, and a re-consideration of the chronology and routes associated with both the pre-Last Glacial Maximum abandonment, and post-Last Glacial Maximum recolonisation(s) of Late Pleistocene Britain.

2.6 The Mesolithic Environment

See note on scope and methodology on page 27.

Introduction

The Early and Late Mesolithic are defined here as:

- Early Mesolithic: 10,000–8500 BP (*c*.9660–*c*.7500 cal BC). Pollen zones IV (pre boreal) and V (boreal).
- Late Mesolithic: 8500–6000 BP (*c*.7500 to *c*.4000 cal BC). Pollen zones V; VI (boreal) and VIIa (Atlantic).

There are many locations where evidence for Mesolithic vegetation is preserved, though it is rare to find a complete sequence for the period. Most information comes from the acidic soils developed on the granite of Bodmin Moor and Dartmoor and the sandstones and shales of Exmoor. The other areas with particular potential are the lowland wetlands of the region, notably the Somerset Moors and Severn Estuary Levels, but small basins and palaeochannels in other river valleys such as the Exe also preserve sequences of Mesolithic date. However, the most complete Mesolithic sequences are to be found only in relatively few basin peats in both the lowlands and uplands, such as at Hawks Tor on Bodmin Moor (AP Brown 1977) and the Gordano valley in north Somerset (Gilbertson *et al.* 1990).

Much of the pollen analysis carried out between *c*.1960–1985 was focused on the uplands and established the general character of the Mesolithic vegetation. In the last twenty years, much research has been carried out in areas not previously studied, and includes sampling sites where the interpretation of local environments is relatively detailed, in contrast with earlier studies where more regional information was obtained. These new areas include the Blackdown Hills (Hawkins 2005), Exe valley (Fyfe 2000; Fyfe *et al.* 2003a) and the intertidal zone where peat and forest beds are exposed between high and low tide.

The best studied stretch of coastline is the Severn Estuary and Bristol Channel with studies, listed from north-east to south-west, from Oldbury, South Gloucestershire (Druce 2000), Gravel Banks, Bristol (Druce 2000), Brean Down (Bell 1990), Burnham-on-Sea (Druce 1998; 2000), Stolford (Heyworth 1985), Minehead (J Jones *et al.* 2004), Porlock (Canti *et al.* 1995; Jennings *et al.* 1998; Straker *et al.* 2004) and Westward Ho! (Balaam *et al.* 1987). There has also been some important detailed work on the inland coastal clay belt in Somerset which has for the first time allowed an understanding of the development of saltmarsh communities in the Late Mesolithic period (Cameron *et al.* 2004). Further west, several locations have been studied in Cornwall for postgraduate research (Healey 1993), development, Crooklets Beach near Bude (Cole 2001) and Porthleven (Lawson-Jones 1999), and through the English Heritage-funded coastal assessment survey on the Isles of Scilly (Ratcliffe and Straker 1996).

In the chalk and limestone parts of the region, Early to Mid-Postglacial tufa deposits preserving molluscs offer considerable potential for landscape reconstruction. Such deposits accumulate as a result of calcium carbonate deposition from groundwater (in river valleys) or around spring issue points. For the region detailed sequences are available from Blashenwell (Preece 1980) and from Cherhill (Evans and Smith 1983). Parker and Goudie (1998) have also mapped tufas in the Upper Thames/Cotswold areas.

In the first book published that specifically addressed issues of environmental changes in prehistory, Simmons and Tooley (1981) remarked that, in environmental terms, the Mesolithic covers two differing "epochs", the first a period of rapid environmental change and the second, after *c*.7500 BP (*c*.6450–6240 cal BC), much more stable with a relatively warm and oceanic climate and developed woodland flora over much of the present UK.

The Early Mesolithic (as defined for present purposes) covers most of the first "epoch". In the Late Glacial and Early Holocene, the ameliorating climate was reflected by a rapid rise in sea level of *c.*1cm per year, with a drop in this rate after *c.*7000–6500 BP (*c.*5990–5350 cal BC). Sea level rose from *c.*35m below present mean sea level (MSL) at *c.*9500 BP (*c.*9130–8630 cal BC), reaching *c.*5m below MSL in the Bristol Channel by *c.*4000–3800 cal BC (the rate of rise having slowed by *c.*4000 cal BC). Interpretation of sea level change in the South West has to take account of local coastal variables such as spits, dunes systems and compaction of sediments. In addition, recent estimates show negative isostatic effects in the South West (subsidence), which are most pronounced for Cornwall, with figures of -1.0 to -1.2mm per year (UKCIP 2005).

The final flooding of the low-lying land between southern England, France and the Netherlands took place by *c.*7500 BP. By this date, most of the plants and animals that are regarded as "native" had reached the UK. There were however subsequent additions in the later prehistoric period, such as crops and their associated herb flora, with the introduction and development of farming technology.

Soil development and the warmer conditions of the Early Mesolithic saw a rapid establishment of temperate vegetation, with the arctic grassland, dwarf shrub communities (typically dwarf birch, juniper and crowberry), and plants tolerant of ground disturbance such as *Artemisa* (mugwort), replaced. The incomers were trees such as birch, willow and then pine that tolerate cool conditions. These were succeeded in many areas by warmth loving or thermophilous species, notably hazel, elm, oak, alder and lime. The transformation took place in less than four thousand years. The forest composition was variable locally and developed largely due to competition (for soil nutrients, light and other resources) and succession between species. Regional differences are evident, with the uplands of the west of the region dominated by oak/hazel woodland in the Late Mesolithic, whereas lime (*Tilia sp.*) is a more frequent component from the Bristol area northwards, as shown by Jefferies *et al.* (1968) for the Gordano valley and recent work at Deanery Road, Bristol (Tinsley and Wilkinson 2005). In 1981, Simmons and Tooley commented that there was possibly less distinction between upland and lowland forest than we see today. However, recent work in the Exe valley (Fyfe *et al.* 2003b), has started to challenge this by showing that lime was also an important component of the Late Mesolithic woodland in the lowlands of south Devon.

The following 1500 or so years of the Late Mesolithic saw marginal increases in sea level compared with earlier millennia, and fewer major changes to the composition of the boreal forest. However, other changes, notably increased soil acidification and the onset of blanket mire formation in parts of the uplands, are evident.

Coasts and estuaries

Coastal locations where waterlogged, often organic deposits survive, provide evidence for both the development of shorelines in response to sea level change and the dryland vegetation in the hinterland. The waterlogged sediments preserve a range of biological remains (such as wood, pollen, plant macrofossils, insects, diatoms and foraminifera), so that it is usually possible to employ multidisciplinary studies of the organic and inorganic sediments.

Cornwall and the Isles of Scilly The granite archipelago of the Isles of Scilly has afforded the opportunity to examine Holocene vegetation development as well as coastal change and land loss on an offshore island. The longest pollen sequence is that at Higher Moors (Scaife 1984; Ratcliffe and Straker 1996) with Late Mesolithic oak-ash and hazel woodland at the base of the sequence (5490–5050 cal BC, HAR-3695). The Late Mesolithic-Early Neolithic intertidal peats at Par Beach on St Martin's and at Porth Mellon on St Mary's indicate mixed deciduous woodland with birch, oak, hazel, lime, holly, alder and willow (Ratcliffe and Straker 1996).

On the Cornish mainland, Healey (1993) examined several coastal sequences for his PhD research. Two of these, Marazion Marsh in Mounts Bay and Trewornan on the River Amble in the Camel Estuary, cover parts of the Mesolithic. Healey (1999) describes Marazion as a typical sequence with basal organic sediments resting on bedrock and overlain by a long sequence of marine sand. This is then overlain by a further organic deposit and then sand. He interprets these changes to be the result of coastal evolution linked to barrier dynamics, coastal sedimentation and the movement of relative sea level. The earliest organic horizon dates to 4370–4050 cal BC (Q-2779). Healy's analysis is based on pollen and diatom stratigraphy.

Trewornan (Healey 1999) produced a sequence extending to over 9m below OD with organic sediment resting on a basal soil. The single radiocarbon date, presumably from the organic layer, is 5610–5290 cal BC (Q-2781). Reed swamp at the base was succeeded by alder carr woodland, which was then overtaken by sands containing marine molluscs.

The Bristol Channel, Severn Estuary and Somerset Levels and Moors

Westward Ho! The extensive area exposed between tides at Westward Ho! on the north Devon coast has revealed Late Mesolithic forest and peat beds and a midden containing plant macrofossils, flints, bones and shells. There are also wooden stake alignments, but these are of various, more recent dates. This site is of particular importance as it is the only surviving remnant of a wetland occupation site of the 6th millennium BC in the South West. Other intertidal peat and forest beds have produced flints and occasionally charcoal, but none also preserved a discrete midden, overlain by peat. The site was first studied by Rogers (1946) and Churchill and Wymer (1965) but was subsequently reinvestigated by Balaam *et al.* (1987) following concern after exposure by storms in the early 1980s; recent work by Martin Bell (pers. comm.) has suggested that the original midden is now completely eroded away. Multidisciplinary scientific work followed, which included pollen, plant macrofossil, insect, mollusc, animal bone and diatom analyses as well as palaeomagnetic dating of silts. In 2004, the site was resurveyed by Hazel Riley of English Heritage and further sampling of the exposures was undertaken by Reading University (Martin Bell) and Exeter University (Linda Hurcombe). The Reading project was directed at the submerged forest and upper peat remains and the Mesolithic/Neolithic transition. Selected radiocarbon dates from Balaam *et al.*'s (1987) research are given in Table 2.3 on page 60.

Pollen and plant macrofossils demonstrated that the peats derived from freshwater fen woodland with oak and hazel growing in the drier areas and willow in the woodland pools. The insect communities from the midden and overlying fen peat supported these conclusions and added further detail. Robinson (2002) describes the presence of a full range of "tree-dependant" Coleoptera (beetles). Some species were plant-specific, such as *Ramphus pulicarius*, indicating willow growth in the woodland pools, whereas *Curculio nucum* and *Rhynchaenus quercus* fed on hazel and oak in the drier parts of the woodland. There was also a small group of beetles probably representing exposed sand dunes to seaward of the fen woodland. Robinson (2002, 44) comments "that no evidence has yet been found of any human influence on the insect population of the region during the Mesolithic".

Mammal remains (bone and antler) from the midden and adjacent peat showed that red and roe deer, aurochs and wild pig had been available to the hunters. A range of wild species included slow worm, bank vole and frog, and occasional fish bones of the Gobiidae, a shallow-water coastal group, which could have been caught on the shoreline (Balaam *et al.* 1987).

The freshwater habitats at Westward Ho! are of a rather different character from the exposures further up the estuary at Porlock and Minehead, for example, where reed beds, sedge swamp and alder carr woodland are more typical, as summarised below.

Severn Estuary A descriptive stratigraphy for the sediments of the Severn Estuary was published by Allen and Rae (1987) and provides a useful terminology for the main stratigraphic units in the Estuary levels. A full review of the Mesolithic environments of the Severn is not presented here, but further information is published in the journal *Archaeology in the Severn Estuary*, particularly volume 11 (2000). The examples below are drawn from the lower estuary and Somerset Levels and Moors, but early sequences have also been described further up the estuary at Gravel Banks, Bristol and Oldbury (Druce 2000).

Porlock Bay and Marsh Extensive coring on Porlock Marsh in 1995 revealed up to 10 metres of sediments (silts, sands and peats), dating from *c.*6700 cal BC when mean sea level may have been around 8m lower than the present day. Biostratigraphic analyses (pollen, diatoms, foraminifera and plant macrofossils) and radiocarbon dating revealed episodes of saltmarsh and lagoonal environments alternating with wet alder and willow woodland and sedge swamp as the influence of the sea fluctuated (Canti *et al.* 1995; Jennings *et al.* 1998). At the end of the Mesolithic period, freshwater alder carr woodland was established under what became Porlock Marsh. This was flooded, early in the Neolithic period (*c.*3550 cal BC or before), by estuarine water resulting in the development of saltmarsh and the accumulation of silts. The environmental changes at Porlock were influenced by the presence, at least intermittently, of a shingle barrier. This breached during a gale in 1996 and has not fully re-established. Substantial erosion has taken place revealing palaeochannels and land surfaces beneath the former pasture (now saltmarsh and lagoon) of Porlock Marsh. Recent findings are summarised by Straker *et al.* (2004). One of the channels (palaeochannel A) appears to have opened and closed on a similar alignment over a long time period, as the basal dates are Late Mesolithic (4600–4340 cal BC, Wk-10878), whereas at the surviving top an alder cone gave a radiocarbon date of 1900–1530 cal BC (Wk-10876).

Minehead Detailed multidisciplinary palaeoenvironmental analyses were carried out in advance of sea defences and beach re-profiling at Minehead. This work has provided the most detailed spatial analysis of the palaeoecology of a later Mesolithic coastal landscape anywhere in the South West. J Jones *et al.* (2004) studied insects (Smith), pollen (Tinsley), diatoms (Cameron), foraminifera (Haslett) and plant macrofossils (Jones) from peats and silty clays at eight locations. The evidence from intertidal peat and forest beds revealed that between *c.*5670 and 4360 cal BC a mosaic of upper saltmarsh, reed beds and alder carr woodland grew at different altitudes on what is now the present intertidal area. The gently shelving topography allowed a true saltmarsh community to develop. Saltmarshes provide a valuable grazing resource. Coastal areas such as Minehead and Porlock with a mosaic of habitats on a gently sloping shore would have been very important food sources for large mammals such as red deer and aurochs as well as habitats for wildfowl and fish, and so would have been ideal hunting grounds for Mesolithic communities. Burning of the reed beds, possibly to assist hunting, is suggested by Graminoid charcoal fragments; further evidence for burning is noted in the summary for Pawlett on page 44.

As in the Somerset Moors (see below) the insect analysis revealed several freshwater reed bed species that are rare or extinct in Britain today. These include *Oodes gracilis*, *Hydroporus scalesianus*, *Odacantha melanura*, *Dromus longiceps*, and *Silis ruficornis*. There are also two beetle species (*Dirhagus pygmaeus* and *Dryocoetes alni*) typical of decaying timber in woodland, the latter particularly associated with alder carr, that are rare in Britain today (Smith unpublished). This could be because of climate change, but it is more probable that habitat loss is the dominating factor.

Somerset Levels and Moors The following summary draws upon the publications of many specialists, starting with Sir Harry Godwin in the 1940s who established the basic sequence of vegetation change in the Brue valley with publications from 1941 (Godwin 1941; Clapham and Godwin 1948) until the 1960s. Subsequent specialists A Alderton (pollen), S Beckett (pollen), A Caseldine (pollen and plant macrofossils), M Girling (insects), F Hibbert (pollen), R Housley (pollen and plant macrofossils) and R Morgan (tree rings) worked under the auspices of the Somerset Levels Project, directed by John and Bryony Coles between 1974 and 1989. Much of the work was related to site-specific investigations of tracks and settlements and is published in the *Somerset Levels Papers* volumes 1–15, with useful lists of radiocarbon dates and publications (Coles and Dobson 1989). Caseldine (1984b) published a useful summary of environmental work in the Somerset Levels and Moors in Martin Bell's review of environmental archaeology in the South West (Bell 1984). Subsequent research and development-led work by N Cameron (diatoms), S Haslett (foraminifera), P Davies (stratigraphy), D Druce (pollen and foraminifera), R Housley (pollen and stratigraphy), H Kenward (insects), J Jones (plant macrofossils), M Robinson (insects), H Tinsley (pollen), D Smith (insects), V Straker (pollen and stratigraphy), K Wilkinson (geoarchaeology and stratigraphy) and others has continued since 1989. Most studies are again related to specific site investigations. Examples include evaluations in advance of development, reed bed creation (Ham Walls, J Jones *et al.* 1998), erosion (the Huntspill saltern at Woolavington Bridge, Tinsley 2003; J Jones 2003), landfill excavation (Walpole, Cameron *et al.* 2004) and university research (The Shapwick project, Wilkinson 1998a; Tinsley 2002).

The Somerset Levels and Moors occupy a broad sediment-filled valley or inlet which is up to 30 metres deep in places. This drains north-westwards into the main valley of the Severn Estuary. The present-day rivers Parrett, Brue, Axe and Huntspill flow into the Severn through the area. The Brue and Axe valleys are confined between the largely Carboniferous limestone of Mendip to the north and the Lias limestone of the Polden Hills to the south. A smaller Lias limestone outcrop, the Wedmore ridge, separates the Brue and Axe valleys. The Parrett and its tributary the Cary flow largely between the Polden Hills and the Devonian sandstones and slates of the Quantock Hills.

The vegetation of the Somerset Levels and Moors over the last 10,000 years or so owes its character to geology and geomorphology, climate, sea level changes, drainage patterns and human interaction with the landscape. There were considerable variations in wetland vegetation development in the different parts of the Levels and Moors. While sediments in the coastal Levels are similar to the general sequence for the Severn Estuary, the inland Moors differ in some respects.

The earliest (lowest) fills were studied from boreholes in the coastal area. The earliest dated deposits are from wood fen peat in deep channels (to *c.*20m below OD) at Highbridge. These peats formed between about 7000 and 7900 cal BC (Heyworth and Kidson 1982). Younger peat beds dating from around 4–5000 cal BC, can be seen at low tide at Burnham-on-Sea (Druce 1998), Stolford (Heyworth 1985) and Brean Down (Bell 1990). The best examples of the oak fen woodland that grew during episodes free from marine flooding are visible in the intertidal zone at Stolford, to the west of the present-day mouth of the Parrett. Housley *et al.* (1999) and Straker (2006b) provide general summaries of the varied stratigraphy and environments in the Levels and Moors.

The full central Brue valley sequence (as seen on Shapwick and Meare Heaths) comprises laminated muds and tufas or Lias gravel overlain by a lower peat, above which accumulated a layer of estuarine silty clay with a regressive contact at approximately OD, overlain by an upper peat. The upper peat contains the wooden trackways of Neolithic and later date.

As part of the Shapwick project, Wilkinson (1998a) published stratigraphic work between Shapwick Burtle and the edge of the Polden Hills. A 7m core (borehole A) has provided a date of 5710–5530 BC (OxA-11230) for the base of the lower peat. Borehole A is the first long Holocene pollen sequence to be dated for Shapwick Heath (Tinsley 2002), though it does not extend as far back as those for Minehead and Porlock on the west Somerset coast (see above on pages 42–43). An earlier undated core from the central Brue valley was analysed by Hibbert from the Sweet Track Factory site, to the north of Shapwick Burtle (Coles *et al.* 1973).

The lower peat-forming vegetation was wet woodland, mainly alder carr with some birch, willow, hazel and oak, but there were also open water and swamp habitats supporting plants such as common reed, bur reeds, sedges and bulrushes. The alder declined somewhat before estuarine flooding deposited silty clays, as conditions probably became too brackish (the result of a positive sea level tendency) for alder to continue to grow, but before the peat stopped forming (Tinsley 2002). This observation was first made by Caseldine (1988b) on the undated Factory site diagram. More recently, others have noted a change in environment identified by the macro and microfossil records, before a clear stratigraphic change is evident (Haslett *et al.* 1997a; Druce 1998 at Burnham-on-Sea, and J Jones *et al.* 2004 at Minehead).

Radiocarbon dates suggest that this period of wet woodland and swamp may only have lasted for a few hundred years. A major marine inundation occurred in the late 6th–early 5th millennium cal BC. This clay deposition (the Lower Wentlooge formation, Allen and Rae 1987) represents an extensive Late Mesolithic saltmarsh development which extended inland round Glastonbury, to Queen's Sedgemoor and Street and northwards to the foot of Mendip, north-east of Godney (Housley *et al.* 1999).

Sometime around 4600–4200 cal BC, a change from estuarine silts to largely freshwater peat (the upper peat) took place due to reduced marine influence (negative sea level tendency). The age range given above is based on a variety of radiocarbon dates for the peat/clay junction, at several places in the central Brue valley. This major change was caused by several possible factors. These include a slow-down in the rate of sea level rise, a fall in relative sea level, protection of inland areas from the sea by coastal dunes or other barriers, or a combination of some of these.

In the central Brue valley (Shapwick Heath and Meare Heath) the general vegetation sequence from the base of the upper peat is a classic hydroseral succession and the earlier stages are summarised from the base upwards as follows:

- Bulrushes (*Typha sp.*) and common reed (*Phragmites communis*) were early colonisers of the saltmarsh clays. *Phragmites* reedswamp (fen) communities established, with some shallowing of the water suggested by *Cladium* (great fen sedge) growth, suggesting base-rich water conditions.

- Above this, fen carr developed when peat growth raised the bog surface high enough for better drainage, or the groundwater levels dropped slightly. The onset of the fen carr and the species composition varied locally, with dominance of alder, birch or willow. The early Neolithic Sweet Track (3807–6 BC) lies mainly below the fenwood, in the reedswamp peat.

- The later stages of the vegetation succession are omitted here as they post date the Mesolithic period.

Insects of Mesolithic date were studied on samples from the Abbots Way and Rowlands Track sequences where monoliths were taken through the upper peat to the top of the underlying clay. In the fauna from the peat/clay interface, dated at Rowlands to 4690–4350 cal BC (HAR-1831), salt-loving species were absent, but *Bembidion fumigatum*, which feeds on vegetation such as reed debris in brackish swamps, was present. The pollen, plant macrofossils and insects all describe a reed swamp environment. Robinson (2002) and Girling (1977) identified a range of insects characteristic of deep water and open areas within the reedswamp. The eutrophic nature of the water is demonstrated by the presence of three species of beetle, *Chlaenius sulcicollis*, *C. tristis* and *Oodes gracilis*, which are extinct in the British Isles today. At the same time as the saltmarsh and freshwater wetlands were developing, mixed deciduous woodland colonised the higher ground. The woodland trees included oak, elm, lime, hazel, birch, alder, holly and willow.

The most detailed study of a Late Mesolithic saltmarsh is by Cameron *et al.* (2004) on the Pawlett Level an opportunity afforded by extensive excavation to create the new Walpole landfill site. Multidisciplinary analysis at site L demonstrated that *Chenopodiaceae* (sea blite, glassworts, oraches or sea beets) alternated with reed or other grass-dominated communities as water tables fluctuated around a Lias island. The Late Mesolithic (between *c.*4800–4200 cal BC) was a relatively dry period of saltmarsh emergence associated with a slow-down in the rate of sea level rise or reduced marine influence as a result of a temporary coastal barrier. Freshwater seepage from the dry land allowed development of freshwater communities around spring flushes or small streams. The steeply sloping bedrock around the island resulted in a sharp transition between dryland and marsh and restricted the development of upper saltmarsh. This contrasts with the mosaic of upper saltmarsh communities, reed beds and alder carr woodland that flourished between *c.*5500 and 4360 cal BC on the gently shelving surface at Minehead (J Jones *et al.* 2004).

Druce (1998) reported on broadly similar conditions for the peats and silts at Burnham-on-Sea, laid down between *c.*5500 BC and *c.*3370 cal BC. At Pawlett the dry land vegetation was oak-hazel woodland, with a little elm, lime and ash present throughout the time the saltmarsh deposits were accumulating. This would have existed on the lias island, Pawlett Burtle, and probably also Brent Knoll. Broadly similar woods also existed on the dryland around Woolavington Bridge (Tinsley 2003) and further inland in the Ham Walls area and on the Polden Hills (J Jones *et al.* 1998; Tinsley 2002). Small-scale clearances followed by regeneration were identified on the Pawlett Level. Elm was not a major feature of the maritime woods but initial opening of the dryland woods does appear to predate the Elm decline of the Early Neolithic. Microscopic charcoal fragments indicate Later Mesolithic burning of the reed swamps at Walpole, Ham Walls, Minehead and Woolavington Bridge. Bell *et al.* (2003) suggest that this could be a hunting strategy to encourage large herbivores. It would also have a similar effect on wildfowl. Additionally, or alternatively, the microscopic charcoal could result from temporary camps of wildfowlers and hunters. The issue of burning of vegetation is also relevant to Mesolithic lifestyles on the uplands, as noted below. By *c.*4350–4040 cal BC saltmarshes had receded some distance to the west of Woolavington Bridge, though there may have been occasional incursions of brackish water at high tides.

The uplands: Bodmin Moor, Dartmoor, Exmoor, Blackdown Hills, Cotswolds, Mendip

The three principal upland areas are Bodmin Moor, Dartmoor and Exmoor. Granite-derived soils and sediments on Bodmin Moor and Dartmoor provide excellent conditions for pollen preservation, and pollen also survives well on the predominantly Middle and Upper Devonian sandstones, grits and slates of Exmoor. Dartmoor is the largest at *c.*500km^2 and has a maximum summit height of 619m. Bodmin Moor's maximum summit is 572m and Exmoor's is 520m, but with a summit accordance on the central "plateau" of 400–480m. The moors were formerly wooded; oak-hazel dominated woodland was established by *c.*7500 cal BC in places on all the moors. The extent of the other main woodland trees (such as elm, pine, willow, lime, alder and especially birch) was variable.

Other uplands of lower altitude include the Quantock Hills, Blackdown Hills and Mendip. No pollen record has yet been published for the Quantocks, but work has started recently on the Blackdowns under the auspices of Exeter University's Community Landscapes project (Hawkins 2005). Pollen preservation is poor on the limestone soils of Mendip and there are no results for the Mesolithic period.

Bodmin Moor Caseldine (1980) published a useful review of previous work on Bodmin Moor, notably that of the pioneering work of Connolly *et al.* (1950), AP Brown (1977) and Dimbleby's work on soil pollen sequences of later prehistoric date. Bell (1984) also included Bodmin Moor in his review of environmental archaeology in the region.

The important sequence from Hawks Tor has already been noted on page 29. Scaife (forthcoming) notes that Connolly *et al.* (1950) also studied Dozmary Pool and Stannon clay pit and all these sites included data that extended throughout much of the Holocene. In Caseldine's review of 1980, he noted the lack of major pine peaks in the pollen record, which contrasts with the east of the region. The possibility remains that on Bodmin Moor (as on Dartmoor), the most exposed locations may have retained an open moorland vegetation, rather than assuming forest cover.

Simmons *et al.* (1987) reinvestigated the Dozmary Pool sequence, known to be important for the Mesolithic period, and published a dated sequence extending to 6640–6240 cal BC (HAR-5083). However, the depth of interpretation was limited as the sequence had been disturbed and some of the dates are out of sequence.

Walker and Austin (1985) published Late Devensian/Early Holocene pollen data for Redhill Marsh with radiocarbon dates of 8710–8280 cal BC and 7960–7530 cal BC (both quoted as GU-1739), providing a chronology for a change from birch scrub and juniper to oak, elm and hazel. Scaife (forthcoming) comments that there was "enigmatic" evidence for Mesolithic activity shown by a woody layer with birch overlain by willow, which provided the samples for the radiocarbon dates.

The most detailed work for Bodmin Moor is from Rough Tor, which formed the focus for some of the PhD research by Gearey (Gearey 1996; Gearey and Charman 1996; Gearey *et al.* 2000a). He sampled five locations and obtained data covering most of the Holocene including the Mesolithic, though as evidence for human activity was limited, most of his detailed interpretation concerned changes associated with later periods. Tinsley (2004) has also studied vegetation change at Stannon clay pit, in association with the excavation of prehistoric sites before their destruction by china clay extraction.

These studies showed that in the Stannon area, peat began to accumulate in the 6th millennium cal BC (Late Mesolithic) and preserves a history of environmental change to the early medieval period. The earliest woodlands which were oak and hazel dominated were established from *c.*6100-5800 cal BC (Wk-8500) and grew when there was very little open ground. But by 4320–3970 cal BC (Wk-8501) the wetter valley floor between Stannon and Rough Tor supported alder woodland. At Stannon there is also evidence for some birch, but elm and lime may have been restricted to lower altitudes. Rough Tor South (Gearey and Charman 1996; Gearey *et al.* 2000a) presents a similar picture. The expansion of alder onto suitable wetland habitats in the South West is suggested by Bennett and Birks (1990) to be between 7–6000 BP and the evidence from Bodmin Moor broadly fits this picture. Tinsley (2004) comments that the ground flora of the alder carr included royal fern, polypody fern with ivy and honeysuckle as climbers on the alder trunks. She also notes the presence of microscopic charcoal fragments and some small-scale opening of the canopy by flowering of ribwort plantain and *Asteraceae* pollen. There is some circumstantial evidence for early disturbance to local woodland cover in Gearey and Charman's Rough Tor South diagram, with a slight drop in hazel-type pollen and increases in herbs and shrubs such as *Potentilla*, *Calluna* and *Lactuceae*. There is also some increase in ivy, which does not flower in heavily shaded conditions. A fall in oak pollen values at 4800–4550 cal BC on East Moor at 1m depth in the profile (GU-5615), coupled with a slight increase in grasses and appearance of Potentilla-type pollen, might suggest some disturbance. However, it was not accompanied by microscopic charcoal fragments.

Dartmoor Dartmoor has benefited from a lot of research by pollen analysts and the work prior to the early 1980s was summarised by Caseldine and Maguire (1981) and in Bell (1984). Since then there has been some further work, and frank reappraisal of the state of knowledge, by Caseldine and Hatton (1993; 1994) and Caseldine (1999). Late Devensian herb communities extend into the Early Holocene and altitude and climate limit the establishment of birch woodland over possibly 500 years. Other woodland trees establish, firstly hazel from 8800 BP (*c*.7880 cal BC), followed by oak and elm, with alder by 6500–6300 BP (*c*.5470 cal BC).

Scaife (forthcoming) notes the potential importance of the 6m long sequence at Tor Royal (West *et al.* 1996). The earliest of 6 radiocarbon dates on peat was Late Mesolithic (4940–4580 cal BC, Beta-93824), at 574–589cm depth. This site was recently the focus of an MSc dissertation (Amesbury 2004) undertaking proxy climate reconstruction by examining testate amoebae and peat humification. The results of 8 AMS dates are awaited and a paper for publication is in preparation (Ralph Fyfe pers. comm.).

Simmons *et al.*'s (1983) detailed pollen and microscopic charcoal studies at Blacklane were the basis for much later and continuing debate about the effects and scale of burning and the role of Mesolithic communities in using manipulation of their environment to assist hunting strategies. The possible role of humans in the onset of peat accumulation is also important. Simmons published extensively with reference to the uplands of the South West and elsewhere on these interrelated topics (for example, Simmons *et al.* 1983; Simmons 1996). Caseldine and Hatton (1993) have continued the debate and examined the effects of Mesolithic burning in detail at Black Ridge Brook between 7700 and 6300 BP (*c*.6300 and 5270 cal BC). The role of burning at the upper woodland edge, woodland reduction and prevention of regeneration by acidification and grazing is explored in connection with the development of blanket peat. Caseldine and Hatton's (1994) paper presents a model to show possible routes for vegetation change from woodland to blanket peat on the high moorland at Pinswell.

The Dartmoor evidence for microscopic charcoal fragments indicating burning is widespread, especially in the Late Mesolithic between *c*.5700–4100 cal BC, though the duration and extent of each episode is unknown. In contrast, on Bodmin Moor most evidence is circumstantial, inferred from increases in pollen of those plants preferring open conditions, with only very occasional charcoal fragments. On Exmoor there is little evidence of microscopic charcoal on the upland, but it is present in the coastal sediments at Minehead (J Jones *et al.* 2004), which adjoin the upland. On the northern fringe of Dartmoor the building of the A30 dual carriageway at Sourton Down provided useful information from on-site soil pollen analyses and an adjacent springhead mire which started to form a little before 6400–6100 cal BC (GU-5387) providing an environmental context for the archaeological evidence from the Mesolithic onwards (Straker in Weddell and Reed 1997, 95–115).

Exmoor The first studies of Exmoor's palaeoenvironmental history were carried out as PhD research by David Merryfield (Merryfield 1977; Merryfield and Moore 1974; Moore *et al.* 1984) using pollen analysis and peat depth mapping. Pollen was analysed from several areas of blanket mire, the most extensive sequences published for The Chains and Hoar Moor. Straker and Crabtree (1995) also published an undated diagram for the Chains in their review of palaeoenvironmental work and potential on Exmoor prior to 1995. Merryfield and colleagues' Chains profile has few radiocarbon dates. The earliest, which was not at the base of the peat, was *c*.3025 cal BC, so the onset of the 3m of blanket mire formation cannot be assumed to extend back to the Mesolithic. Merryfield and colleagues debated whether blanket mire development is linked with human activity, considering whether deforestation led to a reduction in evapotranspiration resulting in waterlogging and soil deterioration, in an already fragile ecosystem. The part played by climatic deterioration was also considered. Francis and Slater (1990) carried out further work on blanket mire at Hoar Moor and Codsend Moor.

Since the mid-1990s Exmoor has benefited from further PhD and post-doctoral research by Ralph Fyfe who concentrated not on blanket mires, but spring sites. The advantage of these is that they give a more detailed local picture and often provide a longer chronology of vegetation development.

In broad terms, the vegetation record from both the earlier studies and more recent work by Jennings *et al.* (1998) on Porlock Marsh and Bay and Fyfe (2000; Fyfe *et al.* 2003a;b) shows that oak-hazel woodland with some pine, alder, elm and particularly birch was established by *c.*7500–7000 cal BC.

Fyfe *et al.* (2003b) reported on studies from three spring mires on Exmoor's southern fringe spanning the Middle to Late Holocene, two of which, Long Breach, Molland and Gourt Mires, date back to the Late Mesolithic period. At Long Breach, an open landscape with damp heath species existed, while on drier ground oak-hazel woodland predominated. Woodland was in evidence in the Late Mesolithic/Early Neolithic at Gourt Mires. Scaife (forthcoming) comments that these studies demonstrate the scale of variation around the fringes of the upland zone.

Francis and Slater (1990) obtained a Late Mesolithic/Early Neolithic date for the base of their Hoar Moor sequence. The result of 4460–3980 cal BC (I-15549), showed that the Late Mesolithic forest prior to the onset of blanket mire included a variety of trees and shrubs such as birch, oak, hazel, pine, alder, elm and lime.

There have also been student projects on an eroding springhead mire at Halscombe Allotment on Exmoor, carried out at both Bristol and Exeter Universities. The Exeter study included two radiocarbon dates, the lowest in the sequence being 6070–5830 cal BC (Wk-10647, Ralph Fyfe pers. comm.). The fallen oak trunk seen protruding from the section was sampled for dendrochronology and when a match could not be obtained, the outer 10 rings were radiocarbon dated, giving a result in the Neolithic of 3640–3360 cal BC (GU-8220).

The signals for early human impact, such as charcoal fragments and early clearance episodes showing the reduced tree pollen levels and increased plant pollen levels of disturbed ground and pasture, are limited compared with Dartmoor. Such changes were noted on Exmoor's southern fringe at Exebridge at *c.*6500 cal BC and *c.*5000 BC (Fyfe *et al.* 2003a), and in some of the Late Mesolithic/Early Neolithic peat/clay interfaces at Minehead (J Jones *et al.* 2004).

Blackdown Hills So far, evidence for the Mesolithic environment in the Blackdown Hills rests on a single pollen analysis from Bolham, where dates of 6780–6650 cal BC and 4230–4040 cal BC have been obtained. The profiles show some open grassland and oak-hazel woodland in the middle Mesolithic with lime forming a major component of the Late Mesolithic-Neolithic woodland. Small scale woodland clearances from the Late Mesolithic onwards are noted (AG Brown pers. comm.; Hawkins 2005).

The lowlands

(Scaife forthcoming) comments that the three pollen sequences in the lower Exe valley published by Fyfe *et al.* (2003a) provide the most complete vegetation sequences from a lowland river in South West England. The Exebridge sequence covers *c.*9000–5500 cal BC; Lower Chitterley *c.*10,600–3500 cal BC; and Brightworthy *c.*7500–2000 cal BC. As noted above, Late Mesolithic burning of vegetation from *c.*6500 cal BC onwards was identified at Exebridge and some woodland clearance is seen from *c.*5500 cal BC onwards. At Brightworthy, there is evidence for a first early "elm decline" prior to the Neolithic around 5500–5300 cal BC. At both sites, the local vegetation is tall fen with meadowsweet, bedstraws, devils bit scabious, sedges and grasses with some willow and birch.

Two locations in the Clyst valley in Devon give further evidence for long term vegetation change in Devon river valleys (AG Brown pers. comm.). At Helling's Park, floodplain mire proved to span the Late Glacial to medieval periods, making it a very valuable sequence. At Broadclyst Moor, the sequences extended from the Mesolithic to the Late Bronze Age. Summary information is available, but clearly both sites will benefit from detailed analysis and dating. Late Glacial vegetation at Helling's Park included sedges and grasses with some willow, whereas the Early Mesolithic vegetation on the floodplain was a patchwork of grasses and sedges, with pine and birch woodland. Alder was established at *c.*5000 cal BC which is similar to the lower Exe but somewhat earlier than in the upper Exe. Lime was a relatively significant component of the Mid Holocene woodland, which also contained hazel, elm, oak and birch. The Clyst valley sites show multiple elm declines, the first noted at *c.*5500 cal BC, as also observed in the Lower Exe valley. The Clyst profiles show a second decline in the Early Neolithic at *c.*3700–3200 cal BC, but no coincident changes to the curves for cereal pollen were observed (AG Brown, pers. comm.).

Chalk and limestone landscapes: Dorset, Wiltshire and Gloucestershire

There are few studies of landscape change involving pollen analysis in the east of the region as the geology, where not modified by acid drift deposits, gives rise to biologically active soils where pollen preservation is usually very poor. Exceptions are some valley sediments and subsoil features as summarised below. Mollusc preservation, in contrast is very good, but the strength of interpretation is in its local detail.

The sequence from the Upper Allen valley, Cranborne Chase, Dorset (noted for its Late Glacial pollen assemblage) continues into the Mesolithic. However, Scaife (forthcoming) notes that unlike other sites in southern Britain, herb and scrub communities persist into the Early Holocene (Early Mesolithic) at a time when elsewhere woodland has become dominant. He attributes this to survival of refugia of the Late Devensian chalk flora, from which the herbaceous species were able to expand in the late prehistoric period.

A further location in Dorset affording pollen analysis is the floodplain of the Allenborne at Wimborne Minster where peat deposits accumulated. Scaife (1994) identified alder and willow carr on the Mid-Holocene floodplain, dated to 5990–5780 cal BC (Beta-189166) with oak, elm, lime and hazel woodland on drier ground. He also notes high values of pine in the Mid-Holocene, suggesting survival of stands for longer than usually observed. However, as there are so few pollen studies from this period in Dorset and Wiltshire, possibly this is not such an unusual event as it appears.

There is very little other palaeoenvironmental evidence from Mesolithic Dorset. Reconsideration of the mollusc data from the Dorset Cursus has led Allen (in French *et al.* 2003) to suggest that the assemblage may be intrusive, with some flint and bone, originating in the Mesolithic soil through which the cursus ditch was cut, eroding into the ditch. He also suggests that the snails provide a rare example of a Mesolithic chalkland environment of deciduous woodland with some clearings.

There are similarly few studies from Wiltshire. Pollen and molluscs were examined from a Mesolithic pit at Stonehenge where, despite poor and differential preservation which was not unexpected given the chalk soils, two pollen zones were determined. The greater concentration of trees and shrubs (birch, elm, pine, oak and hazel) was in the lower profile with an increase in herbaceous plants and improved preservation, including of pine and fir, indicating some downwashing of recent pollen (Scaife in Cleal *et al.* 1995). The lower pollen assemblage is considered to be earlier Mesolithic on the basis of species composition and a radiocarbon date on pine charcoal of 8300–7650 cal BC (GU-5109). Molluscan sampling of earlier Postglacial tree-throw pits at Avebury (Evans *et al.* 1985), Easton Down (Whittle *et al.* 1993) and South Street (Ashbee *et al.* 1979) have consistently shown the development of woodland conditions during the Mesolithic period.

In the upper Kennet valley (Evans *et al.* 1993) Late Glacial marls and gravels were overlain by a Mesolithic to Neolithic soil. Molluscan sampling demonstrated that in the Early Mesolithic (Early Postglacial) open ground and marshy conditions were succeeded by the development of full woodland, with a date of 8500 BP (*c.*7500 cal BC) obtained from an associated tree-throw pit.

Scaife (in Cleal and Pollard 2004) reported on pollen analysis of peat and alluvium floodplain sediments in the Avon valley, *c.*300m to the east of Durrington Walls. A basal radiocarbon date of 8300–7200 cal BC (GU-3239) was obtained. The flora contained Late Devensian/Early Holocene largely herbaceous vegetation with some birch and juniper. A subsequent reduction in herbs is matched by expansion of pine and hazel and there are early records for oak and elm.

As noted above, in the chalk and limestone parts of the region Early to Mid- Postglacial tufa deposits offer considerable potential for landscape reconstruction. At both Blashenwell (Preece 1980) and Cherhill (Evans and Smith 1983) Early Postglacial open-ground marshy environments were succeeded by full woodland conditions. Unpublished sequences are also available for the Mendip and Cotswold areas (Willing 1985) with the same general trends apparent.

Significantly, many of the tufa deposits contain, seal, or are associated with Mesolithic archaeology, as at Blashenwell and Cherhill. In part such associations are due to the fact that there are few other sealed Mesolithic contexts available where artefacts might be found, although there may be a wider significance in the siting of activity at such locations (Davies and Robb 2002; Evans 2003). Of significance too is that many tufa deposits also span the Mesolithic-Neolithic transition. On-going work on Mendip has also established Mesolithic activity associated with tufa deposition in that area (Davies and Lewis 2005), and the presence of extensive early Postglacial palaeosols beneath the tufa. Tufa deposits are undoubtedly under-recorded for the Mendip region, and given the lack of pollen preservation in the area, offer the only real opportunity for establishing its landscape history. Altitudinally the deposits recognised so far range from *c.*10m OD at Rodney Stoke, to *c.*130m OD near Ston Easton (Paul Davies pers. comm.). Similar potential undoubtedly exists for the Cotswolds and Wessex chalklands.

2.7 Mesolithic Archaeology (*c.*10–6000 BP)

2.7.1 Introduction

The British Mesolithic has typically been divided into two phases (e.g. Mithen 1999): an Early Mesolithic (*c.*10,000–8500 BP), and a Late Mesolithic (*c.*8500–6000 BP). However, recent workers (e.g. Barton and Roberts 2004; Reynier 2005) have emphasised the non-uniform nature of the Early Mesolithic and the fact that, in lithic terms, it is not represented by a single, monolithic assemblage type.

The Early Mesolithic is generally characterised by "broad blade assemblages" (featuring obliquely blunted points), which show clear links with the

Maglemosian industries that occur across northern Europe (Mithen 1999). Reynier (2005, 11) highlights three major typological units within this period: the "Star Carr", "Deepcar", and "Horsham" assemblage-types. These variants essentially reflect differences in tool types and proportions (see Reynier 2005, Chapter 2; Jacobi 1978a;b for further details). Of these assemblage-types the "Star Carr" and "Deepcar" are thought to be the oldest, and roughly contemporary, at around 9500 BP, while the "Horsham" assemblage type appears to date to nearer 9000 BP (Reynier 2005, 14–15). These Early Mesolithic assemblages are succeeded by the "narrow blade assemblages" (featuring relatively small microlith forms such as needle points and scalene triangles) of the Late Mesolithic after 8500 BP which Mithen (1999, 38) suggests may reflect new hunting strategies. This may be as a result of environmental change or it may reflect new cultural traditions of artefact production. Although microliths dominate the majority of Late Mesolithic assemblages in the region, other tool types were also significant, including scrapers, burins, awls, and flint axes/adzes and axe/adze re-sharpening flakes. Coastal locations also yield tools made from minimally altered beach pebbles. These might possibly be linked with the acquisition and processing of shellfish, although the pebble tools found at Butterstor on Bodmin Moor, 13km from the present coast and even further from the Mesolithic coast, were probably not for shellfish processing (Herring and Lewis 1992). Overall, stone tools and manufacturing debris provide the largest body of evidence for the Mesolithic, with the simple presence of microliths often being taken as evidence for Mesolithic affiliations.

Organic tools (probably due to issues of preservation quality) and non-utilitarian artefacts are rare from this period, as are substantial site features such as postholes and dwellings (although small pits, usually of unknown purpose, are relatively common). Animal bones are also found at few sites, although they were present at Aveline's Hole (Davies 1921; 1922; 1923; 1924) and abundant at Totty Pot (Chris Hawkes pers. comm.). New work at the tufa spring site of Langley's Lane (Davies and Lewis 2005) has also revealed substantial quantities of Later Mesolithic faunal remains.

Although a relatively neglected topic in the British Mesolithic, the issue of death and mortuary practice can be approached through the currently available evidence, particularly in light of recent studies addressing issues of chronology and the re-assessment of old accounts (Schulting and Wysocki 2002a; Schulting 2005). The South West boasts a significant component of the available material, most notably from the cemetery at Aveline's Hole, but also from other, smaller collections such as the remains from Totty Pot and Gough's Cave.

A key issue is the use of coastal zones during the Mesolithic, not least since much of this evidence has been lost to rising sea levels. However, the site at Culverwell on the Isle of Portland (Palmer 1999) provides an indication of Mesolithic coastal activity; the 300m^2 shell-midden documents the exploitation of a wide range of marine molluscs, although fish bones are absent. The site also includes several hearths, a possible cooking pit and a floor of limestone slabs (although doubt has been cast on the status of the latter). The picks found on the site (made from local Portland chert) may have been used to remove limpets from rocks or were perhaps for extracting chert from outcrops (Mithen 1999, 49). Other midden sites in the South West (for example, Westward Ho! and Blashenwell) also highlight the importance of coastal resources during the Mesolithic period.

There are several other key themes in Mesolithic archaeology, to which the archaeology of the South West can potentially contribute. With regard to the interpretation of Mesolithic assemblages, both Mellars (1976) and Barton (1992) have provided models, exploring the implications of microlith and scraper percentages for understanding site function, and the relationships between artefact frequencies, topographic locations, geology, and site function. Raw material source data can also highlight mobility patterns and/or exchange networks, while site locations and topography highlight patterns in Mesolithic land-use, economy and subsistence strategies. Finally, shell-middens indicate elements of Mesolithic economy with regard to the coastal zone.

2.7.2 The South West Resource

The recovery of data for the Mesolithic period is uneven in the South West, with Somerset having the most comprehensive assemblages, together with a greater number of excavated sites. In Devon, the evidence is variable and fragmentary and much of the Cornish evidence comes from surface finds with only a few excavated sites. There are few radiocarbon dates available for either Devon or Cornwall. The records in Gloucestershire and Wiltshire are relatively minor, in terms of quantity, although there are occasional significant sites and findspots. Most notable of these is the lithic material sealed below Hazleton North long barrow (Saville 1990), but also worthy of note are Tog Hill (Sykes and Whittle 1965) and Castle Meadow, Downton (Higgs 1959; Radley 1969). The Mesolithic of Dorset is of course better known, principally (although not exclusively) because of the key sites at Hengistbury Head and Culverwell. In general however, Somerset has better documentation than the other counties and is an area where more extensive archaeological research has taken place both in the past and more recently. For this reason the following discussion focuses strongly on the Somerset material, although the Mesolithic resources in the other counties are also reviewed.

It is of course recognised that much of the current knowledge of the Mesolithic in the South West stems from recent and current (multi-period) fieldwalking and excavation projects. While the references deal primarily with published sources, the importance of the "grey literature" in our understanding of the period is also acknowledged, as is the need for re-assessment of much of the "grey collections" where, in many cases, surface material from fieldwalking has potentially been mis-identified as Mesolithic.

Somerset

The University of Bristol Spelaeological Society (UBSS) has been an active research group on Mendip throughout the last century and in the 1970s the Somerset Levels Project was actively involved in collecting, recording, excavating and monitoring the wetlands of the Somerset Levels. Many amateur workers have fieldwalked and collected flint from Mendip and Exmoor and elsewhere.

In North Somerset, excavation has been carried out at Lower Court Farm, Long Ashton (Saville 1986), Freeman's Farm, Felton (fieldwalking and trial trenching by the University of Birmingham Field Unit in 1992), Hay Wood Cave, Hutton (Everton and Everton 1972), Sandford Hill, Winscombe (UBSS unpublished) and Birdcombe, Wraxall (Sykes and Whittle 1960). Most of these sites have only a small component of Mesolithic material and in some cases the stratification is not secure. Birdcombe was re-excavated in 1997 when large quantities of early, and particularly, later Mesolithic flintwork was recovered. The flint appeared to have been obtained from the Marlborough Downs as small nodules and knapped on site. Radiocarbon dates of 3640–3360 cal BC (Beta-147105) and 4370–4050 cal BC (Beta-147106) were obtained from sealed contexts but are later than the flintwork might suggest (PJ Gardiner 2001).

Joan Taylor carried out extensive fieldwalking as part of the Priddy Plateau Survey (Taylor and Smart 1983) and also undertook excavations at Lower Pitts Farm (Taylor 1975–6; 1976–7; 1977–8; Taylor in Aston 1977, 109–110; Taylor in Aston and Murless 1978, 120; Taylor 1979–80; Taylor in Minnitt and Murless 1979, 85; Taylor in Burrow *et al.* 1980, 118–9). Excavation and fieldwork showed a Mesolithic element within a mixed assemblage; however, the flintwork is believed to have been lost (Joan Taylor, pers. comm.). The excavation was interpreted as a "burnt Mesolithic structure" although the published radiocarbon date of 3950–3660 cal BC (labcode unknown) obtained from burnt material relating to the hut, would appear to suggest a Neolithic date. The excavation of the burnt structure was published in 2001 (Taylor 2001a), but there is uncertainty over the feature's interpretation, because there was considerable disturbance around the site by ploughing and much of the flint from the excavations and surface collection was rolled. Elsewhere museum collections show other concentrations of material around Charterhouse-on-Mendip and Ebbor Gorge (Lewis 1998).

The Mendip Caves Mesolithic flint has also been recovered from Mendip caves and rock shelters such as Rowberrow Cavern (Taylor 1926) and Hay Wood Cave (Everton and Everton 1972). There is also more unusual burial evidence from Aveline's Hole, Burrington Combe (Davies 1921), Gough's Cave (Davies 1904; Tratman 1975; Stringer 1986), Badger Hole at Wookey Hole and Totty Pot (Barrington and Stanton 1970; PJ Gardiner in press a). These sites are particularly important for our understanding of Mesolithic mortuary practice.

Aveline's Hole, Burrington Combe, was excavated in the late 19th century, in 1914 and from 1919 to 1933 (Davies 1921; 1922; 1923; 1924; Fawcett 1919–20; 1920–21; 1924; Tratman 1922–3; 1975; 1977). This work recovered an estimated 50–100 skeletons from the cave floor (Davies 1921): the largest collection of Mesolithic human remains in Britain. Unfortunately, most of the collection was destroyed during the Second World War but 800 surviving specimens have been re-assessed by Schulting and Wysocki (2002b), representing a minumum of 21 individuals. This re-assessment has also identified infants, thus confirming the older accounts of the cave (such as Tratman 1922–3) and providing an interesting contrast with continental cemeteries, where adolescents and children tend to be under-represented (Conneller 2006).

Schulting (2005) has re-assessed the history of the discoveries and the lithic assemblage and has undertaken new research on the human and animal remains. This has included analyses of the stable isotopes, palaeodiet, pollen and the palaeoenvironment. Bayesian analysis of radiocarbon dates on the human bone (for example, Q-1458, BM-471, OxA-799, GrN-5393) confirms a Mesolithic age of *c.*8400–8200 cal BC for the burials (Tratman 1977; Jacobi 1982; Schulting 2005; Marshall *et al.* 2005), while the short date span that is indicated suggests the possibility that a significant proportion of a community is represented here (Conneller 2006). The nature of the early accounts has made it difficult to assess the character of the mortuary treatment, but there would appear to be a mixture of inhumation (assuming that the double burial is not Late Upper Palaeolithic in age) and the laying out of human remains on the cave floor (Conneller 2006). There is also evidence of grave goods, including unmodified red deer teeth. Conneller

(2006) has reviewed the evidence from Aveline's Hole within a wider discussion of death and mortuary practice in the Mesolithic of Britain and Ireland.

Rock art has recently been identified in Aveline's Hole by members of the UBSS (Mullan and Wilson 2004). It consists of three incised rows of 3 crosses and has been sealed by a layer of stalagmite. Although it has not been possible to accurately date the art by scientific means, a close analogy with rock art from Scandinavia suggests a Mesolithic date. A further discovery of an incised square by Wilson and Mullan in Long Hole (above Gough's Cave) may also be of Mesolithic date (Linda Wilson, pers. comm.).

Human bone was recovered from the swallet hole at Totty Pot, Cheddar in the 1960s when the cave was discovered by Chris Hawkes. There is an estimated minimum number of four individuals, including a child (PJ Gardiner 2001). Little of this bone survives, but a radiocarbon date of 7450–7040 cal BC (BM-2973) places it in the Late Mesolithic (Schulting 2005, 231). Excavation by the University of Bristol in 1998 around the mouth of the swallet hole suggests that there was no occupation evidence outside the cave and that the flint débitage from Totty Pot is likely to have resulted from re-sharpening hunting tools, with the finished tools being hunting losses (PJ Gardiner 2001).

The most complete Mesolithic human skeleton in Britain is "Cheddar Man" from Gough's Cave with a date of 8700–7750 cal BC (BM-525, Davies 1904; Stringer 1986). Anecdotal evidence from a workman involved in the digging at Richard Gough's show-cave suggests that many human skeletons were found, with the crouched "Cheddar Man" kept because of its completeness (Roger Jacobi pers. comm.). Chantal Conneller (pers. comm.) has noted that this highlights a possibility that Gough's Cave was, like Aveline's Hole, a Mesolithic cemetery, but it is not certain due to the late Palaeolithic dates associated with scattered, cut-marked skeletal material from Parry's 1920s excavations (Parry 1928; 1930) and the recent British Museum excavations (Currant *et al.* 1989).

The dates from the three cave sites suggest that Aveline's Hole and Gough's Cave were in use at around the same period of the Early Mesolithic (although Gough's Cave was also occupied in the Later Upper Palaeolithic) with Totty Pot having a later occupation phase in the Late Mesolithic.

Apart from the burial evidence, there are relatively few open sites that suggest permanent or even temporary occupation in the Mesolithic period on the Mendip Hills. However the recent work by Davies and Lewis (2005) at Langley's Lane is of key importance here as it shows a range of activities taking place at an open site on the lower Mendip plateau. Large quantities of Later Mesolithic lithics have been recovered, together with animal bone and a buried soil, on and around a natural tufa deposit. Contemporary with this activity is a series of small pits along the edge of the tufa mound into which were placed lithics, different coloured stones and fossils. The excavators have suggested that this open-air site was a focus for formal, ritual deposition possibly linked to the unusual properties of the white tufa mound. The tufa has yielded excellently preserved environmental material, including molluscs, the analysis of which will improve current understanding of spatio-temporal changes in the local vegetation record.

More generally however the uplands appear, on the basis of the lithic evidence, to have been used for hunting rather than settlement. Yet, although a large quantity of flint has been recovered, either through fieldwalking or isolated finds, it can frequently only tell us that hunter-gatherers were using the landscape on a temporary basis, and that it was probably part of a seasonal territory that had links to sites on the lowlands. The poor preservation of palaeoenvironmental evidence for Mendip (apart from in the caves) also makes it difficult to reconstruct the local environment in the Mesolithic period, although the animal bone recovered from caves can help interpretation (Jacobi 1982).

Early Mesolithic flint has been recovered from the Somerset Levels, where the higher ground of the Burtle Beds provided access to the rich wetland resources that were available to hunter-gatherer groups. Wainwright's assessment of two sites at Shapwick and Middlezoy indicates a non-geometric industry with obliquely blunted points of the Early Mesolithic period (Wainwright 1960). Norman's work at Greylake, Chedzoy and North Petherton also suggests an early Mesolithic presence (Norman 1975; 1982; 2002). The recovery of hollow-based points from the Chedzoy site suggests a link with the Horsham industry in the south-east of England (Chris Norman pers. comm.).

Analysis of the flintwork from the large-scale fieldwork of the Shapwick Project by Clive Bond (in Gerrard and Aston forthcoming) suggested only a slight Late Mesolithic presence, although the results of test-pitting from the Burtle Beds (Bond in Gerrard and Aston forthcoming), indicate that the area around Shapwick was extensively used in the Early Mesolithic period, as had been suggested by earlier, unsystematic fieldwalking (Clark 1933; Wainwright 1960; Norman 1975; 1982). There was some later material from Shapwick Burtle (Chris Norman pers. comm.; Bond 2006) however, and Clive Bond's current research on the lithic industries of the area may shed further light on this (Bond in press a; in press b).

There is little evidence for Early Mesolithic activity on Exmoor; the material is restricted to isolated finds or small flint scatters from the Later Mesolithic period. This material has been found predominantly on the coastline around Porlock, including finds from behind

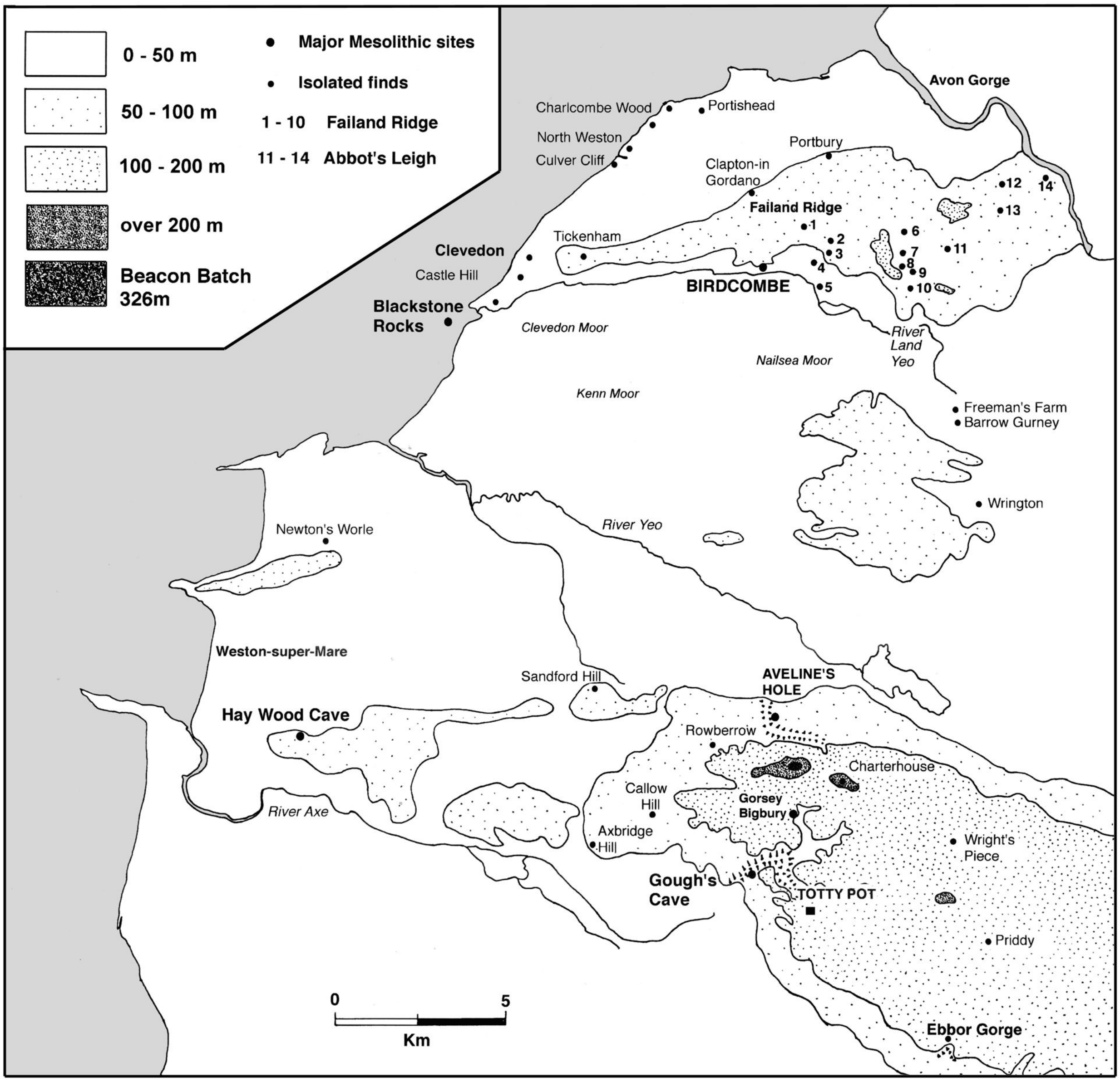

Figure 2.3: *Mesolithic finds in North Somerset (PJ Gardiner 2001; in press a)*

the shingle ridge at Porlock Marsh, from the cliffs at Hurlstone Point, Bossington Hill and North Hill, Minehead (Riley and Wilson-North 2001). The fame of AL Wedlake's discovery of Mesolithic flint at Hawkcombe Head in 1942 meant that subsequent visitors often removed surface finds. Many of these are permanently lost, but the Wedlake collection includes the largest assemblage of microliths from Exmoor (Riley and Wilson-North 2001) and is diagnostic of the Late Mesolithic period (Norman 1982).

Excavations by the University of Bristol and the Exmoor National Park Authority (PJ Gardiner in press b) have revealed a series of features and structures on the site, including a temporary structure consisting of a deliberately laid clay floor surrounded by postholes. Hearths were also located and radiocarbon dates of 6390–6220 cal BC (GU-11979) and 6770–6510 cal BC (GU-11978) obtained. The flint appears to be beach material, probably from further west at Baggy Point or Croyde Bay (Chris Norman pers. comm.).

There are submerged forests at Minehead (Dawkins 1872) and Porlock Weir (Wymer 1977) where flint from the Mesolithic period has been found. These forests would have been in a dry-land location at the beginning of the Mesolithic period, but became submerged when sea level rose at the beginning of the Holocene. The submerged forest at Porlock is on the seaward side of the present shingle ridge and consists of trunks and stumps of alder and oak that rooted into the "head" and blue mud. The forest and its associated beds are believed to be between 8000 and 5000 years old (Edwards 2000). The submerged forest at Stolford in Bridgwater Bay (35km to the east) has been dated to around 5000 BC (Heyworth 1978).

Devon

The Mesolithic record for Devon is relatively minor, and is dominated by surface scatters, in which Mesolithic artefacts are usually mixed with later material (Miles 1975c), although there is also a small number of excavated assemblages from cave sites such as Three Holes Cave, Torbryan (Jacobi 1979). Key sites and findspots include the collections at Yelland (Rogers 1946), Baggy Point (Gardner 1955; Miles 1972), East Week (Greig and Rankine 1953), and at Westward Ho! where excavations and extensive collections have been made (see Clark 1955; Churchill and Wymer 1965; Balaam *et al.* 1987). The material from the Torbay and Torbryan caves is most notable for the *in situ* Later Mesolithic occupation level at Three Holes Cave. This is located just outside the cave entrance and has produced dates of 5480–5070 cal BC (OxA-4491) and 5290–4840 cal BC (OxA-4492) on hunted red deer remains (Roberts 1996, 202). As well as being a rare example of an inland, lowland site for the Later Mesolithic in the region, the material also shows evidence of coastal contact with flint artefacts manufactured on beach pebbles, a sandstone beach pebble rubber and perforated marine shell beads (Roberts 1996, 20). The site is another example of the observed pattern that sites of the Later Mesolithic occur (as in Cornwall) both along the cliffs of the Atlantic and English Channel coasts and in the areas of granite upland (Jacobi 1979, 74).

The finds from Westward Ho! numbered nearly 2000 pieces and the shell midden from which the majority of the finds originated was until recently still exposed at low tide (Balaam *et al.* 1987); recent work by Martin Bell (pers. comm.) has suggested that the original midden is now completely eroded away. The Westward Ho! site has yielded a series of Later Mesolithic radiocarbon dates from both the midden and the peat above the forest. Those from the midden centre around *c.*6000–5000 cal BC, while those from the peat mostly date to between 5300 and 3800 radiocarbon years BC; the latest date is 5740-5300 cal BC (Q-672). These dates are particularly significant as with the exception of the Three Holes Cave dates, there are few others from the remainder of Devon for the Mesolithic period. The range of environmental evidence (land mollusca, plant macrofossils, and insects) indicates that the midden was situated within damp woodland with some pools, set a little back from a sandy shore (Balaam *et al.* 1987). The main types of marine molluscs – mussels, cockles, and peppery furrow shells (*Scrobicularia plana*) – also reflect an ecotonal position at the boundary between rocky shore, sandy bay and muddy estuary. Despite an extensive spread of charcoal in the buried landsurface, pollen evidence for human impact on the vegetation during the Mesolithic was slight. The available evidence for subsistence strategies includes vertebrate fauna from the midden (cattle, pig, red deer, roe deer, and fish), marine molluscs (dominated by those species listed above), and plant species likely to have been utilised (including hazelnuts and hawthorn nutlets). This strongly suggests the combined use of a range of terrestrial and marine resources, and the evidence of a mixed economy at Westward Ho! provides support to the observation of Jacobi (1979, 77) that shellfish alone would be unlikely to provide a long-term solution to regular short-falls in resources. More recent work, undertaken in 2002, has discovered two charred trees in the submerged forest, further occupation spreads beyond the original midden, deer footprint tracks in the Mesolithic peats, and further pointed, worked wood stakes driven into the peat. These are in the same area as those which have previously been dated to the Early Neolithic (Martin Bell pers. comm.).

The Three Holes Cave Late Mesolithic assemblage provides evidence for the renovation of tool-kits (shown by the significant quantities of microburins, broken microliths, and retouch chips, and a tranchet axe re-sharpening flake), while the significant number (32) of perforated and/or modified marine shells has parallels with Culverwell (Roberts 1996, 201). The location of the site (approximately halfway between the Dartmoor granite uplands and the contemporary coastline, and on a major watercourse tributary) further reinforces the picture of groups moving between the coast and the uplands (Roberts 1996, 201). The site is also unusual in having a faunal assemblage clearly associated with Late Mesolithic activity. Red deer, wild pig, and roe deer are present, with evidence of human action (fragmentation, burning, and cutmarks), although in general the faunal material is very fragmentary and weathered (Roberts 1996, 202).

There are claims for Mesolithic surface finds from several sites, including Beer Head (MacAlpine Wood 1929–32), Postbridge (Lydford), Fernworthy (Lydford), Bolt Head, Weare Gifford Cross (Worth 1933), Higher Spreacombe (Mortehoe), Mutter's Moor (Sidmouth, E Smith 1948–52), Yalland Farm (South Brent), East Week (South Tawton, Greig and Rankine 1953; Collop 1973) and Collaton (Whitchurch). Unfortunately it is not always possible to use typological approaches with this material, as illustrated at Yelland for example, where the majority of the microliths are broken, making classification difficult (Rogers 1946). Of particular interest are the alleged association of two Mesolithic artefacts and a "dug-out" boat in submerged forest deposits at Bigbury Bay (Winder 1924), and the rich series of surface sites over an area of two square miles at East Week (Greig and Rankine 1953).

More recently, a gradiometer survey at Handsford Farm, Chawleigh was undertaken following the recovery of Mesolithic flint from fieldwalking by the ACE Archaeology Club in 1999. This survey revealed anomalies similar to those from the geophysical surveys carried out at Hawkcombe Head that later excavations showed to contain hearths and postholes. Although no excavation has taken place at Handsford Farm to test these anomalies, the survey suggests archaeological potential for Mesolithic hunter-gatherer activity (Ross Dean pers. comm.).

Palaeoenvironment studies on Dartmoor (Caseldine and Hatton 1994; Simmons 1996) show that upland areas such as Dartmoor have areas of repeated burning, which suggests that Mesolithic hunter-gatherers might have been manipulating their environment. Although these areas cannot be conclusively linked with Mesolithic flint scatters, it does suggest that hunter-gatherers may have been investing time and energy in areas that were visited frequently throughout the year (PJ Gardiner 2001).

Cornwall

Mesolithic evidence for Cornwall (Figure 2.4 on the facing page) is more identifiable than for Devon, with some sites having been excavated and sampled for radiocarbon dates, although surface collections of lithic scatters are also common. Key site and findspot concentrations (including some of the largest assemblages of Mesolithic flint from Cornwall) were identified through predominantly surface finds in the Gwithian area, the West Penwith area (including Pednmên-an-mere, Carn Greeb and Rosketal Cliff, all within the parish of St Levan (Figure 2.4: 1–8, Berridge and Roberts 1986), the Constantine Bay area (Trevose Head) (Figure 2.4: 14) and the Lizard (Figure 2.4: 20–22, G Smith 1987). The limpet scoops from West Penwith may benefit from further investigation as would other material in Cornwall. Much of the material from Trevose Head comes from different locations with often uncertain provenance, for example over 8000 pieces of worked flint has been recovered from site TV1 covering both the Early and Late Mesolithic periods (Johnson and David 1982; Cave 1985). Jacobi has suggested that this area would have acted as a permanent occupation area, with coastal and inland resources being available (Jacobi 1979, 76–8).

In the Earlier Mesolithic period the Trevose Head locality would have been inland, only becoming a coastal location with later sea level rise (Johnson and David 1982). At Constantine Island, Norman and Miles (1977) investigated a site containing limpet shells, gravelly sand and hundreds of smashed beach pebbles. The flint assemblage contained many *ecaillé* pieces and may belong to the Obanian/Larnian industries (Norman and Miles 1977; Chris Norman pers. comm.). It should be noted however that the apparently coastal (and marine resource) focus of Mesolithic occupation in Cornwall, as represented by the collections at Stepper Point near Padstow, Penhale Headland near Newquay and North Cliff at Camborne (Jacobi 1979, 54) for example, may at least partly reflect bias in lithics collection, and that recent work (such as development monitoring and fieldwalking on lowland, inland sites) has suggested a significant inland archaeology for this period, perhaps reflecting the exploitation of a variety of environmental and landscape contexts during the Mesolithic (see Berridge and Roberts 1986). This has been specifically suggested for example by fieldwalking on Bodmin Moor, with its estimated 140,000 discrete Mesolithic flint scatters (Peter Herring and Andrew Jones, pers. comm.).

The area of the Lizard at Poldowrian, Croft Pascoe and Windmill Farm (Figure 2.4: 20–22) has been the subject of an extensive landscape survey. Fieldwalking, of an area on the cliff edge at 225m OD, produced large amounts of Late Mesolithic flint (G Smith 1987). Excavation at Poldowrian recovered hundreds of worked flints from the Late Mesolithic, together with pebble tools and quartzite hammer stones (G Smith and Harris 1982). There is also evidence for an Early Neolithic presence on the site and, unfortunately, there is considerable mixing with microliths being found above and below the Neolithic levels.

Further extensive fieldwalking and excavation has been carried out at Gwithian, near St Ives (Figure 2.4: 9) where 16 Mesolithic sites have been found on the Godrevy headland to the north side of the Red River estuary (C Thomas 1958; Roberts 1987a). Palaeogeographical and palaeoenvironmental evidence suggest that the estuary was extensive and tidal, providing a habitat rich in food and lithic raw material resources, to which Mesolithic peoples were repeatedly drawn (Roberts 1987a, 137). The sites (essentially discrete lithic scatters of Late Mesolithic age) have yielded hundreds of flint and chert artefacts (with a small percentage of retouched tools) as well as bevelled greywacke beach pebbles. Although these have traditionally been suggested to be “limpet hammers or scoops”, Roberts (1987a, 135) argues convincingly for another, albeit unspecified, function.

On Bodmin Moor, Dozmary Pool has been recognised as an Early Mesolithic site (Figure 2.4: 26), possibly used for hide processing (on the basis of the heavy representation of scrapers), although the collection is loosely provenanced and mixed with later material (Jacobi 1979). Further evidence of Mesolithic activity has been found elsewhere on Bodmin Moor at the Colliford reservoir (Figure 2.4: 27). Fieldwalking from Butterstor (which has yielded bevelled pebbles – unlikey to be “limpet scoops” in this location),

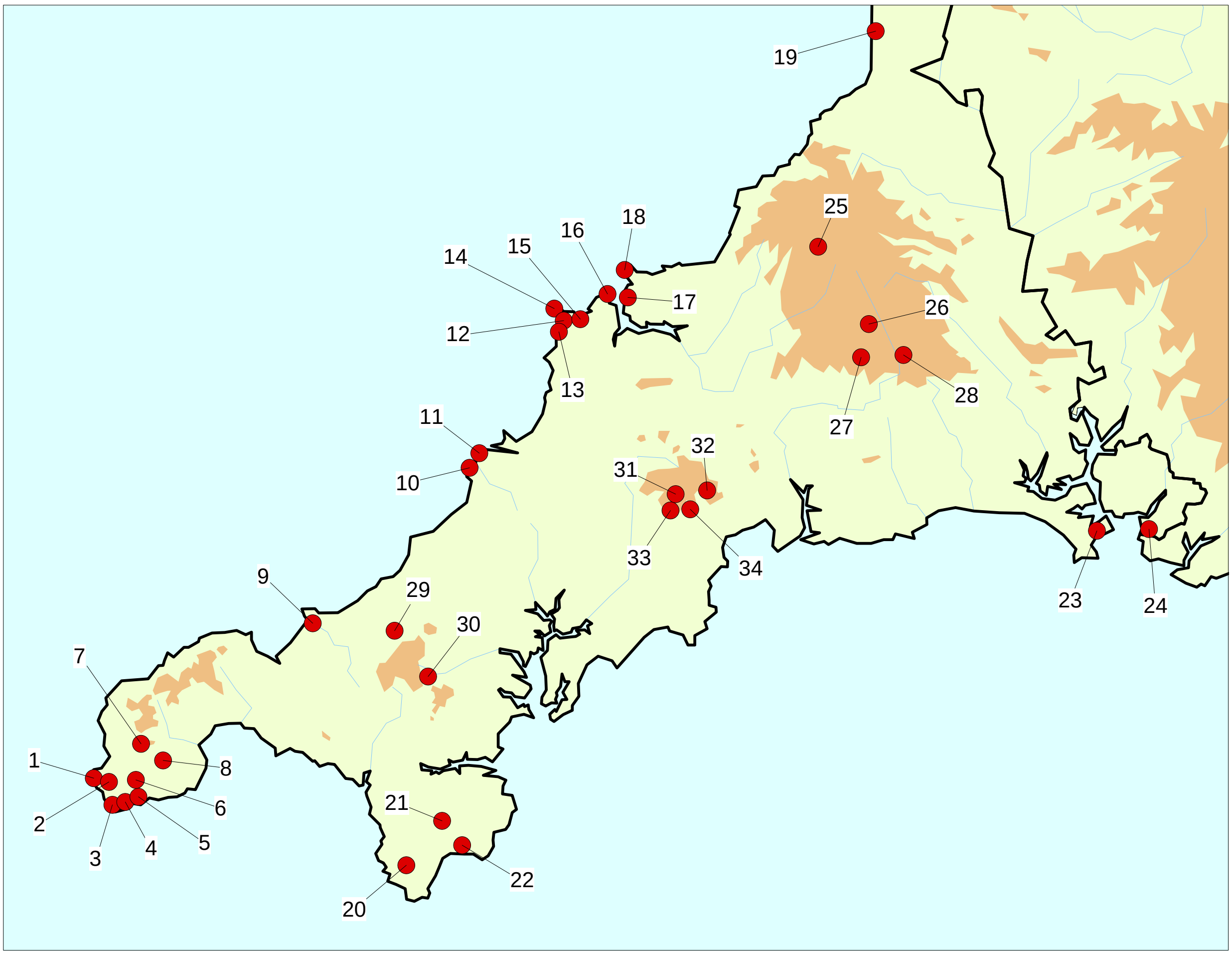

***Figure 2.4:** Map of Cornwall showing key Mesolithic sites (after Berridge and Roberts 1986)*
1 Greeb, 2 Stamps, 3 Roskestal, 4 Pedn-mên-an-mere, 5 Treen, 6 Crean and Tressidder, 7 Carn Euny, 8 New Shop, 9 Gwithian, 10 Penhale Head, 11 Kelsey Head, 12 Booby's Bay, 13 Constantine Bay, 14 Trevose Head, 15 Harlyn Bay, 16 Stepper Point, 17 Daymer Bay, 18 Pentire Point, 19 Crooklets, 20 Windmill Farm, 21 Croft Pascoe, 22 Poldowrian, 23 Maker, 24 Staddon, 25 Crowdy Marsh Reservoir, 26 Dozmary Pool, 27 Colliford Reservoir, 28 Siblyback Reservoir, 29 Carn Brea, 30 Stithians Reservoir, 31 Cocksbarrow, 32 Caerloggas I & III, 33 Watch Hill, 34 Trenance Downs.

and elsewhere on the moor, has produced a general scatter of flint from the Later Mesolithic period, but it is believed that these sites do not represent base camps, but semi-permanent sites that were part of the seasonal hunting round (Herring and Lewis 1992).

Ashbee (1986a) has reviewed the evidence for Mesolithic occupation on the Isles of Scilly, noting the paucity of distinctive lithic material but also stressing the impacts of later prehistoric sea level rises and the apparent persistence of an essentially "Mesolithic" lifestyle (the exploitation of marine and seashore resources) into the Neolithic.

Although there appears to be extensive microlith production throughout Cornwall, certain areas appear to have been favoured: the cliff tops of the north coast, together with the lowland sites of Poldowrian and Trevose Head, the granite uplands of Bodmin Moor and the estuarine area around St Ives Bay of the Gwithian sites. Jacobi suggests that it was the same hunter-gatherer groups using these sites, rather than separate social groups (Jacobi 1979, 72). There may, however, be variability in the data collection, with a notable distribution of Mesolithic sites on the north coast of Cornwall and few sites on the south coast between the Helford River and the Tamar. This may be due in part to erosion exposing flint scatters, apparent on the north coast but not so in the south (Berridge and Roberts 1986).

It should also be stressed here that there has been very little opportunity to fieldwalk in upland Cornwall (with instances limited to rare forestry schemes, and searching in disturbed ground at gateways and fords, and around the several reservoirs), so the significant numbers of scatters found at such locations suggests that very large numbers of sites do exist in the uplands (see Herring and Lewis 1992 for further discussion of these points). Furthermore, away from the Lizard area there has still not been very much fieldwalking, and while pipeline work is helping to redress this issue there is still a bias in fieldwork against the enclosed farmland of Cornwall (Peter Herring and Andrew Jones, pers. comm.). Finally, it would appear that much additional Mesolithic material lies unstudied in private and museum collections, and this resource may help to redress some of the biases discussed above.

Overall, for Cornwall, there is a concentration of material on the north coast. Berridge and Roberts (1986) saw these as predominantly cliff top hunting sites, with Poldowrian and Windmill Farm, on lower ground, being viewed as more long-term base camps, due to the variation in their flint collections. Jacobi (1979, 84–6) argued that the upland and inland finds from Bodmin Moor (and Dartmoor) represent summer (perhaps late summer) hunting, and whilst acknowledging the limitations of the available data also noted that the paucity of unshed red deer antlers and the absence of broken (or broken and carbonised) hazelnut shells and/or fruit stones (indicative of late summer gathering, perhaps for winter consumption) might be suggestive of absent human populations during late summer and the earliest part of the winter.

Gloucestershire

In some contrast to Somerset to the south, the Mesolithic archaeological record in Gloucestershire is a relatively minor one, with a rather patchy distribution, and notably richer for the Late Mesolithic. The Early Mesolithic is mainly characterised by stray finds of broad, obliquely blunted microlithic points (Saville 1984c, 69) but there is a series of Late Mesolithic sites, predominantly from the Cotswold uplands, which include the substantial assemblages from Syreford Mill (Whittington), Troublehouse Covert (Cherington), Boldridge Farm (Long Newton) and Hazleton North, the last of which includes *in situ* material recovered through systematic excavation (Darvill 2006, 11).

Where material is present it is primarily focused in the centre, south and west of the county; there are few collections from the east especially from the area of the Upper Thames valley, although taphonomic issues may be of importance here since changes to river patterns and later sedimentation have sealed large areas of low-lying landscape that would have been available during the Mesolithic (Darvill 2006, 11). The archaeology is generally dominated by surface collections, such as the microliths and cores, with later Neolithic artefacts, recovered from the surfaces at Leonard Stanley and Long Newton (Gracie 1938; 1942). The majority are characterised by relatively small numbers of artefacts and/or mixed collections, including Neolithic and/or Bronze Age material.

The most significant of the findspots in numerical terms are those within the Forest of Dean at Tog Hill, between Cold Ashton and Doynton (Sykes and Whittle 1965) and at Great Larkhill Farm and Boldridge Farm in the parish of Long Newton, with the assemblages dominated by microlithic material (Wymer 1977, 101–2).

The last twenty years has seen an increasing awareness of the Mesolithic resource in the Forest of Dean. Saville (1986) documented Nedge Cop flint scatter (found by Brian Walters) as the first unequivocal Mesolithic site in West Gloucestershire, with its mixture of Mesolithic, Neolithic and Bronze Age material. Walters (1988) expanded on the evidence from the Forest of Dean, covering 28 sites and noting that most of the valleys giving access to the St Briavels–Bream plateau have produced Mesolithic material. It should be noted that the "major Mesolithic camp site" at Briery Hill, Kilcot (Christie *et al.* 1994) contains mixed material, with the Mesolithic elements being the smallest component. Nonetheless, by the early 1990s nine substantial Mesolithic settlement areas had been claimed for the Forest of Dean (and the Lower Wye valley), balancing the material known from the Cotswolds and those lands east of the Severn (Walters 1989; 1991; 1992; Darvill 2006, 13).

Of potentially great interest in the Gloucestershire Mesolithic is the spatial relationship that can be observed between selected Mesolithic findspots and materials from later prehistoric periods. At Beverston, Tog Hill, Frocester, Kingscote, and Tetbury Upton (amongst others) Mesolithic surface material is associated with Neolithic and/or Bronze Age artefacts (Wymer 1977, 100–104). This continuity in landscape use (whether deliberate or accidental) is perhaps best expressed by the Mesolithic assemblage recovered at Hazleton North (characterised by crescent and scalene micro-triangle microlith forms and microburins), which has generated discussion as to possible reasons for the re-use of this location over apparently centennial timescales (Saville 1989). The Late Mesolithic assemblage was collected from a pre-cairn surface, lying beneath the Hazleton North Neolithic chambered tomb.

Also notable is the extensive spatial extents of some of the surface scatters, perhaps best exemplified by the material from Ashley Manor Farm (over 100 acres), Avening (over 40 acres), and Tog Hill (over 20 acres). Snashall (2002) has argued for a sustained and substantial Late Mesolithic occupation at Tog Hill on the southern escarpment, where flint was brought from the chalk, and a more sporadic presence at other sites. At these last sites imported raw materials suggest that some groups coming to the area had connections to both the east and the south (Snashall 2002, 129–131; Frances Healy pers. comm.). The Avening site is also notable for its location, with the artefacts recovered from high land above Nailsworth.

Recent work by Alex Brown and Martin Bell (AD Brown 2005) has identified a Mesolithic landsurface with overlying peat at Oldbury. The deposit includes lithic material and charcoal, the latter indicating human impact on the coastal woodland during the Mesolithic period. Peats of Mesolithic date have also been identified at Woolaston in the Forest of Dean; the environmental sequence indicates burning episodes, although there is minimal artefactual evidence for human activity. At Hills Flats intertidal peat deposits have been sampled, yielding evidence of reed burning. There are also unstratified lithics from the general area of Hills Flats, although they are not directly associated with the environmental sequence (for further details of all of these sites see AD Brown 2005). This evidence from Gloucestershire shows strong parallels with Martin Bell's work (for example Bell *et al.* 2000; 2003) on the Welsh side of the Bristol Channel, such as at Goldcliff, where charcoal was associated with lithic scatters and evidence for the burning of grasses, probably reeds. On both sides of the estuary it appears that Mesolithic communities were modifying areas of coastal-edge plant communities, and this would appear to be comparable to the much more widely recorded evidence from the upper woodland edge on Dartmoor and Bodmin Moor (Martin Bell pers. comm.).

Wiltshire

The Mesolithic record in Wiltshire is relatively rich with a mixture of minor artefact findspots, recovered through surface collections, and a small number of significant assemblages, recovered both through excavations and surface collections. The archaeology, which shows something of a riverine distribution, is found throughout the county, although there are clusters in south Wiltshire (in the environs of Salisbury), and also in the north-east and north-west of the county (near the borders with West Berkshire and South Gloucestershire respectively).

Principal sites include the excavations at Castle Meadow, Downton (Higgs 1959; Radley 1969) and Cherhill (excavated in 1967, Evans and Smith 1983) and the surface collections from around Knighton (Froom 1965). Deep ploughing at Bapton Water Meadows, Stockton also brought up a small assemblage (32 artefacts) from an area *c.* 30 x 50m in size, perhaps suggesting the presence of a richer, buried assemblage there (Wymer 1977, 344; Rankine 1955).

At Cherhill, a Mesolithic occupation deposit lay on, and in, a contemporary soil and in an overlying tufa deposit, possibly from a nearby spring (Evans and Smith 1983). A Late Mesolithic industry in fresh condition was associated with charcoal, a little sarsen and animal bone including wild pig, aurochs, red deer and roe deer. A deliberately dug hollow contained struck flint, sarsen and animal bone. The occupation took place, on molluscan evidence, in closed woodland which became swampy as the tufa accumulated. There is a radiocarbon date of 4450–3750 cal BC (BM-447) for a bulk sample from a charcoal lens within the tufa, and although the nature of the deposit makes reworking a possibility, Late Mesolithic activity has none the less been demonstrated. The site, which was discovered by chance, is also a pointer to the kinds of location from which a gamut of environmental, behavioural and economic evidence for the period may be recovered (Frances Healy pers. comm.).

The site at Castle Meadow yielded a working floor, with evidence for tool manufacture and distinct divisions into separate activity areas (Higgs 1959, 215–216), and also hearths and probable Mesolithic structures (Higgs 1959, 224–228). The presence of structures was suggested by a series of stake holes, and Higgs (1959, 231) suggested that these represented shelters that may well have been light-weight and associated with summer or temporary camps.

A surface collection near Stonehenge has provided possible evidence of raw material exchange and/or long distance acquisition, in the form of a flake made in "Portland" chert (Wymer 1977, 333). However "Portland" chert can come from numerous sources, including the Carstens series soils of south-west Dorset (PJ Woodward and Bellamy 1991) and the Portland Beds (and other deposits) in north Wiltshire (Pitts in Evans and Smith 1983, 79, 81); the origin of this artefact should therefore be treated cautiously. Moreover, there is relatively little diagnostic Mesolithic material from the Stonehenge area, with only several heavy core tools claimed (Cleal *et al.* 1995, 41–43) although an unambiguously Mesolithic assemblage has been recovered from the Avon valley (Richards 1990, 263; Frances Healy pers. comm.). A suggestion of Mesolithic monumentality is provided by a row of three postholes of Boreal Age spaced at intervals of *c.*10m, and a another feature which may originally have been a further posthole, in what is now the car park at Stonehenge. The evidence of radiocarbon dates, mollusca and pollen places these features in the period 8090–6590 cal BC (HAR-455, HAR-456, GU-5109, OxA-4919, OxA-4920) in light, open woodland including pine, birch and hazel. The massive pine posts would have been 0.60–0.80m in diameter (Cleal *et al.* 1995, 43–56, 470–3). These features, which contained no artefacts, were investigated and identified as Mesolithic almost certainly only because of their location; had it not been for their proximity to Stonehenge there would have been little incentive to date and analyse their contents. It is worth noting also that a ditch buried beneath colluvium at Strawberry Hill in north Wiltshire has been attributed to the Mesolithic on the evidence of radiocarbon dates and mollusca (Allen 1992). At Foxbridge Farm, Wanborough a single microlith was recovered from a bowl-shaped pit filled with soil and ash (Wymer 1977, 345). The probable under-recognition of Mesolithic subsoil features is explored by Allen and Gardiner (2002).

Dorset

The Mesolithic record of Dorset is, in terms of numbers of sites and collections, also a rich one, most notably characterised by the well-publicised sites at Hengistbury Head and Culverwell, although there are a number of other significant Mesolithic assemblages. In general the richest zone for sites and findspots is the south coast area around Lulworth, Weymouth, Portland, and Bournemouth, although there are smaller concentrations in several other parts of the county (Wymer 1977, 67–77).

The principal surface collections are from places such as Penbury Knoll (Green and Lewis 1970), Iwerne Minster (Summers 1941), Fleet, Weymouth and Winterborne Monkton (Bayard's Farm), whilst significant excavations have taken place on Mesolithic habitation sites at Culverwell (and other Portland sites, Palmer 1970; 1990), Hengistbury Head (Barton 1992), Ulwell (Calkin 1952) and Whitcombe Hill (Palmer 1972).

Hengistbury Head has of course provided rich evidence of Early Mesolithic activities. The average thermoluminescence age of 9750±950 years BP indicates an occupation during the Boreal or pre-Boreal, when Hengistbury may have been as much as 20 km inland of the contemporary coastline (Barton 1992, 273). Although the majority of the raw materials (both flint and non-flint) are of probable local origin, there is evidence for the use of sandstone originating from much further into the South West (Barton 1992, 273). In general the narrow range of tool types at Hengistbury (microliths, end-scrapers and microdenticulates) has been seen as suggesting a specialised activity site, probably associated with game hunting (partly based on the presence of similar tool-kits at other upland locations in the region). The presence of large numbers of proximal microburins has been interpreted by Barton (1992, 274) as evidence that the site was a primary tool production zone and, while microwear analysis was not appropriate due to post-depositional surface modifications, damage to microlith tips has been interpreted as evidence of tool-use and possible re-tooling of projectile equipment. Microlith morphology also suggests comparison with other sites in the general region, including Castle Meadow to the north and Winfrith Heath (Whitcombe Hill) to the west (Barton 1992, 274).

Alongside the key site at Hengistbury is that at Culverwell, near the southern tip of the Isle of Portland (Palmer 1999). Shell midden and hearth charcoal have yielded radiocarbon dates of 5700–6350 cal BC (BM-473) and 6210–5750 cal BC (BM-960), while thermoluminescence samples from the charcoal-yielding hearth have produced a weighted average date of 5400±390/640 BC (OxTL 501 b,m; Palmer 1999, 92). AMS radiocarbon dating of *Monodonta* shells (AA-28213 through AA-28220) has yielded a range of calibrated ages between 6460–6240 and 5480–5300 cal BC (Palmer 1999, 91). The site consists of several important features: including the midden (*c*.20m x 18m x 1m), with mollusc remains dominated by limpet, periwinkle and topshell and a floor associated with hearths, a (cooking?) pit, and possible windbreak and hut structures indicated by a series of postholes (Palmer 1999, 34–35). The lithic assemblage is characterised by the large numbers of pointed picks (the Portland Picks) and Palmer (1999, 57, 148) suggests that the abundance of these artefacts at Culverwell and on Portland in general reflects the distinctive characteristics of the locally-available limestone raw material, and a localised adaptation by the Mesolithic occupants. The region to the west of Portland Bill has also been significant for Mesolithic archaeology, with large numbers of artefacts recovered from the Fleet behind Chesil Beach (Palmer 1990, 87).

Cranborne Chase has long seen intensive investigation, most recently by Martin Green. His collections document a substantial presence throughout the Mesolithic (Arnold *et al.* 1988; Green 2000, 20–28). They are also extensive enough to show a strikingly consistent distribution, concentrated on patches of clay-with-flints (a major flint source then and in later periods) in the north of the Chase, with other sites on the Reading Beds and around the headwaters of the river Allen further south (Barrett *et al.* 1991, 29–30; Green 2000, fig 11). In this last area is the natural swallowhole known as the Fir Tree Field shaft, the deposits in which provide a dated, stratified sequence spanning the fifth, fourth, and third millennia cal BC (Allen and Green 1998; Green 2000, 27–28; Allen 2000, 40–45). Its lower part was filled with naturally accumulated chalk rubble which contained two articulated roe deer skeletons, one nearly 2m above the other, which seem to have fallen to their deaths, respectively in the third and fourth quarters of the fifth millennium (4460–4250 cal BC, OxA-7991 and 4360–4040 cal BC, OxA-7990). The earthy fills of the weathering cone at the top of the shaft contained far more cultural material. Near its base were seven microliths, most of them rod forms, tightly clustered, as if they had been hafted when they entered the shaft and would thus have been deposited there close in time to the last use of the weapon of which they formed a part. They were stratified above short-life charcoal dated to 4340–4040 cal BC (OxA-8011) and below an early fourth millennium hearth with domesticated animal bone and Neolithic artefacts. The implication is that, locally at least, Mesolithic traditions continued to the end of the 5th millennium and that the transition to Neolithic beliefs and practices was relatively rapid (Frances Healy pers. comm.).

2.7.3 Discussion

The evidence for the Mesolithic in the South West is geographically variable, with surface scatter material present across the region (in varying quantities) and particularly rich site-based evidence found predominantly in Somerset and Dorset. Although the surface scatters and isolated finds are almost always undated, it is still possible to explore issues of Mesolithic land-use on the basis of the wide range of topographical and geological locations known. Moreover, the (relatively small) sample of key sites from the South West does permit the asking of a series of key questions with regards to Mesolithic occupation and behaviour, including raw material acquisition and usage, subsistence strategies, site structure and organisation, and hunter-gatherer movement and mobility models. However it must also be stressed that current Mesolithic research across the British Isles is looking beyond purely functional topics and that attention should also paid to issues such as the active role of material culture, concepts of inhabitation, control and manipulation of the environment, cosmology, tasks, routines and social relations.

2.8 Summary

The Palaeolithic and Mesolithic archaeological resource of the region is, while varied in distribution and quality, one of considerable importance, at both a regional and national level. This importance is best summarised by its rich cave-based archaeology (especially for the Late Upper Palaeolithic period, although also for the Middle and Early Upper Palaeolithic, and Mesolithic as well), significant Pleistocene fluvial landscapes and associated archaeology (principally the Solent River and the Bristol Avon), and its wide-ranging evidence for Mesolithic land-use; this includes evidence for seasonal scheduling of activities onto particular landscapes, group mobility and possible exchange systems, specialist site types, environmental manipulation, and the adaptations and subsistence strategies associated with marine resources.

This resource assessment has also sought to highlight possible areas and agendas for future research, including the relationship between cave and open-landscape sites, Mesolithic land-use strategies, the nature of social relations and the role of material culture within those, the development of new, and expansion of existing, geochronological frameworks for all periods and the palaeoenvironmental contextualisation of the archaeological evidence for all periods, with particular emphasis towards human and hominin responses to, and influences upon, environmental change, and an emphasis upon the patterns and processes of hominin and human colonisation and abandonment phases.

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2.9 Radiocarbon dates

Table 2.3: *Details of radiocarbon dates used in the text. Calibrated ranges are at 2σ (95.4%) and were calculated with OxCAL 3.10 (Bronk Ramsey 2005) using the probability method and the IntCal04 calibration curve (Reimer* et al. *2004).*

Lab. Ref.	^{14}C age BP	Cal BC	Site	Context	Reference
AA-28213	6800±60	5840–5610	Culverwell	Shell from midden	Palmer (1999)
AA-28214	6730±55	5730–5550	Culverwell	Shell from midden	Palmer (1999)
AA-28215	6410±55	5490–5300	Culverwell	Shell from midden	Palmer (1999)
AA-28216	7145±70	6220–5880	Culverwell	Shell from midden	Palmer (1999)
AA-28217	7145±60	6210–5890	Culverwell	Shell from midden	Palmer (1999)
AA-28218	7525±60	6470–6240	Culverwell	Shell from midden	Palmer (1999)
AA-28219	6525±60	5620–5360	Culverwell	Shell from midden	Palmer (1999)
AA-28220	6855±75	5900–5620	Culverwell	Shell from midden	Palmer (1999)
AA-30681	3300±55	1740–1450	Porlock Marsh	Aurochs bone	Straker, pers. comm.
Beta-93824	5890±70	4940–4580	Tor Royal	Peat	West *et al.* (1996)
Beta-115384	11400±80	11460–11160	Ashton Keynes		Lewis *et al.* (2001)
Beta-147105	4700±50	3640–3360	Birdcombe	Oak charcoal	PJ Gardiner (2000; in press a)
Beta-147106	5420±60	4370–4050	Birdcombe	Oak charcoal	PJ Gardiner (2000; in press a)
Beta-168611	11120±170	11360–10870	Allen valley, Cranborne Chase		French *et al.* (2003)
Beta-189166	7000±40	5990–5780	Wimborne Minster	Peat	Scaife (1994)
BM-447	5280±140	4450–3750	Cherhill	Charcoal associated with occupation	Evans and Smith (1983)
BM-471	9115±110	8650–7950	Aveline's Hole	Burial	Tratman (1977)
BM-473	7150±135	6350–5700	Culverwell	Charcoal from midden	Palmer (1999)
BM-525	9080±150	8700–7750	Gough's Cave	Burial ("Cheddar Man")	Stringer (1986)
BM-960	7101±97	6210–5750	Culverwell	Charcoal from hearth	Palmer (1999)
BM-2183R	12350±160	13100–11900	Gough's Cave	Cut-marked bone. See OxA-589, OxA-590	Jacobi (1991)
BM-2188R	12380±230	13200–11800	Gough's Cave	Animal bone	Bowman *et al.* (1990); Jacobi (2004)
BM-2973	8180±70	7450–7040	Totty Pot	Burial	Ambers and Bowman (2003)
GrN-5393	8100±50	7310–6830	Aveline's Hole	Stalagmite in human skull. ?too recent	Tratman (1977)
GU-1739	8655±85	7960–7530	Redhill Marsh	Mesolithic activity	Walker and Austin (1985)
GU-1739	9250±85	8710–8280	Redhill Marsh	Mesolithic activity	Walker and Austin (1985)
GU-3239	8640±200	8300–7200	Avon valley (Durrington Walls)		Scaife (in Cleal and Pollard 2004)
GU-5109	8880±120	8300–7650	Stonehenge car park	Charcoal from posthole	Cleal *et al.* (1995)
GU-5387	7480±70	6460–6220	Sourton Down	Peat	Weddell and Reed (1997)
GU-5615	5830±50	4800–4540	East Moor	Peat 77.5–82.5cm	Gearey *et al.* (2000a)
GU-8220	4690±50	3640–3360	Halscombe Allotment	Bog oak	Straker *et al.* (nd)
GU-11978	7815±40	6770–6510	Hawkcombe Head	Holly charcoal	PJ Gardiner (in press b)
GU-11979	7420±35	6390–6220	Hawkcombe Head	Hearth	PJ Gardiner (in press b)
HAR-455	9130±180	8900–7700	Stonehenge car park	Charcoal from posthole	Cleal *et al.* (1995)
HAR-456	8090±140	7500–6650	Stonehenge car park	Charcoal from posthole	Cleal *et al.* (1995)
HAR-1831	5650±70	4690–4350	SLP - Clay-Peat Dates: marine clay-peat interface	Walton Heath	Coles and Dobson (1989)
HAR-3695	6330±100	5490–5050	Higher Moors	Peat	Scaife (1984)
HAR-4568	4500±110	3550–2900	Poldowrian	Pooled hazelnut shells (?too recent)	G Smith and Harris (1982)
HAR-5083	7590±100	6640–6240	Dozmary Pool		Simmons *et al.* (1987)
HAR-5632	6100±200	5500–4550	Westward Ho!	Midden	Balaam *et al.* (1987)
HAR-5640	5200±120	4350–3700	Westward Ho!	Top of peat above midden	Balaam *et al.* (1987)
HAR-5641	5740±100	4800–4360	Westward Ho!	Peat above midden	Balaam *et al.* (1987)
HAR-5645	6320±90	5480–5050	Westward Ho!	Midden	Balaam *et al.* (1987)
I-15549	5410±110	4460–3980	Hoar Moor		Francis and Slater (1990)
OxA-464	12470±160	13200–12000	Gough's Cave	Animal bone	Gillespie *et al.* (1985); Housley (1991); Jacobi (1991); Housley *et al.* (1997)
OxA-465	12360±170	13100–11900	Gough's Cave	Animal bone	Gillespie *et al.* (1985); Housley (1991); Jacobi (1991); Housley *et al.* (1997)

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Lab. Ref.	^{14}C age BP	Cal BC	Site	Context	Reference
OxA-466	12800±170	13800–12300	Gough's Cave	Animal bone	Gillespie *et al.* (1985); Housley (1991); Jacobi (1991); Housley *et al.* (1997)
OxA-535	12210±160	12900–11800	Sun Hole	Human bone	Gowlett *et al.* (1986a); Housley (1991); Jacobi (1991); Housley *et al.* (1997)
OxA-589	12340±150	13000–11900	Gough's Cave	Cut-marked bone. Repeat of BM-2183R	Gowlett *et al.* (1986a); Housley (1991); Jacobi (1991); Housley *et al.* (1997)
OxA-590	12370±150	13100–12000	Gough's Cave	Cut-marked bone. Repeat of BM-2183R	Gowlett *et al.* (1986a); Housley (1991); Jacobi (1991); Housley *et al.* (1997)
OxA-799	9100±100	8650–7950	Aveline's Hole	Human bone	Gowlett *et al.* (1986b); Housley (1991)
OxA-1071	12300±180	13000–11800	Gough's Cave	Animal bone	Hedges *et al.* (1997); Housley (1991); Jacobi (1991); Housley *et al.* (1997)
OxA-1789	12320±130	12950–11950	Kent's Cavern	Worked bone	Hedges *et al.* (1989); Housley (1991); Jacobi (1991); Housley *et al.* (1997)
OxA-2234	11480±90	11610–11220	Gough's Cave	Human bone (?conserved). Joins OxA-2795	Hedges *et al.* (1991); Jacobi (2004)
OxA-2795	11820±120	12000–11450	Gough's Cave	Human bone. Joins OxA-2234	Hedges *et al.* (1991); Jacobi (2000)
OxA-2796	12380±110	13000–12050	Gough's Cave	Human bone	Hedges *et al.* (1991); Housley *et al.* (1997)
OxA-2797	11870±110	12050–11500	Gough's Cave	Worked antler	Hedges *et al.* (1991); Jacobi (2000)
OxA-3208	12260±140	12900–11800	Three Holes Cave	Cut-marked animal bone	Chamberlain and Williams (2001); Hedges *et al.* (1996)
OxA-3209	12180±130	12700–11800	Three Holes Cave	Animal bone	Chamberlain and Williams (2001); Hedges *et al.* (1996)
OxA-3411	12650±120	13300–12300	Gough's Cave	Cut-marked bone	Hedges *et al.* (1994); Jacobi (2000)
OxA-3412	12490±120	13100–12150	Gough's Cave	Cut-marked bone	Hedges *et al.* (1994); Jacobi (2000)
OxA-3413	12940±140	13850–12950	Gough's Cave	Cut-marked bone	Hedges *et al.* (1994); Jacobi (2000)
OxA-3414	12570±120	13200–12200	Gough's Cave	Human bone	Hedges *et al.* (1994); Housley *et al.* (1997)
OxA-3452	12400±110	13000–12100	Gough's Cave	Cut-marked bone	Hedges *et al.* (1994); Jacobi (2000)
OxA-3890	12150±110	12500–11750	Three Holes Cave	Animal bone	Chamberlain and Williams (2001); Hedges *et al.* (1996)
OxA-3891	11980±100	12120–11680	Three Holes Cave	Animal bone	Chamberlain and Williams (2001); Hedges *et al.* (1996)
OxA-4106	12670±120	13350–12300	Gough's Cave	Cut-marked bone	Hedges *et al.* (1994); Jacobi (2000)
OxA-4107	12550±130	13200–12200	Gough's Cave	Worked bone	Hedges *et al.* (1994); Jacobi (2000)
OxA-4150	10710±110	10940–10440	Great Rissington		Wilkinson (1993)
OxA-4782	40400±1600	—	Hyaena Den	Cut marked tooth	Jacobi (2000); Hedges *et al.* (1996)
OxA-4919	8520±80	7740–7360	Stonehenge car park	Charcoal from posthole	Cleal *et al.* (1995)
OxA-4920	8400±100	7600–7180	Stonehenge car park	Charcoal from posthole	Cleal *et al.* (1995)
OxA-5692	12250±110	12750–11850	Kent's Cavern	Cut-marked animal bone	Jacobi (2004); Hedges *et al.* (1996)
OxA-5844	4860±65	3800–3510	Hay Wood Cave	Human bone	Richards and Hedges (1999)
OxA-6001	7120±110	6230–5760	Sourton Down	Peat	Weddell and Reed (1997)
OxA-7990	5385±65	4350–4050	Fir Tree Field shaft	Bone from shaft infill (-5.2m)	Allen and Green (1998)
OxA-7991	5500±55	4460–4250	Fir Tree Field shaft	Bone from shaft infill (-7m)	Allen and Green (1998)
OxA-7994	12430±80	13000–12150	Kent's Cavern	Cut-marked animal bone	Jacobi (2004); Bronk Ramsay *et al.* (2000)
OxA-8002	12240±100	12700–11850	Kent's Cavern	Cut-marked animal tooth	Jacobi (2004); Bronk Ramsay *et al.* (2000)

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Lab. Ref.	^{14}C age BP	Cal BC	Site	Context	Reference
OxA-8011	5355±45	4330–4050	Fir Tree Field shaft	Charcoal from silting Layer 8 (Mesolithic flint)	Allen and Green (1998)
OxA-11230	6700±45	5710–5530	Shapwick Heath Borehole A	Plant macrofossil	Wilkinson (1998a); Gerrard and Aston (forthcoming)
OxA-13512	36800±450	—	Bench Tunnel Cave	Animal bone associated with leaf point	Jacobi *et al.* (2006)
OxA-13716	31730±250	—	Uphill Quarry	Worked bone or antler	Jacobi *et al.* (2006)
OxA-13803	31550±340	—	Hyaena Den	Worked bone or antler	Jacobi *et al.* (2006)
OxA-14164	24470±110	—	Eel Point, Caldey	Human bone	Schulting *et al.* (2005)
Q-672	6585±130	5740–5300	Westward Ho!	Peat	Balaam *et al.* (1987)
Q-1211	5005±140	4250–3500	Westward Ho!	burnt wood adjoining midden	Jacobi (1979)
Q-1212	4860±140	4000–3350	Westward Ho!	animal bone from midden	Jacobi (1979)
Q-1458	9090±110	8650–7950	Aveline's Hole	Burial	Tratman (1977)
Q-2779	5420±60	4370–4050	Marazion Marsh		Healey (1993)
Q-2781	6460±80	5610–5290	Trewornan		Healey (1999)
SRR-3203	11020±190	11350–10700	Gordano valley	Peat	Gilbertson *et al.* (1990)
Unknown	5000±50	3950–3660	Lower Pitts Farm	Burning associated with Mesolithic activity	Taylor (2001a)
Wk-8500	7100±70	6100–5800	Stannon	Peat	Tinsley (2004)
Wk-8501	5290±55	4260–3970	Stannon	Peat	Tinsley (2004)
Wk-10647	7080±60	6070–5830	Halscombe Allotment	Peat	Ralph Fyfe pers. comm.
Wk-10876	3425±60	1900–1530	Porlock Marsh	Palaeochannel top	Straker *et al.* (2004)
Wk-10878	5633±59	4600–4340	Porlock Marsh	Palaeochannel base	Straker *et al.* (2004)

Note: GU-1739 is intentionally duplicated as both dates are given with this laboratory number in the source.