



Early Humans

Nick Ashton



CHAPTER 3

The History, Geography and Biology of Britain

ONE OF THE EXCITING ASPECTS OF WORKING ON early humans is the diversity of different disciplines that I encounter as an archaeologist, working with botanists, beetle specialists, mammalian palaeontologists, geologists and dating experts, to name but a few. We saw in the last chapter how the origins of our subject grew initially from biology and then geology. When a better appreciation of the history of the earth was in place, after two or three centuries of remarkable insights into our planet, only then was the world ready to accept the antiquity of humans. This chapter explains how we have built on the giant strides made by the pioneers of the subject through the developments in science and explores how we study the depths of human time today. The starting point is geology and the land we see around us.

BRITAIN'S GEOLOGY OVER THE LAST MILLION YEARS

Britain's geology stretches back over 800 million years, but for our subject it is the last 2.5 million years that are of most interest. It is a tiny element of a much longer geological history and largely consists of superficial, soft sediments of gravels, sands, silts and clays. This stretch of time is called the Quaternary period, and is subdivided into the Early, Middle and Late Pleistocene and the warm period since the last Ice Age in which we live today, the Holocene. Our human story starts towards the end of the Early Pleistocene about one million years ago (Figure 21).

As recognised by the early geologists, the Pleistocene witnessed dramatic changes in climate, which literally altered the shape of Britain. The most obvious effect of glaciation was the lowering of sea-level as water became locked up as

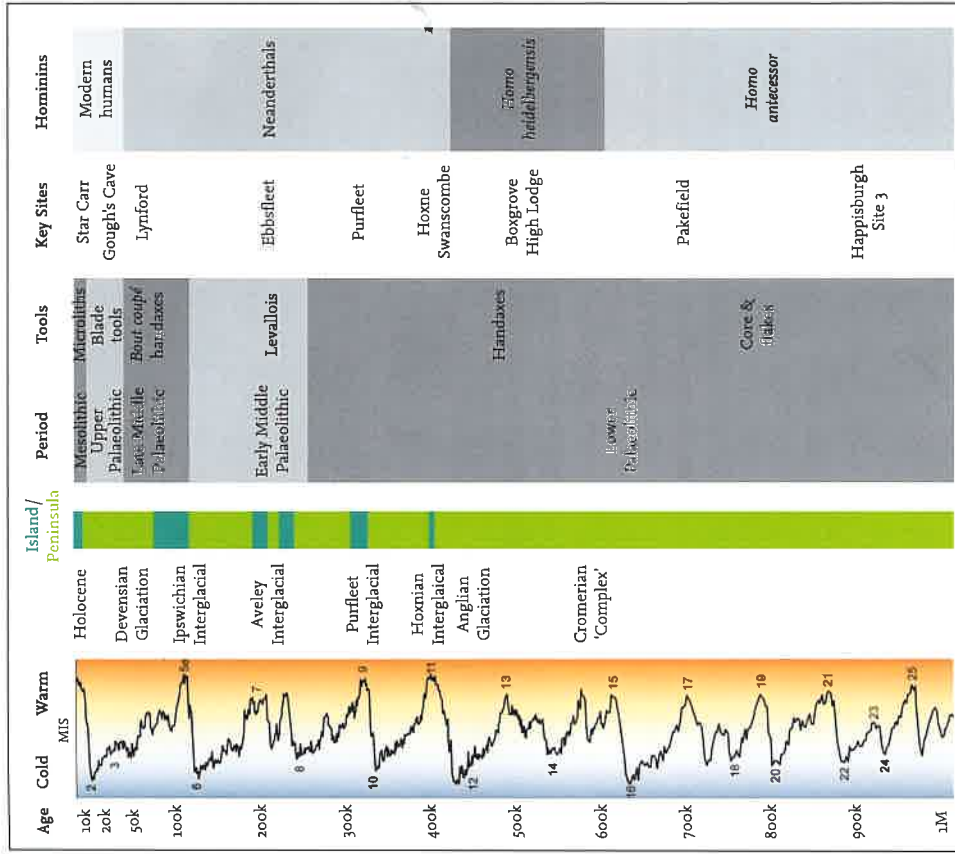


FIG 21. The changing climate over the last million years with geological and archaeological periods, main tool types, principal sites and hominin types.

ice on the poles, at times falling as much as 120 m. This extended the landmass of Britain, revealing the floor of the North Sea Basin, the English Channel and much of the Irish Sea, so that the British Isles formed a westerly peninsula of continental Europe. Each time climate warmed, the ice caps melted, sea-level rose and drowned the once exposed areas. With higher sea-levels, new beaches were formed. These can sometimes be seen on today's coasts as raised beaches



FIG 22. Raised beach at Little Portelet, Jersey. (Martin Bates)

of coarse rounded pebbles (Figure 22). The heavy ice sheets also had an effect on the height of the land, depressing it by several metres during glaciations, but as climate warmed and ice melted it bounced back to previous levels or sometimes higher. Longer-term shifts in the earth's crust have also had an effect, so that much of Britain and the English Channel region are rising tectonically. By contrast the North Sea Basin and Netherlands are subsiding, in part caused by the heavy gravels brought down by the Rhine, Scheldt and the eastward-flowing British rivers.

The cyclical changes in climate created both erosion and deposition, whereby combinations of gravels, sands, silts and clays have been created, moved and re-deposited through a variety of processes. During glacial periods ice extended over large parts of the British landmass, scouring and destroying the underlying rocks and softer sediments. This created churned up sediments called 'till', which was deposited beneath the ice sheet. Enormous pressure at the base of the ice created meltwaters, which flowed as streams, leaving gravel-filled channels above, within or beneath the till. At the ice front, meltwaters formed further streams, sometimes creating gravel fans. Any blocking of the streams resulted in small lakes, which filled with sediment to form characteristic deltas. Larger blocks of ice within the till, or at the ice front, melted more slowly as the ice retreated, to form lakes that filled with fine-grained sediments as climate warmed.



FIG 23. Section through the glacial gravel of the Blakeney Esker, Norfolk, which stands as a gravel feature above the surrounding landscape. (Peter Hoare)



FIG 24. Glaciated valley in Nant Ffrancon, Snowdonia. (Simon Lewis)

In lowland areas, many of the effects of glaciation are not so obvious, although the flat plateaux between the rivers of East Anglia are mantled by a blanket of till, softening the landscape. Occasionally landforms can be seen, such as 'eskers', which are elongated ridges of gravel, marking former melt-water channels within the ice (Figure 23). In highland areas, the aftermath of glaciation is clearer. 'U-shaped' or glaciated valleys show the erosive power of the descent of a glacier downstream (Figure 24). Feeder streams and their valleys were often left suspended above the main valley floor as 'hanging valleys'. In valley floors, characteristic moraines, such as elongated hummocks, called drumlins, mark the limit of the valley ice. Meanwhile on steep, northern-facing slopes, precipitous cliffs called 'corries' were created by regular freeze-thawing of snow that fractured and shattered the bedrock. Corries are usually semi-circular in shape and have accumulations of rock at their base, sometimes surrounding a deep tarn or lake. Whether in the highland or lowland zones, glaciation has had a dramatic effect on the landscapes that we see around us.

For much of the last million years Britain has had a cool climate between the extremes of glaciation and the temperate climate that we enjoy today. During these intermediate episodes, the ice sheets only directly affected the high mountain areas to the north, though their effect was still felt further south. Tundra and little tree cover left open landscapes ripe for erosion. At times there was permafrost where only the top metre or so of ground would thaw, with frozen sediments beneath. For the wet, thawed muds on hilltops and valley sides, the only drainage was downslope across the frozen ground beneath. These 'solifluction' deposits accumulated down the slopes and in valley bottoms.

The poorly vegetated landscapes were exposed to wind, which further denuded the higher ground and plateaux to the south of the ice sheets, depositing wind-blown sands and silts. In the Breckland of Suffolk and Norfolk, for example, the poor, sandy soils called 'cover sands' were deposited during the last glaciation, when ice reached the northern coasts of East Anglia. Lighter silt, known as 'loess', was blown further afield and now forms blankets, metres-thick, in a belt from the Russian steppes to northwest France, just reaching some areas of Britain. Many of the 'brickearths' in the lower-lying areas and valley bottoms of eastern England have a loess component mixed with hill-wash. On the lower-lying exposed hills and interfluvies between the valleys, blankets of eroded bedrock accumulated, such as 'clay with flint' on the downlands of southern England.

Seasonal melted snow in spring added large volumes of water to the drainage. The dry valleys that we see today were once active streams and rivers, feeding meltwaters above frozen ground to the larger rivers. The rivers carved out new channels and carried coarse gravels downstream, which were dumped as the



FIG 25. Limestone karstic landscape of the Cheddar Gorge, Somerset. (Paul Pettit)

flowing water slowed. The annual accumulations formed metres of thick sand and gravel, which can be seen in many of the quarries of Britain today.

As climate warmed during each interglacial, vegetation became more firmly established and erosion decreased. Other than the highland areas, the rivers no longer had the big annual input from melting snow, so carried only lighter sands, silts and clays. They meandered more gently across floodplains creating cut-off channels and oxbow lakes, which gradually filled with lighter sediments and peats. Downstream in the estuaries, tidal muds built up around the river mouths. Across the floodplains and valley slopes, thicker soils developed as grasslands turned to woodlands. On wet, upland plateaux, peat bogs formed.

Although most erosion slowed down during temperate periods, warmer water created ideal conditions for chemical solution of some bedrocks, particularly chalk and limestone. Solution often created sinkholes or 'dolines' which sometimes formed ponds, eventually infilling with silts and clays. In limestone, solution created fissures and hollows, which often widened as drainage routes through the bedrock to form extensive cave systems (Figure 25). Caves filled with a mixture of water-lain silts, debris and mudflows from further up the cave or rocks from collapsed roof-falls. Water rich in calcium carbonate from dissolved

limestone under warmer conditions precipitated out to form stalagmites and stalactites, or beds of calcrete. The survival of cave sediments was often short-lived as increased water-flow through the system sometimes washed all but remnants away.

SURVIVAL AND DISTRIBUTION OF SEDIMENTS

The present-day distribution of the different sediment types has been strongly affected by the underlying bedrock and the extent of previous glaciations. The younger bedrocks of Triassic sands and clays, Cretaceous chalk and Greensand or Jurassic clays and limestone lie to the south and east of England, whereas the older, often harder, rocks tend to lie to the north and west. This simple divide runs approximately from East Yorkshire to Dorset, with the younger, softer rocks generally eroding and dissolving more quickly to create both sediment and sediment traps over the last million years. It is the sediment traps, such as caves, fissures, dolines, lakes and river valleys that preserve the best records of our Pleistocene and Holocene past.

Access to, or survival of, the sediments has also been dependent on the extent of past glaciations. The most extensive ice sheet was the Anglian about 450,000 years ago, which had limits as far south as Hornchurch and Finchley in north London and the Severn Estuary in the west. Many of the pre-existing deposits were destroyed, except as odd patches of gravel or uniquely as the Cromer Forest-bed on the East Anglian coast. The extent of most other ice sheets is little understood, except the last glaciation, called the Devensian, between 80,000 and 11,500 years ago. The ice front extended from the Severn Estuary, through the West Midlands to Yorkshire and down along the east coast to the Wash. Most of our Pleistocene record therefore survives to the south of this line, except in caves to the north. The Holocene in which we live today was unaffected by glaciation and has a more widespread distribution across Britain.

CONSTRUCTING A GLOBAL FRAMEWORK

Understanding of the changes and development of the environment and landscape is dependent on knowing the order in which the deposits were laid down. This stratigraphic history is a complex three-dimensional jigsaw with many missing pieces and large parts of which are still poorly understood. Much of the work focuses on trying to match what we see of the fragmented record on

land to the more complete sedimentary sequences preserved beneath the sea floor. The longer deep-sea cores in the Pacific and Atlantic cover over two million years of recent geological time. Preserved within the cores are microscopic foraminifera, which are single-celled organisms with a shell. The shells preserve heavy and light oxygen isotopes, ^{18}O and ^{16}O , the ratio of which reflects water temperature. The lighter ^{16}O evaporates more quickly and during glacial episodes, rather than being precipitated back into the sea, it becomes locked within ice on the poles.

Study of the cores reveals the variation in the ratio of ^{18}O and ^{16}O and hence changes in climate. The complexity over the last million years is shown in Figure 2.1, where warm stages are given odd numbers and cold stages even numbers. Sometimes the stages are subdivided into substages, denoted by a letter, so for example the last interglacial is attributed to Marine Isotope Stage (MIS) 5e. As first conjured up by James Croll (Chapter 2), it is now widely agreed that the changes in climate correspond to the astronomical cycles in the position of the earth around the sun. The overriding pattern is a 100,000-year cycle in the elliptical trajectory of the earth's movement around the sun. This is complicated by the 41,000-year cycle in the tilt of the earth and a 23,000-year cycle of a slight wobble as it spins around its axis. The combined effect is a glacial-interglacial cycle every 100,000 years, but with shorter-term changes from the tilt and wobble of the earth. If Croll came up with the idea, in 1924 the Serbian mathematician, Milutin Milankovitch, provided the mathematical predictions of the astronomical history of climate change. But it was only through dating of the deep-sea cores that his modelling proved to be correct. So how are the cores and for that matter other deposits dated?

DATING

New methods of dating have transformed our understanding of the past.

Not only do they give us the depth, but they enable us to order events where stratigraphic relationships are missing. Many methods of dating are based on the decay of isotopes at a known rate (Walker, 2005). So radiocarbon, for example, measures the amount of ^{14}C in organic material, which is absorbed from the atmosphere when alive. When the organism dies, the ^{14}C decays at a known rate by halving every 5,730 years – known as its half-life. This comparatively small half-life limits the dating to about the last 50,000 years, as the tiny quantities that survive in anything older become difficult to measure. Other isotopes have much longer half-lives, which considerably extend the age range. Potassium–Argon

dating for example can date volcanic rocks over millions of years, or Uranium-series dating on materials such as stalagmites, tufas or shells can be used back to several hundred thousand years ago.

Basalts and other volcanic rocks are particularly useful in dating the last few million years. Not only can they be dated by Potassium-Argon, but they also contain a good record of the earth's changing magnetic field. In the past, slight shifts in the earth's iron-rich liquid core have created periods of reversed polarity, when we had a magnetic south, rather than the present north. The last big reversal was between 1 million and 780,000 years ago, which can be measured in various places around the globe. Fortunately for us that period of reversal and other minor excursions also show up in the deep-sea cores and help tie down their dating and correlation with other cores.

An important corroboration to these methods is provided by the Greenland and Antarctic ice cores, which record annual growth rings in one instance over the last 400,000 years. The changes in oxygen isotopes show a similar record of climate development and help calibrate the last few hundred thousand years of our Pleistocene history.

Other dating methods include luminescence where either fine-grained sediments or burnt materials have their radiation reduced to zero through exposure to sunlight or burning. After burial they start to reaccumulate background radiation from surrounding sediment. Today we can measure the background radiation to calculate the annual dose and, by measuring the amount of accumulated radiation in the sample, can estimate the age of burial. A confounding factor is the assumption that the background radiation has remained constant, although this can be affected by factors such as changes in groundwater. A related technique is Electron Spin Resonance, which measures trapped electrons after a mineral has formed (Grün, 1989). It can be used on a range of materials including sediments and tooth enamel.

A method that has been widely and successfully applied in Britain is amino acid dating, which relies on the conversion of amino acids after death (Penkman, *et al.* 2012). The tiny 'opercula' or lids of the mollusc *Bithynia* have proved to be particularly reliable (Figure 26). Ratios are produced of one amino acid to another, but because the conversion rate is dependent on temperature, the ratios have to be calibrated against better-dated sites. This has been achieved with consistency across a wide range of locations in Britain over the last million years and can now be used to estimate the age of sites where other methods of dating cannot be used.

Arguably one of the oldest methods is also the most important and widely applied, being based on the new arrival and extinction of biological species. As seen in Chapter 2, Hugh Falconer was among the first to realise the power



FIG 26. Opercula from *Bithynia tentaculata* from Barnham, Suffolk.

of changes in mammals for dividing up Pleistocene time. It is largely the case that mammals show the biggest evolutionary changes, although the range of molluscs and some plants also show some differences through time. The vole family have been of particular use, where speciation events and slight morphological changes in dentition occur synchronously across Eurasia. One example is the change from rooted to unrooted incisors with the Water Voles *Mimomys pusillus* and *Arvicola cantiana* (Figure 27). This development occurred between 700,000 and 600,000 years ago. Species such as Red Deer first evolved about 800,000 years ago, in contrast to the southern mammoth (*Mammuthus meridionalis*) which became extinct at about the same time (Chapter 4). For Britain, occasionally species appear for a short time and then disappear till modern-day reintroductions. Rabbits (*Oryctolagus cuniculus*) were brief Iberian

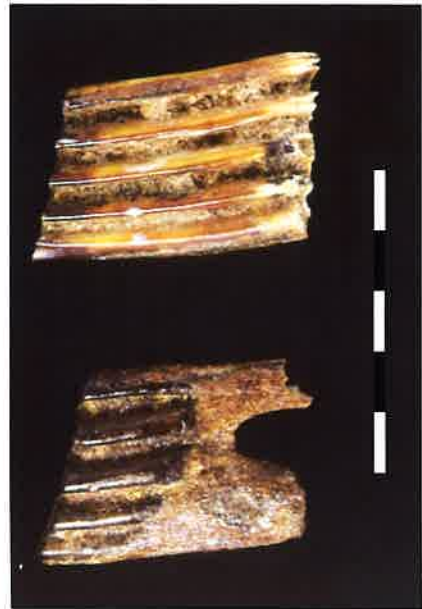


FIG 27. Teeth of water voles: rooted 3rd molar of *Mimomys pusillus* (left) and unrooted 3rd molar of *Arvicola cantiana* (right). (Simon Parfitt)

visitors to Britain 400,000 years ago after which they disappeared until reintroduction by the Normans or possibly Romans (Chapter 7). Hippopotamus populated Britain several times, the last period being the last interglacial, about 125,000 years ago (Chapter 9).

For molluscs, we have frequently had the influx of foreign visitors, one of the best examples being the 'Rhenish fauna' composed of species from central Europe about 400,000 years ago (Chapter 7). Being freshwater taxa, they show a connection between the Rhine, Scheldt and Thames rivers at this time, indicating a land link between Britain and mainland Europe. Although the vegetation of Britain has changed according to the climate, only rarely do plants contribute to our understanding of the age. An exception is the rare presence of Tertiary relicts that survive the beginning of the Pleistocene in Europe. Hemlock (*Tsuga* sp.) was only native to Britain till about 800,000 years ago, and is now only found naturally in the Far East and North America. Similarly, the Wingnut tree (*Pterocarya*) last grew naturally in Britain 400,000 years ago.

In combination, the full range of biological species can be used to assess the correlation of sites and their age. It is a powerful tool for building a framework in which to understand our past.

CONSTRUCTING A LOCAL FRAMEWORK

The global framework, based on the continuous deep-sea cores, is the standard against which fragmented records from the land can be assessed and compared. We have already seen how the terrestrial deposits rarely form continuous sequences. Instead, the landscape has been reshaped time and again through the interglacial-glacial cycles. Our understanding is based on the basins, valleys, caves and other sediment traps where deposits survive. So how do we put it all together to order the events that we can see at individual sites?

A good starting place is the rivers and, for Britain, the Thames. As suggested in the early years of the subject, through time rivers cut deeper and deeper channels, a process that is controlled by changes in climate (Bridgland, 1994). At the end of a glaciation, melting ice-waters carve deep channels in the local bedrock, which rapidly fill with sands and gravel as climate warms. The interglacial river is far less active and forms wide floodplains, but with little incision, generally depositing sands, silts and clays. As climate cools and vegetation cover is reduced, gravels once again accumulate in the channel. With water locked up as ice during the peak cold, it is the next warming that causes further down-cutting of a new channel, leaving remnants of the previous river

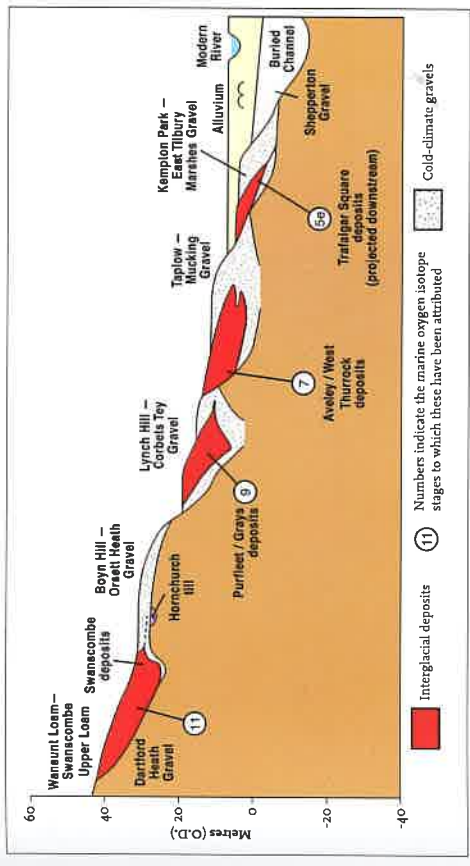


FIG 28. Terraces of the Middle and Lower Thames showing terrace names, principal sites, geological periods and Marine Isotope Stage numbers. (Courtesy of David Bridgland)

gravels on the valley edges. These gravel remnants are called river terraces, forming a staircase, each one usually representing a glacial-interglacial cycle, the oldest at the top and the youngest being the modern river (Figure 28).

In the Thames Valley, from Reading through to London, four main terraces have been recognised above the modern floodplain. Importantly the highest and oldest terrace sits on glacial till from the biggest of the ice sheets, the Anglian Glaciation. Simply counting from the bottom up would be one way to assess the age of each terrace and of the Anglian. The first terrace forms the flatter ground for Trafalgar Square and dates to the Last Interglacial, known as the Ipswichian Interglacial, about 125,000 years ago. The next two higher terraces would therefore date to about 200,000 and 300,000 respectively, while the highest would correspond to about 400,000 years ago (Figure 28). The glacial till on which it sits would therefore be the Anglian, dating to about 450,000 years ago. On the Marine Isotope curve this corresponds to Stage 12, which does appear to be the most extreme of the glaciations and probably the most southerly in extent.

Fortunately we have independent ways of checking this interpretation. The Anglian glacial tills are often formed of chalky, flint-rich clay, with large spreads across East Anglia, or brown sandy clay that is visible in the cliffs of Norfolk (Figure 29). Several sites are found around the edges of small lakes that have formed in Anglian till and have provided material for direct dating. One such site



FIG 29. The grey-brown sandy clays of the Happisburgh glacial till in the lower half of the cliff at Happisburgh. (Martin Bates)

is Beeches Pit near West Stow in Suffolk, where ESR and luminescence dating both suggest an age of about 400,000 for the interglacial sediments and therefore implying an age of 450,000 for the underlying till (Chapter 7).

Further checks are given by the amino acid ratios and biological remains, which provide correlations between sites, so that Swanscombe in Kent and Barnham in Suffolk, for example, both post-date the Anglian Glaciation, have the same range of mammals, including the notable appearance of rabbits, but also have similar amino acid ratios (Chapter 7).

This is typical of the basic building blocks that we use to understand the Pleistocene geology. The river terraces form a relative sequence in the form of a staircase that can often be tied in to our biggest glaciation, the Anglian. Biological remains and various methods of dating can provide refinement to our understanding and so we can produce a chronological framework to understand the recent geological history of Britain.

RECONSTRUCTING PAST ENVIRONMENTS

The sediments themselves can tell us a little about the position in the landscape: whether the situation is a valley-slope, lake, fast-flowing river or sluggish estuary. Clues to climate will also be given by features such as the coarseness of the gravels, or freeze-thaw structures left by permafrost. But it is really the biological evidence that allows us to paint detailed pictures of past landscapes. Preservation of course is very varied, dependent on numerous factors, such as the acidity of groundwater, depth of burial and water-logging. What is best for one type of evidence is not necessarily good for another. Pollen, for example, survives best in acidic sediments, whereas bone prefers alkaline calcareous sediments. For many sites there is no preservation at all, so where biological remains do survive, they are critical for our understanding of the past habitats and landscapes of early humans.

Plant remains

Fortunately for us pollen is remarkably robust and quite difficult to destroy, surviving particularly well in lake sediments and some fine-grained river or estuary deposits. In the best situations it will provide an accurate reflection of the local plant life at any particular time, so that within deep lakes the development of vegetation can be seen over appreciable lengths of an interglacial. In river sediments much of the pollen is washed downstream and reflects the more regional vegetation. Most methods of recovering pollen involve use of particularly strong (and dangerous) acids, such as hydrofluoric acid, which dissolve all the sediment, except the pollen. Usually the pollen can only be identified to genus, rather than species level (Figure 30).



FIG 30. Pollen grains from Barnham, Suffolk, of (left) pine and (right) spruce. (Mark Lewis)

Plant macroscopic remains, such as seeds, nuts or cones, also survive, often found in organic-rich river or lake muds. They can sometimes be identified to species, providing a more detailed picture of the immediate surroundings. Wood survives well in waterlogged deposits and in a wider variety of sediments as charcoal. Charred seeds and other plant materials contribute further evidence. Most of these remains can be recovered through floatation, whereby in a container of water the sediments will sink to the bottom, while the plant remains will mainly float at the top.

Animal remains

A wide variety of animal remains sometimes survive from insects through to mammals, each revealing different aspects about the environment. Under the right conditions, one of the more prolific forms of evidence is beetle remains, with body parts such as wing cases and even genitalia surviving (Figure 31; Goope, 1986). With over 400,000 known species, they naturally live in a huge range of environments, each with its own particular habitat preferences. They vary from flesh-eaters or dung-dwellers to specific plant specialists, living in everything from brackish water to dry-land habitats. As they all fly they are one of the first animals to colonise their preferred habitat when conditions change. At many



FIG 31. Beetle remains from Lynford, Norfolk. (Nigel Larkin)

sites hundreds of taxa can be identified, providing clues to the vegetation, the range of water bodies and the presence of carcasses or living mammals from their dung. Calculations can also be made for the likely summer and winter temperatures. When the modern-day geographical distribution of a particular species is known, the range of temperatures that the species will tolerate can be identified. By taking the distribution of perhaps twenty species or more the seasonal temperature ranges can be narrowed down to a few degrees, known as the Mutual Climatic Range or MCR (Atkinson *et al.*, 1987). In this way modern analogues can be found for sites in the past. As with all biological proxies, the results of course depend on the underlying assumption that modern-day distributions really reflect their natural ranges and that beetle habitat preferences have remained the same.

Molluscs, particularly snail shells and slug plates, also survive in many river and lake sediments. As with beetles, they live in a wide array of habitats from marine to dry land with over 85,000 recognised species. They feed on a variety of plant materials, giving clues to the local vegetation. They also provide some indication of climate, but give a more generalised reflection of conditions than beetles (Jones & Keen, 1993).

Ostracods, sometimes known as seed shrimps, are a tiny form of crustacean, typically less than 1 mm in size. Just as with the molluscs, different species have different habitat preferences and provide clues to the water, whether saline, fresh-running or swamp conditions. In recent years they have also provided temperature estimates for summer and winter, which has provided corroboratory information for the climate indications from beetles (e.g. Holmes *et al.*, 2010). Equally small are foraminifera or 'forams' for short. The tiny shells from these protozoa survive in marine sediments and can be used to determine water conditions, such as brackish water, or high sea-level stands. Their main benefit to understanding the past, though, is the record of changing climate they provide in the deep-sea cores (see above).

As we saw in Chapter 2, vertebrate bones, teeth, antler and tusks were the earliest fossils to hint at the exotic environments of Britain's past. The larger fossils have long been recognised from coastal exposures in East Anglia, sand and gravel quarries inland or from caves. Nowadays, equal attention is focused on the smaller vertebrate remains, recovered through extensive sieving programmes to find even the tiniest of teeth. Fish bones, teeth and even scales can be attributed to species and provide information on water conditions (Figure 32). Bird bones survive less well as they are usually hollow, but contribute to the reconstruction of coastal, wetland, grassland and woodland habitats. Amphibians and reptiles are particularly useful indicators of summer climates as some species only survive



FIG 32. Sieved and sorted residue of small vertebrate bones and teeth. (Simon Parfitt)

and successfully breed in warmer summers. European Pond Terrapin (*Emys orbicularis*), for example, struggles to breed in southern England today, requiring July average temperatures of at least 18°C. Exotic creatures of this sort hint at warmer climates than today.

Compared to the biological evidence above, mammals probably provide the poorest indications of past environments as their modern ranges have been severely affected since the Neolithic or earlier and we can only guess at the ecology of the many extinct species. This downside is more than compensated by the colour they provide for past landscapes, with exotic animals roaming the river valleys and forests of early Britain. At times, the larger mammals included hippopotamus and various forms of extinct elephant, mammoth and rhinoceros. Aurochs, bison, horse and a range of deer species, including extinct forms of giant elk, added to the picture. The herbivores were hunted by the larger carnivores, such as extinct sabre-toothed cats, lion, wolves, hyaena and bear with the smaller hunters of wild cat, fox and pine marten. A wide array of small mammals included bats, moles, voles, shrews and occasionally rabbit. As well as enriching the landscapes, as shown above they are of vital importance in helping to date the sites through understanding of their presence and absence at particular times, but also of when particular species first evolved and when they became extinct. An additional benefit is the evidence they sometimes provide of humans.

EVIDENCE OF HUMANS

For most of Britain's past, humans seem to have been a minor component of the fauna, but they played an increasingly important role. Human remains are incredibly rare, pointing to low populations, but fortunately for us they left behind large quantities of rubbish in the form of stone tools and sometimes butchered bone.

Many sites preserve bone and teeth that retain clear incisions from stone tools and characteristic fracture patterns showing the smashing of bone for marrow extraction (Figure 33). One such site is the 500,000-year-old Boxgrove in Sussex where the bones show clear patterning in how the carcasses have been processed with the detachment of certain muscle groups and the careful filleting, which reflects the knowledge and expertise of the human butchers (Chapter 5). At much later sites, such as Gough's Cave, these practices were put into action against fellow humans, a sure sign of cannibalism only 15,000 years ago (Chapter 11).

For this late period, bones of modern humans (*Homo sapiens*) have survived in some quantity, but for earlier species there are only three sites with remains. For the first half of our human story there are no bones at all, but Atapuerca in northern Spain does have human remains which have been attributed to a species called *Homo antecessor* or 'Pioneer Man' (Chapter 4). It is not until 500,000 years ago at Boxgrove that we have a tibia and two teeth, which are probably from a more evolved species called *Homo heidelbergensis* (Chapter 5). Swanscombe in Kent has provided three parts of the same skull of a very early Neanderthal,

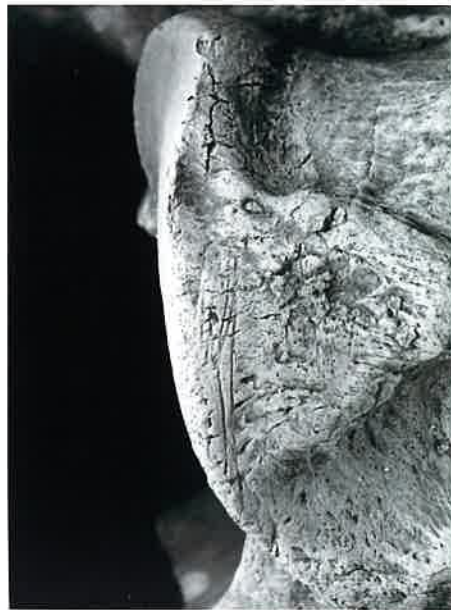


FIG 33. Cut marked bone from Happisburgh in the Savin Collection. (Simon Parfitt; courtesy of the Natural History Museum)



FIG 34. John Lord, one of Britain's best flint knappers, making a handaxe. (Peter Hoare)

dated to 400,000 years ago (Chapter 7). Finally the maxilla and several teeth of a more evolved Neanderthal (*Homo neanderthalensis*) have been excavated from the 230,000-year-old cave site of Pontnewydd in North Wales (Chapter 8). With our current knowledge, these fragmentary remains are all that survive of our earliest relatives in Britain.

By far the most prolific form of evidence is the stone tools, belying the apparently small human populations. Making or 'knapping' stone tools is a highly wasteful process, which leaves many flakes and chips behind and it is this evidence, together with the finished tools, that we discover

(Figure 34). For Britain, flint was usually the best raw material, but was largely limited in a usable form to the chalklands and the rivers of southern and eastern England. Elsewhere, flint and chert from limestone was sometimes used, or otherwise rocks such as basalt and quartzite, dependent on the bedrock geology. These rocks all share a property called 'conchoidal fracture' which, due to their particular crystalline structure, means they can be flaked and shaped in a controlled way. Any acutely angled edge of a block of raw material could be hit with a pebble or 'hammerstone' to remove a flake. A series of flake removals could start to reduce the original block (or core). The sharp edges of the flakes could be used for cutting and slicing, or if the edges were modified through small removals called 'retouch' they could be converted to scrapers, notches, points or saw-tooth edges called denticulates. More elaborate flaking could shape the core into tools such as handaxes in the earlier periods or tranche axes in much later episodes.

So how do we distinguish between natural stones and those made by humans? The answer lies in the particular properties of conchoidal fracture. The flakes have specific features that characterise them as being knapped (Figure 35). They include a small ring from the impact, a 'bulb of percussion' beneath the impact point and ripples that spread out from the point. The negative features will be found on the core. Similar negative features can often be found on the

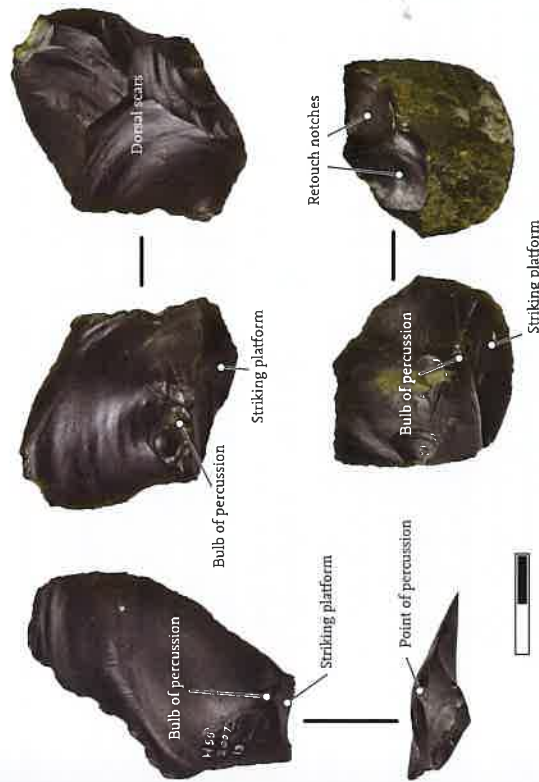


FIG 35. Flint flakes from Happisburgh Site 3 showing features that distinguish human workmanship. (Phil Crabb)

back of the flake from previous flake removals. Although natural processes can occasionally replicate these features through violent collision of stones in a river or on a beach, when they occur repeatedly then humans are thought to be responsible.

The period of human activity has been structured into a series of chronological phases, usually characterised by particular tool types (Figure 21). The earliest phase is the Lower Palaeolithic which extends from the beginning of tool-making, in the case of Britain just under a million years ago, until about 250,000 years ago. The earliest sites have simple flake tools with the addition of handaxes by 500,000 years ago. The ensuing Middle Palaeolithic is often equated with evolving Neanderthals from early forms through to the fully fledged species about 40,000 years ago. The early part of the period is characterised by the development of a particular core technology, where the shape of the flakes is predetermined by careful core preparation (see Chapter 8). The resulting flakes often had an all-round cutting edge or were specifically designed to form points, almost certainly for spearheads. The technique is called Levallois, named after a suburb of Paris where it was first recognised. After a prolonged human absence

of at least 120,000 years, the later part of the Middle Palaeolithic is marked by the return of humans to Britain about 60,000 years ago with new forms of handaxe, often termed '*bout coupés*' (see Chapter 10).

The demise of Neanderthals and the emergence of anatomically modern humans about 40,000 years ago marked the start of the Upper Palaeolithic (Chapter 10). The tools of choice were made on elongated flakes called blades, which were converted into scrapers, points and engraving tools or chisels called burins. Specific forms of the various tools seem to identify a series of different cultural groups that visited Britain until the end of the last ice age, some 11,500 years ago (Chapter 11). The warming climate heralded the start of the Mesolithic and the arrival of new people to Britain (Chapter 12). They produced much smaller blades, which were retouched to form 'microliths' and then mounted onto handles or shafts in a variety of ways. One of the most significant innovations was the hafting of microliths to make armatures for arrows. With the Mesolithic we have the first clear use of bows and arrows, an enormous advantage in the quest for game.

The prolific quantities of stone tools and their waste products have tended to overshadow the rest of their tools and belongings which have not survived, particularly those made of wood, bone, antler and hide. From the earliest sites we occasionally get a glimpse of a different material world, such as the 500,000-year-old hammers made of bone and antler from Boxgrove or the spear from Clacton 100,000 years later. We can only guess at what we are missing by drawing inferences – so were carefully crafted scrapers used for processing hides, or were the Levallois points mounted onto spear shafts?

By the time we get to modern humans clearer pictures emerge with the better survival of tools made from bone, antler, ivory and on occasion wood with points, harpoons and hide-working tools. Evidence of the habitations, huts and fires more often survive. We also see the first clear expression of art through decorated bone and ivory, engraved walls of caves, ornamentation with pendants and beads or ceremonial headgear. But by this time we can begin to recognise these humans as our own, behaving in ways that are familiar, already dominating the natural world that was soon to see the introduction of farming.

My job in what follows is to piece all this information together starting with the geography and geology of the sites, drawing on the evidence that we have about the environment from the floral and faunal remains, and finally attempt to understand a little about the humans and their lives. The journey begins just under a million years ago when Britain was a very different place from where we live today.

CHAPTER 4

Wilderness and the First Pioneers: One Million Years Ago

A MILLION YEARS AGO BRITAIN WAS a far-flung peninsula of the Eurasian landmass. A large embayment stretched from the Norfolk coast across the southern North Sea Basin to the Netherlands. A similar embayment linked Britain's southern coast with France, so that the chalklands of southeast England ran continuously to northwest France providing a permanent land link with the continent. The drainage systems were also different. Now-extinct rivers flowed from the Midlands across East Anglia into the North Sea to join the Rhine and Baltic rivers. The Solent River was fed by tributaries from southern England and flowed to the north of the Isle of Wight, then heading south to join the rivers of Normandy and Brittany to form the Channel River (Figure 36).

As a wilderness on the northwestern fringes of Europe, Britain had landscapes rich in flora and fauna. Forests varied from deciduous to coniferous, and included exotic relict plants from the much earlier Tertiary period. Large herbivores, such as mammoth and hippopotamus, foraged in the river valleys alongside bison, horse and deer. The herbivores were prey to the large carnivore guilds which included the sabre-toothed cat, lion and hyaena. There was however a newcomer to this wilderness; humans had arrived and were now competing with other carnivores for the rich game.

THE CROMER FOREST'-BED

Most of the evidence we have for this period has been recovered from the Norfolk and Suffolk coasts, where beneath the cliffs there are exposures of sediments that infill a depression known as the Crag Basin. The basin covers