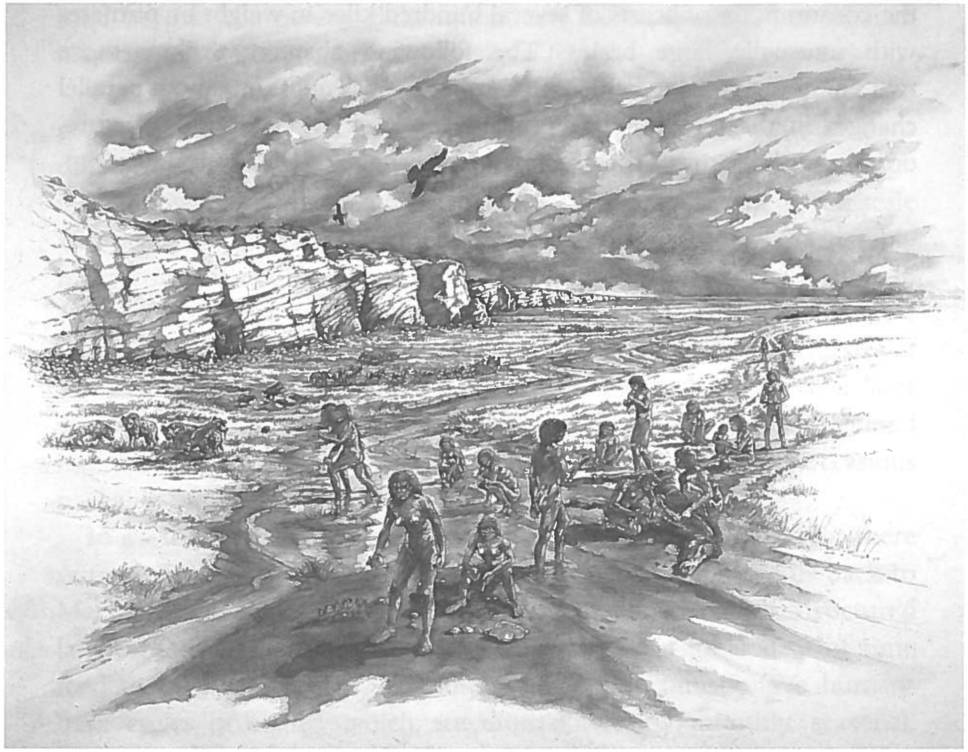


6. Imagined scene of the butchery of a wild horse, half a million years ago along the coast of southern England at Boxgrove.

3

IN SEARCH OF BIG GAME

Boxgrove, near Chichester, southern England, circa 500,000 years ago

She crashed down at the edge of the water's edge, her body disappearing beneath the grass. All that could now be seen from the cliff was the flailing motion of the long, slender hardwood spear lodged in her shoulder, and tagging her staggered movements across the mudflats. They hurried down the scree onto the mudflats to join the spear-thrower, the stronger among them making good headway. Around half a dozen of the others lingered at the flint scree; even though others had already reached the injured horse, they knew their own turn to eat would come. High above, birds gathered and began to circle, it seemed with a similar wisdom. Down below, flint nodules were being checked, turned over, and a few of the better-shaped ones selected. Others had brought their own carefully fashioned stone tools with them.

Making their way carefully across the salt marsh, creeks, and mud slurries, they reached the point where their faster relatives had brought the wild horse down. They were already circling the carcass. Their anxious eyes were wide open, all the while scanning the horizon. An open watery place was a dangerous place to linger. Hurling sticks and stones at hyenas was one thing—big cats were something else. They might have to abandon the whole thing if one of those lions got too close. They would remain on guard for as long as it took—probably several hours. The chosen nodules were placed at various well-chosen points around the carcass.

Activity centred on the last arrivals at the scene. Each laid their spear beside them, pulled from their hide waistband an antler hammer, and settled in the position they had carefully chosen, with one foot extended, the other bent at the knee to serve as an *anvil. They began to strike. The physical contact with the nodule was critical to getting the impact right. An impact at the wrong point, or in the wrong direction, would have no visible impact on the flint. A strike, which to an observer displayed the same natural fluency as breathing or walking, would cause the nodule to fall into two, the freshly exposed faces moistly gleaming with a deep blue-black hue.*

Within minutes, those moist new surfaces would dry, their rich dark colour dull, and newly created edges lose some of their sharpness. For the next few hours, however, those edges would be among the sharpest edges ever fashioned. By turning and striking, turning and striking, each globular flint nodule was transformed into an elegant oval shape, its matt white surface removed to reveal the shimmering blue-black surface beneath. Others were sharpening the tools they had brought with them.

A lead hunter carried his butchery tool or 'hand-axe' across to the carcass, the guards letting them by. First slicing open a main neck artery, in order to ensure the animal was lifeless, and then plunging deep and low into the horse's belly, the newly prepared blade was dragged up the throat. Immediately working on the head, the tongue was cut out and the skull smashed open. A constant chattering from those who brought the horse down ensured they were included in the distribution of these tender tissues. By the time the liver, kidneys, stomach, and intestines were eased out and consumption had begun in earnest, yet more feeders arrived at the scene.

The original hunting party was now joined by many others, jostling noisily. Some were presenting themselves for sex in the hope of food shared in exchange, an offer that would be taken up on several occasions before the meal was over. Young mothers begged both for meat and for the soft and oily layers of horse fat. The jostling males occasionally allowed them access to the flesh without any further bargaining.

Things were settling down around the dead animal as empty stomachs had gradually filled. The guarding of the kill had found a more settled rhythm. There was certainly a band of hyenas lurking at the woodland edge on top of the cliff, but so far, the cats has chosen to stay back from the commotion. Two of the group each had sections of the rib-cage clamped firmly between their jaws. A skilful wrench of the neck muscles would peel the ribs back, freeing the heart and lungs for consumption. A few fragments of tissue were quickly consumed by the bolder gulls that had been circling for some time up above. More skilful blade work was in progress now, with neat incisions around each hoof, around the eye sockets and across the skull. The blades could then be used to ease the hide off the body.

One of the older flint-knappers bared her teeth and cried out. She was vigorous in defence of her prized hand-axe. She moved quickly to the skinned animal, and with a well targeted strike, plunged her axe into the prize—the socket of one of the rear legs. She allowed her immediate kin to get close and help with the limb's detachment. After much striking, bending, and slicing through meat and tendons, the leg came free and was dragged to one side. Another of the knappers was already at work on the second hind leg, and others were moving to the forelegs.

By now, the feeders had aggregated into separate clusters, each with their own fragment of the carcass, and the job of cutting off fillets of meat began. The more urgent competition now behind them, a member from each kin group set off towards the coast in search of large pebbles. On their return, the meat filleting was already drawing to a close. Slabs of meat were being parcelled up in strips of the horse hide and skewers by the spears for ease of transport. The work on the carcass had moved to the scraping of the bone surfaces, in preparation for fracture.

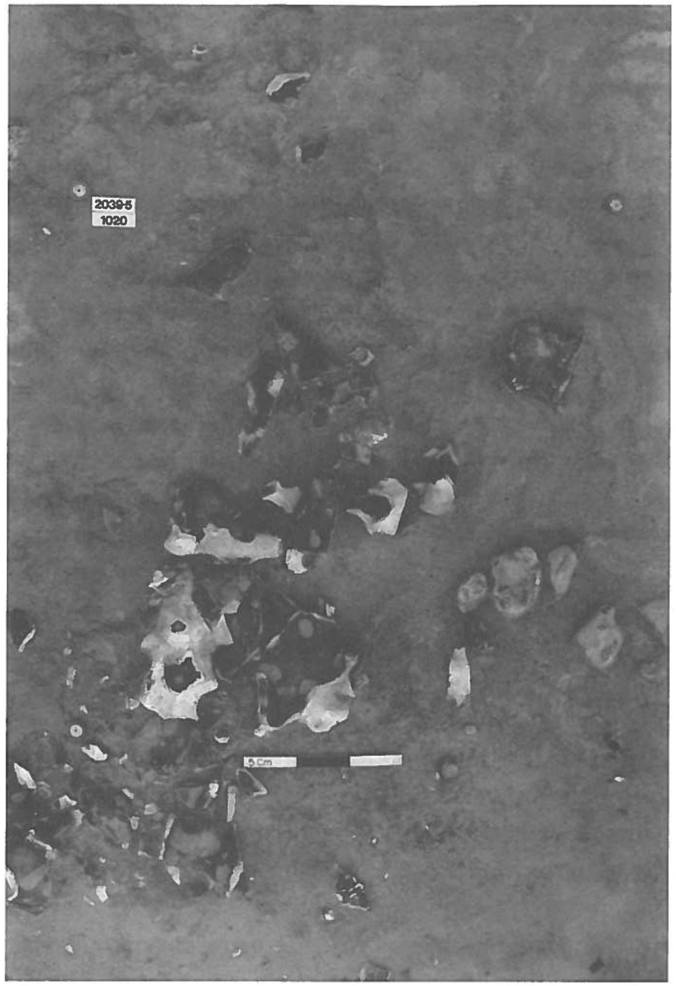
With a bone held firmly down upon one beach pebble, another pebble was hammered down from a full arm's length to shatter the bone and reveal the soft, tasty marrow. The entire skeleton was smashed up in this way, the scene opening up into a feast of happy sucking and chewing.

This meal had taken several hours, and they had hardly started on the actual meat, which was now all rolled up and ready for transport, back up the cliff and into the woods. The tools they had carefully manufactured at the site were also taken with them. Even without consuming the meat they felt bloated and somewhat heady after their vast intake of protein.

They set off with their food parcels, leaving precious little soft tissue behind them. The hyenas did eventually come over to the site, to chew away at a few pieces among the scatter of fractured bone and viciously sharp flint. However, the rewards were minimal and the walking surface decidedly unpleasant. It was left to the birds to dispose of most of the debris. A few days after the flesh had gone to the woods, most of the bones had gone to the sky.

Much of the carcass had disappeared, but not all. That some bone fragments remained was critical in building towards the storyline above. Around 180 of these fragments were carefully picked from a sand and gravel quarry close to the coast of southern Britain. The roughly cratered landscape of the quarry has in modern times been populated by scrub, weeds, and the heavy machinery of mineral extraction. In a few places its irregular surface had been interrupted by neat rectangular trenches, their sections straightened and cleaned, their exposed surface peppered with small black flags, marking where some tiny flint flake or bone fragment had been exposed by meticulous excavation, and its precise position plotted. One set of black flags in the sand mapped out a brief episode half a million years ago when flint blade and wild animal prey came together in the quest for food. Archaeologists have undertaken several seasons of excavation in the Boxgrove quarry, plotting the finds trapped within the accumulating sediments. In 1989, they unearthed the scatter of bones and flints from which the above narrative was assembled, a narrative that captures one striking feature of the human food quest, the consumption of very large animals. The 180 bone fragments were scattered across around 70 square metres of a buried sandy surface. Also scattered across that same surface were a multitude of chipped flints.[1]

The most striking items among these flints from the Boxgrove quarry are a series of elegantly fashioned 'hand-axes', large tools, skilfully shaped on both sides to create one of the most durable artefacts the world has ever seen. More numerous by far were the courser flint fragments of various sizes which the archaeologists could occasionally fit together along the lines of their original breakage, in the manner of a three-dimensional jigsaw puzzle. The task is laborious but rewarding; if enough pieces are recovered, a void can be reassembled, capturing the shape of the hand-axe within. Because the final location on the sand surface of each fragment was recorded, and their relative position on the original flint nodule known, three dimensional cameos can be built up of human action in the fracturing or 'knapping' of the flint. Both the preservation of these spatial patterns and the freshness of the flint surfaces confirmed what the pattern of accumulating sediments also indicated. These scatters were buried fairly quickly in an active



7. Dense distribution of primary flint-knapping debris at the horse butchery site at Boxgrove.

coastal landscape; the moments in time were quickly covered up and conserved. The pattern of the scatter is in places so precise that the sitting position of the knapper can be established, and the 'spray' of shattered debris followed from the knapper's hand. The pattern preserves a precise echo in flint fragments of a series of instances of flint working around whatever it was that had generated the scatter of fractured bone.[2]

To the untrained eye, those fragments of bone looked unpromising, and certainly gave the impression that most of the skeleton from which they came had disappeared. The small portion that remained, when carefully cleaned and inspected under a scanning electron microscope, was quite enough to reveal the fine details of the series of events narrated above. Take, for example, the pieces of backbone. A trained eye can recognize not only that they were vertebrae, but also at which position on the backbone they belonged. Through comparison with modern reference material, it was confirmed that their particular shape and size matched the wild horse, *Equus feris*. That much was accomplished with the naked eye. A low-power microscope allowed analysis to proceed further, into how the animal was divided for consumption. Under magnification of seventy-five times, a pattern is discernible across each vertebral surface. These marks resemble tiny plough furrows, even including a miniature version of the 'feathering' effect that can be seen on dragged soil. It is possible to create very similar marks on a fresh modern bone by scoring it with a fresh flint blade. In the context of a surface scattered with freshly knapped flint, it could thus be inferred that what were visible under the microscope were cut-marks, traces of the passage of a sharp flint blade along the axis of the spine. This is precisely the motion needed to separate the rib-meat from the bone. An exciting result, but by no means unique. On close inspection, almost half the remaining fragments carried marks of this kind.[3]

It is precisely cut-marks such as these that have taken the study of ancient animal bones far closer to meals of the distant past. Routine analysis of animal bones from archaeological sites has aimed to establish species, sex, the age of animals at death, and whether different elements of the body are present in different proportions. These data alone can tell us a great deal about the living population, and a certain amount about how they were hunted, scavenged, or culled. From the moment a blade

makes contact with the skeleton a whole new realm of forensic evidence begins to accumulate. Fresh bone is comparatively soft, inasmuch as even a dinner knife can leave a durable cut-mark. It is not only the strike of a hand-axe, but the careful filleting of meat from the bone, or the removal of hide from the body that leaves a characteristic mark behind, a mark that becomes fixed as the bone dries out.

There are many ways of taking an animal apart. It can be fairly randomly hacked into meal-sized chunks, or systematically dissected into component meats. The vertebral elements may all be sliced in two, an indication of the division of 'sides' of meat for transport and storage, or cut laterally to prepare rib steaks. In recent centuries, when butchery practices have actually been written about, it is clear that they reflect not just preferences for particular cuts and joints of meat on the table, but the actual context of those preferences in narratives of social hierarchy and religious belief. Certain cuts may be considered impure, and forbidden; other cuts may be reserved for sacrifice to the gods. In a contemporary cosmopolitan city, butchers from each of the major religions may have separate establishments, dividing the carcass with different equipment in different ways. In medieval Ireland, the carver of the meat at a feast was a significant figure; it was he who indicated the status of the diners by the cut they received. Half a million years earlier, we have no texts, but we can follow the sequence in which the wild horse carcass at Boxgrove was divided.

The direction of the actual cut-marks can be informative. On one particular vertebral fragment from high in the back, close to the neck, the flint incisions ran at right angles to the body. This is consistent with the separation and removal of the horse's head. Other marks differ, not in their direction, but in their form, indicating scraping or smashing, rather than skinning. As with the flint incision, experimentation with fresh bones provides a useful route to interpretation. Striking a bone with a large pebble can release a rounded chip, and replicate the patterns seen on some of the ancient bones. A fragment of the upper-left forelimb has the scar from such fractures on opposite sides of the bone, one corresponding to the striking pebble, the other to the anvil. Those large pebbles were presumably being used in the breakage for marrow. Yet another fracture is different again; it is a semicircular wound on the surviving fragment of one of the shoulder blades. It seems to be a projectile wound, and is broadly consistent with the impact that would be expected from a form of artefact that has been recovered from a slightly younger archaeological site in Germany. Close to the modern settlement at Schöningen, between 400,000 and 350,000 years ago, three sharpened lengths of wood, around two metres long, were laid down in the archaeological sediments. They were found together with a shorter implement sharpened at both ends, reminiscent of contemporary Australian aboriginal throwing sticks. These artefacts were interpreted as wooden spears, of the kind that could have certainly inflicted the Boxgrove shoulder wound and brought the wild horse down.[4]

Horses that are truly wild no longer roam the earth's surface, but they have left enough skeletal evidence for us to estimate their size. The bones at Boxgrove indicate a pretty large animal, producing somewhere in the order of 400 kilos of edible tissue. What is more, another feeder has left its marks on the bone, and in a most informative way. As well as the narrow grooves left by the flint, a few of the bones carry a broader, deeper groove, of a type that matches teeth rather than a blade. A comparison with modern bones chewed by known animals comes up with a good match, the spotted hyena, whose bones are also known from Boxgrove.

These gnawing marks tell us something else, about patterns through time. Occasionally, the toothmarks of a hyena and the cut-marks of a stone tool could be found on the same bone. Inspecting those coincident marks under a lens, it became clear that, each and every time this has happened at the Boxgrove horse kill site, it was the hyena tooth marks that cut through the flint tool marks, and never vice versa. This apparently was not the occasional return of two types of scavenger to the carcass, but instead, two distinct episodes. The humans consumed, departed, and only then did the hyenas feed. This gives us some sense of the timescale of the whole episode. All this was going on in an open landscape of salt marsh and mud slurries, close to patches of open water. This much we can infer from the morphology of the sediments above and below the Boxgrove finds, sediments that preserve direct traces of marine washing, and unstable stream formations. It is further elucidated by identifying the shells and bones of small animals that have been carried along and then trapped within these sediments. Over 100 such species provide a detailed reflection of the ecology of the site.[5]

Some of the other bones uncovered from the quarry levels remind us how different such ancient open watery places were from the ones we know today. Not far from the wild horse bones the archaeologists unearthed the complete skull of a wolf. A little further away, they uncovered the paw bone or 'metatarsal' of *Panthera leo*, the lion. Placed alongside the equivalent bone in a modern African habitat, it became clear that the beasts that also roamed that coastal marsh were substantially larger. As these fast-moving carnivores waited for their own prey, they knew that patches of water would attract mammals of all sizes; the open landscape made it easy for these top carnivores to sit and wait, and in this open wet grassland, the stench of the carcass would be drawing every predator for miles. However large the task, it seems reasonable to infer some sense of urgency among our human feeders. At the very most, this episode will have spanned from dawn until sunset in a single day.

Let us compare this with the chimpanzee 'feast' recorded a quarter of a century ago in the Gombe reserve, and discussed in Chapter 2. The distribution of meat from a colobus monkey brought together a significant number of the most powerful males and females within the Kaseleka chimpanzee community. One of the most socially complex episodes of food-sharing ever recorded in the animal world took nine and a half hours in the distribution of less than 20 kilos of meat. Over a similar period of time, quite possibly less, a group of hunters, half a million years ago near the Boxgrove coast, dispatched twenty times that quantity of edible tissue—400 kilos dispatched between dawn and dusk.

So far, the roots of the opening narrative have been hard material evidence, evidence that has gone much further than identifying the meat and the toolkit. The Boxgrove team have built up a picture of the ancient landscape, a chalk cliff, coastal mudflats, and a distant beach, and populated it with wildlife. From the source of the pebbles and flints they have plotted the hunters' movements through that landscape, and nowhere with more precision than when they paused to fashion their flint butchery tools. We can follow our flint-knapper from how she or he was sitting on the ground for one stage in the process, got up and walked one to two metres to finish off the core tool, and then identify the traces of those tools along the animal carcass itself, and how the jaws were used as a 'third hand'. A series of independent foci of hand-axe preparations can be carefully charted at different points around the carcass.

Their research has provided us with superb stage directions, but what about the plot and the lives of the players? The narrative I have woven through the results of their research goes far beyond those stage directions to allude to role-division, kinship loyalty, and competition, small and large group cooperation and trust, bargaining, double-crossing, hissing, tooth-baring anger, and repeated acts of sexual congress even as the tasty intestines were still being passed round. Where did all that come from?

The idea of the 'primitive'

The renowned fictional detective, Sherlock Holmes, famously proceeded by excluding all impossible scenarios until he ended up with the truth. He used reason and forensic evidence to narrow the corridor of plausibility to such an extent that only a single story could pass through. I doubt that is ever achievable in real life, let alone real lives from which we are separated by thousands of years. Instead, we have to guide ourselves along these corridors of plausibility by borrowing patterns observed amongst living peoples who were engaged in a similar kind of food quest. This would have been a rather easier task in the late nineteenth-century London with which Holmes is connected than it is now, for the simple reason that his contemporaries had a far more straightforward idea of the 'savage'. This was the time when Buffalo Bill's Wild West shows were travelling to London and other European cities, and in which his troupe portrayed the 'wild rivalries of savage, barbarous and civilized races'. Those three categories were not just the stuff of entertainment; they were how critical observers, even sympathetic ones, shaped their accounts of the progress and development of humanity. One of the most influential observers was the nineteenth-century American scholar Lewis Henry Morgan. His descriptions of the American Indian would shape the narratives woven around unearthed bones and ancient stone hand-axes for generations.

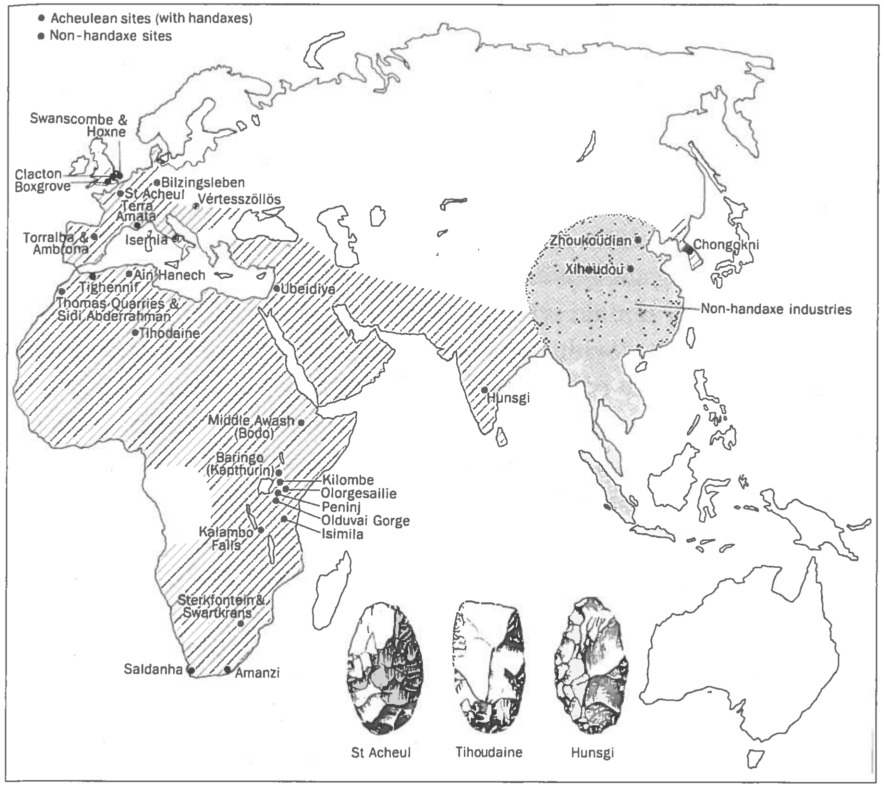
In 1859, when Charles Darwin's *Origin of Species* took the public by storm and opened minds to the possibility of a long prehistory of human big-game hunters, Morgan set out to explore the American west, in search of a deeper knowledge of native American life. On his frequently

difficult journeys up river and across prairie, he encountered and recorded an enormous diversity of communities, who combined different patterns of farming, fishing, and hunting. His journeys across space seemed like journeys back in time, rather in the manner of an archaeologist peeling off layers of earth. Using his words, he was leaving *civilization* behind, to record the kinship patterns and ways of life of communities who remained in a state of *barbarism*, in other words rudimentary farmers. Upstream on the Missouri River and westward into the Kansas prairies, he encountered communities further still from civilization and yet closer to nature. They hunted big game, the North American buffalo, and he described their state as *savagery*. A century and a half later, a word like *savage* has a disconcerting and derogatory sense. For Morgan, who had a much greater respect and sympathy for native Americans than many of his contemporaries, the term was closer to the French *sauvage*, alluding to the 'wild', 'untamed' aspect of these communities. They had yet to adopt the trappings of high culture and existed within a more innocent world of nature. In the eye of east coasters and contemporary Europeans, they conveyed an image of timeless harmony with natural cycles, not yet diverted to the path of history and progress.[6]

The people he called 'savages' were mobile, tracking the seasonal movements of the buffalo, and dovetailing their intensive periods of hunting with the life cycle of their prey. As the buffalo gathered in large groups, so would their human predators. During midsummer, the peak of the buffalo rut, when hunting would have been dangerous and counter-productive, the human predators instead engaged in the ritual of the sun-dance. Here, they would celebrate the cyclical harmonies of nature, of death, rebirth, and regeneration. Through trance, and sometimes through extremes of self-inflicted pain, participants would lose their sense of individuality, and merge with the harmony of the universe. The buffalo was a central feature of the ritual, which would often be accompanied by buffalo dances, buffalo songs, and feasts of buffalo meat.

Morgan's savage from the High Plains could be transferred back through time with relative ease, and to the large animal bones and hand-axes then being unearthed by quarrymen and antiquaries across Europe. Without the fine constraints of detailed excavation, a broad corridor opened up, along which narratives could easily pass from hunters of the nineteenth-century world to hunters of the Palaeolithic. Well into the twentieth century, an account of the Boxgrove episode would have been heavily populated by Plains Indians and Inuit Eskimo in all but name. We would have talked of tribes and bands, perhaps of ceremonies and totemism. I would have recreated a nobler, less animalistic scene. We might have given them tepees, perhaps some interesting headgear, and a little warpaint. But by the time of the meticulous work of the Boxgrove project, however, the corridor of possibilities had greatly narrowed. A modern-day Sherlock Holmes would have drawn attention to two simple and basic features of the scene. The first is a seeming mismatch in the data, the second a few fragments of bone.

The mismatch is between two strands of evidence that lead to opposite impressions of Boxgrove hunters' versatility of action. Both of these strands connect to the site's most characteristic artefact, repeatedly created in the vicinity of the Boxgrove horse carcass—those elegantly made hand-axes. Tools of this kind have been found from deposits spanning a vast stretch of space and time. During the nineteenth century, large numbers were recovered from a gravel pit above the River Somme at St Acheul, attracting many of the pioneers of archaeology to visit. The village lent its name to the entire worldwide corpus of bifacial 'Acheulian' hand-axes. Rather similar tools have been found at sites like Olduvai and Olorgasailie close to the heartland of human evolution, and also in the southern and western ends of the African continent. They are found as far east as India and across Western Europe, for example at Torralba and Ambrona in Spain. Their latitudinal range spans from south of the Tropic of Capricorn in Southern Africa to northerly sites like Boxgrove itself. This geographical spread must have corresponded to an equally vast ecological range with substantial variations in climate, topography, and available species of plant and animal. The lives of those who fashioned these tools must have displayed a considerable ecological versatility. In that way they can indeed be compared to the American Indians observed by Morgan who, within a few thousand years of their appearance in the New World, had diversified to consume fish, whales, game, seeds, squashes, fruits, and tubers from the Arctic to the Amazon forest, from the waterholes of Florida and the chilly bays of Patagonia, to some of the most sun-parched arid regions on earth. Similarly, a muddy, windy saltmarsh in north-west Europe is not a lot like the East African heartlands of human evolution, yet the Boxgrove hunters had managed to switch the skills and knowledge that their ancestors had acquired in quite different ecosystems to an alternative group of species and environments.


● Acheulean sites (with handaxes)
● Non-handaxe sites
Swanscombe & Hoxne
Clacton
Boxgrove
Bilzingsleben
St Acheul
Vértesszöllös
Terra Amata
Torralba & Ambrona
Isernia
Ain Hanech
Tighennif
Thomas Quarries & Sidi Abderrahman
Tihodaine
Ubeidiya
Zhoukoudian
Xihoudou
Chongokni
Non-handaxe industries
Hunsgi
Middle Awash (Bodo)
Baringo (Kapthurin)
Kilombe
Olorgesailie
Peninj
Olduvai Gorge
Isimila
Kalambo Falls
Sterkfontein & Swartkrans
Saldanha
Amanzi
St Acheul
Tihoudaine
Hunsgi

MAP 2. The Acheulean world with some key sites indicated, together with three representative tools: a hand-axe from St Acheul in France, a cleaver from Erg de Tihoudaine in Algeria, and a hand-axe from Hunsgi in India.

Yet as they squatted by their kill to prepare their cutting tools, they displayed a distinct difference from the American Indian, whose material culture is at least as diverse as their ecology. By contrast, the Boxgrove hunters' artefacts display a profound lack of diversity. The ease of transformation and changed practice evident from their ecological range could not be discerned in their manner of knapping flint. We see no evidence of the redesign of the blades to fit new species of prey, none of the artefact diversity that the recent American Indian hunters have shown in abundance. Instead, they embarked on the monotonous production of a tool that broadly shared its design specifications with tools created a million years earlier in quite different environments, and continue to be created in diverse places for hundreds of thousands of years to come. What was going on in the mind of those ancient knappers, whose chilly northern surroundings bore witness to great versatility in engaging with nature, but whose expert hands struck away at the flint nodule without innovation or invention, their movements locked instead within an unchanging script? The answer may lie in the second key piece of evidence, a few fragments of bones.

The fragments in question number only six, and derive from a single leg bone, a tibia, from a member of the hunting community which lived around the general period when the horse met its fate. This fragmented tibia, carefully reconstructed and measured, was estimated to have come from an individual of six foot in height, and quite a sturdy individual at that, with an estimated body weight of around 80 kilos. Taken together, the measurements indicate a sturdiness that lies outside the range of modern humans. The Boxgrove hunters belonged to a species of early human that was physically quite distinct, with a more robust skeleton and a somewhat smaller brain. The differences are sufficient to place the fragments within a separate species, known from a scatter of sites around the Old World, and labelled *Homo heidelbergiensis*. The differences in their bodies, which could be recorded and measured on their skeletons, raises the question of whether there were also differences in what was going on in their minds.[7]

When Morgan was observing the big-game hunters that would come to serve as a modern analogue of ancient hunters, he knew little of other species of humans, beyond the news that had spread across the world three years earlier of the strange half-man half-skeleton that had been unearthed in Prussia from the Neanderthal ravine. Archaeologists today are much more familiar with the idea of different human species roaming the world at different times in the past. However, it is only quite recently that the full implications of their belonging to another species have been tackled head on, with profound implications for how we reconstruct the Boxgrove scene.

A different kind of humanity

The idea of fundamental differences between types of humanity is not new, and did not actually depend on finding new species of human. Indeed, many of Morgan's contemporaries believed the savage 'Red Man' to be intrinsically different from the civilized 'White Man'. The Red Man was close to nature and subject to her rules. The White Man was liberated from nature and able to embark on his cultural journey through history. Such a difference for a long time informed and shaped our views of ancient hunters. Also being close to nature, they could be treated as biological organisms, following nature's laws and as much subject to her constraining powers as birds, animals, and fish. At some point in the past, White Men had become liberated from nature, to become social persons, shaping history and the world about them. We are now far more aware both of the rich social and historical complexity of American tribes, and also of the profound importance of biology in shaping contemporary cosmopolitan societies. We also know that Red Man and White Man are virtually identical in genetic terms, that the skin colour implicit in 'red' and 'white' is a poor proxy for the tiny genetic variations that do exist, and that all are simultaneously biological organisms and social persons within a single, fully interfertile species.

By contrast, analysis of DNA fragments from our very closest extinct relatives, the Neanderthals, has revealed that the genetic distance between us and them is significant.[8] If we could access the DNA of more distant relatives in the genus *Homo*, such as those from Boxgrove, we presume the difference would be greater still. This issue of difference within the human genus has been considered in depth by Steven Mithen, an archaeologist who believes that paradoxes in the archaeological evidence such as the one explored above lead us directly to the workings of the early human mind. By drawing on modern advances in our understanding of the living brain, he argues that the kind of paradox we have observed above between ecology and tool-making may be resolved by imagining that early humans operated, not with a single fully interactive intelligence, but instead by a cluster of 'domain-specific' intelligences. Mithen compares the workings of the mind to a cathedral, in some cases accommodating a single service, in other cases fragmented into separate services in distinct chapels. Whilst in the modern human mind, movement within the entire cathedral is fairly fluid, he argues that in some early human minds, the chapel model fits better with such data as we possess. In one 'chapel', they had a rich understanding of the living world, its different species and aspects. That would be an 'ecological intelligence'. Lateral thinking in this compartment could clearly take them to countless different ecosystems on the planet. Another 'chapel' guided dextrous hands to work with, and to shape inanimate materials, a 'technical intelligence'. This compartment adhered to stricter norms, repeatedly fashioning the same sort of tool out of the same kind of material. A third chapel facilitated recognition of its own species, and guided it through social interactions with its own kind, a 'social intelligence'. Mithen's model, which cleverly addresses a number of initially unusual features of the archaeological record, is also supported by certain forms of mental illness that uncover the potential of the brain activity to be compartmented. It also has implications for a critical feature of modern food-sharing. There is one attribute among our own species that involves a great deal of cross-reference between different sections of our mental cathedral. It involves a constant interplay between social recognition, reference to both animate and inanimate objects, and movement of our body. That attribute is as much a part of the modern human meal as the food itself—conversation.[9]

There can be little doubt that early humans expressed themselves through sound, since many other primates communicate vocally in quite precise ways. A few examples were touched upon in the context of Passion's meal explored in the previous chapter. There are examples among several primate species of alarm, warning and greeting signals, as well as socially reassuring equivalents of 'grooming'. It seems reasonable to assume a fair lexicon of these, and I have therefore alluded to vocalization within my narrative. There is quite a distance, however, between a lexicon of vocal signals and a 'conversation' in the modern human sense.

Imagine a conversation between two modern humans standing over a fresh kill, planning the collection of pebbles for bone-smashing from a nearby beach. That conversation would necessarily involve such details as: directions to the beach, warnings about the lions on the way, and so on; a fairly basic conversation perhaps, but one that at minimum would

involve sentences, syntax, connections between individuals, things, and landscapes and a range of tenses including the future and the conditional. Is that likely to have been within the abilities of early humans?

There are a number of ways that question can be addressed, from both the remains of early human skeletons, and from the archaeological traces they leave in the landscape. From fragments of their skulls and spines, anthropologists are generally agreed that all members of our genus were endowed with both the bodily equipment required to generate a wide range of vocal sounds, and the brain power to do something interesting with those sounds. Whether or not that 'something interesting' corresponded to what we might call language and conversation is a point that has been queried in relation to the objects and material traces left within the archaeological record. There are a number of such traces that have what might be called a 'narrative' quality about them; they imply a sequence of connected ideas, a storyline. They might be artefacts that require a number of different steps in their manufacture and a template in the mind of the maker. It is hard to imagine how the ability to fashion such objects could be learnt without a narrative form of language. More directly, they might be items that we would describe as 'art', that employ representations or symbols of an idea to tell a visual story. Musical instruments would imply something similar.

Uncontentious traces of this narrative kind come from sites associated with one single species of human, our own. There are a few, strongly contested claims for Neanderthal art, music, narrative thought, and projections to the future, but other species within our genus leave no artefacts that so obviously connect with a narrative way of thinking. Indeed, the monotonous uniformity of the Acheulian biface might suggest the opposite. Returning to Stephen Mithen's idea of a compartmentalized intelligence, it could be that the large brain and vocal capacity simply did not make strong connections with the creation of artefacts. Language may not have been directly connected with technological intelligence. Instead it might be closely attached to one particular chapel of the mind, the chapel concerned with social intelligence, for example. Mithen comes down on the side of a social language in early humans, with a rich vocabulary of reassurances, acknowledgements, warnings, and greetings, and enabling a large group to interact successfully around a sizeable kill like the wild horse, but not substantially connecting with other chapels of the mind.

Begging and bonding

Following Mithen's reasoning, the Boxgrove horse kill could have been the site of a great deal of 'chattering', whose principal impact was to enable a reasonably large group of early humans to coexist at the site for as long as it took to dismantle this rich source of food, and to focus on external dangers without the whole thing erupting into intra-group violence. We might speculate that the power of early human chattering to serve as a kind of low-cost grooming was repeatedly stretched to its limit, as larger groups dispatched larger animals with growing pace. That has drawn me to imagine that sexual bargaining played a part in this episode of food-sharing, much as has been observed in chimps and bonobos.

Alongside these exchanges, a parallel negotiation is portrayed in the narrative in which young mothers successfully begged for meat and fat. It may not have been that different from the chimp mothers who begged some monkey meat from Mike in the Gombe forest; that transaction too seemed to be underwritten by a memory of sexual engagement in the past. In general, however, chimp mothers raise their young independently. That may have been true with early humans, but two key changes would have greatly shifted the economic costs of feeding and sharing. First, early humans were evolving with much larger brains. Pregnant and lactating women were carrying a greatly increased nutritional burden of growing their offspring's massive brain. Second, those same early humans were moving through landscapes in which the diversity of plant foods was diminishing, and hunting of large animals played an increasingly central role. This was an activity in which younger, fitter males would always have the competitive edge. Older males and the bolder females may also have been at the heart of the hunt, but it would have been tough for pregnant and lactating females to compete. It is the context of such an imbalance that some form of kin cooperation might be favoured in evolutionary terms, between mother and grandmother, for example, or between mother and father.[10]

It is a long way from the reconstructions that drew heavily from Lewis Henry Morgan's observations of the American Indian; that simple equation between big-game hunters of the very recent and very distant pasts no longer stands up to close scrutiny. The Boxgrove hunters belong to a different species of human. In genetic and cognitive terms we and the American Indians are more or less identical. We cannot transfer their world of culture back half a million years. Neither can we transfer their world of nature back in time. It too has a complex dynamic of transformations, a feature that lies at the very heart of the history and evolution of human food-sharing.

The changing world of nature

When Morgan described the woodlands, river valleys, and prairies in which he observed Amerindian life, words like 'nature' and 'environment' had little scientific shape. They expressed concepts that were essentially poetical or aesthetic. While Morgan himself was keenly aware of the food quest and its role in shaping the lives of the communities he observed, placing them within a 'natural environment' would have conveyed more of a romantic idea than a scientific analysis. Part of that romance endowed nature with a sense of timelessness, a serene removal from history and change. It was an impression of nature that did not fit with observations that were currently being made of peat bogs on the far side of the Atlantic.

Across large stretches of the northern latitudes, a treeless horizon is softened by the gently domed surface of peat, carpeting moist cool expanses and throttling any over-adventurous seedling that takes root. As these peaty areas were dug for fuel and fertilizer, many cuttings exposed whole forests of tree stumps, sometimes metres below that treeless surface. It was from exposures such as these that Morgan's European contemporaries realized that the world of nature was not so timeless and serene. Even in these wilderness areas, far from the settler's axe, woodland was being replaced by open land, at a later stage to return once again to woodland. They did not have good dating methods, but they knew that peat grew fast. These successive bands of wooded and open peat were not separated by vast tracts of geological time.[11]

The Scandinavian peat studies had been read by an American naturalist who grew up a generation after Morgan's travels, not far from the end of his historic westward journey. Frederick Clements was more attuned to the idea of environmental change at the hands of farming settlers like his own family. As he looked eastward from his Nebraskan home, he saw that much of the valley woodlands that Morgan had described had been cleared for wheat. Looking westward towards what remained of the open prairie, he still saw an essentially timeless big-game hunter, the Plains Indian, hunting buffalo across the essentially timeless prairie grassland. From these various elements, however, he did extract a logic of environmental change. That logic comprised two fundamental models that would go on to form the foundations for the fledgling science of ecology.[12]

One of these models was 'succession'. He combined the Scandinavian observations of change between wooded and open ground through time, and his own observations of an equivalent change across space, to argue for a gentle ebbing and flowing of vegetation bands back and forth, propelled by either slow climatic change, or more rapid human action. As the vegetation bands ebbed and flowed, they did so in a predictable sequence, and that sequence was 'succession'. The second model was the 'food chain', to which other pioneer ecologists attached the terms 'food web' and 'ecological pyramid'. These connected animals to the vegetation bands through the pattern of their feeding links. Buffalo grass–buffalo–High Plains Indian is a simple example of such a food chain. As the vegetations bands ebbed and flowed back and forth, so did the chains that they supported. These two simple models provided the theoretical basis from which visual inspection of peat cuttings could blossom forth into a detailed study of changing environments over the last two million years, or 'quaternary science', as it is known. Peat sections were complemented by river gravel exposures, lake and seabed sediments, and tree stumps were complemented by pollen grains, insects, vertebrates, shells, and algae. In the century since Clements's work, they have charted and described the ebbing and flowing of the world's natural environments in fine detail.[13]

An important element of these quaternary reconstructions is the climatic driver of the ebbing and flowing, temperature change. One of the best records of temperature change is the balance between different

types, or 'isotopes' of oxygen, tracked in microscopic plants within sediments cored from beneath the seabed. The marine cores go so deep that an oxygen isotope record of temperature can go back millions of years. The complex patterns of temperature changes are subdivided into distinct episodes or 'isotope stages'. At the top of the sequence is isotope stage 1, in which we live today, a relatively mild period. Going back 20,000 years, the climate was much colder, and the cool period is isotope stage 2. Following the marine core down through increasingly distant periods of sedimentation, towards half a million years ago we reach isotope stages 11–13, during which period the Boxgrove horse was consumed.[14]

Back on land, geological exposures and cores through peat and lakes allow us to populate those temperature fluctuations with the ebbing and flowing of plants and the animals they carry in their food chains. In a warm period, the tree stumps will appear in those Scandinavian peat bogs, and retreat again in the cooler periods to more sheltered spots and lower latitudes. The pollen enriches that picture with long lists of plant taxa, and insects, shells, and bones do the same for other parts of the food chain. The Boxgrove archaeologists could argue that they were in isotope stage 11 from a combination of different dating methods, and then populate it with animal species determined from the study of bones from the site. The bones actually go further than invoking a landscape populated by lions, hyenas, and rhinoceroses; they can serve as a dating methods in their own right. This is because a certain number of species only occur in particular isotope stages. After that they disappear, providing us with a convenient chronological marker. In doing so, they incidentally also challenge a fundamental feature of the whole ebb and flow model on which the reconstruction is based.[15]

Equilibrium and disequilibrium

Extinction was not really explained by Clements's successional model. The different species should simply move back and forth between warm and cold latitudes, altitudes, and refuges as the climate fluctuated; there was no reason for them to disappear. Yet extinction is sufficiently widespread and common to serve as a dating tool. Why is this, and what is it telling us about the natural environments in which big-game hunters lived? It turns out that the answer may also be sought from the metaphor of an ebbing and flowing tide, not in the repetitive movement back and forth of the tide itself, but in the ephemeral crashing of waves on its surface. Waves form and then break because the tide is moving fast, the vast release of energy creating turbulence. It is as if the water itself has difficulty 'keeping up' with the massive energy it is dissipating. It seems that the quaternary climate has also been moving so fast that certain species and parts of the ecosystem have also had difficulty keeping up. It is a difficulty that has left its marks in recent sediments, and can be observed directly in an exposed cliff face on the Welsh coast.

Back in the 1970s, some fragments of ancient insects were collected from dark bands of organic sediment exposed in this particular cliff. The ecological traits of these particular species of insect allowed a picture of climatic change to be assembled, over the period from 15,000 to 10,000 years ago when the sediments had accumulated. At the bottom of the cliff sequence were fragments of insects characteristic of cold, open ground conditions. A little way up the profile, these hardy species are replaced by insects acclimatized to the lusher ground cover of more temperate climates. This transition was radiocarbon dated to just less than 13,000 years ago. The same organic sediments also preserved the contemporary pollen rains, which might provide a second marker of environmental change. However, the pollen immediately around these warmth-loving insects was still derived from cold climate vegetation. Not until a further 25 cm of deposit were laid down did the warm-phase tree pollen appear, an accumulation that must have taken three centuries. There is a considerable time lag between the rapid flight of insects to a newly warm location, and the sluggish spread of a woodland community in response to exactly the same climatic transition. Such a time lag distances the slower elements of the ecosystem from equilibrium. Like a spinning top, their disequilibirum state can take them in unpredictable directions, repeatedly following a novel course. This helps explain why the pollen evidence from different isotope stages follow similar, but certainly not identical patterns. The difference between successive patterns of vegetation ebb and flow is particularly evident when the warm-period woodland is ebbing. The plants that flourish at this point in the cycle vary markedly between different ebbing episodes. These effects

arise from responses that may be slow, but there are other features of the organization of the whole woodland ecosystem that are slower still. Perhaps the slowest of all to respond are the soils. There are still soils exposed on the surface of Britain which formed in desert conditions millions of years ago, and failed to modify their form in line with more recent soil development. The system has a lot of lags in it; they ebb and flow less in the manner of a marine tide than a slurry of treacle.[16]

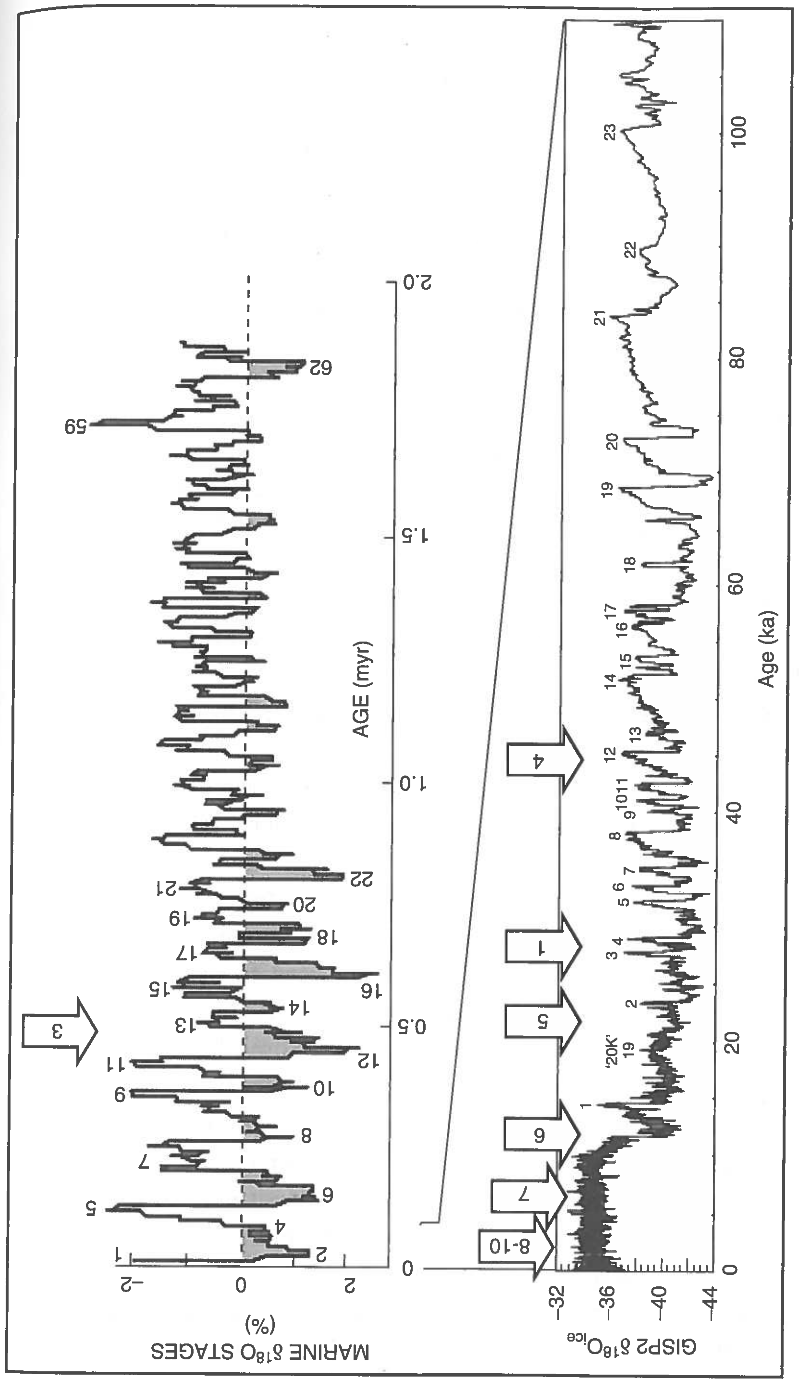
The process of feeding itself can amplify disequilibrium, such that as we move up the food chain to herbivores and carnivores, the turbulence becomes yet more accentuated. Moderate fluctuations in the plant cover may lead to substantial fluctuations in the animal populations feeding upon it, and consequent turbulence in predator prey couplings higher in the food chain repeatedly lead to extinction. It is not simply a question of some tardy species lagging behind. In the intense competition of colonization, they may be too late to make their mark at all. As a result whole permutations, indeed whole communities of plants and animals, may get lost. If we look at the pollen rains that were falling in northerly regions when the world was at its chilliest, around 18,000 years ago, grass and heather pollen fall in proportions that are without parallel today. There seems to be a whole arrangement of vegetation missing from the modern map, and a highly significant one at that. Specialists of the period talk of 'arctic steppe' or 'mammoth step' to describe the vegetation on which great herds of animals, many of which we only know from their fossil bones, once grazed. The vegetation communities have since disappeared along with the herds that grazed upon them. The plants have not so much disappeared. They have just regrouped, in the helter-skelter of activity following fast climatic change. Arctic steppe is not alone.[17]

There is a form of pollen analysis that goes beyond tracking individual plant types through time, and tracks instead the whole suite of pollen types falling at any one episode. In this approach, analogues are sought among modern vegetation for plant communities that release a similar collective pollen rain to that found in ancient profiles. If we go back 15,000 years only, we find that no more than half of ancient pollen rains can be accounted for in this way. Taken at face value, the plant communities that we might have come across when the planet's temperatures were really changing are as likely to have disappeared as they are to have survived, and this in turn has implications for early human life and the food quest at palaeolithic Boxgrove.[18]

The evidence of changing global temperatures derived from coring through the seabed indicates a planet whose temperature is fluctuating and has always fluctuated. The underlying causes of those longer-term fluctuations lie in the physics of the solar system and the gravitational forces between planets. These create minor changes in the earth's orbit, and gentle oscillations in the degree of warming by the sun. In certain periods of the planet's history, the poles accumulate caps of ice, and these interfere with the gentle climatic oscillations, giving the temperature curve through time a more sharpened and jagged edge, with certain periods of especially rapid climate change. The last two million years, broadly corresponding to the lifetime of the human genus, is one such period; it is known as the Quaternary Epoch. We have increasing evidence of episodes of abrupt temperature change during the Quaternary Epoch, and also evidence that the world's biomes have had some problem keeping up.[19]

We can bring all this evidence together to draw some conclusions about the changing world of nature of which the big-game hunters were part. It would seem that the notion of timeless harmony is not just an illusion for the hunters themselves; it is also an illusion for the worlds of nature they inhabit. This is as true of the recent High Plains Indian as it was for the ancient Boxgrove hunters. Even as Clements was writing, there was evidence in existence that the prairie was not exactly timeless; indeed its existence was in part a consequence of the ecological actions of the Plains Indian themselves. Going back in time to the Boxgrove hunters, the frequency of extinction is, in itself, an indicator of the underlying disequilibrium of the natural environment, a disequilibrium we could extend to the period known as the Quaternary Epoch, broadly corresponding to the timescale of the genus *Homo* itself.

One evolutionary consequence of the jagged edge of the quaternary temperature curve was that fast response times have been favoured. This has encouraged the diversification of small short-lived organisms, and quaternary extinction has particularly affected larger animals, a category that includes our own genus. Early humans adapted to the jagged temperature curve, and the disequilibrium world it engendered, by moving in the opposite direction. Rather than getting smaller and



8. Ambient temperatures as reflected by oxygen isotope evidence ($\delta^{18}O$). The most recent 100,000 years has been charted through the Greenland Ice Sheet Project (GISP). The last two million years has been charted through the Ocean Drilling Programme (marine cores). Peaks to the left of the curve indicate cold periods, and peaks to the right, warm periods. The chronological position of the key case studies is indicated by their chapter number alongside.

speeding up their generation time, humans enlarged their feeding group to a sizeable cooperative community, ranging extensively across the landscape, and evolving a mental capacity to handle bigger slices of time in the form of memory. Rather than harmonizing with a timeless nature, humans have adapted to the constant potential for change, and that is what particularly marks out the human food quest. That ability to respond to change enabled their movement around distant and contrasting parts of the Old World, everywhere depending upon a particular, and quite unusual facility of sharing food on a very large scale, a scale which came from bringing down the largest animals in the landscape. During the Quaternary Epoch, the period when ice caps have given our planet a considerable thermal shake-up, the key to early human survival was to engage in our food quest in a very social way indeed, an engagement that has been captured in fine detail in a sand and gravel quarry at Boxgrove.

Returning to the opening narrative, the predators and prey have by and large disappeared from Britain and sometimes the planet. The wild horse itself has gone, as have the hyenas and lions, and of course *Homo heidelbergiensis* itself. The gulls are still flying up ahead, taking food to the air, but I have to admit they were conjectural. Indeed, humans as a whole are perfectly consistent with the general pattern for medium- and large-size animals in that the Quaternary Epoch has seen a fair amount of extinction. Here once again, the scale of our observation greatly affects the patterns we see. Looking back from the modern landscape, the oldest monuments we see around us are a few thousand years old at most. The style of hand-axe in use at Boxgrove persisted for more than a million years. The long epoch of hunter-gatherers understandably has a timeless feel about it. However, looking forward from the broader context of plant and animal evolution, the human line has a very short evolutionary history of about two million years. Some life forms have barely changed their structure in fifty times that interval. Within those few million years, all bar one of those human species has gone into extinction, a familiar fate for slow-living, large animals in the climatic hurly-burly of the Quaternary Epoch. Those that persisted into the most recent periods of all did so through food quests and patterns of food-sharing marked by versatility.

At Boxgrove, we already observe two key elements of that emergent versatility. First, we see an African genus a long way from 'home'.

The vast geographical range of the Acheulian hand-axe is testament to an ecological versatility that continues to mark the human genus. Second, we see that versatility in their social interaction. For all the remaining uncertainty about how they actually engaged and communicated, we are clearly looking at a relatively large number of individuals sharing an undoubtedly large supply of meat. The consumption of big game captures a theme that also continues to mark the human genus. Feeding is fundamentally a social phenomenon, bringing together human communities in a complex range of permutations. As humans evolved with larger brains still, the ecological and social complexities of the meal would similarly expand and diversify.