

Chapter 8: The prehistoric environmental sequence of the Barrow Hills area

by Mark Robinson

INTRODUCTION

The monument complex was situated along the crest of the second or Summertown-Radley gravel terrace of the Thames. The site overlooks the Kimmeridge Clay slope which runs down to the first or floodplain gravel terrace and the modern floodplain, with its covering of alluvial clay, beyond (Fig. 1.3). Full details of the present-day soils of the area are given in Jarvis (1973). The soils of the second terrace and the predominant soils on the first terrace in the area belong to the Sutton series, reasonably fertile well-drained circumneutral brown argillic sandy loams overlying limestone gravel. There are, however, also areas of calcareous soil (Badsey and Lashbrook series) on the first terrace. The Kimmeridge Clay gives a circumneutral gleyed clay loam (Isle of Abbot series) on the slope (Fig. 7.10). The alluvial clay of the modern floodplain is mostly of recent origin (Robinson and Lambrick 1984) and until the late Iron Age, much of the floodplain probably had a covering of free-draining soils similar to those of the remainder of the first terrace.

Immediately to the W of Barrow Hills lies Daisy Banks, a small calcareous fen (the name refers to the vegetation of a medieval fishpond dam across the fen). The fen is situated below the confluence of two small streams which cross the second terrace and, where they join, have cut down to the underlying clay. Organic sediments in the fen span the Neolithic and the first half of the Bronze Age. These deposits are overlain by further organic sediments of medieval to post-medieval date (Parker, Ch. 7).

Medieval and modern ploughing at Barrow Hills had removed the last vestiges of the prehistoric earthworks which might have sealed palaeosols. However, the fills of the archaeological features yielded many of the lines of palaeoenvironmental evidence appropriate to well-drained circumneutral to calcareous sediments: charcoal, other charred plant remains, land molluscs and bones. The potential to construct an environmental sequence for Barrow Hills has been greatly enhanced by the pollen analysis of a core from Daisy Banks. In addition, palaeoenvironmental investigations have also taken place on several nearby archaeological sites. Charcoal, plant impressions in pottery, bone and land molluscs of middle Neolithic date were studied from the Abingdon causewayed enclosure, which is situated on the peninsula of second terrace formed by the two streams above Daisy Banks (Figs 1.2–3; various authors in Case 1956a; Avery 1982). Charred plant remains and bones were analysed from later Neolithic pits at Barton Court Farm on the second

terrace just beyond Daisy Banks (Jones 1986; Wilson 1986). Sites have also been investigated on the lower ground towards the river. A pair of Bronze Age waterholes, one of late Bronze Age date, the other of middle or late Bronze Age date, on the first terrace about 1 km SW of Barrow Hills at Eight Acre Field yielded pollen, waterlogged macroscopic plant remains and insects (Parker 1995b; Robinson 1995). Land snails were identified from a Neolithic ring ditch situated on a sandy island projecting above the first terrace just over 1 km SW of the site at Thrupp (P. Bradley, Ch. 1; Robinson 1981, 82.1–4, 128.1–30). Finally, pollen, waterlogged macroscopic plant remains and insects were analysed from a large late Iron Age ditch on the first terrace at the Vineyard, Abingdon, 2 km to the SE (Parker forthcoming; Robinson forthcoming b).

THE MESOLITHIC

The results from Mesolithic treethrow hole 5353 at Barrow Hills are unexceptional, with *Quercus* (oak) charcoal and a woodland molluscan fauna. Unfortunately it was not possible to relate the context to human activity in the site, although small quantities of Mesolithic artefacts have been found nearby, both during the 1983–5 excavations and in the wider area (Ch. 3). The vegetational succession on the second terrace during the first half of the Flandrian is unknown, but mixed deciduous woodland including oak seems entirely appropriate for the radiocarbon date of 7450–6600 cal BC (95% confidence)(8100±120BP; OxA-1883) obtained on the charcoal.

THE EARLY NEOLITHIC

Sediment accumulation at Daisy Banks Fen began in the late fifth millennium cal BC. The pollen (zone DBF 1) showed this was at or just before the onset of the elm decline. The major drop in elm pollen occurred in the early fourth millennium cal BC and falls well within the date range for the elm decline elsewhere in the British Isles. Indeed, it almost coincides with the date of 4350–3950 cal BC (93% confidence)(5250±75 BP; OxA-3560) obtained for the elm decline at Sidlings Copse, the nearest neighbouring pollen sequence covering the relevant period, 16 km NE of Daisy Banks (Preece and Day 1994). When factors of differential pollen productivity and dispersion are taken into account, the results from Daisy Banks suggest the pre-elm decline vegetation of the gravel terrace to have been

Tilia (lime)/*Ulmus* (elm) woodland, with some *Quercus* (oak) and *Corylus* (hazel). Lime is regarded as having been a major component of late Mesolithic and Neolithic woodland throughout the region prior to clearance (Greig 1982). The proportion of elm pollen in the earliest samples from Daisy Banks, was, however, unusually high, being greater than the combined values for lime and oak pollen. In contrast, at Sidlings Copse, where the vegetation of the well-drained soils of the Corallian Limestone and Sands which surround the small valley fen was interpreted as lime-dominated woodland prior to the elm decline, elm pollen was outnumbered by oak pollen while lime pollen had a greater value than the combination of the other two (Day 1991). It is possible that conditions on the second terrace were particularly favourable to elm.

Whereas the pollen and molluscan evidence from Sidlings Copse suggested no more than a slight reduction in shading during the elm decline (Preece and Day 1994), the elm decline at Daisy Banks was accompanied by substantial clearance. It is possible that this clearance brought about hydrological changes which resulted in the small valley at Daisy Banks becoming drowned and therefore the accumulation of the organic sediments. The evidence of pollen and macroscopic plant remains from zone DBF 1 suggested shallow open water conditions, with *Nymphaea* or *Nuphar* sp. (water lily), *Myriophyllum* sp. (water-milfoil) and *Potamogeton* sp. (pondweed). While the latter two plants could have grown in the streams which feed Daisy Banks, it seems implausible that a small wetland which had its origins at the end of the Late Devensian/earliest Holocene, as was the case of Sidlings Copse and Cothill Fen, another small valley fen in the Corallian Limestone and Sands of the Oxford Heights (Clapham and Clapham 1939; Day 1991), would have retained open shallow water after about 6000 years had elapsed. It would be expected to have become well-vegetated with Cyperaceae (sedges) or *Alnus glutinosa* by this date but neither was well represented by their pollen.

The range of radiocarbon dates from the Abingdon causewayed enclosure (Appendix 2), which were obtained on charcoal, are broadly contemporary with the elm decline. It is possible that the initial clearance around the Daisy Banks was related to constructional activities on the site. Cereal pollen was present from the start of the Daisy Banks sequence and immediately following the elm decline rose to 7% of total non-aquatic pollen and spores. Wheats and barleys are notorious for their poor pollen dispersal, and such a value would be very high for an early Neolithic landscape. It suggests that at the very least, cereal fields extended to the edge of Daisy Banks. Cereal pollen tends to remain associated with the bracts and grain rather than being scattered to the wind (Robinson and Hubbard 1977). An alternative explanation for the high levels of cereal pollen would be that crop processing remains from a settlement at the causewayed enclosure were being discarded into the streams.

Before the end of pollen zone DBF 1 at c. 3500 cal BC the inner circuit of the causewayed enclosure had already been constructed, while at Barrow Hills the

earliest of the 'flat' burials had been made and the first monuments may have been built (Ch. 9). Charcoal from the inner ditch of the causewayed enclosure was mostly *Quercus* (oak), but included other tree and scrub species, among them *Fagus sylvatica* (beech), from the upper fills (Western 1982). Beech charcoal was also present in the upper fills of the outer ditch, with a similar but narrower range of species, mainly *Quercus* (oak), but including *Fraxinus* (ash), *Corylus* (hazel) and *Prunus spinosa* (sloe) (Dimbleby 1956). These are the earliest records of beech from the region, and the absence of beech pollen would suggest that it was not a common tree). The pollen from Daisy Banks suggested that the landscape had become open grassland with perhaps some cereal plots, and that woodland had been reduced to a background presence.

THE MIDDLE NEOLITHIC

There were some problems with pollen preservation and perhaps the incorporation of reworked pine pollen in the next part of the Daisy Banks sequence, DBF 2, which ran from c. 3500 to c. 2800 cal BC. While the elemental carbon and sedimentary evidence from this part of the sequence suggested burning and erosion in the catchment, the pollen suggested some woodland regeneration. The increased frequency of tree and shrub pollen was for *Alnus*, *Salix* and *Corylus*, not *Quercus*, which continued to decline. It is possible that this regeneration represented succession in the fen itself, with the open water being replaced by carr vegetation. There is no need to assume woodland regeneration on the second gravel terrace, indeed the erosion could have been related to the digging of the outer ditch of the causewayed enclosure and further monument construction at Barrow Hills.

Molluscs from the middle Neolithic grave within linear mortuary structure 5352 comprised an open country fauna. The charred plant remains from this context included tubers of the grass *Arrhenatherum elatius* var. *bulbosus* (onion couch), which is characteristic of ungrazed or lightly grazed grassland and can readily colonize land following disturbance. Such grassland perhaps prevailed amidst the Neolithic monuments of Barrow Hills.

Cereal pollen was present throughout DBF 2, and grain impressions on sherds of this date from the inner ditch of the causewayed enclosure included *Triticum dicoccum* (emmer wheat) and *Hordeum vulgare* (six-row hulled barley), two of the main cereals cultivated in England during the Neolithic (Murphy 1982). The food plant remains also showed the exploitation of wild fruits, with impressions of *Malus sylvestris* (crab apple) pips and a stone of *Prunus spinosa* (sloe) in sherds from the causewayed enclosure and a possible fragment of apple endocarp from 5352.

The only middle Neolithic charcoal from the Barrow Hills monuments was a little *Quercus* (oak) charcoal from 5352 and an even smaller quantity of Pomoideae (hawthorn type) charcoal from the pit beneath it. The charcoal from the inner ditch of the causewayed enclosure, however, comprised a very diverse range of

taxa, particularly shrub species but including *Fagus sylvatica* (beech) again (Western 1982).

There was very little bone from the middle Neolithic features at Barrow Hills, although there were some placed red deer antler from the ditch of the oval barrow. A useful assemblage of animal bone was recovered from the inner ditch of the causewayed enclosure (Cram 1982). The bones were almost entirely of domestic animals, primarily cattle, but pig were also well represented. Bones of sheep/goat were sparse.

The overall picture of the middle Neolithic landscape around Barrow Hills is of open conditions, with local woodland restricted to Daisy Banks Fen itself. Grassland probably predominated, but there would also have been some cereal plots. It is, however, possible that the low proportion of sheep bones (cattle and pigs being suitable for woodland browsing/grazing), and the wild food plant remains were reflections of a more general background presence of woodland or at least incompletely cleared areas.

THE LATE NEOLITHIC

The late Neolithic and Beaker activity on the site corresponded to the first part of the next pollen zone of Daisy Banks, DBF 3, which extended from c. 2800 to c. 1600 cal BC. There was a rise in the pollen of grassland plants, particularly *Plantago lanceolata* (ribwort plantain) and cereal pollen continued to be well represented. The secondary woodland of the previous zone seems to have been cleared, and values for tree pollen were low.

Mixed molluscan faunas from late Neolithic pits, most of which contained Grooved Ware, and some Beaker graves suggested that open conditions prevailed around the monuments but that there were episodes when areas were overgrown with coarse herbaceous vegetation, and indeed there was pollen evidence for appropriate plants, for example *Urtica dioica* (stinging nettle).

The assemblages of charred plant remains from the Grooved Ware and other late Neolithic pits were dominated by collected wild food plants, with numerous fragments of *Corylus avellana* (hazelnut) shell and *Malus sylvestris* (apple) endocarp, pips etc. There were a few cereal grains including *Triticum* sp. (wheat). There was a greater range of cereals from the later Neolithic pits at Barton Court Farm, with *Triticum dicoccum* (emmer wheat), free-threshing *Triticum* sp. (probably bread wheat) and *Hordeum* sp. (barley), although pit 866, from which most of the cereal grains came, contained no pottery (Whittle 1986, microfiche 3:A14-B8). Hazelnut and crab-apple again predominated (Jones 1986, microfiche 9:F2-5).

The charcoal from the late Neolithic pits at Barrow Hills was mixed, with thorn scrub/hedgerow species of *Prunus* cf. *spinosa* (sloe), *Rhamnus catharticus* (purging buckthorn) and Pomoideae (hawthorn type) as well as the more typically woodland species of *Quercus* sp. (oak), *Corylus avellana* (hazel) and *Acer campestre* (maple). The charcoal seemed to represent fuel collected for domestic purposes and was therefore more likely

to be representative of the local vegetation than wood brought to the site for ceremonial purposes.

The pits contained a high proportion of pig, followed by cattle, with relatively few sheep bones present. The assemblages are plausible as domestic refuse although it has been argued that the high proportion of pig is itself a feature of ceremonial sites. They contrast with the animal bone from the broadly contemporary lowest layers of ring ditch 611, where there were placed red deer antlers and cattle limbs around the bottom (Fig. 4.1). The Beaker contexts yielded very little non-human bone. Pig bones also predominated in the Grooved Ware pits at Barton Court Farm, with smaller proportions of cattle and sheep bones (Wilson 1986, microfiche C1-2, 10). Remains of wild vertebrates were few, but included a red deer antler from a pit containing Grooved Ware.

The overall picture for the late Neolithic is of an open landscape, with any secondary woodland removed from Daisy Banks. The full extent of the open area remains unknown, although the Neolithic ring ditch at Thrupp, 1 km SW of Barrow Hills on the first terrace, yielded an open country molluscan fauna (Robinson 1981, 128-130, 317). Various of the lines of evidence, however, suggested a background presence of scrub and woodland. Shade-loving species of mollusc were able to recolonize parts of the Barrow Hills site when they were neglected. It is possible that there were areas of thorn scrub of sloe, purging buckthorn and hawthorn which provided refuges for the woodland snails. These shrubs were represented by their charcoal, but, being insect-pollinated, they were absent from the pollen record apart from a slight trace of hawthorn. Cereals were probably grown in the vicinity of the site and woodland food plants were also exploited. The domestic animals from Barrow Hills and Barton Court could have been raised on the grassland of the open area, but the high proportion of pigs from some late Neolithic sites has been related to the exploitation of woodland resources (Grigson 1982).

It is appropriate to consider here the place of the Barrow Hills complex in the Neolithic landscape of the Upper Thames valley. It had previously been argued that the long life of the Dorchester ritual complex, downstream on the second gravel terrace, implied a permanently open landscape there (Robinson and Wilson 1987, 33). This may indeed have been so. However, the radiocarbon dates for tree clearance at the Drayton cursus on the Thames floodplain suggested woodland regeneration over the monument; one episode of clearance related to the construction of the cursus in the early Neolithic and a second phase of clearance related to late Neolithic/Beaker occupation of the site (Robinson 1992, 501). Upstream on the Oxfordshire/Gloucestershire border at Buscot Lock, human activity on the floodplain was taking place under largely wooded conditions (Robinson and Wilson 1987, 31-2). Away from the river gravels, major clearance began on the drier soils at Sidlings Copse at perhaps 3500 cal BC/4500 BP (Preece and Day 1994).

THE NEOLITHIC LANDSCAPE OF THE RIVER GRAVELS

When evidence from Neolithic sites on the river gravels of the Middle Thames, particularly Runnymede (Greig 1991; Robinson 1991, 316–21) and the river gravels of the Midlands (Robinson 1992b, 50–53) is also taken into account, the picture that emerges of the landscape on the gravels throughout the Neolithic is of a mosaic of clearings of various size set against a background of woodland. Clearances were not necessarily permanent, indeed it is possible that most eventually became overgrown with scrub or returned to woodland. Sufficient woodland remained on the gravels that when regeneration did occur, as for example over the large ceremonial complex in the Ouse Valley at Godmanchester (Robinson, unpublished), insects characteristic of old woodland, which have very poor dispersive powers, were able to re-colonize. The Barrow Hills complex must be seen as of special importance because the area was cleared so early and remained open throughout the Neolithic. It is also significant as an area which was apparently a focus for cereal cultivation over a long period. However, the evidence from the charred plant remains and bones suggests a similar economic basis to other Neolithic sites on the gravels, with a partial reliance on woodland economic resources. The strong presence of remains of collected woodland plants alongside cereal grains is usual for English Neolithic sites, especially away from the Wessex Chalk (Moffett *et al.* 1989). It had been argued that the herding of cattle and pigs replaced hunting during the Neolithic as a more efficient way of obtaining animal products from woodland (Robinson 1992b, 53). Entomological evidence has now emerged for the herding of domestic stock under woodland conditions on the gravels at Godmanchester during the late Neolithic over the former ceremonial complex (Robinson, unpublished). Further work at Runnymede is suggesting early Neolithic grazing prior to clearance (Robinson, unpublished).

THE EARLY BRONZE AGE

Pollen zone DBF 3 of Daisy Banks continued into the Bronze Age, with the deposition of prehistoric organic sediments ceasing in the middle Bronze Age at around the middle of the second millennium cal BC. Initially, the early Bronze Age vegetation remained similar to that of the late Neolithic. However, in the late third millennium cal BC, there was a decline in cereal pollen to values of around 1% of the dry land pollen sum and an increase in the coarse mineral fraction of the sediments. This was probably the time of maximum barrow construction and the decline in cereal pollen perhaps resulted from a greater part of the catchment being used for ceremonial purposes. Values for *Plantago lanceolata* (ribwort plantain) and Gramineae (grass) pollen remained high until the end of the zone, suggesting a grassland landscape predominated. The molluscs indicated grassland around the barrows. However, small quantities of *Crataegus* (hawthorn) and

Rubus sp. (blackberry) pollen from Daisy Banks perhaps imply a slight spread of scrub.

Whereas the charred plant fragments (other than wood charcoal) from the late Neolithic pits were mostly food remains, the material from the early Bronze Age barrows mostly represented herbaceous plants used as fuel for cremations, so they are giving rather different information. The discovery of a couple of tubers which resembled *Conopodium majus* (pignut) is of interest because they had probably been derived from woodland edge or woodland, but the woodland fruit and nuts found in some of the Neolithic contexts were absent. There were also a few cereal grains, but the majority of the remains were stem and rhizome fragments of grasses, and medick or clover-type seeds. The grass remains included tubers of *Arrhenatherum elatius* var. *bulbosus* (onion couch), which seem particularly characteristic of Bronze Age cremations (Robinson 1988, 102). It has already been mentioned that this is a grass of ungrazed grassland and abandoned arable. Perhaps the barrows were set amidst *Arrhenatherum* grassland and it was collected for the funeral pyres.

The charcoal from the early Bronze Age contexts was either fuel from cremations or, in the case of 4969, part of a coffin for an inhumation. There appeared to have been a high degree of selection exercised when the wood was chosen for these funerary purposes so the charcoal records probably give a very biased picture of the local scrub and woodland vegetation. The coffin was made of *Alnus* (alder) which had perhaps been derived from Daisy Banks or the floodplain. Most of the charcoal from the cremations was *Quercus* (oak).

Many of the bones from the early Bronze Age contexts had also been selected for ceremonial purposes, but the five sets of red deer antlers from the skulls of slaughtered animals in grave 4969 and the aurochs bone from the outer ditch of barrow 12 suggest that there were still relatively large tracts of woodland for exploitation, although the aurochs bone could have derived from later Neolithic ring ditch 611. The pike and mallard bones from barrow 12 serve as a reminder of the resources available from the floodplain. Otherwise, the small assemblage of early Bronze Age bones was dominated by cattle, with a low proportion of pig and sheep.

The early Bronze Age landscape of Barrow Hills appears to have been relatively similar to the late Neolithic landscape when due allowance is made for the different nature of some of the evidence. The area around the monuments remained primarily grassland and there is some evidence that it was not being heavily grazed. Cereal cultivation in the immediate vicinity continued although the level declined during the early Bronze Age. There was no evidence from the early part of the period for episodes of neglect, with coarse vegetation becoming established on areas amidst the monuments, as seems to have occurred in the late Neolithic. However, the pollen hinted that there might have been a spread of thorn scrub towards the end of the period and into the middle Bronze Age, although not necessarily amongst the barrows. As previously,

there was an indication of a background presence of woodland, although it is possible that progressive clearance since the Neolithic had resulted in the woodland becoming more remote.

THE EARLY AND MIDDLE BRONZE AGE LANDSCAPE OF THE UPPER THAMES GRAVELS

The degree of clearance on the gravel terraces of the Upper Thames Valley during the early and middle Bronze Age remains uncertain. It has been noted that ring ditches on the gravels tend to contain a layer of fine sediment above their primary silting and any deposits related to rebuilding, which contrasts strongly with the gravelly ploughsoil of Iron Age or Roman date which often fills the top of these features, indicating a long stable phase assumed to be grassland (Robinson 1992b, 53). The ditches around the Bronze Age monuments at Barrow Hills displayed this feature, although they remained open for longer. Evidence from soils and continuity of land usage into the middle Iron Age on the second gravel terrace in the Stanton Harcourt area suggested that a large block of land around the Devil's Quoits henge, on which there are numerous Bronze Age ditches, was grassland which had its origins in the Bronze Age (Lambrick 1992b, 90–1).

While the continuity of land usage and the molluscan evidence from the site (Evans 1995) precludes complete woodland regeneration around the Devil's Quoits in the middle Bronze Age, the spread of thorn scrub around some monuments following their abandonment seems plausible. It is also possible that some land on the terraces between groups of monuments had retained its woodland.

Some areas of floodplain certainly retained their tree cover into the Bronze Age. At Mingies Ditch, on the lower Windrush floodplain, alder woodland was being cleared in the late Bronze Age and some mixed scrub seems to have survived into the Iron Age (Allen and Robinson 1993, 14–15, 114). A little further down the Windrush at Gravelly Guy, analysis of pollen, macroscopic plant remains and insects from a palaeochannel dated to the late third millennium cal BC, which ran along the edge of the second gravel terrace, showed that the floodplain supported dense alder woodland (Robinson forthcoming c; Scaife forthcoming). Relatively high levels of the beetle *Phyllopertha horticola*, pollen of *Plantago lanceolata* (ribwort plantain) and pollen of Gramineae (grasses) however, suggested that the gravel terrace was, in contrast, grassland. The monument complex of the Devil's Quoits is situated nearby on this terrace. A later sample from the palaeochannel showed that clearance on this part of the floodplain had largely been completed by 910–790 cal BC. Some areas of floodplain, at least along the course of the Thames itself, do appear to have been cleared at an early date, for example at King's Weir, Neolithic activity preceded the construction of a group of three round barrows (Bowler and Robinson 1980), although scrub regeneration on these sites would have been possible.

Away from the gravels, the pollen sequence from Sidlings Copse showed progressive clearance from the

Neolithic, with a reduction of older woodland along the valley bottom, which had been unaffected by earlier activity at around 1850 cal BC/3500 BP (Day 1991; Preece and Day 1994). No woodland or scrub regeneration occurred at Sidlings Copse until well after the end of the prehistoric period.

According to the radiocarbon date of 1680–1420 cal BC (95% confidence)(3250±60 BP; GU-3379) for the earlier of the two Bronze Age waterholes at Eight Acre Field, the evidence for this context follows on from the end of the Daisy Banks sequence in the middle Bronze Age — the excavator regards the waterhole as more likely to be late Bronze Age in date (A Mudd, pers. comm.), although the biota from it would be appropriate to either date. The pollen from the waterhole suggested that the local landscape had been substantially deforested, with low levels of tree and shrub pollen (Parker 1995b). A little *Quercus* (oak) and *Corylus* (hazel) pollen was perhaps from the last vestiges of the former woodland of the gravel terrace. The vast majority of pollen came from grassland plants including Gramineae (grasses), *Plantago lanceolata* (ribwort plantain) and Compositae-Liguliflorae (hawkbit etc). The Coleoptera had also been largely derived from a grassy landscape, with beetles such as *Agrypnus murinus* present (Robinson 1995). Scarabaeoid dung beetles showed that domestic animals were being grazed in the area. The use of cereals was indicated by glumes of *Triticum dicoccum* (emmer wheat) and a seed of another cultivated crop, *Linum usitatissimum* (flax) was also present. The macroscopic plant remains, however, also suggested that the waterhole was surrounded by mixed mostly thorny scrub. Indeed, conditions appeared similar to that of the Neolithic. Seeds of *Rhamnus catharticus* (purging buckthorn), *Rubus fruticosus* agg (blackberry), *Prunus spinosa* (sloe), *Crataegus cf monogyna* (hawthorn) and *Cornus sanguinea* (dogwood) were much in evidence. The conditions at Eight Acre Field were perhaps typical of the Bronze Age landscape of the gravels following clearance until the agricultural intensification of the first millennium BC, with grassland predominating but some arable plots present and a tendency for mixed thorn scrub to become established whenever management was relaxed.

THE LATE BRONZE AGE

Some late Bronze Age activity did occur at Barrow Hills. Later Bronze Age sediments from the upper fill of pond barrow 4583 and from treethrow hole 3430 contained rich woodland faunas. This implies that at least local woodland regeneration had occurred, although it need not have been any more than scrub over some of the monuments.

The charred plant remains from the late Bronze Age sediments in pond barrow 4583, which were mostly fragments of *Malus sylvestris* (apple) endocarp, might seem more appropriate to a Neolithic context. They may be of the same age as the later Neolithic artefacts from the same deposits. Wood charcoal was also present, mostly oak. A small assemblage of bones comprised almost entirely domestic animals, especially cattle,

although deer were also present. The occurrence of a whole calf buried in an upper layer of ring ditch 611 and the association of a possible wild pig mandible with a human burial in pond barrow 4583 emphasises that there continued to be a ceremonial aspect to the bones from Barrow Hills.

Whereas some scrub became established at Barrow Hills during the late Bronze Age, the scrub was cleared from the site at Eight Acre Field (Parker 1995b; Robinson 1995). Seeds of shrubs were absent from a second waterhole, dated to 1040–790 cal BC (95% confidence)(2720±70 BP; GU-3378), and there was greater evidence for grassland. A few wheat glumes were again present, but they were from *Triticum spelta* (spelt wheat), the wheat which began to replace *T. dicoccum* (emmer wheat) during the late Bronze Age. A landscape of lightly grazed grassland with some thorn scrub was indicated by waterlogged plant and invertebrate remains from a late Bronze Age pond at Mount Farm, Dorchester on the third gravel terrace of the Thames (Robinson 1984, 4).

Some agricultural intensification was probably beginning to occur in the region during the late Bronze Age and was very much in evidence during the Iron Age (Robinson 1984, 9–10). The establishment of scrub on the monuments of Barrow Hills was certainly not part of any general trend towards the abandonment of land. It was probably due to a changing attitude to sacred sites. The monuments managed to survive amidst the fully agricultural landscape of the Iron Age despite apparent pressures on arable land. The Iron Age settlement on the second gravel terrace at Ashville Trading Estate, Abingdon, was involved in large-scale cereal production (Jones 1978). The charred weed seeds found showed that cultivation had extended onto less suitable soils and provided evidence of declining soil fertility. Pollen and waterlogged macroscopic biological remains from the Iron Age ditch at the Vineyard, Abingdon indicated very open conditions, with no woodland available for clearance (Parker forthcoming; Robinson forthcoming b).

CONCLUSIONS

Barrow Hills must be unique as a major complex of Neolithic and Bronze Age monuments on a well-drained calcareous substrate in lowland Britain having such a good pollen record. The arrangement of

monuments up to the edge of Daisy Banks Fen leaves no doubt that the ceremonial site would have comprised a major part of the pollen catchment and the time span of the organic sediments from the fen, from the earliest Neolithic into the middle Bronze Age, was exactly the period for which it was most important to have details.

The evidence of macroscopic biological remains from Barrow Hills and the results of environmental studies on nearby sites, when combined with the pollen data from Daisy Banks, give a very useful environmental sequence against which to set the development and use of the monuments. This can be briefly summarised as major clearance for grassland at the start of the Neolithic, with some cereal cultivation from an early date, slight woodland regeneration in the fen during the middle Neolithic which was removed again in the late Neolithic, a decline in cereal cultivation in the middle Bronze Age and local scrub or tree regeneration over some of the monuments in the late Bronze Age while the surrounding landscape remained open. The area of the monuments seems to have been grassland until the late Bronze Age, except that during the Neolithic there were episodes of neglect when parts became overgrown with coarse vegetation. While the economic aspects of the plant and animal remains were very much influenced by the ceremonial nature of the site, woodland resources were significant in the Neolithic and their reduced importance in the Bronze Age was perhaps related to clearance on the gravels becoming more extensive.

The work at Barrow Hills resulted in advances for environmental archaeology. The pollen analysis showed the pre-elm decline vegetation of the second gravel terrace to have been *Tilia* (lime)/*Ulmus* (elm) woodland, with some *Quercus* (oak). It is also interesting that the early Neolithic clearance apparently had sufficient influence on the hydrological regime to cause the onset of organic sedimentation at Daisy Banks. The more systematic analysis of charcoal from the archaeological features gave significant results, showing a contrast between funerary contexts, which tended to be dominated by a single taxon and pits containing occupation debris, which yielded diverse assemblages (Figs 7.7–8). Finally, the synthesis of evidence from various sites has given a picture of the Bronze Age landscape of the gravels following clearance as lightly grazed grassland with a few arable plots and localised areas of mixed thorn scrub.