ARCHAEOLOGICAL INVESTIGATIONS ON WHITELEAF HILL, PRINCES RISBOROUGH, BUCKINGHAMSHIRE, 2002–6

BY GILL HEY, CAROLINE DENNIS AND ANDREW MAYES

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Investigations were undertaken from 2002 to 2006 on Whiteleaf Hill as part of a Buckinghamshire County Council, Heritage Lottery and Onyx Environmental Trust-funded project to improve the understanding, conservation and presentation of this important archaeological, geological and ecological site, which lies in the Chilterns Area of Outstanding Natural Beauty. Archaeological work was undertaken by Oxford Archaeology with the assistance of the Princes Risborough Countryside Group and entailed fieldwalking, geophysical survey, test pitting, excavation and watching briefs.

The re-examination of a Neolithic oval barrow dug in the 1930s has shown that this unusual monument began with the burial of an adult male in a mortuary structure in the first part of the 37th century cal BC and evolved as the result of a sequence of ditch digging and mound construction spanning around 500 years. Evidence for Bronze Age, late Iron Age and Roman activity around the barrow has been confirmed, although the character of this activity remains uncertain. It is suggested that disturbance in the side of the Neolithic mound took place in the Roman or medieval period, perhaps in an attempt to recover grave goods from the burial within.

Two features, scheduled as ancient monuments by the Department of Culture, Media and Sport as Bronze Age round barrows, were discovered to be, respectively, a natural knoll where flint nodule extraction and initial preparation took place in the late Neolithic, and a post-medieval windmill mound. Excavation of the windmill mound revealed further finds of the Roman period, including a copper-alloy votive leaf. A cross-ridge dyke was examined to the south of the hill, as was a curvilinear bank and ditch running north between this feature and the Neolithic barrow. No dating evidence was recovered from these features but mollusc samples taken from them, as well as from the Neolithic barrow and beneath the post-medieval windmill mound, have provided important evidence for the development of the landscape and vegetation of this site from relatively-undisturbed, mature, broad-leafed deciduous woodland in the Neolithic to open grazed grassland in the late medieval period. Works on the chalk-cut cross were monitored, two trenches were excavated across a possible Saxon boundary to the west of Kop Hill known as the 'Black Hedge', and the more recent history of the hill was explored, including the excavation of a section across a World War 1 practice trench.

Introduction

The project

Between 2002 and 2006 a number of archaeological monuments were investigated and survey work took place at Whiteleaf Hill above Princes Risborough, Buckinghamshire (SP 82 04; Fig. 1; Plate 1). These features are an integral part of the of the landscape character of the hill and demonstrate the importance of the site from over 5,500 years ago when the Neolithic barrow was constructed, until the early part of the 20th century. However, the monuments were not previously fully appreciated by visitors, were poorly understood by archaeologists, and many were obscured by undergrowth.

As part of a project to conserve, manage, display and interpret the Whiteleaf Hill Local Nature Reserve more effectively, Buckinghamshire County Council successfully bid for Heritage Lottery and Onyx Environmental Trust funding. This provided an outstanding opportunity to enhance the landscape setting of the archaeological monuments, improve our understanding of them, encourage public appreciation and enjoyment of the site and promote the value of archaeological study (Carey *et al.* 2003). The project was designed to contribute towards meeting the cultural-heritage objectives of the Chilterns Area of Outstanding Natural Beauty (AONB) Management Plan. It was undertaken in partnership with the Countryside and Heritage Group of Buckinghamshire County Council, Princes Risborough Countryside Group and Town Council and supported by the Chiltern Conservation Board.

The site

Whiteleaf Hill is a prominent chalk ridge on the Chiltern escarpment (at *c* 245 m OD) with extensive views over Princes Risborough and the Vale of Aylesbury (Fig. 1; Plate 1). The main geology is

Plate 1 Whiteleaf Hill from the air, taken by Major Allen in August 1934 (Copyright Allen Collection, Ashmolean Museum, Allen 0957/AA0603)

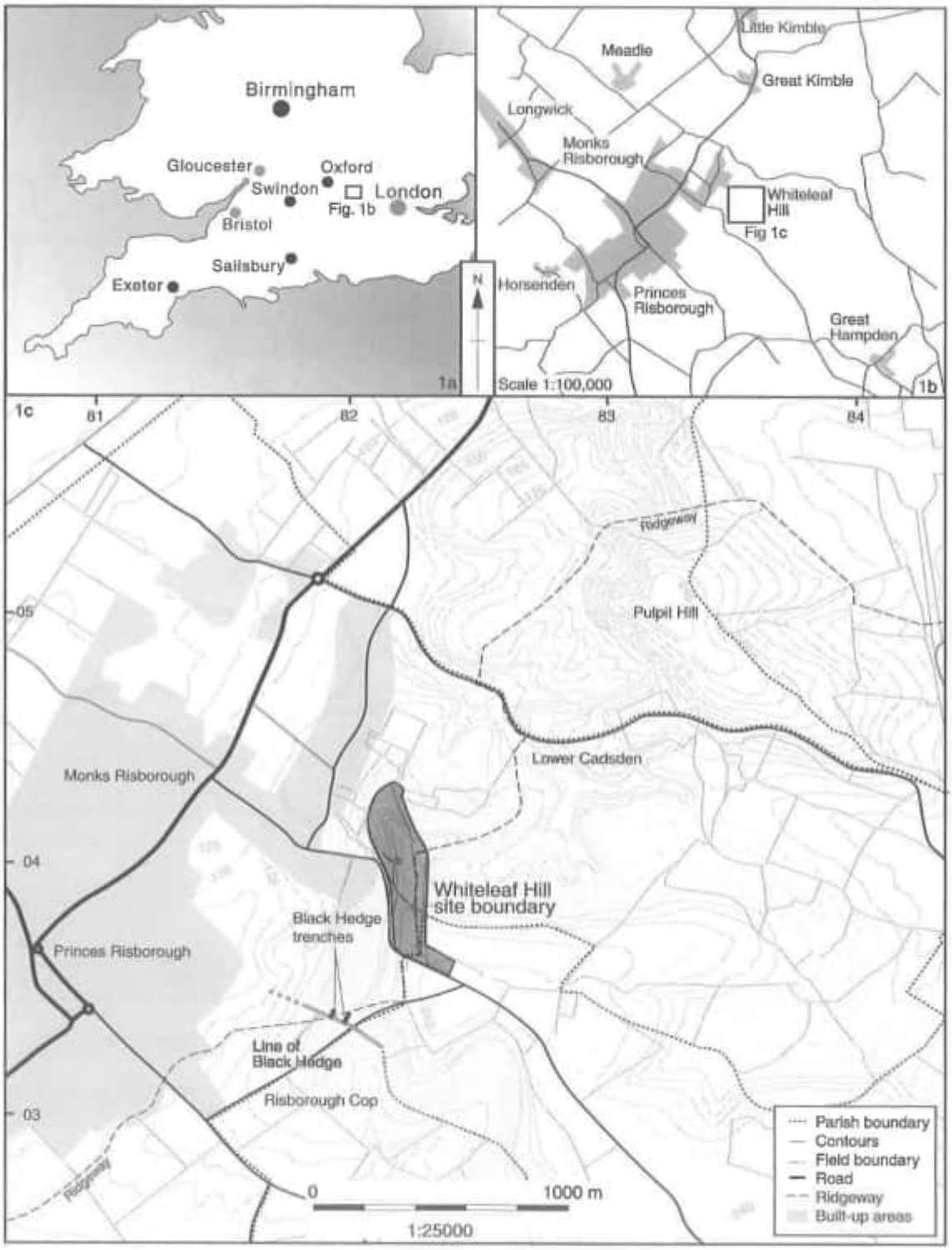


FIGURE 1 Site location

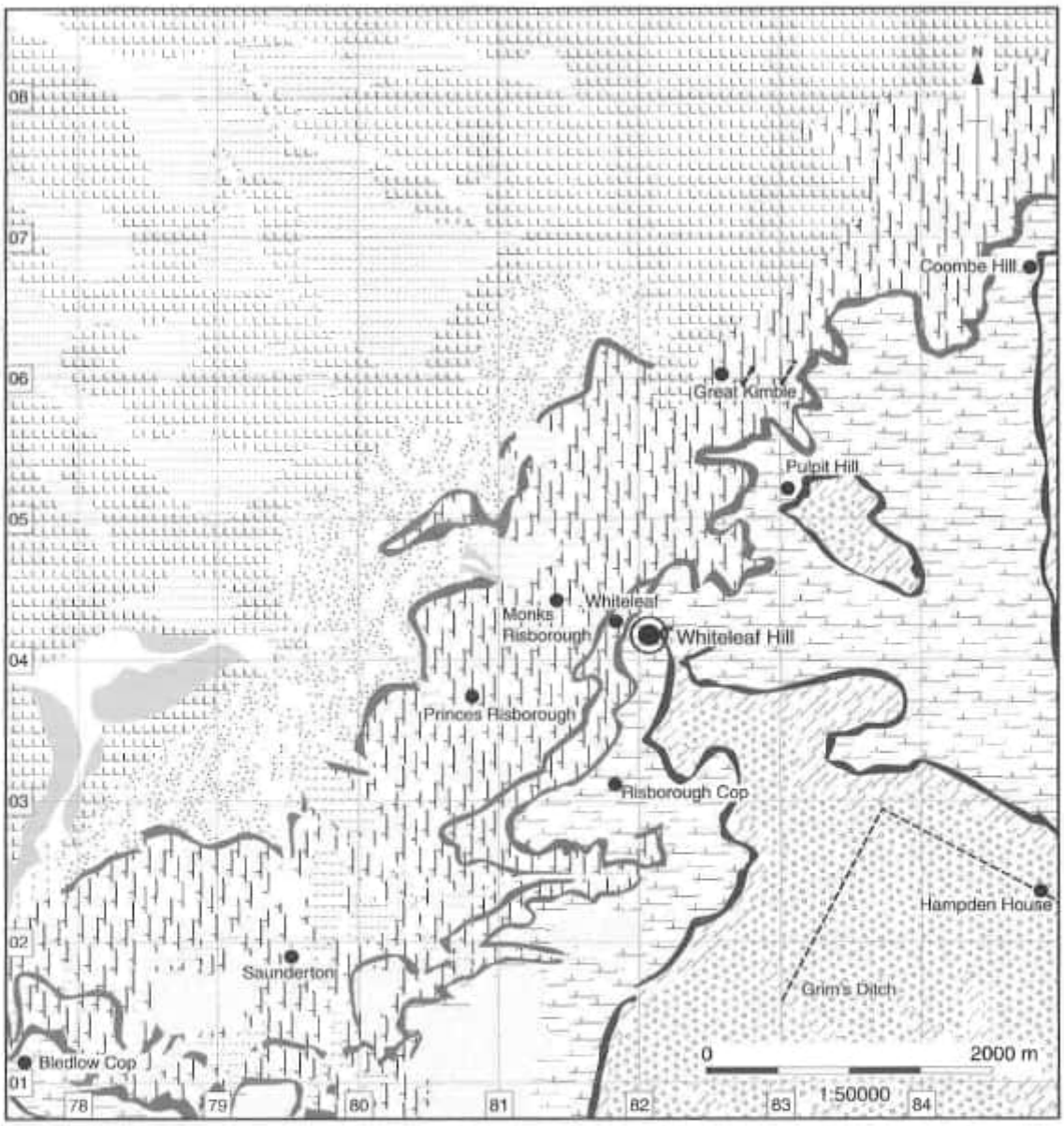


FIGURE 2 Geology and sites referred to in the text. (Geological information from the British Geological Survey, Sheets 237 and 238)

PLATE 2 The Neolithic barrow in 2002, looking north

Middle Chalk with some areas of Upper Chalk and thin clay-with-flint capping (Fig. 2). It lies within the Chilterns AONB and is crossed by the Ridgeway National Trail. The hill is also designated as a Village Green and a Local Nature Reserve covering *c* 11 ha. It is owned and managed by Buckinghamshire County Council for conservation and recreational purposes.

Today Whiteleaf Hill is wooded with open areas of calcareous grassland around the Cross and the other monuments along the top of the ridge. Air photographs taken in the 1930s (Plate 1) show that tree cover increased considerably in the last half of the twentieth century and, although woodland was a common feature of the Chilterns scarp in the post-medieval period, the general aspect of the hill was much more open in 1934 than it was when the project began in 2002 (Farley 2000, figs 1–8). Clearance of secondary woodland on the west facing slope of the hill to the north of the Cross has been carried out as part of Buckinghamshire County Council's Restoration Project over the last few years.

Five Scheduled Ancient Monuments are present on the site (Fig. 3): a Neolithic oval barrow (Scheduled Monument Number – SM – 19053), two supposed round barrows (SM 19047 and SM 19048, referred to as Mounds 1 and 2 respectively within this report), a cross-ridge dyke (SM 27148), which crosses the hill from east to west, and the chalk-cut cross on a triangular base (SM 27147). Other visible remains include a sinuous bank and ditch running north from the cross-ridge dyke towards the Neolithic barrow and then curving to the north-east (referred to in this report as 'the curvilinear ditch and bank'), the remains of practice trenches believed to have been dug at around the time of the First World War, holloways and a number of other dug features that could be slit trenches or saw pits. The condition of these monuments was assessed as part of the project design.

The Neolithic barrow was a prominent feature on the hill but was very uneven and lumpy and it was difficult to make out its original shape. The

mound had been excavated in the 1930s but had not been reinstated subsequently, and it was unclear what was part of the Neolithic barrow and what was spoil heap (Plate 2). Additionally, rabbits had burrowed extensively into the upstanding remains and off-road motorcycles and foot tracks had dug into its fabric. The forms of the two supposed round barrows further north (Mounds 1 and 2) were also uncertain and both were crossed by footpaths, leading to some erosion. The earthworks further south on the hill were obscured by undergrowth and had been badly disturbed by the uprooting of trees and, in some cases, by subsequent attempts to clear trees using machinery. Trails also cross these features. The cross was in a particularly bad state of repair, mainly as a result of natural weathering, but its shape was increasingly being hidden by the growth of vegetation.

Concern at the condition of these monuments and the need to improve their interpretation and display led to the archaeological work which formed part of the restoration programme.

Archaeological and historical background

There is no record of archaeological investigation on the hill before the 1930s, when Sir William Lindsay Scott began his excavations of the Neolithic barrow. There is, however, a possibility that a trench had previously been inserted into the east side of the barrow, accounting for its rather curious 'kidney-shape' which did not accord with the apparent shape of its surrounding ditch. Cross-like depressions within Mound 2 (SM 19048) could also have been the result of antiquarian investigation. Scott's excavations ran from 1934 until the outbreak of war in 1939 (Childe and Smith 1954, 212). Scott died before he was able to prepare a report on his excavations, but Professor Gordon Childe and Isobel Smith examined his records and published an account in the *Proceedings of the Prehistoric Society* for 1954.

No subsequent excavations have taken place on Whiteleaf Hill, but several surveys of the site have been undertaken. In 1991 a survey of the visible remains was conducted by Julia Wise for the Buckinghamshire County Museum Archaeological Service, and included a tape-and-line topographic survey (Wise 1991). The survey points were not tied in to the National Grid, and the overgrown condition of the site made work difficult. Not all features now known to exist on the site were recorded at that time.

More recently, the Oxford Archaeological Unit undertook a rapid Condition and Management survey of the site as part of its Historic Landscape Survey of the Ridgeway National Trail for the Countryside Commission (OAU 1998). In addition, a desk-top study and walkover survey was undertaken by Mike Farley (2000), which examined historical records, gathered together early mapping, investigated the location of some of the excavation archives and commented on aspects of the condition and management of the monuments. He also drew attention to less obvious earthworks observed by Julia Carey on more wooded parts of the site (Farley 2000, figs 9 and 10).

Two Mesolithic flint tools have been found on Whiteleaf Hill, a microlith on the ground surface (Buckinghamshire SMR no 002960) and a blade within a tree-throw hole (SMR no 0560501; Fig. 9), indicating that people visited the hill before the Neolithic. Neolithic and Bronze Age flints, including a scraper, had also been collected from the ground surface or tree-throw holes before the start of the project. The approximate position of these is plotted on Figure 9. Finds of this period have also been recovered from the surrounding area during fieldwalking, metal detecting and garden digging, with concentrations on Risborough Cop (SMR no 009860) and in the Bledlow/Saunderton area (Farley 1988, 177). Sir John Evans reported that flint flakes, including scrapers, had been found 'in wonderful abundance on the surface' at Pulpit Wood near Princes Risborough (Evans 1897, 280–1, 310). A number of Neolithic stone axes have also been found at the foot of the Chilterns scarp, including a polished flint axe and two polished stone axes from the modern settlement of Whiteleaf village (SMR nos 009800 and 059360); one is made of Group VI tuff from Langdale in the Lake District. There have also been a number of finds of Bronze Age metalwork. They include a side-looped spearhead found in the bank of the cross-ridge dyke by a metal detectorist in the early 1970s (Farley and Smith 1972; Farley 2000, 8; Fig. 9). In addition, a socketed spearhead or axe came from Risborough Cop (SMR no 002931) and a late Bronze Age chisel and a knife on the Aylesbury Road in Princes Risborough (SMR no 009850).

Comparatively few Neolithic monuments are known from this part of Buckinghamshire, although there are long barrows further along the

Chilterns escarpment at Pegsdon and Therfield Heath, both in Hertfordshire, a causewayed enclosure at Maiden Bower, Dunstable, and a henge at Waulud's Bank (Phillips 1935; Oswald *et al.* 2001, 25–6; Dyer 1964; Holgate 1995). Recent survey work has suggested possible Neolithic enclosures below the Cheddington and Ivinghoe Beacon hillforts (K Biddulph 2006); the identification of a mound dug in the 1920s at Halton Camp as a Neolithic long barrow is unlikely (*ibid.*; Reader 1920–26). Round barrows and ring ditches are more common, both individually and in small groups (Dyer 1959), and there is a significant group around Bledlow, to the west of the Princes Risborough (Saunderton) Gap. Other than these, the only known feature of Neolithic or Bronze Age date in the vicinity of Whiteleaf is a crouched burial discovered during the extension of a garden terrace on the southern edge of Princes Risborough, near to the Ridgeway, in the early 1980s (Farley and Browne 1983). The very small number of flint and pottery finds suggested a late Neolithic to early Bronze Age date for the burial.

The Chilterns Grim's Ditch in the Princes Risborough area runs north-east from Lacey Green and turns through 90°, two kilometres south-east of Whiteleaf, and then runs south-east past Hampden House towards Great Missenden (Fig. 2). Its ditch and bank were sectioned in two different developments at Lacey Green, but no dating evidence was retrieved (Hunn 2004). Elsewhere, dating evidence suggests an Iron Age date for this feature (Davis and Evans 1984, 7; Kidd 2006). The dates of the parallel ditch and bank systems at Great Kimble, at the foot of the scarp (Fig. 2), are even less certain. Pulpit Hill Iron Age hillfort lies on the adjacent prominence to the north of Whiteleaf, along the Chiltern ridge (Figs 1 and 2), but known Iron Age sites are otherwise few in the immediate area, although this may partly be the result of the relative lack of modern development until very recently. A possible boundary ditch was discovered at the Princes Risborough swimming pool in advance of development which contained a little early to middle Iron Age pottery (Ford 2000); very recent work less than 500 m to the west has uncovered the remains of pits, postholes and ditches with early to middle Iron Age pottery, animal bone and charred plant remains (David Radford, pers. comm.).

Finds of the late Iron Age are more common, and Roman discoveries have been quite numerous. On Whiteleaf Hill itself, a 1st-2nd century enamelled plate brooch was discovered in a rabbit burrow (SMR no 049750; Fig. 10), and two coins (one dating to AD 253 – 260 and the other to AD 350 – 364) were found near to the cross-ridge dyke (SMR nos 000701 and 000702). Their findspots are plotted on Figure 10. Roman villas are known at Saunderton and Great Kimble (Fig. 2) and a number of Roman finds have come to light along the foot of the scarp, approximately along the line of the present Icknield Way. However, it should be noted that a recent study has thrown doubt on the antiquity of the Icknield Way; excavations on the Aston Clinton Bypass, for example, have shown that the accepted line of the Lower Icknield Way post-dated features of the early Iron Age to late Roman periods (Harrison 2003). Pottery, including colour-coated wares of the 2nd and 3rd centuries came from a garden at the foot of Whiteleaf Hill (SMR no 009790) and a late 4th-century coin hoard was found on Longdown Hill, just above Lower Cadsden (SMR no 042860). A sizeable assemblage of finds of this date has been recovered from Risborough Cop, including coins, pottery, glass vessels, beads and bronze objects (SMR no 002930) and Roman pottery has been reported by the Princes Risborough Countryside Group from fields between there and the Saunderton Roman villa (Paul Green pers. comm.). In advance of building works at the Princes Risborough Upper School, Wessex Archaeology excavated three Romano-British infant burials that appear to have lain at the periphery of a farmstead (Appleton and Armour Chelu 2004). An unaccompanied and badly-disturbed adult inhumation found nearby during garden digging (SMR no 058340) may be of similar age. A Roman enclosure has also been detected from the air in a large arable field between Whiteleaf Hill and Princes Risborough and Roman brick and pot has been collected from the surface nearby (SMR no 021420; Farley 1979).

Whiteleaf Hill, now in Princes Risborough parish, was formerly in the separate parish of Monks Risborough, an estate of Canterbury Cathedral Priory. A boundary charter of AD 903 describes the Canterbury estate and the boundaries of Monks Risborough, including the area of Whiteleaf Hill and the Black Hedge to the south of the parish (Sawyer 1968, no 367; Gelling 1979, 74; Reed 1979, 178–81). It also refers to a 'heathen burial ground', to which the undated, extended east – west

burials found in a chalk pit on the north side of Whiteleaf Hill in the mid-19th century may belong (SMR no 00910). The shape of the parish reflected the medieval settlement and land-use, with the village centre and its common fields at the foot of the Chilterns scarp, and a long extension up the hill and into the woods providing downland pasture and woodland forage. The scarp-foot parishes form a row of such long narrow shapes, crossed by roads and tracks leading into the hills, and at right-angles by the Upper Icknield Way, which forms the main street of Whiteleaf hamlet. Named after the chalk hill or 'white cliff' below which it was situated, this was an outlying portion of Monks Risborough, an extended or polyfocal village, with the parish church and rectory about a quarter of a mile west of Whiteleaf. Whiteleaf Hill was the nearest part of an extensive common, extending towards the south-east possibly as far as Green Hailey Common, and partly occupied by Whiteleaf Wood (part of the common at the time of enclosure in 1839).

An iron arrowhead found on the ground surface on the north-east of the Hill (SMR no 003470; Fig. 10), and two socketed arrowheads found a little to the north-east in Giles Wood (SMR no 020810), may have been lost during medieval hunting expeditions. Holloways, the result of routes up the scarp, can be seen at Whiteleaf, and also in Pulpit Wood and on Longdown Hill. Post-medieval chalk pits are present at Whiteleaf, Risborough Cop and Giles Wood.

Methodology

A suite of methods was used to investigate the archaeological remains on the hill (Fig. 3). Non-intrusive survey included topographical survey, fieldwalking and geophysical survey using magnetometry, resistivity and magnetic susceptibility. Test-pitting was undertaken over the hill on a 30 m grid where possible, supplemented by additional trenches when necessary.

Excavation work comprised one trench (Trench 1) dug through Mound 1 to the north of the site (SM 19047), two trenches (Trenches 2 and 5) dug through Mound 2 (SM 19048), a single section (Trench 3) dug across the cross-ridge dyke near the Ridgeway path and a trench (Test Pit 32) dug across the curvilinear ditch and bank to the north of, and possibly associated with, the cross-ridge dyke, and one section (Trench 4) across the WWI practice trenches (Fig. 3). Additionally, two small trenches were excavated at the base of Whiteleaf Cross to search for buried soils suitable for optical dating, and two trenches were dug across the possibly Saxon, Black Hedge boundary to the south of Brush Hill (Fig. 1).

The main element of the archaeological work, however, was the removal of the backfill and spoil resulting from the excavations of the Neolithic oval barrow in the 1930s. This included a re-examination of the exposed sections and surfaces, with provision for additional sampling. Reinstatement of the barrow to its pre-1930s shape, based on Scott's pre-excavation contour plan (Childe and Smith 1954, fig. 1), was also carried out.

The removal of turf and excavation of all trenches was carried out by hand. All archaeological features were planned at 1:50 or 1:20 and, where excavated, their sections were drawn at 1:20 and features were photographed using colour slide and black-and-white print film. All deposits which demonstrated potential for environmental analysis were sampled, following advice from Dominique de Moulins, English Heritage Regional Advisor for Science, and Matthew Canti of English Heritage. Recording followed procedures laid down by the OA Fieldwork Manual (Wilkinson 1992).

All stabilisation works resulting in ground disturbance on or around Whiteleaf Cross were fully monitored for potential archaeological features, as were all works associated with improving the car park to the south of the site (Fig. 3).

Survey work

Survey work was undertaken in order to record and understand the full range of monuments and features present and their physical characteristics. This work has formed the basis of a programme to ensure their long-term conservation and preservation, and to enable their more effective and informative presentation to the public. In the short term, the work was undertaken to guide the conservation measures undertaken on the hill and engineering works on the Cross and to guide the proposed programme of archaeological work. Creating a base map has allowed all subsequent work to be recorded spatially in an integrated manner.

Topographical survey

The project began in 2002 with a topographic survey over the entire ridge of Whiteleaf Hill,

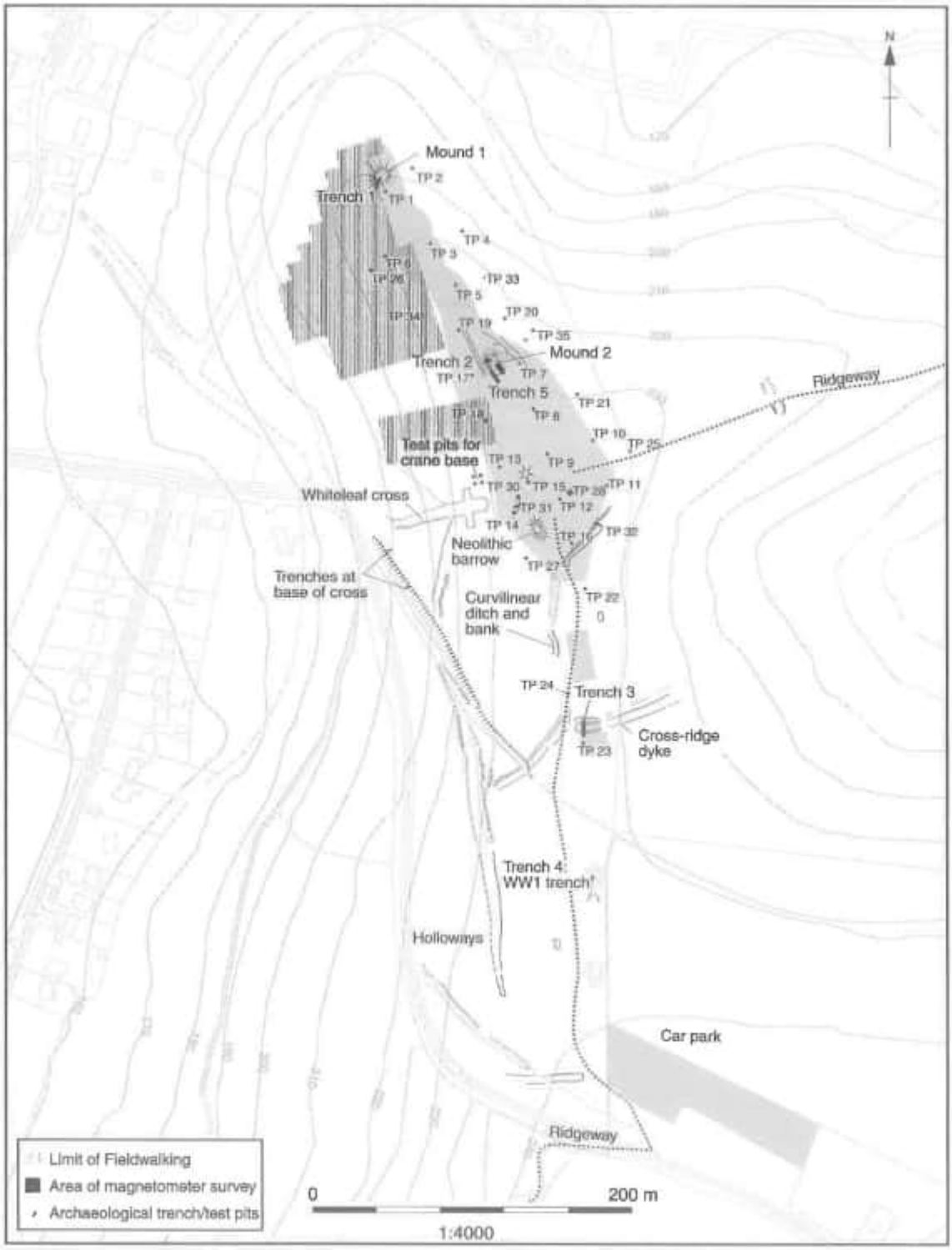


FIGURE 3 Site plan showing archaeological investigations, including test pits (TP) and trenches (Trenches 1 – 5)

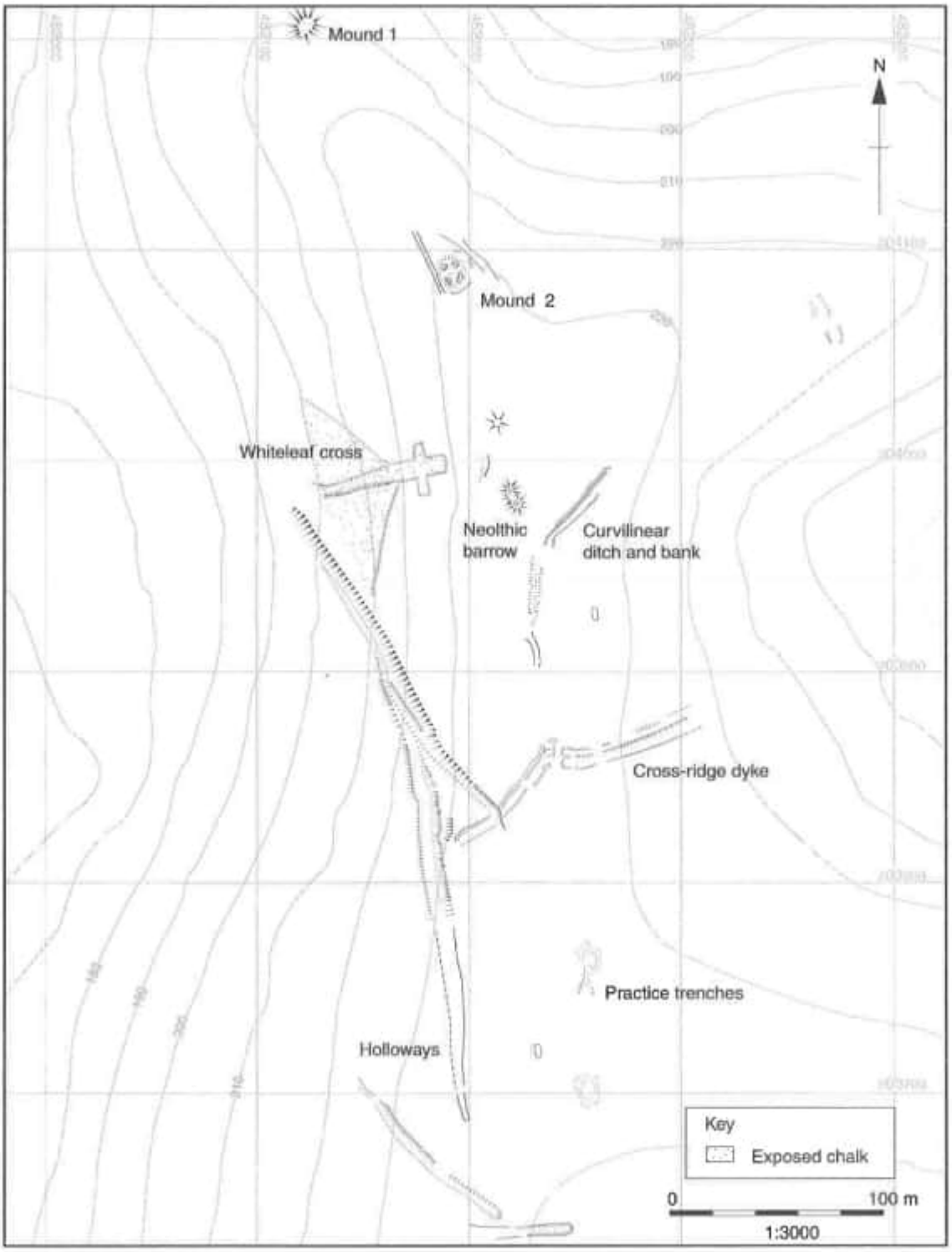


FIGURE 4 Topographical survey

approximately 11 ha, which recorded the current physical form of all visible archaeological features (Fig. 4).

An initial site walkover identified a number of features of archaeological interest. Following the establishment of 25 control stations, a survey was conducted using an EDM total station. An absolute height above ordnance datum of 247.56 m was established from a triangulation point at OS SP 824 034. A second and more detailed walkover of the site was undertaken the following winter when vegetation was at its lowest and additional features, especially military works in the north and north-east of the site, were added.

Detailed hachure plans were produced and the features were plotted on a main OS landline basemap with detailed hachure information added. Survey stations were also added and recorded on plan. A finalised AutoCAD drawing was then produced onto which archaeological interventions could be recorded.

A topographical survey had been undertaken on the hill by Julia Wise in 1991, although the hill was much more densely vegetated then and features were difficult to see (Wise 1991). It was also not possible to tie the survey points in to the National Grid. Subsequent work on the hill by Julia Carey and Mike Farley had identified other earthwork features that lay in undergrowth and needed to be mapped (Farley 2000). The full length of the cross-ridge dyke has now been plotted as it runs across a narrow neck of the hill and ends in steep, natural breaks in slope on each side; a continuation of the curvilinear ditch and bank running between the cross-ridge dyke and the Neolithic barrow has also been traced (Fig. 4). The main additional features added to the survey, however, were hollow ways running up the south-east and southern slopes of the hill, practice defensive trenches along the route of the Ridgeway to the east and below the hill to the north-west, and two possible saw pits on either side of the Ridgeway, one to the south of the hill and the other between the cross-ridge dyke and the Neolithic barrow. It was also possible to undertake a more thorough survey of the Cross.

Geophysical survey by Alister Bartlett

An archaeogeophysical survey was conducted at Whiteleaf Hill by Alastair Bartlett, of Bartlett Clark Consultancy, in September 2002 and during an open day in June 2003. Magnetometry (Fig. 3), magnetic susceptibility and resistivity survey was attempted. A full report of the method and its findings is deposited with the site archive.

Method

Magnetometer survey was carried out as far as was practical on the densely-wooded site, over the three scheduled 'barrows', two small open areas adjacent to the access track as well as a grassed area adjacent to the car park in the south of the site (Fig. 3). In addition, a magnetic susceptibility survey was carried out over the entire length of the study area and resistivity survey was carried out over the two round 'barrows' and in two areas at the edge of the Neolithic oval barrow.

Magnetometer readings were recorded at 25 cm intervals along lines 1 m apart using Geoscan fluxgate magnetometers. The x-y (graphical) plots represent the initial data after correction for irregularities in line spacing caused by variations in the instrument zero setting (Fig. 5).

Magnetic susceptibility readings were taken at 16.6 m intervals using a Bartington MS2 meter and field sensor loop. Susceptibility measurements can provide a broad indication of areas in which there is archaeological debris, particularly burnt material associated with past human activity. They can provide useful supplementary evidence when interpreting a magnetometer survey, but can be affected by non-archaeological factors, including geology, past and present land use, and modern disturbances.

Ground resistance measurements were taken using a Geoscan RM15 resistivity meter with the twin electrode probe configuration and a mobile probe spacing on 0.5 m. A mean value calculated from neighbouring readings is subtracted from each reading in turn in the filtered plots (Fig. 6). This removes larger-scale background effects and emphasises localised features which may be of archaeological significance.

The survey grid was set out and located at the required national grid co-ordinates by means of a sub-1 m accuracy GPS system.

Results

Conditions on chalk-based soils are usually reasonably favourable for magnetometer surveying, as is confirmed here by the susceptibility readings (Fig. 7). These are sufficiently high (mean = 11 x 10^{-5}

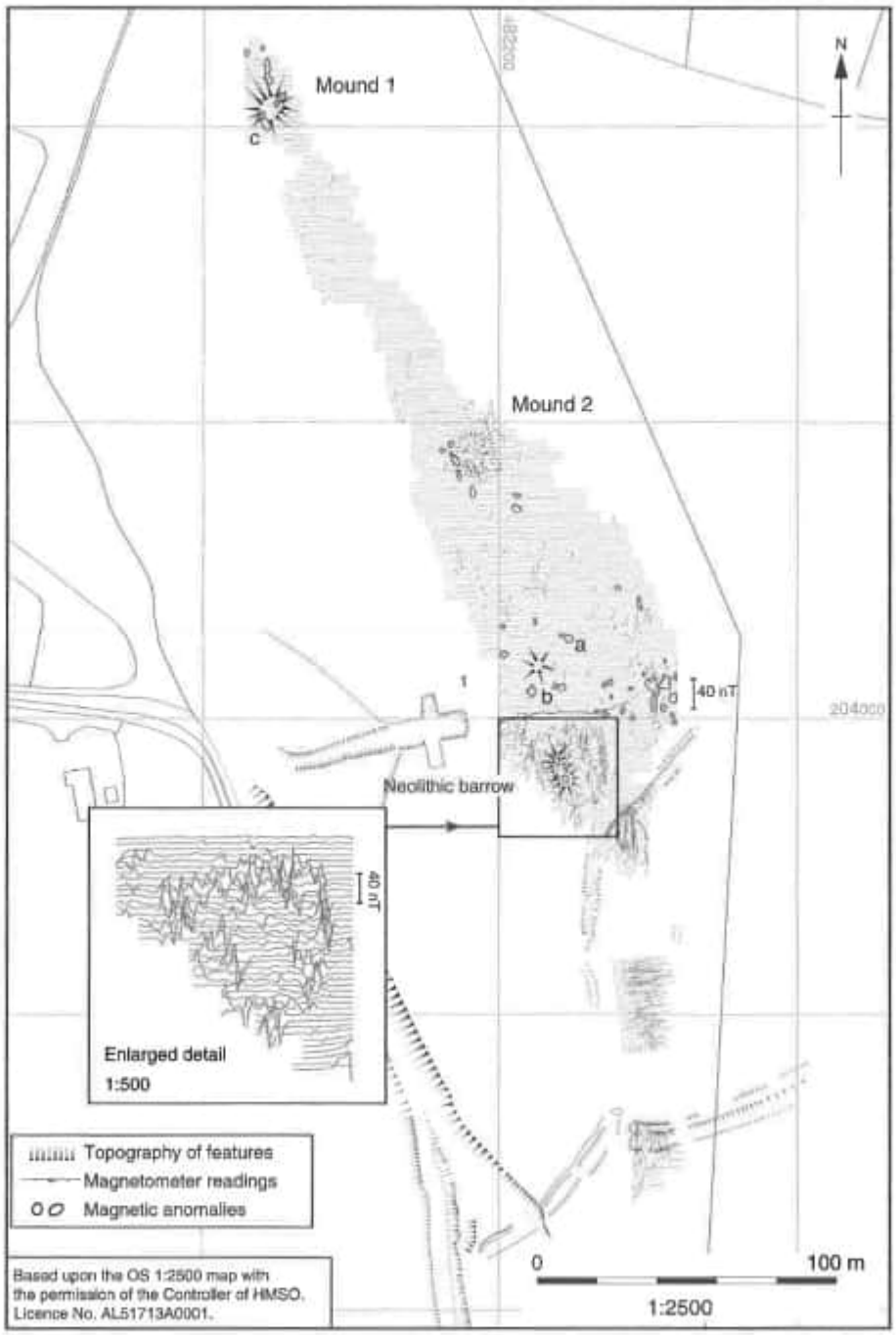
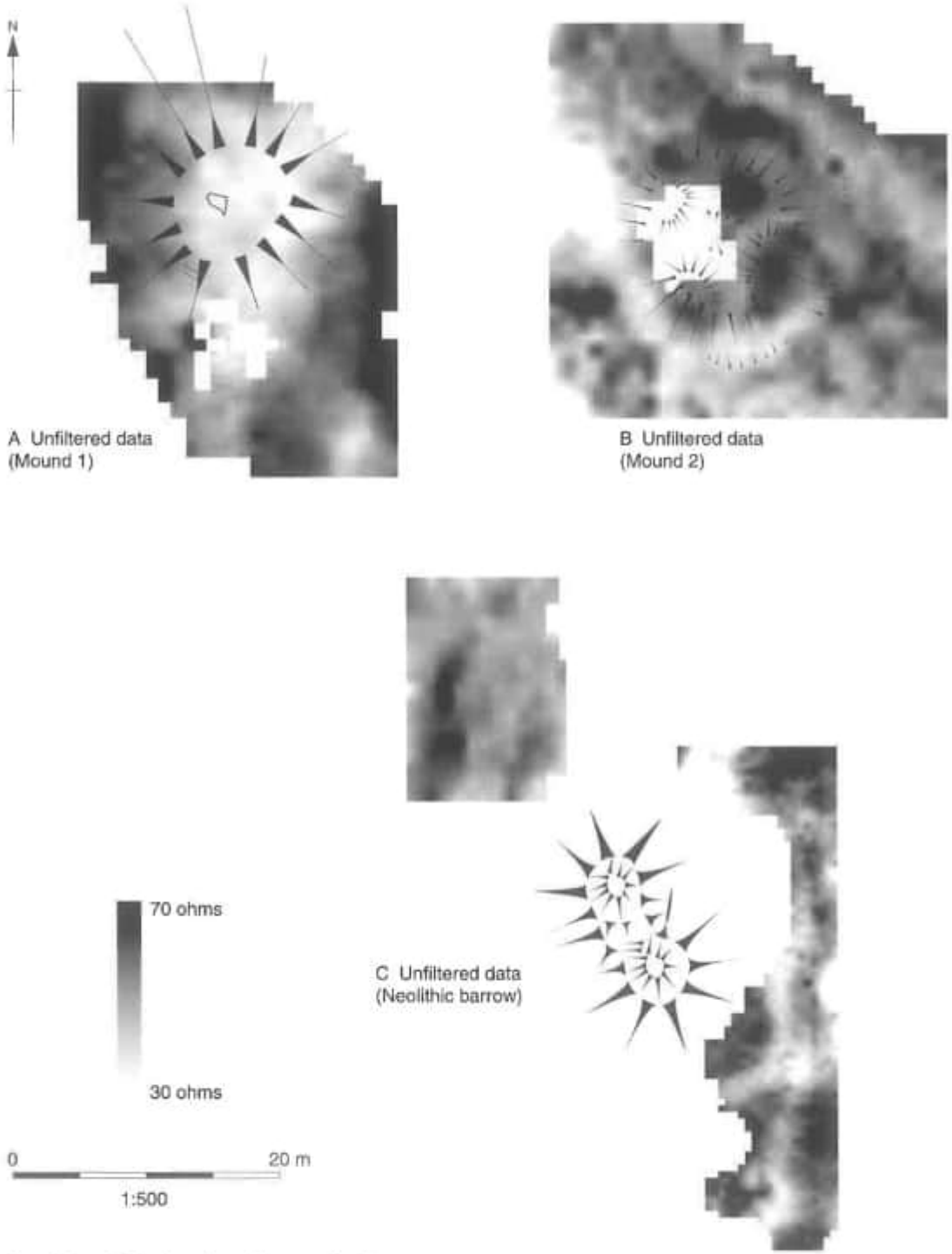


FIGURE 5 Magnetometer survey (interpretation) with enlarged detail of the Neolithic barrow



See Figure 7 for location of areas A - C

FIGURE 6 Resistivity survey

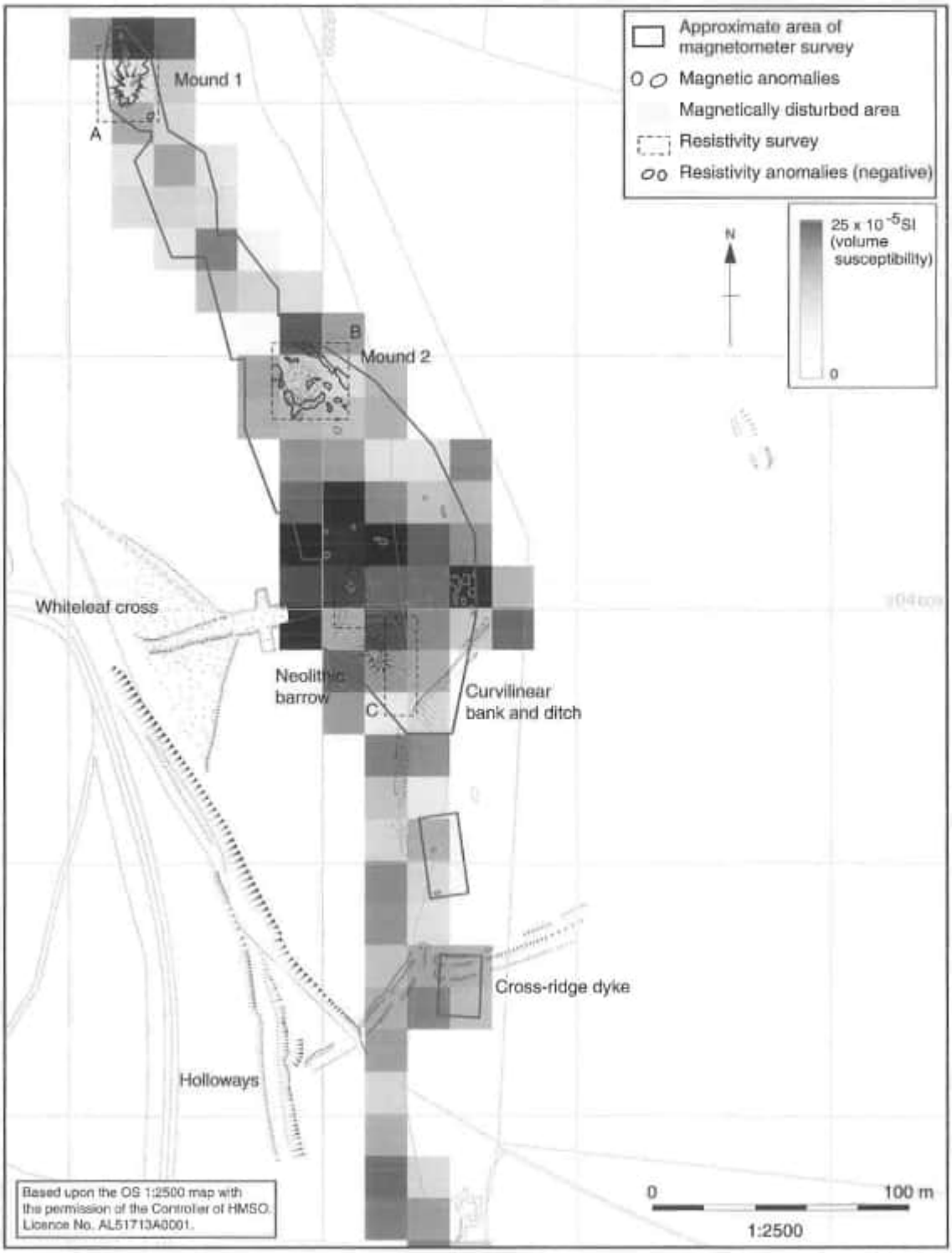


FIGURE 7 Magnetic susceptibility survey

SI) to suggest that subsurface archaeological features should, in general, be detectable. Magnetometer survey does, however, respond more readily to ancient settlement or industrial remains, which usually contain traces of burnt material which causes magnetically enhanced fill, rather than to earthworks. Ditches are sometimes detectable, depending on the depth and composition of the fill, particularly in the vicinity of settlement remains, but this cannot be relied upon. The magnetic anomalies detected in this survey may represent a variety of subsurface disturbances, but few appear to relate to the barrow ditches.

One of the more significant findings from the magnetometer survey may be the cluster of magnetic anomalies on the hilltop above the Cross and to the north of the Neolithic barrow (including the features at a and b; Fig. 5). Some of the magnetic disturbances here could be non-archaeological, having narrow spikes indicating buried iron, but others, for example a and b, have the rounded profile characteristic of silted pits. The activity here also corresponds to an area of enhanced magnetic susceptibility readings (Fig. 7), and could therefore indicate settlement or other remains. It is unlikely that ephemeral events such as medieval fairs would have left substantial remains, although hearths or pits of any date should be detectable.

The three mounds scheduled as barrows produced only limited findings. There were distinct pit-like magnetic anomalies at c adjacent to Mound 1 (Fig. 5), and the resistivity results suggest an earth filling to the mound (Fig. 6 A). Neither survey, however, shows any distinct circular plan that would indicate a deliberately-constructed mound.

Some ditch-like negative anomalies were seen in the resistivity results from Mound 2 (Fig. 6 B). These could indicate a response to a barrow ditch, although the plan of the anomalies, if it does represent a circular ditch, is incomplete and irregular.

There are strong disturbances across much of the area of the Neolithic barrow, and this part of the survey is shown in an enlarged detail plot inset on Figure 5. Some small pit-like features may be present, but are difficult to identify. The majority of the magnetic disturbances shown as shaded around the Neolithic barrow (Fig. 5) probably relate to the backfilling of the 1930s excavation rather than the barrow itself; they are strong and narrow, and probably indicate iron objects in the backfill. The strength of the magnetic interference may, therefore, provide some indication of the extent of the excavations.

The additional resistivity surveying done alongside the Neolithic barrow in June 2003 appears to have detected part of the main barrow ditch on the east side of the mound (Fig. 6 C), but failed to confirm the continuation towards the north of a small linear ditch exposed in the excavations on the north-east side of the barrow (3312, Fig. 8).

Disturbances to the south-east of the Neolithic barrow probably indicate magnetic debris (bricks, slag etc) in hardcore laid along the access track. Strong disturbances near the cross-ridge dyke may also indicate recent debris, rather than relate to the original earthwork.

Various magnetic disturbances were detected in the area of the car park, but none appear to be of clear archaeological significance. Susceptibility readings here were lower than on the hill top near the Neolithic barrow.

Surface collection

Fieldwalking was undertaken in 2002–4 over three areas following tree clearance on the steep, west-facing slope of Whiteleaf Hill to the north of the Cross (Fig. 3). The areas measured 2100 m² and two adjacent areas of 5100 m² and 2700 m², and were walked at 10 m intervals with any finds collected and bagged in units of 10 m². Very small quantities of material were recovered from the southernmost area (six flint flakes and four burnt unworked flints, see P Bradley below). No finds were recovered from either of the larger areas to the north, perhaps due to the extensive ground cover of leaf litter and scrub when they were walked, or to the steep angle of slope resulting in the downward movement of any surface finds.

Test pitting

During 2003–6, 33 test pits were excavated by hand across Whiteleaf Hill by the Princes Risborough Countryside Group with supervision from OA (Fig. 3; Plate 3). The pit positions were based on three NNW – SSE transects 30 m apart and were dug every 30 m along these lines where possible, although the uneven topography and dense vegetation cover (especially in 2003) made this difficult. Additional pits were dug to fill gaps in the general distribution and to investigate possible anomalies

PLATE 3 Test pitting on Whiteleaf Hill in 2003, looking east

in the magnetometer survey (TP 15 and TP 28) and in the resistivity survey where a possible linear feature was also faintly visible on the ground (TP 30 and TP 31). Four test pits were also dug by OA in 2003, just above Whiteleaf Cross (Fig. 3), to assess an area being considered as a crane base from which to undertake remedial works to the Cross (no finds came from these test pits). Test Pit 32 was extended to become a trench across the curvilinear ditch and bank to the east of the site and is described below with the excavation results from the cross-ridge dyke and other ditches. In general, the pits were 1 m x 1 m in size, although TP 28 and TP 30 were 2 m x 2 m and TP 31 was 2.5 m x 1 m. The pits were excavated by stratigraphic units and all soil was sieved through a 10 mm mesh to maximise finds recovery.

Most test pits revealed two layers: a friable dark brown clay-silt topsoil with 5% – 10% chalk flecks and small chalk and flint lumps, averaging 0.15 m deep (*c* 0.10 m at the top of the hill to 0.25 m deep in the saddle to the north of the site), and a more tenacious dark orange-brown or grey-brown silty clay subsoil with 50% – 75% chalk and flint lumps, 0.08 – 0.20 m deep. The subsoil was mostly the result of root and frost disturbance of the underlying natural, but there were some thin colluvial deposits on the slopes and some looser and more rooty deposits on the east side of the hill and just below the Neolithic barrow. Test Pit 23 to the south of the cross-ridge dyke had only a single 0.15 m deep layer above the clay natural. It seems likely that there had been some scouring of the ground surface here, possibly related to vegetation burning evident in this area. All the pits were excavated to natural, which was mainly chalk with patches of clay-with-flint to the north (TP 1 and TP 2) and near the cross-ridge dyke (TP 23 and TP 24).

A possible posthole (3152) was revealed in the south edge of Test Pit 15, situated 25 m to the north of the Neolithic barrow. It appeared to be circular, 0.30 m in diameter and filled with friable, dark grey-brown clay silt with some chalk and flint

lumps (3153). No finds were recovered. The possible postholes was recorded in the field as lying beneath the subsoil, but this seems unlikely, especially as its fill resembled the topsoil, and it is more likely to have been cut through it and be 0.22 m deep. Although it does not correspond precisely to any of the anomalies on the magnetometer survey, it does lie in an area where other features may be present.

The edge of a NE – SW ditch was found in the south-east corner of Test Pit 14 to the north-west of the Neolithic barrow, corresponding to an area of low resistance on the resistivity survey (Fig. 6 C, north-west portion) and a slight depression on the ground (Fig. 8). It was seen to be fairly steep-sided and flat bottomed, and was filled with pale silty-clay with many chalk lumps (3143). It is probably a continuation of the ditch (4184) exposed in the north-west corner of the Neolithic barrow excavation (see below and Fig. 15 Section 9). Test Pits 30 and 31 were excavated to examine the continuation of this feature. A ditch with a very similar profile and fills was discovered in Test Pit 31 (3312; Fig. 8) running in a more north – south direction. It is possible that a shallow, bowl-shaped feature on the south edge of Test Pit 30 (3302) represented the northern terminal of this feature which was not otherwise present in this 2 m x 2 m pit. Taken together, this ditch appears to be small, narrow, steep-sided and flat-bottomed, with a compact lower, chalky fill and with upper more friable deposits. It is sinuous in shape and does not appear to continue to the north of Test Pit 30, although its extent to the south is unknown. No finds were recovered from its lower fill, but two sherds of prehistoric, probably Iron Age, pottery came from the upper fill (3313) in Test Pit 31. Excavation to the north-west of the Neolithic barrow shows that this ditch is stratigraphically later that the barrow ditch.

Test pit 28 was excavated to the north-east of the Neolithic barrow, in an area where the magnetometer survey indicated anomalies (Figs 6 and 8). No features were exposed but the subsoil layer was uneven and large fragments of pottery were found at its interface with the topsoil. These included four prehistoric sherds from a plain globular vessel which could be early Neolithic or late Bronze Age in date and twenty-six sherds from an Oxford colour-coated mortarium (see Booth below). The character and significance of this deposit remains unclear.

Struck flint was recovered from 20 of the 33 test pits excavated (Fig. 9). This material was found across the top of the hill, but with a distinct concentration around and to the north-east of the Neolithic barrow and another cluster to the south of and below Mound 1 where evidence of the preparation of flint nodules was found (Trench 1). The majority of the test pits yielded between one and four flints, but between nine and seventeen flints came from Test Pits 1, 2, 4, 10 and 14 (Fig. 9). This material is not very diagnostic but includes a small possible Mesolithic component; most flint seems to be late Neolithic in date (see P Bradley below). Twenty pieces of burnt unworked flint were also found, but these could be of any date from the prehistoric to the very recent past. They have not been plotted.

Four sherds of pottery from Test Pit 28 could be early Neolithic in date, but are more likely late Bronze Age. Otherwise the earliest pottery recovered during test pitting was late Bronze Age to Iron Age in date (eight sherds; Fig. 10). Seven late Iron Age and 31 sherds of Romano-British pottery were also found (see Booth below). All the pottery of these periods found in test pitting came from the vicinity of the Neolithic barrow (Fig. 10) where Scott had found a Romano-British rubbish pit cut into the side of the barrow in his 1930s excavations.

Only seven medieval sherds were retrieved from the whole site, but post-medieval and modern finds were common, mainly coming from the highest part of the hill which is frequented by visitors today. This material includes much glass, a little pottery, six clay pipe stems, parts of small metal and plastic objects, animal bone, some ceramic building material, parts of earrings and a leather watch strap (see archive).

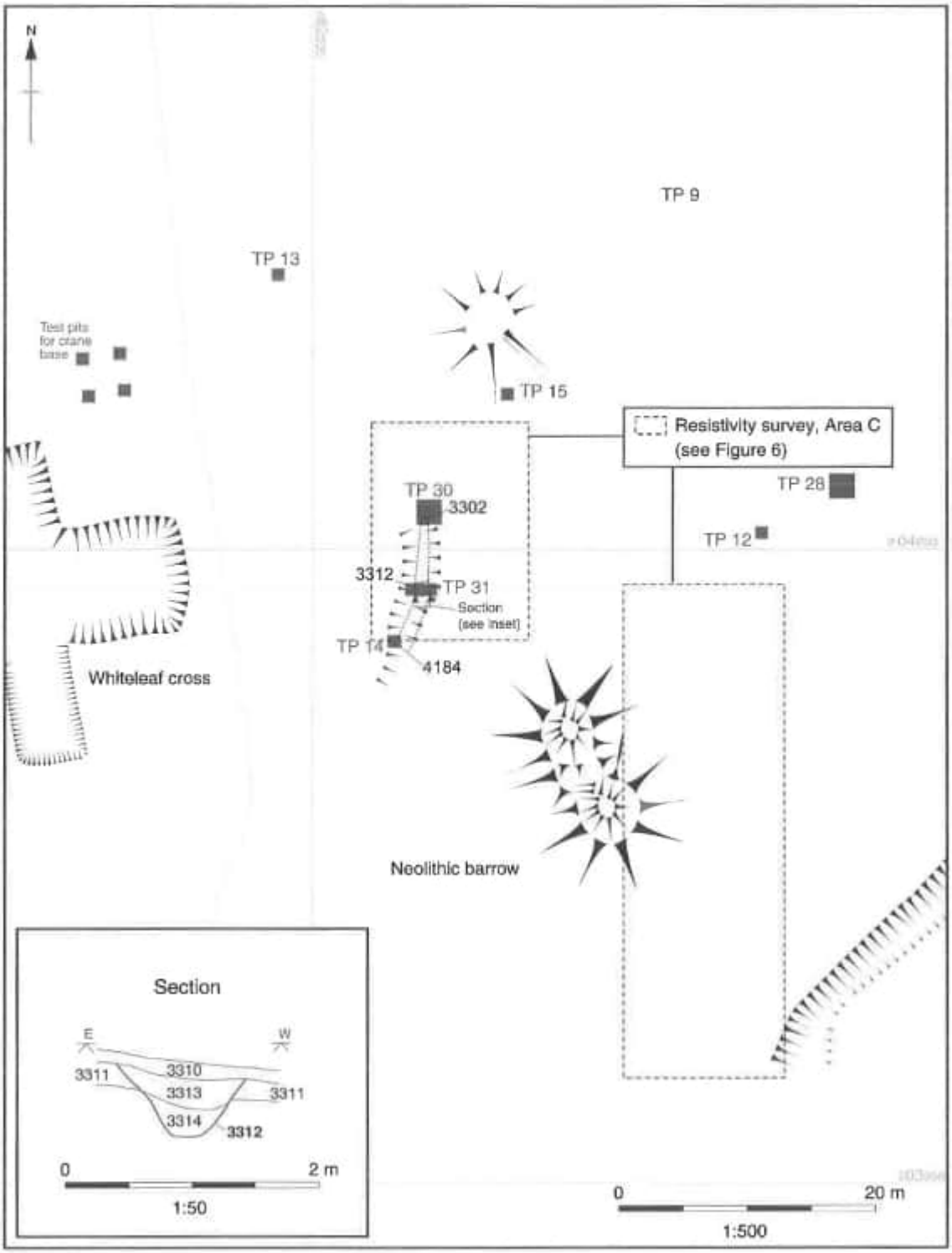


FIGURE 8 Plan and section of ditch to north-west of Neolithic barrow

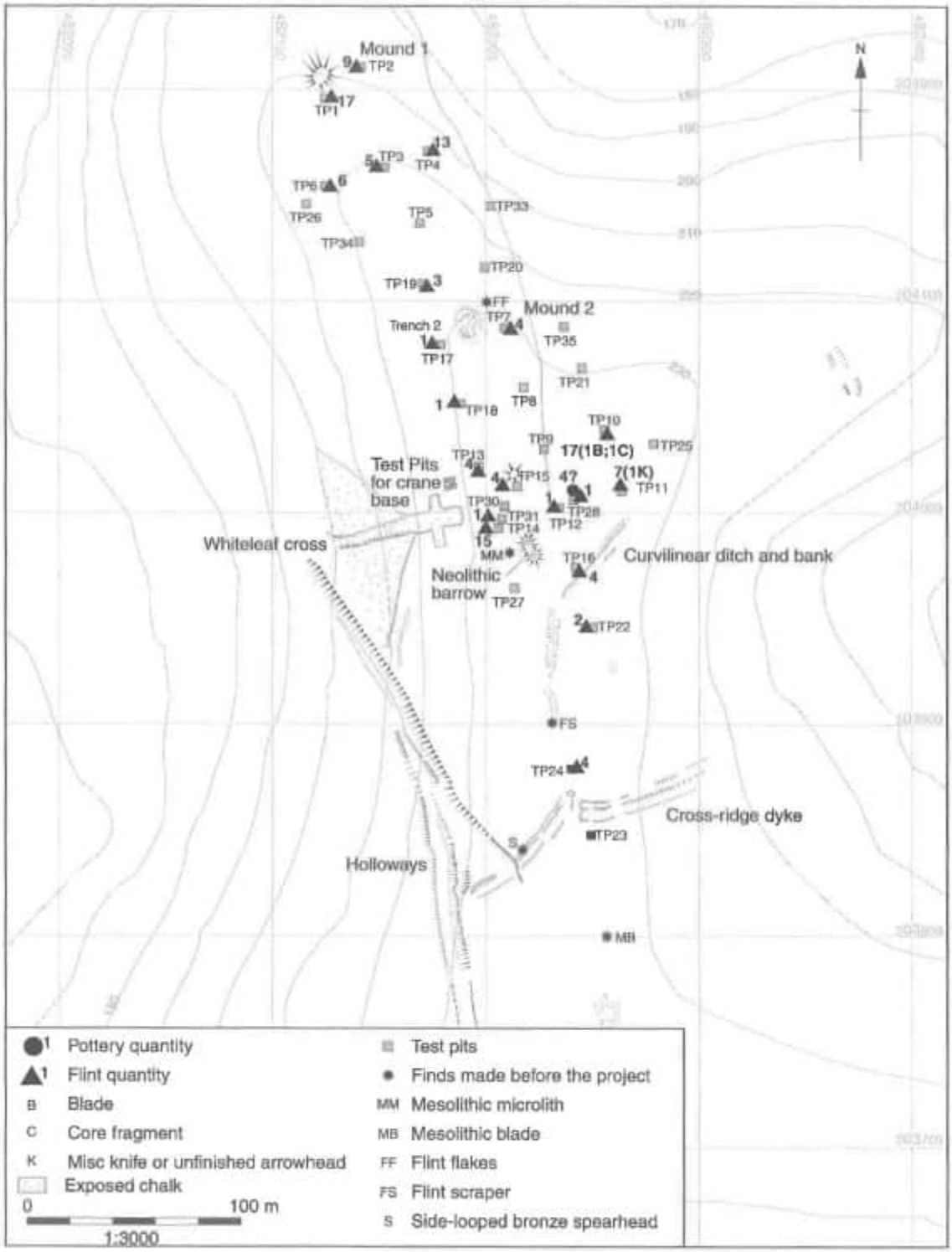


FIGURE 9 Types of earlier prehistoric finds from test pits and previous discoveries

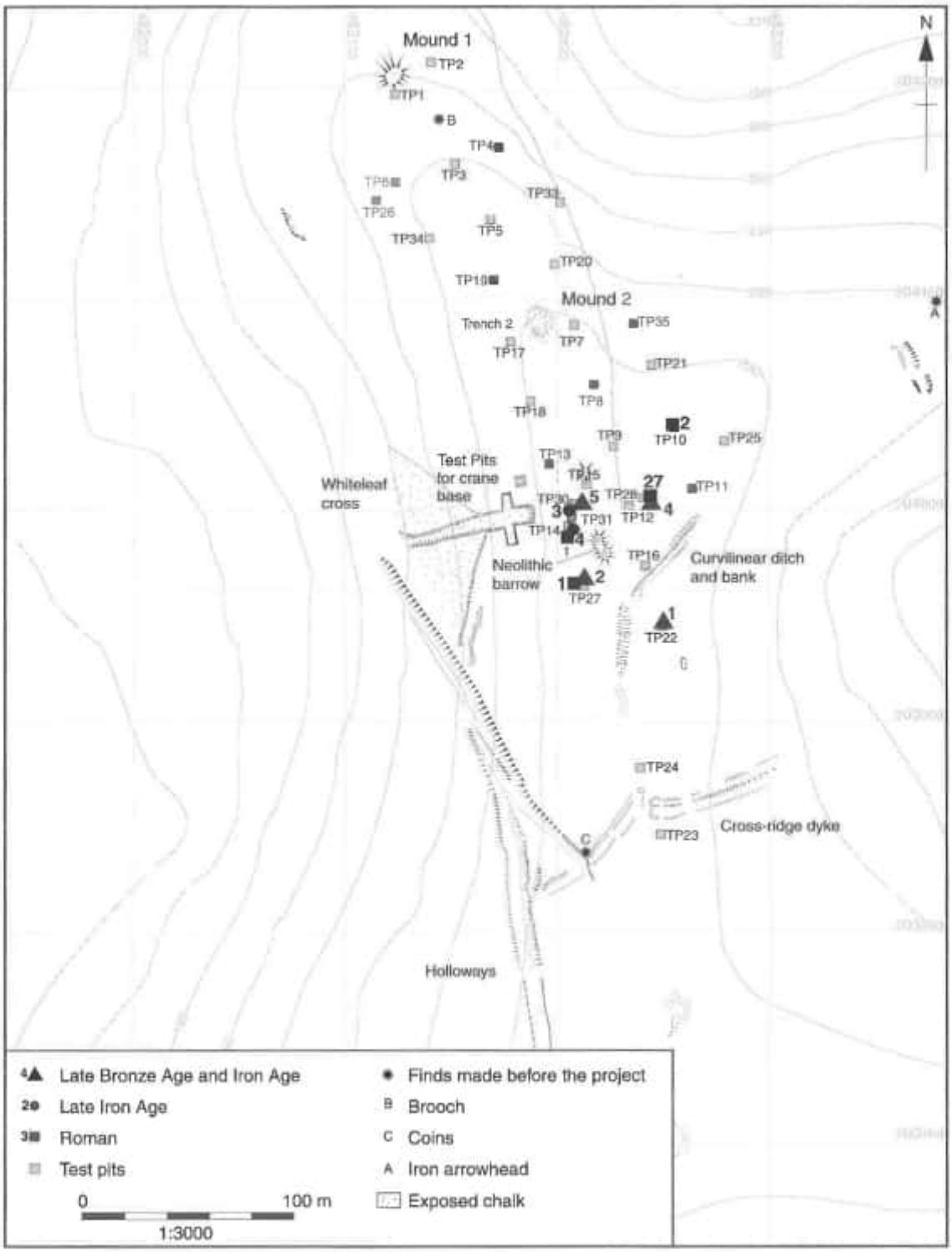


FIGURE 10 Iron Age and Roman finds from test pits and previous discoveries

Excavations on the Neolithic barrow

Introduction

The main element of the Whiteleaf project was the re-excavation, investigation and restoration of the Neolithic barrow which stands in a prominent position on the edge of the chalk ridge at *c* 233 m OD (Fig. 3), approximately at the intersection of the ridge with the spur to the north (Farley 2000, 10). The monument was extensively excavated between 1934 and 1939, with a short season just after the war, by Sir William Lindsay Scott who died before he could complete his excavations or publish his findings. Professor Gordon Childe and Isobel Smith examined Scott's records and published an account in the *Proceedings of the Prehistoric Society* for 1954, but there were some uncertainties surrounding the excavations – for example their full extent – and a number of issues of interpretation remained unexplained (Farley 2000). It was also unclear how the mound that could be seen on the hill at the beginning of the project related to the original barrow or to Scott's spoil heaps. Anecdotal evidence had it that the excavation trench had been at least partly covered in soil at the beginning of the Second World War, when the Cross was also camouflaged to obscure potential landmarks for enemy aircraft, but the extent of soil movement was unknown. Therefore, it was determined to remove Scott's spoil and backfill archaeologically to enable the site to be examined and sampled under modern conditions. Additionally, it was intended to reinstate the monument to its pre-1930s shape, based on Scott's pre-excavation contour plan.

The excavations of the 1930s

Scott made a detailed contour survey of the barrow and what could be seen of its ditch prior to excavation, onto which he plotted his excavation grid (Fig. 11). He excavated the site in 2 ft vertical slices, not in stratigraphic units, and the sections were drawn meticulously every 2 ft on both the x and the y axes (the section drawings are held at the National Monuments Record in Swindon; Record Number 63/615753). All finds were recorded three-dimensionally according to each 1 ft square. Detailed plans were drawn of individual features exposed, but there was no overall site plan and no written records or observations (Childe and Smith 1954, 212). A section was also reported as having been dug through the ditch on its western, downhill side (*ibid.*, 215; Fig. 11). Scott published three interim reports on his excavations in the *Proceedings of the Prehistoric Society* (Lindsay Scott 1935; 1936; 1937a) and one in the *Records of Buckinghamshire* (Lindsay Scott 1941–6), but stressed that these were entirely provisional.

Childe described the barrow as 'kidney-shaped' with two high lobes and a hollow 'forecourt' area to the east (Childe and Smith 1954, 215). The mound was 66 ft 5 ins x 47 ft 10 ins (20.25 m x 14.6 m) and orientated NNW to SSE and was at least partly surrounded by a ditch, which was evident on Scott's contour survey in the east, south and west (Fig. 11). Excavation to the west revealed the ditch to be approximately 6 ft wide and 3 ft deep (*ibid.*, fig. 3). The barrow was composed of an inner mound of earth and flints, interspersed with patches of clay and burning and occasional tips of chalk (*ibid.*, plate XXIV). This core was covered with a layer of clean chalk, overlain by earthy chalk rubble and then turf. Scott reported the inner mound to have been contained to the north, west and south by large tree trunks laid horizontally, but Childe found no obvious evidence of these in Scott's sections or notes (Childe and Smith 1954, 216), and they cannot be seen in the surviving photographs. Beneath the inner mound, four postholes were reported to define a mortuary chamber, measuring 8 ft by 5 ft 6 ins (2.44 m x 1.68 m; *ibid.*, fig. 1). Childe was unable to identify the nature of the walls or roof, but a depression visible in section at Y 64 was thought to indicate the collapse of the chamber roof (*ibid.*, plate xxiv). Scott also mentions a compacted chalk floor lying to the north and south of the chamber.

Scott examined some other possible features cut into the chalk, including a long narrow 'peristalith' trench, beyond the inner mound to the west but within the line of the ditch, which was 'packed with clay and flints and containing big posts' (1941–6, 298). Two pits, one apparently encircled by small postholes, and several other depressions and irregularities in the chalk surface were recorded, but no finds were recovered from any of these features except a little charcoal from one of the pits (Childe and Smith 1954, fig. 2). It is clear that Scott began to have doubts about the true character of these features and, after taking geological advice, decided many were natural in origin, although he did not record which. Childe concluded that the majority,

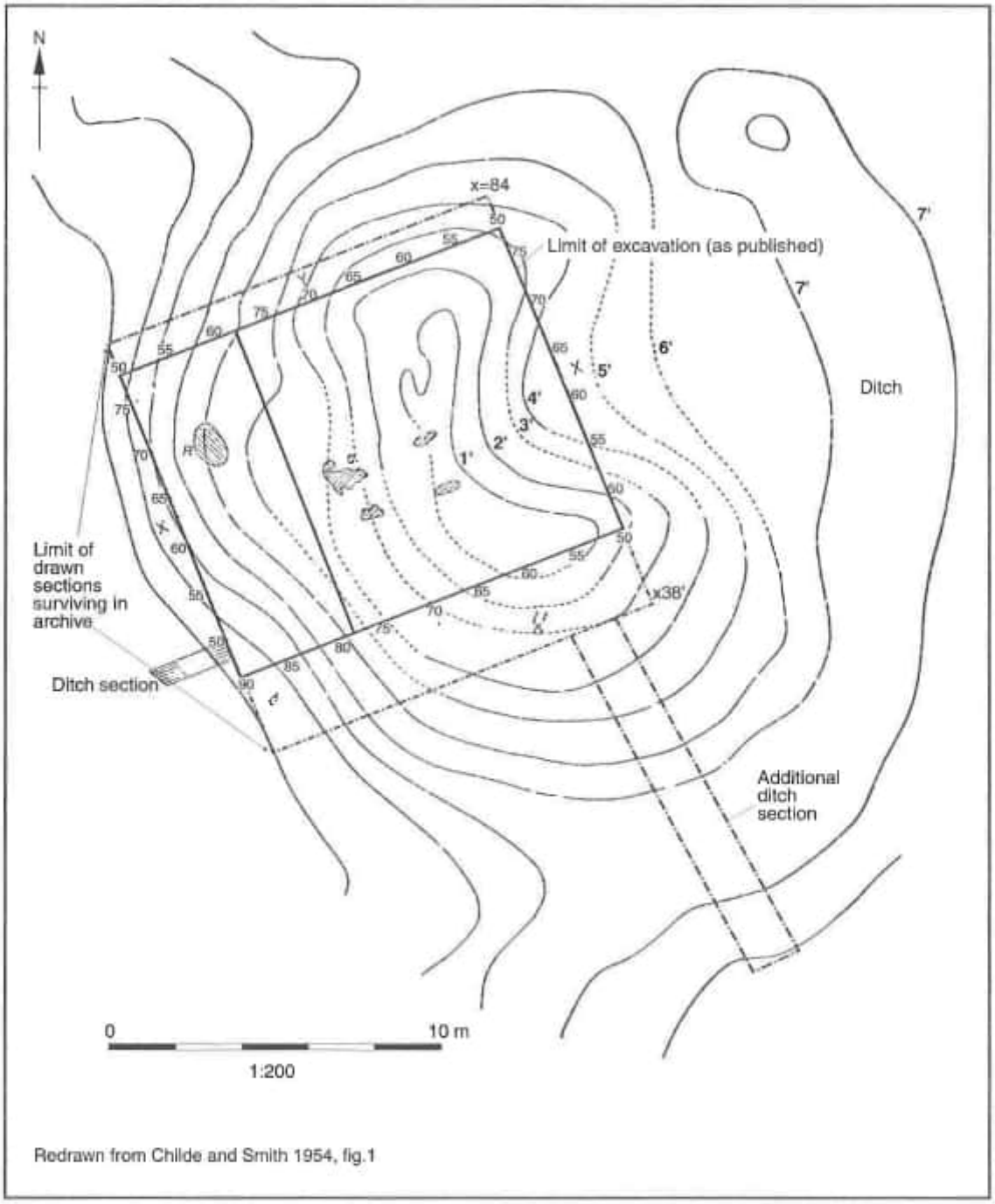


FIGURE 11 Scott's contour plan of the Neolithic barrow (in feet) and his excavation area

including the 'peristalith' trench, were probably natural solution features or tree-throw holes (*ibid.*, 216).

A single adult male skeleton was discovered beneath the inner mound, the left foot, some skull fragments and one tooth lying within the 'mortuary chamber'. Most of the rest of the body was found scattered immediately to the east (Childe and Smith 1954, 216). The human remains were analysed by Miss M S Tildesley of the Royal College of Surgeons, who surmised that the skeleton was that of a middle aged man, between 5 ft 6 ins to 5 ft 9 ins in height, with a long and narrow skull 'almost unknown in any population but the Neolithic, in England'. The teeth were badly worn with large abscess cavities, and there was considerable evidence of arthritis in the joints (*ibid.*, 220).

A large number of pottery sherds (two with grain impressions), flint flakes and a 'modest number' of animal bones were found scattered within the 'inner mound' (Childe and Smith 1954, 216). Some worked bone and antler was also recovered, including a pin and some possible antler picks. Isobel Smith examined the large pottery assemblage and concluded that its closest parallels lay with the Ebbsfleet substyle of Peterborough Ware, although there were similarities with earlier Decorated Bowl, especially with Abingdon Ware (*ibid.*, 221–8). None of the finds were grave goods as such, and their derivation and purpose within the mound are of considerable interest, as they are unusually prolific. Animal bone from this deposit was examined by Drs Cornwall and Jackson and found to include red and roe deer, beaver and bird in addition to the usual domesticated species, especially pig (*ibid.*, 219). A sample taken from beneath the barrow mound for molluscs was analysed by A S Kennard (1954, 230) and found to contain thirteen different species, as well as some indeterminate fragments. These indicated a damp woodland environment at the time of, or just before, the construction of the mound.

A secondary burial, the cremation of a child, was made in the mound within an urn of Bronze Age date. Roman finds were recovered from the topsoil and top fill of the ditch in the west, and from a pit dug into the west side of the mound. This points to continuing use of the hill and monument after the prehistoric period.

The paper records and finds associated with this work have been reassessed as part of this project, and will form the subject of a separate article (Hey forthcoming).

The investigations of 2002 and 2003

Topographical survey

In order to ascertain the relationship between the mound as it existed in 2002 and as first encountered by Scott, a detailed topographical survey was carried out and compared to that drawn by Scott prior to his excavation. As seen in Figure 12, the largest and highest mound of soil at the time of the recent survey lay to the east of Scott's excavation area which, with hindsight, could be seen as a slight depression in the ground surface to the west. It was apparent, therefore, that most of the mound in 2002 was spoil from Scott's excavation with comparatively little *in-situ* barrow material visible. Only a small amount of soil seemed to have been cast into the excavation area to cover the exposed ground.

Geophysical survey

Magnetometer survey by Alister Bartlett across the Neolithic barrow prior to excavation (see above) detected a high degree of disturbance over the main part of the mound, and subsequent work has shown that this relates to material in the 1930s spoil and backfill (including quantities of barbed wire). There was also a distinct concentration of magnetic disturbances to the north and north-east of the Neolithic barrow (a and b on Fig. 5), an area which also shows enhanced susceptibility readings (Fig. 7). These anomalies could indicate early settlement features or other remains, or could derive from more recent hearths or bonfires lit on the hilltop.

The area over which resistivity survey could be conducted was constrained by various modern obstacles, but two small areas of open ground were surveyed, to the north-west (17 m x 12) on a 1 m grid, and along the eastern edge of the barrow (38 m x 12 m – 4 m) on a 0.5 m grid (Figs 6 and 7). Low readings visible as pale areas in the unfiltered data plot (Fig. 6 C) could indicate the location of an earth-filled ditch on the south-east side of the barrow and the possible outer edge of the same ditch to the north-east. High readings (dark areas) could indicate where the chalk bedrock lies near to the surface. To the north-west on Figure 6C, a possible ditch can be seen running from SSW to NNE, corresponding to the later prehistoric ditch found in

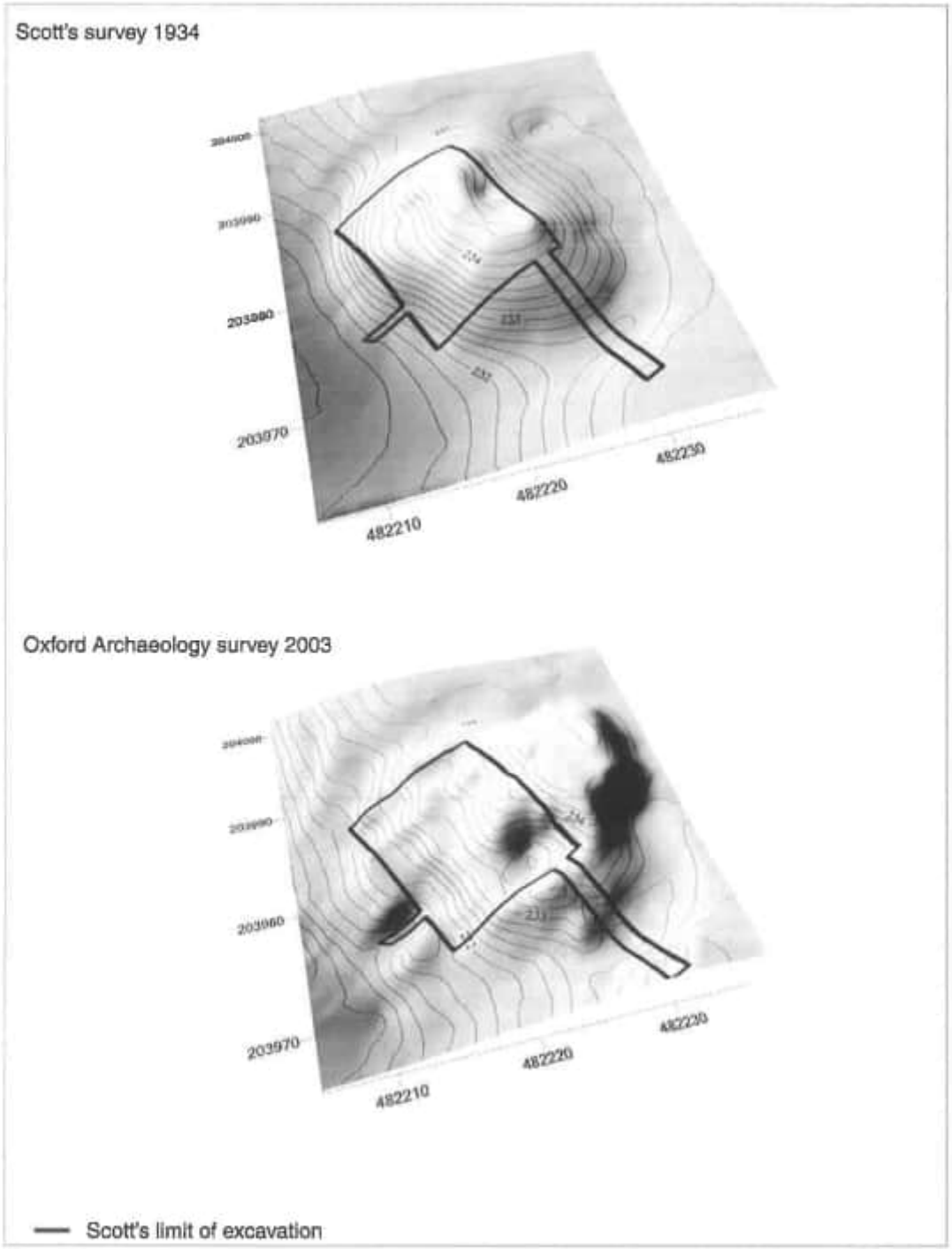


FIGURE 12 Scott's excavation trench as plotted in 2003 in relation to: Top, Scott's survey and Bottom, the barrow mound and spoil heap as surveyed in 2003. Contours in metres

the test-pitting survey and in the excavation area (Fig. 8, and see below).

Excavations in 2003 (Fig. 13)

The site was excavated in four quadrants and all turf was removed by hand. The northern edge of Scott's excavation running east – west became visible as soon as the turf was removed. All backfill within the area of Scott's excavation was removed by hand, down to the natural chalk, and sections were drawn through the backfill along each quadrant as work progressed.

Much of the spoil from Scott's excavations was found to have been piled up to the north-east of the barrow, to a maximum height of 1.32 m. It was possible to identify layers belonging to individual episodes of excavation, with brown, well-mixed and finely-sorted chalky soil interspersed with lenses of brown humic material, interpreted as the topsoil from each season (Plate 4). This spoil covered the eastern edge of the barrow mound and obscured its ditch on the east and north-east side. Two sections were dug through this material by hand and the soil was sieved through a 10 mm mesh. Very few finds were recovered by this process and, therefore, the upper part of the spoil heap was carefully removed by a 22 ton 360° tracked excavator fitted with a toothless bucket. The spoil immediately above the barrow was removed by hand.

Removal of the backfill and spoil revealed the extent of Scott's excavations (4116, Fig. 13). In his study of Scott's records, Childe had already ascertained that the excavations had extended west of the limit plotted on the pre-excavation contour plan, and the site was published as being 40 ft x 33 ft in extent (Fig. 11). Examination of the site archive held in the NMR before the 2003 excavations began (Farley 2000 and the authors), showed that drawings existed of sections beyond the published area to the north and south indicating a final site area of 40 ft x 46 ft (or 12.2 m east – west x 14 m north – south). These dimensions were confirmed in the 2003 excavations. Only the lower slopes of

PLATE 4 Cleaning the north-west quadrant of Scott's excavation area, showing his spoil heap in section

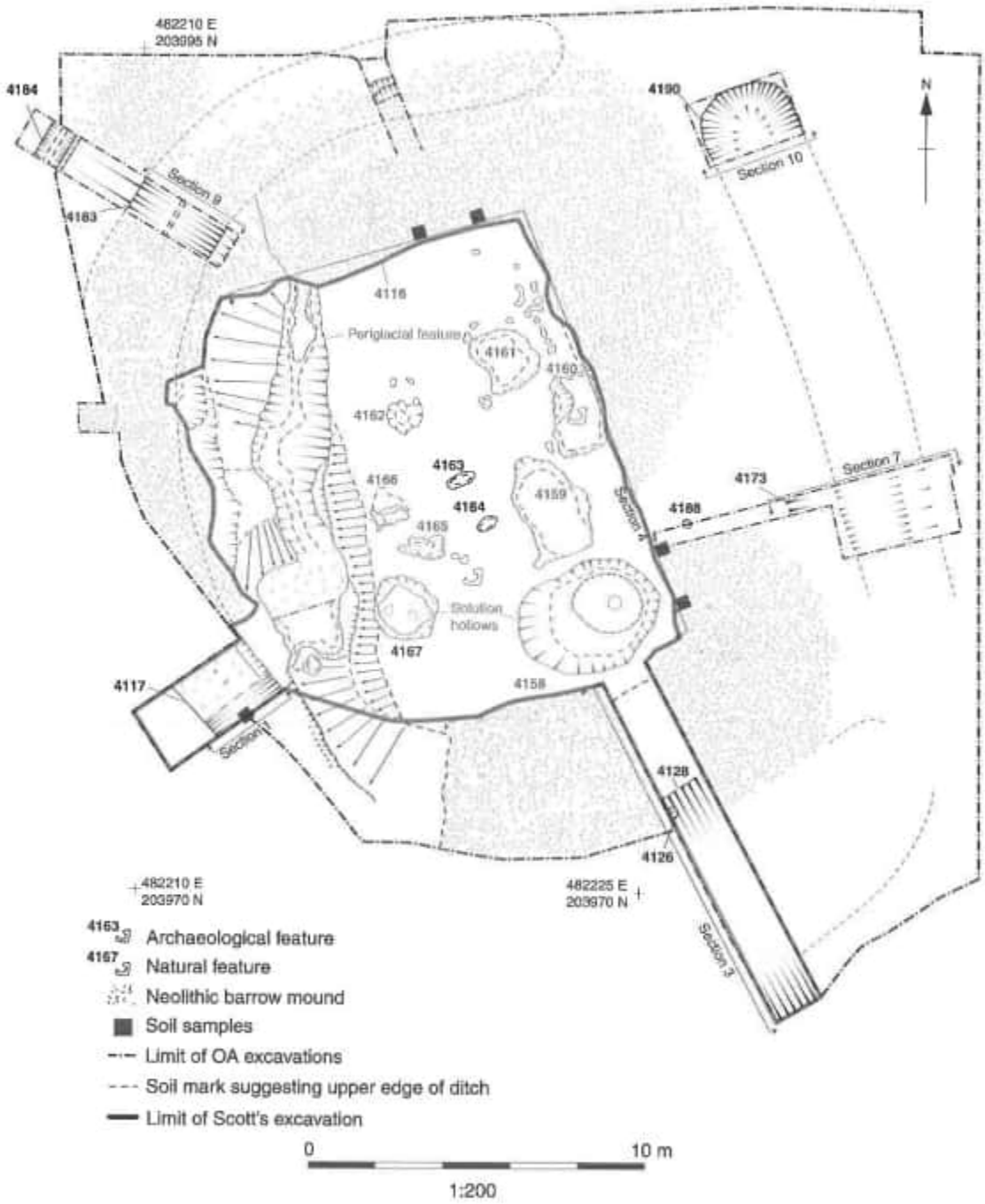


FIGURE 13 Plan of the Neolithic barrow as surviving in 2003

the barrow on the north, east and south sides remained *in situ* (Plate 5).

The edges of the original excavation were cut back and straightened to allow examination, and the present topsoil (4102) was removed from the north, east and south slopes of the barrow, 90% of which was sieved through a 10 mm mesh. This deposit was very productive of finds of prehistoric to modern date, including pottery, flint, bone, glass, and metal. Much of the pottery was late Iron Age/early Roman in date, indicating a significant degree of activity around the barrow in this period. Advice was taken on sampling strategies from Dominique de Moulins and Matthew Canti of English Heritage who visited the site, and snail columns and bulk samples were taken from three areas of the barrow mound and the western ditch section (Fig. 13).

Exposure of the excavation surface showed that Scott had excavated many features cut into the natural chalk (Fig. 13; Plate 5), not all of which had been planned. They were all filled with Scott's mixed backfill (4103) and were re-excavated. As all soil relating to these features had been removed in the 1930s and features may have been sculpted when dug, it was difficult to assess which were natural and which may have been humanly-cut features. The majority appeared natural, for example the 'peristalith' trench seen on the west edge of the excavations in the photograph, and numerous root holes. The four 'postholes' Scott identified as delineating the mortuary structure were readily apparent near the centre of the barrow. The easterly pair, 4163 (0.82 m x 0.4 m x 0.36 m) and 4164 (0.67 m x 0.36 m x 0.28 m), were well-defined features with vertical sides and flat bases, and were clearly anthropogenic (Fig. 13; Plate 5). They lay, 1.2 m apart, in the central portion of the barrow and were oval with slightly flattened inner edges, suggesting that split tree trunks had been positioned within them. The western pair (4165 and 4166) lay further down the slope and were very irregular in shape. It is possible that postholes in this position had been cut into existing tree-throw

PLATE 5 Scott's excavation area looking north-west, showing possible mortuary structure

holes or solution hollows, or that later root disturbance had occurred. It is also conceivable that the mortuary structure had used existing trees or bushes; they are very conveniently placed. However, as the evidence survives, these two 'mortuary' features appear to be natural.

Four large, but fairly shallow features (between 0.18 m and 0.65 m deep) with flattish bases are considered to be tree-throw holes of varying sizes and shapes: feature 4161 (surrounded by numerous root holes), 4159, 4160 and 4162. The two largest features Scott had excavated (4167 and 4158) had tapering bases and had been excavated 0.95 m and 2.2 m into the chalk. They seem likely to be natural solution hollows.

The surviving barrow mound was highest to the south-east of the excavated area, where it stood to approximately 1 m above the level of natural chalk (Fig. 14). This was the only part of the site where anything like a full sequence of deposits could be observed. Above the soft subsoil of weathered chalk was a compact reddish-brown clay soil with flints (4153) which was at first thought to be a geological deposit, but which contained snail shells in reasonable quantities (see Stafford below), and is now considered to be a buried ground surface. Its uneven surface could be the result of tree clearance immediately preceding barrow construction, and this would conform with the mollusc evidence of a densely-wooded environment at that time. It was overlain by a dark-brown silty deposit (4154) containing organic material, flints and occasional chalk fragments which could be the outer edge of the inner mound, although no finds were recovered from the very small amount examined. A deposit of yellow-brown chalky silt (4155) was placed over this deposit, followed by a layer of clean chalk (4156). Layers 4154, 4155 and 4156 appear to represent the first phase of the barrow mound, and a thin layer of brown clay silt (4157) is probably erosion from this mound. The uppermost barrow deposit excavated was compacted chalk and flint rubble (4104–7; 4106 in Fig. 14) which overlay the earlier erosion layer and seems to represent a later addition to the barrow mound. This layer could be seen in all areas where *in-situ* mound material existed; it was usually the only layer lying above the buried ground surface or subsoil (4151) and had evidently spread quite widely beyond the initial barrow mound (Fig. 13).

The eastern side of the barrow mound slumped significantly in the centre (Fig. 14), forming the 'forecourt' area, which Scott considered an original feature of the barrow. As the 1930s excavations had removed most of the mound in this area, the surviving deposits were very thin. Only tentative conclusions can, therefore, be reached about the character of these layers and their origin, from an examination of the NW-SE section (Fig. 14) and a 0.5 m-wide trench dug west from and across the ditch on the east side of the mound (Fig. 15, Section 7). There were slight indications that the second-phase mound deposit (4105) became looser and more stony in the centre of the dip, and this layer appeared to continue patchily to the east where it overlay the infilled barrow ditch fill (4169 in Fig. 15). Whether this deposit represents the fill of a feature cut into the mound at a later date, or whether it is material that has eroded from the mound cannot be ascertained, although the latter seems more likely. Nevertheless, the topsoil was black and slightly ashy, possibly indicating disturbance of some kind.

Five sections were excavated through the barrow

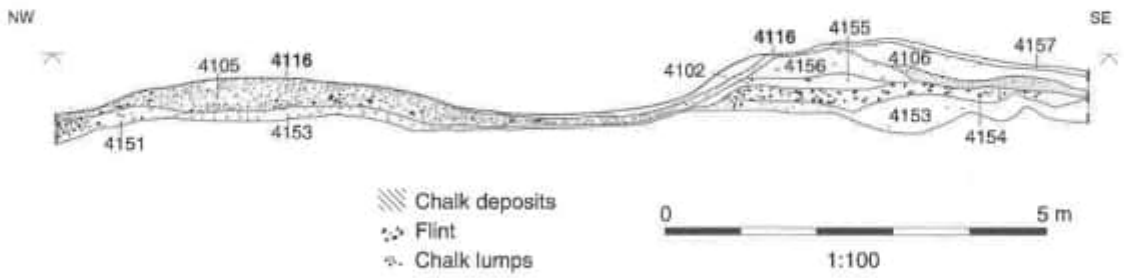


FIGURE 14 Section through the Neolithic barrow mound (Section 4). See Figure 13 for location.

ditch, two of which had been previously dug by Scott. The only published section is that to the west of the barrow (Childe and Smith 1954, fig. 3). Re-excavation and cleaning of this section revealed a U-shaped ditch 2.3 m wide and 1 m deep from the inner lip (4117; Fig. 15, Section 1), which was more substantial than Scott had drawn, for he had failed to excavate fully the primary deposit of compacted silty chalk.

It became apparent that Scott had excavated an additional trench across the southern slope of the barrow and its ditch (Fig. 13), although this was not recorded on his sections or in his notes, and was not mentioned by Childe. Examination of the site photographs shows that this trench was dug by Scott sometime in the 1930s. Re-excavation showed the ditch here (4128) to be much broader and shallower than the one on the west side of the barrow (6.5 m wide and a maximum of 0.65 m deep; Fig. 13) which, perhaps, conforms with the widely-spaced contours on the south side of the barrow on Scott's pre-excavation plan. It was filled with thin deposits of clay silt with chalk (4129, 4130 and 4131, 4132), which only filled the ditch to a depth of 0.28 (Hey forthcoming). A thick layer of humic topsoil (4102) overlay these fills above which were patches of spoil from the 1930s excavations and more recent topsoil. The base of a posthole (4126; 0.34 m in diameter and 0.24 m deep) was found cut into the natural chalk immediately inside the northern edge of this ditch. Evidence of the relationship between of the posthole and the ditch had been removed in the 1930s excavations.

Oxford Archaeology excavated three additional sections through the ditch, one to the north-west (Section 9, Figs 13 and 15) and two to the east of the barrow, including the ditch terminal at the north-east apparent in the 1930s contour survey (Sections 7 and 10, Figs 11, 13 and 15). The ditch on the north-west side (4183) was of a similar size and shape to 4117 in the west (2.8 m wide and 1.1 m deep), but its profile was more steep-sided and V-shaped (compare Sections 1 and 9 on Fig. 15). It had a similar sequence of fills: primary compacted chalk (4181), overlain by a deposit of chalky clay (4180) and then of relatively stone-free silty clay with flint and chalk (4178). It is conceivable that 4178 filled a recut of the ditch, but it is more likely to be gradual infilling of a relatively stable ditch profile. The uppermost fill (4175) was a stony, dark-brown chalky soil which had probably eroded from the barrow mound, or slipped in as a result of disturbance; Scott had examined a Romano-British 'rubbish' pit on this side of the barrow. A layer of fairly clean chalk silt and rubble (4176) lay on the downslope side of the ditch, overlapping its outer edge and interleaved between the main central fill (4178) and the uppermost fill (4175). Its derivation is uncertain. It was cut by a steep-sided ditch (4184; 0.8 m wide and 0.6 m deep) running SW-NE, 2.6 m to the north-west of the barrow ditch, but layer 4176 seems too extensive to have been upcast from this small feature. The western ditch (4184) appears to be the same linear feature, exposed in Test Pits 14 and 31 to the north-east (see above), which is believed to be late prehistoric or Romano-British in date.

The ditch to the east of the barrow (4173) was similar in size and profile to the section excavated by Scott to the west, except that it widened out at its upper, inner edge suggesting more activity here (Figs 13 and 15, Section 7). It had a simple sequence of a primary chalky fill (4172) overlain by two thick deposits of brown chalky clay (4171 and 4170), the upper of which had lenses of lighter chalk clay. A little Romano-British pottery came from 4170. A stony spill (4169) overlay these deposits and extended for 1.7 m over the berm between the ditch and the barrow mound where it overlay a fairly loose layer of chalk (4187). Layer 4187 extended up to the barrow mound and appeared to be a continuation of chalky subsoil 4153 beneath the mound material (Fig. 14). It is suggested that the looser character of the chalky subsoil is the result of exposure by activity in the 'forecourt' area, activity which may also have resulted in the partial removal of spill 4169 which strongly resembled eroded soil from the mound.

Removal of the topsoil to the north-east of the barrow revealed a ditch terminal (4190) to the north-east of the barrow, in approximately the position indicated on Scott's contour plan (Figs 11 and 13). The ditch was wide and shallow at this point (2.7 m wide, 0.38 m deep; Fig. 15, Section 10), possibly because it was cut through a very tough layer of clay-with-flints rather than chalk. It was filled with a deposit of dark flinty clay (4191) which contained a few sherds of middle Bronze Age Bucket Urn and a looser layer of clay silt (4193) in which pottery from the Romano-British to the post-medieval periods was found.

Of the five ditch sections investigated, only the

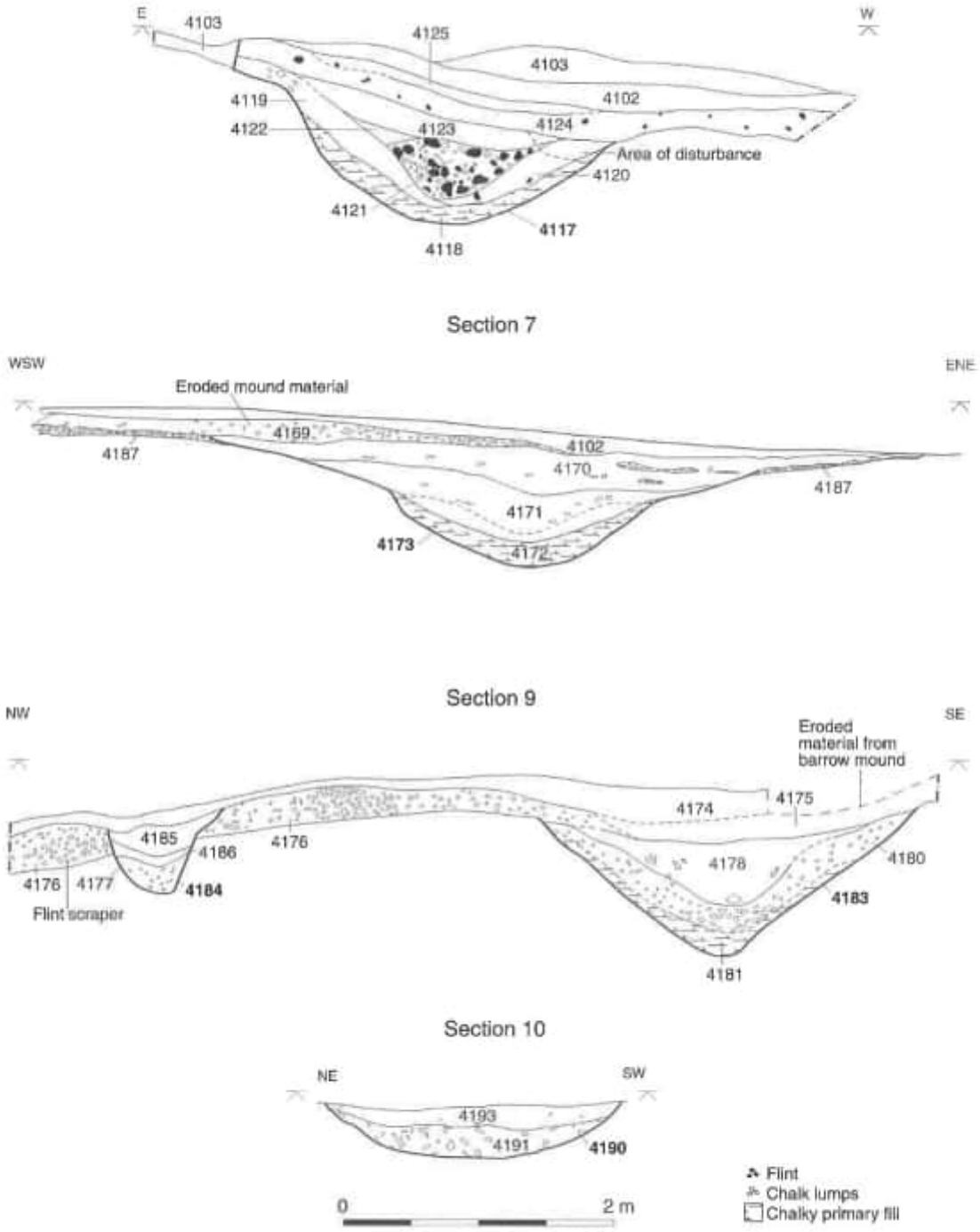


FIGURE 15 Sections through the Neolithic barrow ditch (Sections 1, 7, 9 and 10). See Figure 13 for locations.

two to the west of the barrow (4117 and 4183) and, to a lesser extent, the section to the east (4173) showed similarities in terms of size and shape. This may suggest that the barrow ditch was dug, or re-dug, on two or three separate occasions.

Reinstatement of the barrow

Scott's pre-excavation contour survey provided dimensions for the reconstruction of the barrow, and a 3D computer model enabled this to be visualised and achieved (Fig. 12).

The 1930s backfill was used to build up the mound over the excavation areas and the *in-situ* barrow deposits. Using the 3D model to guide their positions, carefully measured rods were inserted into the deposits so that their tops represented the height to which that part of the barrow should be built. A mechanical excavator was then used to place the backfill so that it just covered these rods. A large number of points were measured over the barrow to check that their heights corresponded with the measurements required.

Once satisfied with its size and shape, a layer of chalk was placed over the entire mound. This was covered by Geojute, a 100% natural jute fibre, to ensure long term stability (Plate 6 upper) and an additional layer of chalk was placed over the top which was finally shaped by hand (Plate 6 lower). The barrow was re-surveyed after reinstatement and turf plugs were placed into the barrow surface, the areas between being grass seeded. The layers of chalk have raised the barrow slightly above its pre-1930s height which will allow for the deposits to settle over time, and provide a sacrificial layer so that the barrow can eventually be unenclosed within open grassland without fear of damage to *in-situ* deposits.

Excavations on Mound 1: Trench 1

A prominent mound or knoll sits at the north end of the steadily falling ground of the Whiteleaf Hill escarpment; the land falls away steeply to west, north and east (Fig. 3). It is scheduled as a round barrow (SM 19047). The resistivity survey registered low readings across the mound itself, suggesting an increased depth of soil (Fig. 6 A; Bartlett, above) with a small area of relatively high readings to the south corresponding to a possible anomaly (c) in the magnetometer survey (Fig. 5). Magnetic susceptibility, on the other hand, recorded low-susceptibility in this area, although there were high readings to the north (Fig. 7). No finds were recovered during fieldwalking undertaken after tree clearance on the slope to the west of the mound, but test pitting in the adjacent area to the south (Test Pit 1) yielded seventeen flint flakes, four burnt unworked flints and three sherds of medieval pottery (Fig. 9). Nine flakes and one burnt unworked flint were recovered from Test Pit 2 to the east.

Trench 1 (7 m long and 1.5 m wide) was aligned NNE-SSW across the mound from its centre point down its western slope (Fig. 3). Chalk bedrock lay between 0.14 m and 0.32 m below the ground surface and was overlain by either natural clay-with-flint (104, 112 and 121) or a friable layer of silty-chalk between 0.01 and 0.10 m deep (103), partly erosion from the top of the knoll and partly root-disturbed chalk (Figs 16 and 17). These layers were cut by two large tree-throw holes, 107 (2.5 m wide and 0.2 m deep) and 110 (0.75 m wide and 0.25 m deep) and overlain by topsoil (100), 0.08 – 0.12 m deep.

The top few centimetres of clay-with-flints 104, in the southern end of the trench, produced a dense *in-situ* flint scatter containing over 1600 flints concentrated within a 2 m stretch of the trench (Fig. 16). Tree-throw pit 107 also contained 27 flints. The flint scatter was planned and excavated in spits, four x 0.01 m-deep spits initially, and then in one 0.05 m-thick spit when the flint specialist suggested that time-consuming recording was unlikely to yield further information. The flints became more densely concentrated in each successive spit (Figs 16 and 17).

The assemblage mainly comprised trimming flakes with almost no retouched tools and very few chips (see P Bradley below). This suggests that the scatter represents waste produced during initial working of flint nodules, probably in the late Neolithic period, prior to further preparation elsewhere. The clay-with-flint deposit here, which was close to the surface, was presumably used as a source of good flint nodules. No pottery or other finds were recovered from this trench.

The trench revealed no evidence of a barrow, of a mound or of an encircling ditch. The mound appears to be a natural knoll on which flint working took place, and it is suggested that the resistivity survey detected the presence of the clay-with-flint deposit lying on the Chalk.

PLATE 6 The barrow with its protective Geojute layer during restoration (upper), and as reinstated (lower) (Photographs by Julia Carey)

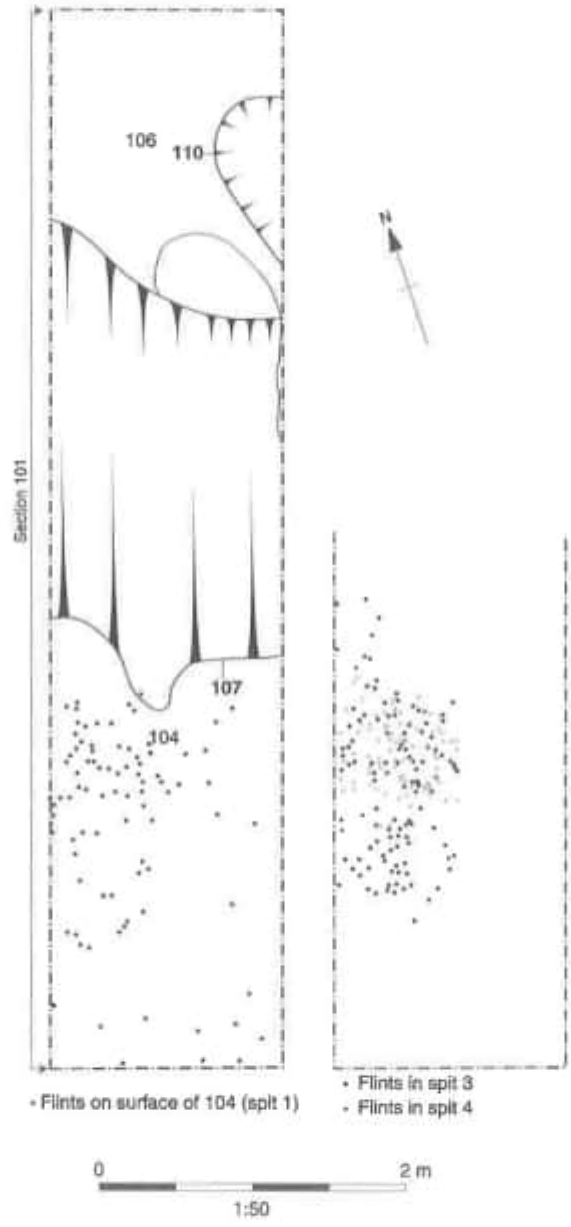


FIGURE 16 Plan of Trench 1 showing the extent of the finds scatter. See Figure 3 for location

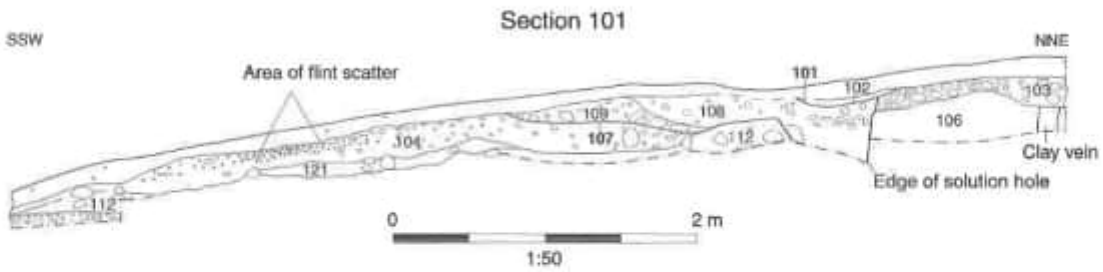


FIGURE 17 Section of Trench 1 (Section 101). See Figure 16 for location.

THE CROSS-RIDGE DYKE (TRENCH 3) AND OTHER DITCHES

Cross-ridge dyke

Trench 3 was excavated towards the southern end of the Whiteleaf Hill complex to investigate an east – west bank and ditch (Scheduled Monument 27148) running across the ridge (Fig. 3). This feature is believed to be a cross-ridge dyke and can be seen as an earthwork approximately 140 m long across the southern end of the narrowest part of the ridge (Fig. 4). It is sinuous in shape and can be traced from the highest part of the ridge to probable terminals at each side at points where the ground falls away steeply. The ditch and bank are not visible beneath or immediately adjacent to the Ridgeway, but this is probably because here the ditch has been infilled rather than being an entrance through the earthwork (Farley 2000, 7). The trench (10 m x 2 m) was aligned north – south across the bank and ditch just to the east of the Ridgeway.

The ditch was V-shaped in profile (3.5 m wide and 1.7 m deep) with steep, slightly convex sides and a narrow rounded base (Fig. 18; Plate 7). The primary fill (303) was a soft chalky-silt deposit (0.25 m thick) overlain by a number of firmer clay-silt deposits containing chalk and flint inclusions (304, 312 and 313). The uppermost fill was a dark brown clay loam (314) which extended beyond the limits of the ditch and may represent a buried soil horizon. Twenty-one, not closely-datable, flint flakes were recovered from the primary fill of the ditch; no pottery or other finds were recovered. Samples taken for charred plant remains yielded only a little comminuted charcoal, although snail samples were more useful (see Stafford below).

PLATE 7 The section across the cross-ridge dyke, looking north, with Sandy Kidd, Buckinghamshire County Archaeologist, as a scale
(Photograph by Julia Carey)

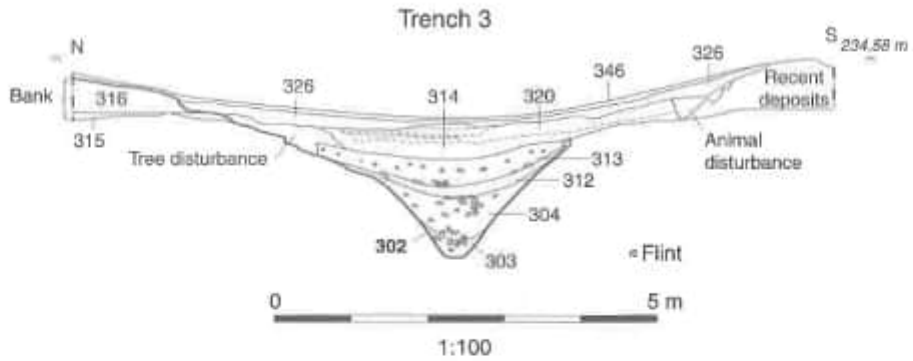


FIGURE 18 Section through the cross-ridge dyke, Trench 3. See Figure 3 for location

A bank of re-deposited chalk (316) survived to a height of 0.4 – 0.5 m on the north side of the ditch (Fig. 18; Plate 7). It was cut by three small tree-throw holes and overlay a buried soil horizon of mid orange-brown silty clay (315). Samples from this deposit yielded only snails (see Stafford below).

A large rectangular feature (305), 0.9 m wide and 0.6 m deep, was found against the west section on the south side of the ditch, cutting down through all but the uppermost fills of the ditch (Plate 8). It had near-vertical sides and a flat base and cut into the base of the ditch, continuing west beyond the limit of the trench. This feature is evidently fairly recent and may be the eastern end of a saw pit (I am grateful to Mike Farley for this suggestion). It was cut by two tree-throw holes 311 and 333, the latter of which was large (2.5 m wide and 0.9 m deep) and filled by numerous deposits of peat, ash and charcoal, perhaps the result of burning during forestry clear-up operations after the 1989 storm. Recent, loose deposits were found on the ground level to the south of the ditch, and the natural clay-with-flints seems to have been scoured here, perhaps during clear-up operations at the same time.

Although the character and profile of the ditch is consistent with its interpretation as a late Bronze Age boundary (Bryant 1994, 54), the only finds recovered from either the ditch fill or bank were a few undiagnostic flints from the bottom of the ditch. Hence, the date of this feature remains uncertain, although it is probably prehistoric.

Curvilinear bank and ditch

Julia Wise noticed the earthworks of another ditch with a bank to its west, running north along the top of the ridge between the cross-ridge dyke and the Neolithic barrow (Wise 1991, fig. 1). More of this feature has now been traced (Fig. 4). The earthworks of the ditch form a sinuous line running in a northerly direction commencing 90 m north of the cross-ridge dyke for a distance of *c* 130 m, before curving north-east from the Neolithic barrow for a further 150 m. A bank can be traced intermittently over this length on the west and north-west side of the ditch. The only place where it was possible to undertake geophysical survey over this feature was south-east of the Neolithic barrow, and the magnetic disturbance in this area probably reflects modern activity and rather than a ditch (Fig. 5). It has not been possible to determine whether the ditch continues south to the cross-ridge dyke; to the north-east it disappears where the ground begins to slope more steeply and there is much vegetation cover.

In spring 2006, the Princes Risborough Countryside Group with OA supervision, excavated a section across the ditch and bank to the east of the Neolithic barrow (TP 32, 4.6 m x 1 m; Fig. 3). The ditch (3333) was U-shaped, although not dissimilar in section to the cross-ridge dyke, with a rounded base, and had been cut into ground rising from east to west (Fig. 19). It was 1.7 m wide and 0.7 m deep. It had a chalky primary fill (3332) and had then filled with light-brown silty clay with lumps and flecks of chalk (3328, 3329), which became quite stony in the centre (3334). These layers were very

PLATE 8 Section through the possible saw pit in the cross-ridge dyke, looking west

root disturbed, but the ditch seemed to have been recut by a steep-sided, but narrow feature (3327, 0.45 m wide) filled with darker silty clay (3323). The main part of the bank lay to the west of a berm, 1.1 m wide, which had been revetted in part with large chalk lumps. Between the revetment and the ditch edge the original topsoil had been eroded or removed, and there was a step in the natural running alongside the ditch. Two probable root holes (3335 and 3337; 0.22 m and 0.14 m in diameter and 0.18 m and 0.12 m deep respectively) filled with brown silty clay (3336 and 3338) were found on the step, although they could have been postholes disturbed by roots. They were overlain by silty clay and chalk (3326). The bank survived to a height of 0.24 m and consisted of a lower layer of dark-brown silty clay and stone (3324) and a more compact and stony upper layer (3322) lying on a buried ground surface (3325). The upper part of the bank had spilled over the revetment and into the top of the ditch (3321). Loose silty-loam with leaf mould and many roots overlay these deposits.

Two small sherds of flint-tempered pottery were recovered from this trench, one is almost certainly early Neolithic (from the upper bank deposit, 3322) and the other possibly early Neolithic (from 3323, fill of the ditch recut). The sherd in the bank probably predates the ditch (having been scraped up when the ditch was dug) and both sherds could be residual finds which were part of a spread of material associated with the barrow. Six flints and one burnt unworked flint were also found, from the topsoil and upper bank and upper ditch fill, including two blade-like flakes and a retouched flake that may have been used as a scraper. Otherwise, all the finds from this trench came from the upper layer and included the usual range of glass, bottle tops, animal bone, a clay pipe stem and a one-penny (1 p) piece.

The cross-ridge dyke and the curving ditch and bank had a similar appearance in profile, although the curving ditch was not as substantial or as steep-sided. Neither could be dated, although the presence of flint and a little Neolithic pottery and absence of Romano-British and later pottery suggests a prehistoric date. Snails taken from both features suggest either that they were not strictly

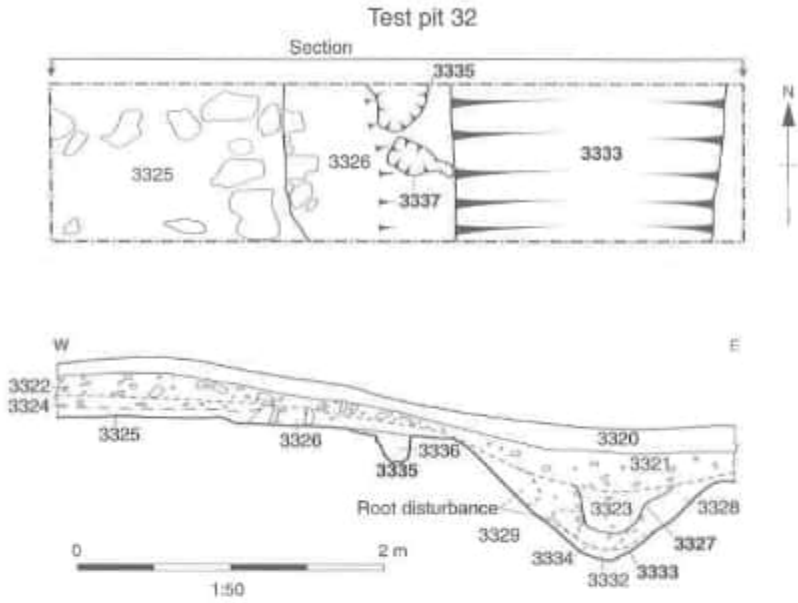


FIGURE 19 Plan and section across the curvilinear ditch and bank, Test pit 32. See Figure 3 for location

contemporary, or that the density of tree cover varied across the hill, the samples being from sections 125 m apart (see Stafford below).

MOUND 2: THE WINDMILL MOUND (SM 19048)

Mound 2 lying near the top of Whiteleaf Hill, 90 m to the north of the Neolithic oval barrow, had been scheduled as a Bronze Age round barrow (Fig. 3, SM 19048). However, there were important questions about the form and date of this feature which were hard to answer from its ground plan. It is a roughly circular mound with a central depression (Fig. 4). A hollow suggesting an encircling ditch survives around most of the mound and slight traces of an external bank were thought to be present in places on the south and east sides. However, it is also marked in the centre by two linear depressions forming a cross shape (Figs 4 and 20). These features threw the interpretation of the monument into doubt. Various possibilities were suggested:

1. the depressions are the result of an unreported antiquarian investigation into a Bronze Age barrow,
2. the earthworks derive from the siting of a windmill here, or
3. the earthworks are the result of a windmill reusing a prehistoric barrow. Such a practice is known to occur elsewhere (Dyer 1959, 11; Watts 2002, 104).

To clarify the precise nature of this feature, two trenches were excavated (Fig. 20): one by OA in 2002 running ENE – WSW along the line of one of the depressions (Trench 2) and the other by the Princes Risborough Countryside Group supervised by Gill Hey south from the highest part of the mound and across the external depression or possible ditch (Trench 5).

Trench 2 was 6 m by 1.5 m. Removal of the topsoil (200) revealed a substantial linear feature (204) orientated east – west and running towards the centre of the mound (Fig. 20). It was 1 m deep and cut silty chalk subsoil (202) to the west of the trench and the natural chalk bedrock elsewhere (Figs 20 and 21; Plate 9). This feature had near-vertical sides and a flat base, and was 3.8 m in length and 1.3 m wide. At its eastern end, corners at both the northern and southern edges of the cut showed that it joined a trench or trenches at right angles to it.

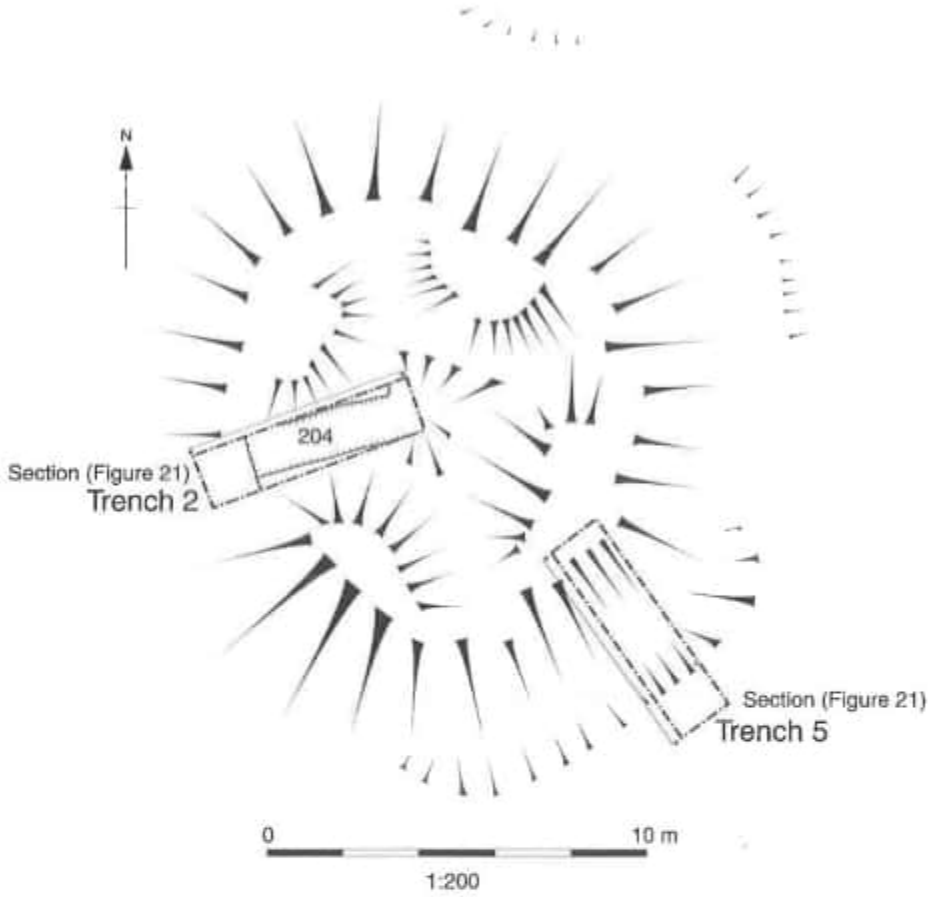


FIGURE 20 Plan of the windmill mound (Mound 2) trenches. See Figure 3 for location

Fills of loose light brownish-grey silty-chalk rubble (203), overlain by firmer light grey-yellow silty-clay (201), were found in all these cuts, suggesting that they were contemporary and were backfilled at the same time. These fills produced a few sherds of Roman and medieval pottery as well as bone and flint.

Trench 5 was also 6 m x 1.5 m and ran south from the centre of the highest part of the mound (Figs 20 and 21). Removal of the topsoil (5000) revealed that the depression around the mound was more accentuated than appeared on the surface (Fig. 21), but no ditch was present. The depression appears the result of erosion of the grey-brown clay silt, chalk and flint subsoil (5004/5007/5012) on a gentle south to north slope. The only features cutting the subsoil and beneath were root holes. Above the subsoil and beneath the mound to the north, a relatively stone-free soil horizon (5011) seems to be a buried ground surface onto which deposits 0.30 m deep of brown clay-silt with flint and chalk lumps and chalk flecks were placed (5006 and 5003). These layers were relatively finds-rich, with Roman, medieval and a small quantity of post-medieval material, the latest diagnostic material being of late 16th- or 17th-century Cistercian Ware. The Roman finds included a coin and a copper-alloy votive leaf (see Booth and Crerar below). Stony trample (5008) was present in some places beneath the mound and on top of the buried soil level. A tree-throw hole (5009; fills 5010 and 5005) was found in the eastern side of the trench cutting

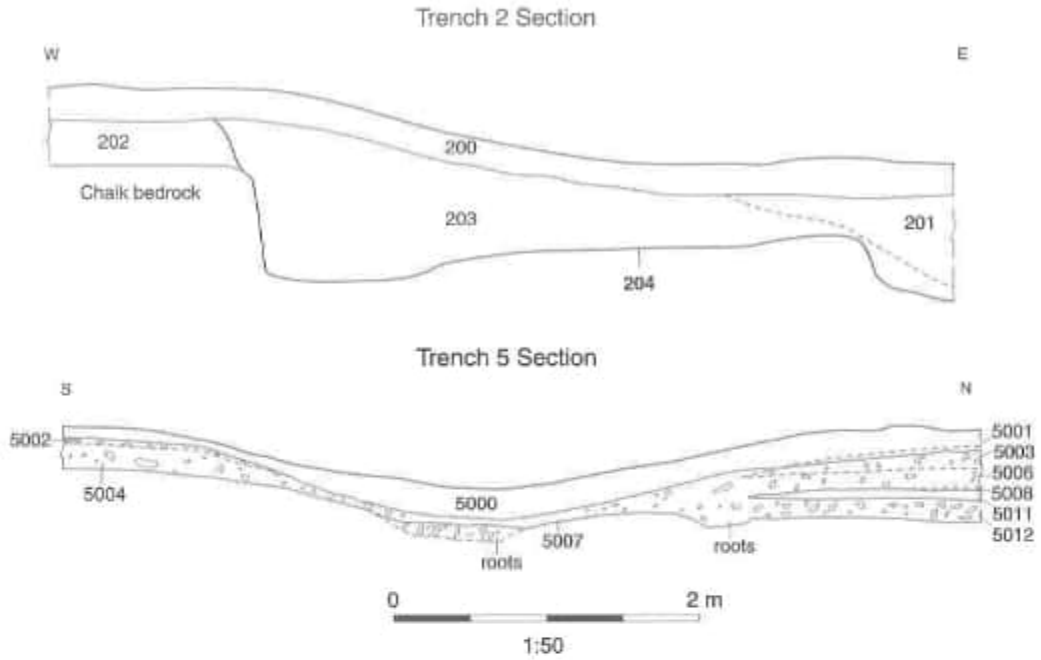


FIGURE 21 Sections through the windmill cross arm (Trench 2) and the windmill mound (Trench 5). See Figure 20 for locations.

down through the mound material and into chalk bedrock. A thin stony layer (5002) was found between the subsoil and modern topsoil to the north of the depression. Its origins are uncertain.

It is suggested that the linear features in Trench 2 were dug to seat the substantial wooden cross bases of a post windmill. Although other types of uprights could have been supported on a cross-beam base – for example posts for beacons such as those around the Kent coast (Wilkinson 2006, 36; Smith 2002, 5; I am grateful to Chris Welsh for pointing out these references) or, perhaps, gallows – the base at Whiteleaf seems too substantial for such purposes. A number of excavated post mills certainly exhibit similar characteristics. The post mill at Great Linford near Milton Keynes, Buckinghamshire, also had a cruciform feature in the centre of the mound, with arms 3.7 m long and 1.2 m wide, only fractionally smaller than the Whiteleaf trenches (Mynard and Zeepvat 1992, 104–7). The Great Linford trenches were also vertically sided and flat bottomed, but the remains of the timber cross beams still survived *in situ* sitting on large limestone slabs (*ibid.*, 105, fig. 43). Another 13th to 14th-century cross-shaped windmill base of similar size has recently been excavated on Tring Hill during the Aston Clinton Bypass construction (http://www.highways.gov.uk/roads/projects/10946.htm).

The homogenous clay silt fill of these near-vertical trenches strongly indicates that the wooden bases were removed; there was no surviving organic content to the soil and no indication of slumping of soils as timbers decayed. The substantial timbers, which would have been brought here at great cost, would have been too valuable to be left to rot (Watts 2002, 108). The surrounding mound is the soil that came from the digging of these trenches, either for the original insertion of the timbers or their removal, and possibly also from scraping up the topsoil around the mound. Layers 5006 and 5003 were, in fact, very similar (5003 being slightly darker in colour and less stony) and it cannot be determined whether they were the result of different or the same depositional events. Watts cites examples of windmill mounds that were heightened either improve stability or to gain less turbulent wind flow (2002, 106).

PLATE 9 The excavated cross arm in the windmill mound, looking south-west from the centre of the mound

Erosion of the subsoil around the southern and eastern edges of the mill mound could partly have been to heighten the windmill mound, but may also have been caused by the tail pole lever used to move the sails into the wind (an idea suggested by Ian Kelloway of Princes Risborough Countryside Group). Some tail poles had wheels to facilitate their movement and there is 14th-century documentary evidence of the use of a wheel with a paved track at Turweston (Watts 2002, 107). Similar features can be seen in existing windmills at Bembridge, Isle of Wight, and the 19th-century post mill from Danzey Green, Warwickshire (http://www.walsallgfl.org.uk/Avoncroft/doc/Avoncroft-144.htm).

The quantity of Roman finds from the trenches (see below) remains unexplained.

Julian Munby adds: Since their appearance in England in the late 12th century, windmills were a common alternative to water-mills, and it might be expected that the monks of Canterbury would provide one on the hill above the village (Langdon 2004). The discovery of the cross-timber base thought to be for a windmill, naturally led to the extensive Canterbury records to see if a mill could be identified. John Langdon, who has assembled an extensive database on records of medieval mills, has kindly reported on his discoveries in Canterbury. The accounts speak of one then two mills, which in 1384/5 were described as water mills, and for which there are detailed repair accounts in 1480/1 referring to two adjacent mill houses apparently on one watercourse (Canterbury Archives DCc Risborough 3–5; DCc MA6, ff. 115–115v). In 1519/20 they were described as newly constructed (at a cost of £29 17s 2 1/2). It is hence unlikely that Canterbury had a windmill, or indeed that there could have been an 'independent' (non-manorial) windmill within the manor before the dissolution of the monasteries. By the early 17th century there was a windmill in Monks Risborough, described as 'on Brokenhill' (*VCH Bucks ii*, 256–7). This may have been on Whiteleaf, although the location of the place-name is uncertain, and there was a 'Windmill Field' just north of the church in the 19th century (Bucks SMR, *ex inf.* Sandy Kidd); by no means all Buckinghamshire windmills were set upon hills (Farley 1978). There is no evidence for a beacon site or gallows on the hill.

It seems possible then, that there was a windmill on Whiteleaf Hill, with cross-timbers supporting the base, which could date from the medieval period to the 17th century. The wind flow over the top of the hill is uneven (as experienced by modern-day kite flyers) and this may have led to difficulties in any mill's operation, and/or its distance from arable field may have made it unpopular. Whatever the case, the archaeological evidence suggests that the mill was not in use for long. Of course, wooden mills could have been easily dismantled and moved (Farley 1978, 516). Intriguingly, in the early 18th century the 'old and ancient' post mill at Radnage was believed, to have been moved from 'near Princes Risborough' (1724 Tithe Interrogation; information kindly supplied by Dr Sandy Macfarlane and Paul Green of Princes Risborough).

Whiteleaf Cross

Trenches at the base of Whiteleaf Cross

Two trenches aligned east-west (both 3 m x 0.5 m) were excavated at the very base of Whiteleaf Cross, through its erosion deposits, to search for buried soils relating to the first cutting of the monument. Trench 1 butted the fenceline directly below the right hand scar on the centre of the cross and Trench 2 was located 15 m to the south, at the base of the fan of the Cross (Figs 3 and 22). They were dug to chalk natural at a maximum depth of 0.8 m.

Both trenches contained a very thin layer of topsoil overlying layers of compacted and semi-compacted chalk that had washed down from the Cross above (Plate 10). In both trenches, numerous individual layers could be assigned to three major episodes of deposition, 0.14 m to 0.38 m deep, separated by bands of humic material, 0.01 m to 0.10 m deep, in which leaf litter and roots were visible. No evidence for ancient buried soils was observed in either trench, and the only find comprised a small piece of clear, pale green glass which was recovered from humic layer 4204 near the bottom of the Trench 2. This piece of glass has been dated to the late 19th century.

Stabilisation and cleaning of the Cross by Andy Miller

As part of the work to clean and stabilise the Cross, ground works were to take place that would result in disturbance on or around the monument. These included:

- stripping back the turf around the edge of the Cross and its fan to a width of 1 m,
- vertical cutting of the Cross edge on the upper slope of the two arms, the lower left hand side of the upright section and across the junction between the bottom of the Cross and the triangle and
- regrading both sides of the edge of the triangular

Plate 10 Section through deposits at the base of Whiteleaf Cross (northernmost trench), looking northwest

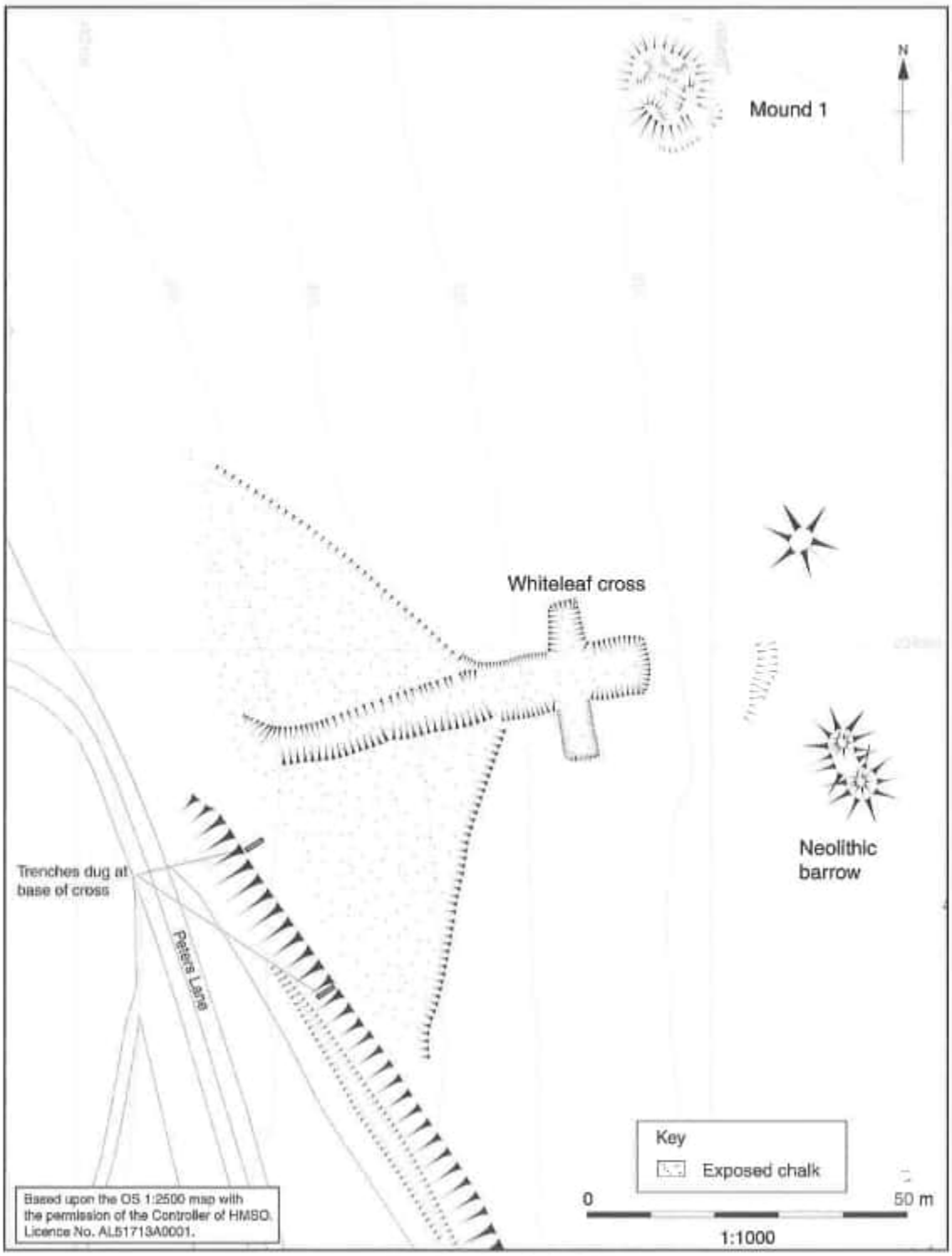


FIGURE 22 Plan of Whiteleaf Cross

base and other parts of the Cross to provide a suitable gradient for the fixing of stabilisation mesh.

It was decided to monitor all these works for potential archaeological features and finds to understand better and date the Cross and its recuttings. This took place between 28 July and 12 August 2003. The stripping of the turf by machines, along with the cutting or regrading of the banks was observed close at hand where possible, and vertical sections were photographed. Any spoil created on the slope or at the base was sorted through for finds while the underside of all stripped turf was also carefully examined. Much of the scouring of the Cross face was also monitored at the same time.

The sections showed varying depths of topsoil, 0.10 m – 0.28 m in depth and occasional thin subsoil layers above natural chalk. No archaeological features were observed and the only finds recovered were 20th-century glass and other rubbish and a 1944 halfpenny found directly under the turf within the soil matrix at the very top of the Cross. It is likely that any earlier chalk figure would have been removed by years of cutting back, scouring and erosion. It is worth noting that, according to local history, the fan of the Cross was thinner in the past and was widened with each cleaning.

The Cross was surveyed before (Fig. 22) and after the restoration works.

Documentary evidence by Julian Munby

The origins of the chalk-cut Cross are unknown, though definite evidence is not expected; even such prominent features as the Cerne Abbas giant in Dorset are poorly recorded. The Whiteleaf Cross is first shown in Francis Wise's 1742 description of the Cross and then on John Andrew and Andrew Drury's map of 25 miles around Windsor (1777), and Jeffery's 1787 map of Buckinghamshire (surveyed in 1766–8), in something like its present form (Farley 2000).

World War I practice trenches: Trench 4

A number of earthworks surviving upon Whiteleaf Hill are believed to be the remains of trenches dug at the beginning of World War I (Wise 1991, 113). Some older local residents had been told as children about their excavation, and it is apparent from local accounts that they were much more clear of vegetation before the 1960s.

The earthworks appear to comprise irregular, but interlinking trenches forming sub-rectangular or star shapes. Two distinct systems of trenches, 47 m apart, can be seen on the east side of the Ridgeway path just to the north of Buckinghamshire County Council's visitor car park (Fig. 23), and another set further to the north-east on either side of the Ridgeway where it leads off the hill in the direction of Lower Cadsden (Fig. 4). In addition, an arc of four trenches, *c* 20 m long in total and separated by causeways 1 m wide, follows the contour of the steep hillside to the north-west, below knoll SM 19047. This could be part of a system of trenches or fox holes belonging to World War I or World War II (Farley 2000), as could two shorter but deeper trenches on either side of the Ridgeway between the car park and the Neolithic barrow (Fig. 4). The latter features could also be sawpits.

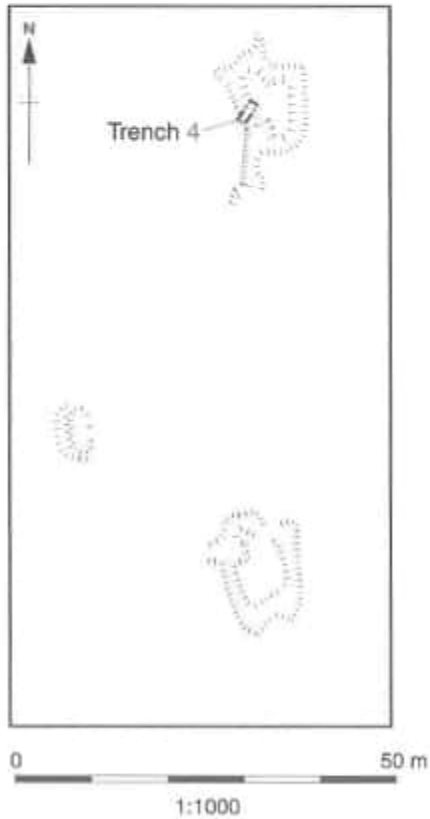


FIGURE 23 Plan of World War I practice trenches on the south of Whiteleaf Hill. See Figure 3 for location

Trench 4 was positioned across part of one of the practice-trench systems, to the east of the Ridgeway, approximately 90 m to the south of the cross-ridge dyke. The trench was orientated NE-SW and measured 3.2 m by 1 m (Figs 23 and 24).

The excavation revealed a ditch (401), 1.5 m wide and 0.9 m deep, mainly cut through chalk bedrock. It had steep sides and a flat base, 0.6 m wide. The steeper side lay to the south-west, the 'forward' edge, where it survived at an angle of 65° and had a small ledge or step 0.15 m deep 0.8 m above the bottom of the trench. The inner edge of the trench sloped more gradually (48°).

The ditch had been cut through a ground surface of dark grey-brown clay soil with flints and chalk lumps (405), which survived beneath banks built up on the forward and backward sides of the trench (403 and 402 respectively, 0.16 m – 0.14 m deep). These comprised very compact mid grey-brown clay loam with rammed chalk surfaces, and had presumably been constructed to protect personnel within the trench.

The ditch was filled by two deposits, a loose yellow-brown chalky-loam (406) followed by a dark-brown silty-loam with flint and chalk inclusions (404), which contained finds of 20th-century date.

The section appeared to reveal a fire trench with a forward fire step, around 0.4 m below the top of the bank as it is now, a palisade and a parisido (front and rear earth embankments designed to absorb enemy and friendly fire respectively). The small size of the trenches, but their careful formation, indicate that they were dug to demonstrate techniques of warfare and methods of trench construction, rather than to train troops in trench digging *per se*. In a general way, these features resemble miniature trenches shown in manuals of the period (Farley 1998). It is possible that, as they feature redoubt rather than zigzag trench patterns, they may date to slightly later in the war, rather than to its earliest phases (Griffith 2004).

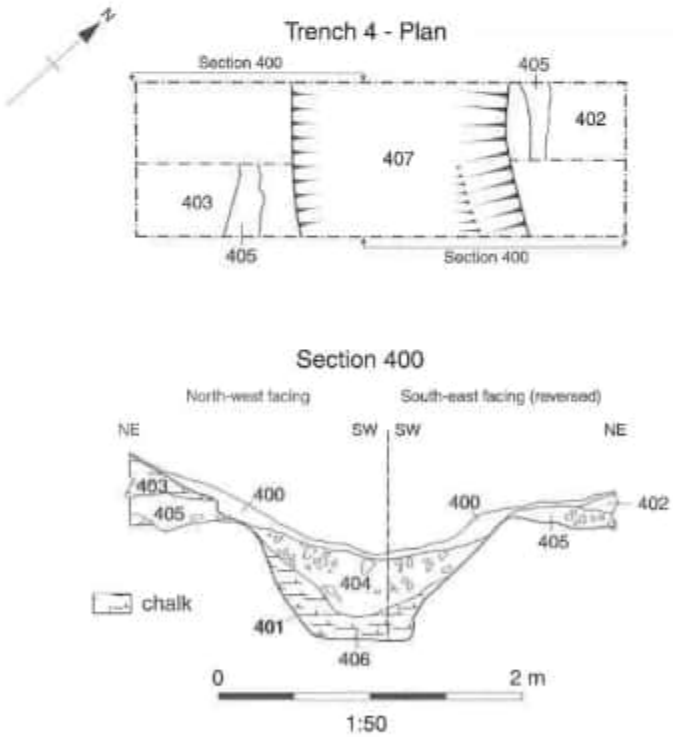


FIGURE 24 Plan and section of Trench 4 through World War 1 practice trench. See Figures 3 and 23 for location

Trenches across the 'Black Hedge'

Two trenches were excavated on the east side of Kop Hill (Fig. 1) by the Princes Risborough Countryside Group with OA supervision, to examine a linear feature known as the Black Hedge, the 'Blacanhegceann', which is believed to mark the 9th or 10th-century boundary of Monks Risborough (Gelling 1979, 178–81; Reed 1979; Baines 1983). At this point, the boundary survives as a hedge running east – west, to the north of which a slight depression can be seen in the ground. The two trenches were positioned north – south to run across the depression.

Trench 1 (4.3 m x 1.5 m) contained a ditch (1001), 1 m wide, which cut through light yellow-brown subsoil (1006) and the natural chalk beneath, and was filled with mid grey-brown clay silt with chalk fragments (1002; Fig. 25). The relationship between the ditch, its upper fill (1007) and the layers overlying the subsoil on either side was uncertain because of extensive root disturbance. It is also possible that a rabbit-proof fence running along the hedge line, some netting from which was nailed to the nearest trees, had disturbed the top of the feature (I am grateful to Julia Carey for this suggestion). Nevertheless, it is suggested that the 0.24 m-deep layer of mid yellow-brown, relatively stone-free silt (1004) to the south of the ditch is probably bank material from the ditch, and that the soil to the north, which was a stony, very dark brown clay silt (1003), is a cultivation soil, possibly relating to 19th and 20th-century agricultural activity which is recorded from this slope. This activity may have cut into the ditch and it certainly seems to have filled it, as the ditch upper fill (1007) is very similar in character to 1003. If this interpretation is correct, originally the ditch would probably have been 0.3 m deep. No finds were recovered from these deposits and they cannot be dated. They were overlain by topsoil rich in leaf mulch and roots, 0.12 m deep, from which a metal shoe plate was recovered. No other features were found in this trench.

Trench 2, further east down the slope, (4.1 m x 1 m) contained a more substantial ditch (2001), 1.55 m wide and 0.48 m deep, with a U-shaped profile (Fig. 25). It was cut into a colluvial deposit (2004 and 2005) and natural chalk, and appeared to have the remnants of a bank (2010) on its south side. The ditch was filled by mid grey-brown silty clay and chalk (2002) and an upper, darker and less stony layer (2003), neither of which contained any finds.

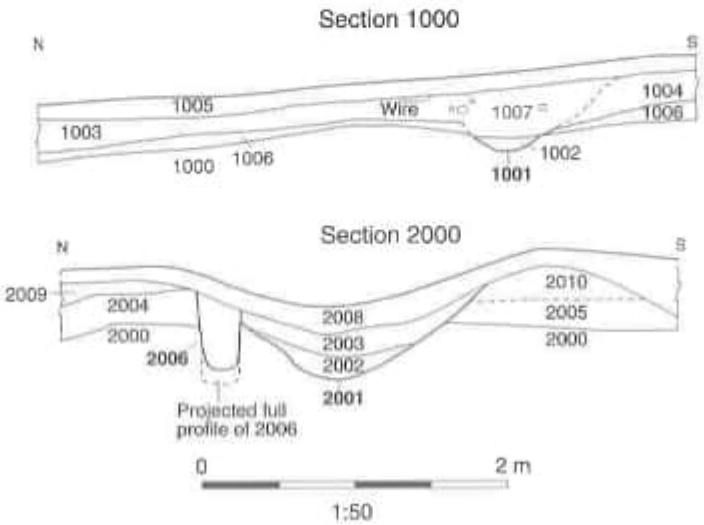


Figure 25 Sections across the 'Black Hedge' ditch. See Figure 1 for location

A circular posthole (2006), 0.27 m in diameter and 0.56 m deep, cut the northern edge of the ditch, and may relate to a 20th-century parish boundary fence. An upper layer of colluvium lay to the north of the ditch, but had no clear relationship with these deposits.

It seems likely that the ditch exposed in each of these trenches is the same feature running east – west up the slope. The sections revealed a ditch which, in each case, had a broadly open and U-shaped profile, with a bank on the south side and a similar primary fill. However, it is clear that the feature has experienced different subsequent land-use histories, the western trench revealing an area of cultivation which ran up to, and probably into the ditch. This has served to alter the appearance of the upper ditch profile and upper fill. Unfortunately, it was not possible to date the ditch and there is no archaeological evidence to confirm that it was a Saxon boundary.

Artefactual evidence

Pottery by Paul Booth

Introduction

Some 1692 sherds (8962 g) of pottery were recovered during the 2003 excavation of the Neolithic barrow. A further 83 sherds (380 g) came from the test pits excavated from 2003 to 2006 and the examination of the windmill mound in 2002 and 2006 produced another 185 sherds (725 g). The condition of the material and the fact that much of it was poorly stratified led to the decision to record it at quite a low level. The pottery from each context group was scanned rapidly and quantified by sherd count and weight in terms of broad period. The Roman pottery was quantified in terms of the major ware groups identified in OA's standard system, and notes were made of principal inclusion types in relation to some of the other material where this was likely to be informative (details in archive). The material was generally in poor condition; the mean sherd weight was low (5.2 g), although there was some spatial variation in this characteristic, and many sherds were very abraded. The degree of fragmentation of the prehistoric, late Iron Age and Roman pottery was very similar, while medieval and post-medieval sherds were on average larger, but still not substantial. Attribution of sherds even to broad period was therefore problematic in many cases and the figures tabulated below should be regarded as a guide rather than as definitive. A few particularly small sherds, principally amorphous fragments in sand-tempered fabrics, were categorised as 'uncertain' with regard to period. Quantification of the material by major period and context is given in Table 1.

The pottery from the 1930s excavations of the Neolithic barrow was analysed and reported on by Isobel Smith (Childe and Smith 1954, 221–8). This material was re-examined by Alistair Barclay and the original work was found to have been of a high standard with little that can usefully be added (Barclay forthcoming).

Prehistoric

The most significant group of prehistoric material found during the recent excavations on the hill consisted of four hard-fired sherds heavily tempered with ill-sorted calcined flint (1–4 mm), from context 4191 in the terminal of the Neolithic barrow ditch (Section 10, Fig. 15). These were all from the same vessel, a relatively small thin-walled Bucket Urn with a biconical profile and a cordon with finger impressed decoration, of middle Bronze Age date.

The majority of the other fragments dated to the prehistoric period were tempered with flint and sand, but occasional sherds were tempered only with fine sand. Diagnostic pieces were almost entirely lacking in the 2003 excavations of the Neolithic barrow. Simple rims, probably from barrel shaped jars, were present in flint and fine sand-tempered fabrics (one each). These fabrics and forms are consistent with a date in the middle Iron Age. The fine sand-tempered fabric is similar to that of a number of sherds recovered from the ditch on the west side of the barrow in the 1930s. This was described in the original report as 'a very coarse hand-made pot with splayed base, in Iron Age A tradition. While it might be pre-Roman, fragments of Romano-British wheel-made ware were found in close proximity' (Childe 1954, 229). There is little doubt that this vessel should also be assigned to the middle Iron Age. Like this vessel, all the other prehistoric sherds from the 2003 excavation appear to have been residual in mixed contexts.

Prehistoric pottery was proportionally better represented in the 2004 test pits and in the 2006 work than in the 2003 excavations of the Neolithic

TABLE 1 Quantification of pottery from 2003-2006 excavations by period and context (sherd count/weight (g))

Context	*Period Prehistoric*	*Late Iron Age*	*Roman*	*Medieval*	*Post-medieval*	*Uncertain*	*TOTAL*
Neolithic barrow (2003)							
4101					1/5		1/5
4102	34/131	483/1983	191/863	18/129	72/421	30/78	828/3605
4103		391/2032	179/899	3/30	34/193	23/55	630/3209
4104	2/22	7/67	4/171				13/260
4105			1/107				1/107
4113	1/16	1/13	8/83		4/469		14/581
4114	3/5	5/8	13/33		1/1		22/47
4143				1/9			1/9
4169			3/15	1/5			4/20
4170	2/14	14/70	64/346	1/6	2/5		83/441
4174		3/9					3/9
4182		3/27					3/27
4191	4/79						4/79
4193		2/8	65/357		12/112		79/477
subtotal	***46/267***	***909/4217***	***528/2874***	***24/179***	***126/1206***	***53/133***	***1692/8962***
2003 windmill mound							
200			1/8		1/4		2/12
201		2/26	5/83	1/6	1/5		9/120
203			10/54	1/13			11/67
2006 windmill mound							
5000	2/6		2/6				4/12
5002	3/8						3/8
5003	2/19	3/3	15/102		5/18	2/7	27/149
5005			5/25			1/1	6/26
5006	3/7	6/9	108/287		4/15		121/318
5008			1/4				1/4
5012			1/10				1/10
subtotal	***10/40***	***11/38***	***148/579***	***2/19***	***11/42***	***3/8***	***185/725***
Trench 4							
404					1/56		1/56
2003-6 test pits							
3010				3/46			3/46
3100			2/3				2/3
3120				3/12			3/12
3140		4/38	1/1				5/39
3160					3/15		3/15
3180					1/1		1/1
3220	1/6						1/6
3270	2/4		1/1				3/5
3281	4/39		27/119	1/31			32/189
3300					1/3		1/3
3310	3/5	3/14					6/19
3313	2/4						2/4
3320			2/4		17/24		19/28
3322	1/5						1/5
3323	1/5						1/5
subtotal	***14/68***	***7/52***	***33/128***	***7/89***	***22/43***		***83/380***
TOTAL	**70/375**	**927/4307**	**709/3581**	**33/287**	**160/1347**	**56/141**	**1961/10124**
Mean weight	5.4	4.6	5.1	8.7	8.7	2.5	5.2

barrow. The material was comparable, however, being almost entirely in flint-tempered fabrics. The latter included the only feature sherds; a short slightly everted rim from the mixed-date context 3281 from Test pit 28 to the north-east of the Neolithic barrow is probably of middle Iron Age date, and a small rim sherd, slightly outsloping, with a squared tip and a possible finger tip impression on the top, from context 5002 on the south edge of the windmill mound (Mound 2; Fig. 21) is probably of late Bronze Age or early Iron Age date. One sherd with ill-sorted flint fabric from context 3322 is almost certainly early Neolithic in date and a similar sherd from nearby 3323 could also be early. They came from the curvilinear ditch and its bank respectively (Fig. 19).

Late Iron Age

This material was recorded separately from the remainder of the Roman component of the assemblage because it appeared to be particularly common; it comprises 47.3% of the total number sherds (42.5% by weight), concentrated very largely in the area of the 2003 excavations of the Neolithic barrow. The sherds are almost entirely in grog-tempered fabrics in a 'Belgic' tradition (*sensu* Thompson 1982, 4) characteristic of the region. Vessel rims (55 sherds) were probably almost entirely from jars, as would be expected, though many were very fragmentary and could not be assigned to specific forms. There were occasional examples of possible dishes and one certain dish, probably of Thompson type G1–11 (*ibid.*, 471–3), from context 3140. This pottery would have continued in use into the early Roman period and there is no particular reason to suggest a significant chronological break between its use and that of the earliest 'Roman' material.

Roman

A wider range of fabrics and forms was encountered amongst the Roman material, but diagnostic pieces were still scarce – there were 52 rim sherds among this material, but most were quite small. Six tiny fragments of samian ware and a single possible amphora fragment were the only imported types. One sherd of Nene Valley colour-coated ware and a small number of Oxford colour-coated ware sherds were present, and single sherds of Oxford and Verulamium white ware mortaria (the latter a typical hooked rim) were noted, together with two sherds of Oxford parchment ware – both rims of Young (1977) type P24 (in contexts 4102 and 5003). Some 26 fragments (118 g) of an Oxford colour-coated mortarium of Young type C97 came from Test Pit 28. The great majority of the material consisted of sandy reduced coarse wares, presumably from relatively local sources. The Fulmer and Hedgerly kilns, for example, produced similar fabrics (Corder 1943; Oakley *et al.* 1937; Stainton and Stanley 1987; Tarrant and Sandford 1972), lie between 20 and 25 km south-west of Whiteleaf Hill.

The reduced coarse wares were associated with a (very) few black-burnished ware sherds (including the rim of a flanged bowl of late 3rd-4th century type), small quantities of oxidised coarse wares and a slightly larger component of shell-tempered fabrics. The latter were particularly well represented in the 2006 windmill mound assemblage. It is possible that some of the shell-tempered sherds should be assigned to the late Iron Age or possibly even earlier, but all the identified rim forms, of jars, are of distinctly Roman types (although characteristic 4th-century hooked rim forms, for example, were absent) and together with finely-rilled body sherds suggest that much of this material is consistent with products of the Harrold industry (Brown 1994). Generally, the range of fabrics and forms does not permit the identification of any particular chronological emphasis in the Roman assemblage, but both early and late material is present. The only exception may be the windmill mound material, in which a late Roman emphasis seems to be indicated.

Post-Roman

A small number of medieval sherds, the identification of some of which was rather tentative, were in sand-tempered fabrics. These included three sherds from a decorated Brill-Boarstall jug in context 3120 and a base sherd from a similar vessel in Test Pit 28, context 3281. Only two rim sherds, both from cooking pots, were present. It is possible that one or two sherds in glazed red sandy fabrics, recorded as post-medieval, were in fact of late-medieval date. The post-medieval pottery comprised a relatively wide range of fabrics and forms, with the majority of the material probably of 19th century date. Significant post-medieval material came from the windmill mound, however, where sherds of Cistercian ware and an unglazed oxidised

earthenware were recovered from contexts 5003 and 5006. Sherds of both fabrics were found in these contexts and probably derived from a single vessel in each fabric.

Groups and chronology

The majority of the pottery occurred in mixed assemblages and most was probably redeposited. The mixed nature of the groups makes them of limited value for developing detailed understanding of activity in successive periods, but a few general trends are apparent. A single context (4191) with *in-situ* Bronze Age sherds has been noted above. Four test pit contexts (3220, 3313, 3322 and 3323 from Test Pits 22, 31 and 32) contained only prehistoric sherds, and two very small groups (4174 and 4182) contained only pottery of probable late Iron Age date, but in view of the size of all of these groups the significance of this is uncertain.

The overall quantity of late Iron Age pottery is notable and suggests relatively intensive activity at this time. The great majority of this material is, however, associated with the backfill of the 1930s excavation and recent topsoil over the barrow. In these contexts it is more than twice as common (in terms of both sherd count and weight) as Roman material. In contrast, Roman sherds outnumbered late Iron Age ones five to one (again by both sherd count and weight) in 'upper deposits' associated with the barrow itself, and the mean sherd weight of this material was in both cases almost 2 g higher than the overall site mean, a small but possibly significant difference. The contexts in question also include post-Roman pottery, so the distinction between this group of material and that associated with the 1930s examination of the barrow should not be overdrawn, but perhaps provides the best indication of activity on and around the barrow in the Roman period, resulting in the accumulation of pottery in the top of the ditch and on the mound itself. The pottery in question has no characteristics which distinguish it from the generality of the assemblage. Why late Iron Age material should be better represented in contexts more closely associated with the 1930s excavation is uncertain.

A similar preponderance of Roman over late Iron Age pottery is seen in the groups associated with the location of the windmill. These, particularly contexts 5003 and 5006, contain material amongst which the diagnostic pieces, such as Oxfordshire colour-coated ware and ?Harrold shell-tempered ware, seem to be late Roman. However, the Roman sherds from these contexts are even more fragmented than those associated with the Neolithic barrow examined in 2003 and the material is clearly redeposited. This is emphasised by the occurrence within the same context groups of a small but significant number of post-medieval sherds (see above) which suggest a late 16th-17th-century *terminus post quem* for the deposits in the windmill mound.

Flint by Philippa Bradley

Introduction

A total of 1956 pieces of worked flint and 100 pieces of burnt unworked flint were recovered from the recent excavations. The assemblage came from several trenches and test pits across the area investigated and a wide variety of contexts including the Neolithic barrow (see below), a flint scatter, other layers, and the fills of ditches and tree-throw holes. The assemblage is composed largely of debitage, with only six retouched forms being recovered (Fig. 26.1–3). These pieces are not particularly diagnostic and dating is therefore problematic, although the technology of the material provides some dating evidence. The flint is summarised in Table 2, selected pieces are described in the catalogue and illustrated in Figure 26. Further details of the flint assemblage may be found in the site archive.

The majority of the flint came from a probable *in-situ* scatter found in Trench 1 (Figs 16 and 17); smaller quantities of material came from the re-excavation of the Neolithic barrow and the windmill mound (Trenches 2 and 5). Test-pitting across the area and fieldwalking also produced flint (Table 2). This included burnt unworked flint which could be the result of recent clearance of the vegetation. A minimally worked flake was the only retouched piece and a few flakes and blade-like flakes were also recovered. A fairly substantial assemblage of worked flint was also recovered from the Neolithic barrow originally excavated during the 1930s (736 pieces; Childe and Smith 1954). This latter material is summarised here, but is discussed in more detail, together with the flint recovered by Scott, in P Bradley (forthcoming).

Raw materials and condition

The flint is heavily corticated and the original

TABLE 2 Summary quantification of flint

Context	*Flakes*	*Blades, blade-like flakes etc*	*Chips*	*Irregular waste*	*Cores, core fragments*	*Retouched forms*	*Burnt unworked flint*	*Total*
Trench 1								
	1316 (incl. 6 core-rejuvenation flakes)	10	35	9	41 (20 core fragments, 14 tested nodules, 2 multi-platform core, 1 core with 2 platforms, 1 core on a flake, 1 single platform core)	3 (2 serrated flakes, 1 end scraper)	18	1432
Trench 2								
	53							53
Trench 3								
	21							21
Test pits								
	116	3			1 (core fragment)	2 (both misc. retouch, knife or unfinished arrowhead and a ?scraper fragment)	20	142
Trenches 5 and 32	14	4				1 (retouched flake)	35	54
Neolithic barrow re-excavation								
	308	1		3	3 (2 tested nodules, single platform flake core)	1 (end scraper)	23	339
U/S	5							5
Fieldwalking								
	6						4	10
Total	**1839**	**18**	**35**	**12**	**45**	7	**100**	**2056**

colour was only discernible in recent breaks and a few uncorticated flints. The original colour of the flint is dark brown to black. Cortex, where present, is brown or buff in colour and it is generally worn. It is likely that this material came from the clay-with-flint capping the site; examples of flint nodules suitable for knapping were found during the excavation (G. Hey pers. comm.). Some post-depositional damage was also recorded. A small quantity of burnt unworked flint was recovered, generally heavily calcined grey or tinged with red. Few of the worked pieces have been burnt.

Description and discussion

Debitage, in the form of flakes, roughly-worked cores and tested nodules, dominates the assemblage. Only six fairly regularly worked cores were recovered, the remainder consisting of irregularly-worked fragments and tested nodules (Table 2). The regularly-worked examples are all flake cores, varying from a core on a flake to multi-platform types (Table 2; Fig. 26.4). A few blades, blade-like flakes and bladelets were recovered. Occasional blade scars were noted on the dorsal surfaces of flakes and a couple of cores also have some blade scars (eg SF 1228, context 105), although no cores were exclusively used to remove blades. Little platform-edge preparation was noted and both hard and soft hammers were used to remove flakes, although six core rejuvenation flakes, all removing the front of the cores, were recovered, perhaps indicating that some care was taken during the reduction stages. Trimming flakes of various types dominate the assemblage. The dominance of trimming flakes and the roughly-worked nodules suggest that the flint assemblage is the product of initial preparation of material and shaping of cores for removal and further working elsewhere.

The small quantity of blades and blade-like flakes suggests a Mesolithic or earlier Neolithic date. A little Mesolithic material was recovered from Scott's assemblage (Bradley forthcoming) so it is possible that the small quantity of blade material from this excavation is Mesolithic but this must

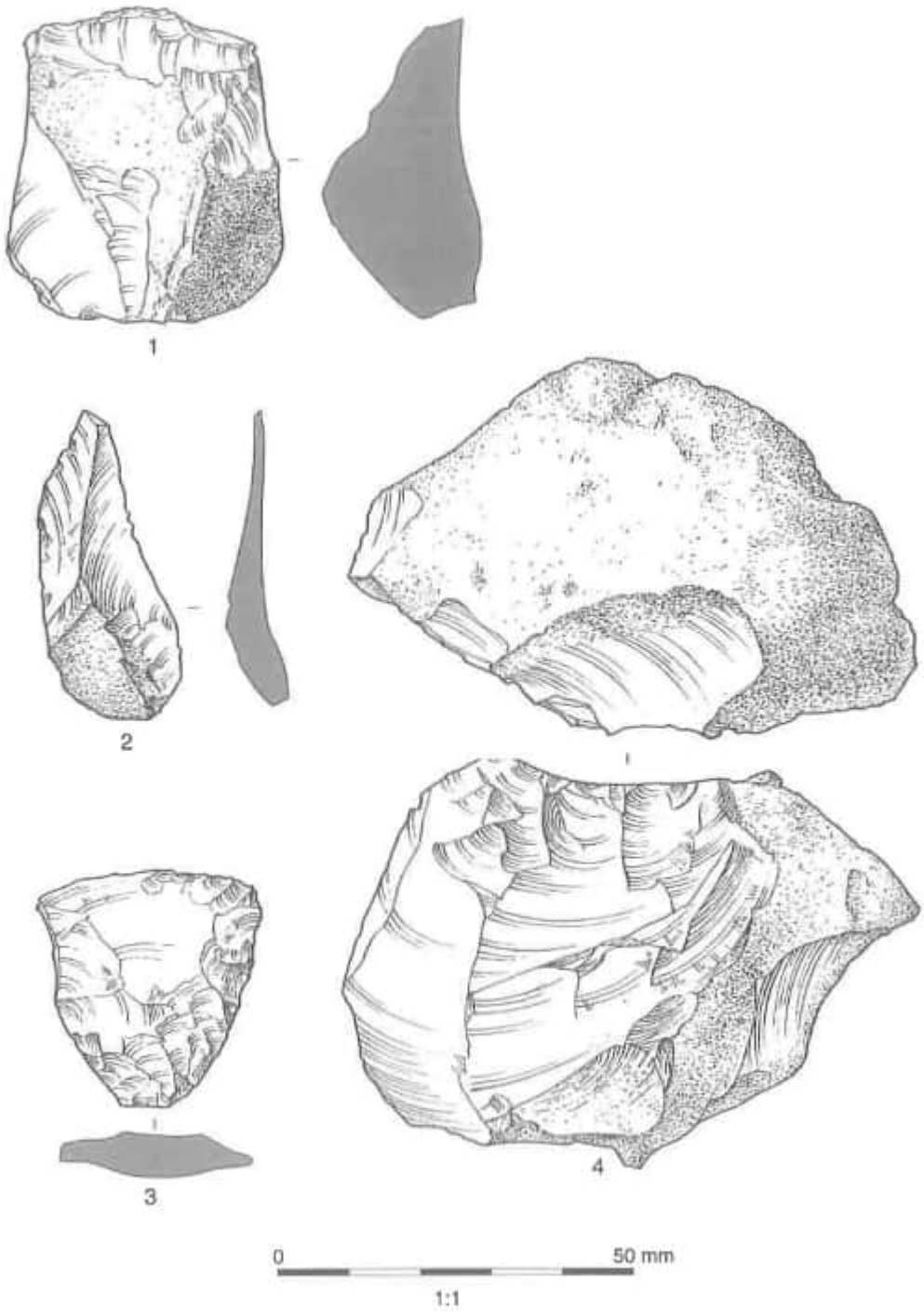


FIGURE 26 Worked flint

remain speculative given the limited nature of the evidence. The majority of the debitage is, however, much less carefully worked and likely to be later in date, perhaps later Neolithic given the general lack of demonstrably Bronze Age flintwork other than one unfinished knife or arrowhead (Fig. 26.3).

All stages of the reduction sequence were recovered but chips and smaller pieces seem to be underrepresented. This is likely to be due to recovery methods rather than representing a real absence. Some possible differences in the types of flakes recovered were noted between the layers making up the flint scatter in Trench 1; for example context 114 which was the fifth 0.05 m spit in layer 104 produced many more non-cortical flakes than context 105, the top spit in that layer. It is possible that differential dumping of flint was occurring in this part of the site (see below).

Unfortunately the few retouched forms recovered do not really assist with dating; they include only a retouched flake (Fig. 26.1), two very worn serrated flakes (eg Fig. 26.2), three minimally worked scrapers and a probable unfinished knife or arrowhead (Fig. 26.3). Serrated flakes occur in both Neolithic and early Bronze Age assemblages and scrapers are difficult to date individually (*cf.* Riley 1990). The unfinished knife or arrowhead has been invasively retouched and may be early Bronze Age in date. This piece would seem to be later than the majority of the flint recovered and may therefore be a chance loss. It came from Test Pit 11 which was located to the north-east of the Neolithic barrow, away from the main areas of activity.

The retouched pieces were scattered across the site, coming from the flint scatter in Trench 1 and the test pits, and a scraper came from the re-excavation of the Neolithic barrow. The limited number of retouched forms clearly relates to the function of the assemblage. Little usewear was noted (Bradley 2004). This suggests that the majority of the material recovered is waste produced while roughly shaping the flint before further working elsewhere. It seems likely that the raised knoll with naturally-occurring flint nodules (Mound 1) was used to undertake the initial preparation and shaping of the flint. The few retouched and used pieces that were recovered perhaps reflect other activities being carried out across the site.

The material from the *in-situ* scatter in Trench 1 is dominated by debitage; only three, undiagnostic, retouched pieces were recovered (Table 2). There seems to be a greater proportion of irregular and less carefully worked flakes from the assemblage. The slightly greater numbers of blades and blade-like flakes from Trench 1 may simply reflect the quantity of flint recovered from this trench. Although not closely datable technologically, this material may be later Neolithic. The numbers of trimming flakes suggest that the material represents initial knapping prior to working elsewhere. The flint scatter in Trench 1 can be seen as a tight cluster of material that has been slightly dispersed through time.

Elements of the assemblage are closely comparable to the material from the initial excavation of the site (Childe and Smith 1954, 217–9). This excavation produced a large number of trimming flakes and a few limited retouched forms. Four arrowheads were reported to have been recovered, two leaf-shaped arrowheads and 'two blades pointed by secondary working at the tip and bulbar end' (Childe and Smith 1954, 218–19, fig. 4.2–4); at least one of the latter category is a microlith (Bradley forthcoming). Holgate lists four leaf-shaped arrowheads from the site (1988, 242, table 4), and it is possible that more material existed originally but has not been seen by the present author. However, it is perhaps more likely that the misidentified pieces have been listed by Holgate.

Table 3 summarises the flint recovered from Scott's spoil and backfill layers during the re-excavation of the Neolithic barrow. It can be seen that flakes dominate; only two chips, a single core and a small quantity of burnt unworked flint was recovered from these layers. This reflects the composition of the 1930s assemblage recovered from the site (*cf.* Bradley forthcoming). Two layers in particular produced most of this material (4103 and 4114), a mixed backfill layer and the topsoil over the barrow.

Summary

Flint scatters have been found along the Chiltern ridge and on the fields beneath (Holgate 1988, 244, map 12; 1995, 10–13), and the material from Whiteleaf Hill seems to fit into the local pattern. The *in-situ* scatter from Trench 1 seems to be the result of exploiting locally-occurring flint, the slightly raised knoll providing a suitable place for the initial reduction stages. The paucity of retouched forms and the few instances of usewear suggest that the assemblage is primarily waste from

TABLE 3 Summary of flint from the backfill of Scott's excavations

Context	*Flakes*	*Blades, blade-like flakes etc*	*Chips*	*Cores*	*Burnt unworked flint*	*Total*
4103	67	1		1 (single platform flake core)	8	77
4113	1					1
4114	31		1		1	33
4135	2					2
4138	2					2
4142	2		1			3
4143	2					2
Total	**107**	**1**	**2**	**1**	**9**	**120**

initial shaping of cores which were then removed for knapping elsewhere. Although not closely datable, the flint from Trench 1 may be later Neolithic in date. Flint nodules may also have been encountered during the digging of the Neolithic barrow ditches and knapped down on the site before removal for further working or use elsewhere. The flint from the re-excavation of the Neolithic barrow produced flint that was virtually indistinguishable from that recovered from the original excavation of the monument (Childe and Smith 1954). Again, diagnostic material was not abundant but leaf-shaped arrowheads were recovered from the 1930s excavations (Childe and Smith 1954, 218, fig. 4, numbers 2 and 4).

Catalogue of illustrated flint (Fig. 26)
1. End scraper, made on a thick flake from a small worn pebble, steeply retouched. Ctx 115, spit 5.
2. Serrated flake, heavily corticated and very worn. Made on a partly cortical blade-like flake. Ctx 115, spit 5.
3. Knife or arrowhead, ?unfinished. Neatly retouched along one edge with invasive retouch. Ctx 3110, TP 11.
4. Single platform flake core, some platform-edge preparation. Heavily corticated. Ctx 4103.

Copper alloy objects by Leigh Allen
Nine copper-alloy objects were recovered during the 2002–6 fieldwork at Whiteleaf, in addition to a number of modern pennies (Table 4). These include a votive leaf from the windmill mound (see Crerar below), a Roman pin from the topsoil of the Neolithic barrow and three Roman coins, two from topsoil over the Neolithic barrow and one from the windmill mound. Four Roman coins (all 4th century) were also reported from the 1930s excavations (Childe and Smith 1954, 229). The buckle fragment is likely to be post-medieval. Other items are either undated or modern.

Coins (identified by Paul Booth)
SF 1 – GLORIA ROMANORUM, Emperor and captive 364–378, Ctx 4103
SF 2 – Very worn 4th century Roman coin, Ctx 4102
SF 5001 – Antoninianus, 17 x 20 mm. Eroded. Obv: ?? ...TETR]ICVS P[F AUG, radiate head r. Rev: PAX AVG. Pax l. AD 270–273 if Tetricus, Ctx 5003

Pin – has a domical head of green glass D:7 mm and a copper-alloy shaft of rectangular section L:54 mm. An almost identical example was recovered from Winchester (type C) from a context dating from the early 11th-12th century (Biddle 1990, 554–557, fig. 150, No.1439). Glass-headed pins are quite frequently found in Romano-British contexts and, as with the Winchester example, this item could be regarded as a residual item of Romano-British manufacture. Ctx 4102

Copper-alloy strip – L:28 mm curved along its length and flaring towards one end. Plain but possibly plated with a white metal coating, possibly silver or tin. Ctx 4102

TABLE 4 Copper-alloy objects

Location	*Ctx*		*SF No*	*Description*
Neolithic barrow	4102	Topsoil	2	Roman coin Modern pennies Part of a cartridge case Pin with a domical head of green glass Copper-alloy strip
Neolithic barrow	4103	Scott's backfill	1	Roman coin Modern pennies Tin plated modern mount and decorative fitting Decorative copper-alloy strip
Neolithic barrow	4113	Scott's backfill		Modern pennies
Curvilinear ditch	3320			One penny (modern)
Windmill mound	5003	Upper part of mound	5000	Roman coin
	5006	Lower part of mound	5001	Roman votive leaf

Decorative copper-alloy strip – curved along its length and expanded at the centre to form a circular plate with two small perforations through it. On either side the strip is decorated with raised ridges of knurling. Possible fragment from a buckle frame/shoe buckle. Ctx 4103

A copper-alloy votive 'leaf' from Whiteleaf Hill by Belinda Crerar

Description

The copper-alloy votive 'leaf' plaque recovered from the windmill mound (Mound 2) on Whiteleaf Hill was made from a triangular metal sheet incised with repoussé lines from the reverse (Plate 11). It is now 55 mm in length, but would be about 60 mm when flat, and approximately 26 mm in width at its base, tapering to 3 mm at the tip. It is extremely thin, less than 0.5 mm, and weighs 2 g. A central incised line extends the length of the plaque with seven shorter lines on each side, emanating from it at oblique angles and resembling the veins of a leaf. The oblique lines are not symmetrical on either side of the central vein, as some near the tip consist of two 'sketchy' lines rather than one neat line, implying that they were drawn quickly and with little care.

The plaque is complete and in fairly good condition considering its fragility, although the edges, particularly on the left hand side, are slightly chipped and there has been slight pitting through the surface particularly around the apex. One of the corners at the base is folded back towards the reverse. The plaque has also been bent slightly in two places, once near the centre and again near the tip so that it no longer lies flat but is slightly bowed. The plaque has discoloured due to the corrosion of the copper alloy, but on the reverse side, where it has been bent and slightly broken near the centre, the original gold colour of the alloy is still partially visible, giving an impression of its original appearance. The metallurgic content of the plaque has not been analysed.

Discussion

This 'leaf' is one of a number of similar 'leaves' dated to the Roman period and discovered not only in Britain but across Europe and also east into ancient Galatia, in modern Turkey (Toynbee 1978). They have been broadly dated to the 2nd to 4th centuries AD based largely on contextual evidence since, due to their simplicity, it is difficult to ascertain any kind of stylistic chronology (Crerar 2006). Even the more elaborate examples which bear inscriptions and, occasionally, figural decoration are still too rudimentary to be dated.

The majority of the known examples are associated with pagan worship, having either been found with inscribed dedications or other decoration linking them with particular deities, or discovered within known pagan religious sites. However, Christian examples are known, specifically the

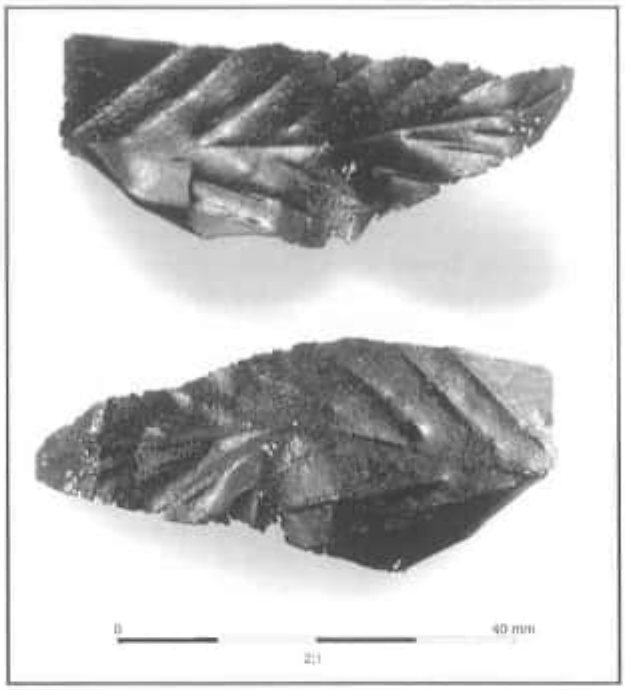


PLATE 11 Copper-alloy votive leaf

silver and gold plaques discovered within the Water Newton hoard of Christian church plate (Painter 1975; 1977). Although the Water Newton plaques are the only definitely Christian examples of these plaques, and may present an anomaly, it is also possible that such leaves could post-date the 4th century if they were being used in Christian worship. It seems more likely, however, that the Whiteleaf plaque belongs to the period before the late 4th century, when paganism gave way to Christianity and temple sites largely went out of use.

It is generally agreed that these plaques would have been made by a smith, hammering out the metal and incising the lines from the reverse (Crerar 2006). They would then have been sold to worshippers either at his workshop or, more likely, at the sanctuary or shrine itself. They then would have been taken to the shrine and offered to the relevant god either in anticipation of divine assistance or as an *solutiones*, a gift of thanks after a favour had been granted. The idea is similar to buying a candle in church and lighting it with a prayer, although it differs in its assumption that giving the god something of monetary value would make him or her more inclined to assist the donor. One aspect that remains debatable is how these plaques were displayed within the shrines. Some of the more elaborate examples have small punched holes at the top or bottom, presumably for affixing them to a board or directly onto a wall, or they have a rectangular or trapezium-shaped foot at their base so that they could be slotted into some kind of holder. However, the majority of plaques are similar to the Whiteleaf example and have nothing on them to indicate how they would have been exhibited. This is particularly true of the smaller copper-alloy plaques but is also the case with many of the more expensive versions. They were probably simply laid on or around the altar, possibly in some kind of receptacle. Indeed, a stone altar from the sanctuary at Uley shows a number of leaves carved around its base, perhaps indicating that these leaves were customarily placed at the foot of altars.

As a general rule in Roman votive worship, the greater ones financial means, the more generous one was expected to be with offerings (Crerar

2006). As mentioned above, much more elaborate examples of this style of 'leaf' plaque are known and, within the category, there appears to have been a fairly wide spectrum of relative value. The most expensive examples were larger and made of precious metals. They also bore extravagant decoration in the form of intricate incised patterning, figural scenes and, occasionally, personalised inscriptions naming the donor and god to whom they were dedicated. Examples are known from Barkway, Hertfordshire, and Stony Stratford, Buckinghamshire (Lysons 1813–17). The Whiteleaf plaque, however, is at the other end of the spectrum and falls within a comparatively large group of fairly unremarkable small copper-alloy plaques of lesser value, discovered wherever they happened to have been lost rather than concealed in hoards like those of silver and gold. Examples are known not far from the site at Whiteleaf Hill, particularly at the Romano-British temple site at Woodeaton in Oxfordshire and at Higham Ferrers, Northamptonshire (Bagnall Smith 1995; 1998; Lawrence *et al.* forthcoming). However, leaves were not the cheapest of the votive objects and were probably more expensive than, say, the ubiquitous pipe clay figurines. This may be inferred from the fact that they are comparatively rare and that, even where many similar plaques are found together, such as the smaller plaques within the Water Newton hoard, some effort seems to have been made to vary the incised patterning on each leaf. This may have been an attempt to give each plaque its own unique character and make it a more personal gift for the god than, for example, the moulded figurines.

Leaves would have been appropriate offerings for the gods because of their symbolic importance in pagan traditions, not least the laurel and the palm as symbols of victory. A plaque from Stony Stratford depicts the goddess Victory carrying a palm over her shoulder and incised leaves shaped like laurels are found on plaques dedicated to Vulcan in the hoard at Barkway (Lysons 1813–17). However, it seems more likely that the origins of these votive 'leaf' plaques lie in *aurum coronarium*, the Crown Gold, a tribute paid by the provinces to the emperor as a display of their gratitude for his protection and services to their cities. Traditionally, this took the form of wreathes fashioned from gold or silver leaves, as shown in the Notitia Dignitatum under the duties of the *comes sacarum largitionum*, the Count of the Sacred Largess (Berger 1981). It is easy to see how the giving of precious metal leaves to the emperor, or from the emperor to his subjects, could be transferred to the divine realm, offerings being made to the gods to ensure their protection and services. Doubtless, over time, the origin of the practice was forgotten and metal leaf plaques became standard votive gifts.

As these leaves are associated with votive worship and have generally been discovered at sites known to have had some kind of religious significance, the discovery of the leaf plaque at Whiteleaf Hill may indicate the presence of a shrine. However, it would be unwise to construct such a theory on the existence of only one small votive leaf. The mere presence of the Neolithic barrow and other early features in the area may have led to a belief that this was a place of mystical importance and worthy of veneration. Even without the physical presence of a shrine, votive objects may have been offered to the *genius loci* or simply because this was considered an appropriate place to communicate with the gods. Plaques have been discovered away from religious settings, for example that found during the excavations of a domestic site at Roughground Farm, Gloucestershire (Allen *et al.* 1993, 144–147, fig. 94.26), although even this may have been offered at a household shrine. Nevertheless, as the overwhelming majority of plaques are directly associated with religious sites, it seems reasonable to attribute some spiritual significance to the Whiteleaf Hill discovery, even though no physical evidence of a shrine has been discovered.

Bone and antler find by Emma-Jayne Evans

A small number of bone/antler objects were recovered from the Neolithic barrow and its ditch in the 1930s (Childe and Smith 1954, 219): a small bone pin, three red deer antlers (one shed) and a beaver's tusk (longitudinally split but showing no traces of working). In 2003, a fragment of red deer antler was recovered from the upper mound of the Neolithic barrow (4104). It is in poor condition, with much of the surface abraded and what appear to be fresh breaks around the base. The fragment is an unshed antler, but the condition is too poor to determine if it has been worked or chopped. Red deer continued to be hunted during the Neolithic period, so it is not surprising to find red deer remains on this site. It is possible that this antler was used in the excavation of part of the ditch of the barrow, and the radiocarbon date on this object

TABLE 5 Other finds from Whiteleaf Hill

	Context	*Glass*	*Iron*	*Clay pipe*	*Shell*	*CBM*
Neolithic barrow: topsoil	4101, 4102	121	29	15	167	11
Neolithic barrow: Scott's backfill	4103, 4113-4, 4135	168	35	33	1	49
Neolithic barrow: upper ditch fill	4193, 4130, 4170	5	5		1	
Cross-ridge dyke: ? saw pit	308		1			
Curvilinear ditch	3320	59		3		2
Windmill mound: topsoil	200			3		
Windmill mound: upper fill of cross-beam base	201					1
Whiteleaf Cross trench	4204	1				
WW1 practice trench fill	404		2			
Test pit 6	3061			1		
Test pit 10	3100			1		
Test pit 16	3160	15		2		
Test pit 17	3170		1			
Test pit 18	3180					1
Test pit 22	3220, 3223	8				1
Test pit 25	3250	5				
Test pit 28	3280	35				
Test pit 30	3300	2				
Test pit 31	3310	4				5
U/S: Ground surface above Cross			1			

(see below) suggests that this would have been associated with later 4th-millennium digging and barrow augmentation. Red deer antlers were often used as tools such as picks and rakes, such as those recovered at Hazleton North (Levitan 1990), and Grimes Graves (Legge 1992).

Other find by Leigh Allen

Large quantities of 19th – 21st-century glass and metal were recovered from the backfill of Scott's excavations and the topsoil over the barrow, as well as from the upper layers of other excavation trenches and a number of the test pits; most of these finds date from 1930 to the present day. Iron, clay pipe, shell and ceramic building material were also found, including a musket ball and a metal shot. These finds are summarised in Table 5.

Large quantities of barbed wire were found within the topsoil of the barrow and Scott's backfill, which appear to have originated from the fence surrounding the 1930s excavation of the Neolithic barrow. Additionally, a range of modern items have been recovered, such as plastic bottle tops and beads, leather watch straps, spectacle frames, metal parts for engines and tin foil.

Two imported stone fragments were found in the backfill of the 1930s trench. These were identified by Ruth Shaffrey as being of Culham Greensand from the Upper Thames Valley. One had two worked surfaces suggesting that it was a fragment of a rotary quern. The recovery of stone from this source was a surprise, but as it came from an unstratified context, little can be said about its presence.

ECOFACTUAL EVIDENCE

The animal bone by Emma-Jayne Evans

Introduction

A total of 78 fragments (489 g) of animal bone and teeth were recovered during the excavations on Whiteleaf Hill in 2002 (Trenches 1 – 4) and 2003 (the Neolithic barrow). Additionally, 11 fragments came from the topsoil and uppermost fill of ditch 3333 in Test Pit 32 in 2005, and six fragments were recovered from test pit sieving (two fragments each in Test Pits 22, 28 and 31). The bone from the 1930s excavations cannot be found, but is reported to comprise 38 red deer fragments, 23 fragments of

pig, 10 of sheep, 9/12 of roe deer, two bird bones and a beaver lower incisor (Childe and Smith 1954, 219).

Methodology

Identification of the bone excavated in 2002 and 2003 was undertaken at Oxford Archaeology with access to a reference collection and published guides. With the exception of the animal bone from test pits, which was small in quantity and from undated or recent contexts, all the animal remains were counted and weighed, and where possible identified to species, element, side and zone (Serjeantson 1996). Fusion data, butchery marks, gnawing, burning and pathological changes were also noted when present. Ribs and vertebrae were only recorded to species when they were substantially complete and could be accurately identified. Undiagnostic bones were recorded as small (small mammal-size), medium (sheep-size) or large (cattle-size). An attempt was made to separate sheep and goat bones using the criteria of Boessneck (1969) and Prummel and Frisch (1986), in addition to the use of the reference material housed at OA but, since no distinctions could be made, the bone was recorded as sheep/goat (s/g).

The condition of the bone was graded using the criteria stipulated by Lyman (1996), grade 0 being the best-preserved bone and grade 5 indicating that the bone had suffered such structural and attritional damage as to make it unrecognisable.

The quantification of species was carried out using the total fragment count. Tooth eruption and wear stages were measured using a combination of Halstead (1985) and Grant (1982), and fusion data was analysed according to Silver (1969). Measurements of adult (fully-fused) bones were taken according to the methods of von den Driesch (1976), with asterisked (*) measurements indicating bones that were reconstructed or had slight abrasion of the surface.

Quantity of Material

The bone analysed included both the hand-collected and sieved material, and was recorded in full. Of the hand-recovered material, any broken fragments were re-fitted, reducing the number of bone and teeth to 58 fragments. Table 6 shows the number of sieved and unsieved bones recovered from the site.

Species Representation

A total of 36 fragments were identified to species, 63% of the total fragment count (Table 7). From the site as a whole the main domestic species are represented, with red deer and rabbit representing wild species, and domestic fowl and wood pigeon representing birds. The only bone identified from a secure Neolithic context was a red deer bone from the second phase of the barrow mound. The presence of rabbit and domestic fowl in context 4102 suggests that this context has suffered from a degree of disturbance, as these species were not introduced until much later than the Neolithic period.

Condition

The animal bone has survived in relatively poor condition, with the majority of the bone scoring 4 according to Lyman's (1996) grading (Table 8). Gnawing and butchery marks were only noted on one bone from this site, and it is likely that the poor

TABLE 6 Total number of animal bones present from Whiteleaf Hill

Location	*Context*	*Unsieved*	*Sieved*	*Total*
Trench 3				
Lower fill of cross-ridge dyke	303	–	2	2
Neolithic barrow				
Barrow: topsoil	4102	28	–	28
Barrow: Scott backfill	4103	19	–	19
Barrow: upper barrow mound	4104	1	–	1
Barrow: slumping from mound	4169	1	–	1
Barrow: upper ditch fill	4170	5	–	5
Barrow: upper ditch fill	4193	1	–	1
	Total	55	2	57

TABLE 7 Total number of animal bones identified to species and context

Context	*Phase*	*Sheep/ goat*	*Pig*	*Cattle*	*Dog*	*Red deer*	*Deer*	*Rabbit*	*Domestic fowl*	*Wood pigeon*	*Bird*	*Unid.*	*Total*
303	LBA/EIA	–	–	–	–	–	–	–	–	–	–	2	2
4102	Modern	7	3	1	1	–	2	2	2	1	–	9	28
4103	U/S	–	2	–	–	1	–		–	–	9	7	19
4104	Neolithic	–	–	–	–	1	–	–	–	–	–	–	1
4169	Uncertain	1	–	–	–	–	–	–	–	–	–	–	1
4170	Uncertain	2	–	1	–	–	–	–	–	–	–	2	5
4193	Uncertain	–	–	–	–	–	–	–	–	–	–	1	1
Total		10	5	2	1	2	2	2	2	1	9	21	57

TABLE 8 Condition of the hand-collected and sieved material

	Condition			
Context	*1*	*2*	*3*	*4*
303	–	–	100.0%	–
4102	10.7%	28.6%	28.6%	32.1%
4103	–	47.4%	10.5%	42.1%
4104	–	–	–	100.0%
4169	–	–	100.0%	–
4170	–	–	40.0%	60.0%
4193	–	–	–	100.0%
Total	5.2%	29.3%	27.6%	37.9%

surface condition has hindered the identification of such processes.

Charred plants by Dana Challinor

Introduction

Two bulk 50 litre samples were taken from the Neolithic barrow for the recovery of charred plant remains, one from the possible 'midden' material (4154; Figs 13 and 14) described by Scott, and one from the barrow mound immediately below the topsoil (4104; Fig. 13). The sample from the upper barrow mound (4104) was not thought to be worth assessing as it clearly included recent material. Three samples were also taken from fills of the cross-ridge dyke (Trench 3) along with one from the layer containing the flint scatter in Trench 1.

Methodology

The samples were processed by flotation using a modified Siraf-type machine, with the flot collected on a 250mm mesh. After air-drying the flots were scanned for material under a binocular microscope at x10 and x20 magnification.

Results

The flots were medium to large in size and all were dominated by tree roots (Table 9). A few modern seeds were also present. Molluscs were abundant, and specific samples have been assessed separately (see Stafford below). Occasional fragments of wood charcoal were noted in the samples; several taxa were represented, including Quercus sp. (oak), Ilex aquifolium (holly) and cf. Fraxinus excelsior (ash). No other charred plant remains were recorded.

Land mollusca by Elizabeth C. Stafford

Introduction

The calcareous nature of the soils at Whiteleaf Hill, situated on Upper Chalk overlain by patchy

TABLE 9 Results of the assessment of the charred plant remains

Location	*Sample Number*	*Context number*	*Charcoal*	*Snails*	*Modern contamination*
Trench 1	1	114	–	++	++++
Trench 3	3	308	++	++++	++++
Trench 3	4	306	+	++++	++++
Trench 3	5	315	–	++	++++
Neolithic barrow	11	4154	+	+++	++++

+ = present, ++ occasional, +++ frequent, ++++ abundant

drift deposits of clay-with-flints, are generally conducive to the preservation of mollusc shell. During the 2002–2006 excavations, 48 samples were taken for the retrieval of molluscan assemblages. Following an initial assessment, 23 samples were selected for full analysis. The samples derive from a sequence of deposits beneath the Neolithic barrow, from the make-up of the barrow itself and from the fill of the barrow ditch. Bank and ditch deposits associated with a cross-ridge dyke and a curvilinear earthwork, believed to be of late Bronze Age to Iron Age date, were also examined, along with a single sample from beneath the windmill mound.

The samples, 1–2 kg of sediment, were processed at Oxford Archaeology following the methods of Evans (1972). Nomenclature follows Kerney (1999) and habitat groupings follow the scheme of Evans (1972; 1984). The Shannon Weiner (H') and Brillouin (HB) diversity indices have been calculated on a number of the sequences following the formulae of Magurran (1988). The variation between the two indices (H'-HB) could be considered an indicator of the degree to which the assemblages can considered to be autochthonous (Evans 1991). The shell counts are presented in tabular format (Table 10) and as percentage frequency histograms (Fig. 27). The species in the histograms are ordered from left to right on the basis of broad ecological groupings, shade-demanding, catholic and open-country species.

Results

(i) The Neolithic barrow: the pre-barrow deposits

One profile, covering a depth of 25 cm, was examined in detail through deposits beneath the barrow mound (section shown on Figure 14). At the base of the sequence was subsoil layer 4153, a compacted reddish-brown clay with flint and chalk fragments. This was overlain by layer 4154, a more humic dark-brown clay silt interpreted as either the remains of a possible pre-barrow soil or the edge of the inner core of the barrow. The sequence was sealed by layer 4155, a compact mid grey-brown to yellow-brown silt clay with chalk fragments interpreted as a barrow makeup layer.

Overall preservation of shell was quite poor, possibly due to the low pH of the clay-with-flints which overlay the chalk bedrock. Abundance was greater in the lower part of the sequence which included the upper 5 cm of layer 4153 and lower 5 cm of layer 4154, where 73 and 65 individuals were recorded respectively. The assemblages were dominated by shade-demanding taxa, achieving up to 85% of the assemblages. The most abundant species were *Discus rotundatus, Carychium tridentatum* and various zonitids, suggesting an enclosed environment with abundant leaf litter. Lesser numbers of rupestral species were also noted that habitually live on and under fallen logs and tree trunks *(Clausilia bidentata, Cochlodina laminata, Acanthinula aculeata)*. Open-country species were absent, apart from occasional shells of *Vallonia costata* and *Pupilla muscorum*. Overall, although the assemblages were sparse, they were consistent with an environment of broadleaf deciduous woodland. Within layer 4154, there was a marked reduction in shell abundance up-profile, with only eight individuals recorded in the top 5 cm of the layer, possibly indicating that incipient decalcification had occurred at this horizon. An increase in abundance to 66 individuals was noted within the overlying barrow make-up layer 4155, probably due to the presence of chalk fragments producing more calcareous conditions. This assemblage was similarly dominated by shade-demanding species

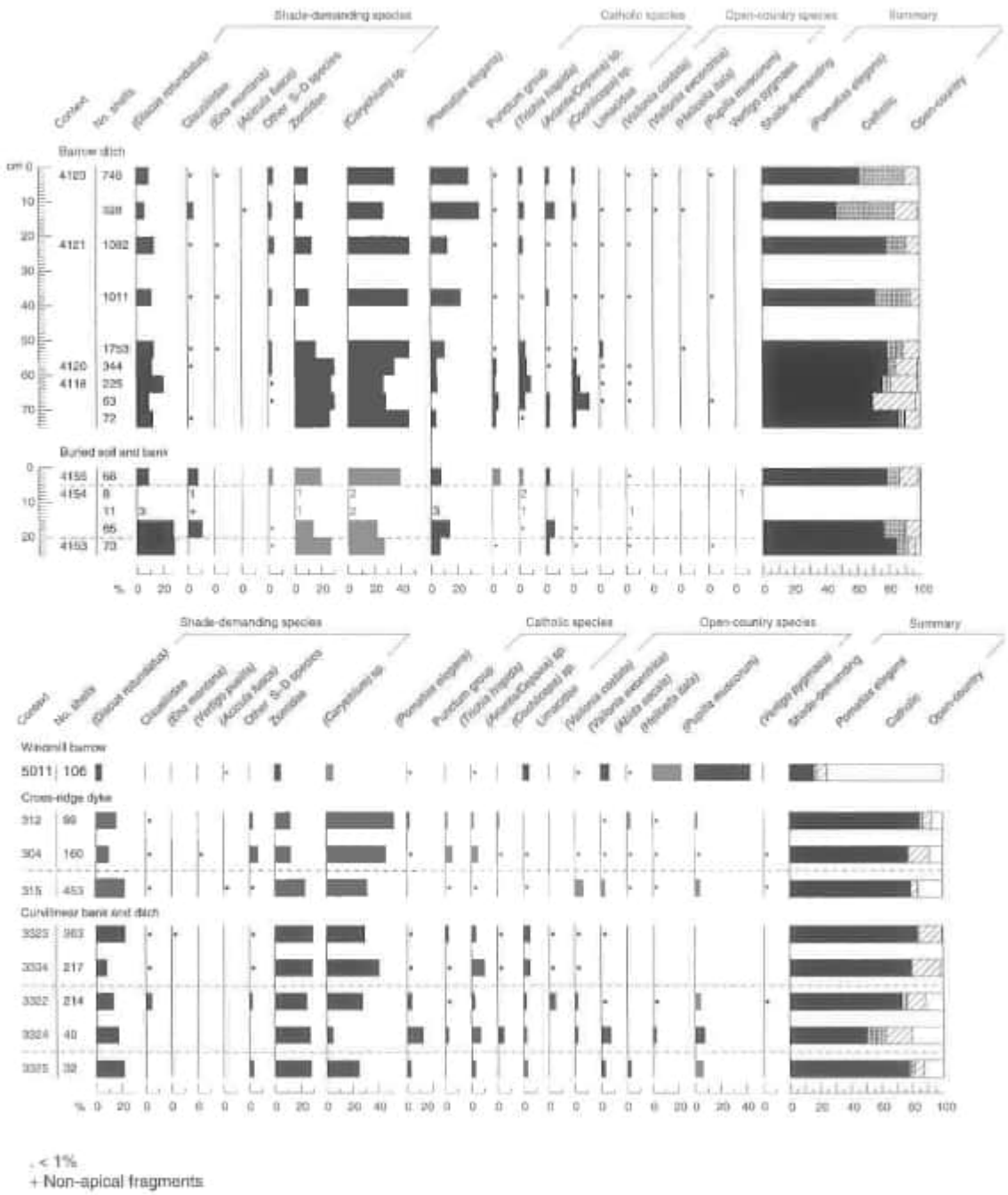


FIGURE 27 Land molluscs from the Neolithic barrow, the curvilinear bank and ditch, the cross-ridge dyke and beneath the windmill mound

TABLE 10 Quantification of identifiable mollusc fragments

	Neolithic Barrow														*Curvilinear bank and ditch*					*Cross-ridge dyke*			*Windmill barrow*	
	Subsoil; Buried soil				*Bank; Ditch*										*Buried soil;*	*Bank*		*Ditch*		*Buried soil;*	*Ditch*		*Buried soil*	
Sample number	8	6	6	6	10	12	12	13	13	14	14	14	17	17	5004	5003	5002	5006	5005	5*	6	6	5000	
Context number	4153	4154	4154	4154	4155	4118	4118	4118	4120	4121	4121	4121	4123	4123	3325	3324	3322	3334	3323	315	312	304	5011	
Taxa																				–				
Pomatias elegans (Müller)	5	9	3	–	5	3	+	11	15	178	227	136	120	214	1	5	8	1	3	–	2	1	2	
Acicula fusca (Montagu)	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	5	–	–	1	
Carychium cf. *tridentatum* (Risso)	20	14	2	2	26	33	18	60	120	811	460	502	89	263	8	2	59	88	107	143	52	74	6	
Cochlicopa sp.	1	1	–	1	–	2	7	13	11	15	6	13	9	16	1	1	5	7	18	5	–	3	2	
Cochlicopa lubrica (Müller)	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	2	–	1	–	–	1	
Cochlicopa lubricella (Porro)	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	2	–	–	–	–	2	
Vertigo pusilla (Müller)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	
Vertigo pygmaea (Draparnaud)	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	4	–	–	5	–	1	–	
Abida secale (Draparnaud)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	2	3	3	2	
Pupilla muscorum (Linné)	1	–	–	–	–	–	1	–	–	–	1	–	–	5	2	3	9	–	–	19	2	3	46	
Vallonia sp.	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	11	–	–	–	
Vallonia costata (Müller)	1	–	1	–	1	–	1	4	6	–	2	5	3	1	–	1	5	3	1	26	–	3	1	
Vallonia excentrica (Sterki)	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1	3	2	–	1	6	1	3	7	
Acanthinula aculeata (Müller)	1	1	–	–	1	–	1	1	5	36	24	36	9	25	1	–	3	–	2	7	2	6	–	
Ena Montana (Draparnaud)	–	–	–	–	–	–	–	–	–	1	1	4	–	7	–	–		–	1	–	–	–	–	
Ena obscura (Müller)	–	–	–	–	1	–	–	2	3	8	3	10	–	3	–	–	2	1	–	2	1	4	–	
Punctum pygmaea (Draparnaud)	–	–	–	–	3	2	2	1	5	5	7	6	–	7	–	–	2	–	3	9	2	9	–	
Discus rotundatus (Müller)	21	18	3	–	6	9	6	46	41	229	115	145	20	70	7	7	29	18	82	97	16	16	5	
Vitrina pellucida (Müller)	–	–	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–	4	6	–	–	–	–	
Vitrea sp.	–	1	–	–	–	8	2	7	23	56	13	12	3	9	–	–	–	–	–	–	–	6	–	
Vitrea crystallina (Müller)	1	–	–	–	–	–	–	–	2	13	5	12	1	–	–	–	–	–	–	6	2	–	–	
Vitrea contracta																								

(Westerlund)	3	–	–	–	3	4	4	12	10	15	6	14	1	8	4	2	14	19	28	27	2	3	2	
Nesovitrea hammonis (Ström)	–	–	–	–	–	–	–	4	7	1	–	–	–	–	–	1	1	–	–	–	–	–	–	
Aegopinella pura (Alder)	1	–	–	–	4	–	5	23	27	43	20	21	6	30	1	1	3	1	8	11	2	2	–	
Aegopinella nitidula (Draparnaud)	3	3	1	–	3	6	8	14	28	55	40	37	2	15	3	–	10	19	26	30	4	5	–	
Oxychilus cellarius (Müller)	12	5	–	1	3	1	–	6	13	95	24	42	7	15	1	8	26	24	45	27	2	4	3	
Euconolus fulvus (Müller)	1	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Clausiliidae	–	1	+	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	
Cochlodina laminata (Montagu)	–	5	–	–	3	1	–	–	1	15	7	13	15	10	–	–	5	–	3	1	–	–	–	
Clausilia bidentata (Ström)	–	1	–	–	2	–	–	–	1	4	2	1	–	3	–	–	5	2	–	–	1	1	–	
Helicella itala (Linné)	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	1	4	–	–	8	1	1	24	
Trichia striolata (Pfeiffer)	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Trichia hispida (Linné)	–	1	1	2	2	1	3	20	20	88	19	34	13	22	1	3	6	23	13	5	2	9	2	
Arianta arbustorum (Linné)	–	–	–	–	–	–	–	–	–	+	–	–	1	–	–	–	–	+	–	–	–	–	–	
Helicigona lapicida (Linné)	–	–	–	–	–	–	–	–	+	1	+	+	–	–	–	–	–	–	–	–	–	1	–	
Cepaea/Arianta sp.	2	4	–	–	2	2	2	–	3	21	20	13	18	11	–	2	–	1	7	–	1	1	–	
Cepaea sp.	–	–	–	–	–	–	–	+	+	11	4	7	4	11	–	–	–	+	–	–	1	–	–	
Cepaea nemoralis (Linné)	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	+	–	–	–	–	–	–	
Limacidae	–	–	–	–	–	–	1	1	2	50	5	19	2	–	–	–	11	2	7	–	–	–	–	
Total of number individuals	**73**	**65**	**11**	**8**	**66**	**72**	**63**	**225**	**344**	**1753**	**1011**	**1082**	**328**	**746**	**32**	**40**	**214**	**217**	**363**	**453**	**99**	**160**	**106**	
Diversity (H')	**1.97**	**2.02**	**1.67**	**1.55**	**2.23**	**1.84**	**2.38**	**2.25**	**2.34**	**1.97**	**1.80**	**1.98**	**2.00**	**2.00**	**2.20**	**2.38**	**2.50**	**2.03**	**2.15**	**–**	**1.89**	**2.18**	**1.85**	
Diversity (H'-HB)	**0.23**	**0.24**	**0.47**	**0.53**	**0.31**	**0.22**	**0.33**	**0.12**	**0.11**	**0.03**	**0.04**	**0.04**	**0.10**	**0.06**	**0.43**	**0.41**	**0.16**	**0.12**	**0.09**	**–**	**0.24**	**0.20**	**0.18**	

+ non-apical fragments only
* excludes residue assemblage

(79%), with additions including the woodland species *Ena obscura*.

(ii) The Neolithic barrow: the barrow ditch

Nine samples were examined from the barrow ditch to the west of the mound (4117; Fig. 15, Section 1), and all contained useful quantities of shells. In the basal primary fill (4118), preservation was moderate with 72 individuals. The assemblages were dominated by shade-demanding species. Open-country species were entirely absent from this deposit. At this level in the ditch it is likely that the edges of the feature were eroding into the ditch, and the assemblages are likely to derive from the deposits into which the feature was cut, including any contemporary topsoil. There is a gradual increase in diversity up-profile with additional shade-demanding and catholic species suggesting a more complex environment developing, and a reduction in the H-HB index suggesting a more autochthonous assemblage. Shell numbers increased up the profile to 344 in layer 4120, suggesting a slow down in deposition, perhaps as the feature edges began to stabilise. Although the snail faunas may to some extent reflect micro-environments prevailing within the ditch, the continued predominance and rapid colonisation by shade-demanding species suggests substantial refugia persisted in the vicinity from which these snails could colonise. Any clearance associated with the cutting of the ditch may have been quite short-lived. The assemblages are characterised by the predominance of *Carychium tridentatum*. This species, along with *Acanthinula aculeata* and some of the zonitids, *Vitrea* sp. and *Aegopinella pura*, although classed as shade-lovers due to their small size, often occur in areas of long grassland. However, the presence of other species such as *Discus rotundatus*, Clausilidae and *Ena obscura* indicate relatively undisturbed mature woodland with abundant leaf litter. A dramatic rise in shell numbers to 1753 individuals occurred in the lowest sample of fill 4121, reflecting increased stability and soil formation in a rather enclosed environment. Additional species included *Helicigona lapicida*, *Trichia striolata* and *Ena Montana*. The presence of the latter may be considered a good indicator of established or ancient woodland.

Higher up the profile, in fill 4121, the *Pomatias elegans* curve increases a little which may indicate some disturbance in the vicinity. This is also suggested by the increase in artefactual material retrieved from this deposit. Although not out of place in a shaded woodland environment, increases in the abundance of *Pomatias elegans* are often associated with disturbance caused by clearance of vegetation, since such activity produces loose surface soil into which the snail can burrow (Evans 1972). Fill 4123 provides more substantial evidence for disturbance. Although the assemblages continue to be dominated by shade-demanding taxa, *P. elegans* increases to a maximum of 37%. There was also a small increase in catholic species to 15% along with an increase in the H'-HB index.

(iii) Later prehistoric earthworks: the curvilinear earthwork

Five samples were examined from the nearby curvilinear earthwork, thought to be later Bronze Age, or possibly early Iron Age in date (Fig. 19). The assemblages were similar to those from the Neolithic barrow ditch in that they were dominated by shade-demanding species, predominantly *Discus rotundatus*, *Carychium tridentatum*, various zonitids, and lesser quantities of Clausiliidae and *Ena* sp.. This suggests the continued presence of woodland or scrub into the Bronze Age. Although preservation was only poor to moderate, open-country species were most strongly represented in the samples from the soil beneath the bank (layer 3325) and from the bank make-up itself (layers 3324 and 3322), where they made up to 20% of the assemblages. This may suggest a more open aspect than in the Neolithic period, although still perhaps with woodland close-by. The presence of xerophile species such as *Vallonia excentrica*, *Helicella itala*, *Pupilla muscorum* and *Abida secale* possibly indicates areas of established short-turfed or grazed grassland prior to the construction of the feature. The latter two species may also indicate patches of bare or stony ground. Evans notes that the distribution of *Abida secale* in particular may be controlled locally as much by the moisture regime of the soil surface as the openness of the environment. In the Chilterns today, this species occurs in juniper sere habitats, and in light woodland on the steeper slopes above Princes Risborough (Evans 1972, 152).

In contrast, however, the samples from the associated ditch fills contained almost no open-country species apart from occasional *Vallonia*. Here, shade-demanding species predominate comprising

up to 84% of the assemblages. In the lowermost sample (layer 3334) numerically important species include *Carychium tridentatum* (41%), the zonitids (29%), and to a lesser extent *Discus rotundatus* (8%) and *Trichia hispida* (11%). In the sample above (layer 3323) the abundance of *Discus rotundatus* increases to 23% and *Ena montana* also appears. This probably indicates the growth of vegetation within the feature, perhaps initially long grass and then scrub. This is supported by the low numbers of *Pomatias elegans* suggesting a lack of disturbance and stable surfaces. The almost total absence of any open-country taxa suggests a very enclosed or sheltered environment and substantial woodland or scrub regeneration at least locally.

(iv) Later prehistoric earthworks: the cross-ridge dyke

Samples examined from a buried soil and ditch fills associated with the cross-ridge dyke produced similar assemblages to those from the curvilinear feature (Fig. 18). The assemblage from layer 315, believed to be a buried soil beneath the bank, derived from a larger bulk sample of approximately 40 litres of sediment. Unfortunately the fine residue, which may have contained some identifiable shell, had not been retained for examination. Although some species, *Pomatias elegans* for example, may therefore be under-represented, it is noteworthy that the flot contained an assemblage of 453 individuals of similar composition to the soil and bank deposits associated with the curvilinear ditch (layer 3325). Shade-demanding species accounted for 79%, and open country species 17% of the assemblage.

No samples were available from the primary levels within the ditch. The two samples examined from the secondary ditch fills (layers 304 and 312), were similarly dominated by shade-demanding species. Additional species included *Vertigo pusilla*, a snail of relatively limited distribution and extinct in this region of the Chilterns today. Although more common in the early postglacial in Southern England, the decline of this species generally coincided with large-scale woodland clearance during the later prehistoric period (Kerney 1999). Unlike the curvilinear ditch fills examined, open-country xerophile species *Helicella itala, Vallonia excentrica* and *Abida secale* were present in these fills, comprising up to 10% of the assemblages, perhaps suggesting the presence or maintenance of more open areas in the immediate vicinity during the infilling of this feature.

(v) The windmill mound

One sample was examined from the soil (layer 5011) beneath the windmill mound (Mound 2), which is believed to be of early post-medieval date (Fig. 21). The sample produced an assemblage unlike any of the other samples examined from the site. It was of low diversity, although preservation was only moderate, with 106 individuals identified. Open-country species comprised 76% of the total. Numerically-important species include the xerophiles *Pupilla muscorum* (43%) and *Helicella itala* (23%), with lesser quantities of *Vallonia excentrica* and *Abida secale*. Shade-demanding species comprised only 16% and catholic species 9% of the assemblage. This indicates a very dry, open environment in the vicinity, and is consistent with established short-turfed or grazed grassland.

Discussion of land mollusca

Overall, the evidence from the Whiteleaf Hill Neolithic barrow suggests the presence of woodland prior to construction, and there is no real evidence for the presence of relict open-country faunas within the pre-barrow deposits to suggest that the woodland was the product of secondary regeneration. *Pupilla muscorum, Vallonia costata* and *Vertigo pygmaea*, typically classed as open-country species, were noted, although they generally occurring as single shells. There are rare records of these three species living in woodland habitats, and it is possible that they were a component of postglacial woodland fauna on the chalk. *Vallonia costata* in particular has been recorded in small numbers in more enclosed environments. Evans (1972) suggested it could achieve up to 12% abundance in open woodland and 6% in closed canopy. On the basis of the snail assemblages, it is difficult to say what that woodland consisted of, other than it was fairly enclosed broad-leafed deciduous woodland with abundant leaf litter; snails are generally not as habitat-specific as, for example, insects (Thomas 1982).

Some level of woodland clearance must have occurred prior to construction of the barrow, but not long before. The small number of open-country colonists, both in the pre-barrow soil and lower fills of the barrow ditch, together with rapid colonisation by shade-demanding species, suggests a

localised clearance in an otherwise wooded area. The woodland may have acted as an ecological barrier to the effective dispersal of open-country species. The three species noted above are considered to be pioneering species. Already present within the woodland fauna, they characteristically exploit newly-opened areas of land before other open-country species, such as *Vallonia excentrica* and *Helicella itala* which only occur in later contexts. Given the prominent position of the barrow, however, even relatively-local clearance would suffice to give good views from the site. The thoroughly woodland character of the assemblages in the barrow ditch indicates the persistence of woodland around the site and rapid regeneration, perhaps suggesting clearance was temporary, possibly for the sole purpose of construction.

Later in the ditch sequence there is some indication of disturbance. Whether this represents an attempt to clear vegetation from the ditch and surface of the barrow, or natural erosion and collapse of the bank is not clear. If the former, there is no evidence to suggest that this was large-scale woodland clearance for the purpose of creating open ground for pasture or arable. The fact that open-country species remain relatively insignificant suggests such activity took place within a woodland setting with no suitable refugia close-by from which these species could colonise a newly cleared area.

The soil beneath the barrow at Whiteleaf has been investigated previously (Kennard in Childe and Smith 1954, 230), although no quantification or details of the soil profile were described. The results are, nevertheless, consistent with those found during this study. Two samples were examined: one yielded no molluscan remains and was interpreted as undisturbed subsoil as opposed to a 'true soil'. The other sample yielded 13 predominantly shade-loving species, particularly *Discus rotundatus*, *Pomatias elegans*, *Carychium* sp., various zonitids and catholic species. Open-country species were absent.

Several molluscan sequences previously investigated from dry-valley sequences attest to the development of closed woodland environments along the Chiltern escarpment during the Postglacial period. At nearby Pink Hill, for example, deposits from subsoil hollows beneath plough-wash deposits contained snail assemblages reflecting a closed woodland environment of Atlantic age (Evans 1972; 1993). The initial clearance at Pink Hill appears to have occurred in the Iron Age or perhaps a little earlier during the Bronze Age. Similar dates have been suggested for clearance sequences at Chinnor (Evans 1971; 1972), Pitstone (Evans 1972; Evans and Valentine 1974) and Pegsdon (Evans 1972; Sparks and Lewis 1957). A sequence from beneath the Bronze Age barrow on Bledlow Cop, on the opposite side of the Risborough Gap, produced a dry grassland fauna (Evans 1972, 316; Kennard in Head 1938), although the date of this barrow has recently been questioned (Farley 1992). A more open landscape would be consistent with evidence of increasingly permanent settlement in the region, although clearance may not have been wholesale (Evans 1972). This latter point is demonstrated by the assemblages examined from the presumed late Bronze Age/early Iron Age features at Whiteleaf Hill which produced evidence for the persistence of significant local tree cover.

Radiocarbon dates by Alex Bayliss and Frances Healy

Introduction

Three radiocarbon samples, one of human bone from the central burial discovered by Scott, one of carbonised residue from a sherd of pottery in the core of the Neolithic barrow mound, and one of red deer antler recovered in 2003 from the upper part of the barrow mound, were dated as part of the reassessment of the site in order to provide a basic chronology for the monument. The details of these results and the methods by which they were processed and analysed will be presented elsewhere (Bayliss and Healy forthcoming; Whittle *et al.* in prep.).

Results and calibration

The results are presented in Table 11 as conventional radiocarbon ages (Stuiver and Polach 1977) with calibrated date ranges at 95% confidence intervals (Stuiver and Reimer 1986). The probability distributions of the calibrated dates (Stuiver and Reimer 1993) are shown on Figure 28 and were undertaken using the program OxCal v3.10 (Bronk Ramsey 1995; 1998; 2001) and the INTCAL04 dataset (Reimer *et al.* 2004). *Posterior density estimates* were also calculated. This calculation allows the radiocarbon results to be combined with the

TABLE 11 Radiocarbon age determinations on material from the Neolithic barrow

Laboratory number	*Context number*	*Radiocarbon Age (BP)*	*$d^{13}C$ (‰)*	*$d^{15}N$ (‰)*	*Material*	*Context type*	*Calibrated date range (95% confidence)*
Neolithic Barrow							
OxA-13567	PRWLH34-39 RCS4.024	4900 ± 33	-21.1	–	human bone	from primary burial beneath barrow mound	3760–3640 cal BC
NZA-21036	PRWLH34-39	4803 ± 35	-27.08	–	charred residue on pot	from assemblage of pottery within barrow mound	3660–3520 cal BC
(65, 59, 1) NZA-20964	PRWLH03 4104	4537 ± 30	-23.7		red deer antler	from upper and outer layer of barrow mound	3370–3100 cal BC

known stratigraphic relationships between the samples in order to provide realistic estimates of the dates of events. This modelling was also undertaken using OxCal v3.10 These include estimates for the dates of events that have not been dated directly, such as the construction of the mound. They are interpretative, not absolute, and would change if the existing data were modelled from different perspectives.

Analysis and interpretation

A chronological model for the barrow is shown in Figure 28. The human bone found by Scott and dated by OxA-13567 (Table 11) is assumed to be part of a single adult male, as indicated by the human bone report, even though it was found both within and spread just outside a probable timber chamber (Childe and Smith 1954, 216, 220). The posterior density estimate for the dated sample from the burial is shown on Figure 28 (Phase burial; *OxA-13567*) and suggests that the man died in the second quarter of the 4th millennium cal BC, probably between *3695–3645 cal BC (at 68% probability)*.

A date for carbonised residue on a sherd found in the core of the barrow mound (NZA-21036; Table

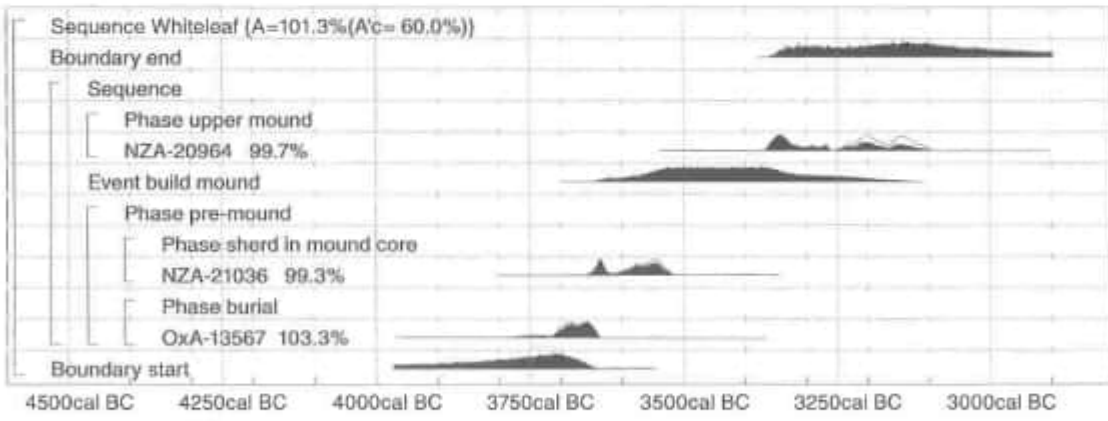


FIGURE 28 Radiocarbon probability distributions. Each distribution represents the relative probability that an event occurred at a particular time. For each of the dates two distributions have been plotted, one in outline which is the result produced by the scientific evidence alone, and a solid one which is based on the chronological model used. The other distributions correspond to aspects of the model. For example, the distribution 'build mound' is the estimated date for the construction of the barrow. The model is defined by the brackets down the left hand side of the diagram.

11) provides a posterior density estimate shown on Figure 28 (Phase sherd in mound core; *NZA-21036*). It has a bimodal distribution covering the 37th or 36th centuries cal BC, and probably dates to *3645–3625 cal BC (*at *18% probability*) or *3585–3530 cal BC (*at *50% probability).*

An interval between *OxA-13567* (the skeleton) and *NZA-21036* (the residue) perhaps equates to the time between the burial and feasting associated with the raising of the mound. Statistically it is possible to estimate that this is likely to be between *70 to 150 years (at 58% probability)* or *45 to 65 years (at 10% probability).*

The antler from the upper part of the mound (NZA-20964; Table 11) is thought to be a digging tool associated with the augmentation of the barrow and, if so, it provides a posterior density estimate (shown in Fig. 28; Phase upper mound; *NZA-20964*) indicating hat this took place in between the 34th and 32nd centuries cal BC, with the greatest probabilities lying at *3365–3310 cal BC (37% probability*) or *3220–3180 cal BC (19% probability)* or *3160–3135 cal BC (9% probability).*

The building of the mound can be dated to a time between the charred residue on the pot in the core of the mound (*NZA-21036*) and the antler from the upper mound deposit (*NZA-21964*). The interval between them is so great that it can be estimated (Fig. 28; *build mound*) only very approximately as *3605–3205 cal BC (*at *95% probability*), probably *3550–3335 cal BC (*at *68% probability).*

Discussion

Whiteleaf Hill has been a significant place in the landscape over millennia, and the work over the last four years has enhanced our understanding of the site and shed new light upon the activities undertaken there.

A Mesolithic microlith and a blade had been found on the hill before the project began (above), and blades and blade-like flakes recovered from across the site during the project also suggest a Mesolithic or early Neolithic presence (see P. Bradley above). Re-examination of the flint recovered from the Neolithic barrow by Scott in the 1930s, has led to the identification of Mesolithic items here too, including microliths, a microburin and blades (P. Bradley above and forthcoming). Although this material is too small in quantity and undiagnostic in type to ascertain the precise period at which it was deposited, it does show that hunter-gatherers visited the site before *c* 4000 cal BC, presumably making use of a highly advantageous place from which to observe and hunt game. There is no obvious indication of the collection and initial preparation of flint nodules at the site during this period.

The Neolithic barrow on Whiteleaf is one of the earliest monuments in the county and is part of a small, but significant group of earthen oval barrows known in southern Britain (Kinnes 1979), although more are coming to light especially in river valleys. Several have been excavated on chalk downland, for example Thickthorn Down, Wiltshire (Drew and Piggott 1936) and, closer to home, Therfield Heath, Royston (Phillips 1935). At Whiteleaf, the radiocarbon result from residue on a sherd of pottery deposited in the barrow indicates that the mound was raised in or just after *c* 3660 – 3520 cal BC (95% probability; NZA-21036, 4803±35). However, the radiocarbon-dating programme also shows that this event post-dated the burial of the male skeleton discovered by Scott in the 1930s, probably by between 45 and 150 years (Bayliss and Healy above). Re-examination of Scott's excavation surface in 2003 suggested that this individual had been placed between two large upright posts, perhaps from a single split tree trunk around 0.85 m in diameter. Scott believed that there had been a mortuary chamber of four posts here, making use of a pair of features to the west, but the latter features appeared to be natural root holes when re-examined and, given the central situation of the verifiable postholes within the mound, and the position of the skeleton between and to the east of these, his hypothesis of a four-post structure seems unlikely.

Mortuary structures based on pairs of posts, the sockets for which are often D-shaped in plan, have been found at a number of sites (Scott 1992). At Aldwincle, Northamptonshire, for example, two adult male burials, one crouched on its back and the other disarticulated, lay between two D-shaped postholes 2 m apart. A second pair of posts lay to the north-east and these and other features beneath the barrow may suggest that there was a period of use of the site before the mounds were built. Here, too, the barrow was small and oval in shape and, in this case, appeared to have at least three separate construction phases (Jackson 1976). Another paral-

lel, and one that is nearer to Whiteleaf, is the site of Wayland's Smithy I, lying further south-west along the chalk escarpment in Oxfordshire (Whittle 1991). Here, the first mortuary chamber was also constructed between a pair of D-shaped posts, although a platform and parallel walls of sarsen stone lay between the posts (*ibid.*, 70, fig. 5). The Wayland's Smithy chamber had received many successive human burials before it was covered by an oval chalk mound around 40 to 100 years later (Whittle *et al.* 2007). It is suggested that the mortuary structure was lidded, perhaps in wood. It has been claimed that pairs of posts elsewhere were the remains of exposure platforms from which disarticulated bones fell or were removed through time (Scott 1992). However, although the Whiteleaf individual was largely scattered to the east of the chamber, the majority of his bones were present when excavated in the 1930s (Childe and Smith 1954, 220) despite the apparent length of time between his death and being covered by a mound (see radiocarbon dating results above), and his left foot was articulated within the chamber (photograph in archive). Additionally, Miss Tildesley, who analysed the human bone, noted that the fragmentation of the bone had probably occurred some time after it had desiccated (*ibid.*). It seems most likely, therefore, that a mortuary structure had covered the bones, perhaps some kind of wooden box, and that the disturbance of the body took place at a later date.

The barrow mound at Whiteleaf comprised a dark, humic layer in which a large assemblage of pottery, flint and some animal bone was present. Various explanations of this unusual deposit were put forward by Childe (*ibid.*, 216–7) and the recent work adds little new information to what is already known, although the observation can be made that the pottery is in good condition considering the soft fabric from which it is made, and it is unlikely that it was exposed to the elements or to trampling for any length of time before burial (as would have occurred on a domestic site or in a midden). It is more probable that it derives from ceremonies that took place here, perhaps feasting as suggested by Childe, and represents continuing veneration of the site after the burial had taken place. This core of the mound was covered by chalk won from the ditches which could, in this first phase, have been flanking ditches to each side, as at Wayland's Smithy I and also, for example, Barton Stacey, Hampshire, which also had an inner core of 'black soil' (Grimes 1960, 248–9). The excavation of the ditch on the south side at Whiteleaf was probably a later event, resulting in the enhancement of the barrow mound. This soil is probably the deposit which survives in part on the north, east and south of the barrow and from which the antler was recovered which provided the radiocarbon date of 3365 – 3110 cal BC (NZA-20964, 4537 ±30) for this event.

Neolithic barrows often have complex histories which result in a sequence of surviving features and deposits; the final form of the monument may never have been envisaged at the outset. Whiteleaf provides an important example of structural development in an earthen barrow and has a number of parallels in multi-phase oval barrows in the area, for example Aldwincle in Northamptonshire and Wayland's Smithy I on the Berkshire Downs, as already discussed, but also Manor Farm, Horton in the Middle Thames Valley and Radley in the Upper Thames Valley (Jackson 1976; Whittle 1991; Ford and Pine 2003; R Bradley 1992). The size of these monuments is also comparable. Therfield Heath, Royston may be another example, although it remains poorly understood (Phillips 1935). Whiteleaf provides, however, an unusually early southern English date for the burial of a single individual within a mound, an event which occurred at some time in the first half of the 37th century cal BC. Early barrows with single burials are known in northern England (Kinnes 1979, figs 4.2–4.4) but in southern England, barrows with multiple burials seem to be the norm at this time (eg around 14 in Wayland's Smithy I; Whittle *et al.* 2007, 105) and social differentiation between the individuals buried is not evident (Darvill 2004, 163–5). The significance of the Whiteleaf barrow and the status of the man buried within it are, thus, uncertain. However, it should be noted that smaller Neolithic barrows with individual burials are increasingly coming to light, for example on lower elevations within the Thames Valley, and as radiocarbon dating becomes more routine it is possible that Whiteleaf will find contemporary parallels. The recent dating of a man within an oval barrow, 9.3 m x 11.5 m in size, at Mount Farm, near Dorchester, Oxfordshire, for example, has shown that he died in around 3640–3375 cal BC (95% confidence; OxA-15748, 4738±35; Lambrick forthcoming). Nevertheless, few people at this time received a form of burial that has left any visible trace, and the

assumption must be that the Whiteleaf burial was of a man of some significance in local society.

The proximity of flint nodules to the surface, in the clay-with-flint deposits that intermittently cap the Chalk, must have made the hill attractive throughout the period before metal came into common use. Indeed, most flint in this area at this time would have been sourced from surface exposures (Holgate 1988, 64). The dense flint scatter on the northern knoll (Trench 1) suggests that, in the later Neolithic, nodules were being tested and cores shaped here before being removed for final working elsewhere. The worked flint recovered from other parts of the hill is also dominated by debitage, mainly flakes from the initial preparation of cores, but it is difficult to date this material precisely.

Snail assemblages from the Neolithic barrow show that throughout this period of time the hill remained quite densely wooded, with relatively-undisturbed, mature, broad-leafed deciduous woodland and abundant leaf litter (see Stafford above). Snails recovered from the primary fill of the barrow ditch on the west side of the mound, for example, included no open-country species, and although more catholic species were present further up the profile, shade-loving species dominate all the assemblages. The evidence suggests that, after clearance undertaken for the construction of the barrow and later disturbance around the mound, these snails were able to recolonise quickly from nearby, substantial refugia. This situation may have prevailed until the Bronze Age. By the time the cross-ridge dyke and curvilinear earthwork were constructed, probably towards the end of the Bronze Age or the Iron Age, there were some indicators of established short-turfed or grazed grassland. Nonetheless, sections examined across both of these ditch-and-bank features produced snails indicating that the ditches quickly became vegetated and that there was woodland or scrub regeneration at least locally. Open-country species were slightly more common in the secondary fills of the cross-ridge dyke than in the curvilinear ditch to the east of the Neolithic barrow, suggesting the presence or maintenance of more open areas towards the south of the Hill. This difference in snail type is most likely to be the result of varied landscape niches across the area, although it could suggest that the cross-ridge dyke is a slightly later feature. As discussed by Stafford above, the wider evidence for this part of Buckinghamshire suggests quite wooded conditions into the Bronze Age in many places, with clearance becoming more common from the Iron Age or possibly the end of the Bronze Age.

There is only limited evidence of activity on the hill throughout most of the Bronze Age, the paucity of finds of this date being compatible with the absence of any evidence of widespread tree clearance. Some of the flintwork recovered could be early Bronze Age in date, but only one piece, an unfinished knife or arrowhead from Test Pit 11 (Fig. 26.3), can be ascribed to this period with any confidence. Neither of the two mounds or knolls scheduled as Bronze Age ring ditches proved to be such on excavation. The only certainly Bronze Age feature is the secondary cremation deposit of a child placed within a middle Bronze Age urn which was discovered by Scott in the side of the Neolithic barrow mound (Childe and Smith 1954, 216, 228–9). Four refitting sherds from a small, thin-walled middle Bronze Age Bucket Urn were also recovered from the middle fill of the barrow ditch terminal during the 2003 excavations. It is possible that there were (or are) other secondary burials in the mound.

Small quantities of late Bronze Age/early Iron Age flint-tempered pottery have been recovered from test pits, mainly around and to the south of the Neolithic barrow, and a side-looped bronze spearhead was found by a metal detectorist in the bank of the cross-ridge dyke (Figs 9 and 10). This slight indication of a revival of activity on the hill later in the Bronze Age may be associated with the excavation of the cross-ridge dyke and the curvilinear ditch. Unfortunately, both these ditches remain undated. Two observations can, however, be made about them in relation to their position on the hill. The first is that the cross-ridge dyke cuts across the narrowest part of the hill and would have created quite an effective barrier, controlling access to and/or from the promontory on the hill, the modern causeway being a later infilling. The second is that the environmental evidence suggests that, although there were some open grazed areas in the vicinity, the landscape was largely wooded at the time.

A number of cross-ridge dykes are known on the Chilterns, though mainly further east around Pitstone (Bryant 1994; Bryant and Burleigh 1995). These are generally thought to belong to the late Bronze Age, partly by analogy with the better-

known dyke systems of eastern and northern England (eg Spratt 1989) and the Berkshire Downs and Wessex (Ford 1981–2; R Bradley *et al.* 1994), but none is well dated. Bryant and Burleigh stressed that many have several phases of modification and could be long lived (1995, 94). They are generally interpreted as local territorial boundaries, and this was first suggested for the Chiltern dykes by Dyer (Dyer 1961). The Chilterns Grim's Ditch is the nearest long-distance ditch and bank system to Whiteleaf Hill, passing only 2 km to the south, and there are some shorter sections of ditch and bank in Great Kimble (Fig. 2). Where Grim's Ditch has been sectioned, it appears to be Iron Age in date and some sections reveal a similar profile to the Whiteleaf features (see above). In contrast to the contemporary environment at Whiteleaf, however, the Grim's Ditch at Ivinghoe was set in relatively open country (Evans and Valentine 1974), as might be expected for land division boundaries.

The cross-ridge dyke at Whiteleaf is a substantial feature, perhaps suggesting an important symbolic as well as a practical role as a boundary marker. It is also possible that it served to corral animals during certain times of the year, making most efficient use of the steep slopes around the hill, dense vegetation and fences to prevent their escape. The curvilinear feature may have subdivided the internal space allowing separation of stock.

A surprising quantity of late Iron Age and Roman finds has come from the hill, much of it from around the Neolithic barrow. Scott identified a Roman 'rubbish pit' in the north-west side of the barrow (Childe and Smith 1954, 215) and found four 4th-century Roman coins as well as Roman pottery in the turf of the mound and in the top of the barrow ditch (*ibid.*, 229). Similar finds were made in the 2003 excavations. The largest proportion of these finds were pre-conquest in date, although early and late Roman material is present (see Booth above). In general, the sherds are small and the vessels represented unexceptional; the nature of the activity which generated these finds remains obscure. A probably Roman gully was found running north from the barrow, terminating 15 m from it (Fig. 8), but it had no obvious purpose, and no structures have been located either in the geophysical survey or the intrusive fieldwork. Large parts of a smashed Oxfordshire colour-coat mortarium were recovered from a hollow in the ground surface to the north-east of the barrow (in Test Pit 28) and this did raise the possibility that some items were being deliberately placed at the site, possibly associated with food preparation. Such a custom is not without parallels (Williams 1998) and Darvill cites a number of examples of Roman activity at Neolithic chambered cairns in the Cotswolds (Darvill 2004, 227–9). Undoubtedly some finds result from agricultural activity around and over barrow mounds, or quarrying as seen at Ascott-Under-Wychwood (E Biddulph 2007). At Whiteleaf, they may represent simple curiosity, an interest in the ancient remains and the wonderful prospect from the hill, but there are barrows where the excavators have suggested that offerings were being left in the Roman period (eg Annable in Corcoran 1970, as cited in Darvill 2004, 228), and there are possible instances of Roman burials in Neolithic barrows (*ibid.*, 227). It has even been suggested that barrows might have been opened up in the Roman period (eg Hazleton North, Saville 1990, 134–5), though whether as early antiquarian activity or for grave robbing is uncertain. It is possible that the disturbance into the east side of the Whiteleaf barrow was Roman in date.

In addition to the late Iron Age and Roman finds associated with the Neolithic barrow, a 1st-2nd century enamelled plate brooch was discovered near the northern knoll, two Roman coins were found near to the cross-ridge dyke (above and Fig. 10) and a 3rd-century Roman coin was found in the windmill mound, along with some later Roman pottery. The discovery in 2006 of the Roman votive leaf in the windmill mound casts a slightly different light on Roman activity on the hill, however, and may indicate that deposition here was of a more formal character than the finds already mentioned suggest. These copper-alloy objects would have been offerings associated with pagan worship (see Crerar above) and have been broadly dated to the 2nd to 4th centuries AD. Crerar suggests that their most likely context of deposition would be at shrine or, perhaps, a place of significance in the natural landscape as an offering to the *genius loci*. Such sites may have been seen as being close to the gods, or a place to contact heroes and/or ancestors (Williams 1998, 77). There is evidently a great deal more to be learned about the use of Whiteleaf Hill in the Romano-British period.

In the 10th century, Whiteleaf Hill was part of the estate of Canterbury Cathedral Priory and fell

within the boundaries of Monks Risborough, as described in the 903 charter confirming the grant of this land by King Edward (Sawyer 1968, no 367), but we have not so far discovered any evidence for how the land was used at that time. In the later medieval period, it was part of the common; the presence of snails characteristic of established, short-turfed, grazed grassland beneath the windmill mound is consistent with this evidence. A very small number of medieval finds (all pottery sherds) have come from the hill during this fieldwork, the majority from the topsoil over the Neolithic barrow; none were reported from the 1930s excavations. Whatever the attractions of Whiteleaf Hill as a prominent site suitable for burial or other activities in the prehistoric and Roman periods, its use as common in the Middle Ages would have precluded any other uses, except for shepherds' huts or windmills. Every parish would have had one or more windmills or water mills, and a number of Buckinghamshire mills were erected upon hill or ridge tops, for example the post mill at Brill. Early windmills were of post-mill type with a cross-beam base, and were commonly raised on circular mounds (Farley 1978). This seems to be the most likely explanation for the archaeological evidence excavated on the mound at Whiteleaf to the north-east of the Neolithic barrow, and the dating evidence from it suggests that it is early post-medieval in date (late 16th to 17th centuries). It does not appear in Francis Wise's illustration of Whiteleaf Hill (1742) or on Jeffrey's 1766/87 *Map of Bucks*. Although it was of earlier, 12th- or 13th-century date, the post mill at Great Linford near Milton Keynes produced very similar below-ground evidence, and its reconstruction (Mynard and Zeepvat 1992, fig. 44) provides a good example of the probable appearance of the Whiteleaf mill. The windmill mound excavated at Tansor, Northamptonshire, also of medieval date, is also comparable (Chapman 1996–7, 33–5). There are a number of examples of windmills reusing Bronze Age barrows (Watts 2002, 104), but this does not appear to have been the case at Whiteleaf. The mill does not appear to have been a success, for it was not in use for long, and it seems to have been dismantled and taken elsewhere.

The date of the first cutting of Whiteleaf Cross is as enigmatic now as it was when the project commenced. The trenches dug at the base of the Cross failed to reveal early soil deposits; only Victorian and later material was retrieved. The first known record of its existence is found in an account written by the Oxford Radcliffe librarian, Francis Wise, in 1742, who describes it as '*an antiquity of the same kind with the White Horse, being formed of the same manner*', and it appears on T Jeffrey's '*Map of Bucks*' of 1766/87. It does not appear in earlier antiquarian accounts of the area and possible medieval references to the Cross or people who lived near to it have been dismissed (Lindsay Scott 1937, 100; Marples 1949, 155), although it was evidently sufficiently well established to pass as an antiquity to Wise. In the words of Scott, the excavator of the Neolithic barrow, '*In itself, Wise's statement hardly puts the Cross back before 1700*' (Lindsay Scott 1937b, 102). Marples compared the records of the size and shape of the Cross since 1742 (1949, 139–41), pointing out that the base in particular has increased considerably in size over time, as a result of weathering and remodelling when it was scoured. He suggested that, on the basis of Wise's description and drawing, it was relatively recent when Wise saw it, perhaps around 100 years old (*ibid.*, 155). It may have acted as a village cross, with both a practical and devotional purpose. For a short period of time, it may have been present on the hill with the windmill. The scouring of the Cross was already an important local custom accompanied by '*merry-making*' when Wise wrote, and these festivities continued into the 20th century.

Although diminished by enclosure, some part of Whiteleaf Hill remained as common into the post-medieval period, and land-use suggests a varying proportion of common grassland and woodland, which might depend on the wishes of the commoners for more or less grazing, woodland forage and firewood/timber. Chalk pits and saw pits on the site are physical reminders of some of the uses to which the hill has been put. Traces of a number of hollow ways can be seen on the ground or appear in old aerial photographs, where droveways from the village led up the hill and had been hollowed out by weathering and erosion (Farley 2000).

In the 20th century, part of the hilltop was used for the construction of practice trenches in or just before the First World War. It is not unusual to find practice trenches of this date on common land, which were used as suitable places to muster and drill local militia and volunteers; there are good examples on Hallam Moor near Sheffield and Lin-

coln South Common. The 17th-century musket ball found in test-pit sieving may indicate the longevity of this practice on Whiteleaf Hill. Smaller, rectangular earthworks are also visible on the Hill which could be slit trenches of Second World War date and/or the remains of saw pits. Saw-pits are fairly common in Chilterns woodland and can be expected in estate-managed woodland areas (Mike Farley pers. comm.).

The scouring of the Cross is a good example of the central role of Whiteleaf Hill in the lives of local people. The Cross is now designated as a Village Green and the hill continues to attract many visitors. From the Neolithic and Bronze Age burials and Roman votive offerings to 20th-century battle drills and the remains of 21st-century picnics, there is no doubt about the ancient and continuing importance of the hill to the inhabitants of the surrounding area.

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