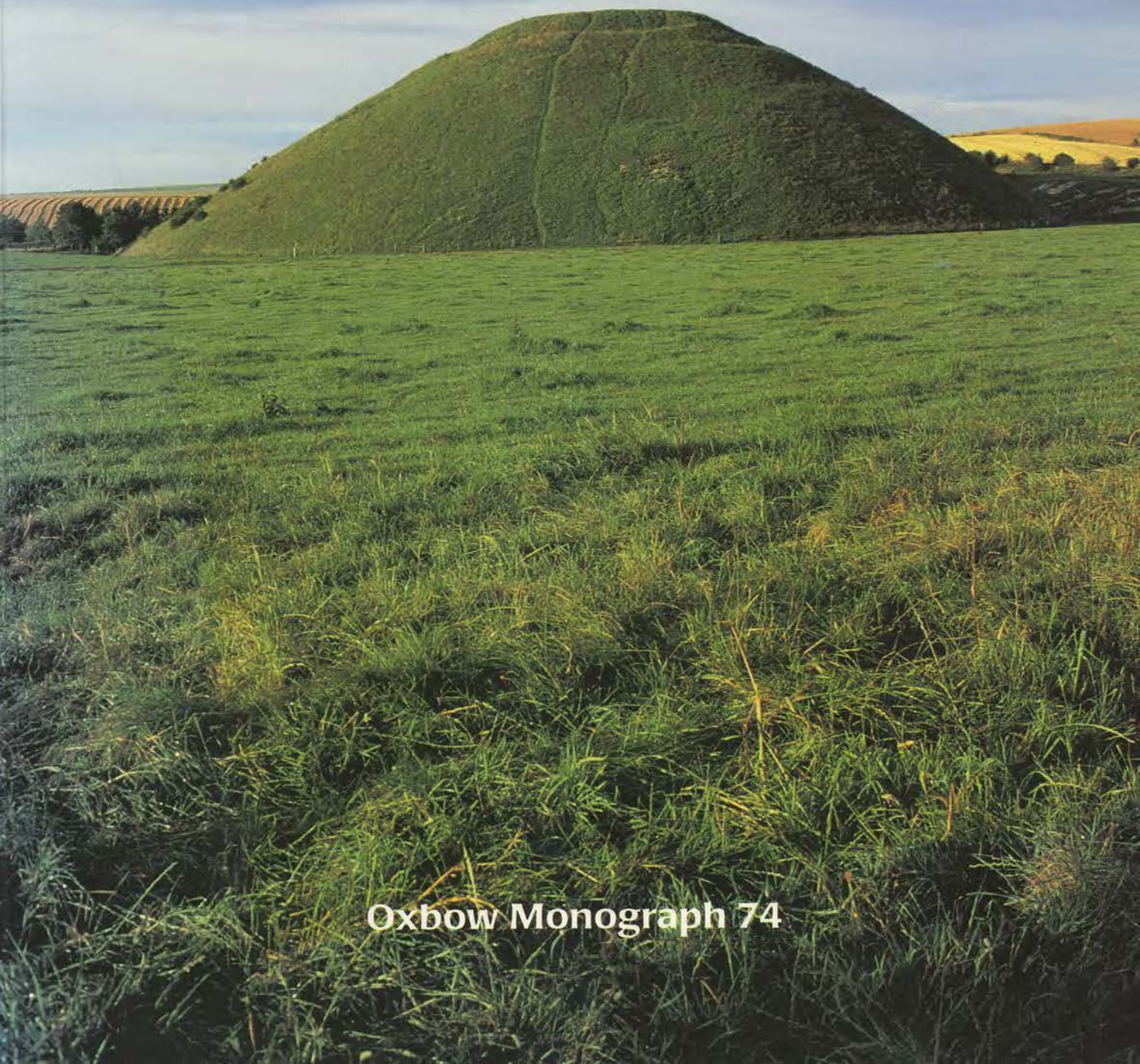
SACRED MOUND HOLY RINGS

Silbury Hill and the West Kennet palisade enclosures: a Later Neolithic complex in north Wiltshire

Alasdair Whittle



Oxbow Monograph 74

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by

Alasdair Whittle

with contributions by

J. Best, C.R. Cartwright, the late I. Cornwall, G.W. Dimbleby, A. Edwards, J.G. Evans, A. Fairbairn, N. Gardner, M.A. Hamilton, M. Horne, M. Robinson, R. Smith, and D. Williams

and a foreword by

G.J. Wainwright

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for helping to make so much possible

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Historic England

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The cover photos were taken by Nicola Collins

Foreword

This welcome book deals with two projects, one of which was undertaken some time ago and one which is relatively recent, both by staff of the University of Wales, Cardiff. It focuses our minds on the perceived importance of those remains which are visible today and those which are not, and Alasdair Whittle deserves our gratitude and admiration for bringing these matters into the public domain so soon after the conclusion of his own work at West Kennet.

Nearly thirty years have elapsed since the great mound at Silbury Hill was penetrated by a tunnel dug by a team of miners under the supervision of Richard Atkinson and the sponsorship of BBC Television. At the time, I was excavating at nearby Marden henge and when passing the great works, would gaze at the busy scene around the shored mouth of the tunnel which was being driven into the heart of the mound and speculate what might lie at journey's end. This was truly the age of innocent – or unthinking – confidence. Not for us thirty years ago was there agonising over the ethics of allowing a unique monument to be penetrated in this way, under financial sponsorship which had not adequately budgeted for analysis and publication, with an overt objective of seeking a primary burial in an unrepeatable experiment and under the supervision of one who already had a number of unpublished excavations on his record.

Alasdair Whittle has extracted the real importance of this difficult material and presented it for us in a totally satisfactory fashion. By doing so, he has transformed what could have been a disaster into a triumph by combining it with his own recent work on the extraordinary sequence of palisade enclosures at West Kennet. These exciting discoveries, brought to us by the combination of geophysical techniques, aerial photography and his own judicious excavations, make a notable contribution to the great complex of prehistoric monuments which centre around Avebury, Silbury Hill and the West Kennet long barrow.

Silbury Hill and the West Kennet palisade enclosures make a piquant contrast which gives the volume added focus and interest. On the one hand, there is the great monument – the largest man-made mound in western Europe – familiar to all who drive through the Kennet valley and to many more through frequently reproduced images. No one who sees it can fail to be moved by its sheer bulk or to speculate on when it was built, for what purpose, how the obvious engineering problems were overcome and the nature of the prehistoric society which could plan and execute such a grossly ambitious project. Juxtaposed in this volume with the great mound are the West Kennet palisade enclosures – invisible on the ground surface and therefore difficult to explain to heritage managers who, understandably, tend to equate importance with visibility unless there are good arguments to the contrary. The palisade enclosures are completely invisible, save through the electronic probing of the geophysicist and the view from an aircraft at certain times of the year. Because of their invisibility, they do not share the public imagination with Silbury Hill, and yet they were contemporary with it and, in their time, their visual impact must have been striking. They also have as much to tell us about how prehistoric society was organised as does the now more obvious Silbury Hill, and much of interest can be deduced in terms of logistics, engineering skills, woodland management and social interaction. It is very satisfying to have the research on these two great public works set side by side in the same volume so that one may relish the contrast and make the point to others that what cannot be seen today may nevertheless be of the highest importance.

This volume is not only a notable contribution to prehistoric studies but also to our understanding of the World Heritage Site within which the monuments lie. As with the recently published volume on Stonehenge and its landscape (Cleal *et al.* 1995), which may be regarded as its companion, it provides a basis on which to move forward to a greater understanding of a formative period in the development of society.

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Contents

Preface

'I am sorry that I did not take the circumference of the bottom and top, and the length of the hill, but I neglected it, because that Sir Jonas Moore Surveyor of the Ordnance, had measured it accurately, and also took the solid content, which he promised to give me, but upon his death, that (amongst many excellent papers of his) was lost. I remember he told me, that according to the rate of the work for labourers in the Tower, at ... the floor, it would cost three score or rather (I think) four score thousand pounds to make such a hill now.'

John Aubrey, *Monumenta Britannica*,
(p. 682 in the 1982 edition of the Dorset
Publishing Company, edited by John Fowles)

This report attempts to capture what can be recovered of the investigations of the monumental mound of Silbury Hill, and to present alongside that the results of more recent research excavations at West Kennet, where two palisade enclosures were discovered from 1987 onwards. Both sites belong to the Later Neolithic complex of the Avebury area in north Wiltshire. Silbury Hill had of course long been recognised. Despite the self-evident importance of the site, the excavations of 1968–70 were not published by the excavator, nor was the record of work undertaken as thorough as would be the case now. It appears that the excavator, like others of his generation, relied to some extent on a partial field record and to a large extent on a sharp memory of detail. Nonetheless I am grateful to English Heritage for inviting me to salvage what survived in drawings, photographs, diaries and film, as the basis of a report. I have not presented all available archive detail (contrast Cleal *et al.* 1995).

From 1987 I have conducted a series of my own research excavations in the Avebury area, designed to investigate the Neolithic sequence, environment and context (e.g. Whittle 1993; Whittle *et al.* 1993; Whittle 1994; Whittle and Pollard forthcoming). Following suggestions made by Caroline Malone, Julian Richards and Julian Thomas, and linked closely to the investigations of Kennet valley history by my colleague John Evans and others (Evans *et al.* 1993), West Kennet was the first site which we examined. It came as the greatest surprise to find so much in an area so well trodden.

It is inevitable that future researchers will wish to return to both the monumental mound and the palisade enclosures, for they still contain an enormous store of information. This report attempts to secure what we know so far, and to relate this to our changing appreciation of the wider complex in north Wiltshire, and of the context beyond, to which they belong. This report concentrates on the Neolithic period; Roman finds from Silbury (e.g. Farley 1971) and Saxon and later finds from West Kennet will be published separately in due course. The appendix, by Joanne Best, sets out what we know of the Marlborough Mound; it remains to be established whether this is of prehistoric date.

Acknowledgements

Silbury Hill

The excavations of 1968–70 were a complex operation and involved many people and institutions. The primary burden of planning and organisation, both in the field and beforehand, fell on the director, the late Professor R.J.C. Atkinson, of the then Department of Archaeology, University College of South Wales and Monmouthshire. The success of the project in the field owed everything to his combination of energy and academic vision.

The excavations were sponsored by the BBC. Broadcasts of the excavation were made principally by the *Chronicle* programme under the direction of the late Paul Johnstone, and also by BBC Bristol under the direction of J. Dewar. The BBC has made available archive film on VHS video cassettes.

Access to the site was granted by the trustees of Lord Avebury and to the adjacent land by the owners N. Hues and Sons. J. Gibbs of Beckhampton provided access to the then abandoned filling station. The then Ministry of Works and Public Buildings provided every help as guardians of the site through the Ancient Monuments Board.

The excavation was directed by R.J.C. Atkinson, with the assistance of Major Lance Vatcher. Mining was supervised by Dr John Taylor under the direction of Professor J. Sinclair, of the Department of Mining, UCSWM, assisted by amongst others the late Bill Curtis. Survey of the mound was carried out by A. Graves under the direction of Professor R. Peel, of the Department of Geography, Bristol. An air photogrammetric survey was organised with the help of Dr K. Atkinson, Department of Photogrammetry and Surveying, University College, London, the Royal Commission for Historic Monuments (England), the National Monuments Record, and Meridian Airmaps Ltd. Professor A. Bishop, of Imperial College of Science and Technology, London, provided advice on borings. Stanley Pugh and Co Ltd of Bridgend provided a rotary core drill at nominal cost. The Department of Geology, UCSWM, under the direction of Dr R. Blundell undertook corings and seismic survey of the ditch. The Wiltshire County Council and the Wiltshire Police assisted with matters of public access. Cdr J. Davies acted as site information officer. The mining was carried out by students of the Department of Mining, UCSWM, and the excavations were carried out by students of archaeology from UCSWM and elsewhere and by others.

Environmental research was coordinated by the Institute of Archaeology, London, under the general direction of Professor G.W. Dimbleby. Radiocarbon dates were provided by Isotopes Inc, the Smithsonian Institution and the British Museum.

In the preparation of this report every assistance was received from Professor Atkinson, until his death in 1994, and practicalities were effected with the help of English Heritage, notably via Brian Davison and Geoffrey Wainwright. Valuable help has also been given by the Alexander Keiller Museum, Avebury, and the Royal Commission on the Historical Monuments of England. English Heritage provided for a draughtsman to work in Cardiff; the drawings were prepared for publication by Chris Rishworth and Howard Mason.

West Kennet

Access was made possible by the landowners Richard Hues and David Hues. The British Pipeline Agency facilitated work in 1990 and 1992. Financial support was given by The British Academy, The Society of Antiquaries of London, The Prehistoric Society, The Wiltshire Archaeological and Natural History Society, The David Thomson Trust and the University of Wales, Cardiff. The contribution of Wessex Archaeology in 1989 and subsequently, especially by Roland Smith and Andrew Lawson, is gratefully acknowledged. Radiocarbon dates were provided by the British Museum Research Laboratory, the Oxford Accelerator Unit and the Radiocarbon Laboratory, University of Wales, Cardiff. I am grateful too to all the specialists and other institutions, especially the Air Photography Unit of RCHM(E), with notable help from Roger Featherstone, who have contributed to the project; Amanda Rouse gave invaluable help in editing the animal bone report. I am grateful to Kate Roberts and Mike Hamilton for magnetometer survey; to Rick Peterson and Joshua Pollard for help in direction of the excavations; and to all the Cardiff students and other volunteers who did the hard work. Howard Mason has prepared the drawings for publication; Joshua Pollard drew the final figure. I owe much to the support of Richard Bradley, Barry Cunliffe and Ian Kinnes, and the encouragement of John Evans.

I am grateful to Joan Oates, Gordon Barclay, Niall Sharples, Roger Mercer, Alex Gibson, Derek Simpson and others for information about other sites; to Brian Davison, Richard Bradley, Ian Hodder, Joshua Pollard, Michael Shanks and Julian Thomas for constructive criticism of text and discussion; and to Christopher Peebles, Vincas Steponaitis and Vernon J. Knight for help in broadening my knowledge of Mississippian culture archaeology. My family took my absences in the field with customary patience. My final and perhaps greatest debt is to Gill and Robin Swanton, who provided invaluable base-camp support and encouragement with astonishing tolerance and helpfulness.

Archive

The finds and archive (including site drawings and notebooks, photographs and VHS cassettes) have been deposited in the Alexander Keiller Museum, Avebury. The records of the 1989 evaluation by the Trust for Wessex Archaeology have been deposited in Devizes Museum, and a copy of the evaluation report has been lodged with the County Sites and Monuments Record.

Radiocarbon Dates

Radiocarbon dates are normally given in calibrated form as ranges at one standard deviation, using the University of Washington 1993 calibration programme (version 3.0.3), based on the Belfast and Seattle curves (Stuiver and Reimer 1993; Pearson and Stuiver 1993; Stuiver and Pearson 1993). Original determinations, where stated, are given in years BP.

Summary

Silbury Hill

The present state of the Neolithic monumental mound of Silbury Hill is described. Previous investigations are noted, beginning with antiquarian accounts from the sixteenth to eighteenth centuries, and followed by excavations in 1776–7, 1849, 1867, 1886 and 1922, of which the most important were the vertical shaft of 1776–7 and the horizontal tunnel of 1849. Excavations in 1968–70, sponsored by the BBC, were part of a tradition of investigating major monuments partly for research and partly for presentation to the public. The excavations involved re-establishing the 1849 tunnel to investigate the construction, date and contents of the mound; they also included investigation of the top of the mound and the encircling ditch.

The tunnel showed that the monument began as a mound less than 40 m in diameter carefully composed of gravel, turves, soil and chalk, in part at least revetted by stakes. This overlay an old land surface above a subsoil of clay-with-flints on what had been originally a spur of Middle Chalk projecting into the Kennet valley. Most of the rest of the mound, some 160 m in diameter, consisted of chalk rubble heaped above the old land surface; some clayey deposits were also recorded. The chalk rubble appeared to have been laid in horizontal layers for the most part, and traces of rough internal chalk walling could be seen. Chalk was derived from the encircling ditch, which had severely scarped the original spur, thus giving an exaggerated impression of the amount of piled material. There was also a quarry or possibly a ditch buried within the outer part of the mound, from which rubble must have been derived at an early stage of construction. There was no clear evidence for prolonged breaks in the process of construction. One radiocarbon date of 2871–2486 BC was obtained on a sample of small wood and vegetation from the primary mound, and another series of five dates from 3627–3344 to 3071–2782 BC was obtained on remains of turf from the primary mound.

Limited cuttings on the top of the mound showed concentric chalk walling, suggesting that the mound might have been constructed throughout as a stepped cone, though the evidence for this has been much exaggerated in secondary accounts. Steps on the side of the mound were superficially examined. It was unclear whether the top, prominent terrace or step and the less prominent second terrace were original features or the result of early medieval fortification; the excavator took the view that the top terrace was original though later modified, but this report suggests that both terraces could be the result of later modification. Apart from walling, there were no clear features on the top of the mound, which, however, had been substantially disturbed.

A cutting was made across the south ditch, showing it to be at least 5 m deep and 20 m wide. The fill of the ditch was largely natural, although chalk rubble on the inner side could have been artificially placed. Radiocarbon dates of 2398–2202 and 2270–2042 BC were obtained from antler samples from near the estimated base of the ditch.

The old land surface consisted of a thin, vegetated loessic soil above clay-with-flints. Turves in the primary mound derived, however, from a different soil, a calcareous rendsina, with a thin stone-free mull-humus horizon. One of the striking features of the excavation was the recovery of preserved vegetation both on the old land surface and in the primary mound. Seeds and mosses from these contexts may reflect a variety of habitats but indicate on the whole the presence of mature grassland. Insect remains comprised faunas of herb-rich grassland, which was grazed, but not so heavily as to prevent the flowering of various herbs; trees and shrubs were probably beyond the catchment of the insects. Remains of winged ant, *Myrmica rubra*, may have been derived from old nests, and may not indicate the season in which construction first began. Land snails preserved in the primary mound show a predominance of open-country species, indicating very dry, open grassland. Scattered bones of domesticated animals and pieces of red deer antler were found in the mound, together with some small mammals from the old land surface. Pollen analysis suggests that at a regional scale primary woodland had been superseded by secondary woodland in the past; and the wider environment of the mound will have included both open ground and woodland.

The West Kennet palisade enclosures

Research investigations since 1987 have shown the existence in the Kennet valley at West Kennet of two palisade enclosures. Enclosure 1 is a near-circular enclosure straddling the present Kennet, with a double circuit at least on the south side of the present river. Enclosure 2 is an elliptical enclosure with a single circuit south of the Kennet, to the south-west of enclosure 1.

Enclosure 1 was first seen from the air in 1950. Its ditches east of Gunsight Lane were observed in a pipe trench in the early 1970s. Research excavations in 1987 and 1990, a watching brief in 1989 and a surface evaluation in 1989, all helped to establish its layout and character. Enclosure 2 was first noticed in aerial photographs and magnetometer survey in 1989, and confirmed and extended by excavations, aerial photographic and magnetometer survey in 1990 and 1992.

As recorded to date the ditches of enclosure 1 form a sub-circular enclosure some 240 by perhaps 220 m. South of the Kennet the palisade ditches were at least 2 m deep and 25–35 m apart. They had been deliberately backfilled, and each contained a more or less continuous timber palisade. The palisades consisted of closely set posts, mostly 25–40 cm in diameter, but occasionally larger. Some sarsen stones were used as packing, and in two trenches (F, J) of the inner ditch on either side of Gunsight Lane these were present in considerable quantities. The posts could originally have formed high timber walls. They had decayed *in situ* below ground, having probably been burnt above ground; some smouldering below ground is also possible. The ditch in the single cutting north of the river (O) was of identical character. Quantities of animal bone, dominated by pig remains, were recovered from the ditches, immediately around the former posts. Only a little of the interior has been investigated. Some very shallow features were found, including a substantial deposit of animal bone, again dominated by pig remains; the 1970s pipeline observation suggests that this kind of feature could have been recurrent within the interior.

Radiocarbon dates were obtained ranging from 2563–2347 to 1961–1756 BC. Very few struck flints were found but included a fine ripple-flaked oblique arrowhead; a few sherds of Grooved Ware were recovered.

As recorded to date the ditch of enclosure 2 forms an elliptical shape whose long axis is some 340 m, and whose short axis is a probable minimum of around 200 m. The character of the palisade ditches and palisades was identical to those of enclosure 1, though in some cuttings the postpipes suggest slightly larger posts. Animal bone, chiefly again that of pig, had also been deposited by the palisade line in every cutting investigated. In addition aerial photographs and magnetometer survey showed radial ditches butted on the circuit of enclosure 2, and in one case apparently connecting both enclosures. One trench (S) showed the most prominent radial to consist of a smaller version of the normal palisade ditch.

Aerial photographs and magnetometer survey showed the existence of three circular structures within enclosure 2. Each appears to consist of an inner and an outer ring, normally consisting of palisade ditches; the inner ring of Structure 2 consisted of individual postpits, and the inner ring of Structure 1 of a large but irregular ditch. Nothing was found in the centre of Structure 2. There was a deep postpit in the middle of Structure 3, and a feature may be suspected in the centre of Structure 1. Animal bone had been deposited around the inner and outer rings of these structures, and there was a substantial surface deposit just outside Structure 2.

Radiocarbon dates ranging from 2850–2468 to 2113–1884 BC were obtained from the palisade ditch and the main radial ditch of enclosure 2. Another fine ripple-flaked oblique arrowhead was recovered from the top of a postpit in the inner ring of Structure 2, and Grooved Ware was found in the main palisade ditch, the radial ditch, the three internal circular structures, and the animal bone deposit outside Structure 2.

The Grooved Ware can be related to the Durrington Walls sub-style. There was only one sherd of Peterborough pottery, and no Beaker or Early Bronze Age pottery. Elsewhere, fine oblique arrowheads have associations with Grooved Ware and large monuments.

Charcoals from both enclosures indicate that the palisade posts were largely of oak. Post diameters may suggest the existence somewhere in the region of managed secondary woodland. The bones of pig were largely from younger animals. Carbonised plant remains, recovered in small quantities, show some cereal cultivation, but its scale is uncertain.

Interpretation

The dating of both Silbury Hill and the West Kennet enclosures is reviewed. It is possible that Silbury Hill preceded the enclosures, and the dating of the enclosures relative to each other is uncertain. It is also possible that the monumental mound and the palisade enclosures were more or less contemporary, part of the wider Later Neolithic monument complex in the area, which includes also the Sanctuary, the West Kennet Avenue, and Avebury itself. The environmental evidence from mound and enclosures is considered together, and is related to other environmental evidence from the valley and surrounding downland. It is clear that there must have been diversity at a regional level, with open ground suggested by the evidence from Silbury Hill and also from Avebury, but with woodland, either primary or perhaps more normally secondary, reflected both in the provision of timber for the palisade enclosures and in the molluscan faunas from secondary ditch fills of long barrows on the surrounding downland. The construction of monuments themselves may have accelerated the trend to open ground; the settlement context at a regional level may still have been one of dispersed and mobile population, a situation which may have persisted until the Later Bronze Age.

Each monument is first considered on its own. With reference to Silbury Hill, analogies which might yield the societal matrix for large monumental constructions are reviewed, including Egypt, Mesopotamia and the Mississippian culture, along with a consideration of processual and post-processual chiefdom models, but it is concluded that the monumental mound cannot by itself support any one social model. Other analogies are reviewed, ranging from the Late Archaic and Woodland cultures of America, and sanctuaries and cult places in Dark Age Greece, to cathedral building in medieval France, and more recent prophets' mounds in Sudan, to suggest that constructions can be undertaken for reasons other than social or political, and that people can interact for such purposes over long distances.

The local and regional context is then considered. The tradition of local monuments is reviewed, including long barrows of the fourth millennium BC which lack burials. The exotic character and possible long-distance connections, not only within Britain and Ireland but perhaps much further afield, as well as the scale of the Silbury mound are stressed. The mound could be seen as marking a special place or location, as a monument over a previous site or burial (as the excavator preferred), or as a means of access to other spheres, celestial, religious or spiritual. Analogies for mound symbolism are noted.

The construction of the West Kennet palisade enclosures, the radial lines and internal structures is considered, including their above-ground appearance and implications for labour. Both enclosures are seen to belong to a cycle of construction (with attendant feasting), destruction and renewal. Various roles are considered. The enclosures could be defensive structures, or they may mark a more permanent area of habitation, which some would argue is a significant development of the Later Neolithic in the area. They may represent, however, a new form of sacred enclosure at the end of the Neolithic sequence of the area, intimately linked to the circumstances in which Silbury Hill was brought into being. Analogies for palisade enclosures are noted within Britain and Ireland, and in other contexts, including the Mississippian culture.

Finally both the mound and the enclosures are considered together in the context of the local and regional sequence. It is possible that they belonged to the same horizon. They may have belonged to a world of dispersed population and mobility of settlement; neither need be the achievement of purely local population. Neither need be the product or emblem of a stratified society, though some differentiation during their creation and subsequent use cannot be excluded. This suggests a rather different society to that often modelled for the Later Neolithic. It is argued that charismatic individuals, the tradition of monument building, the power of monuments themselves, reverence for the past and a cyclic sense of time, together with a strong sense of the sacred and a pervasive system of shared values, could all have been important features of the Later Neolithic world, not only in the Avebury area but also further afield in southern Britain and beyond.

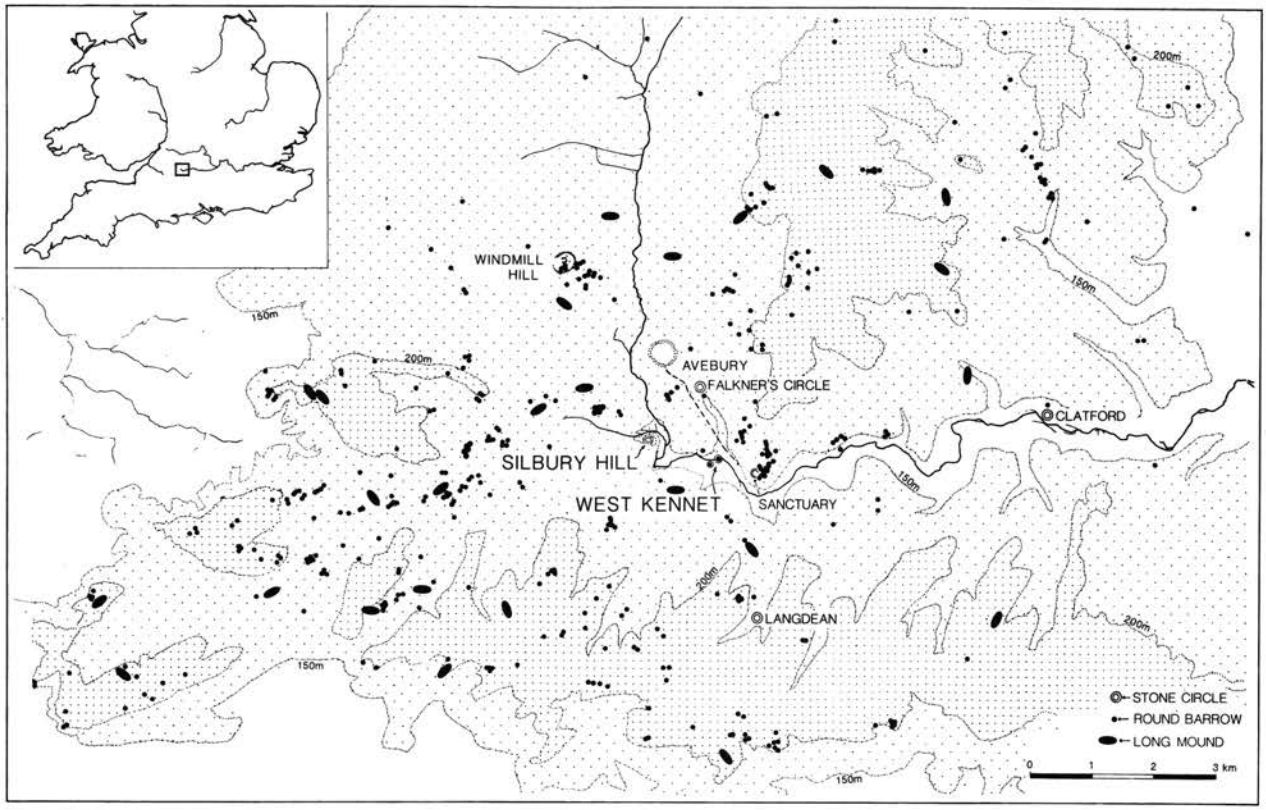

Fig. 1 Location map of Silbury Hill and the West Kennet palisade enclosures (monument distributions: various sources, including Barker 1985, Grinsell 1957 and the county SMR)

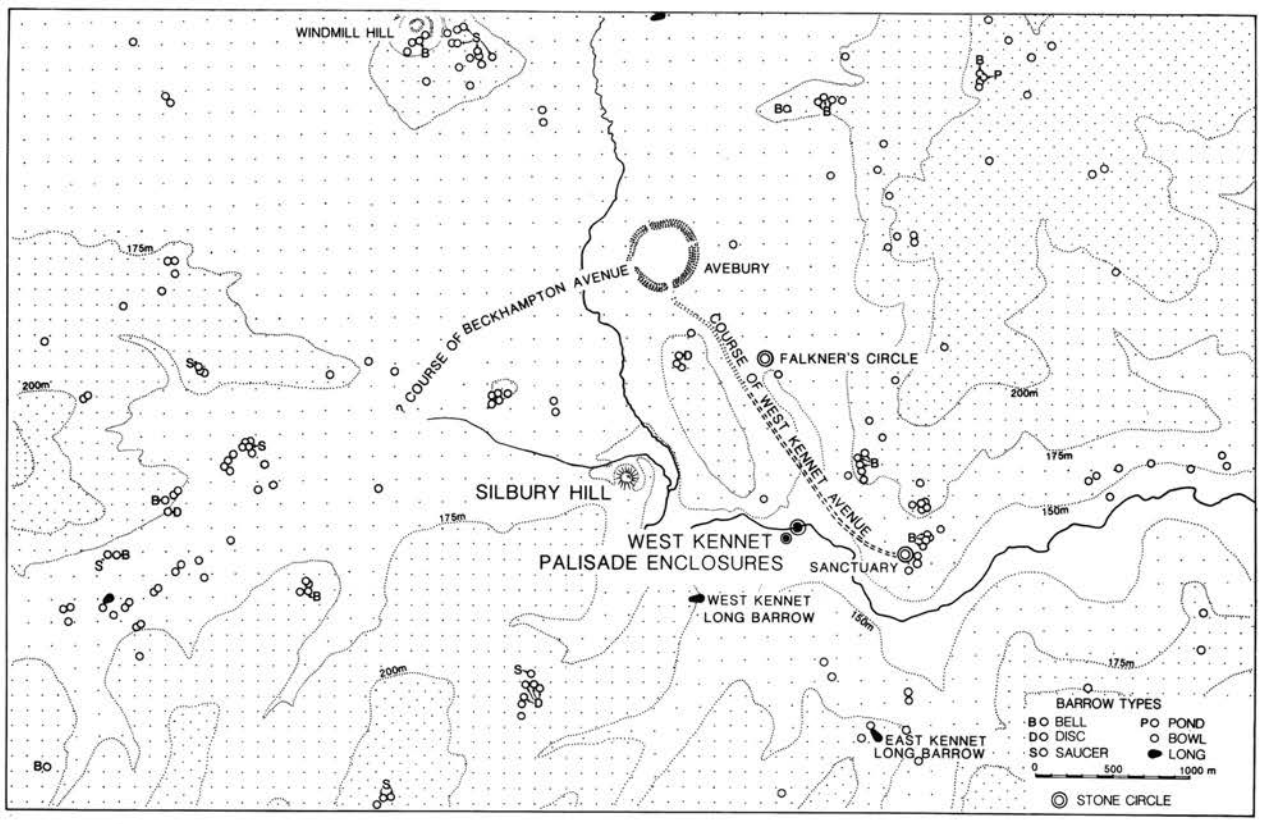

Fig. 2 Detailed map of the setting of Silbury Hill and the West Kennet palisade enclosures (monument distributions: various sources)

Part One:
The Silbury Hill monumental mound

Location and setting

The location of Silbury Hill is low-lying and in itself unprominent (figs 1–2; pl. 1; pl. 15). Because of its size the mound can be seen from several but not all directions, but it does not dominate the whole area. It is sited on the west side of the Kennet valley, its base at c. 150 m OD, at a point where the valley bends from north-south to west-east. The valley is of modest width here, and is formed by Waden Hill to the east and a sweep of downland to the west; the West Kennet long barrow lies on the first ridge of this downland, a little to the south-east. The mound is at the northern end of what was originally a rounded spur projecting into the valley. Low, undulating downland continues to the west towards Beckhampton and north towards Avebury Trusloe.

In the upper Kennet valley as a whole Evans and colleagues have shown that there is a sequence of stratified deposits going as far back as the late glacial period (Evans *et al.* 1993). The nature of the valley seems to have varied both with location and time. In the earlier Holocene, there was no stream around Avebury (approximately 1 km up the valley from Silbury Hill and 2 km from West Kennet), but a mixture of dry and marshy woodland, while down the valley at West Overton (approximately 3 km from Silbury Hill and 2 km from West Kennet) there were locally streams and swamps. In the Earlier Neolithic there was some woodland clearance and some cultivation of the valley floor, resulting in wetter conditions at Avebury and some alluviation at West Overton. Dry grassland later developed, and then throughout the upper valley a major episode of alluviation in open

Fig. 3 Silbury Hill from the south (approximately from the West Kennet long barrow). Windmill Hill is on the horizon to the north

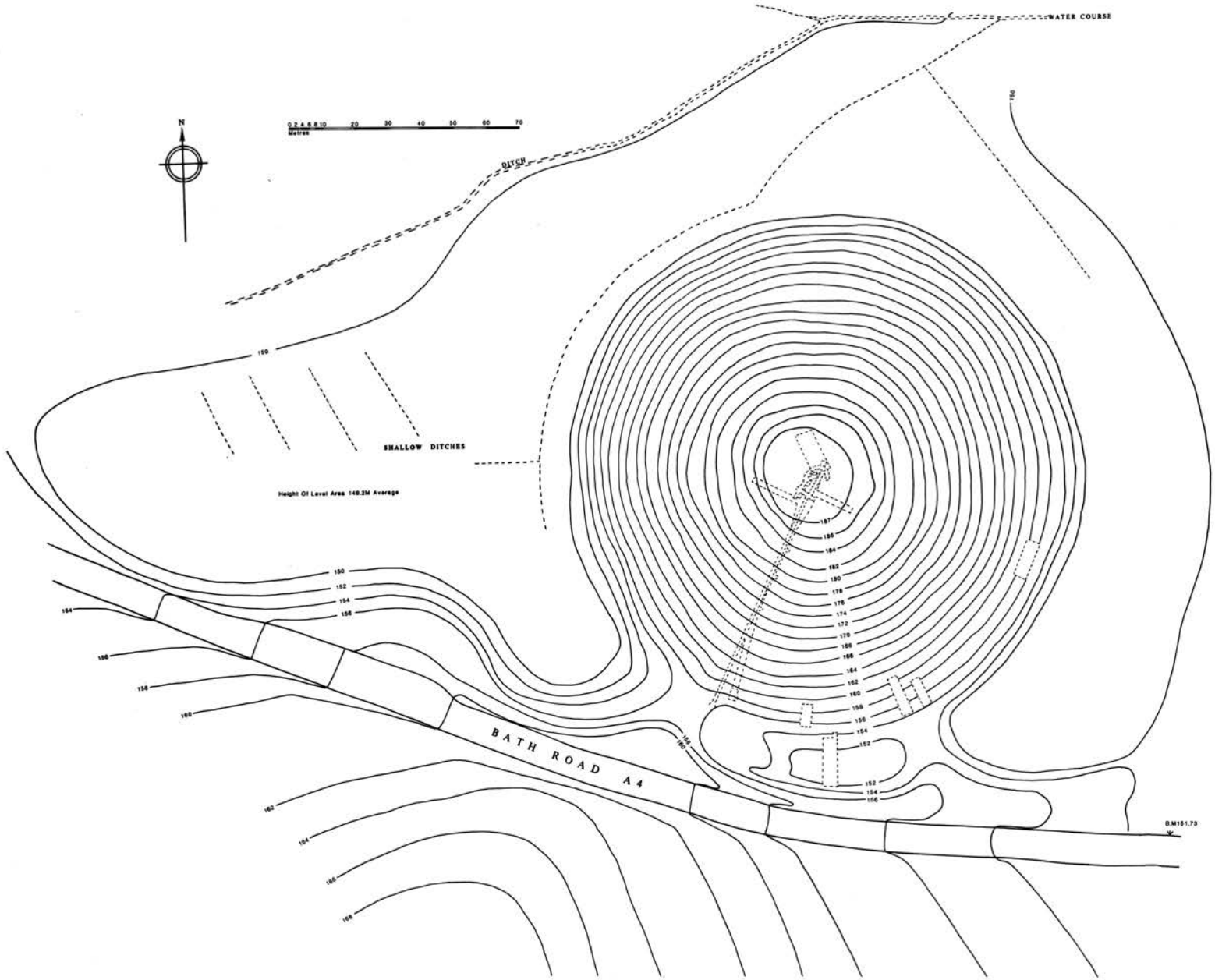

Fig. 4 Contour plan of Silbury Hill with locations of principal excavations. Note that no precise location plan exists for cuttings 4, 5 and 7 on the upper slopes of the mound; for their position see figs 18–20 and pl. 9

country began (called the West Overton Formation), probably in the Beaker phase of the early second millennium BC. There has been no specific investigation of the Swallowhead springs, just below Silbury Hill. Though there have been several claims that the ditch of Silbury Hill was designed to hold water (see below), the hydrological history of the locality remains uncertain. An active stream may have begun, as represented by the West Overton Formation, after the construction of the mound.

The present state of the site

In its immediate surroundings the mound rises impressively (figs 3–5; pls 1–4). The down is steeply scarped, presumably artificially, to the south-west and south-east of the mound, up to a height of 6 m to the south-west and 4m to the south-east. The south ditch continues the southern line of separation, though excavation in 1969 was to show that the southern edge of the south ditch was originally gentler. Two causeways are thus formed, that to the east relatively narrow, but that to the west over 30 m broad; its eastern portion projects as a flattish surface into the western part of the south ditch. It is unclear whether this is an original feature; it could well be the dump from the 1849 excavation.

The east side of the main ditch presents a low, quite gentle scarp. To the west the steep scarp gradually falls away over a distance of some 150 m. From the west there is now a small stream which is led eastwards by two courses (one embanked) around the edge of the very gentle slope to the north of the main ditch. These merge and then join a watercourse leading from the north-east corner of the main ditch, presumably of historic date, which later splits to join the Kennet in two places. The main ditch thus defined runs, anticlockwise, from the south-east around the mound to the south-west; it also continues as a broad projection to the west. In winter the whole of this area can be seen defined by standing water (pl. 2). Summer conditions show smaller, shallow drainage systems cut into it, which connect with the main outlet to the north-east just described. Seen from the west, north and east, therefore, the mound appears to rise abruptly from a more or less level surface. Winter standing water defines a narrow berm not more than 5 m wide at the foot of the mound.

The mound is a flat-topped or truncated cone, some 37 m high above the main encircling ditch. Its sides are at about

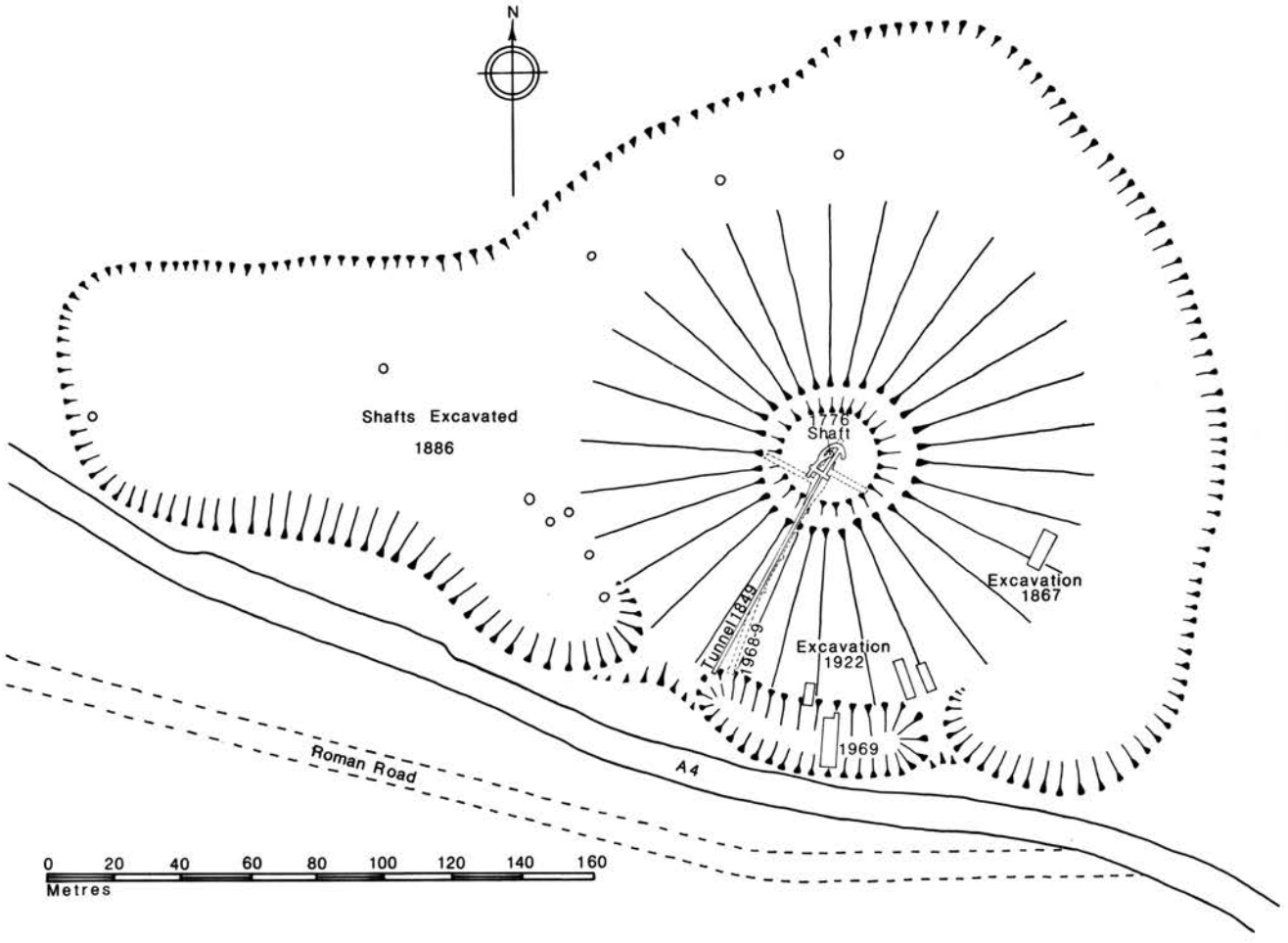

Fig. 5 Schematic plan of Silbury Hill, with locations of principal excavations

30°, sometimes a little more. It is more or less symmetrically built, though the top is a little off centre to the west in relation to the base, and there is one notable projection low down to the north-east. Few such irregularities show clearly on contour plans. The sides of the mound appear to be more or less symmetrical when seen from the west and east, but from the south and north the west side looks steeper and its profile is slightly convex or bowed outwards.

The sides of the mound appear basically smooth but there are many local undulations visible from closer range. On the south-east side the scar left by the 1867 excavation is clearly visible as a small terrace. On the south face a vertical scar is prominent, the result of later collapse above the line of the 1849 tunnel. The backfilled entrance of the 1968–9 tunnel is visible a little to the east of this. Low down on the north side there is a small terrace, 4, which coincides with a change in angle of slope, steeper below and gentler above. The terrace is not more than 5 m broad and is little more than 15 m long. Nothing similar is clearly visible on other sides. Approximately half way up the slope a slight step is detectable from certain aspects on the west, north and east sides. This may be referred to as terrace 3, but the feature is extremely hard to see when one is on the flanks of the mound itself, and is clearly not continuous nor even at exactly the same level around the circumference. Immediately below the top of the mound is a prominent step, terrace 1, best visible from a distance from the west, north and east (figs 3 and 83; pls 2–4). Terrace 1 starts at the north-west corner of the mound. Its riser to the mound top is steep, over 2 m high, and its flattish tread is 3–4 m broad. It continues, clockwise, around to the south-east. At this point it becomes less regular and bifurcates. On the south side it is little more than a break in the slope. On the west side, it is again 3–4 m broad but sloping, with two large scoops into the mound. It ends, going clockwise, below the starting point – as here defined for convenience of reference – at the north-west corner. It is therefore not level around the circumference of the mound. Terrace 2, starting again clockwise at the north-west corner, begins as a pronounced terrace, 3–4 m below terrace 1, and again about 3 m wide. Across the north face it is little more than an irregular, short break of slope. It may resume, somewhat lower, on the east face but is discontinuous; on the east face there is one prominent but short terrace at this level, exaggerated now perhaps by animal burrows. Terrace 2 is barely visible at the south-east corner and appears absent on the south face. There may be a short stretch on the west side, intersected by a former path line, which may also have served to distort the original contours.

These steps or terraces have normally been discussed as artificial features. This is justified in the case of terraces 1 and 2, but less certain in the case of terrace 3. The possibility that terrace 4 and the north-east projection are the result of slipping can be borne in mind.

The top of the mound is more oval than circular in plan. It has a prominent dip at its centre, presumably the top of the 1776–7 shaft, with an irregular ridge more or less right around, perhaps spoil from the same operation. Between this ridge and the edge of the top the surface is concave, giving the impression that the whole top was originally slightly dished.

History of previous investigations

Silbury Hill is first recorded as *Seleburgh* in 1281 AD, and later in the 16th century as *Selbarrowe Hill* (Gover *et al.* 1939, 295). The meaning of the *Sele-Sil* element is uncertain. The *burgh-bury* element may be derived from Old English *beorg*, meaning barrow or burial mound, but could also derive from *burh*, in view of the possible re-use of the mound in the late Saxon period for some sort of military purpose to do with control of the Roman road. Silbury Hill is mentioned in editions of Camden's *Britannia* from the late sixteenth century onwards. It was already a well recognised feature of the landscape when John Aubrey brought the monument at Avebury to general and royal notice. As part of this process Aubrey escorted Charles II to the top of Silbury in 1663 (Burl 1979, 43). Silbury is mentioned several times and sketched but not properly described in Aubrey's unpublished *Monumenta Britannica* (see above, p. ix). The first detailed and illustrated account was given by William Stukeley in his *Abury* of 1743. Stukeley expressed the view that ' 'tis the most magnificent mausoleum in the world, without excepting the Egyptian pyramids'. He recognised that the lower part of the mound was of solid chalk, and that the mound was earlier than the Roman road from Marlborough to Bath, which diverted around its southern foot. Stukeley also recorded, in his unpublished *History of the Temples of the Antient Celts* of 1723 (see Piggott 1985), tree planting at the top of the mound in 1723, in the course of which a decayed skeleton was found, with 'abundance of deers horns, which were very rotten, and an iron knife with a bone handle, and two brass bits of money'. He also acquired an 'old iron bridle of an unusual shape' from operations to make a path up the hill. This bridle, probably of Viking date (Stukeley, *Abury,* xxxvi) is now lost. In the *Abury* of 1743 the burial from the top and the bridle reappear together, the burial as the monarch to whom the mound was dedicated. The bridle was later displayed by Stukeley to his circle in 1751 and claimed to be 'probably the greatest antiquity now in the world', and again in 1759 to the Society of Antiquaries (Lukis 1887, 14 and 275).

In 1776–7, starting in November, the Duke of Northumberland and one Colonel Drax caused a shaft to be sunk from the centre of the top of the mound to the old surface some 100 ft (or some 30 m) below (figs 4–6). No contemporary account survives apart from a paragraph in a Bristol newspaper (contained in Sarah Farley's Journal, held in Devizes Museum Library as *Wiltshire Cuttings and Notes*, vol. 16, 44). This states that the tunnel was 8 ft (2.44 m) square and was dug by miners from Mendip. The bottom of the shaft was measured in 1849 as 5 ft by 4 ft 6 in. (1.53 by 1.37 m) (Merewether 1851). A very brief note of the operation is given by James Douglas in his *Nenia Britannica* (1793, 161). Douglas records that the miners were from Cornwall, and 'great labour [was] bestowed upon it'. The operation took place 'under the supposition of its being a place of sepulture'. Only a single sliver of oak was found at the base of the shaft, quite possibly from the shaft itself. Drax, says Douglas, 'had a fancy that this hill was raised over a Druid oak; and he thought the remains of it were discovered in the excavation; there was, however, no reason

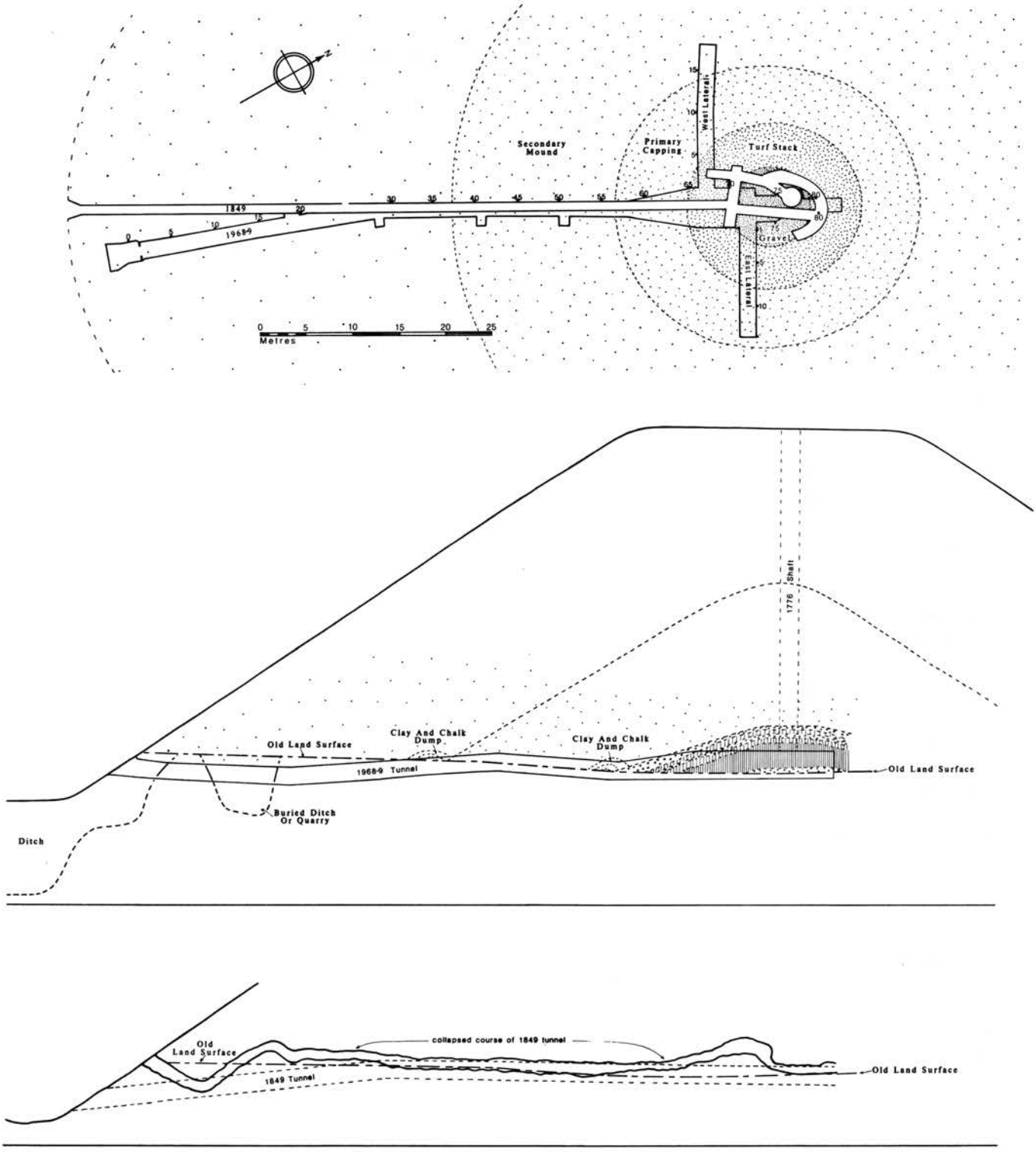

Fig. 6 Schematic plan and sections of Silbury Hill, showing: (top) the tunnels and shaft in relation to major parts of the mound; (middle) the 1968–69 tunnel and the old land surface in relation to the main parts of the mound as suggested by the excavator; and (bottom) the 1849 tunnel as found in 1968, and the old land surface. Note that the text sets out a more detailed phasing of the mound than the three stages implied here

for considering it to have been a place of sepulture by the digging into it'. A search was made of the Duke of Northumberland's papers at the family seat at Alnwick Castle for any other contemporary account, but without result. Merewether in 1849 obtained statements about the 1776–7 shaft from two old men living in the neighbourhood, of whom one had often heard his father talk of it, and the other, then aged 95, had visited it as a young man. Both alleged that the miners had found 'a man' (i.e. a skeleton) at the bottom of the shaft. Merewether assumed that this was wishful recollection (1851, 74, footnote).

In the summer of 1849, to coincide with the meeting of the Archaeological Institute at Salisbury and in answer to 'most urgent requests' received by the committee 'from many quarters' (Tucker 1851, 297), arrangements were made to drive a tunnel to the centre of the mound at its base (figs 4–6; pl. 5). The engineering work was supervised by Henry Blandford of Rowde near Devizes, a civil engineer with much experience of railway construction, assisted by Richard Falkner. Much of the archaeological supervision was done by John Merewether, Dean of Hereford, who was not, however, continuously present; on one occasion when visitors hampered operations he went off 'to open some neighbouring barrows' (Merewether 1851, 78). The latter stages were supervised archaeologically by the Rev. J. Bathurst Deane. As well as that by Merewether, there is an account by Tucker (1851), which diverges slightly over the progress of work. Merewether gives some details of the mound, including the presence of eight sarsen stones set at intervals around the base (Merewether 1851, 74).

The tunnel, initially 3 ft (0.91 m) wide and 6 ft (1.98 m) high, was begun on the south-west side of the mound, a little to the east of the western causeway across the ditch. The first section, some 100 ft (30 m) long, was dug slightly upwards (at about 1 in 28) wholly through solid chalk which here forms the inner side of the ditch and the base of the mound. At 99 ft from the entrance, the roof of the tunnel broke through into the old land surface beneath the mound. Merewether described this as 'vegetable mould, and upon that ... a layer of bluish clay about 2 inches thick, very soft and tenacious, which represented evidently the decayed and compressed turf and grass on the former surface of the hill' (1851, 75). From this point for a further 160 ft (some 48 m) the tunnel was sloped downwards, following the continuously visible old land surface, and keeping it at 18–24 in. (45–60 cm) below the roof, so that any feature cut through it, such as a grave, could easily be seen. According to Merewether, the tunnel extended some 16 yards (14.6 m) beyond the assumed centre of the mound, but this like many other measurements given by him, here and elsewhere, is incorrect (information from R.J.C. Atkinson, and see below). A plan and section made by Blandford show the tunnel extending only about 3 yards (2.74 m) beyond the bottom of the vertical shaft of 1776–7. Because a hollow-sounding place was encountered in the roof towards the centre, the ceiling of the tunnel was raised a further 7 ft (2.1 m) over the last 80 ft (24.4 m) or so; the excavated material was dumped on the floor to form an inclined plane. This yielded no result and even the hollow sound disappeared in the process.

The initial straight tunnel revealed the presence towards the centre of a mound composed of layers of turf, chalk rubble and black soil, with preserved mosses, what were described as freshwater snails, pieces of small branch, insects, especially beetles, and fragments of charcoal. At this point 'the conical heaping up of the earth, which was on all sides so distinctly marked' was investigated by means of a side tunnel. This revealed many sarsen stones 'favouring the line of the heap' and 'casing, as it were, the mound' (Merewether 1851, 79–80). Merewether reports finding bone fragments, a piece of antler tine and small sticks on top of these stones. Other side cuttings were made, one of which encountered the filled up base of the 1776–7 shaft, as well as a semi-circular gallery on the western side which curved back to rejoin the original tunnel (see figs 2, 3 and 8). 'In all of these the sarsen stones were similarly disposed' (Merewether 1851, 88).

Merewether contented himself with the reflection that the project had done much to give attention and understanding to local antiquities. Tucker, in his complementary account, concluded that 'the sepulchral theory being thus exploded, that which supposes Silbury Hill to have had some connexion with the great Temple of Abury, either for the assembling of the people, or for religious purposes, seems to have a better foundation' (Tucker 1851, 303). The work had lasted from 9 July to 30 August. The tunnel was closed in September. *The Archaeological Journal* for 1849 (vol. 6, 395) records a cost of £54. 6s. 4d. for the operation.

In 1867 excavations were made by the Wiltshire Archaeological Society on the east side of the mound, at the level of the old ground surface, to determine whether the Roman road ran beneath the mound (fig. 5). No trace of the road was found, but the excavation yielded six fragments of antler and, in an area previously disturbed, the blade of an iron clasp-knife and a whetstone (Wilkinson 1869). Subsequent excavation in the fields south and west of the mound showed that the Roman road was aligned on the mound but swerved southwards to pass some 30 m from its base. No plan of these excavations appears to survive.

In September 1886 after a prolonged drought ten pits or shafts were dug into the fill of the ditch on the west and north sides (Pass 1887) (fig. 5). These revealed a fill of chalk silt. The depth of the ditch below the modern surface of the silt averaged about 15 ft (4.6 m) and deepened to over 21 ft (6.4 m) at the base of the mound. Numerous animal bones were found, and at one point a dark layer at a depth of 9 ft (2.7 m) contained flints, bone, burnt sarsen and charcoal. In another shaft a coin of Marcus Aurelius was found at a depth of 6 ft (1.8 m). Even after the long dry summer, the water in the shafts rose to within 8 ft (2.4 m) of the top. Pass suggested that the ditch was designed to hold water for defence.

In 1915 the outer end of the Merewether tunnel collapsed to leave a hole above the original entrance, thereby making access to the 1949 tunnel possible. The whole tunnel had risen because of falls from its roof, but many people availed themselves of this opportunity to visit the centre of Silbury. Letters describing this experience are available in the site archive, but add little insight. There was, however, apparently no sign of the buried quarry or ditch later to be seen in the 1968–69 tunnel. The new entrance was sealed with a metal plate in 1923.

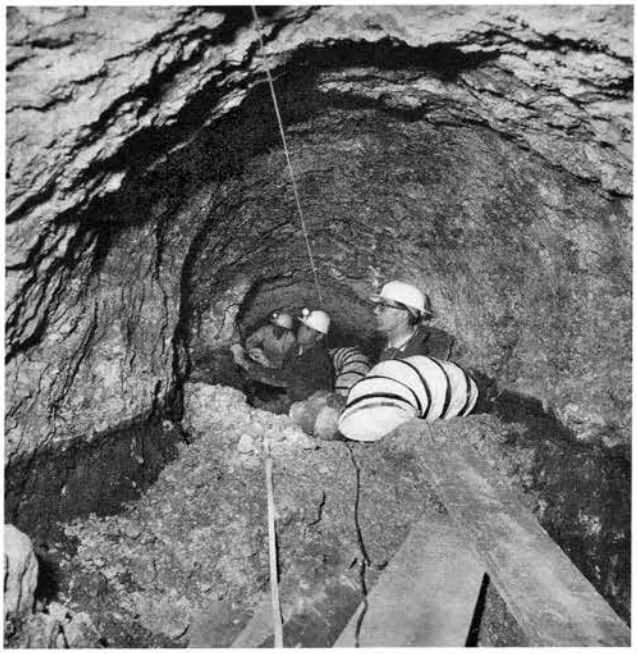

Fig. 7 View along the collapsed Merewether tunnel, showing mound material above the old land surface.

In 1922 Professor William Flinders Petrie, the well-known Egyptologist, undertook a brief investigation (Petrie 1924). Two cuttings, each with a side cutting, were made into the side of the mound, opposite and slightly above the eastern causeway across the ditch, to search for a possible entrance to a tomb chamber or passage (figs 4–5). The results were negative, although the cuttings showed that the mound had been here built in horizontal layers of chalk rubble. There was no sign here of the natural chalk. Other small cuttings were made to find the level of this, on the east side of the mound and midway between the causeways. Information from these was combined with data from inside the tunnel (then still accessible) to suggest that the mound had originally been built on a convex spur which fell sharply to the east. Petrie also revived the existence of sarsen stones at the base of the mound, previously discounted by Smith (1862, 158, footnote), and aired again the view that the low-lying location of the mound was to be explained by the desire of its builders for the ditch to be full of water. He also suggested that the short south ditch reflects an unfinished monument (Petrie 1924, 217).

In 1959 a resistivity survey of the mound was attempted, without results (McKim 1959).

Excavations in 1968–70: aims and progress

The excavations of 1968–70 were sponsored by the British Broadcasting Corporation. The idea of a fresh excavation at Silbury Hill had first been mooted by the BBC in 1960 and suggested to Professor Richard Atkinson and Professor Stuart Piggott; they themselves preferred the alternative of examining barrows around Stonehenge (Atkinson 1978; that account gives fuller details of the circumstances of the project). The idea was revived in 1965 by the *Chronicle* programme, and detailed planning began in 1967, under the direction of Atkinson. Atkinson has already described this aspect of the project, including funding difficulties from 1969 (Atkinson 1978).

The excavation came at a time when the investigation of major monuments and sites was in vogue, both for research and for enhancing the appreciation of the public. Atkinson had already worked with Piggott on behalf of the then Ministry of Works at the West Kennet long barrow, Stonehenge and Wayland's Smithy with just such aims (Piggott 1962; Cleal *et al.* 1995; Whittle 1991). The aim of the BBC, as discussed on several television programmes made in the course of the project, was explicitly to use the excavations to present archaeology to a wide public, both as a discipline which produced answers and results and as a meticulous process or technique whose results could not be guaranteed. It must also have been the hope that spectacular discoveries would be made, and early television programmes from the site talked of the contingency of daily broadcasts as the excavation unfolded. The excavation took place at a time when large-scale excavations were beginning to become more common, yet when the emphasis on rescue archaeology typical of the next decade had not fully emerged.

The primary archaeological aim was to establish the composition and date of the mound and to document its environmental setting, bearing in mind the preservation reported by Merewether, and further, to investigate whether the mound covered or contained a sepulchral or other structure. From the outset Atkinson insisted that any major feature at the centre could only be treated as a bonus. Before the excavation, his own best guess was that the mound was a monumental version of an Early Bronze Age barrow, and probably contemporary with the main sarsen phase of Stonehenge. A radiocarbon date of 999–807 BC (I-2795; table 1) on combined antler fragments from the 1867 and 1922 excavations was judged 'unexpectedly late' for the

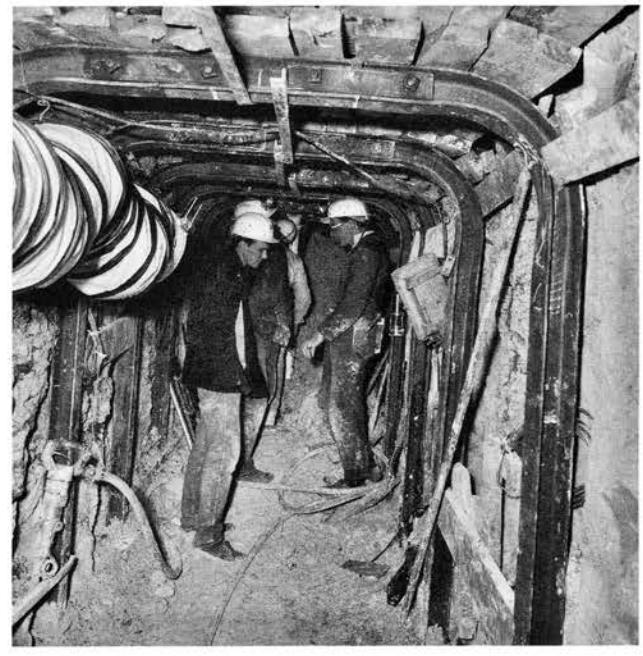

Fig. 8 The 1968 tunnel, looking from ring 25 into the mound

Table 1: radiocarbon dates from Silbury Hill and West Kennet

Lab no	*Date BP* 1σ	*Date BC* 1σ	*Material*	*Source*	*Reference*
Silbury					
I-4136	4095±95	2871-2486	small twigs, ? hazel from bark (excavator's identification), and plant stems and roots	surfaces of turves in primary mound	Atkinson 1969
SI series			fractions of turf	primary mound	Stuckenrath and Mielke 1973
SI-910AH	5995±185	5197-4696	NaOH-soluble portion of SI-910A		
SI-910A	4675±110	3627-3344	Organic matter 2 mm size		
SI-910C	4570±120	3501-3047	Organic matter 0.5-1 mm		
SI-910D	4530±110	3370-3036	Organic matter under 0.5 mm		
SI-910CH	4465±130	3355-2916	NaOH-soluble portion of SI-910C		
SI-910B	4315±110	3071-2782	Organic matter 1-2 mm		
BM-842	3849±43	2398-2202	Collagen from antler	near base of south ditch cutting	Burleigh *et al.* 1976
BM-841	3752±50	2270-2042	ditto		
I-2795	2750±100	999-807	Antler fragments	combined from 1867 and 1922 cuttings on east mound side	Atkinson 1967
West Kennet					
Enclosure 1					
BM-2597	3810±50	2317-2142	Antler	Tr D, outer ditch	
BM-2602	3620±50	2032-1890	Antler	Tr D, outer ditch	
CAR-1293	3960±70	2563-2347	Pig and cattle bone	Tr G, outer ditch	
CAR-1289	3860±70	2457-2197	Pig bone	Tr H, outer ditch	
CAR-1290	3900±70	2466-2280	Pig bone	Tr H, outer ditch	
CAR-1291	3890±70	2464-2207	Pig bone	Tr J, inner ditch	
CAR-1296	3590±70	2026-1785	Cattle bone	Tr H, 215 bone deposit	
CAR-1297	3550±70	1961-1756	Pig and red deer bone	Tr H, 215 bone deposit	
Enclosure 2					
CAR-1294	3620±70	2113-1884	Cattle bone	Tr M, ditch	
CAR-1295	4050±70	2850-2468	Cattle bone	Tr M, ditch	
CAR-1292	3930±70	2489-2313	Cattle bone	Tr S, outer radial ditch 1	
CAR-1298	3830±70	2450-2142	Cattle bone	Tr S, outer radial ditch 1	

construction of the mound (Atkinson 1967, 262). The investigation was undertaken in the belief that the site was unique, and that as such was likely to yield greater insights than other, recurrent types of site into the 'social and political structure of the society which encompassed it' (Atkinson 1967, 261).

The archaeological objectives of the exercise were to re-open the 1849 tunnel and follow it to the centre of the mound and beyond; to examine the encircling ditch on both north and south sides; to examine the top of the mound and at least some of the steps and terraces visible on the upper slopes of the mound; and to establish the junction between solid chalk and artificial mound by corings and cuttings around the mound, including the re-opening of one of Petrie's cuttings opposite the east causeway.

The excavation proceeded in four seasons (figs 4–5). In April 1968 tunnelling began close to the 1849 entrance (slightly to the east and a little higher), but following a slightly different line, in order to rejoin the original tunnel some 25 m inside the mound (at rings 20–22; the recording system is described below). This was because the outer part of the 1849 tunnel had collapsed (figs 6–8). The excavation resumed from late June to mid August in 1968. The tunnel was re-established on the 1849 line, this being open from ring 32, and taken as far as ring 73. From ring 57 the tunnel was a little wider and higher, exploiting the cavity produced by the collapse of the central workings of 1849. The mound was cored mechanically from the top to within 3 m of the tunnel roof, and the ditch was cored by hand and mechanically and investigated by echo-sounding. In 1969, the excavation lasted from late June to mid August. The tunnel was extended to ring 83 and short lateral tunnels were driven both west and east. A broad cutting was made across the south ditch. Because of its great depth this was not completely excavated, and the proximity of the Bath road prevented full excavation of the ditch fill on the south side of the cutting. A cutting was made in the north-western portion of the top of the mound, and two narrow cuttings were extended down the northern slope of the mound. A further small cutting was made below these, and two small cuttings were made on the south side of the mound to look for the level of the solid chalk. It was therefore not possible

to investigate the north ditch, presumed waterlogged, nor to re-examine Petrie's cutting at the east causeway. The tunnel was backfilled in November 1969. The investigation of the top of the mound was completed in 1970, over three weeks from July to August.

The tunnel

The conditions of excavation and the recording system

The size of most of the tunnel was 4 ft 6 ins wide (1.37 m) by 6 ft 6 ins (1.98 m) high (fig. 8). The tunnel was supported on standard steel mining arches, rectangular in section with rounded corners, spaced at 3 ft intervals (0.91 m). The arches were numbered as a recording line, and for coherence between this report and the records taken at the time, this system has been retained, despite being imperial rather than metric (figs 6 and 10–12). From rings 57–58 the tunnel was wider (up to 13 ft 2 ins (3.96 m) wide) and higher (with an internal height of 9 ft 6 ins (2.9 m)), supported on rounded arches, but at the same 3 ft interval (fig. 9). This exploited – and then continued – the cavity or chamber, some 4 m long and 3.5 m wide, left by the collapse of the junction of the main 1849 tunnel with shorter tunnels to either side. The lateral tunnels were the same dimensions as the main tunnel. Beyond ring 73 the dimensions of the main tunnel varied (fig. 6); the tunnel roof was here mainly flat. Throughout, the tunnel was roofed for safety, and much of the sides for the same reason, after recording had taken place. With flooring and roofing, lighting and air extraction in place the working space was cramped (Atkinson 1978; site diaries).

The tunnel was, in essence, excavated by the mining team, both by hand and mechanically (figs 8–9), and then recorded archaeologically. The mining team worked in three shifts round the clock. Their operation could be monitored by inspection of the tunnel sides and of the face of the end of the tunnel at any one time. Where the tunnel beyond ring 73 coincided with the innermost explorations of 1849, it was possible for a portion of the primary mound to be excavated after the establishment of the tunnel. The recording of the tunnel was difficult in the conditions described, not aided by the lack of natural light.

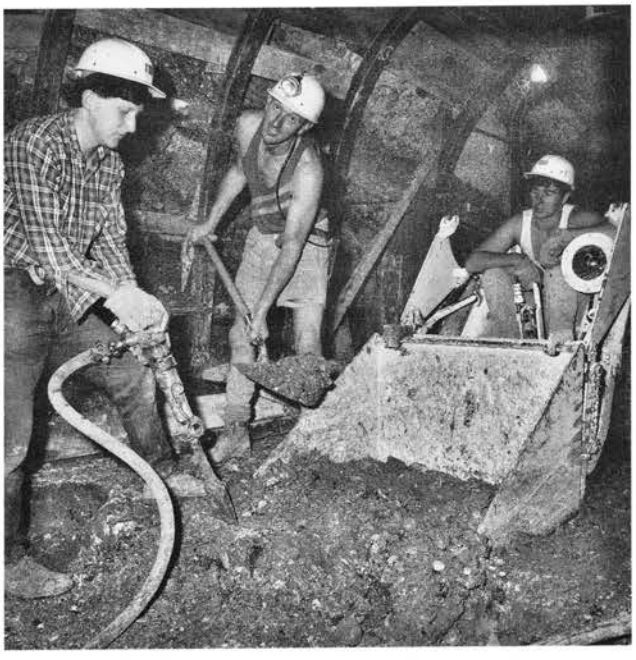

Fig. 9 The 1968 tunnel, around ring 63

As the coring of the mound and photographs of the outer part of the 1849 tunnel make abundantly clear, most of the mound consists of dumped chalk rubble, of a relatively homogeneous nature. The sections drawn at the time now appear at first sight to be somewhat schematic, but they were designed to record any divergence from this standard matrix, in the form of runs of chalk, chalk blocks or walling, and other material altogether. On the original site drawings some but not all of the different layers are individually labelled by means of a short description. In this report, for clarity of presentation, a numbering system has been used on the drawings, and is combined with original descriptions in the text. Original descriptions are given in inverted commas. The site record consists of these drawings, notebook descriptions and photographs. Some VHS cassettes are available from the many hours of filming undertaken. The section of the main tunnel beyond ring 73 was recorded but has not survived. Photographs are, however, available for this part of the primary mound. The west and east sides of the tunnel are described separately but it is possible for the most part to link the two sides closely together.

The mound was built on a spur of Middle Chalk, and the main constituent of the mound was chalk in various sizes and densities of fragments. The spur was overlain by a non-calcareous layer of clay-with-flints with an upper thin loessic horizon, which was vegetated. Turf was also brought into the site from a calcareous source. There are recurrent descriptions in the records for the constituents of the mound. Chalk was derived from the underlying parent material; on occasion the parent material is described as coombe rock, or soliflucted chalk, but this probably just refers to fissured chalk. Chalk fragments are variously described as coarse, medium and fine (roughly over 10 cm, over 5 cm and under 5 cm), as clean (i.e. white) or coloured (i.e. with staining or an admixture of other material), and as dense, compact or loose; the latter are imprecise terms. Clay was presumably derived from the underlying clay-with-flints. Toblerone (a type of chocolate bar) is a term used to describe a mixture of brown clay-with-flints and small chalk material. Deposits of earth (also referred to in a non-technical way as soils) are mainly described in terms of their colour, from grey to dark, but sometimes in terms of their supposed origin, as marsh or floodplain deposits. Redeposited soil on the site may have come largely from purely local sources, and colour may not be due to a valley source. Turf is self-explanatory; it was possible to distinguish turves from a calcareous parent material which was not available immediately on the site of the mound. Gravel seems to refer to small flinty gravel, perhaps derived from clay-with-flints, but there is some ambiguity in the term. Iron pan and iron staining are self-explanatory; panning was a formation which followed the construction of the mound. The environment of the site including soils is fully discussed below.

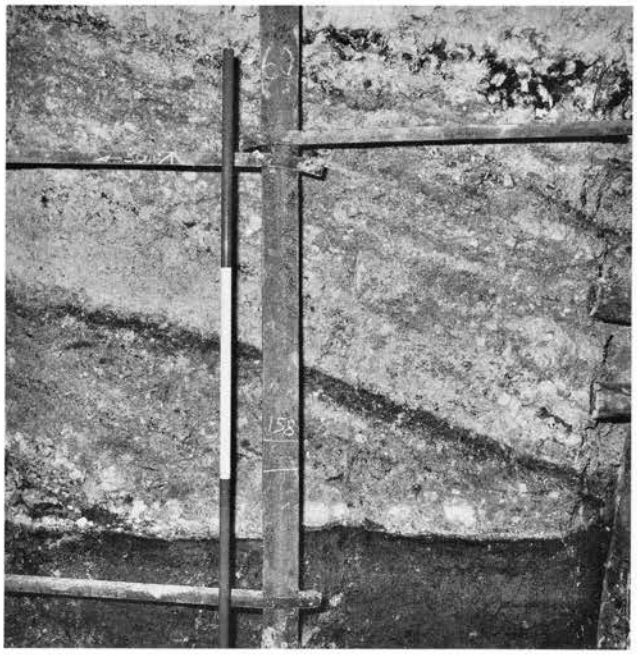

Fig. 13 Detail of the east side of the main tunnel of 1968–69 at ring 60, showing outer capping of the primary mound above the old land surface

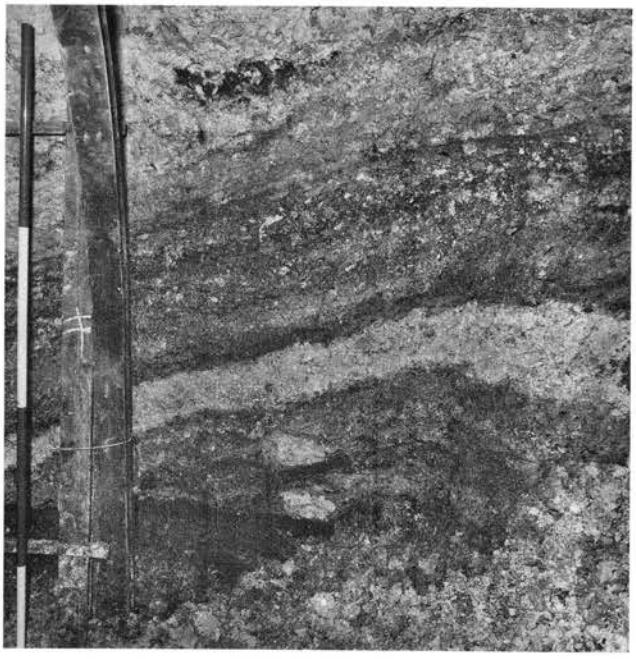

Fig. 14 Detail during excavation of the west side of the main 1968–69 tunnel at ring 66, showing layering of the primary mound

The west side of the tunnel to ring 73 (figs 10 (foldout opposite p. 16) and 14)

100: turf and topsoil.
101: mixed soil and chalk rubble.
102: from entrance to sloping chalk face at rings 3–5; chalk rubble, with some signs of layering, some horizontal, some sloped downwards and outwards. Coring at the entrance to the tunnel showed a further 5.1 m of deposit before solid chalk was reached (site diary, July 21, 1968).
103: 'medium rubble'.
104: 'chalk blocks', apparently angular.
105 and 106: 'dense rubble', separated by a run of smaller chalk rubble.
107: solid chalk, from ring 3 to ring 9/10 at the base of the tunnel, with sloping faces.
108: from ring 9/10 to ring 16/17 at the base of the tunnel chalk rubble of varying kinds between sloping chalk faces of 107 and 123. Coring and percussion soundings suggested that this feature was at least 3.5 m deep below the base of the tunnel (site diary, July 20, 1968: coring at ring 13; July 21, Holman borings at rings 13–15). The feature was originally interpreted as a buried ditch (Atkinson 1968; 1978) but could also be seen as a less regular quarry – see the east side and discussion of sequence below, p. 25. Contains 109–122.
109: not labelled but presumably dark soil lenses.
110: 'compact chalk'.
111: walling of chalk blocks, evidently angular.
112: ditto.
113: ditto, but continues below level of 118.
114: runs of small chalk rubble retained by 113.
115: 'fine rubble'.
116: 'compact chalk'.
117: 'fine chalk'.
118: 'compact chalk', from the north edge of 107 to 113.
119: 'loose mixed rubble'.
120: 'fine rubble'.
121: a wedge of smaller chalk rubble.
122: 'compact chalk'.
123: solid chalk which extends north for the rest of the length of the tunnel. The south edge at ring 17 is steeper than the south edge at ring 9/10.
124: 'Merewether tunnel fill'. The tunnel joined with the 1849 tunnel at rings 20–22. 124 is the collapsed fill of the 1849 tunnel, which was driven initially up through solid chalk. Fig. 6 shows, schematically, how the 1849 tunnel had raised itself by progressive collapse of its roof. It was possible to crawl back to the entrance blocked in 1923 from around rings 30–32. Observation was made by Vatcher between ring 30 and the 1923 entrance of the junction between solid chalk and mound material (site diary, July 7, 1968). Only a little soil was noted at this point – 'part way down the steep south-facing slide', that is, quite near the blocked 1923 entrance – and the inference was made that soil had been stripped or lowered in this area. See 125 below.
124a: 'tread' at base of original 1849 tunnel.
125: clay-with-flints subsoil. This runs under the old land surface (126–7/147) for the length of the rest of the tunnel. Its depth is variable.
126: stone-free thin grey layer at top of 125. The site diary notes (July 5, 1968): '..the old surface is continuously visible as a thin band, about 5 cm thick, of leaden grey clayey soil, completely free from flint and chalk lumps.'
127: very thin layer of chalk and soil. The site diary notes (July 5, 1968): 'Immediately above the buried soil is a thin layer of laminated pasty chalk, with dirty streaks, suggesting the trampling of spilled chalk during construction. Above this is the coarse chalk rubble of the mound.'
128: 'clean chalk', that is clean coarse chalk rubble.

129: 'Toblerone', or brown clay interspersed with small chalk clasts, described in the site diary (July 8, 1968) as 'streaks of chalk in a milk-chocolate clayey matrix', and interpreted in the field as a form of coombe rock or solifluxion material. Similar material was seen in the chalk below 125 at rings 38–40.
130: 'Toblerone dump'. A heaped deposit of clayey material, with strongly visible lines of tipping, including to the north to form a V with 132–3. Chalk is included as 'a series of parallel streaks' (site diary, July 8), some more pronounced than others.
131: chalk rubble.
132: a layer dipping visibly to the south and contrasting with 130, which overlies it. It is not precisely described in the site diary or on the site drawing, but appears from the conventions of the drawing to include large and small chalk fragments and some 'toblerone' or soil.
133: 'earthy material'.
134: 'a thick run of chalk rubble' (site diary, July 8), underlain by chalk silt or chalk mixed with soil.
135: earthy material, by comparison with 133. There is a lacuna in the recording of 135. This point was high up on the side of the tunnel and was presumably obscured for some technical reason.
136: pronounced chalk rubble.
137: large chalk blocks, evidently angular.
138: chalk rubble.
139: a run of closely packed chalk rubble.
140: 'clean chalk' rubble.
141: chalk blocks and chalk rubble runs.
142: 'Tobleroney chalk' above 143.
143: 'a dump of large chalk blocks, 25cm in diameter on average, resting on the chalky trodden surface of the OLS' or 127 (site diary, July 11).
144: 'clean chalk'rubble. Contains 145 and 146.
145: chalk blocks and a run of smaller chalk rubble.
146: a run of closely packed chalk rubble.
147: 'Toblerone – chalk and chocolate clay'.
148: upper part of 147, labelled on the drawing as 'fine chalk with chocolate clay tip lines'. These dip northwards against 151 and succeeding deposits.
149: chalk rubble.
150: 'small chalk blocks'.
151: 'iron stain'.
197: from ring 56, layers 126–7 could no longer be separated. The old land surface is now covered by the primary mound. 197 was dark or black, and was noted as blacker and thicker from ring 62 inwards. The site diary notes (July 15, 1968): '...the OLS under the tail of the primary barrow is very black in the upper 2 cm, and there are clearly recognisable remains of vegetation on the surface...There appear to be small chips of flint, c. 2 mm across, in places on the surface of this buried soil, suggesting that they were deposited very shortly before building the primary barrow.'
152: 'chocolate clay' tip lines at the top of the tunnel side, apparently merging into 153 lower down.
153: 'iron pan layers'.
153a: 'iron pan'.
154: chalk rubble. Contains 155 and 156.
155 and 156: 'chocolate clay tip lines', 155 dipping to the south, 156 to the north.
157: 'dark soil', separating 154 from 158; its upper part seems to diminish to a very thin line.
158: iron 'stained chalk' rubble, similar to 154.
159: 'iron pan' through the base of 158.
160: iron stained lower part of 158.
161: not labelled on the site drawing; the site diary implies this may be 'tread' like 127 (July 15).
162: 'grey marsh deposit with rounded chalk nodules'. It is unclear why this deposit is characterised as marsh-derived. 162 contains 163–8.
163: small lens of 'dark brown soil'.
164: single chalk block.
165, 166 and 167: not labelled, but following the conventions these are lenses of chocolate clay or dark soil.
168: iron pans, the most continuous at the base of 162.
169: lens of 'brown earth'.
170: 'chalk' rubble. The site diary (July 18, 1968) implies that the chalk fragments here have a 'rounded and weathered appearance'.
171: 'rounded chalk with marsh earth', 'light grey' and 'grey'. Its upper part is 172.
172: as 171, but iron stained with a developed iron pan between.
173: as 172.
174: 'iron pan'.
175: thin lens of 'dark grey earth'.
176: 'light grey' soil.
177: not labelled but presumably dark soil.
178: chalk rubble at the base of 171 and 176.
179: 'dark grey' soil.
180: 'light grey' soil, merging into 181 higher up.
181: 'grey' soil', merging into 182 higher up.
182: 'grey speckly' soil.
183: 'iron stained flint and chalk with earth' and 'iron stained earth, flint and chalk'. Contains 184 and is cut by 196.

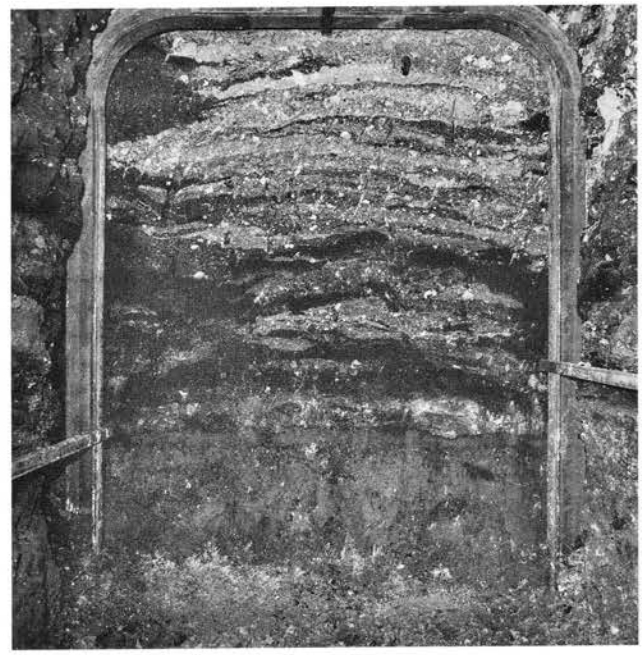

Fig. 15 View of layering in the turf stack within the primary mound, above the old land surface, at an unlocated point within the east lateral tunnel of 1968–69

Referred to in a broadcast description as 'orange' (cassette number 16/OP/46788).
184: 'pan' of iron.
196: 'stake hole with grey marsh deposit replacement'. The site diary (July 23, 1968) notes: 'The filling of the hole at the bottom is grey chalk gravel.' A preliminary published account shows another stakehole in the main tunnel more or less opposite 196, towards the eastern side of the tunnel, but there are no recorded details (Atkinson 1978, 165). This stakehole, 198, was also referred to in a broadcast (cassette number 16/OP/46788).
185: 'grey earth'.
186: 'earth'.
187: 'earth', interleaved with upper and inner part of 183.
188: 'orange earth', presumably iron stained.
189: 'black earth with flints'.
190: 'turf stack with flints'. This is not drawn in detail beyond ring 67. Photographs show its continuation. 191 and 192 are subdivisions within 190. The site diary (July 22, 1968) notes: '... a layer of dark black stacked turves began to appear. On breaking apart lumps of this, the surface vegetation still appeared green, though much flattened. Beetles and snails are visible, the former apparently in an excellent state of preservation.'
191: 'black turf'. As 190.
192: 'turf, from OLS ?'. While most of the turf was from a rendsina profile, some derived from clay-with-flints. This presumably could be seen in the field.
193 and 194: dashed lines on the site drawing. Below 193 is labelled 'turf', and 194 is labelled 'top of primary stack'. Although the drawing lacks detail, there are site diary entries which expand the description. July 31: (in the face, i.e. end of the tunnel, at ring 70) 'on the west side of the main tunnel, the stack of laminated turf has given way to a pile of dark grey sticky soil with flints in it...In the west wall of the north continuation of the main Merewether tunnel, the top of this layer can be seen running horizontally. Above this is the wedge-shaped tail, thickening northwards of an orange fine gravelly layer; and on top of this is a markedly horizontally striped layer, presumably the lowest of the four visible' (capping the primary mound). August 1: (at ring 70) 'The central turf and soil stack continues, but of very mixed consistency, with many streaks of grey and orange gravelly material.' August 2: 'In the face prepared for ring 71, a steep stack of turf and sticky brown soil immediately west of the west side of Merewether's main tunnel. There is now a layer of orange gravelly clay on the OLS, about 25 cm thick, tailing out at the W side of the face, but continuing to the E of the E side. Above the turf and soil stack is a thick layer of banded orange gravel, below the lowest of the four main striped layers.'

This shows, therefore, a banding, from orange gravel on the old land surface (195, below), to a rather mixed turf and soil stack, overlain by a layer of orange gravel (presumably between 193 and 194 on the drawing here), capped by the continuation of 171–82, here lying more or less flat on top of the primary stack.
195: 'orange gravel'.

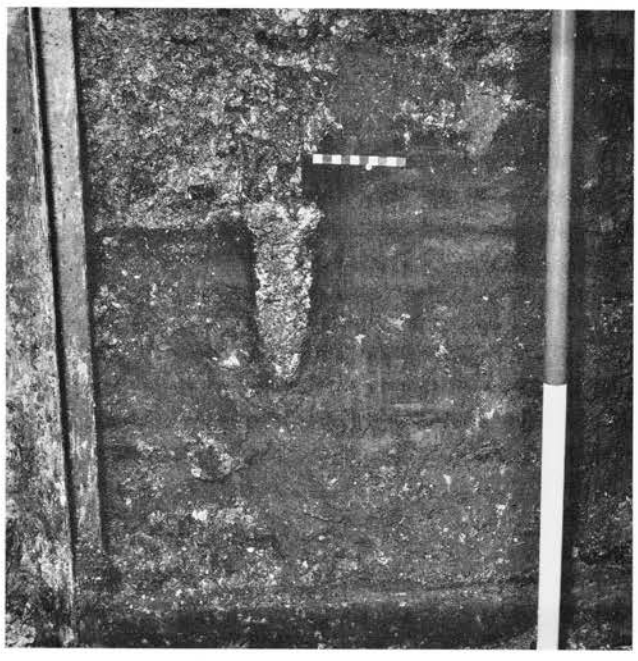

Fig. 16 Detail of stakehole penetrating the old land surface, on the west side of the main tunnel of 1968–69, at the outer edge of the primary mound

The east side of the tunnel to ring 73 (figs 11 (foldout opposite p. 17) and 13)

300: turf and topsoil.
301: as 102, chalk rubble, with various runs, mainly horizontal but dipping towards the edge of the mound.
302: large angular chalk blocks within 301.
303: chalk blocks and coarse chalk rubble.
304: 'coombe rock' or solid chalk. Unlike on the west side of the tunnel, this does not reach the top of the tunnel. The south side is sloping, the north face steep.
305: 'coombe rock' or solid chalk. As 304.
306: as 108, chalk rubble between edges in the chalk, 304–5 and 324, from rings 5 to 17. Although interpreted in the field as a buried ditch, it is possible that this is a less regular quarry. See 108. Contains 307–323.
307: small chalk rubble.
308: soil lens.
309: soil lens.
310: diffuse soil lens.
311: soil lenses.
312: chalk block wall, as 111.
313: ditto, as 112.
314: 'medium chalk' rubble.
315: 'fine chalk' rubble.
316: 'medium chalk' rubble.
317: chalk block wall, as 113, and like it, extending much lower than the other two lines of walling.
318: 'medium chalk' rubble.
319: 'fine' chalk rubble.
320: 'cc', or compact chalk rubble.
321: 'medium' chalk rubble.
322: 'fine' chalk rubble.
323: 'trodden', presumably compacted chalk, extending from 317 to the top of 305, with an apparent discontinuity at ring 10.

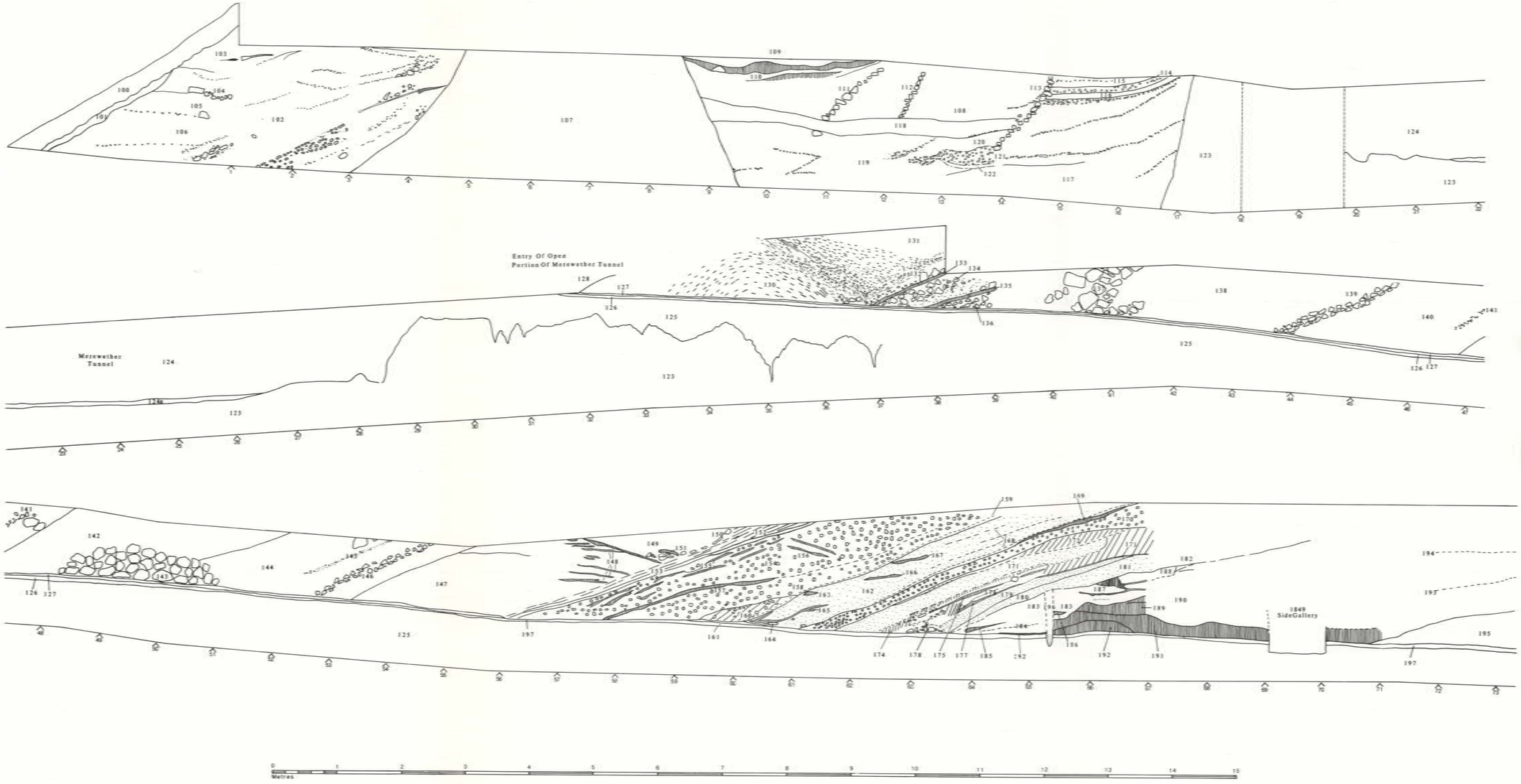

Fig. 10 Section of the west side of the main tunnel of 1968–69

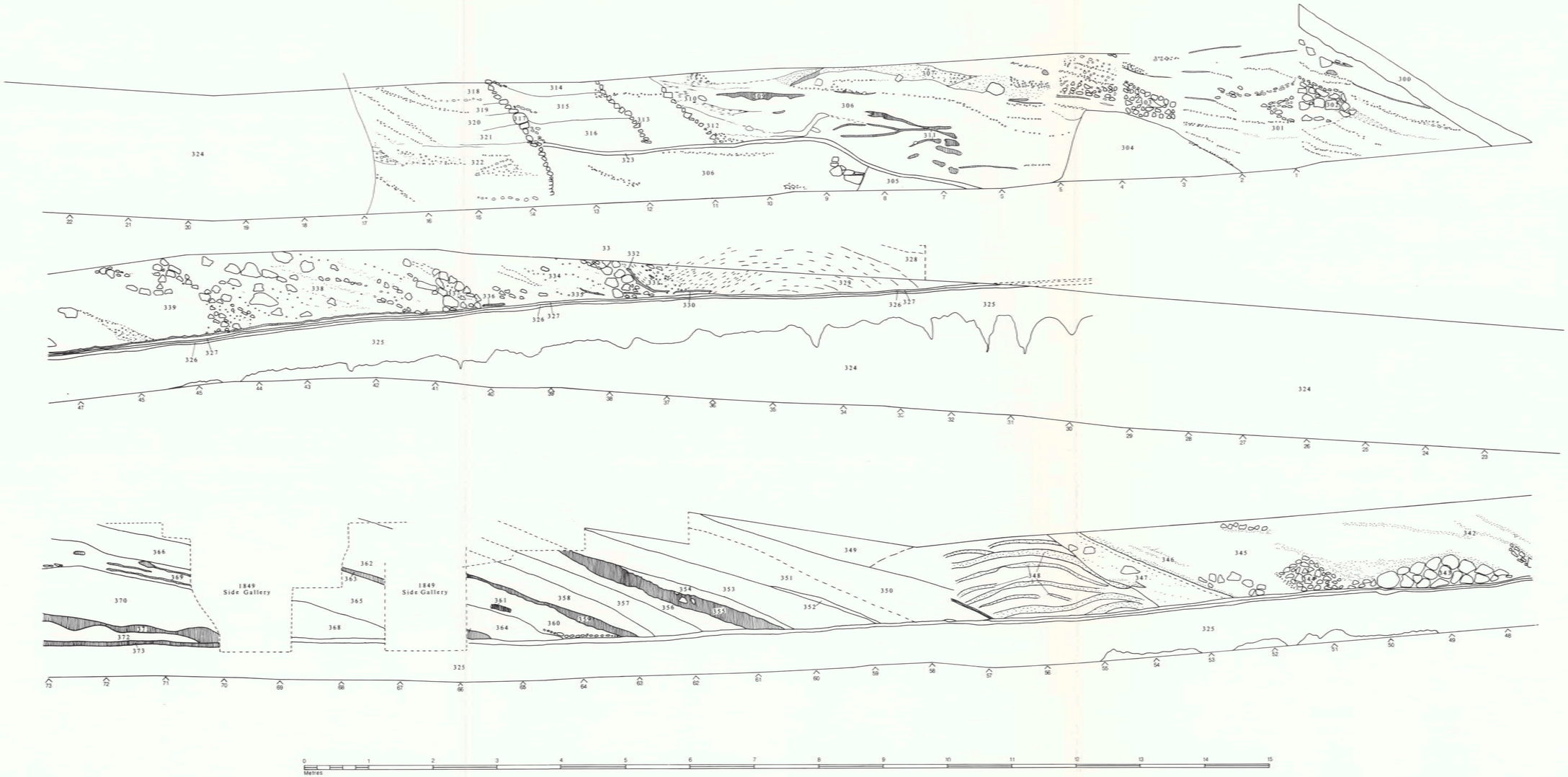

Fig. 11 Section of the east side of the main tunnel of 1968–69

324: solid chalk, as 123. The face is bowed, but 318–22 appear to be dumped against it.
325: clay-with-flints subsoil, as 125.
326–7: old land surface, as 126–7. Extends to ring 57, when it merges with its continuation 373.
328: 'white chalk', rubble as 128.
329: 'Toblerone', as 129–30, and as on the other side of the tunnel, clearly heaped.
330: 'black iron' pan.
331: mixed chalk and clay with chalk.
332: 'soil'.
333: large chalk blocks, with a small soil lens near the old land surface. The site diary (July 14, 1968) describes this as a 'wall'.
334: mixed chalk rubble, with some visible tip lines.
335: 'soil' lens within 334, conforming to the line of tipping.
336: 'black iron' pan, which extends north to just short of ring 48, though more diffusely from ring 41.
337: chalk blocks. The site diary (July 14, 1968) describes this as a 'wall'.
338: mixed chalk rubble and blocks, some large. Some tip lines are visible.
339: chalk rubble.
340: lens of small chalk rubble within 339.
341: small chalk blocks.
342: not labelled, but by comparison with conventions used for 348 and with the west side of the tunnel directly opposite, this must be 'toblerone chalk' or chalk mixed with brown clay. Equivalent to 142.
343: pile of chalk blocks, as 143.
344: small chalk blocks.
345: chalk rubble.
346: probably mixed chalk and chalk with clay.
347: The site diary (July 14) describes this as a 'steeply sloping trampled layer of compact chalk'. There appears to be a slight disconformity with the edge of 348.
348: 'Toblerone', as 147 opposite, with clear heaped tip lines. The site diary (July 14) describes it as 'a laminated heap of white chalk and 'Toblerone', which has been dumped against the outer face of the primary barrow'.
349: chalk rubble.
350: 'dirty yellow chalk', the beginning of the primary mound, equivalent but perhaps not exactly similar to 154. As drawn, there is a slight disconformity in the lower edge with 348. This may actually only reflect stages in the recording process, as the site diary notes that rings 30–57 were recorded in one operation (July 14, 1968).
373: the dark old land surface under the primary mound, as 197. Described by the site diary as 'markedly blacker' from this point inwards (July 14).
351: 'cleaner chalk', by comparison with 350.
352: 'brown clayey chalk'.
353: 'yellow gravelly chalk'. It is not clear what gravel means in this context. It may imply rounded clasts, or the presence of flint. Eqivalent but not perhaps exactly similar to 158 opposite.
354: 'grey speckly' and 'light grey speckly' soil.
355: 'dark grey with chalk', soil.
356: 'light grey speckly' soil. 354–6 are roughly equivalent to 162 opposite.
357: 'orange chalk rubble', equivalent to 170 opposite, but for which colour was not noted on the drawing.
358: 'lighter grey speckly' and 'lighter grey' soil.
359: 'darker grey soil'.
360: 'lighter grey' soil. Contains 361.
361: 'turf'.
362: apparently conformable with the line of 360 below but interrupted by an 1849 side gallery, and of different material – 'orange fine gravel'.
363: not labelled, but presumably a soil lens, or possibly a turf lens.
364: 'darker grey with fine chalk', soil. Contains 367.
367: 'turf', probably several turves.
365: conformable with the line of 364 but interrupted by an 1849 side gallery, and the continuation of the same sort of material – 'grey speckly'.
366: 'fine grey speckly' soil, presumably the continuation of 364–5, though interrupted by another 1849 side gallery. 358–66 are roughly equivalent to 171–81 opposite, but thicker and more complex.
368: 'turf stack with flints', in an equivalent position to 183 opposite, though that was not noted as containing turf.
369: not labelled, and uncertain. It may contain soil and turf lenses.
370: 'earthy grey gravel with fine chalk'.
371: 'black turf'.
372: 'orange gravel', with lens 'of flints', like 195 opposite.
373: old land surface already described above.

Comparison between west and east sides of the main tunnel up to ring 73

As might be expected from two faces less than 2 m apart, there is general conformity between the two sections. There is, from the outside inwards, chalk rubble; a ditch- or quarry-like feature; a clay and chalk dump centred on ring 35; rubble and chalk blocks to ring 47; alternating clay with chalk and chalk layers between rings 47 and 57, with a dump of chalk blocks at centred on ring 49; and the complex primary mound from ring 57 inwards.

It is worth noting, however, that the sides are not the same. Construction in this zone of the mound was clearly planned, but not executed with complete precision. Two aspects of divergence are of special interest.

First, the chalk subsoil on the east side between rings 2 and 8/9 is stepped and does not reach the top of the tunnel. On the west side there is a continuous chalk face at rings 9/10. While corings showed that 108/306 was at least 3.5m deep below the tunnel base, the evidence suggests that the buried feature was not dug from a uniform or regular surface. As noted above, this part of the mound may have covered a slope to the east, and that slope may have been extensively and irregularly quarried. This is considered further below in discussion of the sequence of construction.

Secondly, while the layers forming the outer part of the primary mound are roughly equivalent, they are not exactly so, as detailed above. Describing the banding between rings 57 and 64 in the primary mound, Atkinson wrote (1978, 166): 'Some of the bands were of black marshy soil; others of white chalk gravel, abraded and rounded in a flashflood;

others again were of ochre-coloured flint gravel; and many were of mixtures of these. Furthermore, in places the white chalk had been stained to a brilliant orange tint, by percolating water laden with dissolved iron compounds. The boundaries between each of the ... complex cappings were quite sharp...' This account tallies best with the east side. The significance of this divergence is discussed further below.

The western lateral tunnel, south side (fig. 12 (foldout opposite p. 22))

The western lateral was driven at right angles to the main tunnel at rings 66/67–68. As in the main tunnel the supports were at 3 ft (0.91 m) intervals and were used as the main recording points.

400: dark old surface, as 197.
401: clay-with-flints subsoil *in situ*, as 125.
402: solid chalk, as 123.
403: 'turf from OLS', as 192.
404: 'black turf', as 191. Approximately at ring 4 or a little to its west, a stakehole, 431, was recorded some 60 cm within the tunnel. The site diary (July 7, 1969) notes: 'It was filled with orange-stained chalk gravel, to the bottom of the OLS, but not penetrating the clay-with-flints below. Immediately to the N, on the face, the turf stack rose to a height of about 15 cm, with the turves leaning outwards to the S, as if the stake had been pushed outwards.' The peak on the upper surface of 404 just before ring 4 may be a continuation of the same phenomenon. A little to the north-west of the stakehole, a large sarsen, 432, was found on the old land surface. This was about 45 cm in diameter. The site diary comments (July 7, 1969): 'this looks like a kerb-stone, and recalls similar sarsens described in this position by Merewether and Tucker.' Another sarsen, 433, was found near the tail of 404 around ring 6.
405: 'dark floodplain soil and turf mixed with iron stained yellow chalk'. As 189. A more descriptive term than 'floodplain' could have been used.
406: 'grey' soil.
407: 'iron pan'.
408: 'light grey' soil.
409: 'medium grey' soil.
410: 'dark grey' soil.
411: 'iron pan'.
412: 'buff grey' soil.
413: chalk rubble.
414: 'grey floodplain mixture of chalk', that is, grey soil and chalk.
415: 'grey' soil. 406–15 are presumably roughly equivalent to 171–82.
416: 'chalk'.
417: not labelled, but presumably dark soil.
418: 'dark soil, chalk and flint. Contains 419. 418 is presumably equivalent to 162.
419: 'black soil' lens.
420: 'white and grey alternate tipping', merging with 421 in tail of layer.
421: 'grey only', that is, grey soil without white flecks.
422: 'soil and chalk tread' above 400. Just after ring 15, 400 is no longer indicated on the site drawing, but presumably still underlay 422.
423: chalk rubble.
424: 'white chalk stained with many yellow iron-panned layers and chocolate clay'.
425: 'chocolate clay'.
426: small chalk blocks.
427: 'yellow stained chalk'. 424–7 are presumably equivalent to 154–60.
428: 'chocolate clay', perhaps equivalent to 147 or 148.
429: 'iron pan'.
430: 'white chalk', equivalent to 149 or 144.

The western lateral tunnel, north side (fig. 12 (foldout opposite p. 22))

500: as 400.
501: as 401.
502: as 402.
503: 'black turf'.
504: 'turf from clay with flints'.
505: 'black soil with flints', perhaps as 405.
506: 'black turf'.
507: 'black soil with flints and chalk', equivalent to 405.
508: 'turf'.
512: 'black turf'
509: 'dark earth tip lines' in matrix of 513.
510: 'sarsen' block.
511: 'white chalk' in upper part of 513.
513: 'grey floodplain material'.
514: 'dark earth tip lines'.
515: 'grey floodplain material'.
516: not labelled, but the site diary (July 8, 1969) records: 'The face ... at ring 6 shows the narrow band of white chalk rubble between two fairly uniform thicker bands of grey chalk-and-soil speckly material.' There appears not to be an equivalent of 516 in the south side of the tunnel, nor in the main tunnel, and 516 can be seen as an extra, thin chalk capping in this part of the primary mound. The site diary adds: 'There is very little orange iron staining here, and the complications of the main tunnel sections can now be seen as the effects, in large part, of this staining.'
517: 'grey floodplain material'. 509–17 are presumably equivalent to 406–15.
518: 'chalk', equivalent to 416.
519: chalk rubble at the base of 518.
520: not labelled, but presumably a trampled lens, like 422.
521: 'black soil, chalk and some flint', as 418.
522: 'chalk and soil', clearly in lenses or laminations. Contains 523 and 524. Perhaps equivalent to 420 and 424.
523–4: 'grey' soil lenses.
525: 'earth trample'.
526: 'iron pan'.
527: chalk rubble.
528: 'turf' lens.
529: 'yellow iron stained chalk', as 427.
530: 'trample', presumably as 422.
531: 'iron pan'.
532: 'chocolate clay'.
533: 'coarse white dirty chalk with chocolate clay'. Its edges are not defined on the site drawing.
534: 'white chalk' rubble.
535: 'chocolate clay' lenses.

536: 'chocolate clay'.
537: 'white chalk' rubble.

Comparison of the western lateral tunnel with the main tunnel and of the two sides of the western lateral

As the descriptions above have noted, there is again a broad but not exact correspondence between the layers seen on either side of the western lateral tunnel with those seen in the west side of the main tunnel. Some points of detail are worth noting. The primary turf stack was not a uniform construction, since 512 is separated from 506, while 404 is continuous. 516 can be seen as an extra thin chalk layer. The variable effect of iron staining on colouring shows a variable amount of post-construction change. 406–15 are thicker and more banded than 513–7. There is also some divergence between the thickness and composition of 418–420/1–424–425–427 and 521–522–529. It may again be inferred that a general plan of construction was followed, but not slavishly. (The western lateral tunnel was not on a true radius of the primary mound, so that each side shows a slightly different chord across the primary mound.)

The eastern lateral tunnel, south side (figs 12 (foldout opposite p. 22), 15; pl. 6)

The eastern lateral tunnel was driven at right angles to the main tunnel from rings 71–3. The layers recorded on the section drawing (of which only an inked copy rather than the site version survives) were as follows:
600: clay-with-flints.
601: old land surface.
602: 'black soil with flints'. Contains 603 and 604.
603: individual turves within 602.
604: sarsen.
605: above 602 but composition not recorded. By analogy with the sections of the main tunnel this may have been similar to 602.
606: 'streaky grey with chalk'.
607: 'grey speckly with bands'.
608: 'white', presumably chalk.
609: 'black speckly'.
610: 'grey speckly'.
611: 'banded grey'.
612: 'Toblerone'.
613: 'white chalk'.

The eastern lateral tunnel, north side (fig. 12 (foldout opposite p. 22))

700: clay-with-flints subsoil (above 'decayed chalk').
701: old land surface.
702: 'very gravelly clay-with-flints'.
703: 'black soil with flints', apparently heaped, and with 704–7 on its upper surface.
704–5: individual turves.
706–7: sarsens. At ring 2, the site diary (July 14, 1969) notes: 'frequent sarsens nested in the line of the N wall. The turf stack is here made up mainly of loose soil rather than individual turves. The clay-with-flints layer on top of the OLS comes to an end about 1.5 m inwards from the start of the tunnel.' This presumably correlates with the orange gravel and flints, 372, seen in the east side of the main tunnel. The diary continues (July 15): 'The 'turf stack' in the E gallery is very mixed in composition and contains a lot of chalk and relatively little turf.' Colour photographs do, however, show the form of individual turves.
708: 'dark grey'. Contains 709–10, and merges with 711; no clear boundary shown.
709–10: individual turves.
711: 'dark grey speckly'.
712: 'OLS turf', presumably so designated because of difference to the rest of the turves, but no further details are recorded.
713: 'light' grey soil.
714: 'dark' soil.
715: 'light' grey soil.
716: 'dark' soil.
717: 'light' grey soil.
718: the continuation of 715–6, but no further details recorded; contains 719.
719: 'chalk' lenses.
720: 'dark' soil.
721: 'light' grey soil.
722: 'dark' soil.
723: 'grey speckly [soil] with sloping bands.'
724: 'small light chalk'.
725: 'black speckly' soil.
726: 'orange chalk.'
727: 'white chalk.'
728: 'Toblerone.'
729: not recorded, but presumably chalk of the mound like 349 and 149.
A stakehole was found between rings 6 and 8 but no details are available. A preliminary diagram shows this stakehole, like the others found (fig. 16), at the junction between turf stack and the capping layers of the primary mound (Atkinson 1978, 165).

Comparison of the eastern lateral tunnel with the east side of the main tunnel

The same basic striping of the layers of the primary mound was observed in the east lateral tunnel as in the main tunnel sections but some differences are apparent. 725 is far more developed than 352 (or 157), and there was no thin chalk layer between 711 and 723 to match 357, 170 and 416/518. The two sides of the east lateral do not themselves match exactly, the outer chalk layers being apparently absent or mixed in the south side.

The 1849 central complex and the main tunnel beyond ring 73 (fig. 6)

The main tunnel was taken to ring 83 by a narrower and slightly lower extension. In so doing it encompassed the northern end of the 1849 complex and the base of the 1776–7 shaft. Photographs but no drawn sections are available from this operation. The 1849 tunnel was open right up to its most northern point, but due to collapse had risen from approximately ring 63 to ring 74. The domed central chamber

thus created allowed observation of the upper part of the primary mound. Atkinson has described the effect of 'finding oneself inside an enormously complicated and highly-coloured layer cake of gigantic size' (1978, 166). The details of these layers as seen in the main and lateral tunnels have been recorded above. The site diary (July 12, 1968) adds: 'The topmost layer – grey speckly – is laid conformably on those below, and is not striped. Lower down to the S it is covered by a conformable non-striped layer of chalk, with numerous parallel thin bands of iron pan which give it a spuriously laminated look. Below these top layers the next four, each some 40 cm thick normal to the slope, are striped.' These are presumably the continuations of layers 162, 154/158, and 171–82. The collapse chamber allowed estimates of the height of the primary mound to be made. This was suggested to be 5.25 m or 5.5 m (Atkinson 1970, 313; Atkinson 1968, 299).

The 1969 extension began with the observation of what looked like a pit cut into the top of the old land surface just north of ring 73, and immediately to the west of the Merewether tunnel. There was considerable hope that this was a grave pit or at least a definable archeological feature under the primary mound. Ten days of investigation, however, ended with the conclusion (site diary, August 1, 1969) that the feature was 'a spurious phenomenon due to the displacement downwards and eastwards of a solid block of the material immediately W of the W wall of the Merewether tunnel, with the formation of consequent slip-planes in the clayey patches of the gravelly clay layer over the OLS'.

It was also possible to observe the continuation of the basal gravel layer, the overlying turf stack and the grey layers overlying that in turn. The layout of the 1849 central complex was confirmed over both tunnel seasons (a plan of the central complex had been made by Blandford) and the base of the 1776–7 shaft was re-located in 1969. A little further detail emerged from exploration of the open parts of the 1849 side gallery. The site diary (July 21, 1968) records two further small sarsens, not larger than 30 cm, one to the east of the Merewether tunnel, the other 'in the end west wall of the west passage'. Their stratigraphic position was not precisely recorded but was probably on the old land surface, since they were envisaged in the site diary as marking out stones. A 1968 plan of the Merewether complex available in the site archive records these and one or two other small sarsens, both at ground level and in and on the turf stack.

Coring of the mound from the top

Two rigs were winched to the top of the mound in 1968. One was operated by a Cardiff team from the Geology Department of the university, and the other by engineers from Stanley Pugh and Co Ltd of Bridgend. The latter produced successful results. A rotary core drill with air flush was used to bring up, in sections, a solid core 3 in. in diameter. There is a gap between 10 and 14 ft (4.3 m) deep, when other techniques were experimented with, and from 81 to 86 ft (24.7–26.2 m), where the mound was saturated with water. As noted above, the core was stopped some 3m above the tunnel. Details of the techniques used are available in the site archive, and the core has been preserved and deposited with the finds.

Despite the great labours involved, the results were unspectacular. Essentially, continuous chalk material was recovered, showing that the bulk of the mound, as might be supposed from the tunnels, was made up of dumped chalk rubble.

The top and upper part of the mound

Four cuttings were made from 1969–70 on the top and upper sides of the mound.

The top of the mound showed concentric chalk walling. Chalk walling was also found on the vertical parts of the steps, suggesting that the mound could have been built as a stepped cone. However, there are some signs of much later activity on the top of the mound, and the current appearance of the upper part of the mound may owe much to this.

Cutting 3: the top of the mound (fig. 17; pls 7–9)

Before excavation, the flat top of the mound was broken by several irregularities, caused in part by tree planting in the early 18th century, when a much earlier burial was found, and by the 1776–7 shaft. A contour plan (archive) shows the extent of undulations. Resistivity survey of the top in 1968 proved fruitless, principally because of chicken wire laid as recently as 1963 to stabilise the turf on the top of the mound.

The surviving record of the top of the mound consists of a plan and a partial section of the west side of cutting 3, very short entries in the site diary for 1969 but none for 1970, and photographs. As in the tunnel, context numbers have been added in the preparation of this report.

Excavation of cutting 3 was selective. Initial stripping revealed quantities of chalk blocks, amongst which some patterning was evident. Further selective excavation within cutting 3 in 1970, as shown on fig. 19 and in pls 7–8, revealed the upper parts of stretches of chalk walling. In the south-west corner of the cutting context 800 was a large soil-filled pit, which was presumably the top of the 1776–7 shaft.

801, whose position is only estimated on fig. 17, is a short stretch of chalk walling, roughly piled. It was only examined to a very shallow depth. It appears to connect with or actually to be the upper part of 802, further chalk walling (with one piece of sarsen) examined on the west side of the cutting to a depth of 40 cm or more. 803 is chalk walling connecting with 801, but again examined to a little greater depth. 804 is a short stretch of radial chalk walling. It connects with 805, chalk walling concentric with 801–3, which was examined across the width of the cutting. It consists of roughly piled, angular chalk blocks up to 30 cm, with an outer face at approximately 60°, forming a wall up to 1 m wide and up to 75 cm high as exposed. 806–7 were short, irregular stretches of radial chalk walling connecting with 808, which was similar to 805 though its crest was less regular and several substantial sarsen blocks were found in its western portion near the baulk of the cutting. From it in turn extended further irregular radial walling, 809–10, which presumably connected with 811, similar walling to 805 and 808. An irregular radial wall 812 projects outwards from 811. Limited

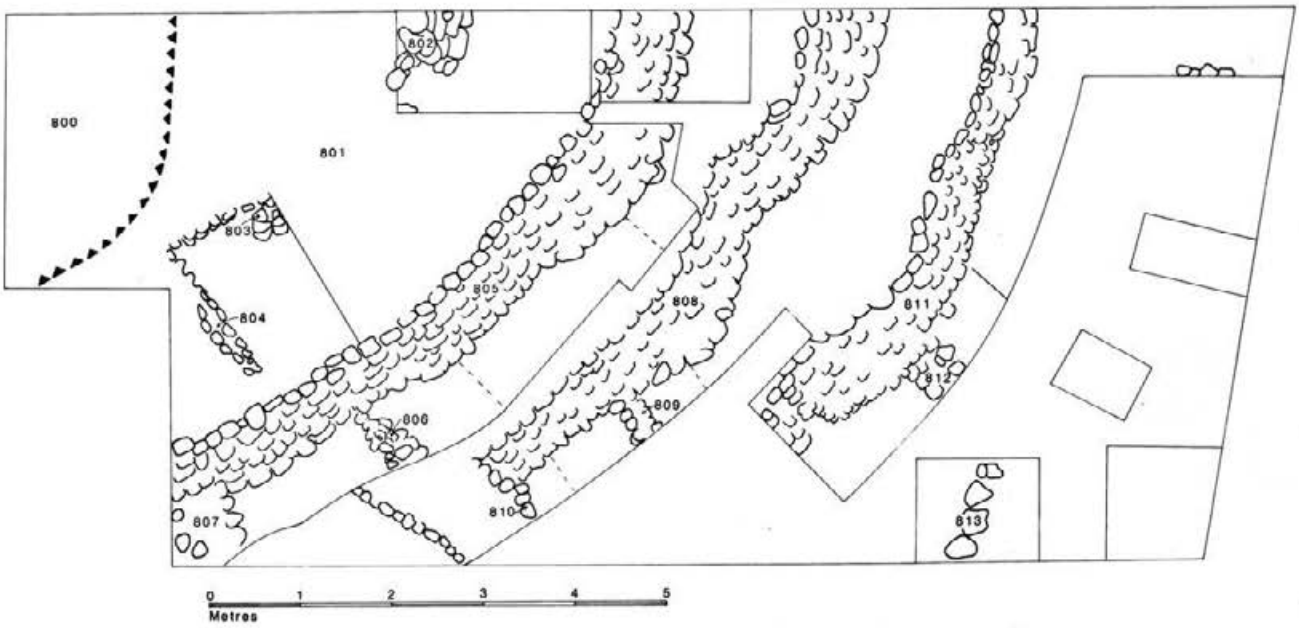

Fig. 17 Summary plan of walling on the top of the mound in cutting 3

sondages within the outer part of cutting 3 showed the top of further chalk walling, 813. It is possible that these were part of another continuous piece of walling.

Between these pieces of rough walling the photographs make it clear that the matrix was chalk silt and rubble, 814, the clasts largely under 10 cm.

Finds were minimal. The site diary records (July 15, 1969) the finding of a 'bronze penannular brooch with recurved flattened terminal, pin missing'. This cannot now be located. A preliminary report (Atkinson 1970, 314) records also a sherd of Windmill Hill ware and a fragment of rock 'apparently identical with one of the varieties of Stonehenge bluestone (volcanic ash)'. Neither of these finds can now be located.

Cuttings 4, 7 and 5: the upper sides of the mound (figs 18–20; pls 9–11)

The record for these cuttings consists of partial sections of cuttings 7 and 5, the site diary for 1969, photographs and preliminary published accounts.

Cutting 4, 2 m wide, extended from the edge of the top of the mound to the outer edge of the flat tread of terrace 2. Excavation showed a general matrix, as on the top of the mound, of chalk silt and rubble, 820. Photographs show that the riser between the tread of terrace 1 and the top of the mound consisted of near-vertical rough chalk walling below chalk silt and small rubble (figs 18–19; pls 10–11). This walling, 821, evidently extended back into the core of the

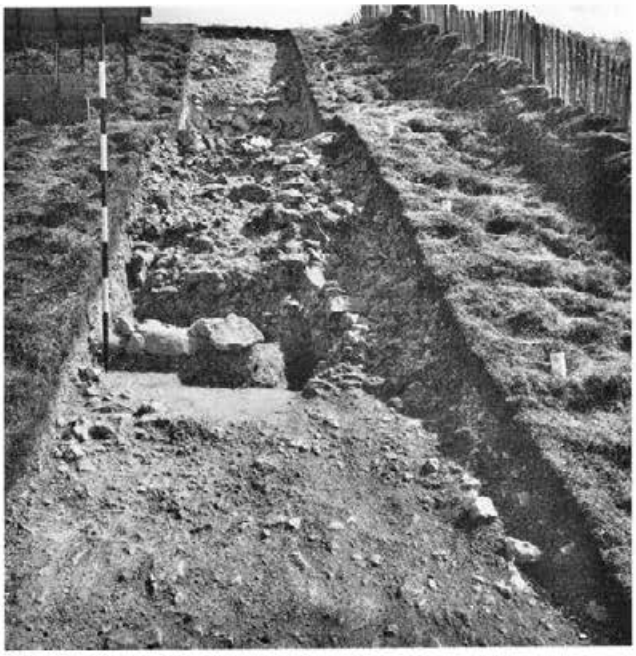

Fig. 18 View from below of terraces 2 and 1 at the top of the mound, cutting 4

Fig. 19 Chalk rubble in the inner face of terrace 1, cutting 4

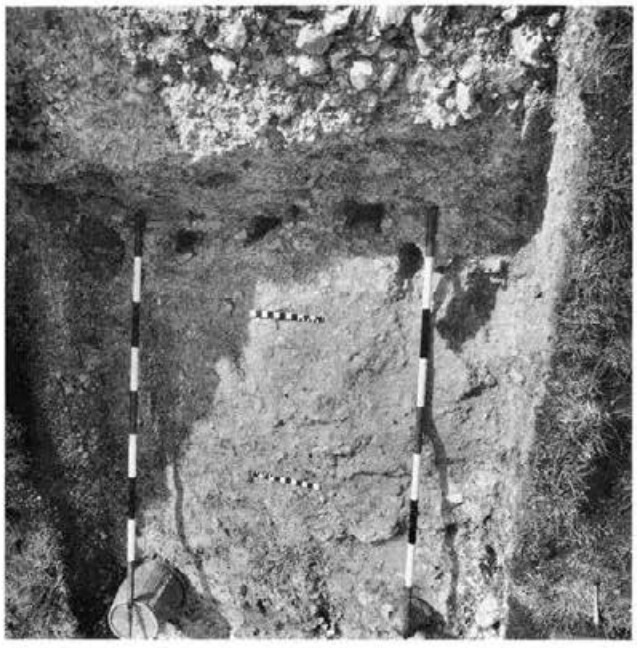

Fig. 20 Postholes in front of the inner face of terrace 2, cutting 4

mound, but how far could not be established in the time available in 1969; it may only have been as thick as 805, 808 and 811 on the top of the mound. There was no definite evidence that this feature was other than original.

The riser between terraces 2 and 1 contained small sarsen blocks, below a small amount of chalk silt and rubble, 822. This rough wall, 823, also included small chalk blocks (figs 18 and 20; pl. 10). Further excavation of this feature showed six small postholes, 824, at the foot of dense small chalk blocks, at the inner edge of terrace 2. 823 cannot therefore be earlier than the postholes. There were also finds of iron nails (site diary, July 9, 1969), sherds of late Saxon or Norman fabric (Atkinson 1970, 314) and a silver farthing minted about 1010 AD in the reign of Ethelred II (Atkinson 1978, 170). These finds cannot now be located.

Cutting 7, parallel to 4, examined only terrace 1 and the riser between it and the top of the mound (pl. 9). Here the riser consisted only of small chalk rubble and silt, densely compacted, 825, with no trace of the chalk walling seen on the inner edge of the same terrace in cutting 4; however, the face was not taken as far back into the core of the mound in cutting 7 as in 4. Sections in the archive show small postholes, 826. There were also finds of iron nails and sherds of late Saxon or Norman fabric (Atkinson 1970, 314). These finds cannot now be located.

Cutting 5 on terrace 3 downslope from cutting 7 was selectively excavated (not illustrated; photos available in the archive). The core of the mound was compacted chalk silt and small rubble, 827. A small step in the surface of 827 was found, with chalk silt, 828, above it. It is unclear whether this was a deliberate constructional step, an irregularity or a later feature. A preliminary account records again the presence of sherds of late Saxon or Norman fabric (Atkinson 1970, 314). These finds cannot now be located.

The original form of the upper mound

It is clear that the top of the mound was constructed with the same care as lower parts. It is not certain how deeply the concentric chalk walling extends into the mound, but even if not far this would have helped to provide stability and prevent erosion. 820 extends about halfway up the riser above terrace 1, and 813 could be seen as the next wall above and inside it. There is no reason to doubt that the top concentric walling (801–3, 805, 808 and 811) is other than original. No other features were recorded on the top.

The original form of the terraces and steps is uncertain. A preliminary published account puts the view that terrace 1 was original, though later cut back to a vertical face revetted by timber secured by iron nails (Atkinson 1978, 170). This is certainly consistent with the evidence in cutting 7, though later activity is not definitely documented in cutting 4 on terrace 1. It is possible, however, that terrace 1 is wholly the result of later modification, this having stopped at the point where original step walling was encountered. Any notion that the mound was unfinished – because of the unfilled top step – is therefore uncertain. The preliminary published view was that terrace 2 was also the result of later modification, dated by the coin of Ethelred II and to be connected with defence against the Danes (Atkinson 1978, 170; 1970, 314); this view was also held at the time of excavation (cassette PL 132073). The irregularities of terraces 1 and 2 also support the notion that they are later features, since terrace 1 is not level right around the mound and terrace 2 is discontinuous.

Cuttings 2 and 6

Cutting 2, 1.5 m², was dug above the inner edge of the south ditch on the mound flank. in order to locate the junction between mound and chalk. This failed, as only chalk rubble in the manner of the outer mound seen in the 1968–9 tunnel was observed (photographs in the archive). The cutting was made some 1.5 m into the mound, and at a height which the site diary implies (without directly recording) was centred on 154 m OD. This cutting has interesting implications for the nature of the lower part of the mound.

Cutting 6 was dug to re-locate the entrance of the Merewether tunnel.

The ditch

Cutting 1 (figs 21, 22, 23 (foldout opposite p. 23), 24; pls 12–14)

Cutting 1 was 5 m wide. Its record consists of a section of the east side, the site diary and photographs. Context numbers have been added to original layer descriptions.

The cutting was in the eastern part of the south ditch. The inner edge was cut into chalk, which narrows to the west, suggesting a waisting or minor causeway. The inner edge of the ditch was just below 153 m OD. The outer edge of the ditch was not found, but borings showed that it must lie somewhere under the main road to the south. This gives a ditch at least 20 m wide at its top. The ditch was excavated to a depth of 4.3 m below the level of the chalk on the inner

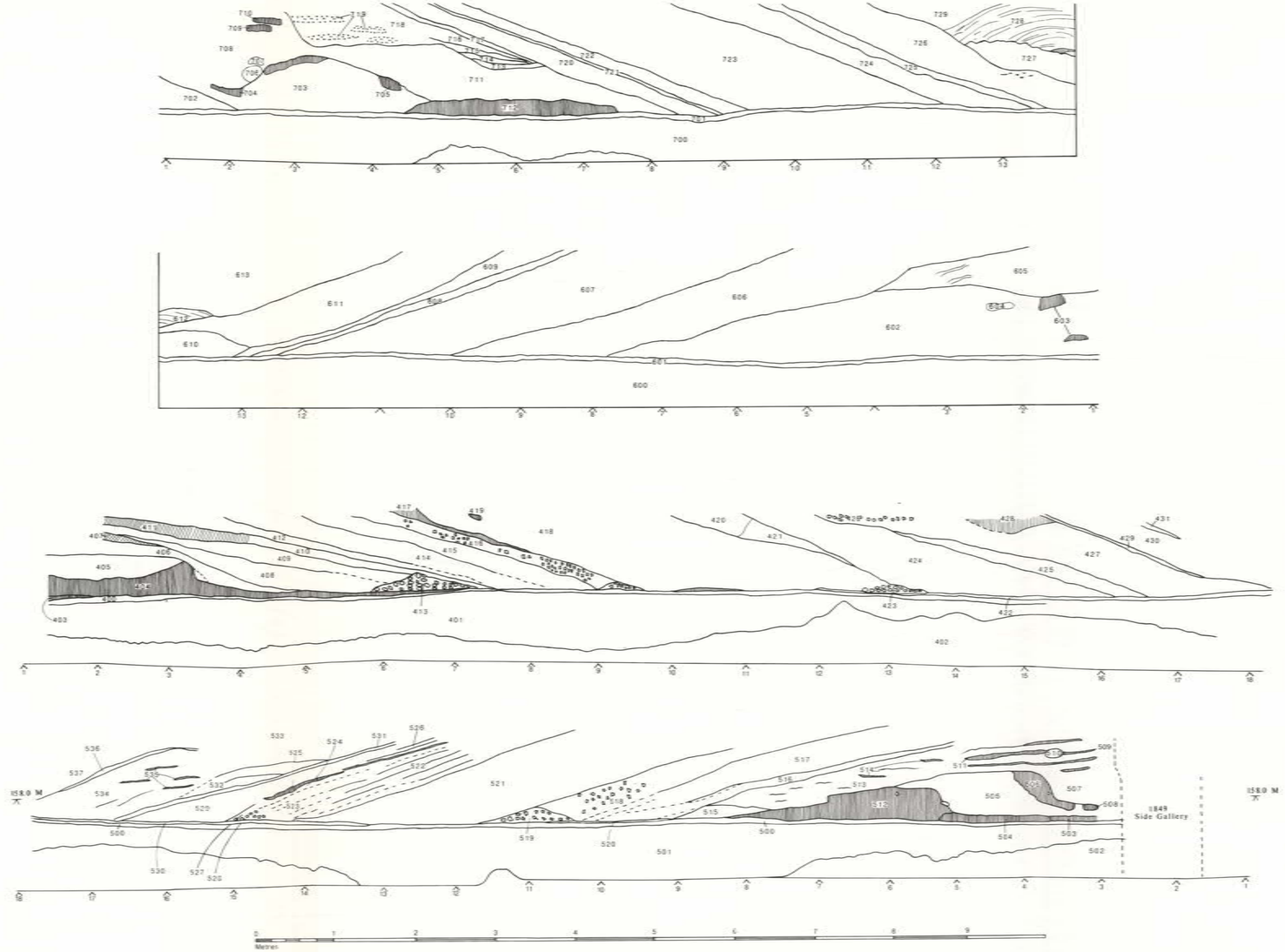

Fig. 12 Sections of (above) the west lateral tunnel of 1968–69 at Silbury Hill, showing (top) the south side, and (second from top) the north side, and (below) the east lateral tunnel of 1968–69 showing (second from bottom) the north side, and (bottom) the south side

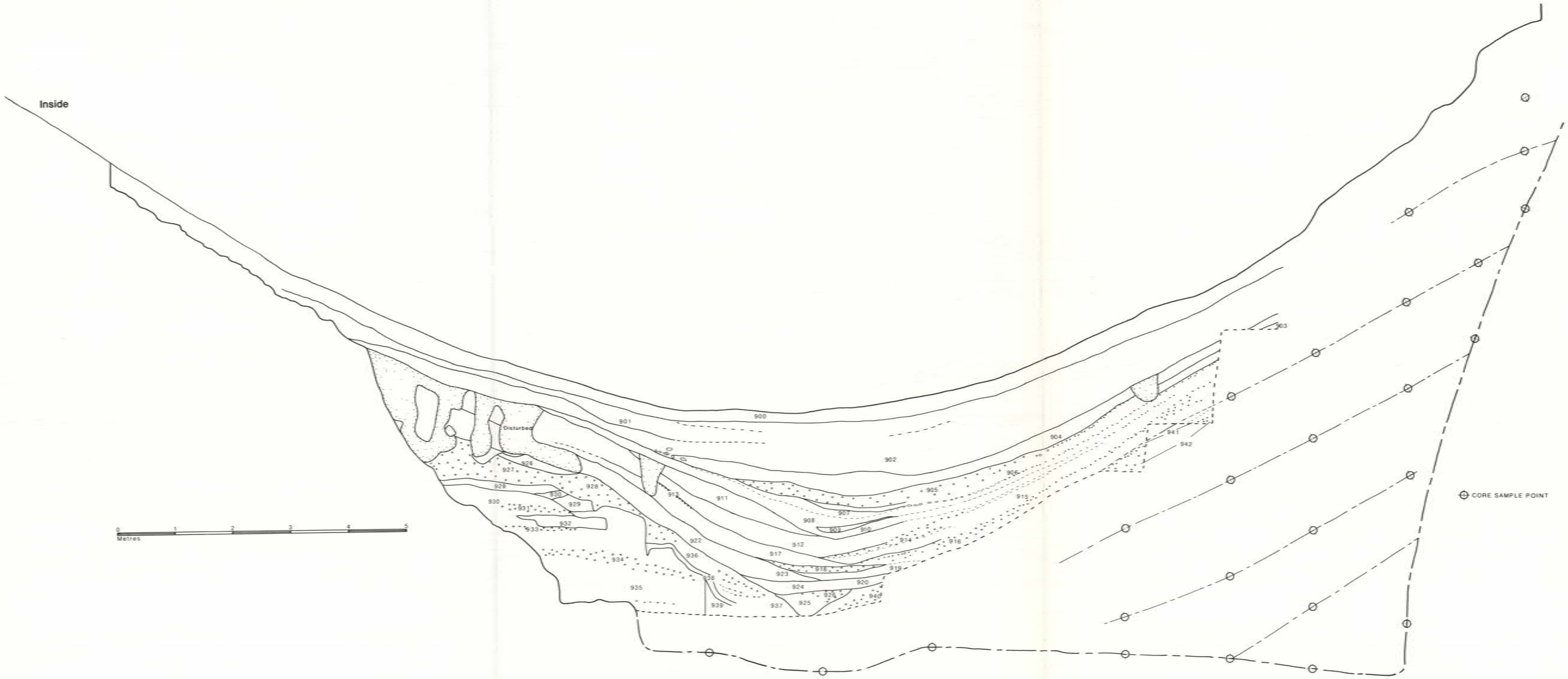

Fig. 23 Section of the east side of cutting 1 across the south ditch. The position of the base and of the outer (south) side of the ditch was established by means of borings

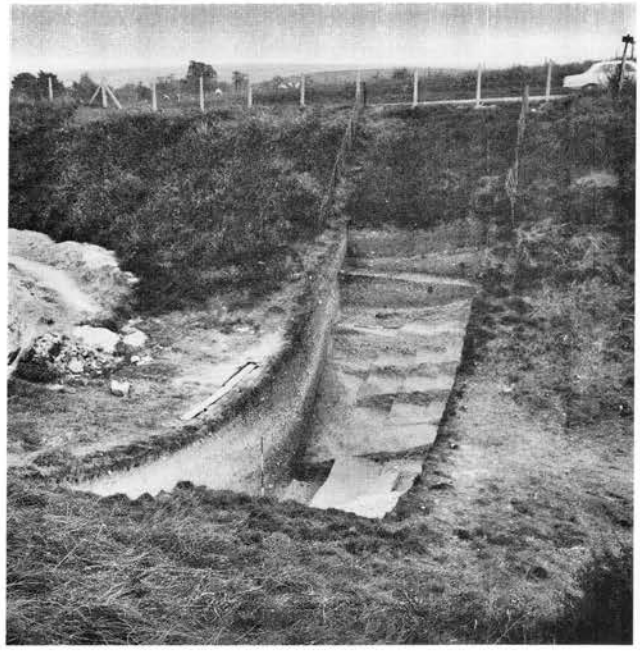

Fig. 21 View from the mound of the south ditch cutting. Scales are in metres

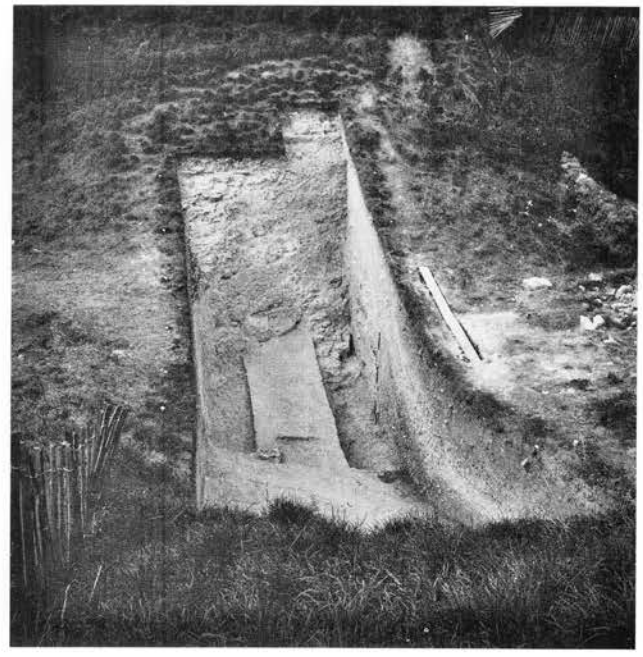

Fig. 22 View from its outer edge of the south ditch cutting. Scale is in metres

edge of the ditch, the lower part dug in a box below the main level reached. The base of the ditch was not reached, partly because of fears for the safety of the unshored sides. Borings suggested that the ditch had a flat base and steep outer side, and had been dug at least 5 m below the level of the original ground surface, and perhaps rather more.

The section drawing is schematic (fig. 23) but the record is supplemented by numerous colour and black and white photographs. Original layer descriptions (site drawing and diary) are transcribed in inverted commas. Terms are used as in the description of the mound. Silt refers to infill material, not to particle-size grade. The chalk defining the ditch was only reached on the north side of the ditch, which falls steeply to a short level step before evidently continuing.

The basal unexcavated fill was chalk rubble, 943. On the south side 940 and 942 was 'loose chalk rubble'; 941 above 942 was presumably finer chalk rubble. Borings on the south side of the cutting through unexcavated deposits suggest the presence of at least four main layers of chalk and chalk rubble, steeply angled. On the north, excavated side of the cutting 935 to 926 were a series of more or less horizontal layers of chalk and chalk rubble, recorded (site diary, August 1, 1969) as 'very compact and cemented'. The outer edge of 935 appears to be steeply truncated, as is much of the outer edge of 730. The details of these layers are:

935: 'compact placed chalk'.
934: 'chalk nodules'.
930: 'compact placed chalk'.
933: chalk rubble.
932: 'light brown soil with chalk'.
931: chalk rubble.
929: 'compact chalk'.
927–8: 'placed chalk rubble'.
926: 'compact chalk'.

Photographs suggest that most of the chalk rubble was small. The layers immediately over this suite were:

939: 'loose chalk'.
938: 'brown soil', perhaps a burrow.
937: 'clean chalk silt', merging above into 936.
936: 'fallen shattered chalk'.

From an imprecisely recorded context near the excavated bottom of the cutting two red deer antler samples were radiocarbon dated, with results of 2280–2047 BC (BM-841) and 2456–2280 BC (BM-842) (table 1).

Above these lower layers was a series of alternating chalk and chalky silt layers, 925 to 905. In colour photographs 912 stands out as a dark layer in the centre of the ditch in contrast to lighter coloured layers below and above. Their details are:

925: 'clean' chalk silt and small rubble.
924: 'clean fine chalk rubble'.
923: 'fine chalk rubble'.
922: 'chalk silt'. 921 is its continuation towards the inner edge, but the fill here is massively disturbed by burrowing, probably by badgers because of the size of the holes. 917 and 912 are similarly truncated.
920: 'dirty chalk rubble'.
919: 'dirty fine silt'.
918: 'chalk'.
917: 'medium grey silt'.
916: 'chalk gravel', presumably fine weathered chalk.
915: 'stone free buff silt'.
914: fine chalk rubble.
913: 'soil'. There is further badger disturbance of 917, 912 and 911.
912: 'silt', 'black' at the centre, merging at the sides to 'dark grey' then 'buff'.
911: 'light grey silt'.
910: silt.
909: chalky lens.
908: 'buff silt'.
907: chalky lens.
906: 'stone free buff silt'. The site diary describes this as 'fine grained chalk rainwash'.

Fig. 24 Detail of the east side of the south ditch cutting. Scales are in metres and feet

905: 'stone layer', presumably a concentration of chalk rubble, but this is not clear from photographs.

The top fill of the ditch was dark. Its details are:

904: 'light grey black'. Photographs suggest that this merges with 902 on the outer side of the ditch rather more than the drawing shows.

902–1: 'black soil', 'Roman midden'. From this layer came Roman pottery, over 100 Roman coins (currently being studied by Sam Moorhead), a bronze bracelet and much animal bone especially from the lower part of the layer. The pottery included a little Samian but mainly consists of 4th-century colour-coated wares. Preliminary study was carried out by Mike Farley as part of a Cardiff undergraduate thesis (Farley 1971).

900: turf and topsoil.

Interpretation

The borings show that the base of the cutting was relatively close to the bottom of the original ditch. The bored chalk layers on the outer side of the ditch are presumably the result of natural silting because of their steep angle. The context of the antler samples for the radiocarbon dates is not precisely recorded. They are not from the ditch base, and could come from within or at the top of the primary fill.

The excavator was of the opinion that 927 to 935 on the inner side of the ditch were placed, because of their horizontal disposition (cassette PL 132073), with which the truncated ends of 930 and 935 would be consistent. The inference was made that such placed deposits were to protect the inner side from erosion which could have threatened the stability of the mound; the truncated ends of 930 and 935 were interpreted as having been retained by timber revetments (Atkinson 1970, 314).

The rest of the excavated fill appears to be natural secondary fill, though the dark colour of the centre of 912 might be due to artificial agencies. Little more chalky silt comes from the inner side than the outer. By this stage at least in the silting of the ditch the mound must have been extremely stable, presumably turfed over as at present.

Preliminary study of the Roman material has suggested the existence on the adjacent Roman road of a staging post or inn (information from Mike Farley).

Investigation of the main ditch north and west of the mound

The site diary (July 12, 1968) records that echo-sounding of the ditch around the mound found an average depth of 3.65 m. Augering was carried out in addition to the north-east of the mound. This suggested a depth in excess of 6 m and a width of over 24 m. The coring further suggested that the main fill was a 'clean chalk silt', overlain in the upper part by 'grey silty clay'. The outer part of the lower fill, interleaved with the chalky silt, is recorded as 'chalk/flint gravel', which was provisionally interpreted as stream-laid. The auger profile is available in the site archive.

It is unclear what this fill represents. Throughout the project the excavator took the view that the mound contributed little or nothing to the fill of the ditch. This implied that the mound had changed very little in shape since construction, and even that it was deliberately turfed over soon after construction (cassette PL 132073). This view also implies that the chalky silt fill comes either from erosion of the ditch sides or from floodings. The recording of snails from the ditch corings identified in the field as freshwater species (cassette 9 2561/2/7/8) is consistent with the latter view. It is at the least striking that there appears to be no major division between conventional primary and secondary silting. The chalk rain-wash recorded by Pass in 1886 is also consistent with this. Resolution of the question of how the ditch fill formed will require a proper cutting across the north ditch, as envisaged in the original research design (Atkinson 1978, 159).

The site diary (July 26, 1968) also records a test pit at Q 160 West (on the Bristol contour plan, on the slightly rising ground north-west of the level ditch surface) as follows: 'through 3 ft (0.91 m) of silty clay, 6 in. (15 cm) of coarse flint gravel and 2 ft (60 cm) of chalk/flint gravel with two bands of flint gravel. Coombe rock reached at about 5 ft 6 in. (1.68 m) from surface.'

The nature and sequence of construction and the date of the mound

The mound was built on a little disturbed surface. The surface was vegetated and had not been stripped of turf. There is little sign of disturbance of the underlying soil profile. The mound was composed principally of chalk, in various sizes of fragments, derived from the underlying parent material via the ditch, the buried ditch or quarry, and scarping of the spur. Earth, 'toblerone' and gravel deposits may represent other immediately local materials which were scraped or

dug up and redeposited. Most turves in the core of the mound were from a calcareous source away from the mound. Some earth deposits could also be derived from elsewhere.

These materials were variously used to form first a circular gravel and turf stack capped by alternating layers of soil and chalk, which was then enlarged by tipped layers of chalk interspersed with 'toblerone' and chalk walling or dumps of chalk blocks. The top of the mound contained concentric and radial chalk walling, and it is possible that the top terrace is an original Neolithic feature, though it may be the result of much later activity, in the early medieval period. The mound could have been built throughout as a stepped cone, whose steps were then infilled. There is no evidence for structures on the top of the mound. A ditch some 20 m wide encircled the mound and the spur was severely scarped.

The detailed sequence of formation of the mound as revealed by the tunnel excavations of 1968–69 was as follows:

a: central orange gravel (195, 372, 702).

b: turf stack (189–92 with 183, 368–71, 404 with 405, 506 and 512 with 507 and 505, 602 and 703); edged or retained by stakeholes (196, 432 and two others); and perhaps edged or marked by small sarsen stones (432, 510, 706–7 and others).

c: four alternating capping layers, in order of deposition essentially soil, chalk, soil, chalk:

- i: 171–82, 358–66, 406–15, 509–17, 606–7, and 711–723;
- ii: 170, 357, 416, 518, 608 and 724;
- iii: 162–9, 354–6, 417–21, 521 (or 521–2), 609 (with 610–11?) and 725;
- iv: 154–60, 350–3, 424–7, 522–9, and 726 .

d: chalk and clay dump (147–8, 348, 428, 532).

e: chalk block dump and chalk rubble (143–4 with 149, 343–7 with 349, 430–1 and 534–7).

f: chalk and clay dump (142, 342).

g: alternating chalk block and chalk rubble dumps (132–41, 331–41).

h: chalk and clay dump (129–30, 329).

j: chalk rubble (128, 328).

k: chalk rubble and walling, infill of buried ditch or quarry previously excavated (108, 306).

l: outer chalk rubble layers (102, 301), derived in part from the main encircling ditch, and probably from the quarrying of the edges of the original chalk spur.

It is not clear to which parts of this sequence the ditch and the buried ditch or quarry should be assigned. Clearly, the buried ditch or quarry must precede the final capping of the mound which buried it, but it is possible that both it and the main ditch were in use from an early stage of construction. Both were sited close together. Scarping of the spur could also have begun at an early stage of construction. The excavator envisaged that 147–8/348 was derived from the top of the buried ditch when the primary mound was enlarged (Atkinson 1978, 172 and site diary). However, little account was taken of further chalk and clay (142, 342), and the same feature can hardly be used twice for the same explanation. There is a distance of over 30 m between the buried ditch or quarry, which cannot anyway have provided more than a part of the envisaged volume of enlarged mound. The buried ditch was not seen in the 1849 tunnel. It is possible that it could have been missed in that operation, but unlikely, given the contrast in material. The excavator, taking regard of the west causeway in the main encircling ditch, envisaged a matching causeway in the buried ditch, but this must remain uncertain. It is possible to suppose from the evidence of the east side of the main tunnel that the originally sloping spur (Petrie 1924, and above) was extensively and irregularly quarried as the mound was increased from constructional step d onwards. Indeed, unless the initial chalk mound was rather low, it is necessary to suppose that such an operation did take place, unless – which is possible – the edges of the original chalk spur were already being quarried as well to provide the required volume.

There is little clear evidence for the timespan over which construction took place. The excavator has suggested that the process of construction was more or less continuous, on the grounds that no stratigraphic or depositional evidence exists for a hiatus in activity (Atkinson 1968, 299). Certainly there are no obvious or major layers which could indubitably represent *in situ* soil formation. Contexts 133 and 135 and 332 and 335 in the main tunnel at ring 37–38 might represent something of the kind, but could just as well be redeposited. Other possible candidates for incipient soil formations come from the core of the mound, such as the thin dark layers in constructional step c (177, 169, 157, 359, 355, 352). In the absence of detailed, technical analysis, no further judgement can now be made. A further problem is to consider what an incipient *in situ* soil formation would look like on a slope of around 30° (assuming that tip lines would have had approximately the same angle as the final surface of the mound) and how long a soil would take to form over a bare chalk mound. There is virtually no comparative evidence available. The slope of the bank of the Overton Down experimental earthwork (at an angle of around and under 25°, over 30 years after construction; information kindly supplied by Dr Martin Bell) has remained largely bare, some thirty years after construction. These uncertainties make it possible that either the mound was built in one go over a short period of time or that its construction was lengthier, with some hiatuses but not long enough to result in soil formation.

The actual date of construction is also unclear. Several radiocarbon dates were obtained from the primary mound, and can be combined with two from near the base of the south ditch cutting (that is, in the main encircling ditch) to bracket the date of the construction of the mound (table 1). Unfortunately, the precise position of the mound samples was not recorded. There is a discrepancy between the single sample I-4136 and the SI series, of which the latest date is 3087–2783 BC and the range of the others (setting aside SI-910AH) 3625–2920 BC. The SI series was experimental (Stuckenrath and Mielke 1973, 401) and it is simplest to set its dates to one side and envisage a bracket of say 2800/2500–2400/2000 BC for the construction of the whole mound. Bearing in mind the possibility mooted above of some lengthening of the process of construction, it might be possible to envisage the construction of the turf stack at or before 3000 BC followed by further capping around 2800/2500 BC, with subsequent enlargement completed before 2400/2000 BC. However, the published details of I-4136

are not consistent with this view, since the material used 'derived from the surfaces of individual turves stacked at the centre, and forming the core of the primary mound' (Atkinson 1969, 216). The last but least preferred alternative is to accept the SI series together with the ditch dates, and to infer from them initial construction of the primary mound around or after 3500/3000 BC, with a greater interval until or during the construction of the monumental capping mound than is apparent from the excavated stratigraphic details. The explanation favoured here is of construction somewhere between 2800/2500–2400/2000 BC, with the possibility kept open of a process of construction lasting one or more generations, within this span, rather than being confined to a mere ten years or so.

While arguing that construction was a single process, the excavator suggested the following phases or major stages in the building of the mound (Atkinson 1968; 1970; 1978):
I: Silbury I is the primary mound (constructional steps a-civ here). This began as a circular area, about 20 m in diameter, fenced by stakes. This was infilled with a low mound, 5 m in diameter, of clay-with-flints or gravelly material, covered by a larger heap of turf and soil. This core was then capped by four successive layers to complete a primary mound with an estimated diameter of about 34–36 m and an estimated height of 5.25–5.5 m.
II: Silbury II is a mound of chalk rubble, with an estimated diameter of 73 m, the material for which was derived from the buried ditch (or quarry) (constructional steps d-g here with the ditch or quarry later infilled in constructional step k). Although the ditch was only seen in the 1968–69 tunnel, its diameter was estimated to be about 116 m. The height of this mound has not been estimated but could have been at least half that of the final mound (measuring from the old land surface under the mound).
III: Silbury III is the final mound, built as a stepped cone and possibly unfinished, which was derived largely from the encircling ditch including its shallow westwards extension.

At face value, the angled, tipped layers of the excavator's Silbury II contrast with the outer and final mound of Silbury III. However, the juncture lies only just within the point where the tunnels reached the old land surface, and the nature of tipping from that point back to the outside must remain uncertain. In the open part, moved upwards by collapse, of the 1849 tunnel, there was no clear sign of similar angled tipping, but it is possible that the conditions of observation and the different heights above the old land surface have served to exaggerate this apparent difference. The outer encircling ditch can have provided much of the required chalk spoil but not all. The evidence of coring at the 1968 tunnel entrance suggests that the inner ditch edge was stepped, and the volume of the ditch may therefore have been a little larger than suggested by the south ditch cutting. At face value 102 and 301 (of constructional step l here) represent laid outer mound material rather than slipped mound. This fits the evidence from the top of the mound for careful construction with a series of retaining walls.

The suggested phasing satisfactorily encompasses the main features described here (see fig. 6) but it may be prudent to keep an open mind on the grouping of stages of construction. If the lengthier process of construction mooted here is followed, the question of intervals is left open. The excavator stressed that there is no clear evidence for significant pauses in the sequence of construction, and for sake of argument offered the possible equation of 500 people working over a span of ten years (Atkinson 1970; 1978, 173). The suggestion that there were no major pauses is undoubtedly correct in broad terms, but it is possible to envisage a rather more lengthy process of construction.

Soils

(I. Cornwall, G. W. Dimbleby, and J. G. Evans)

As the preceding descriptions of the tunnel sections have already made clear, there was evidence for a variety of soils under and in the mound. These will be described and discussed in turn.

The old land surface

The mound sits on a spur of Middle Chalk, but does not rest directly on chalk, but on a layer of clay-with-flints up to 1 m thick. A number of profiles were recorded in the field. There was substantial uniformity along the sections, which showed the same horizonation throughout. The recurrent profile was as follows:

0–4.5 cm (range 3–10 cm): stone-free fine textured soil, variously described as fawn, blue, or blue-grey, but darker under the primary mound. Vegetation was found on its upper surface.
4.5–8.3 cm (range of depth 2–4 cm): compacted mass of small flints embedded in an iron-stained clay matrix.
8.5 cm and below: clay-with-flints.

Superficially there appeared to be differences of colour due to iron staining. This staining occurred as bands of varying thickness within soil horizons and at interfaces. Pronounced iron staining was also seen in the material making up the base of the mound, and it seems clear that the movement and deposition of iron developed after the mound was built and was not a feature of the pre-mound soil.

This profile has been variously examined and interpreted. Evans (1972, 266) has described it as of brown-earth type, and devoid of snails.

Cornwall (documentation in the site archive; the thin section has recently been re-examined by Dr Richard Macphail in the Institute of Archaeology, University College, London) examined it in thin section and classified it as a 'brownearth soil on clay-with-flints now compressed almost beyond recognition. The relatively stoneless upper part suggests a distinct worm-layer, i.e. relatively high base-status (mesotrophic *Braunerde* of Kubiena). The quartz sand grains are markedly wind-graded – a feature of Chalk acid-insolubles. There are plenty of biggish flint chips, too big to be wind-borne, so the quartzes were sorted in Cretaceous, not Bronze Age [for which read Neolithic] times.'

Dimbleby considered the striking contrast between the upper stone-free layer and the compacted mass of flints embedded in a clay matrix below. Although this resembles a worm-sorted mull layer, the compacted flint layer could hardly have been sorted from a mere 4.5 cm of mull. The presence of vegetation on the old surface proved that the soil had not been truncated, at least in the immediate past.

Table 2: particle size distribution (oven dry) of sample from stone-free upper part of old land surface

ϕ divisions	*μm equivalent*	*Weight %*	*Characterisation*
0– -1	1000–2000	0.4	Sand
+1–0	500–1000	1.1	
+2– +1	250–500	1.2	
+3– +2	125–250	1.3	
+4– +3	63–125	3.7	
+5–+4	32–63	22.2	Silt
+6–+5	16–32	21.4	
+7–+6	8–16	13.8	
+8–+7	4–8	9.0	
+9–+8	2–4	6.5	
>+9	<2	19.4	Clay

Table 3: mineralogical composition of coarse silt (16-63 m) fraction from Silbury Hill sample from upper stone-free part of old land surface, compared with Wolstonian and Devensian loesses. Light minerals are given as percentages of the light fraction (specific gravity <2.9), and heavy minerals as percentages of the heavy fraction (sg >2.9), which is 1-2% of the total coarse silt. In both fractions percentages are based on counts of approximately 1000 grains.

	Silbury	*Mean of 5 Wolstonian loesses, Kent*	*Mean of 5 Devensian loesses, Berks*
Light fraction			
Quartz	85.6	84.4	84.1
Alkali felspar	9.7	11.0	12.4
Flint	1.1	1.3	1.2
Muscovite	1.5	2.5	1.4
Glauconite	2.1	0.8	0.9
Heavy fraction			
Epidote	31.6	28.4	36.0
Zoisite	2.1	1.9	2.3
Zircon	19.7	23.4	14.0
Tourmaline	6.2	6.5	4.6
Chlorite	8.4	11.6	18.2
Biotite	1.1	1.0	0.7
Green hornblende	6.9	7.8	7.6
Brown hornblende	0.1	0.2	0.5
Tremolite	2.1	2.0	2.3
Yellow rutile	8.2	4.5	3.7
Brown rutile	2.1	1.6	1.6
Red rutile	-	-	0.2
Anatase	4.5	0.4	0.5
Staurolite	0.4	1.0	0.9
Kyanite	0.4	1.0	0.5
Andalusite	-	0.1	-
Garnet	5.6	6.1	4.4

The possibility was therefore considered that the upper stone-free layer rests unconformably on the clay-with-flints below. A sample was submitted to Dr John Catt of the Rothampsted Experimental station, who reported as follows:

> '[The sample] is very largely loess, though it contains a little more sand than typical loess (table 2). However, this only amounts to some 3–4 percent of the sample, so contamination is minimal...[The loess overlying clay-with-flints,] it is quite common in soils with this succession of deposits to have a little mixing of one in the other, probably by cryoturbation. I suspect the clay content of the sample has also been increased slightly by the same process, but this is less certain, as the clay content of loess-derived soils is quite variable due to eluviation.
>
> I have also analysed the coarse silt fraction mineralogically, and table 3 compares the result with mean compositions of Devensian loess from Berkshire... and Wolstonian loess from Northfleet, Kent and the Red Barns site, Hants...The distinction between Devensian and Wolstonian loess on the basis of mineralogy is not very clear, but there is some suggestion that the Silbury sample is rather more like the Wolstonian than the Devensian samples. Probably it is a mixture of the two. A similar intermediate composition is typical of subsoil horizons in some of the soils at Rothamsted where fairly thick loess overlies clay-with-flints – the upper loessial horizons have coarse silt fractions mineralogically akin to Devensian loess, but lower down just above the clay-with-flints junction there is often a hint of change to mineral assemblages more like the Wolstonian loess. Is it likely that 2–3 ft of topsoil was removed before Silbury Hill was built ?

The presence of vegetation on the old land surface (see below, p. 34) shows that the surface was not altered immediately before construction of the mound. The stone free or loess layer was remarkably uniform over the distance observed, the main source

of variation being the irregularity of the surface of the flinty layer of the clay-with-flints. It would seem impossible that such uniformity could be achieved by techniques available in the Neolithic period. Nor was there any indication of ard ploughing. If, therefore, the loess layer is the remnant of a deeper layer, it is probably the result of natural erosive processes.'

The core of the primary mound

The core of the primary mound (195, 372, etc) was variously described by the excavator as orange gravel and orange gravel with flints. A sample (1) at ring 73 (figs 6, and 10–11) resting directly on the old land surface was analysed by Cornwall and the results (with those of other samples) are set out in table 4. The material was found to be somewhat ferruginous, clayey and very stony. It appears to be clay-with-flints of local origin. Another sample (3) from ring 73 was described as reddish chalky material with large flints and seen as material of similar origin, but mixed with a certain amount of chalk and brown-earth soil.

The turf stack

The fullest formal account of the turves in the turf-stack of the primary mound has already been set out by Evans (1972, 266). The turves were calcareous, with preservation of land snails. They were seen as derived from a chalky parent material, probably a gravel of periglacial origin similar to that at the Beckhampton Road long barrow (Ashbee, Smith and Evans 1979). A typical turf showed the following stratigraphy:

0–2 cm: stone free mull humus horizon. Worm-sorted zone.

2–c.15 cm: calcareous stony loam with numerous flints and chalk fragments.

c.15 cm +: as above, but becoming increasingly chalky with depth. Chalk fragments sub-angular and sub-rounded.

Evans judged that this profile, like those from the South Street long barrow (Ashbee, Smith and Evans 1979) and Wayland's Smithy (Atkinson 1965; Whittle 1991), was probably an ancient plough soil which had lain under grass for a few years prior to use in the mound, during which time a thin turf line formed. To Dimbleby, the thinness of the stone-free mull humus horizon was surprising, since on a mature rendsina under grassland one would expect the stone-free zone to be at least 10 cm thick. Dimbleby therefore considered it likely that the area from which these turves were cut had only been under grassland for a decade or two. He also noted the possibilities that the soil could have previously been stripped of its turf, or that – following the interpretation of Evans – the soil had been cultivated and allowed to revert to grassland. The molluscan evidence is discussed below (p. 49).

Cornwall analysed two adjacent turves from the turf-stack, of which the notable feature was a local development, especially in the partings between the turves, of a bright-blue, very fine-grained or amorphous material, filling root-holes or worm tunnels in the darker, more humic part of the turves. The mineral soil-material was found to be scarcely calcareous at all, the trace of carbonate found being considered due to secondary infiltration from the chalkier parts of the mound; it appeared originally to have been a brown earth soil developed on clay-with-flints. The blue material proved on analysis to be vivianite ($Fe_3P_2O_{8\cdot8}H_2O$). The conditions for the formation of vivianite include waterlogging or the exclusion of oxygen, the presence of plentiful organic matter, iron compounds and a source of phosphate. All except the last were clearly available. The source of the phosphate is not so obvious. It could have come from dung from stock grazing on the site before construction (see the insect report below, p. 38). Another possible source is the chalk itself, which contains an appreciable amount of phosphate. The percolation through time of phosphate-bearing solutions from the chalky make-up of the mound might have concentrated enough phosphate where the conditions were locally suitable for the formation of vivianite. One would not expect a heavy brown earth soil on clay-with-flints to be intrinsically strongly phosphatic, nor in fact were the parts of the turves which were far removed from their surface humus. This strongly suggests that the local reducing conditions set up by the decaying vegetation and root-mat of the turves, deeply buried in the body of the mound, captured and concentrated phosphate from any percolating water from above, the mineral being deposited in the only available spaces – the voids left by decaying roots and, possibly, the still unfilled tunnels of the soil fauna. Water was observed during the excavation to percolate through the roof and sides of the tunnel. The presence of vivianite does not, therefore, demand that the primary mound should have remained exposed for a long time to the weather before the construction over it of the rest of the mound.

Grey soil in the primary mound

A sample (2) of grey chalky material covering the turf-stack at ring 73 (probably but not certainly 370 or equivalents here) was analysed by Cornwall (table 4). The material was much less stony than the samples from the base of the primary mound (1 and 3). The stones were predominantly cherty rather than flinty, and the sample contains a high percentage of black (rendsina) soil-crumbs in the medium- and fine-sand grades. On ignition these fines lost over 30 percent in weight against less than 10 percent for sample 3, the other strongly humic sample, and contained far more alkali-soluble humus than the latter. The iron-content was nearly as high as in samples 1 and 3, though masked by the dark humus. The material appears to be rendsina soil-material from a contemporary soil on chalk.

Chalk from the outer part of the primary mound

Samples 5 and 6, from 158 and 154 respectively, were confirmed as predominantly chalk (table 4). 5 is distinctly more ferruginous and contains rather more soil material, but is essentially the same as 6. The increased iron is probably the result of post-construction percolation.

Table 4: analysis of soil samples from Silbury Hill. Details of samples are given in the text. Procedure was as follows:

a) 100 g per sample were washed through sieves from 2-0.06 mm and the retained stones, fine-gravel and sand fractions dried and weighed. Dispersed silt- (<0.06mm) and clay-grade (<0.002mm) particles ran to waste with the washing water and were estimated by difference.

b) Each sieved fraction was separately decalcified with excess hydrochloric acid, panned under the tap, and the retained gravel and sand grades were rinsed, dried and again weighed.

c) Large quantities of small humic aggregates were found in the medium- and fine-sand grades of samples 2 and 3. Small samples of the washed and decalcified >0.2 mm grades of both were ignited and the loss-on-ignition recorded as organic matter.

d) In the fines (>0.2 mm) dry sieved from each original sample, alkali-soluble humus was estimated in all five cases.

e) A colour card was made of fine siftings or original samples, on the one hand raw, as collected, on the other after ignition.

Sum refers to the total retained on sieves, as a percentage of the original sample.

Sample	*>2.0*	*>0.6*	*>0.2*	*>0.06*	*Sum*	*Difference from 100%*
a) 1	24.6	5.4	3.18	4.5	37.73	62.27
2	18.47	7.71	11.36	20.77	58.31	41.69
3	57.01	8.09	7.32	8.19	80.61	9.39
5	19.75	5.47	5.77	9.52	40.51	59.49
6	19.9	5.59	3.58	5.61	34.68	65.32
Loss						
b) 1	22.43	2.75	1.7	2.32	29.2	8.53
2	3.35	1.0	4.57	2.67	11.59	46.72
3	42.86	2.26	2.2	1.48	48.8	31.81
5	2.47	0.67	0.49	1.33	4.96	35.55
6	1.03	0.36	0.23	0.7	2.33	32.35

c) 2 Loss on ignition (fraction >0.2), 30.5 %
3 " " " 9.3 %

d) Alkali-soluble organic matter (mgs/100 g dry original sample)

1	18
2	1360
3	20
5	6
6	2

e) Colour card. Samples 1–3 showed appreciable amounts of iron, though the colours are much diluted and pale owing to the amounts of chalk present in each. Sample 6 was almost unchanged by ignition, only off-white in colour, but sample 5 was distinctly ferruginous, though less so than in the cases of samples 1–3.

Pollen

(G.W. Dimbleby)

Two series of samples were analysed, from several taken in the field from the west side of the main tunnel (figs 6 and 10):

1. Rings 34–35. This was below context 130, just outside the edge of the excavator's Silbury II.
2. Rings 57–58. This was below contexts 154–158 at the tail of the primary mound.

In both cases samples were taken from about 30 cm below the old land surface up to the overlying mound material. However, pollen was not present in countable quantities below 126/197, the stone-free loessic upper part of the old land surface. Results are therefore presented from the loessic layer plus a single sample in each case from the base of the overlying mound material (table 5).

Comparison of the two profiles

The top 2 cm of the buried profile at rings 34–35 were so poor in pollen that it was not possible to obtain counts totalling >200, the minimum figure aimed at for statistical reliability; in fact the totals reached were only 34 and 41. There was no difficulty in reaching 200 totals for the comparable levels at rings 57–58. There are various possible reasons why the counts should be so low at rings 34–35, including disturbance during construction or locally favourable conditions for microbiological action. The two profiles are virtually identical in the zone 2–5 cm. The profile at rings 57–58 appears to be a connected sequence from top to bottom. This will here provide the focus for discussion, and the profile at rings 34–35 will be regarded as a disturbed version of it.

The profile at rings 57–58

Acidity

The presence of pollen at moderately high frequencies confirms the conclusion that the loessic material is non-calcareous. A moderately acid pH of 4.5–5.0 can be suggested. Such a pH would be incompatible with a chalk flora.

Absence of chalk plants

Whilst it is always dangerous to argue from negative evidence, no taxa which are closely associated with a chalk flora were found in these analyses. Some taxa, such as *Poterium*, *Linum catharticum* and *Helianthemum* have easily recognisable pollen grains and have been recorded from chalk sites such as the Wilsford shaft near Stonehenge, Wilts

Table 5: pollen counts from the profiles at rings 34–35 and 57–58

Rings 34–35						
Depth (cm)	*1–0*	*0–1*	*1–2*	*2–3*	*3–4*	*4–5*
Alnus	1	1	+	5	6	2
Betula	-	-	-	-	-	-
Fagus	-	-	-	-	-	-
Fraxinus	-	-	-	-	-	-
Pinus	1	-	-	1	-	-
Quercus	4	-	-	10	3	3
Tilia	5	-	1	5	2	4
Ulmus	-	-	+	-	-	-
Corylus	12	-	1	19	32	28
Ilex	-	-	-	-	-	-
Gramineae	11	5	7	61	101	72
Caryophyllaceae	1	-	1	2	2	1
Compositae:						
Artemisia	-	-	-	-	-	-
Centaurea nigra	-	-	-	4	-	-
Cirsium	-	-	-	-	-	-
Liguliflorae	2	1	4	25	23	28
Tubuliflorae	-	1	-	-	-	-
Cruciferae	-	-	-	1	-	-
Cyperaceae	-	-	-	1	1	2
Liliaceae	-	-	-	-		
Plantago coronopus	-	-	-	-	-	-
P. lanceolata	10	5	4	37	49	38
P. major/media	-	1	1	-	1	2
Ranunculaceae	-	-	1	9	3	1
Rosaceae	-	-	-	-	-	-
Rubiaceae	-	-	-	4	1	3
Rumex	-	-	1	-	-	-
Umbelliferae	-	-	-	-	1	-
Urtica	-	-	-	-	-	-
Varia	-	2	1	6	3	2
Dryopteris type	3	10	10	12	5	15
Polypodium	3	5	4	7	-	2
Pteridium	1	3	5	8	9	9
Total pollen plus fern spores	54	34	41	217	242	217
Multiplication factor (to APF, grains/gm)	58.4	58.4	58.4	36.5	73.0	58.4

Soil mixing

At the pH suggested there might be some soil mixing by earthworms, which would make pollen values uniform throughout the loessic layer. There is some suggestion of this in the lowest samples, but there are marked increases of frequencies towards the surface. The presence of a piece of charcoal, unassociated with a root channel at a depth of 3–4 cm also suggests physical mixing. The most likely explanation is that this soil was subject to earthworm mixing at one time, but that acidity has increased enough to discourage earthworm activity and at the same time allow some pollen stratification to build up (Dimbleby 1985).

Representation of woody species

Whilst the pollen of woody species is nowhere dominant in the profile at rings 57–58, tree pollen (including hazel, *Corylus*) is well represented. At all levels in the profile grass pollen (Gramineae) exceeds that of trees, and as grasses do not flower freely in shade, it follows that the site itself must have been open. However, trees are mostly wind-pollinated, and doubtless the pollen in the profile is the result of wind transport; in other words, though the site itself was open, there was woodland in the neighbourhood. From the changes in the tree pollen frequencies it is possible to say something about the changes with time in this woodland.

In the lowest three samples of this sequence there is a consistent recurrence of oak (*Quercus*) and lime (*Tilia*), with traces of other trees which may or may not be associated with these at the present day. Hazel (*Corylus*) is, for this species, moderately represented. The impression given here is of deciduous woodland similar to the probable climatic climax of the period, early in Pollen Zone VII. Spores of bracken (*Pteridium*) also feature at this level; bracken is a typical woodland plant, though it tends to avoid calcareous soils. Its frequency here is in great contrast with its extraordinary abundance in later prehistoric soils on the chalk of this area (Dimbleby and Evans 1974). Here it decreases to the surface, clearly not spreading as the woodland changes.

Tilia steadily decreases towards the top of the profile. On the other hand *Quercus* and especially *Corylus* show a

Table 5 (cont'd)

rings 57–58						
Depth (cm)	*1–0*	*0–1*	*1–2*	*2–3*	*3–4*	*4–5*
Alnus	9	16	6	3	1	4
Betula	1	3	1	+	-	1
Fagus	1	-	-	-	-	-
Fraxinus	-	1	-	-	-	-
Pinus	9	22	16	15	19	6
Tilia	3	2	3	6	8	7
Ulmus	1	+	1	-	2	-
Corylus	115	86	52	32	33	22
Ilex	-	1	-	-	-	-
Gramineae	26	163	82	62	54	55
Caryophyllaceae	1	4	+	1	-	3
Compositae:						
Artemisia	-	1	-	-	-	-
Centaurea nigra	-	-	-	1	-	-
Cirsium	-	-	1	1	-	-
Liguliflorae	13	20	31	45	36	69
Tubuliflorae	2	1	2	1	-	2
Cruciferae	-	-	-	-	-	-
Cyperaceae	1	4	-	7	2	2
Liliaceae	-	1	-	-	-	-
Plantago coronopus	1	-	-	-	-	-
P. lanceolata	13	31	22	15	19	14
P. major/media	1	3	-	2	-	3
Ranunculaceae	1	1	7	6	5	2
Rosaceae	1	2	1	-	-	-
Rubiaceae	-	2	1	1	-	-
Rumex	-	-	-	-	-	-
Umbelliferae	-	1	-	-	-	-
Urtica	1	-	-	-	-	-
Varia	6	10	6	7	4	3
Dryopteris type	6	6	4	6	7	12
Polypodium	7	5	+	2	3	2
Pteridium	5	7	6	18	11	19
Total pollen plus fern spores	224	394	243	232	205	217
Multiplication factor (to APF, grains/gm)	41.7	292.0	292.0	146.0	97.3	73.0

marked increase. In this they are accompanied by alder (*Alnus*). The presence of alder need not indicate wet conditions. While there is alder today in the Kennet close to Silbury, this is a species with a strong ability to colonise. In experiments I have found alder to be the most successful of our native trees in becoming established (Dimbleby 1958).

The tree pollen record suggests that in the neighbourhood there was woodland in a relatively primary ecological state, but this gradually retreated and was superseded by a secondary woodland of pioneer species, with oak also establishing itself. It may well be that such a spread of secondary woodland took place not only on the old woodland soils, but on other land, as and when the level of use of such land fluctuated.

Predominance of grass and hazel pollen in the soil

Here we have to consider pollen which is so abundant that the likelihood is that it came from plants that were growing on, or immediately adjacent to, the site. As mentioned above, grasses do not flower freely in shade and as grass pollen is so strongly represented at the top of the profile it must be concluded that the site at the point of sampling was open and dominated by grasses. The increase in hazel and to a lesser extent other tree species (to levels which fall short only of the grass pollen itself) indicates the local recurrence of woodland or at least hazel thickets. This seems to imply an intimate mixture of open ground and woodland, perhaps on a mosaic pattern, or perhaps as the result of clearings in woodland.

Associated herbs

Some herbaceous species occur more consistently than others, such as Liguliflorae, Cyperaceae, *Plantago lanceolata* and Ranunculaceae. Amongst the others, those recorded in several samples include Caryophyllaceae, Rosaceae, *Plantago major/media*, Rubiaceae, *Cirsium*, *Urtica* and Tubuliflorae, but none of these exceeds 1 percent of the total pollen in any one sample. Since most of these taxa are at generic or family level rather than species, there is the problem that under any one head more than one species may be included, and these

may differ ecologically. For example, the Ranunculaceae include the meadow buttercups *Ranunculus bulbosus* and *R. acris*, but also *R. repens* which can be a plant of disturbed ground, including arable. One species may often be found in different habitats. For example, *Plantago lanceolata* has as its most characteristic habitat grazed grassland (in the absence of grazing it is ousted by the dense growth of grass, as in the enclosure around the experimental earthwork on Overton Down, Wilts), but it can also be found as individual plants along waysides and in disturbed ground. Consequently any interpretation of the ecological significance of the pollen data cannot be precise. Nevertheless, it is possible to offer more or less reliable generalisations. For Silbury, it can be said that the herbs reflect a grazed grassland community, rich in perennial herbs. There is no substantial evidence of arable agriculture - there is no cereal pollen - though sporadic grains of weeds of arable land do occur, such as Cruciferae. Although the seeds recorded (see below, p. 34) do not tally with the pollen, they too give little indication of arable cultivation on the old land surface.

It has already been shown that the pollen contains no taxa which are reliable indicators of calcareous grassland. The whole assemblage would seem to indicate circumneutral or mildly acid soil.

There is no indication from the herbaceous pollen that the soil was wet. Whilst the Cyperaceae are continuously present, the percentage representation is always low, and it must be borne in mind that there are several sedges which form part of grassland communities on freely-draining soils. Again arguing from absence, there are no other herbs represented which might indicate wet conditions. It has already been said that the presence of alder should not be taken as proof of wetness.

THE BASE OF THE MOUND

At rings 57–58 the sampling point is covered by the tail of the primary mound, which here consists of tipped chalk rubble. There is only one sample above the old land surface (1–0 cm). The pollen frequency is lower than in any of the samples from the soil beneath, and it displays a totally different spectrum, as might be expected since the material must have been brought in from off-site. What is interesting is that the pollen suite is not primarily a grassland one as one might expect on a chalk soil, though the grasses and grassland herbs are certainly represented, but is dominated by hazel to the extent of 51.3 percent of the total pollen. Small quantities of other tree pollen are also present, but not to the extent of indicating that they were associated with the hazel. This single sample is not from a soil surface. However, the fact that a pollen count could be obtained from such chalky material itself suggests that it is soil from at or near the surface of a soil. Pollen preservation in chalk soils is usually at such low frequencies that this can be regarded as relatively rich, even though it is lower than in the decalcified soil on which it rests.

The single sample from 1–0 cm at rings 34–35, despite its inadequate count, also shows relatively more hazel pollen than in any of the underlying samples. In this case, however, there is stronger representation of other trees, including lime (*Tilia*), which is reminiscent of the primary woodland described above rather than hazel thicket as seems to be the case at rings 57–58. At rings 34–35 there is also a much stronger representation of the grasses and grassland weeds, suggesting that at this point the overburden may be of multiple origin. This may cast some light on the nature of the 'toblerone' of context 130 (and other contexts), which overlies the sampling point at rings 34–35.

Macroscopic Plant Remains

(D. Williams)

The substance of this report was first brought together in the author's unpublished M.Sc. thesis (Williams 1975); a short report on mosses has already been published (Williams 1976). Full technical details of recovery techniques and identification procedures and comparanda are available in Williams (1975), and in the site archive. Samples were made available five years after the excavation. Some loss through drying out and oxidation had thereby been incurred, especially of grasses observed during the excavation both on the old land surface and in the turf stack of the primary mound. The samples came from a series of locations in the tunnel: at rings 34–35; at rings 57–58; from ring 63 to 73 in the main tunnel; at rings 10–11 in the west lateral tunnel; and at rings 4–8 in the east lateral tunnel. Unfortunately, no exact record was kept during this analysis of differences between samples from the old land surface and those from the turf stack, though it has been possible to outline several important divergences; as a generalisation, few species were recovered from the old land surface, and these were mainly weeds. This question is discussed further below.

The plant remains may be divided into bryophytes or mosses, seeds and fruits, grass remains and wood remains.

Mosses

A similar account has already been published (Williams 1976). Mosses were not recovered from samples from the old land surface. They were recovered from samples from the primary turf stack, where they were firmly attached to the surface of the individual turves, evidently having grown *in situ*. The pedological characteristics of the turves, from a calcareous rendsina soil profile, have been described above (p. 30). Moss species identified are set out in table 6. *Pseudo-*

Table 6: moss species from the turf stack in the primary mound

Species	*Percent occurrence by volume*
Pseudoscleropodium purum (Hedw.) Fleisch.	45+
*Rhytidiadelphus squarrosus** (Hedw.) Warnst.	30
Acrocladium cuspidatum (Hedw.) Lindb.	15
Neckera complanata (Hedw.) Huben.	5
Mnium longirostrum Brid.	
Mnium spp. (cf. *M. affine* Bland. or possibly *M. seligeri* (Lindb.) Limpr.)	
Mnium punctatum Hedw.	5
Brachythecium rutabulum (Hedw.) B., S. and G.	
Thuidium sp. (cf. T. philibertii Limpr.)	

* Possibly some *Hylocomium splendens* (Hedw.) B., S., and G. also present

Table 7: species identified from seed and fruit remains from the old land surface and the turf stack (1136 specimens examined)

Species	*No. specimens*
a) certain identifications	
Ajuga reptans L.	2
Arenaria serpyllifolia L.	8
Carex spp.	27+ fragments
Centaurea sp. (cf. *C. nigra* L.)	2
Cerastium holosteoides Fr.	4
Chamaenerion angustifolium (L.) Scop.	1
Chenopodium album L.	4
Chenopodium sp. (cf. *C. bonus-henricus* L.)	1
Corylus avellana L.	3 shell frags 1 kernel
Galium sp. (cf. *G. aparine* L.)	1 (damaged) + fragments
Glechoma hederacea L.	6
Hypericum sp. (cf. *H. montanum* L.)	2
Lapsana communis L.	1
Leontodon hispidus L.	3
Linum catharticum L.	5
Lotus corniculatus L.	1
Montia fontana L. (var. *chondrosperma* (Fenzl.) Walters)	65
Plantago lanceolata L.	2
Polygala sp. (cf. *P. vulgaris* L.)	19
Polygonum aviculare L.	18+ fragments
Poterium sanguisorba L.	32+ fragments
Prunella vulgaris L.	3
Ranunculus sp. (cf. *R. aquatilis* L.)	4
Ranunculus acris L.	{c.600 achenes
Ranunculus repens L.	{
Rubus fruticosus L. *sensu lato*	3
Sambucus nigra L.	10+ fragments
Scabiosa columbaria L.	7+ fragments
Silene dioica (L.) Clairv.	1 (broken)
Stachys sp. (cf. *S. palustris* L.)	5
Stellaria graminea L.	30
Taraxacum sp. (cf. *T. laevigatum* (Willd.) DC.)	1
Taxus baccata L.	1
Urtica dioica L.	min. 120
Viola sp.	1
b) uncertain identifications	
Compositae spp.	1
Fruit stones ?	3
Cyperaceae spp.	min. 50
Small berries ?	min. 40
Spores ?	min. 50

scleropodium purum and *Rhytidiadelphus squarrosus* were the most abundant species recovered.

The majority of species listed are those of mature chalk grassland in the present day (Watson 1964). *Pseudoscleropodium purum* has been found to be common and constant in a series of studies of chalk grassland (Cornish 1954; Hope-Simpson 1941), and up to three times as numerous as *Rhytidiadelphus squarrosus* (Watson 1960). *Acrocladium cuspidatum* and *Hylocomium splendens* have also been consistently recorded in modern studies of chalk grassland (see also Tansley 1939). Most of the remaining mosses of table 6 have also been recorded from chalk grasslands. *Brachythecium rutabulum*, *Mnium affine*, *Mnium longirostrum*, *Neckera complanata* and *Thuidium philibertii* are there of only scattered and infrequent occurrence. Growth patterns also vary. *Mnium longirostrum*, for example, does not form a closely matted, intricately branching system, even if growing luxuriantly (Watson 1968).

Although most of the species recovered could therefore by uniformitarian analogy have been part of a calcareous sward, some of those found in Silbury in small quantities are more characteristic in the present day of shaded, moister conditions. This is particularly true of *Mnium punctatum*, which may have originated in neighbouring woodland or marsh. This species and *Mnium affine* were recovered as small fragments in small quantities, in contrast to the complete plants recovered of those species suggestive of calcareous turf. *Brachythecium rutabulum*, a nitrophilous species, could be present because of localised nitrogenous enrichment of the soil by people and animals.

Modern analogy suggests further details. *Rhytidiadelphus squarrosus* and *Acrocladium cuspidatum* are today almost totally confined to north-facing slopes, while *Neckera complanata* favours south-facing slopes; *Pseudoscleropodium purum* is eclectic (Watson 1960). Tall herbaceous vegetation and very short sward, particularly on south-facing

Table 8: generalised habitats of species identified (1: grassland; 2: cultivated or disturbed ground; 3: nitrophilous; 4: calcicole; 5: scrub; 6: woodland with open clearings; 7: aquatic or moist)

Species	*Habitats*						
	1	2	3	4	5	6	7
Ajuga reptans		*					*
Arenaria serpyllifolia		*					
Centaurea nigra	*	*					
Cerastium holosteoides	*	*					
Chamaenerion angustifolium		*				*	
Chenopodium album			*	*			
Chenopodium bonus-henricus		*	*				
Corylus avellana					*	*	
Galium aparine		*				*	*
Glechoma hederacea		*	*			*	*
Hypericum montanum		*				*	*
Lapsana communis			*				*
Leontodon hispidus		*			*		
Linum catharticum		*			*		
Lotus corniculatus		*			*		
Montia fontana	*	*					*
Plantago lanceolata		*	*				
Polygala vulgaris		*					
Polygonum aviculare		*					
Poterium sanguisorba	*			*			
Prunella vulgaris		*	*		*		*
Ranunculus aquatilis							*
Ranunculus acris		*	*				*
Ranunculus repens		*	*				*
Rubus fruticosus					*	*	
Sambucus nigra		*	*		*	*	
Scabiosa columbaria		*			*		
Silene dioica		*					*
Stachys palustris		*					*
Stellaria graminea		*					*
Taraxacum laevigatum	*	*					
Taxus baccata					*	*	
Urtica dioica		*	*	*		*	*

Table 9: grass remains identified from the turf stack

Species	*Remains*
Arrhenatherum elatius (L.) Beauv. ex. J. and C. Presl.	Empty glumes and pales
Dactylis glomerata L.	Part of branching inflorescence
Alopecurus pratensis L.	Epidermal silica skeletons. Some similarity also to epidermal pattern of *Phleum pratensis* L.
Koeleria cristata (L.) Pers.	Epidermal silica skeletons. Some similarity also to epidermal pattern of *Anthoxatum odoratum* L.

Table 10: identified wood remains

Species	*Remains*
Prunus sp. (cf. *P. spinosa* L.)	Fragment of wood with bark
Corylus avellana L.	Several fragments of wood and charcoal
Crataegus sp.	Several wood with bark fragments
Pinus sylvestris L.	One wood fragment

slopes, are unfavourable for mosses, which flourish best in grass from 7–20 cm high. A fescue sward is usually far richer in mosses than tussocky communities dominated by *Zerna erecta* (Huds.) Gray, and a high proportion of rosette weeds, such as might occur in heavily grazed turf, is also detrimental to moss growth.

The mosses were very abundant in some samples, forming prominent tussocks, indicative of vigorous growth. Various explanations may be suggested. Lack of competition in bare grassland is one. In the present day *Pseudoscleropodium purum* and *Rhytidiadelphus squarrosus* flourish exceptionally well in dense swards, in favourable niches. They also flourish on and around ant hills. The ants were not mound-building species.

Overall, the mosses indicate the presence near the site of moderately grazed mature chalk grassland. The moss flora was similar in composition to that of comparatively recent pasture on the South Downs (Hope-Simpson 1941). *Pseudoscleropodium purum* was the dominant moss, with *Rhytidiadelphus squarrosus* and *Acrocladium cuspidatum* also common, suggesting that the turves may have originated from a north-facing slope.

Seeds and fruits

Full details of identification are available in Williams (1975). Identification was primarily made with a low-power binocular microscope, with some use of a scanning electron microscope. The uncharred seeds and fruits recovered were generally in an excellent state of preservation, shown, for example, by the partial survival of the papery pericarp of *Chenopodium album*. These propagules are not as reliable indicators of the flora of the site itself as the moss species which formed an integral part of the calcareous turves, since they could have been blown in, as in the case of wind-borne Compositae, or brought in consciously or unconsciously by people and animals. The species identified are set out in table 7. Some identifications could not be made to species level. Separation was made between Ranunculus species on the basis of their achenes. Study of ridge measurements made with the scanning electron microscope show the presence of *R. acris* and probably also *R. repens*, though it is possible that *R. bulbosus* was also represented in this material. Full details of the achene analysis are available in Williams (1975).

The number of propagules found was relatively low compared to the numbers to be expected from a peaty or waterlogged deposit. Grass seeds were not noted in any quantity, though grasses may have been the dominant seed producers of the communities represented. The low seed count may, however, be a better reflection of the less common herbaceous components. Little pattern was discernible in the distribution of species typical of chalk grassland in samples from the turf stack. The propagules of the weed species had a wide distribution, occurring both in the old ground surface and in the turf stack, although a far greater concentration of weed seeds (including *Urtica dioica* and *Polygonum aviculare*) was noted in the former. *Montia fontana* was notably localised, in the turf stack at rings 64–65.

By analogy with present day vegetation some species can be assigned to particular habitats and communities (Tansley 1939). Suggestions of the possible habitats of the species identified are set out in table 8. In fact, few of the species represented show habitat fidelity or exclusiveness, in Tansley's term. *Scabiosa columbaria* and *Poterium sanguisorba*, from the turf stack, are now largely confined to calcareous grassland (Tansley 1939, 538). Other species from the turf stack characteristic of such grassland include *Linum catharticum*, *Leontodon hispidus*, *Prunella vulgaris*, and *Lotus corniculatus*, but the first two also appear in Tansley's lists of species found in neutral grassland and even acidic grasslands (Tansley 1939, 508). The situation is complicated by the presence of *Urtica dioica* and *Ranunculus* species in the turf stack which would not be expected to occur in mature chalk grassland. The number of *Urtica dioica* achenes recovered from the turf stack samples was very small compared with the old ground surface and it is possible that they were derived from other areas during construction. *Ranunculus* achenes were recovered from the old land surface (including a notable concentration at rings 34–35) but were also consistently recovered from the turf stack, suggesting that they represent a genuine component of the chalk grassland sward. Most achenes are dropped around the parent plant (Harper 1957). Despite the likelihood of large robust achenes being preferentially picked out during sorting, it seems likely that the high *Ranunculus* achene count is significant and reflects a large population of buttercup plants both on the old land surface and to a lesser extent on the turves incorporated in the turf stack. Damage to chalk grassland turf during construction or earlier cultivation might also help to explain the presence of *Urtica* and *Ranunculus*. *R. repens* appears to indicate old arable or disturbance, and *R. acris* too can become established in disturbed soil (Cornish 1954, on the North Downs; Harper 1957).

Other habitats are also suggested. Achenes of the crowfoot species *Ranunculus aquatilis* points to an aquatic habitat. Several shrub species and even herbaceous species such as *Glechoma hederacea* indicate open woodland or scrub in the vicinity.

Grass remains

Grass remains had clearly deteriorated in storage. They also proved hard to identify, being distorted or lacking important diagnostic features. Some identifications were made by epidermal silica skeletons. Grasses have a tendency to incorporate silica into the cell walls of their leaves, stems and glumes. When any of these parts decompose, or are burnt to ash, the silica persists and the cell structures of the epidermal cells, including hairs and stomata, are perfectly preserved (Dimbleby 1977). Nonetheless, some genera have a range of species with rather similar siliceous patterns. Species identified are set out in table 9.

The grasses recovered in this analysis were largely from the turf stack. Limited ecological inferences can be made. *Arrhenatherum elatius* is a characteristic low constancy component of chalk grassland (Tansley 1939). It attains only localised dominance, usually after disturbance of the soil, and can persist for years after disturbance has ceased. It is intolerant of grazing and trampling and is therefore absent from heavily grazed areas. *Dactylis glomerata* is fairly constant and abundant in calcareous grassland; although a tall hay-type grass, it tolerates grazing well (Tansley 1939).

Wood remains

Help with identifications was given by Dr. D. Cutler, Jodrell Laboratory, Royal Botanic Gardens, Kew. Only a few wood remains were found. Most were slivers a few cm long, although occasional twigs up to 15 cm long were found. Identifications are set out in table 10.

Corylus avellana and *Crataegus* sp. were most abundant. Ecological inference from such scattered specimens is likely to be unreliable. The species identified are consistent with the presence in the vicinity of scrub. No deciduous woodland species were found. Present day scrub in Wiltshire, on both rendsina and non-calcareous soils, is dominated by *Prunus spinosa* and *Crataegus monogyna* (probably the species represented here in the wood remains) (Grose 1957). Hazel is infrequently found in such habitats today, being more characteristic of the shrub layers of woodland on the deeper soils of the lowlands. Pine was uncommon. It is represented in the pollen counts but its pollen can be carried long distances by wind. The specimen here may show a local presence.

Conclusion

In general, it must be concluded from the macroscopic plant remains that grassland was a prominent feature of the site and its surroundings. The investigation did not produce as close an analysis as would have been wished of differences between the old land surface on clay-with-flints and the turf stack formed of calcareous turves. Grass remains were seen in both contexts during excavation, but were poorly preserved in old land surface samples by the time of analysis. The old land surface had relatively few species, mainly weeds, including *Urtica*, *Polygonum* and *Ranunculus*. It is likely from the plant remains to have been open, disturbed and even in places relatively bare. Greater diversity was seen in the turf stack. The mosses in particular from there suggest mature chalk grassland including on north-facing slopes (such as are available immediately locally), but disturbed ground, scrub and even woodland, and aquatic habitats are also suggested.

The insects

(M. Robinson)

Introduction

During the 1968–69 tunnelling of the mound, the excavators commented upon the remarkable state of preservation of insect remains in the turf stack. Substantial samples were taken from the turf stack and old ground surface for entomological analysis. This work was begun by Dr M.C.D. Speight, then a NERC research fellow at the London Institute of Archaeology, probably after the end of the 1968 season of excavation. Insects were extracted by means unspecified. Some were mounted on slide cards but the majority were kept in ethanol. Most of the carded specimens, which include the now famous ants, were identified but little progress seems to have been made with the remainder. The slides were used for teaching purposes at the London Institute but the existence of the other material was forgotten until some glass sweet jars containing tubes of specimens in alcohol were found when the basement was being refurbished in 1992. This enabled analysis of these unique Neolithic insect assemblages from the otherwise unproductive Chalk of Wessex to be completed by the author, funded by the Ancient Monuments Laboratory of English Heritage.

The samples and their analysis

No separate documentation was found but the slides and tubes had been labelled in detail. The samples from the turf stack (Turf Stack or TS) had mostly been located to their tunnel ring and had been numbered when several samples had been examined from each ring. The samples from the old ground surface (Old Ground Surface or OGS) could be divided into an OGS series and an OGS W series. Unfortunately, they could not be related to the tunnel rings. It is possible that the OGS series was from the main tunnel and the OGS W series from the west lateral. However, it is also possible that the first series was from the eastern side and the second series from the western side of the main tunnel.

The insect remains were identified with reference to the Hope Entomological Collections at the University Museum, Oxford and the minimum number of individuals represented by the sclerites calculated for each sample. The detailed identifications by Speight, which comprised about 6 percent of the Coleoptera and 60 percent of the Formicidae were almost all confirmed. The results have been listed in table 11 for Coleoptera and table 12 for other insects. The nomenclature of the Coleoptera follows Kloet and Hincks (1977) and the nomenclature of the Formicidae is after Bolton and Collingwood (1975).

The numbers of insects in each sample are mostly too low for individual interpretation. The results have therefore been combined as follows (using the original sample codes):

Turf Stack 67–68	:	BBC-TS/67–68/1, /2, /3, /4, / 5, .2 near OGS.
Turf Stack 68–69	:	BBC-TS/68–69/1, /2, /3, /4.
Turf Stack 70–71	:	Silbury : Turf Stack 70/71 1. viii.68.
Turf Stack 71–72	:	BBC-TS/71–72/1, /2, /3, /4, / 5, /M, /B.
Turf Stack TS ?	:	BBC-TS/?/1, /2, /3, /4, /SnSS.
Turf Stack Total	:	the samples listed above plus TS 64/65 small find 86 (1 *Hypera punctata*).
Old Ground Surface	:	BBC-OGS 1, /3, /4, /5, /6, /7, / 8.
Old Ground Surface W	:	Silbury-OGS W1, W1A, W3, W4, W5, W7, W8, W9, W10, W11, W12.
Old Ground Surface W	:	the old ground surface samples listed above plus Silbury OGS G1 (1 *Agriotes obscurus*, 1 Diptera puparium).

Along with the identifications is given a short description of the habitat or food of each species. The abbreviations used are as follows: B: bankside/water's edge; C: carrion; D: disturbed/bare ground; F: dung; G: grassland; M: marsh; T: terrestrial and occurring in several habitats; V: decaying plant remains; W: woodland or scrub. Less usual habitats are given in brackets.

A wide range of sources has been used for ecological information about the Coleoptera. The main references are as follows: Donisthorpe (1939), Fowler (1887–1913), Hoffmann (1950; 1954; 1958), Joy (1932), Koch (1989a; 1989b; 1992), Paulian (1959) and the Royal Entomological Society (1953–1990). Other references are given in Lambrick and Robinson (1979) and Robinson (1983).

Food and habitat information for Homoptera is from Le Quesne (1969) and for Formicidae from Bolton and Collingwood (1975) and Collingwood (1979).

The preservation of the insect remains ranged from good (especially in the turf stack) to very poor (many of the old ground surface samples). Some of the poorly preserved material presented different problems of identification from those usual for archaeological material because decay had

Table 11: Coleoptera

	Turf Stack						Old Ground Surface			
	67-68	68-69	70-71	71-72	TS ?	Total	OGS	OGS W	Total	
CARABIDAE										
Carabus monilis F.	-	-	-	-	-	-	1	-	1	WGD
Clivina collaris (Hbst.) or *fossor* (L.)	1	-	-	-	-	1	-	-	-	moist T, often under dung
Trechus obtusus Er. or *quadristriatus* (Schr.)	-	-	-	1	-	1	-	-	-	T
Bembidion obtusum Serv.	-	1	-	-	1	2	-	-	-	T - open, clayish
Pterostichus niger (Sch.)	-	-	-	-	1	1	-	-	-	W(GD)
P. melanarius (Ill.) or *niger* (Sch.)	1	-	-	1	1	3	-	-	-	DGW
P. strenuus (Pz.)	-	-	-	-	1	1	1	-	1	T - often near water
P. cf. *strenuus* (Pz.)	-	-	-	-	1	1	-	-	-	as above
P. cupreus (L.) or *versicolor* (Strm.)	-	-	-	-	1	1	-	-	-	G(DW)
Abax parallelepipedus (P. & M.)	1	1	-	-	2	4	-	-	-	W(GDC)
Calathus fuscipes (Gz.)	5	-	-	4	3	12	1	1	2	WDG - often in meadowland
C. melanocephalus (L.)	7	2	-	6	10	25	2	4	6	GD(W)
Synuchus nivalis (Pz.)	-	1	-	-	-	1	-	-	-	GD(W)
Amara sp.	-	-	-	-	1	1	-	-	-	T
Harpalus cf. *affinis* (Schr.)	-	-	-	-	1	1	-	-	-	DG(W)
Lebia chlorocephala (Hofseg.)	-	-	-	-	-	-	-	1	1	G - larvae mostly on *Hypericum*-feeding chrysomelids
Dromius linearis (Ol.)	-	-	-	-	1	1	-	-	-	G(M)
Metabletus sp.	-	-	-	-	1	1	-	-	-	V
HYDROPHILIDAE										
Sphaeridium bipustulatum (F.)	-	-	-	-	2	2	-	-	-	FVC
S. lunatum F. or *scarabaeoides* (L.)	-	-	-	-	1	1	-	-	-	F - esp cow dung (CV)
Cercyon cf. *atomarius* (F.)	-	-	-	1	-	1	-	-	-	FVC
C. cf. *haemorrhoidalis* (F.)	1	-	-	-	2	3	-	-	-	FV
Cercyon sp.	-	-	-	-	-	-	-	1	1	FVC, some species on wet mud
Megasternum obscurum (Marsh.)	23	18	-	30	45	116	8	33	41	FVC
HISTERIDAE										
Hister bissexstriatus F.	-	-	-	1	-	1	-	-	-	FV
SILPHIDAE										
Silpha atrata L.	-	-	-	1	2	3	-	-	-	mostly under bark or in rotten wood (GDV)
S. cf. *atrata* L.	-	-	-	-	-	-	-	1	1	as above
S. tristis Ill.	-	-	-	1	-	1	-	-	-	C(GDV)
STAPHYLINIDAE										
Platystethus arenarius (Fouc.)	-	-	-	1	-	1	-	-	-	FV
Stenus spp.	5	1	-	13	19	38	4	6	10	TM
Lathrobium sp.	-	-	-	-	-	-	-	1	1	TV(C)
Ochthephilum fracticorne (Pk.)	1	-	-	-	-	1	-	-	-	V, under wet leaves
Rugilus erichsoni (Fauv.) or *orbiculatus* (Pk.)	3	-	-	6	8	17	2	-	2	V(G)

Table 11 (cont'd)

	Turf Stack						Old Ground Surface			
	67-68	68-69	70-71	71-72	TS ?	Total	OGS	OGS W	Total	
Xantholinus glabratus (Grav.)	1	-	-	1	3	5	-	-	-	GDFV
X. linearis (Ol.)	3	-	-	2	4	9	-	1	1	WGV(FC)
X. longiventris Heer	3	-	-	-	1	4	-	-	-	WGV(FC)
X. linearis (Ol.) or *longiventris* Heer	1	3	-	7	13	24	2	6	8	WGV(FC)
Philonthus sp.	1	2	-	1	1	5	-	2	2	FVC(T)
Gabrius sp.	-	-	-	5	10	15	-	-	-	WGFVC
Staphylinus cf. *compressus* Marsh.	-	-	-	-	-	-	-	1	1	T(V)
S. caesareus Ced. or *dimidiaticornis* Gem.	-	-	-	1	3	4	-	-	-	T
S. aeneocephalus Deg. or *fortunatarum* Woll.	-	1	-	2	4	7	-	-	-	WG
Quedius sp.	10	1	2	-	1	14	-	1	1	T
Philonthus or *Quedius* sp.	1	1	-	2	5	9	1	-	1	TFVC
Tachyporus sp.	1	-	-	8	6	15	-	1	1	T
Tachinus sp.	2	1	-	4	2	9	-	1	1	T
Aleocharinae indet.	1	2	-	-	1	4	-	-	-	TFVC
GEOTRUPIDAE										
Geotrupes sp.	3	-	1	1	2	7	2	-	2	F
SCARABAEIDAE										
Colobopterus fossor (L.)	-	-	-	1	-	1	-	-	-	F
Aphodius cf. *foetens* (F.)	1	-	-	-	-	1	-	1	1	F
A. cf. *foetidus* (Hbst.)	-	-	-	-	2	2	-	-	-	FV
A. granarius (L.)	-	-	-	-	1	1	-	-	-	FV
A. prodromus (Brahm)	-	-	-	-	2	2	-	-	-	FV
A. cf. *prodromus* (Brahm)	-	-	-	-	-	-	-	1	1	FV
A. pusillus (Hbst.)	-	-	-	3	2	5	-	2	2	FV
A. rufipes (L.)	-	-	-	1	1	2	-	1	1	F
A. cf. *sphacelatus* (Pz.)	1	-	-	10	20	31	1	-	1	FVC
A. villosus Gyl.	1	2	-	1	1	5	-	-	-	V(F)
Aphodius spp.	12	6	-	12	8	38	2	4	6	mostly F
Onthophagus fracticornis (Press.)	-	-	-	-	2	2	-	-	-	F
O. joannae Goj. (*ovatus*)	1	-	-	-	-	1	-	-	-	FVC
Onthophagus sp. (not *joannae*)	1	1	-	2	3	7	-	2	2	F(C)
Phyllopertha horticola (L.)	5	2	-	4	1	12	1	1	2	larvae on roots in permanent grassland
DASCILLIDAE										
Dascillus cervinus (L.)	2	1	-	3	3	9	-	1	1	larvae on grass roots, adults on flowers and bushes
ELATERIDAE										
Agrypnus murinus (L.)	3	2	-	2	4	11	3	2	5	G
Athous haemorrhoidalis (F.)	1	2	-	1	3	7	-	-	-	WG - esp. meadowland, larvae on roots esp. in grassland
Agriotes obscurus (L.)	-	1	-	-	6	7	-	5	6	larvae mostly on roots of grassland plants
A. sputator (L.)	-	-	-	-	1	1	-	-	-	as above

Table 11 (cont'd)

	Turf Stack						Old Ground Surface			
	67-68	68-69	70-71	71-72	TS ?	Total	OGS	OGS W	Total	
A. cf. *sputator* (L.)	-	-	-	-	2	2	-	-	-	as above
Agriotes sp.	3	-	-	-	-	3	1	2	3	as above
CRYPTOPHAGIDAE										
Atomaria sp.	1	-	-	-	-	1	-	-	-	VT(F)
BRUCHIDAE										
Bruchus or *Bruchidius* sp.	-	-	-	-	1	1	-	-	-	on Leguminosae
CHRYSOMELIDAE										
Chrysolina haemoptera (L.)	-	-	-	-	1	1	-	-	-	*Plantago* spp.
Hydrothassa glabra (Hbst.)	3	1	-	3	5	12	1	3	4	*Ranunculus* spp.
Galeruca tanaceti (L.)	1	-	-	-	1	2	-	-	-	Compositae esp. *Achillea millefolium*
Longitarsus sp.	1	-	-	3	5	9	-	-	-	various herbs
Crepidodera ferruginea (Scop.)	1	-	-	-	1	2	-	-	-	mostly Gramineae
Mantura matthewsi (Curt.)	-	-	-	-	1	1	-	-	-	*Helianthemum* spp.
Sphaeroderma rubidum (Grls.)	-	-	-	-	1	1	-	-	-	Compositae esp. *Centaurea* spp.
APIONIDAE										
Apion spp.	1	5	1	26	25	58	1	8	9	various herbs
CURCULIONIDAE										
Phyllobius cf. *maculicornis* Germ.	1	-	-	-	-	1	-	-	-	deciduous trees and shrubs
P. roboretanus Gred. or *viridiaeris* (Laich.)	3	3	-	-	5	11	1	1	2	trees, shrubs and some herbs
Phyllobius sp.	-	-	1	-	3	4	-	1	1	as above
Phyllobius or *Polydrusus* sp.	3	1	2	1	1	8	-	1	1	as above
Sciaphilus asperatus (Bons.)	-	-	-	-	-	-	3	2	5	various herbs
Barynotus obscurus (F.)	5	3	-	3	2	13	4	4	8	various herbs
Sitona lepidus Gyll.	-	-	-	4	1	5	-	3	3	Leguminosae, mostly *Trifolium* spp.
S. cf. *lineatus* (L.)	1	-	-	-	-	1	-	-	-	Leguminosae
S. sulcifrons (Thun.)	-	1	-	-	-	1	-	7	7	Leguminosae, mostly *Trifolium* spp.
Sitona sp.	1	-	-	-	-	1	-	5	5	Leguminosae
Cleonus piger (Scop.)	-	-	-	-	1	1	-	-	-	Compositae, usually *Carduus* and *Cirsium* spp.
Hypera punctata (F.)	-	-	-	3	-	2	-	-	-	Leguminosae esp. *Trifolium* spp.
Hypera sp. (not *punctata*)	2	-	-	-	-	2	-	-	-	various herbs
Liparus coronatus (Gz.)	1	1	1	-	2	5	-	-	-	Umbelliferae
Bagous sp.	-	-	-	1	-	1	-	-	-	aquatic plants
Rhinoncus cf. *pericarpius* (L.)	-	-	-	1	-	1	-	-	-	*Rumex* spp.
Mecinus pyraster (Hbst.)	1	-	-	5	4	10	1	6	7	*Plantago lanceolata* L. and *P. media* L.
Gymnetron sp. (eg. *labile* or *pascuorum*)	-	-	-	-	-	-	-	1	1	*Plantago lanceolata* L.
Total	132	67	8	189	282	679	43	125	169	

Table 12: other insects

		Turf Stack 67-68	68-69	70-71	71-72	TS ?	Total	Old Ground Surface OGS	OGS W	Total	
HEMIPTERA - HOMOPTERA											
Megophthalmus scabripennis Ed. or *scanicus* (Fal.)		-	1	-	-	1	2	-	-	-	esp. grasses
Aphrodes bicinctus (Schr.)		-	-	-	-	1	1	-	-	-	grasses
Aphrodes sp.		1	-	-	1	2	4	-	-	-	grasses
Aphidoidea indet.		1	-	-	-	-	1	-	-	-	T
Homoptera indet.		-	2	-	1	-	3	-	-	-	T
HYMENOPTERA - FORMICIDAE											
Myrmica rubra (L.)	- worker	19	-	-	-	-	19	-	-	-	T
M. rubra (L.)	- female	1	-	-	-	-	1	-	-	-	T
M. rubra (L.)	- male	1	-	-	-	-	1	-	-	-	T
M. rubra (L.) or *ruginodis* Nyl.	- worker	20	-	-	1	-	21	-	-	-	T
M. rubra (L.) or *ruginodis* Nyl.	- female	1	-	-	-	-	21	-	-	-	T
M. scabrinodis gp.	- worker	1	2	-	1	-	4	-	1	1	T
Myrmica sp.	- worker	2	-	-	2	2	6	-	7	7	T
Lasius flavus gp.	- worker	1	-	-	-	-	1	-	-	-	mounds in old pasture and at edge of woodland
Lasius sp. (not *fuliginosus*)	- female	-	1	-	-	-	1	-	-	-	T
OTHER HYMENOPTERA											
Hymenoptera indet. (not Formicidae)		-	1	-	1	2	3	-	-	-	T
DIPTERA											
Diptera indet.	- puparia	27	38	1	114	102	282	43	84	128	T

Table 13 : modern Coleoptera

CARABIDAE		
Notiophilus sp.	1	MWGD
Loricera pilicornis (F.)	1	T - mostly moist
Bembidion gilvipes Sturm	1	B(W) also wet meadowland
Calathus melanocephalus (L.)	1	GD(W)
HYDROPHILIDAE		
Helophorus rufipes (Bosc.)	1	T - often on Cruciferae
or *porculus* Bed.		
Megasternum obscurum (Marsh.)	1	FVC
STAPHYLINIDAE		
Anotylus sculpturatus gp.	4	FVC(also T)
Xantholinus linearis (Ol.)	2	WGV(FC)
Quedius sp.	1	T
Tachyporus sp.	1	T
Aleocharinae indet.	2	TFVC
SCARABAEIDAE		
Aphodius contaminatus (Hbst.)	1	F
ELATERIDAE		
Agriotes sp.	1	larvae mostly on roots of grassland plants
NITIDULIDAE		
Meligethes sp.	1	mostly on flowers
LATHRIDIIDAE		
Aridius bifasciatus (Reit.)	1	T - on plant moulds
CHRYSOMELIDAE		
Oulema melanopa (L.)	1	grasses
Chaetocnema sp. (not *concinna*)	1	various herbs
CURCULIONIDAE		
Phyllobius roboretanus Gred. or *viridiaeris* (Laich.)	1	trees, shrubs and herbs
Barynotus obscurus (F.)	1	various herbs
Sitona sp.	2	Leguminosae
Ceuthorhynchidius troglodytes (F.)	1	*Plantago lanceolata* L.
Total	27	

Table 14 : other modern insects

HEMIPTERA - HETEROPTERA		
Acalypta parvula (Fal.)	2	T
Heteroptera indet.	1	T
HYMENOPTERA - FORMICIDAE		
Myrmica scabrinodis gp. - worker	6	T
OTHER HYMENOPTERA		
Hymenoptera indet. (not Formicidae)	2	T
DIPTERA		
Diptera indet. - puparia	7	T

started under aerobic conditions before being sealed by the mound. For example, it was sometimes not possible to differentiate the pronota of *Xantholinus linearis* and *X. longiventris*.

The species composition of the assemblages suggests that there had been a good recovery of sclerites (insect skeletal elements) down to about 0.5 mm. For example the small Staphylinidae of the genus *Stenus* were well represented. However the smallest sclerites, which in modern studies are recovered by using a 0.2 mm sieve, such as those of the subfamily Aleocharinae of the Staphylinidae were largely absent. There are no obvious gaps in the faunas which could be attributed to major categories of remains becoming separated from the material which survived at the Institute of Archaeology, although it is possible that some specimens are missing. The Alexander Keiller Museum at Avebury exhibits a rather blurred photograph of a slide on which had been mounted sclerites and wings of female ants. It is labelled *Date: Neolithic Find Silbury Hill No:88024223 Ants found in levels below Silbury Hill.* This slide was not amongst those that were examined and Dr C. Malone (*pers. comm.*) has said that neither the slide nor any other ancient insect material is at the Keiller Museum. To confuse matters, the slides from the Institute of Archaeology included one of fragments of modern ants which had been collected in the vicinity of Silbury Hill and some modern ant specimens are displayed in the Keiller Museum.

The Silbury insects comprise both the fauna trapped by the construction of the mound and the remains of dead insects on the old ground surface or in the turf. Thus they are very different from the usual prehistoric insect assemblages, which either accumulated under water, for example on the bed of a river channel or at the bottom of a well, or accumulated on a peat surface. It is therefore not easy to interpret the Silbury results by direct comparison with insect assemblages from other sites. To assist with interpretation, a sample of 1.5 kg of turf and the top 0.10 to 0.15 m of soil was analysed for insects from the fields to the west of the mound. This field is now improved pasture grazed by cattle. However, an area of high ground close to the Bath Road was found for sampling which seemed to have escaped recent spraying and any cultivation for re-seeding. It still supported a chalk grassland flora, with *Ranunculus acris*, *Lotus corniculatus*, *Sanguisorba minor*, *Primula veris*, *Plantago lanceolata*, *P. media* and *Hieracium pilosella* all growing in the immediate vicinity of the sample. The soil comprised a chalky loam. The sample was washed over onto a series of sieves down to 0.2 mm and the contents identified. The results are listed in table 13 for Coleoptera and table 14 for other insects. Insects from groups which do not survive in archaeological deposits, such as Collembola, were not recorded.

The concentration of Coleoptera fragments and Diptera puparia in the modern sample suggests that the individual turf stack samples were perhaps of the order of 1–2 kg. The individual old ground surface samples contain fewer Coleoptera fragments than the turf stack samples but the numbers of Diptera puparia are more similar. It is thought likely that sample sizes were similar and the differences were due to factors of preservation.

Interpretation

The insect assemblages from both the turf stack and the old ground surface comprise almost entirely taxa which can live under open country conditions. There are strong grassland elements but, with the exception of beetles of foul organic material, species from other habitats are sparse. In general terms, the ancient assemblages are similar in species

Table 15: Silbury Coleoptera classified by habitat groups

Silbury Coleoptera Species Groups		Percentage of Terrestrial Individuals	
		Turf Stack	Old Ground Surface
(1.	Aquatic	0	0)
2.	Pasture / dung	14.7	9.5
3.	? Meadowland	9.7	14.2
4.	Wood and trees	0.1	0
5.	Marsh / aquatic plants	0.1	0
6a.	General disturbed ground / arable	0	0
6b.	Sandy / dry disturbed ground / arable	0	0
7.	Dung / foul organic material	17.8	24.9
8.	Lathridiidae	0	0
9.	Synanthropic	0	0
10.	Esp. on structural timbers	0	0
11.	On roots in grassland	6.3	9.5
12.	Unclassified	49.5	40.8
Total number of terrestrial individuals		679	169

Species from Silbury in the groups: 2 *Geotrupes* sp., *Colobopterus erraticus*, *Onthophagus* spp., *Aphodius* spp. (excluding *A. villosus*); 3 *Apion* and *Sitona* spp.; 4 *Phyllobius* cf. *maculicornis*; 5 *Bagous* sp.; 7 *Cercyon* spp., *Megasternum obscurum*, *Platystethus arenarius*; 11 *Phyllopertha horticola*, *Agrypnus murinus*, *Athous haemorrhoidalis*, *Agriotes* spp. For further details of the habitats of the groups see Robinson 1991, 278-81.

composition to the modern assemblage from the area of unimproved chalk pasture adjacent to the site. All the species identified still occur in southern England, although one of them, *Onthophagus fracticornis*, is now very rare (see below).

Woodland

While a range of the insects are able to live under woodland conditions as well as in grassland only a single tentatively identified individual of the beetle *Phyllobius maculicornis* shows an obligate dependence on trees or shrubs. Its larvae feed on roots but the adults feed on the leaves of various deciduous trees and shrubs (Koch 1992, 217). Another beetle, *Phyllobius roboretanus* or *viridiaeris*, would formerly have been included in the tree and shrub-dependent group. It was quite well represented in the samples and its inclusion in the wood and trees category of table 15 (Species Group 3) would have raised the value of this group from 0.1 percent to 1.8 percent of the terrestrial Coleoptera from the Turf Chalk and from 0 percent to 1.2 percent of the Coleoptera from the Old Ground Surface. Indeed, the majority of unattributed *Phyllobius* or *Polydrusus* fragments could easily have been from *P. roboretanus* or *viridiaeris*, which would have doubled these percentages. A value of 0.1 percent from Species Group 3 implies very open conditions whereas a value of 3.6 percent would imply a significant presence of scrub at the very least (Robinson 1991, 280).

The taxonomy of *P. roboretanus* and *P. viridiaeris* is confused, (Pope in Kloet and Hincks 1977, 80), which has made much of the habitat information for them unreliable. In recent Continental works, *P. viridiaeris* (Laich.) is referred to (possibly more correctly) as *P. virideaeris* (Laich.) (e.g. Hoffmann 1950, 200).

Phyllobius larvae are root feeders and the adults are mostly arboreal, feeding on the leaves of deciduous trees, but a small group has adults which feed on herbaceous vegetation (Cooter 1991, 175). Hoffmann (1950, 200–1) gives *P. roboretanus* in France as feeding on *Salix* spp., *Prunus spinosa* and *Quercus* sp. and *P. virideaeris* as feeding on *Salix* spp., *Populus* spp. and *Ulmus* spp.. Freude *et al.* (1981, 228) list both *P. roboretanus* (as *parvulus*) and *P. virideaeris* as feeding chiefly on *Salix* and *Populus* spp. in central Europe but also on other bushes. In contrast, Koch (1992, 215–16), also using central European information, gives *P. roboretanus* (as *parvulus*) as feeding on bushes and trees, especially Rosaceae, but states that *P. virideaeris* seldom occurs on bushes but feeds on various herbs, favouring Compositae.

The reason for believing Koch (1992) is not simply that it is a more recent and detailed work than the others. It seems unlikely that a single tree or shrub feeding species would be so well represented in both the old ground surface and turf stack samples without any other evidence from the insects for woody vegetation or decaying wood. *P. viridiaeris* feeding on Compositae would make a very plausible addition to the grassland fauna from Silbury.

Of the other species that more usually occur in woodland, the carabids *Pterostichus niger* and *Abax parallelepipedus* are considered below. *Silpha atrata* hunts snails in rotten logs but does also occur in grassland and is quite frequently found in open country archaeological insect assemblages.

The insects can be interpreted as showing very open conditions both in the area from which the turf was cut and the site of the mound. It is unclear how large the catchment would have been for insects. Inevitably, a large proportion of the insects would have been of very local origin because the turf of the mound and the old ground surface would have supported a rich fauna. However, the almost complete absence of tree-feeding species, given the size of the assemblages, suggests that any woodland as opposed to groups of trees or bushes was probably at least a few hundred metres distant from the site.

Grassland

The prominence of various grassland and grassland-related groups of Coleoptera in table 15 and fig. 25 suggests that grassland predominated at the area from which the turf was cut and on the site of construction of the mound. The two most abundant species of beetle which comprise Species

Group 11 (larvae feeding on roots of grassland plants), *Phyllopertha horticola* and *Agrypnus murinus* occur in the turf of well drained permanent grassland. Other beetles from this group which are well represented are *Athous haemorrhoidalis* and *Agriotes obscurus*. Another beetle, *Dascillus cervinus*, although not included in this group, has larvae that feed on the roots of grasses (Koch 1989b, 112) and was identified from many of the samples. The adults tend to congregate on flowering bushes and on Umbelliferae in grassland.

The Silbury Coleoptera include a major phytophagous element, particularly Chrysomelidae (leaf beetles), and Apionidae and Curculionidae (weevils). As can be seen from table 16, all the plants which the more host-specific species feed on can occur in chalk grassland, indeed some are characteristic of it. The most numerous species are *Hydrothassa glabra*, which feeds on *Ranunculus* spp. (buttercups), *Sitona lepidus*, which feeds on various Leguminosae, particularly *Trifolium pratense* (red clover) but less often on *Lotus corniculatus* (birdsfoot trefoil), and *Mecinus pyraster* on *Plantago media* (hoary plantain) and *P. lanceolata* (ribwort plantain). All these plants and the other plants listed in table 16, with the exception of *Rumex* spp. (docks) occur in *Festuca ovina/rubra* grassland on the chalk of Wiltshire (Wells 1975). It is a herb-rich grassland of unimproved permanent pasture and is now usually maintained by sheep grazing although it could also probably be maintained by the grazing of cattle. Only slightly fewer of these plants occur in two other categories of traditional chalk pasture, *Carex humilis* grassland and grazed *Bromus erectus* grassland. Under the National Vegetation Classification, the first two categories of chalk grassland fall within CG2, *Festuca ovina-Avenula pratensis* grassland and the third within CG3, *Bromus erectus* grassland (Rodwell 1992, 140–25). *Rumex* sp. is only suggested by a single tentatively identified specimen of *Rhinoncus* cf. *pericarpius*. However, there is only a single individual of a beetle which is restricted to calcicolous plants, *Mantura matthewsi*, which feeds on *Helianthemum* spp. (rock-roses). The remainder of the phytophagous Coleoptera would also occur on some categories of mesotrophic grassland, probably transitional between MG5, *Cynosurus cristatus-Centaurea nigra* grassland and MG6, *Lolium perenne-Cynosurus cristatus* grassland (Rodwell 1992, 60–73).

The weevils of the genera *Apion* and *Sitona* which comprise Species Group 3 of table 15 and fig. 25 are sufficiently abundant, with values of around 10 percent, that had the Silbury material been from ordinary archaeological deposits, the results would be regarded as strongly suggestive of hay meadow (Robinson 1991, 280). More caution must be exercised with the Silbury assemblages but at the very least they suggest grassland that was not so heavily grazed as to suppress flowering of the herb flora (Robinson 1983, 27–8, 34). Many species of *Apion* have larvae that develop in flower heads or seed pods (Morris 1990, 34–64). For example, the cessation of grazing on chalk grassland was shown to result in an increased flowering of *Lotus corniculatus* and a 90–fold increase in number of *Apion loti*, which has larvae that feed on seeds in the pods of *L. corniculatus*, compared with grassland that remained grazed (Morris 1967, 459–63).

The percentages of scarabaeoid dung beetles (Species Group 2) which feed on the droppings of medium- to large-sized mammals, especially domestic animals on pasture, range from 10 percent–15 percent of the Coleoptera, which would be typical for pastureland away from watering places or areas where stock was concentrated (Robinson 1991, 278–80). They are dominated by species of *Aphodius*, particularly *A.* cf. *sphacelatus*, with lesser numbers of *Geotrupes* and *Onthophagus*. The majority of them occur in dung in the region at present and are not restricted to the dung of any particular mammal. However, *Onthophagus fracticornis*, represented by a female head in BBC TS/?/2 and a male head in BBC TS/?/3, is now very rare in Britain. Jessop (1986, 27) gives Mately Bog in the New Forest as the only known locality although there is also a single male specimen in the Hope Collections, Oxford University Museum, captured by P. Harwood at Perranporth in April 1911. It most usually occurs in horse dung (Koch 1989b, 355) but is certainly not entirely restricted to it. *O. fracticornis* was also recorded from another prehistoric site on the Wiltshire Chalk, the Middle Bronze Age shaft at Wilsford (Osborne 1969; Osborne 1989).

One species of *Aphodius* from the site, *A. villosus,* has been excluded from Species Group 2 because it is variously described as never occurring in dung (Landin 1961, 213), sometimes occurring in old cow dung (Koch 1989b, 368) and in vegetable matter or dung (Jessop 1986, 19). Its larvae develop in humic soil amongst grass roots and the adults mostly feed on decaying plant material in or on the soil. It now has a very local distribution in Britain and is associated with warm, sunny habitats on sandy and chalky soils.

Almost all the remaining Coleoptera in table 11 go towards making up a balanced fauna of well drained, lightly grazed grassland on calcareous or circumneutral soil. Amongst the predatory ground beetles (Carabidae), the most numerous, *Calathus fuscipes* and *C. melanocephalus* would be expected in such habitats unless very closely grazed. Likewise the most numerous Staphylinidae, *Stenus* spp. and *Xantholinus linearis* or *longiventris,* are abundant members of grassland faunas. Two of the species of Carabidae, *Pterostichus niger* and *Abax parallelepipedus,* are now more usually associated with woodland habitats than grassland in Southern England. However, both appear to have been living in grassland at Runnymede during the late Bronze Age (Robinson 1991, 322). This just leaves *Ochthephilum fracticorne*, *Bagous* sp. and the rather high numbers of *Megasternum obscurum* as apparently inappropriate to the grassland fauna.

The ants from Silbury Hill were the one aspect of the original palaeoentomological work to catch the public imagination and they have also entered archaeological mythology. Fragments of ants characteristic of grassland were said to have been found at a winged stage which showed that the turf had been cut and placed in the mound in late July or August (Dimbleby 1977, 32; Malone 1990, 23). Ant remains are not particularly abundant in the majority of the samples. However, Sample BBC/67–68/2 from the turf stack contains a minimum number of 42 individuals of *Myrmica rubra* or *ruginodis*, most of which could be confirmed as *M. rubra* on pedicel shape (Bolton and Collingwood 1975, 31). While the majority are workers, there are heads and pedicels

of two females and one male. No ant wings are present on any of the slides or in the specimen tubes but it is possible that the photograph of the slide displayed in the Keiller Museum, which shows ant wings (see above) is of remains from this context.

Myrmica rubra is an ant of sheltered, lowland areas which nests in such places as loamy pastures and country gardens (Bolton and Collingwood 1975, 17; Collingwood 1979, 53). Nests are usually constructed under stones, in decayed tree stumps or in soil. A mature nest will contain several females and 100 or more workers (Bolton and Collingwood 1975, 17) or up to 1000 or more workers (Collingwood 1979, 53). From personal experience, the smaller size seems more usual. Winged males and females are developed in the nests in July and mating flights occur in early August. Donisthorpe (1927, 121–2) gives a longer period when the winged forms can be found in the nests, from June to September and even notes winged females overwintering in a nest, but this must be very unusual.

The high concentration of *M. rubra* in Sample BBC-TS/67–68/2 when ants are relatively sparse in the other samples suggests that part of a nest had been incorporated in one of the cut turves. If the male ant (and indeed the winged specimens now lost) had been buried alive in the mound, this could indeed validly be taken to indicate that it was constructed in July or August. However, the remains of dead ants which commonly occur around nests could also have been incorporated with the turf and would raise some doubts about the season of construction.

Silbury only produced a single ant that could be attributed to the *Lasius flavus* group. *Lasius flavus* itself builds substantial earth mounds in old pasture and on the edge of woodland, often with large numbers of colonies in suitable habitats (Bolton and Collingwood 1975, 26). Where colonies are not destroyed by mechanical disturbance, they can reach very high densities on old chalk grassland in Wiltshire (Wells *et al.* 1976). Silbury Hill, therefore, does not seem to have been set amidst ant hills.

The modern assemblage of insects from the chalk pasture adjacent to the mound shows most of the faunal elements recorded from the mound. Scarab dung beetles are represented by *Aphodius contaminatus*, elaterids that feed on the roots of grassland plants are represented by *Agriotes* sp.. Grassland phytophagous beetles from the families Chrysomelidae and Curculionidae include *Oulema melanopa*, *Sitona* sp. and *Ceuthorhynchidius troglodytes*, while the predators *Calathus melanocephalus* and *Xantholinus linearis* occur in both the ancient and the modern assemblages.

Decaying organic material

Relatively few of the species of Coleoptera from Silbury, with the exception of the scarab dung beetles, feed on decaying organic material. However, numbers of one such species, *Megasternum obscurum*, are very high and it comprises around 17 to 24 percent of the total Coleoptera. It is included in Species Group 7, certain Hydrophilidae and Staphylinidae which live in various types of foul organic material including dung, manure heaps, compost and other categories of decaying vegetation. The other members of this group are scarcely represented. Some presence of this group, including *M. obscurum*, would be expected along with the scarabs in animal droppings. Many rural archaeological assemblages show values between 7.5 and 15 percent, seemingly independently of the percentage of scarabaeoid dung beetles and the intensity of human habitation (Robinson 1991, 280), but in some of those cases, naturally occurring accumulations of decaying plant debris along the edge of waterlogged deposits probably contribute to the fauna. Under ordinary circumstances, the Silbury results would be interpreted as suggesting large accumulations of decaying refuse on the site. In the absence of other insects of decaying plant debris, however, it must be assumed that the high numbers of *M. obscurum* are due to the samples being of a different nature than is usual, and that their habitat was animal droppings along with the scarabs. Curiously, members of Species Group 7 comprise 19 percent of the Coleoptera from the modern turf that was analysed, but there are four individuals of *Anotylus sculpturatus* gp. and only one of *M. obscurum.*

Other habitats

Aquatic insects are entirely absent from Silbury. There is a single specimen of *Bagous* from the turf stack. Members of this genus feed on various marsh and aquatic plants. The lowest part of the area around the mound is by no means dry at present. *Polygonum amphibium* (amphibious bistort) grows in its quarry ditch and *Filipendula ulmaria* (meadowsweet) grows on the base of the mound. Williams (this volume) recorded seeds of *Ranunculus S. Batrachium* sp. from the turf stack (confirmed by the presence of a seed in an insect sample). There is also a single specimen of *Ochthephilum fracticorne* from the turf stack. This beetle lives in a variety of roots of decaying plant debris, usually on wet ground. The Coleoptera, therefore, only suggest a very slight presence of wet habitats.

All the other groups of Coleoptera in table 16 and fig. 25 are entirely absent from both the old ground surface and the turf stack. The lack of Carabidae that tend to favour arable, disturbed or weedy ground (Species Group 6) agrees well with the evidence of the phytophagous Coleoptera, which mostly occur on grassland plants. The various species of *Phyllotreta* and *Ceutorhynchus* that feed on cruciferous weeds which are usually well represented in open country terrestrial insect assemblages are absent. There is only a single example of a beetle that feeds on *Rumex* spp., *Rhinoncus* cf. *pericarpius,* and other beetles that feed on Polygonaceae, such as *Chaetocnema concinna*, are absent. Neither are there phytophagous beetles that feed on plants of waste ground. Insects that feed on *Urtica dioica* (stinging nettle) can be common in archaeological deposits, but none was found.

The insect evidence apparently conflicts strongly with that from the macroscopic plant remains, which include seeds from annual weeds such as *Polygonum aviculare* agg. (knotgrass) as well as numerous seeds of *U. dioica*. This aspect of the flora might have been expected to have been reflected by the insect fauna. However, the most numerous seeds in the modern turf sample are also weedy species: *Cerastium* cf. *fontanum* (mouse-ear chickweed) and *U. dioica*. Neither plant grew in the vicinity of the sample spot. The probable reason for this discrepancy has already been

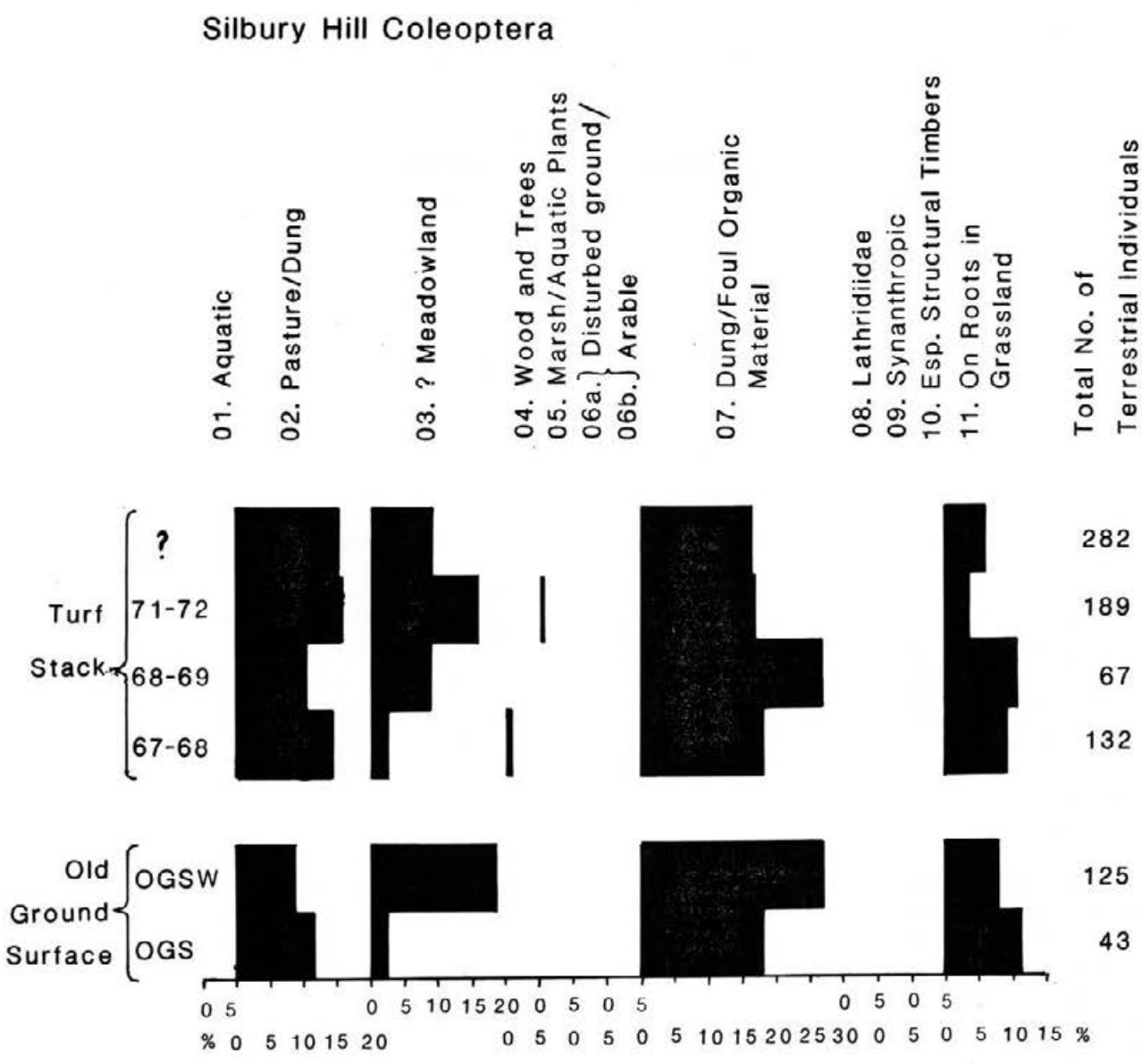

Fig. 25 Species groups expressed as a percentage of total terrestrial Coleoptera. Not all the terrestrial Coleoptera have been classified into groups

Table 16: Host plants indicated by the phytophagous Coleoptera

		Turf Stack	Old Ground Surface
Ranunculus spp.	Buttercups	+	+
Helianthemum spp.	Rock-roses	+	-
Leguminosae esp. *Trifolium* spp.	Clovers etc.	+	+
Umbelliferae		+	-
Rumex spp.	Docks	+	-
Plantago lanceolata L.	Ribwort Plantain	+	-
P. media L. and *P. lanceolata L.*	Hoary and Ribwort Plantains	+	+
Compositae esp. *Achillea millefolium* L.	Yarrow	+	-
Compositae esp. *Carduus* and *Cirsium* spp.	Thistles	+	-
Compositae esp. *Centaurea* spp.	Knapweeds	+	-
Gramineae	Grasses	+	-

alluded to. Whereas the usual waterlogged prehistoric seed assemblages largely comprise fresh seeds that entered the deposits and were then preserved, the Silbury assemblages, both ancient and modern, comprise the soil seed bank and dead seeds in various stages of decay. The effect of seed longevity and resistance to decay have apparently over-emphasised the importance of weed seed remains in relation to the presence of weed plants in both the Neolithic turf and the modern pasture.

The three groups of Coleoptera that tend to be favoured by human habitation on a site, Species Groups 7, 8 and 9, are all absent. The lack of the woodworm beetles of Species Group 9 and the various indoor beetles of Species Group 8 is hardly surprising, given the complete lack of any other evidence for buildings or occupation of the site. However, the complete absence of Species Group 7, the Lathridiidae, is unexpected because as well as occurring in old thatch and hay, they also live in lower numbers in grassland.

Comparison between the Turf Stack and the Old Ground Surface

Although there are differences between the insect assemblages from the turf stack and the old ground surface, they can mostly be attributed to the poorer state of preservation of the remains from the old ground surface. Perhaps coincidentally, the only calcicolous beetle, *Mantura matthewsi*, was identified from the turf stack, which comprised turf cut from a chalk rendsina soil, whereas there was a non-calcareous covering to the chalk in the area where the old ground surface was exposed.

Conclusions and comparison with other insect assemblages

The insects from Silbury comprise faunas of herb-rich grassland which was grazed, but not so heavily as to prevent the flowering of the various herbs. The evidence from scarab dung beetles for grazing is supported by the short, square-ended leaves to the grass of the turf stack noted by Dimbleby (1986) as probably due to grazing. Taking into account the soil and seed evidence as well as the insect results, the chalk rendsina of the turf stack probably supported *Festuca ovina-Avenula pratensis* grassland (CG2) while the circumneutral soil of the old ground surface perhaps supported a grazed but unmown variant of the *Cynosurus cristatus-Centaurea nigra* grassland (MG5) of the National Vegetation Classification (Rodwell 1992, 60–73, 140–65). *C. cristatus-C. nigra* grassland would certainly provide a satisfactory explanation for the numerous seeds of *Ranunculus acris* (meadow buttercup) that were reported by Williams.

The ants from Silbury Hill have attained a certain fame, and while it is probably stretching the evidence rather too far to argue from the lost remains of a winged ant and the head of a single male for the season of construction of the mound, there were undoubtedly many ants. However, they were not of a hill-constructing species, as has been speculated; they were *Myrmica rubra*, an unpleasant stinging ant.

Any pollen of trees and shrubs appears to have been derived from beyond the catchment of the insects. This evidence from the insects for open grassland conditions is in keeping with that obtained by Evans (1975, 116–19) from land snail analysis of soils associated with Neolithic monuments in the Avebury area (indeed including Silbury) for large-scale permanent clearance. The degree of clearance on the Chalk of Wessex, however, does not seem to have been typical of much of England in the Neolithic. Insects from other Neolithic sites present a very different picture. For example, although pastureland was a significant part of the catchment at Runnymede, wood and tree-feeding beetles comprised 7 percent of the terrestrial Coleoptera which was interpreted as suggesting between 30 percent and 60 percent tree cover (Robinson 1991, 318). The woodland fauna included species characteristic of old woodland which are now very rare or extinct in Britain. The landscape was interpreted as a mosaic of small clearances, abandoned clearances with woodland regeneration and undisturbed woodland. Interesting results have also been obtained from

Table 17: Seeds from the insect samples

Quite a few seeds had inadvertently been placed in the tubes along with the insect fragments. Some of these are species which had not been recorded by Williams. Only *Sambucus nigra* could be identified from the old ground surface samples, but the following were identified from the turf stack:

	Ranunculus cf. *acris* L.
*	*R.* cf. *bulbosus* L.
	R. S. *Batrachium* sp.
	Cerastium cf. *fontanum* Baum.
	Stellaria graminea L.
	Montia fontana L., ssp. *chondrosperma* (Fenz) Walt.
	Linum catharticum L.
*	*Aphanes arvensis* agg.
	Polygonum aviculare agg.
*	*Rumex* sp.
	Urtica dioica L.
*	*Euphrasia* or *Odontites* sp.
	Glechoma hederacea L.
*	*Plantago major* L.
	Sambucus nigra L.
	Leontodon sp.
	Carex sp.
	Gramineae indet.

* indicates species not recorded by Williams. Some *Lotus* sp. pod fragments were also noted in the turf stack samples.

a Neolithic site at Godmanchester (Robinson, unpublished). Tree and wood-dependent beetles from a cursus ditch comprised 4.5 percent of the terrestrial Coleoptera and there was a strong presence of grassland species. The area of the cursus was probably open but the insects suggest it was set against a background of *Tilia* sp. (lime) and *Quercus* sp. (oak) woodland. In the later Neolithic, woodland regeneration occurred over the site, the old woodland rarities returned and the value for tree and wood-dependent beetles rose to 9 percent. In the Raunds area of the Nene valley, a series of Neolithic monuments seem to have been set in a cleared corridor and a value of 2.4 percent was obtained for the wood and tree group from the ditch of a long barrow (Robinson, unpublished). Again, though, the ritual site was set against a background of woodland and a value of 7 percent was obtained for the woodland group from Neolithic deposits in a palaeochannel. Neolithic sites in the Etton area, Cambs, also had a high presence of woodland beetles.

The obvious site for comparison of the insect results is the Wilsford Shaft (Osborne 1969; Osborne 1989). The assemblage was from the bottom of a Middle Bronze Age shaft on the Chalk near Stonehenge. As at Silbury, there was a strong element of pastureland Coleoptera appropriate to Chalk grassland with both the scarab dung beetles and the phytophagous species. Likewise, there was a low proportion of the wood and tree-dependent Coleoptera, suggesting an open landscape. However, there are significant differences between the Silbury and Wilsford faunas.

Both sites had a wide range of scarab dung beetles, but, along with geotrupid dung beetles, they comprised about 50 percent of the terrestrial Coleoptera, more than 3.5 times their abundance at Silbury. While the high numbers of Geotrupidae from the Wilsford shaft were perhaps due to a bias in the Wilsford assemblage towards the larger Coleoptera, possibly a result of a pitfall trapping effect of the shaft, numbers of *Aphodius* spp. and *Onthophagus* spp. were about equal. At Silbury, *Aphodius* spp. outnumber *Onthophagus* spp. by about a factor of ten. The most abundant species of *Onthophagus* from Wilsford was the now very rare *O. fracticornis* (also identified from Silbury, see above) but *O. nutans*, which recently became extinct in Britain, was also present. Osborne (1989, 98) has argued that the abundance of these species of *Onthophagus*, which tend to become more common in relation to *Aphodius* further south in continental Europe, implies warmer summers in Britain during the Bronze Age than at present. It is therefore interesting that Silbury did not give a similar result because the Neolithic tends to be regarded as within a climatic optimum.

Scarab dung beetles that are now extinct or very rare in Britain have been identified from several Neolithic and Bronze Age sites (e.g. Robinson 1991, 320). Relating their decline to climatic deterioration, though, is by no means certain. Some have also been identified from Iron Age sites in the Thames valley, (including *Caccobius schreberi* and *O. fracticornis* from an Iron Age ditch at Abingdon, Robinson, unpublished), at a period when summers were supposedly cooler and wetter than at present (Lamb 1981, 54). Some of the beetles also survived as members of the British fauna until the 19th century AD.

Another difference between the Silbury and Wilsford assemblages is that there was a significant presence of beetles which feed on annual weeds of disturbed ground, for example *Stenocarus umbrinus* on *Papaver* spp. (poppies), from Wilsford. There was also good evidence from the macroscopic plant remains for the proximity of weedy disturbed ground to the shaft (Robinson 1989), which helps to confirm that had this habitat been important at Silbury, it would have been reflected by the insect fauna.

Unlike Silbury, the Wilsford Coleoptera included many specimens of *Anobium punctatum*, the woodworm beetle, and *Ptinus fur*, a synanthropic beetle that tends to occur indoors. They suggest that there was perhaps a building near the top of the shaft, although no remains of such a structure were found by the excavation.

Silbury Hill has provided a unique opportunity to study the insect fauna of Neolithic grassland on the Chalk of Wessex. The insects give both useful information on the environmental setting of a major ritual monument and provide an interesting comparison with Neolithic insect assemblages from elsewhere. It is fortunate that the specimens survived the past twenty years in good condition.

Mollusca

(J.G. Evans)

Mound

Results have already been published (Evans 1972, 266–7). No Mollusca were found in the buried soil under the mound. Given its character and assumed pH, this absence is normal. Land snails were, however, abundant in the stacked turves derived from a chalky parent material in the primary mound (see above, p. 15–21). Four samples were analysed (exact contexts are not recorded).

In all samples, open country species were predominant, particularly *Vallonia excentrica* which in two cases comprised 40 percent of the total. *V. excentrica* tends to like a grass cover with no broken ground, and so does *Vertigo pygmaea*. *Pupilla muscorum* is more or less absent and this species likes warmth and some bare ground. The picture suggested by the Mollusca is of a continuous grass or herb cover, but not necessarily short, since *Helicella itala* can occur in quite long *Festuca* grassland.

Vertebrates and small vertebrates

(N. Gardner)

Animal bone was recovered from the excavations in generally small quantities; greater abundance was found in the upper layers of the ditch. The bone was originally studied by the late Betty Westley, and subsequently by the author as an undergraduate thesis (Gardner 1987), a copy of which has been deposited with the site archive. Full details of procedure of analysis are given there.

Sporadic animal bone and pieces of red deer antler were found in the tunnelling of 1968. Presumably this material was from the calcareous makeup of the mound, rather than on or in the old land surface, which had an assumed pH of 4.5–5.0 (see above, p. 31). Small vertebrate bone was

Table 18: the numbers of animal bone fragments, excluding the tunnel

Context	*No. Fragments*	*Identified*	*Not identified*
Mound, Neo	196	179	17
Mound, Saxon	55	41	14
Ditch, 929	18	17	1
927	2	2	-
919	14	13	1
918–909	43	43	-
921	3	3	-
908–906	8	7	1
Ditch, 905–901	748	748	-
900	71	66	5

Table 19: species and numbers from Neolithic contexts at the top of the mound

Species	*No. fragments*	*MNI*
Cattle	1	1
Pig	28	3
Sheep	50	9
Dog	14	2
Red deer	67	3
Fox	4	2
Beaver	4	2
Hare	1	1
Frog	7	-
(Badger)	4	2

Table 20: species and numbers from the ditch (up to layer 906). Entries record fragments followed by MNI

Species	*Contexts*					
	929	927	919	918–909	921	908-906
Cattle	10/2	2/1	6/2	28/5	2/1	1/1
Sheep	7/3	-	-	3/2	-	1/1
Pig	-	-	-	2/1	1/1	4/1
Red deer	-	-	-	7/1	-	1/1
Small mammals	-	-	2/2	-	-	-
Birds	-	-	2/2	-	-	-

recovered (Atkinson, *pers. comm.* and video cassette 9 2561/2/7/8), presumably from the calcareous turves of the primary mound. These were recovered in modest quantities. Shrews and voles appear to have been identified, but no species listing is available.

The archive lists 16 fragments from the tunnelling of 1969, presumably therefore again from the primary mound. Pig, cattle and sheep or goat are represented by fragments of leg, rib and vertebrae, identified by Betty Westley.

Table 18 sets out the quantities of animal bone recovered from other contexts. Details of that from late Saxon contexts on the top of the mound and from the main Roman layer and the contexts immediately below it (905–901) in the south ditch are available in the site archive; the bone in the former context may be derived from Neolithic contexts, but that from the latter appears to have been deposited directly into the ditch. The site archive also contains full details of body parts, age, sex, and measurements where these are not indicated below.

The bone from the mound was much fragmented, with surfaces damaged by chemical erosion and mechanical abrasion. The ditch layers below 905 also yielded fragmented bones; that from 905–901 was far less damaged, with few signs of abrasion and little evident trace of scavenging.

The mound

The 214 fragments showed the presence of cattle, pig, sheep, dog, red deer, fox, beaver, hare and frog; badger is present but is probably intrusive (table 19).

Cattle. Represented by one incisor.

Pig. 28 fragments showed a minimum of 3 animals, 1 juvenile, 1 adult male and 1 old male. The few measurements possible indicate animals similar to those from Durrington Walls and Woodhenge (Harcourt 1971a; Cunnington 1929).

Sheep. 50 fragments showed a minimum of 9 individuals (1

foetal, 1 newborn, 5 juvenile, and 2 adult). Most parts of the skeleton were represented, with a high proportion of femurs. Measurements indicate animals of similar size to those on other Neolithic sites. Only 3 cut marks were seen.

Dog. 14 fragments (including 8 vertebrae from one individual) show a minimum of 2 individuals (1 juvenile and 1 adult).

Red deer. 16 bone and teeth fragments showed a minimum of 3 individuals (1 juvenile, 1 adult and 1 old). The bones included teeth, vertebrae and hind limbs, suggestive of whole carcasses. 51 antler fragments were also found. 11 worn tine tips and 2 fragmentary shed burr pieces could be identified. Another piece of shed antler had had the brow and trez tines removed, as well as the beam above the trez, leaving the small bez as a working point; the back of the burr was much damaged.

Beaver. 3 limb fragments of a young beaver were recovered. Beaver has also been recorded at West Kennet palisade enclosure 1 (Edwards and Horne, this report) and at Durrington Walls (Harcourt 1971a).

Fox. 4 fragments indicate 2 animals. The condition of the bone was similar to the rest of the material, which suggests that it may not be intrusive.

Badger. 4 fragments indicate 2 animals. The good condition of the bone suggests that it is intrusive.

Hare. A single tibia fragment could not be measured but was taken to come from a hare rather than a rabbit.

Frog. 7 fragments were recovered.

The ditch below the late Roman layer

20 fragments were recovered from 927 and 929, and 68 from 906–921 (table 20). These two contexts may be treated separately. 906–921 may cover a long period of time, but much of this may still have been prehistoric, though post-Neolithic.

927 and 929

Cattle. 12 fragments (including 6 mandibular teeth from the same animal) indicate a minimum of 2 adults. A single humerus measurement fell within the upper range of Neolithic domestic females as represented at Windmill Hill, Cherhill, Durrington Walls, Woodhenge and Maiden Castle (Grigson 1965; 1983; Harcourt 1971a; Cunnington 1929; Wheeler 1943).

Sheep. 7 fragments indicate a minimum of 3 individuals (2 juvenile and 1 adult). The measurements were consistent with those from other prehistoric sites of both Neolithic and later date.

Ditch layers 906–921

Cattle. 37 fragments indicate a minimum of 6 individuals. A large fragment of skull and a horn core fragment with a small section of skull attached were recovered from 921. In 919, one tibia was consistent in size with Neolithic domestic cattle, but another tibia with aurochs. The bone in 918–909 was much fragmented. One scapula was from a small animal. In 908–906 a single tibia gave measurements smaller than those of Neolithic examples from other sites (see above), but within the range of those from various Iron Age and Roman sites, including Gussage All Saints and Danebury (Harcourt 1979b; Grant 1984) and Portchester (Grant 1975).

Pig. There were 6 bone fragments and 1 tooth.

Sheep. 4 fragments were recovered. 3 from 918–909 indicate 1 juvenile and 1 adult. The proximal part of a sheep metatarsal had been fashioned into a simple pointed implement; the tip was broken. A single, gnawed, scapula fragment came from 908–906.

Red deer. 8 bone fragments and 2 antler fragments were recovered.

Small mammals. A mole skull and a field vole mandible were recovered from 919. Both could be intrusive.

Birds. From 919 were recovered a carpometacarpus from a duck-sized bird, and a tibia shaft from a large, long-legged bird, possibly a crane.

Discussion

The small and scattered sample precludes detailed analysis. A range of animals was used, presumably for meat, during the construction of the mound and ditch. Both whole carcasses and selected parts could have been brought to the site. Overall sheep have the largest number of individuals, which is at least consistent with the other evidence for open country. The very young specimens from the top of the mound add (assuming that they are genuinely Neolithic from the phase of construction) another specific season during which activity on the mound took place.

Plates

The folowing eight pages of colour plates are unumbered.

Plates 1–14 relate to Silbury Hill and the first part of the book.

Plates 15–40 illustrate the excavation of the West Kennet palisades in the second part of the book.

Pl. 1 Silbury Hill from the north-east, looking over Avebury and Waden Hill. Photo: Mick Aston

Pl.2 Silbury Hill from the north-east. Note terrace 1 and 2 at the top of the mound, and the extent of floodwater marking roughly the extent of the outer ditch. Photo: Mick Aston

Pl. 3 Silbury Hill from the west. Note terrace 1 and 2 on the top of the mound. Photo: Mick Aston

Pl. 4 Silbury Hill from the east

Pl. 5 The end of the 1968 tunnel, showing part of the turf stack of the primary mound, and the remains of the 1849 tunnel

Pl. 6 The start of the east lateral tunnel, showing layering within the primary mound

Pl. 7 Cutting 3 on top of the mound, looking north-west

Pl. 8 Cutting 3 on top of the mound, looking south-east

Pl. 9 View from the north of excavation of the top of the mound. Cutting 3 is on the top of the mound, and cutting 4 to the right and cutting 7 to the left on the upper slope of the mound

Pl. 10 View from below of cutting 4, taken from terrace 2

Pl. 11 Terrace 1 in cutting 4. The scale is in feet

Pl. 12 The cutting across the south ditch, taken from the mound

Pl. 13 The cutting across the south ditch during excavation, looking at the east section

Pl. 14 Part of the east section of the south ditch of Silbury Hill

Pl. 15 View from the east of the Kennet valley. In the foreground are the Sanctuary and adjacent barrows, in the middleground the West Kennet Farm and fields 1-3 (see fig. 28), and in the background are Waden Hill and Silbury Hill. Photo: Mick Aston

Pl. 16 Part of West Kennet palisade enclosures 1 and 2, in fields 1 and 2, from the north. For orientation, see fig. 28. The prominent scar beside Gunsight Lane is the area of pipeline maintenance initiated in 1989. Photo taken in the dry spring (late March) of 1990. Photo: RCHME, © Crown copyright, NMR 4503 frame 25, SU 1168/65

Pl. 17 View from the south-west of fields 3, 2 and 1, during excavations in 1990 in field 2 (see fig. 28). Trench N is visible in the east meadow, and the old channels are visible as soil marks in field 1

Pl. 18 View over palisade enclosure 1, looking east, during excavation in 1987. The figures mark the approximate position of the outer ditch; Trench D is visible in the middleground, with the ridgeway behind

Pl. 19 View over the palisade ditch of enclosure 2, at an early stage of excavation in Trench BB, looking west towards Silbury Hill

Pl. 20 The outer ditch of enclosure 1 in Trench H, at a depth of over 1.5 m, showing postpipes in plan and section, sarsen packing and ditch backfill. The view is of the north section

Pl. 21 The excavated outer ditch of enclosure 1 in Trench H, showing basal sockets and the north section (see fig. 29)

Pl. 22 The excavated outer ditch of enclosure 1 in Trench G, showing basal sockets and the west section (see fig. 29)

Pl. 23 The inner ditch of enclosure 1 in Trench F, taken from the south at an early stage of excavation, showing sarsen packing and postpipes

Pl. 24 The inner ditch of enclosure 1 in Trench J, showing sarsen packing, postpipes and ditch backfill. The scale against the section is 1 m

Pl. 25 Evaluation trench TWA/G (see fig. 38) in the West Kennet Farm, showing the palisade ditch north of the Kennet as a surface feature. Photo: Wessex Archaeology

Pl. 26 Evaluation trench TWA/F (see fig. 38) in the West Kennet Farm, showing the palisade ditch north of the Kennet as a surface feature. Photo: Wessex Archaeology

Pl. 27 The palisade ditch north of the Kennet in Trench O, from the east, showing also context 803 of medieval or later date running obliquely across the cutting

Pl. 28 The palisade ditch in Trench O, showing postpipe and sarsen packing in the west section, and basal sockets

Pl. 29 View from the east over Trench H, showing the location of bone deposit 215

Pl. 30 Detail of bone deposit 215 in Trench H, within the area of enclosure 1

Pl. 31 Bone deposit 215 in section in the north face of Trench H, above the prominent white context 238/222. The scale against the section is 1 m

Pl. 32 The excavated palisade ditch of enclosure 2 in Trench BB, showing basal sockets and the west section

Pl. 34 Excavation of the palisade ditch of enclosure 2 in Trench T. The scale against the far section is 1 m

Pl. 33 Detail of the south section of the palisade ditch of enclosure 2 in Trench M (see fig. 44)

Pl. 35 The outer ditch of Structure 1 in enclosure 2, in Trench Y

Pl. 36 View of the inner ditch of Structure 1 in enclosure 2, in Trench Y, looking over Boxes 1-6

Pl. 37 The inner ring of Structure 2 in enclosure 2, in Trench Z, with context 5003 in the foreground

Pl. 38 The inner ring of Structure 2 in enclosure 2, in Trench Z

Pl. 39 Detail of bone deposit 5007, outside Structure 2 in enclosure 2, in Trench Z (for location see fig. 52)

Pl. 40 Trench D from the north. The inner natural channel is visible as a dark soil mark between the inner and outer palisade ditches, marked here by whiter spoil dumps

Part Two:
The West Kennet palisade enclosures

Location and setting

The sites lie at about 148 m OD in the upper Kennet valley, in and to the south and south-west of the small hamlet of West Kennet (centred on SU 111682) (figs 1–2, 26–7; pls 15–17). Enclosure 1 straddles the present course of the Kennet, while enclosure 2 lies wholly to the south of the river. On the north side of the river, the ground rises at first gently. Behind is Waden Hill, and to the north-east the steep chalk ridge of Overton Hill, the south-western extremity of Avebury Down. To the south the chalk downland rises steadily to the scarp on All Cannings Down some 4.5 km distant. The sites are roughly equidistant from Silbury Hill to the west and the Sanctuary to the east, being about 1 km from each. The south-eastern end of the West Kennet Avenue (Smith 1965a) passes within about 170 m to the north-east of enclosure 2. On the first chalk ridge to the south lie the West Kennet and East Kennet long barrows (Piggott 1962; Barker 1985).

Ditches have been traced on the rising ground north of the river and east of Gunsight Lane, on the terrace south of the Kennet floodplain meadows and in the southern edge of the floodplain meadows. The Kennet here is now a narrow, shallow river, often dry in summer. The floodplain adjacent to the terrace on which the sites mainly lies is of variable width. Coring during the investigations, and earlier by Professor John Evans, showed deposits over 1 m deep below the present floodplain surface (cf. Evans *et al.* 1993). In the present, these deposits prevent easy inspection of the presumed course of the ditches across the valley floor. There was only one opportunity to look for the presumed course of the ditch or ditches in the north-west quadrant of the

Fig. 26 Aerial photograph by J.K. St Joseph in June 1950 of enclosure 1 in field 1, from the east. The palisade ditches show as narrow lines; the site was first noted on the basis of the channels which show as darker marks.

Fig. 27 Aerial photograph by RCHME from the north in July 1992, showing parts of both enclosures, including enclosure 2 in fields 2 and 3 (for orientation see fig. 28). Photo: RCHME, © Crown copyright , NMR 4763 frame 74, SU 1067/33

enclosure, west of Gunsight Lane north of the river; but the results from Trench U (see below) were negative. There has been no investigation in the grounds of the manor west of Gunsight Lane; it has been assumed that buildings and garden terracing will have masked the site here.

As already noted above (p. 3), there is little detailed evidence from recent research for the place of the West Kennet sites in the history of valley development (Evans *et al.* 1993), but we cannot assume that there was yet a very active stream at the time of the enclosures.

The sequence of discovery and the aims of research

Palisade enclosure 1

1950

The site was first seen, from the air, by J.K. St. Joseph under crop in early June 1950. His photograph (FC 28; fig. 26) shows two narrow concentric marks in the corner of the field just south of the Kennet floodplain and east of the Gunsight Lane. These describe a shallow arc butted on the terrace edge. Between these is a more obvious but discontinuous broader dark mark, which appears to be matched by another at a further distance outside the outer narrow mark. The site later passed into the Wiltshire Sites and Monuments Record (SU16NW 695) as a site with concentric marks, probably of geological origin.

1970s

In the early 1970s a pipe trench was dug along the Kennet valley and passed through the cultivated field east of the Gunsight Lane (hereafter field 1: fig. 28) roughly parallel with its northern hedge line and only 10 m from it. The pipe trench was observed by the late Mrs F. de M. Vatcher, then of the Alexander Keiller Museum in Avebury, with Major H. L. Vatcher. Their records are kept in the museum. They recorded several features of interest in the sides of the pipe trench, which was about 1 m deep. Two ditch-like features were seen in section, containing what were drawn, somewhat schematically, as postpipes, along with some sarsen packing and patches of charcoal. The more easterly ditch was about 2 m broad, the more westerly over 3 m broad. It was clear that the ditches were not bottomed by the pipe trench. In plan, they ran obliquely across the pipe trench and showed

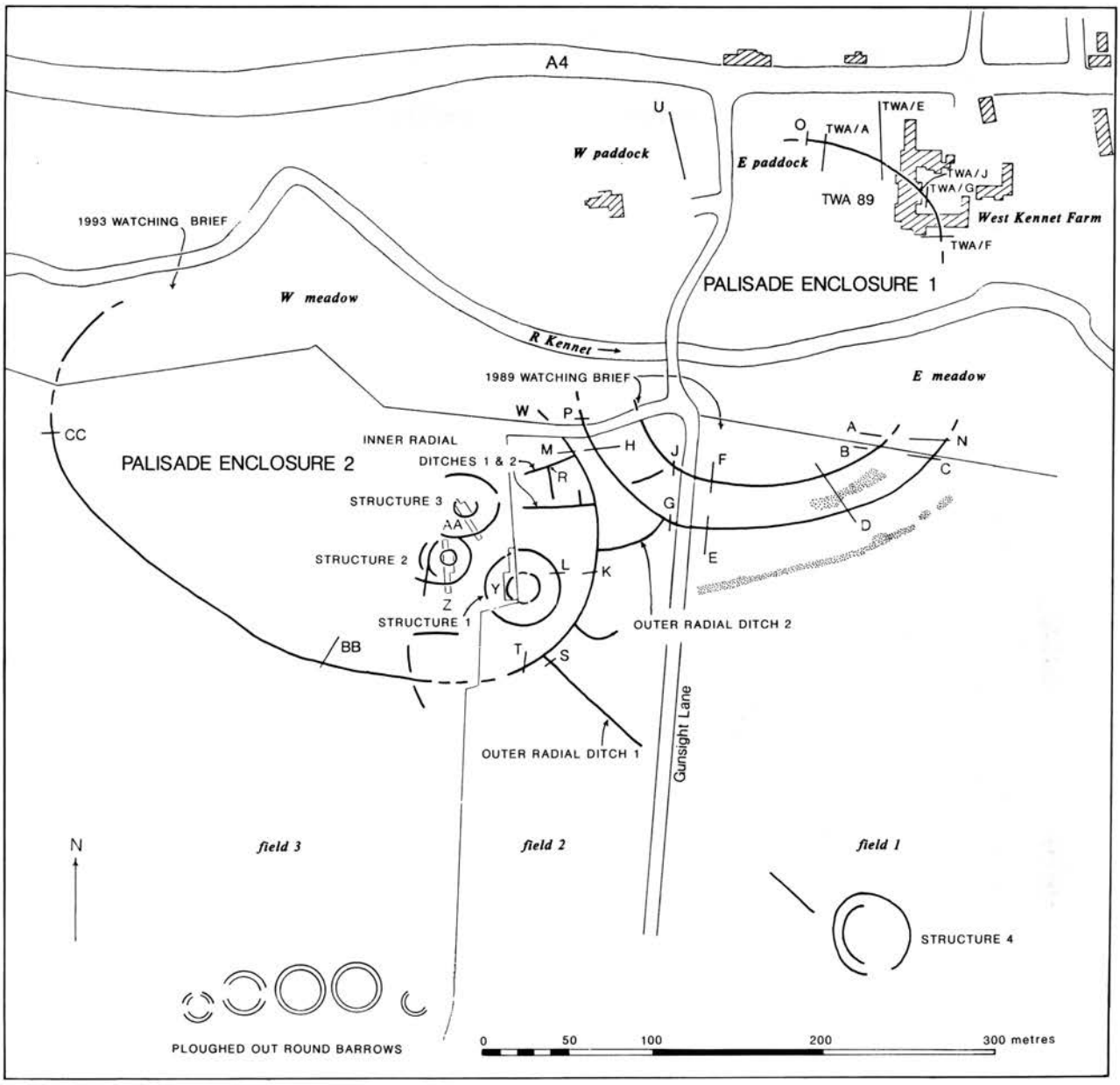

Fig. 28 Plan of the West Kennet palisade enclosures. The 1987, 1990 and 1992 trenches are lettered. Much of the layout of enclosure 2 is based on air photographic evidence supplied by the Royal Commission on the Historical Monuments of England

more clearly than in section a pattern of closely spaced postpipes with small sarsens and charcoal concentrations. To the west of the more westerly feature there was a further zone approximately 20 m long with a series of smaller and larger subsoil features including what appear in section to be stakeholes and shallow scoops, and a possible shallow ditch or trench. There are other drawings with more shallow features on them, but unfortunately these are not located in relation to the ditches. From the zone of scoops came several worked flints, including scrapers on thick flakes struck with a hard hammer, and a single decorated rim sherd from a Grooved Ware bowl (fig. 60, 1). Animal bone including scapulae were also recovered; these have been identified as cattle by Dr Julian Thomas, and an ox horncore of Neolithic type has been noted by Dr Caroline Grigson. Apart from correspondence with other colleagues, nothing further was done with the site at this stage.

1987

It was clear from the Vatchers' measurements that the ditches observed by them must correspond with the narrow marks seen on the aerial photograph. In 1987, the site was chosen for trial excavation. Particular thanks are extended to Julian Richards, Julian Thomas and Caroline Malone for helpful discussion of the potential of the site before excavation. The excavation was the first stage of a research programme of excavation and survey of the Neolithic in the Avebury area (see Whittle 1993). The project grew out of the desire to take further the earlier episodic archaeological research in the area during this century, and out of the sustained environmental research of Professor John Evans. This began with several important investigations on the chalk downland (e.g. Evans 1972; Evans and Smith 1983; Ashbee *et al.* 1979), and had concentrated since 1983 on valley deposits (Evans *et al.* 1993). The West Kennet site offered the

possibility of linking an archaeological site with investigations into valley history.

Excavation was carried out for five weeks in August and September 1987. Five trenches (B-F) were laid out in field 1 to locate the features seen in the 1970s pipe trench and on the aerial photograph; one (A) was just over the field boundary in the floodplain meadow (fig. 28). Although the innermost ditch and the natural channel, described below, were readily found, the features of the palisaded enclosure proved very difficult to locate both in wet and dry conditions. The deliberate backfill of the ditches was partly reponsible, and the subsoil has been compacted by regular cultivation over many years. Subsoil survey by a soil conductivity meter, kindly arranged and carried out by Professor Mark Pollard, proved ineffective, even where the ditches had been located by conventional archaeological procedure.

An inner and an outer ditch about 25–30 m apart were located and excavated in Trenches F and E respectively. Both features were also located and excavated in Trench D, and the outer ditch was located and excavated in Trench C. An oblique ripple-flaked flint arrowhead was found in the outer ditch in Trench D, which also provided antler samples which in due course yielded radiocarbon dates of 2317–2142 BC (BM-2597) and 2032–1890 BC (BM-2602). The inner ditch was not seen in Trench C. A small ditch was seen in the adjacent Trenches A and B, but this is a different feature to the inner ditch seen in Trench D. A modest ditch-like feature can be seen on the Vatchers' section just inside or west of the inner or larger ditch, and it is likely that the inner palisade ditch passed between Trench C and Trenches A and B, a gap of about 10 m. The small ditch in Trenches A and B therefore constitutes an innermost ditch not seen on the aerial photograph, which may be of later date.

A very little of the interior was excavated. Features were visible in Trench B, significantly perhaps adjacent to the zone of shallow features observed by the Vatchers. There is here a little lynchet formation, which may aid survival of shallow features. In other trenches very little was seen other than the ditches themselves.

In Trench C a deep, broad natural channel or hollow was found; this was the inner broad mark seen on the aerial photograph. Its fill was mainly of Romano-British and then Saxon date. The same feature was seen and cleared at its surface in Trench D between the inner and outer palisade ditches, but not excavated.

1989

Other fieldwork continued as part of the project described above (Whittle 1993). Meanwhile, proposals to develop the West Kennet Farm led in early 1989 to a surface evaluation (funded by the developers and carried out by the Trust for Wessex Archaeology) of the subsoil in the farm precinct north of the river. This showed an arc of ditch (fig. 38) with chalk and some sarsen packing and some possible postpipes (Wessex Archaeology 1989; Whittle and Smith 1990). This arc was scheduled on the premise that it belonged to the palisade enclosure. The subsequent public enquiry led to the rejection in late 1990 of the proposed development.

In September 1989 observation of further pipe trench digging on either side of Gunsight Lane allowed partial recording of a substantial ditch some 30 m west of Gunsight Lane, at the junction of field 2 and track (fig. 41); this was subsequently considered after the 1990 excavations to be the inner ditch. A narrow, deep ditch was also seen some 17 m east of Gunsight Lane, in the corner of field 1 (figs 46–7); this might prove to be a radial ditch connected to enclosure 2. Magnetometer survey west of Gunsight Lane in field 2 showed clearly the presence of what proved later to be enclosure 2, but only hinted at the layout of enclosure 1. Aerial photographs taken by amateurs and by Roger Featherstone of the Air Photography Unit of the Royal Commission on Historical Monuments (England) in the summer of 1989 and especially in the dry spring of 1990 (late March) revealed the position of the outer ditch of enclosure 1 in field 2 (fig. 27; pl. 16).

1990

Though the initial aim of the project had been to sample as many different sites as possible in the area, research excavations were carried out for a further five weeks in August and September 1990, since there was clearly much more to learn about the West Kennet site. These confirmed the position and character of the outer and inner ditches west of Gunsight Lane in field 2 (Trenches G, H and J); the ditches were up to 35 m apart (fig. 28). The outer ditch was located by trenching but not excavated in the southern edge of the floodplain on either side of the site south of the river, in Trenches P and N. The ditch north of the river was confirmed by excavation in Trench O, in the paddock of Tan Hill House, to the immediate west of the West Kennet Farm precinct. A small portion of the interior was excavated south of the river in Trench H, and the natural channel was re-examined on the edge of the floodplain meadow east of Gunsight Lane in Trench N. The inner ditch was not seen in Trench N.

1992

The opportunity was taken at the start of the 1992 season to look for the continuation of the perimeter ditch north of the river and west of the Gunsight Lane (fig. 28). Trench U was located in unused ground adjacent to the lane. Footings for barns and other recent features were recorded, but there was no sign of the enclosure ditch, which must be presumed to pass to the south of Trench U.

Palisade enclosure 2

1989–90

Palisade enclosure 2 was first seen in magnetometer survey of field 2 west of the Gunsight Lane, carried out in the summer of 1989 by Michael Hamilton, in anticipation of the 1990 season on palisade enclosure 1. As well as some traces of palisade enclosure 1, there was a prominent curving line running through field 2, with both outer and inner radial lines butted on it; and a double circular cropmark (? Structure 4, below) was seen on air photographs butted on the far end of the main radial line (outer radial ditch 1, below) running away from enclosure 2 to the south-east. This survey also confirmed the presence of the double circuit of Structure 1, which was also visible on amateur air photographs taken in summer 1989. The features in field 2 were further defined by air photographs taken by RCHM(E) at the end of March

1990 (fig. 27; pl. 16). At this stage it was not suspected that enclosure 2 was also Neolithic.

In the 1990 season, Trenches M, K and T were cut across the perimeter of palisade enclosure 2, and Trench S across the associated outer radial ditch 1 to the south-east. To the surprise of everyone at the time, the enclosure and radial ditch very soon showed evidence of late Neolithic date (fig. 28). Trench L was cut across the outer circuit of Structure 1, and Trench R was an unsuccessful attempt to locate one of the presumed inner radial ditches.

1991–92

In 1991 magnetometer survey by Kate Roberts was extended into field 3 and the line of palisade enclosure 2 was traced for some 100 m westwards, forming not as had been supposed after the 1990 excavations a circular layout, but a more oval shape. Over the winter of 1991/2 this line was confirmed and extended by review of its air photographic archive by the Air Photography Unit of RCHM(E), taking the line of the enclosure over 250 m west from the boundary between fields 2 and 3 (figs 27–8). At this point the line of the perimeter appeared to be beginning to return, and further magnetometer survey in the west meadow by Kate Roberts during the 1992 excavations established its return, before a combination of underground pipe lines and overhead cables blotted out its geophysical visibility. Air photos consulted were principally from 1984 and 1991, but other coverage came from the 1940s and 1950s, and even from 1920s oblique shots taken by O.G.S. Crawford (RCHME 1992). It is clear that the complex could have been recognised much sooner.

The 1992 field season was designed to complete initial understanding of the layout and character of the complex (fig. 28). Trenches BB and CC were dug to confirm the layout of enclosure 2. Trench W was started in an attempt to track the perimeter on the edge of the flood plain but was abandoned in the face of terrible wet weather.

In the same 1991/2 surveys more detail of Structure 1 was added, and Structures 2 and 3 were discovered, all within the perimeter of palisade enclosure 2. Further lines were seen on air photos to the south of Structure 2, in uncertain relationship to the perimeter of palisade enclosure 2. Magnetometer survey in 1989 also covered some parts of the interior in the rest of field 3, which have also been subject to aerial survey. So far no other structures or features have been seen within the interior in field 3. Structures 1–3 were sampled by Trenches Y, Z and AA.

The layout of the palisade enclosures: summary (fig. 28)

The form of enclosure 1 as recorded to date is sub-circular. South of the river a double circuit has been traced on the more or less level ground of the terrace in fields 1 and 2. The outer ditch has been traced into the edge of the floodplain meadow on either side of Gunsight Lane. The continuation of the ditches across the valley bottom has yet to be established, though it is normally assumed in this account. It remains to be seen whether the ditch found on more sloping ground north of the river was in fact the only one in that zone. A second, inner ditch north of the river would not alter the perceived form of the enclosure, but a further, outer ditch would give a more circular shape.

Palisade enclosure 2 runs across more or less level ground at the foot of the ridge crowned by the West Kennet long barrow. In the west meadow, the perimeter has been traced near to the edge of the terrace or solifluction lobe which overlooks the Kennet. That terrace grades into the floodplain approximately 150 m east from the last known traces established by the geophysical survey. It is possible that the enclosure was merely butted on the valley edge; or it may have continued along the valley edge to form a complete circuit. It seems very unlikely that it continued across the present course of the Kennet. There is no evidence at all for a double circuit. Enclosure 2 has at least one outer radial ditch, which appears to be connected to a further double circular feature to the south-east.

Only a narrow space separates the two enclosures. One curving radial ditch appears to be butted (on both geophysical and aerial photographic evidence) on both the perimeter of enclosure 2 and the outer perimeter of enclosure 1.

Palisade enclosure 1

The palisade ditches

GENERAL CHARACTER (FIGS 29–41)

In all the cuttings the ditches had been dug through coombe rock, an extremely variable subsoil, from white and yellow to light brown and reddish brown in colour, and containing variable amounts of shattered chalk and flint with occasional small sarsens. Its mixed composition shows up as irregular crop marks on aerial photographs. Underlying the coombe rock at different depths was chalk, into which the base of ditches had been dug in Trenches C, D, F, J, H and O.

The ditches were at least 2 m deep. The inner ditch in Trenches D and F was deeper than this, reaching 2.7 m in Trench F. Depth was variable since the inner ditch in Trench J was only 2 m deep, while the outer ditch in Trench H reached a depth of 2.6 m (and 3.1 m measured to the bottom of its post sockets). The inner ditch was consistently broader than the outer ditch, reaching over 3 m wide in Trenches D and F. The outer ditch in Trenches C, D and G was particularly narrow, being less than 1 m across in its main part. In all the cuttings both ditches had been deliberately backfilled with dug spoil. There was a varied use of sarsen stone as packing in both the outer and inner ditches, there being particularly striking concentrations of large sarsens in the middle and upper parts of the inner ditch in Trenches F and J. Consistently within the deliberate backfill of both ditches was found a more or less continuous row of closely set postpipes. At the base of the ditch in nearly every case there was a socket cut into the natural, usually solid chalk, at the base of the postpipe. These features represent posts which had been set firmly and upright in the ditch and packed with deliberate ditch backfill, and which had then rotted *in situ*. Abundant charcoal fragments, particularly in the inner ditch in Trench D and the outer ditch in Trench H but recurrently in all cuttings except in the somewhat root-disturbed Trench G, suggest that these posts may have been burnt above ground before their decay below ground. Very few flint artefacts were found but regular quantities of animal

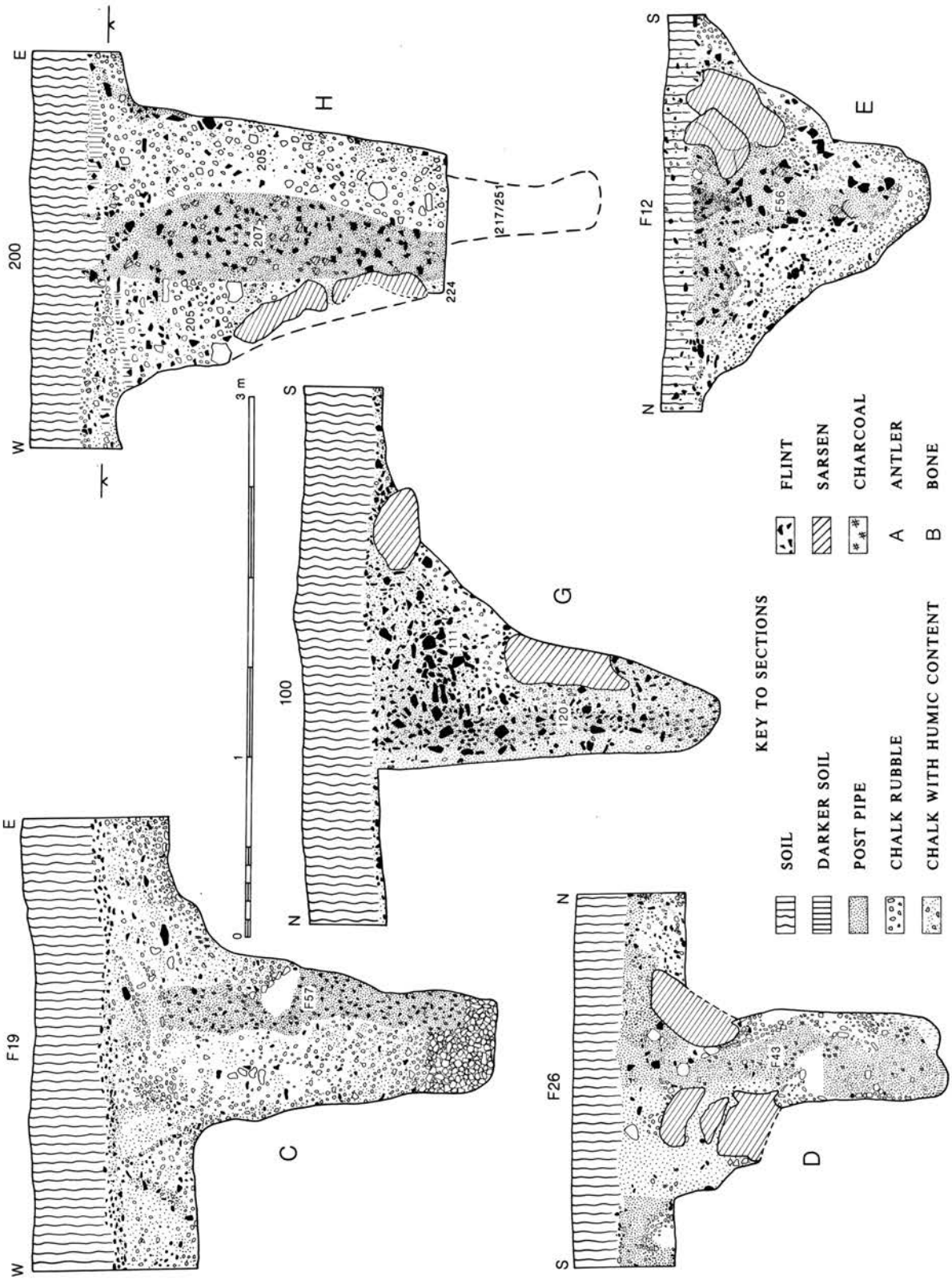

Fig. 29 Sections of the outer ditch of palisade enclosure 1

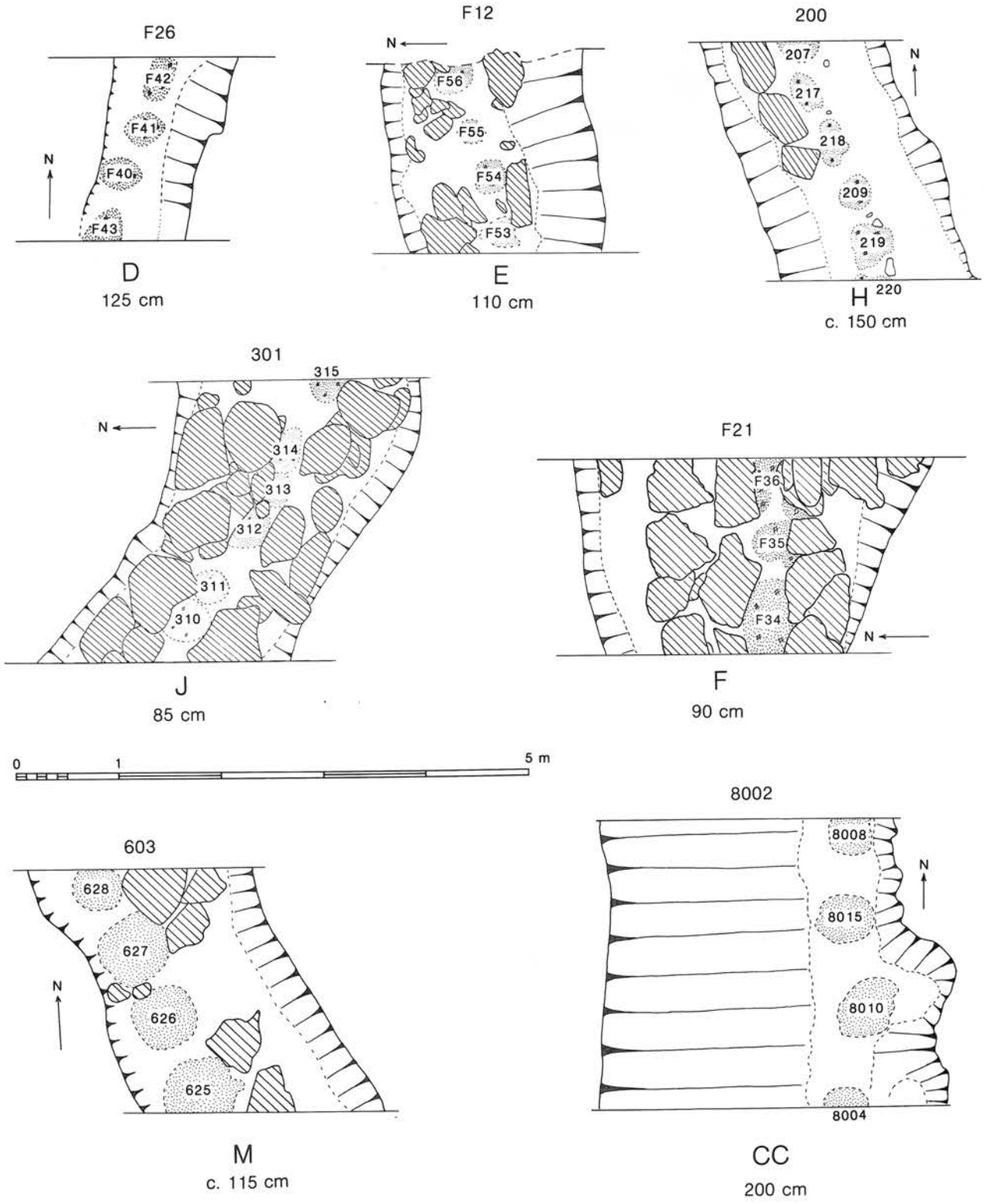

Fig. 30 Plans of selected palisade ditch trenches. D: enclosure 1, outer ditch, at 1.25 m depth; E: enclosure 1, outer ditch at 1.1 m; H: enclosure 1, outer ditch at 1.5 m; J: enclosure 1, inner ditch, at 85 cm; F: enclosure 1, inner ditch, at 90 cm; M: enclosure 2, at 1.15 m; CC: enclosure 2, at 2 m

Fig. 31 The outer ditch of enclosure 1, Trench E, at an early stage of investigation, from the north

Fig. 32 The outer ditch of enclosure 1, Trench E, at an early stage of investigation, from the west

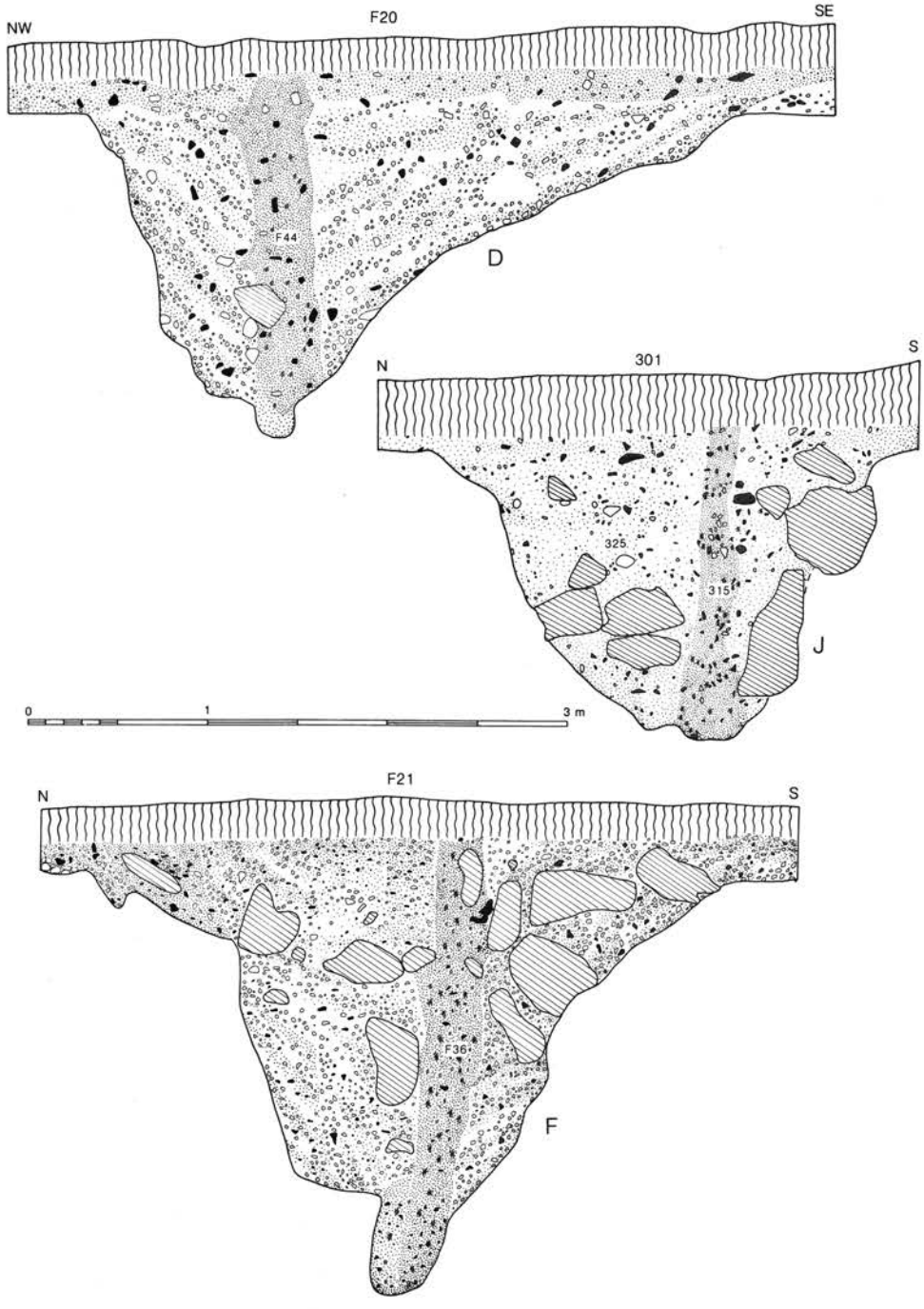

Fig. 33 Sections of the inner ditch of palisade enclosure 1

bone, including burnt and charred pieces, and occasional pieces of antler were recovered. The bone was found mainly at the edge of the postpipes, and occasionally within them; hardly any was found in the backfill of the ditches, but a few antler pieces were so located. Some bone in Trench H had clearly been packed upright immediately adjacent to the posts as backfill was put in around them. The animal bone assemblage was dominated by pig.

The ditch north of the river, as excavated in Trench O, was identical in general characteristics. It was cut through overlying deposits to reach solid chalk. It contained closely set postpipes with charcoal flecking (somewhat root-disturbed), which ended in shallow sockets in the rounded ditch base. There were sarsen packing stones and the fill of the ditch was spoil deliberately thrown back. The shape of the ditch (some 2 m deep from its uppermost sarsens and over 2 m broad with a rounded base) resembles more the inner than the outer ditch south of the river, but it is not possible to be dogmatic; the broader form of the outer ditch in Trench E can be noted as further evidence of variation. To repeat, if Trench O does mark an inner ditch north of the river, then the form of the enclosure would be more circular than sub-circular.

Each of the cuttings of both ditches will be described in turn. (In 1987 feature and layer numbers were given to contexts, but thereafter just context numbers.) The excavated cuttings were usually 2 m wide.

The outer ditch

Trench C (fig. 29). The ditch (F19) was very difficult to locate. Topsoil (layer 1), here about 20 cm thick, and an immediately underlying clayey brown soil (layer 2), also about 20 cm thick, were stripped off the eastern end of Trench C by machine, together with the top of a flinty brown soil, layer 3. Layer 3 can be seen as a lynchet formation. Below it was layer 5, about 40 cm thick, composed of light brown flinty and very chalky soil overlying solid chalk. One seemingly isolated large sarsen was found. Repeated cleanings and a 10 cm spit produced two more sarsens close to the first. These seemed to rest on an undifferentiated chalky soil, but further trowelling around them, on the assumption already proved correct in other trenches that these could be ditch packing stones, eventually showed the light brown, very chalky soil fill of the ditch. This began to contrast with the solid chalk, whose surface, however, was very uneven and had pockets of darker material in it. Within the ditch could be seen the outlines of six individual postpipes, slightly darker than the ditch fill. F19 was not therefore located here until about 80 cm below the present surface. Only a 1.4 m segment of this part of the ditch was excavated, in order to get a proper transverse section.

The ditch was a narrow chalk-cut slot. Its outer edge had been cut in two concave scoops, giving a width range of about 1.3–1.4 m to over 1.75 m. At the base its width tapered to 50–60 cm; this was 1.75–1.85 m below the surface of the solid chalk. If layer 5 can be seen as some sort of coombe rock, the original depth of the ditch may have been at least 2.15–2.25 m. On the west side of the north section it seemed possible to see the edge of the ditch extending a little up into layer 5. The inner edge of the ditch was more or less vertical, and the outer more bowed; but the very topmost part of the inner edge at the south section was strongly scooped inwards. The main fill of the ditch was a very chalky soil with some flints in it. In the lower parts there were large chalk fragments, and in the south section one zone of grey chalk wash with occasional chalk fragments.

The postpipe row F47 contained six postpipes (F48–52, F 57), of which F48, F49, F50 and F57 were excavated. These were from 35–40 cm in diameter at the surface, and the unexcavated F51 was some 45 cm in diameter. Of the four fully observed, F50 retained approximately the same diameter throughout its depth, the others (F49, F48 and F57) being somewhat reduced by the base of the ditch. F48 and F57 merged at the surface to appear as one large postpipe. All the postpipes were basically circular throughout the fill. The posts had been set at intervals of about 5–10 cm at the surface. In this part of the outer ditch the posts appear not to have been set into the ditch base, but to have ended 15–45 cm above the base of the ditch. F50 and F49 were close to the inner edge at the base of the ditch, F48 in the middle, and F57 hard up against the outer edge; the plans suggest either irregular posts or subsequent displacement. The fill of the postpipes was dark soil looser than the main fill, with many small flint fragments and some flint nodules, and some small chalk pieces. All were flecked throughout with small charcoal fragments in consistent quantities.

The three sarsens first observed will have been packing in the upper part of the ditch, if the ditch was originally cut through layer 5. Two more sarsens were found in the south part of the cutting at a depth of about 70 cm below the chalk surface, hard between the outer ditch edge and the main fill.

Some animal bones were found in the fill of the ditch, concentrated in or adjacent to the postpipes. One Romano-British sherd, presumably intrusive, was found at the top of the ditch where first identified, at a depth of approximately 80 cm below the modern surface. An antler beam fragment, no. 462, was found beneath F50 in the chalk rubble fill. It was submitted for dating to the British Museum laboratory but proved to have insufficient collagen for a date.

Trench D (figs 29–30). The ditch (F26) was located with great difficulty, even after the corresponding inner ditch had already been found in the same trench. After machine stripping of topsoil, here 20–25 cm thick, the surface was cleaned several times, and the feature finally located by means of a narrow inspection slot. The difficulty was caused by the chalk subsoil rising here to the surface, and its upper part had been caught by both regular and deeper ploughing, probably including steam ploughing, and considerably mixed. At a depth of about 50 cm below the present surface and only a little above the chalk itself, the ditch edges a little over 1 m apart, the chalky ditch fill, central dark individual postpipes and sarsen packing stones could all begin to be distinguished. A large antler fragment lay on the surface outside the ditch.

The ditch (F26) was a narrow chalk-cut slot, about 1.2 m broad at the top, 40–45 cm broad at the base and 2.05–2.15 m deep. For the most part its inner edge was more or less vertical, though at the east end of the cutting where a small extension was made to get a better cross-section of one of the postpipes (F45), its upper part had been scalloped inwards. The outer edge was bowed. The line of the ditch was visibly curved. Its fill was a variable mixture of brown

soil with small chalk fragments and small flints, light chalky soil and packing of smaller and larger chalk lumps. The east section (not illustrated) shows finer brown soil in the upper fill, with packed chalk lumps in the lower fill. The west section (fig. 29) shows some patches of finer brown soil together with a very chalky soil in the upper fill, and larger chalk fragments down the sides in the lower fill, with some fine grey chalky silt at the base.

Along the centre of the ditch ran a line of postpipes (F39). F39 consisted of five individual postpipes (F40–43, 45). They were approximately 20–25 cm in diameter and set at intervals of about 10 cm in the upper fill, but up to 20 cm at the base of the ditch. The postpipes were seen right through the ditch. The timbers therefore appear to have tapered a little with depth. The postpipes varied in plan. F42 was a slightly elongated oval set longways along the ditch, F41 was sub-circular to lenticular, and F40 was more consistently lenticular, set crossways, conforming to its basal socket. The situation of those in the sections was obscured, the western one (F43) by the necessity for the sake of safety to leave a batter below sarsen packing stones, and the eastern one (F45) because it was only just clipped by the section. F40, F41 and F42, however, all had shallow chalk-cut slots (from 7–25 cm deep below the ditch base) into which the post bases had been let. That of F41 was partly rectilinear in plan. The postpipes themselves had a fill of grey to dark brown fine soil with some small chalk lumps and occasional flint nodules, as well as consistent quantities of small charcoal fragments right down the postpipe fill. There was a substantial void in the fill of both F40 and F43 in the west section at about 1.3 m below the surface.

There were several sarsen packing stones. At the west side of the cutting on either side of F43 there was one high on the inner side and three roughly on top of each other on the outer side. At the east side there were two smaller stones on the inner side midway down the fill, and one small stone in the lower fill, just below the point where F45 disappears into the section.

From the upper fill at a depth of 65 cm, and therefore below the solid chalk subsoil, in the south-west portion of the ditch came a fine oblique ripple-flaked flint arrowhead (fig. 58, 17). Two edges were broken but the object was otherwise in fresh condition. A small thin flint knife (fig. 58, 20) came from the ditch base. There were animal bones, mainly on the edges of or in the postpipes. There was an antler fragment in the fill of F40 and antler fragments were lodged at the junction between the ditch fill and the inner chalk edge of the ditch. An antler beam fragment from F40, and an antler crown fragment from the ditch edge, yielded radiocarbon dates of 2032–1890 BC (BM-2602) and 2317–2142 BC (BM-2597) respectively. Both samples were from the upper part of the feature.

Trench E (fig. 29–32). The ditch (F12) was located after machine stripping of topsoil, here only about 15 cm thick. The ditch appeared as a slightly darker zone with distinct edges, about 2 m apart, contrasting with the yellow to reddish brown flinty coombe rock of the subsoil. In addition, there was a faint narrow central linear zone of darker colour, and four sarsen blocks, in two opposed pairs. A small extension to the east, Trench E1, showed the same features at subsoil level, including one much larger flat sarsen, numbers of flint nodules in the central dark slot and rammed chalk in the presumed ditch fill. The ditch within Trench E was then excavated.

The ditch was V-shaped, cut into flinty coombe rock. It was around 2 m broad at its top, and 1.2–1.45 m below the modern surface. The main fill of the ditch was homogeneous, a light brown to reddish brown flinty soil with some small chalk lumps, distinguishable in places from the subsoil only by slightly looser texture and slightly darker colour.

The central dark linear zone was the palisade line (F23), which had a consistently dark colour, with visible charcoal fragments, a looser texture incorporating flint nodules, and some animal bones and fragments in it. Its width varied in the upper part of the ditch, but it was generally around 10–20 cm wide, appearing at its broadest between the sarsen pairs. Its upper part did not show clearly in section (fig. 29). Around 50 cm deep there were small voids in the feature. From a depth of about 75 cm below the modern surface, individual postpipes began to be definable within F23, and from 95 cm to the base of the ditch there were four well-defined such features (F53–56), with much less or no intervening dark stain. The postpipes had very dark loose soil, concentrated charcoal and a noticeable concentration of small to fist-sized flint nodules. They were more or less circular, about 25 cm in diameter, and there was a space of 15–25 cm between them. The west section of the trench just clipped the outer edge of F53, which was the least well defined in plan and did not quite reach to the base of the ditch like the others. The other postpipes ended a little before the base of the ditch, and under F56 was seen a small lens of rather different fine, dark, humic soil, above fill immediately above the ditch base.

Flanking F23 were some 22 sarsen packing stones. These were arranged in three approximate levels or courses, and were seemingly grouped in two main concentrations to flank F53 and F54, and F55 and F56 respectively. Some of the stones were small, particularly the lowest ones, but others were substantial; S2 for example was over 50 cm broad, and stood upright some 73 cm high.

Some animal bone and a little struck flint including a substantial flake scraper were found in the fill of the ditch. The bone was recovered in or on the edge of the line of postpipes.

Trench G (fig. 29; pl. 22). The ditch (100) was located from aerial photographs and uncovered by machine stripping of 20 cm of topsoil and 20 cm of loose upper subsoil. The ditch first showed as a dark mark against brown, very flinty subsoil, with sarsens aligned within it. The upper outer edge of the ditch was hard to define; although not cut into chalk the lower sides of the ditch became chalkier and easier to define. Being close to the hedge of Gunsight Lane, there were many roots in the ditch fill.

The ditch was 1.5–1.6 m broad, and about 2.3 m deep to the base of the post sockets (approximately 1.7 m deep to the floor of the ditch). The inner edge was near vertical and even, the outer edge convex and irregular, producing a narrow lower half. The fill (111 subdivided as 143–147) was varied brown, flinty to very flinty soil with some chalk fragments, becoming lighter brown and chalkier with depth. A postpipe row (101) was seen intermittently throughout the fill, but was much root-disturbed and was clearest in section. Five

individual postpipes (120–124) were roughly defined and were seen in the inner side of the ditch at upper levels. As in other cuttings these were distinguished by dark, fine soil and some charcoal fragments, but were much more diffuse than normal because of root action. Their shape and details of spacing could not therefore adequately be traced in the body of the fill. However, from the floor of the ditch continued five deep post sockets (141–145). These were sharply cut but of varied shapes. 141–144 were sub-circular, while 145 was an elongated oval, though it ended like the others in a more or less rounded base. Most were 40–60 cm across; 145 reached 80 cm on its long axis. As in other cuttings the sockets were closely spaced (10–15 cm between their edges) and here they were only about 20 cm from the steep inner edge of the ditch.

Some 26 sarsens provided additional packing for the posts, arranged in three rough courses. At the top and in the middle of the ditch there were stones on either side of the line of postpipes, while in the narrowing lower part of the ditch there was a line of substantial sarsens on the outer side, lodged firmly between posts and the outer edge of the ditch. The bases of these rested on or nearly on the floor of the ditch.

A little animal bone was recovered from the fill of the ditch. In lower levels it was possible to record that the bone came from the edges of postpipes. There was a little antler, one piece from the lower fill and two from the edges of postpipes. A bone sample from postpipe 123 yielded a radiocarbon date of 2563–2347 BC (CAR-1293).

Trench H (figs 29–30; pls 20–21). The ditch (200) was located from aerial photographs and uncovered by machine stripping of 20–25 cm of topsoil and up to 20 cm of loose upper subsoil. The ditch showed from this depth as a slightly darker stain against whitish to grey rather chalky subsoil. The edges of the ditch were a little darker than the body of the fill; this may be the result of root penetration or differential drying. With a little further cleaning a more or less central, irregular dark stain could be seen, suggesting a line of postpipes (201); one part had fallen in leaving a substantial cavity (in postpipe 209).

The ditch was 1.7–1.8 m wide with straight, well-defined upper edges. It was some 2.3–2.6 m deep to a rather irregular ditch floor, from which post sockets continued on to a depth of up to 3.1 m. Both sides of the ditch were steep, the inner a little more so than the outer; the inward slope of the sides reduced the width at the floor of the ditch to 80 cm and less. The subsoil became solid chalk only at a depth of 3 m. The fill (205) was tightly packed whitish to yellow chalk silt and chalk lumps, becoming sandier and gravelly between the postpipe line and the outer edge at lower levels (224). Two sarsens were incorporated in the upper fill, and in the middle to lower fill there were four sarsens in two courses rammed against the outer edge of the ditch in the northern part of the cutting.

The central postpipe line (201) contained five postpipes (207, 217, 218, 209 and 219) with a sixth just visible in the south section (220). Their fine, dark, charcoal-rich fills contrasted sharply with the ditch backfill. At certain levels, 217 and 218, and 219 and 220 merged into two larger features, but mostly the line consisted of separate circular to sub-circular postpipes 30–40 cm in diameter, spaced quite regularly at intervals of 10–15 cm. The postpipes retained a more or less constant diameter with depth; 207 in the north section (fig. 29) appears to taper largely because of a slight batter to the section. 207 and 220 were not traced right to their bases because of batter in the sections, but the others continued into substantial sockets cut from the floor of the ditch. 217 and 218 were let into well-cut but irregular sockets (251 and 252) about 45 cm long, while 209 and 219 shared one large squarish socket (253) about 70 cm square. There was quite a lot of animal bone, all from the edge of or within the postpipes. In upper levels, especially in the cases of 207, 217 and 218 bones were found right on the edge of the postpipes, not in the main body of their fills. A few bones were found upright, in this location, and there was a little burnt bone. A piece of antler with skull attached was found halfway down the ditch in the main fill. There was a very little struck flint. Several small Grooved Ware sherds were found at lower levels, including a simple plain rim, a flat rim with fingernail and impressed decoration and a possible flat base sherd (fig. 60).

Two bone samples from around postpipes 217–9 and around postpipes 219–220 yielded radiocarbon dates of 2457–2197 BC (CAR-1289) and 2466–2280 (CAR-1290) respectively.

Trench P. The ditch was located by extrapolation and trenching (in a cutting only 1 m wide) in the south edge of the Kennet floodplain meadow west of Gunsight Lane. When flinty soil up to 40 cm thick had been removed the outer ditch was defined within the chalky, flinty subsoil exposed, as an area of slightly looser chalk and some light grey soil with two distinct grey, circular postpipes, which contained charcoal flecks. The feature was not further examined, and no other certain archaeological features were recognised in the trench.

Trench N. The ditch (713) was located by extrapolation from aerial photographs and uncovered by a 1 m wide extension to the east side of Trench N. The ditch was recognised under 20 cm of flinty topsoil as an area of loose chalky fill approximately 2 m wide contrasting with the more chalky subsoil. Its edges were angled across the trench, continuing the line seen on aerial photographs. Only the upper 50 cm of the fill were excavated. Within the fill below the defined surface were visible two circular postpipes (715 and 716) about 30 cm in diameter, which had a grey silty fill and contained charcoal flecks. A piece of antler was found in the ditch fill. The ditch lay about 4.5 m east of the natural channel investigated in the main part of Trench N. The feature was not further examined.

The inner ditch

Trench D (figs 33–35). The inner ditch (F20) was located relatively easily, its outer edge being 18 m inside the inner edge of the outer ditch F26. After machine removal of topsoil, here 15–20 cm thick, the edges of F20 were seen as roughly parallel dark stains in the dirty yellow flinty chalk gravel or coombe rock subsoil, though it was difficult otherwise to distinguish the ditch fill. An initial 10 cm spit heightened the contrast between the increasingly pale subsoil and the light brown to brown fill of the ditch. The ditch was seen to run obliquely across the cutting, the inner edge being sinuous. Two modest sarsens were found within the ditch fill, one close to the inner, the other close to the outer edge. There

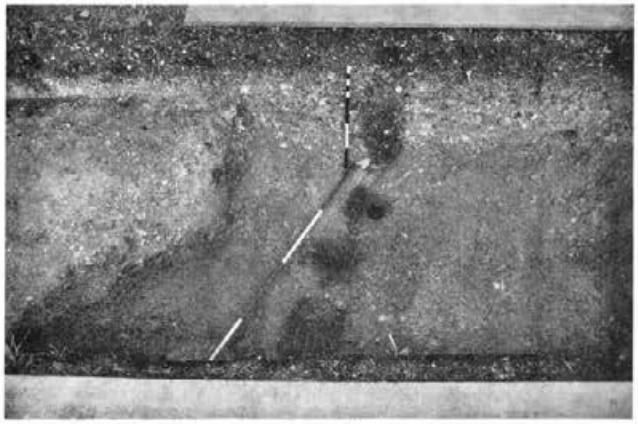

Fig. 34 The inner ditch of enclosure 1 in Trench D during excavation, from the west

was a little dark staining close to the inner one. This proved to be the uppermost sign of a palisade within the ditch.

The ditch (F20) was about 3.5 m broad (the recorded sections are slightly oblique). The inner, more sinuous edge was steep, the outer edge convex, and its upper part gently sloping. The base of the ditch was about 70–90 cm wide, at a depth of 1.8–2 m. Further slots were cut from this base and reached a maximum depth of 2.45 m. The ditch was cut through flinty coombe rock, and only at the base of the ditch was the underlying chalk subsoil met. The main fill of the ditch was brown to light brown soil with small chalk fragments and occasional flint fragments and nodules. The edges of the ditch, particularly the outer one, were regularly hard to distinguish from the subsoil, but the fill was consistently looser. Two small lenses of chalk fragments were seen near the upper part of the outer edge. The uppermost fill in the top 10 cm was perceptibly darker brown than the rest of the fill. In the western part of the cutting was a substantial block of rammed chalk fragments (F33).

Within the ditch was found a row of closely set postpipes (F22). There were five or six postpipes (F27–29, F37/38, F44). These emerged gradually as the top of the ditch was excavated. At a depth of 40 cm below the present surface, F22 could be seen as a dark stain, 25–30 cm broad, running parallel to the inner edge of the ditch from the east section two thirds of the way across the cutting; individual postpipes could not yet be seen, but F33 was already visible and seemed to sit across the further line of F22. By a depth of 65 cm F22 could be seen right across the cutting. Individual postpipes could begin to be discerned, with charcoal fragments frequent in their loose fill of fine dark soil. Charcoal was found throughout their fills in consistent quantities, and was particularly marked in F29 and F37/F38 from 65 cm to 1.2 m deep. There was not yet any space between the individual postpipes, and F37 and F38 were at first recognised only as a single large postpipe F30, and only as two separate ones at a depth of 80 cm, at which depth F44 could be distinguished from F37/38. The row continued as a continuous line to a depth of 1.2 m. Flint nodules were concentrated in and around F29 and F30 at a depth of 65 cm, and charcoal remained abundant throughout the postpipe fills. Animal bone including burnt pieces and fragments was found, almost exclusively from in or on the edge of the postpipes. At 65 cm the diameters of the postpipes ranged from 35–45 cm, and this persisted with minor variation at increasing depth. By 1.2 m deep, spaces up to 15 cm were visible between the postpipes. At this point F28 and F29 were still 40–45 cm in diameter, although F37 and F38 were now visible again only as a single postpipe 33 cm in diameter. It is possible therefore that twin posts were inserted into the same socket. In plan F37/F38 was roughly circular, while F28 and F29 were oval to D-shaped. By 1.65 m deep, the size of F29 had shrunk to a maximum diameter of 25 cm and its fill was less dark, but that of the others retained a dark colour and charcoal fragments, though with some lighter material at the edges of the postpipes. In plan the features were oval to sub-circular. At the base of the ditch at 1.8–2 m deep, the postpipes continued into post sockets cut into the chalk subsoil. These were oval to sub-circular in plan, and 30–35 cm deep, except for that of F28, which was neatly rectangular, 50 by 35 cm in plan and about 45 cm deep. The socket of F27 was not seen because of batter on the section. This also explains why the lower part only of F28 is visible in the west section.

Further packing for the posts was provided by sarsens and rammed chalk. At the very top of the ditch at its outer edges were the two sarsens already described, the inner one straddling the edge of F22 in the area of F44 and F30. In the western portion of the cutting, F33 was a substantial block of rammed chalk blocks and fragments, welded together into an almost single whole, roughly circular in plan and about 80 cm across, and reaching from near the top of the ditch fill

Fig. 35 The excavated inner ditch of enclosure 1 in Trench D, showing basal sockets and the west section

to a depth of 1.7 m below the present surface. The bulk of it lay between F27 and F28 and the inner edge of the ditch, though a small portion was also found on the outer side of F27 at the top of the ditch. Within this could be seen behind the section line a sarsen stone of unknown overall size. At the base of F33 and at the point where the postpipe of F27 stops in the west section, there was another modest sarsen packing stone. A similar one was found about two thirds of the way down the inner edge of F44 in the east section.

There was a little struck flint. Amongst the finds of burnt and unburnt animal bone from the postpipes was a very fresh red deer antler tine, from the fill of F37/F38 between 1.2 and 1.4 m deep. This was submitted to the British Museum C14 laboratory but had insufficient collagen for a date.

Trench F (figs 30, 33; pl. 23). The ditch (F21) was extremely hard to locate. When topsoil, here 20 cm thick, was stripped off by machine, the only features at first visible in the very compacted and dry surface of the brown to light brown flinty chalk gravel or coombe rock subsoil were F15 and F14, later features described below. A darker area, F16, towards the northern end of the trench, was suspected of being the ditch but was soon proved to be only a surface discoloration. Rain then showed up a slightly darker stain, about 30 cm across, extending from side to side of the cutting, next to F15. An inspection slot and then an initial 20 cm spit rapidly showed this feature (F31) to continue. It also revealed another 30 cm broad dark linear stain parallel to it 1–1.3 m to the north (F32), and a further narrow dark stain 30 cm more to the north (F63). Also seen from immediately below the surface of the subsoil were the tops of several sarsens, which were set both amongst and outside the linear dark stains. This concentration of features proved to be the inner ditch (F21). F31 proved to be the major post row within it; F32 was much shallower and restricted to the top of F21. The sarsens as in other ditches were packing stones, but were to be joined by many others, in a startling concentration. The actual edges of the upper part of the ditch proved hard to find since ditch fill and subsoil were very similar. As eventually defined, the outer edge of F21 was 27.5–28 m inside the inner edge of F12, the outer ditch in Trench E.

The ditch was 3.4 m broad to the east, narrowing to 2.6 m broad to the west. The ditch was U-shaped with steep sides, slightly less steep on the outer side. The upper parts of both sides, especially in the east section, were markedly shallower and more splayed. The ditch narrowed to a width of approximately 80 cm-1 m at a depth of 2.2–2.4 m, but the basal angle of the south side could not quite fully be excavated because of the danger from large sarsens in the sections. By contrast the upper north side was overcut to provide access and an exit for the removal of sarsens. To this depth much of the ditch had been cut through flinty chalky coombe rock, though through more solid but still clayey chalk on the north side from a depth of 50–70 cm. From 2.2–2.4 m deep, solid chalk was found across the base of the ditch, and into this to a maximum depth overall of 2.75 m had been cut sockets for the bases of the postpipes of F31. The main fill of F21 was a brown, sticky, chalky soil with plenty of small flint fragments and nodules. The inner and lower parts of the east section were chalkier, with small compressed and well mixed pieces of chalk. In the west section, the fill of the upper inner side was distinguished from the outer by lighter brown colour. The lower fill on the inner side in the west section had a high concentration of small chalk pieces and blocks mixed in with the clayey brown soil matrix.

The postpipe row F31 consisted of three substantial postpipes (F34–36). These were seen from the top of the ditch down to the basal sockets cut in the base of the ditch. With the quantity of large sarsens in the fill, it was necessary progressively to batter the sections (apart from shoring), and the sections therefore give an oblique cut through both F34 and F36. In plan the features were first distinguished individually at a depth of 65–75 cm, but neither F34 nor F36 were as clearly defined as some of those in other cuttings. None of the three retained exactly constant measurements at different depths. F34 was oval, fully 70–80 cm long by approximately 50 cm wide in the upper fill, but might in fact represent two posts, despite the size of its socket There was a gap at upper levels of about 20 cm between F34 and F35. F35 and F36 merged in plan at certain depths, but F35 was roughly circular with a diameter of about 45 cm and F36 an oval over 50 cm long by 40–50 cm wide. F36 may also represent two postpipes. The clearest sign of this was seen at a depth of 90 cm; differentiation had gone again by a depth of 1 m. The section shows a minor disconformity at this point, and because of the batter on the section the basal socket is some distance out from the top of the section edge. It is likely therefore again that the section in fact shows two postpipes. The upper fill of all three features was fine dark compact soil with charcoal fragments. The lower half of the fills was a much looser (though in places sticky and clayey) greyer fill, with some quantity of orange stained small flint nodules and pieces; charcoal fragments were still present right to the base of the sockets. The basal socket of F36 was cut 55 cm into the chalk at the base of the ditch at 2.2 m, giving an overall depth of 2.75 m. That of F35, close to that of F36 as in the postpipe fills above, was 40 cm deep. That of F34 was cut 25 cm into the chalk from a depth of 2.4 m, giving an overall depth of 2.65 m. In plan these sockets were again oval but with the long axis at right angles to that of the postpipes in the fill above. That of F35 was 60 by 40 cm; the parts of the others which were visible inside the battered sections suggest similar dimensions, though that of F36 was probably a little smaller, perhaps 50 by 30 cm.

There were many sarsen packing stones. These were concentrated in the upper and middle parts of the fill, down to a depth of about 1.6 m, and were set from the sides of the ditch right up to the edges of F31. 32 stones were found, in three rough courses or levels, though there was much interleaving. Many of the stones were substantial. S6 in the west section was 73 cm long by 30 cm thick; others were thicker, such as S16, which was 45 cm thick. Others seen in plan such as S12 and S18 were up to 90 cm long. There were also much smaller stones. None of the stones had been altered, except for a large flake which had been detached from the corner of S28. The flake was recovered and refitted. This massive conjoin suggests that the largest stones were tumbled into the ditch. While charcoal as in other cuttings was almost entirely confined to the fill of the post row, it was found in small quantities directly under S13 and S18.

F63 marked the inner edge of the ditch, and was barely visible in section even in the uppermost fill. F32 was a linear

Fig. 36 Feature (emerging under temporary bridge) identified as the continuation of the inner ditch of enclosure 1, observed during a watching brief on pipeline operations in 1989. For location see fig. 28

feature across the inner edge of the ditch. It ranged from 20–40 cm wide, and reached a maximum visible depth of about 30 cm below the surface of the subsoil. Roughly U-shaped in section in the west section, it was barely distinguishable in the east section, other than as a slightly browner zone, because it was obscured by S1. Its fill was brown soil with some flint nodules. No individual features could be distinguished within it. This might represent a minor fence or post line.

There was a very little struck flint. One small grass-tempered sherd of post-Roman type was found in the fill of F36 at a depth of 70 cm. A few finds of unburnt and burnt animal bone were recovered from the fill of the postpipes. One piece of antler was found in the top of the subsoil beyond the outer edge of the ditch.

Trench J (figs 30, 33; pl. 24). The ditch (301) was found by extrapolation and uncovered by machine stripping. Some 30 cm of topsoil were removed to reveal a band very slightly darker than the light brown to yellowy brown subsoil, here rather gritty. A little further cleaning produced the tops of four sarsen stones and a thin central dark stain. The curved edges of the ditch were well defined.

The ditch was 1.9–2 m broad and 2 m deep. It was U-shaped but the sides of the ditch were very hard precisely to define because of the similarity of the fill and subsoil. The lowest part of the ditch was cut into dirty sandy chalk. The fill (325) was a gritty brown gravel with small flints and chalk fragments.

As in other cuttings the upper central dark stain resolved itself into a row of postpipes (309) by a depth of 80 cm. There were six postpipes (310–315), and a seventh was partially seen in the west section (364). The postpipes were circular to sub-circular, around 30–40 cm across; the more elongated 312 was up to 50 cm along its long axis. Their fill was a dark to dark grey, fine, rather greasy soil, with abundant charcoal flecks, especially in 311 and 312. 313 and 314 were difficult to trace separately in the region of the lower sarsen packing stones. The space between the postpipes varied. 310 and 311 formed an almost adjacent pair; 312–314 were almost touching; and there were gaps of up to 30 cm between 311 and 312, and between 314 and 315. The postpipes did not appear to be tapered with depth. They continued into sub-circular to oval sockets set along the centre of the ditch (378–383). 380–383 (corresponding to 312–315) were only up to 15 cm deep, but 378 and 379 were 30 and 35 cm deep respectively. The sockets were a little wider than the postpipes, and their spacing was a little more regular, with 380 further from 381 than the relative positions of 312 and 313 would have suggested.

There were 63 sarsen packing stones in four rough courses from the upper fill down to near the base of the ditch. These were distributed more or less evenly on either side of the row of postpipes. About half the stones were of substantial size, up to 1 m in maximum dimension; some were only 15–20 cm. The stones were tightly packed, but did not appear to have been carefully laid.

There was a little animal bone, including some burnt pieces, from the edge of or within the postpipes. Several antler pieces were found in the main fill, well down. One cordoned Grooved Ware sherd was found in postpipe 313, at a depth of 1.8 m (fig. 60, 3). A bone sample from postpipes 311, 313, 314 and 315 yielded a radiocarbon date of 2464–2207 BC (CAR-1291).

1989 watching brief. In the position marked on fig. 28 a ditch-like feature was partially observed (with difficulty under a temporary bridge) in the section of a freshly cut pipe trench (fig. 36). This was up to 2 m deep and at least 3 m broad, and had a dark fill including substantial sarsens. It is presumed that this was the inner ditch, the continuation of that seen in Trench J.

The ditch north of the Kennet

The 1989 evaluation in the West Kennet Farm *(Roland Smith)*

In 1988–89 Marlborough Homes Ltd applied to Kennet District Council for permission to redevelop West Kennet Farm and environs (part of which lay within the scheduled area of the West Kennet Avenue) as an hotel and conference centre. In February 1989 the developers commissioned the Trust for Wessex Archaeology to assess the archaeological potential of 1.44 ha of the farm precinct itself, some 44 percent of the total application area. The application was subsequently called in and refused, after a public enquiry. Full details of the assessment are to be found in the evaluation report (Wessex Archaeology 1989).

The area was examined by 11 narrow trenches, which covered approximately 4.5 percent of the assessment area (fig. 37). In addition, 14 boreholes were hand-augered adjacent to the Kennet in the area of TWA/Trench H. Nine trenches were machine-dug, while TWA/Trench J and TWA/Trench H were dug by hand. The machine trenches were excavated using a 2 m grading bucket under archaeological supervision to the base of the overburden (which was found in variable depths across the site) and to the top of the subsoil deposits, and then investigated by hand.

The evaluation located the palisade enclosure ditch in five trenches (TWA/F, G, J, E and A), thus over an arc some 100 m long, but the feature was not further examined apart from superficial inspection slots in TWA/Trenches A and F (for subsequent investigation in 1990 west of the farm precinct, see Trench O, below). TWA/Trench H on the

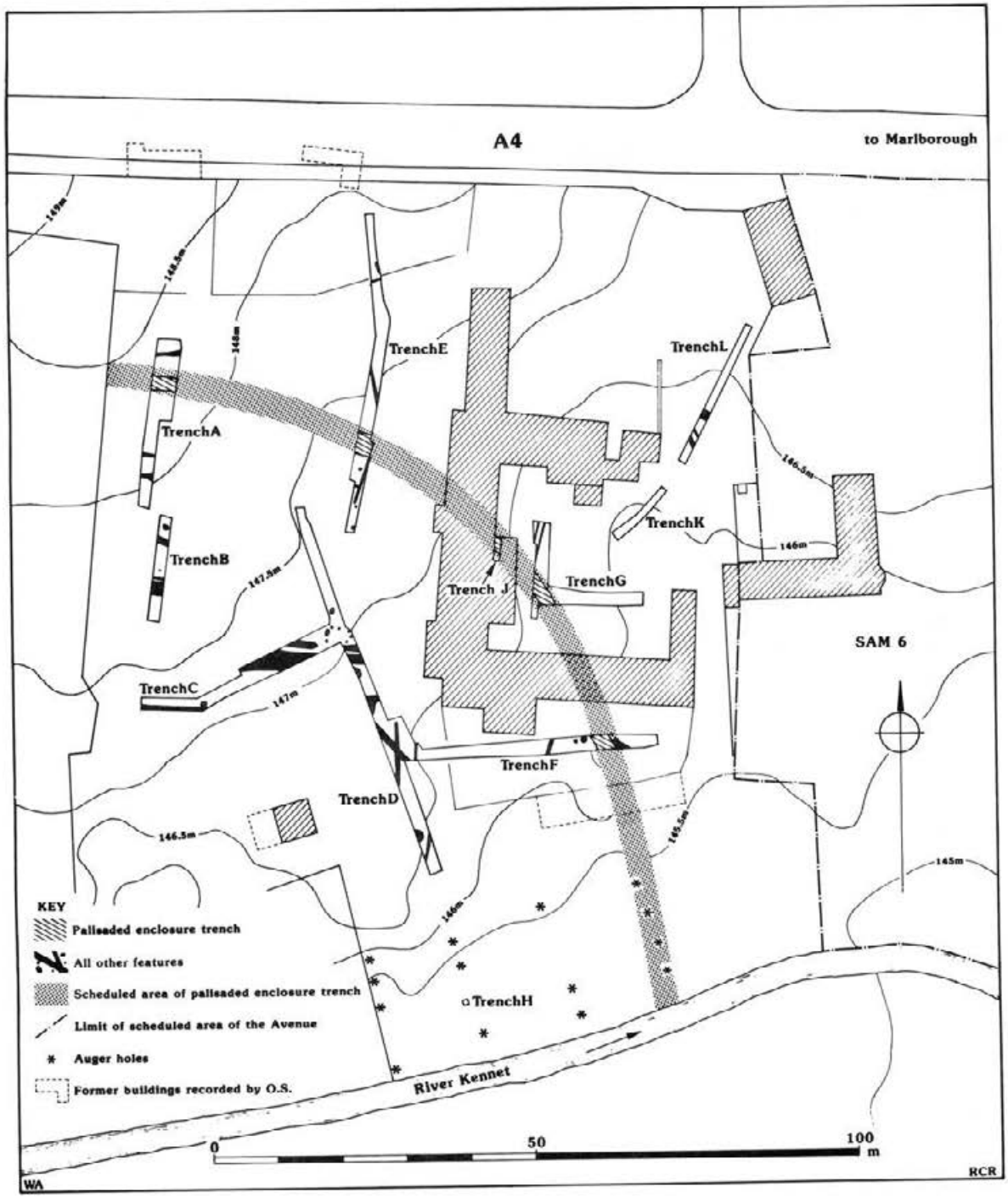

Fig. 37 Plan of the 1989 evaluation by the Trust for Wessex Archaeology in the West Kennet Farm. Plan prepared and supplied by Wessex Archaeology

floodplain of the Kennet identified a buried land surface sealed by alluvial deposits; its date is uncertain, but may be Saxon or medieval. A series of linear ditches were recorded, five containing medieval pottery, which are probably plot or property boundaries associated with the medieval settlement of West Kennet. There were a number of associated postholes. The foundations for post-medieval structures were also identified, which probably relate to earlier farm buildings and outhouses associated with the existing farmhouse. The post-Neolithic features will be published in due course with the rest of the post-Neolithic evidence. The valley evidence is noted also below.

The subsoil here generally consisted of gravel comprising loose, small rounded chalk fragments and moderate quantities of flint. In TWA/Trenches A, B and E, this chalky material was sealed by a deposit of brown silty clay with some flint inclusions. This brown clay also infilled isolated solution features within the chalky gravel deposits. Sarsen also occurred in the subsoil.

TWA/Trench A (figs 38–9). Several sarsens were found beneath 50 cm of overburden, within the fill of a broad linear feature (90), nearly 4 m broad. Its upper fill (155) consisted of a pale brown silty clay with chalk inclusions. A narrow section, 70 cm wide by 40 cm deep, showed further sarsens

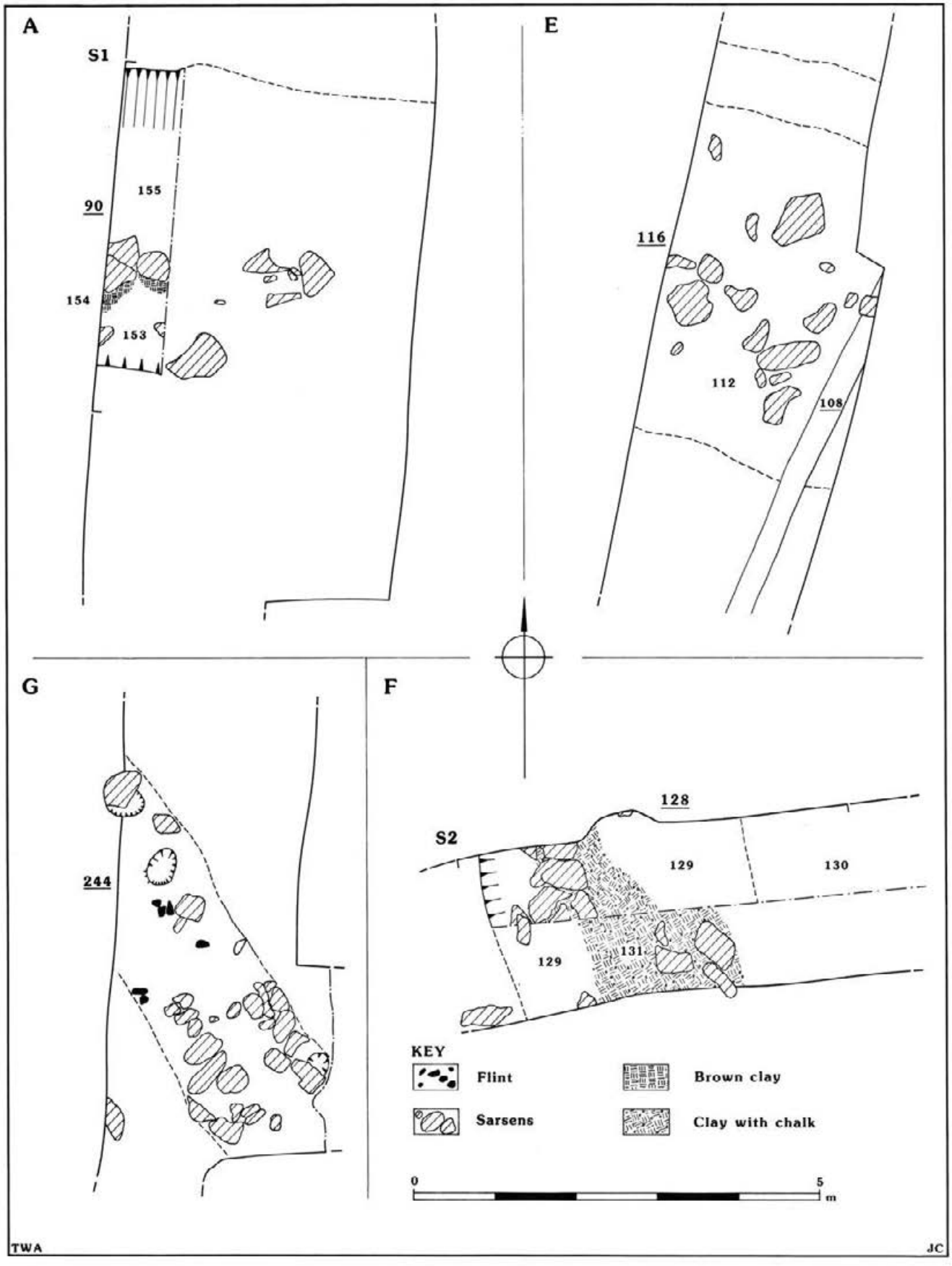

Fig. 38 Plans of the palisade ditch in TWA Trenches A, E, G and H. Figure prepared and supplied by Wessex Archaeology

Fig. 39 Sections of the minimal investigation of the palisade ditch in TWA Trenches A and F. Figure prepared and supplied by Wessex Archaeology

and defined better the edges of the feature, the outer sloping and the inner near-vertical. Also seen in plan and section was an area of homogeneous brown clay (154), which may represent the infill of a postpipe. From the surface of 155 came one fragment of fired clay, one fragment of burnt flint and two worked flints.

TWA/Trench E (fig. 38). Below 45 cm of overburden sarsens were found in the fill of feature 116, which was almost identical to feature 90 in 1989/Trench A, and presumed to be the enclosure ditch. An area of darker soil amongst the sarsen may represent the upper part of a postpipe.

TWA/Trench J. A number of sarsens (179) were exposed below a puddled chalk floor. The southern edge of this feature was poorly defined, and the northern edge lay outside the trench. The feature was at least 2.2 m broad, with an upper fill of grey brown silty clay. One of the sarsens was butted by the lowest course of the adjacent barn wall. The sarsens are presumed to be part of the enclosure ditch, as above.

TWA/Trench G (fig. 38; pl. 25). The subsoil lay below a shallow build-up of brick, flint cobbling and puddled chalk surfaces. There was a dense concentration of sarsens (224) in a chalky matrix across the cutting. It was difficult further to define the feature, which was at least 1.8 m wide, and any associated fill. There was no further excavation.

TWA/Trench F (figs 38–39; pl. 26). A concentration of sarsens was found within a grey chalk and clay matrix (131) that was itself within the very chalky fill (129) of a broad though imprecisely defined feature (128). A 1 m wide section was excavated through the top of 128 along the northern edge of the cutting. More sarsens were seen. The western (i.e. inner) edge of 128 was very steep, but the eastern edge (i.e. outer) was more shallow. A few fragments of animal bone were found in the upper fill (129).

1990 AND 1992 INVESTIGATIONS

Trench O (figs 40–41; pls 27–28). Following the line indicated by the 1989 evaluation a trench was cut by hand in 1990 in the paddock immediately to the west of the West Kennet Farm (defined here as the east paddock with reference to Gunsight Lane). Thin turf and topsoil 15–20 cm thick was underlain by a grey soil with some small flints and occasional chalk fragments (804). The ditch (802) was first recognised by sarsen stones protruding from the lower part of 804. Further cleaning showed that these had been disturbed by a shallow, later ditch (of presumed medieval date) which ran obliquely through the middle of the cutting (803). Postpipes were found below the level of this disturbance and could be recognised in section. The upper edges of the

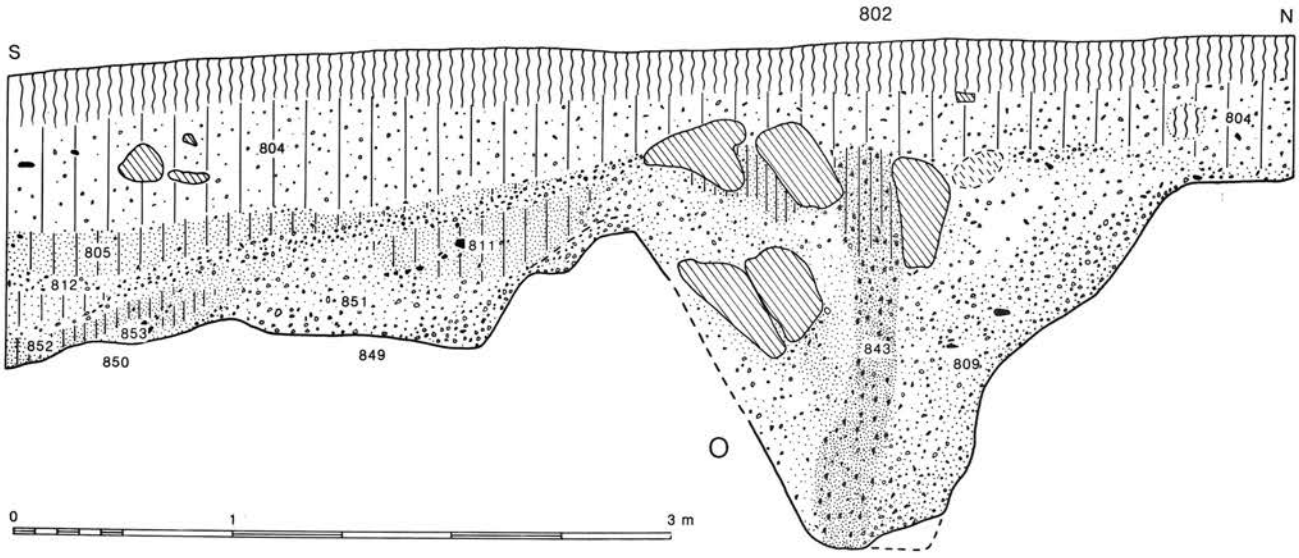

Fig. 40 Section of the palisade ditch north of the Kennet in Trench O, showing the west section and basal sockets

ditch, especially the northern, outer one, were hard to define as the fill of the ditch was so similar to the brown gravelly subsoil. The base of the ditch was cut into slightly sandy chalk. The ditch appears to have been placed on a surface sloping strongly to the south. This surface contained other features and was overlain by other deposits. The small investigation of this area is described separately below.

The ditch was almost 2 m deep measured from the top of the upper sarsens, and perhaps 2.5 m broad at its top, but the precise edges were hard to define. The profile was bell-shaped, the outer side perhaps less steep than the inner. The fill was a light brown chalky gravel, more or less uniform throughout (809). Centrally within this, the line of postpipes (813) consisted of five postpipes (843–847). These were more or less circular, about 25–30 cm in diameter, and fairly regularly spaced at intervals of about 10 cm. Their fill was brown to grey brown, fine, slightly clayey soil with charcoal flecking and some small flints and chalk fragments. The upper parts were somewhat disturbed by roots. The postpipes continued into shallow chalk-cut sockets, only 10–15 cm deep. These (854–858) were circular to sub-circular (and little bigger than the postpipes), but 857 corresponding to postpipe 846 was irregular and elongated, with its long axis set transversely across the ditch.

27 sarsen packing stones were set in three rough courses on either side of the row of postpipes, in the upper and middle fill. Some were modest in size, but many were up to 50–70 cm; the largest, in the top course, was 90 by 70 cm. The uppermost sarsens protruded into the covering layer 804.

Trench U. In 1992 the opportunity arose to search for the continuation of the palisade enclosure ditch to the west of Gunsight Lane north of the river. The west paddock slopes from north to south. Within living memory there were cottages fronting the lane, with barns behind; there are still sheds on the west side. Geophysical survey did not seem likely to be profitable. An evaluation trench (Trench U) approximately 2 m wide was cut for some 50 m down the centre of this ground, avoiding the most obvious cottage foundations. The upper surface was carefully cleaned. Several footings and floors of recent buildings were observed. No certain sign of the palisade enclosure was recorded. The possibility cannot be excluded that one or more of these features has obscured the palisade circuit, but that would be most likely in the central part of Trench U. Assuming a slight curvature in the line from Trench O, the palisade circuit could have been expected in the southern end of Trench U, where cobbling rather than foundations were found. It is therefore most likely that the line of the palisade circuit seen in Trench O continued to the south-west, curving sufficiently not to be seen in Trench U. If the continuation of the line seen in Trench O passed to the south of Trench U, it may be significant that no other palisade feature was found in Trench U; the line at Trench O may have been either a single circuit or the outer perimeter if the circuit was a double one.

In approximately the northern third of Trench U, a brown flinty, clayey soil was found overlying the gravel subsoil. This could be either a natural mantling or the result of cultivation. It was cut through to check that no feature underlay it. It remains possible that a palisade feature could pass in the undug ground between the north, top end of Trench U and the A4, a stretch of some 20 m. Any future evaluation will have to take account of the surface masking.

Interior features

Possible features recorded by the Vatchers within the arc of

Fig. 41 The excavated palisade ditch in Trench O, showing the west section and basal sockets

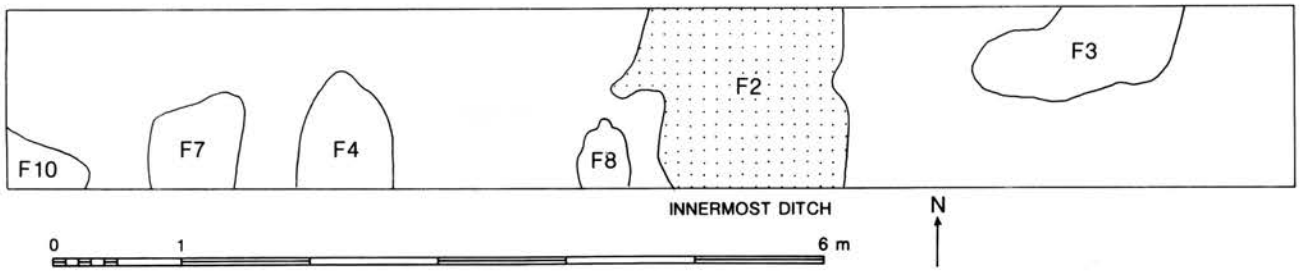

Fig. 42 Summary plan of features in Trench B

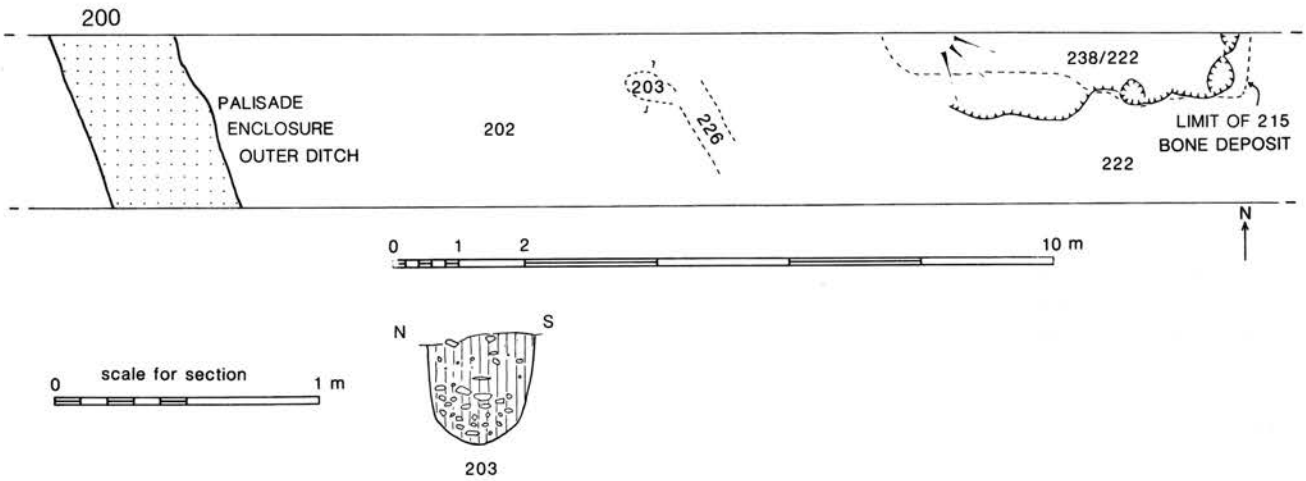

Fig. 43 Summary plan of features in Trench H, and section of 203

the ditches, in the form of scoops and hollows, have already been noted. Further features were recorded in the following trenches. Not all are certainly archaeological, and some if archaeological may be later than the enclosure.

Trench A. F5 was 50 cm in diameter and 10 cm deep, with a uniform fill of loose dark soil. In it were set one sarsen and two flint nodules. These appeared to be bedded in the subsoil, but the feature could represent a posthole. There was no dating evidence.

Trench B (fig. 42). F3 was a dark oval feature about 1.5 m by 50–60 cm with a fill of loose dark soil, but it was only about 5 cm deep. At its west end there was a deeper hole 16 cm deep. Close to this there was a concentration of four animal scapulae, four small sarsen fragments, some charcoal and a cordoned sherd and three plain sherds, from Grooved Ware vessels (fig. 60, 2).

F8 was a small dark feature with a maximum depth of 10 cm and width of 30 cm. F4 was a shallow oval feature 70 cm broad and at least 90 cm long. Within it were a small sarsen and a small flint nodule. Mostly 5 cm deep, the western part reached 10 cm deep. F7 and F10 were similar features, partially uncovered in the trench. Their status is uncertain.

Trench C. F18 was a kidney-shaped depression only 30 cm deep with a mid to dark brown very flinty soil fill. It was seen in layer 5, and extended into the south section of Trench C, and was at least 1.5 m long. It lay a little to the west or inside of the inner edge of the outer ditch F19. This may only be a tree hole, and there were no finds.

Trench D. There was a row of five postpipes, F58–62, spread evenly over 3 m at approximately right angles to the inner edge of the outer ditch F26, the closest being 30 cm from the ditch edge. These were cut into the subsoil of flinty chalky soil and had a fill of fine brown soil. They were approximately 15 cm in diameter and 20 cm deep.

Trench F. F15 was a very shallow oval feature (1 m by 50 cm) with a hard, fine dark grey fill, found overlying the inner ditch F21.

F14 consisted of two parallel lines of very fine hard brown soil, which could be traced through the subsoil of the south end of the trench. The lines were about 30–40 cm broad, and ran obliquely south-east to north-west through the cutting about 1.2–1.5 m apart. In section the northern line was U-shaped, about 20 cm deep, and its fine brown fill contained large quantities of crushed and struck black flint flakes and blocks. This line clips the very southern edge of F21 in its west section, where the concentration of flint was partly visible in section. The relationship is not clear, but F14 is presumably later. It is curious that the top of the feature was so visible in the otherwise hard and compacted surface of the subsoil in Trench F. This may be a very recent feature and on this basis its flint has not been analysed below, but its non-alignment with the field edge is odd.

Trench H (fig. 43; pls 29–31). Trench H was extended 17 m to the east of the outer ditch. Several features and finds

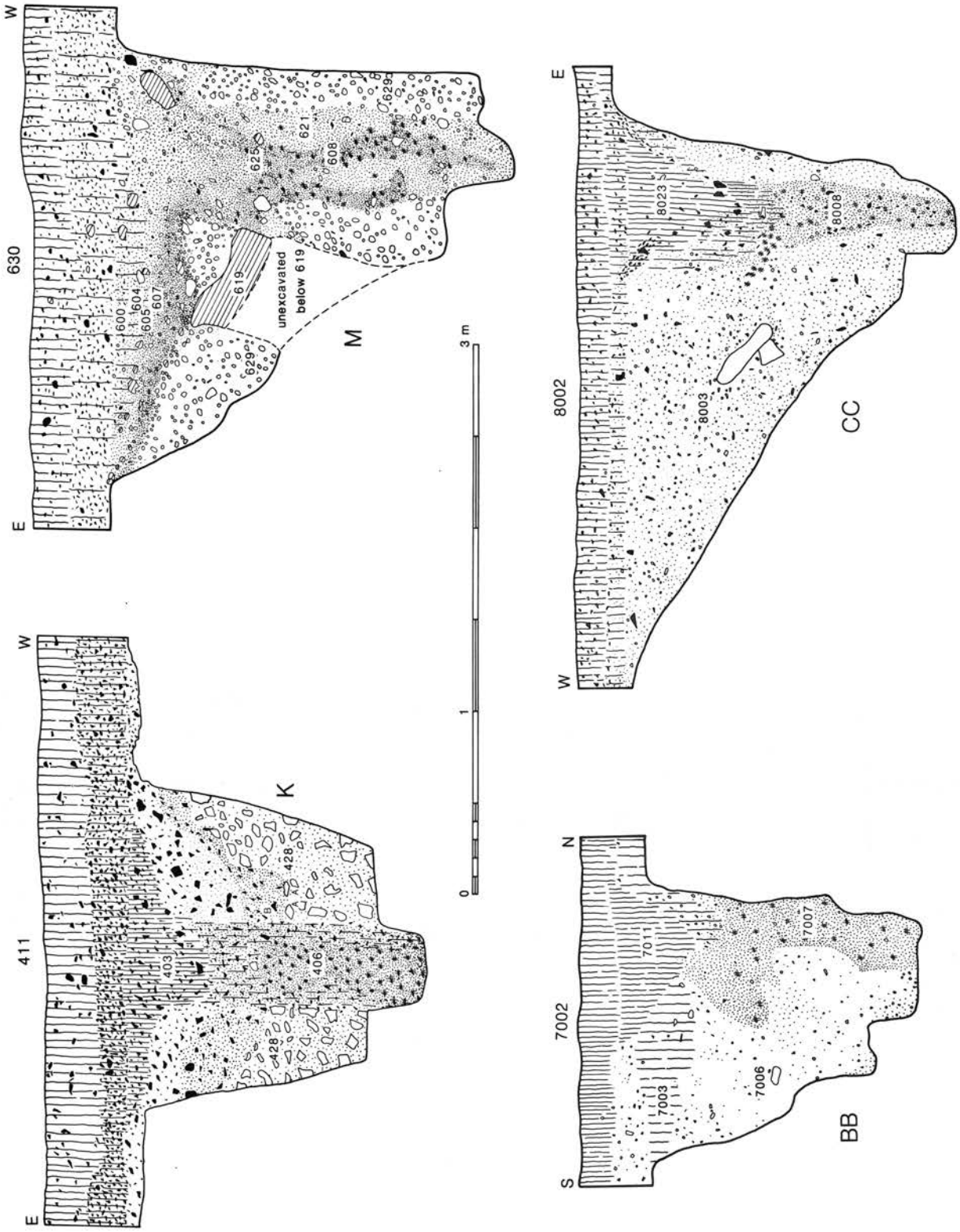

Fig. 44 Sections of the palisade ditch of enclosure 2

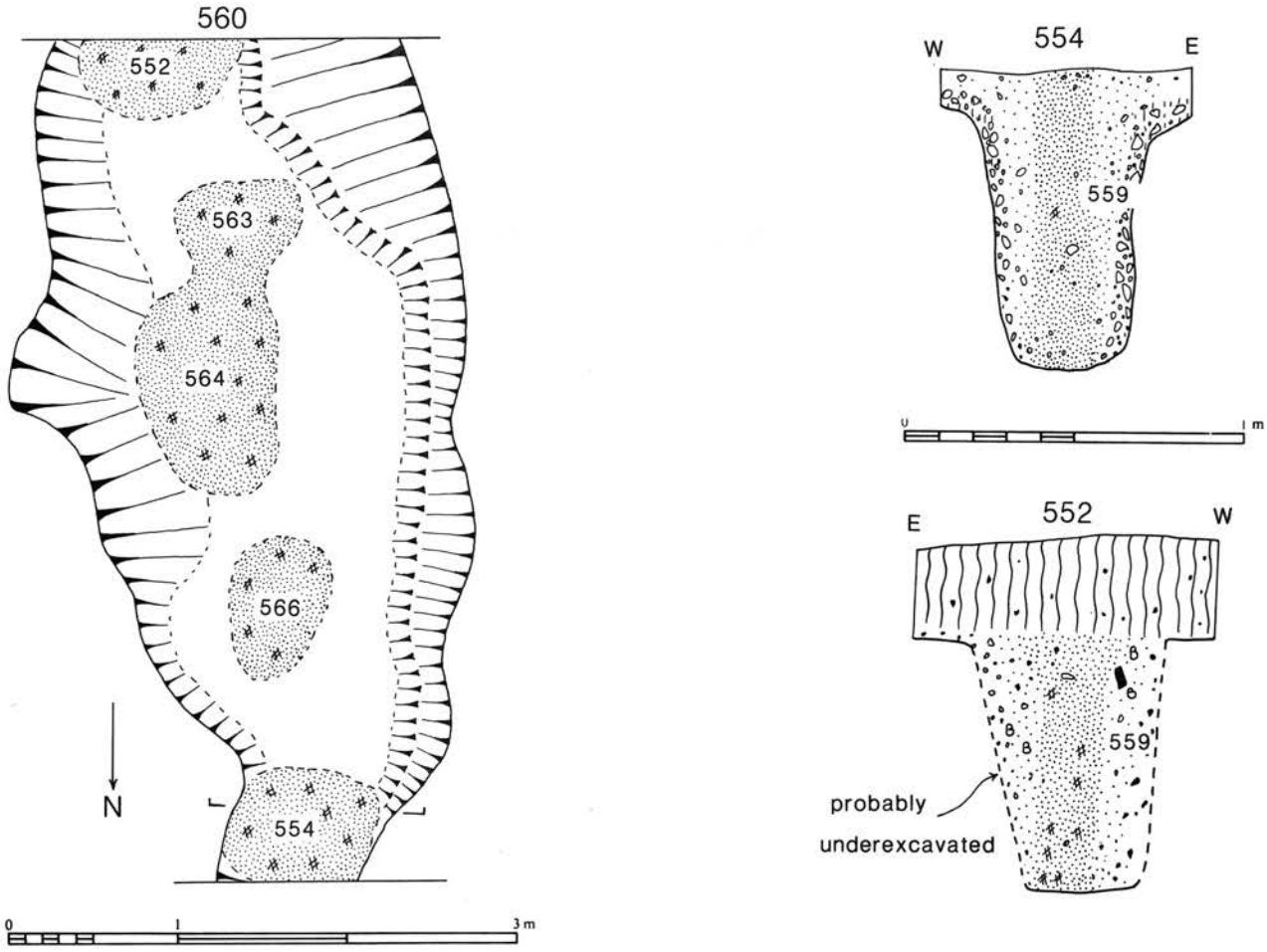

Fig. 45 Plan (at c. 50 cm depth) and sections of outer radial ditch 1, in Trench S

Fig. 46 Pipeline trench in field 1 observed in 1989 watching brief, showing possible radial ditch. For location see fig. 28

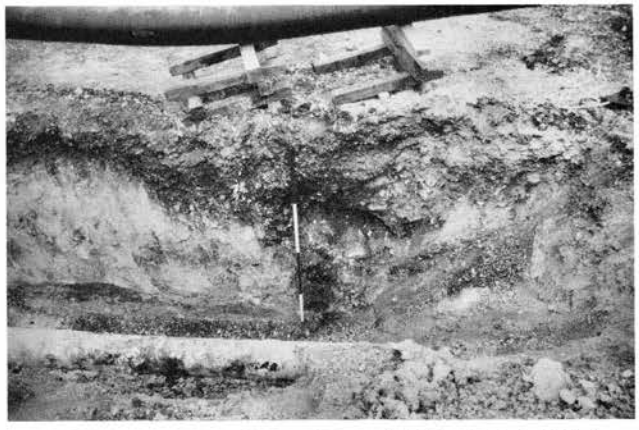

Fig. 47 Closer view of possible radial ditch in field 1 (see fig. 46)

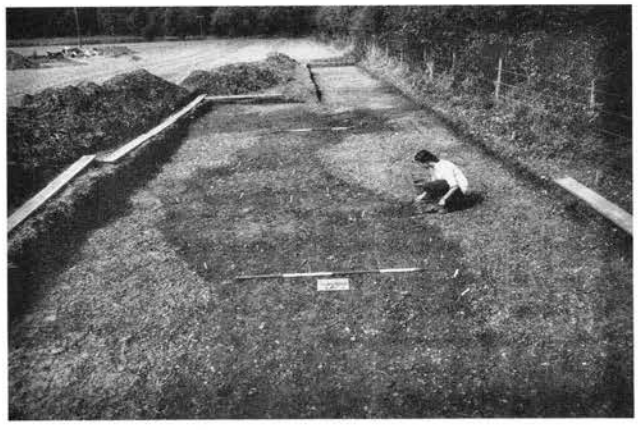

Fig. 48 The inner ditch of Structure 1 within enclosure 2, in Trench Y, at an early stage of excavation, from the south

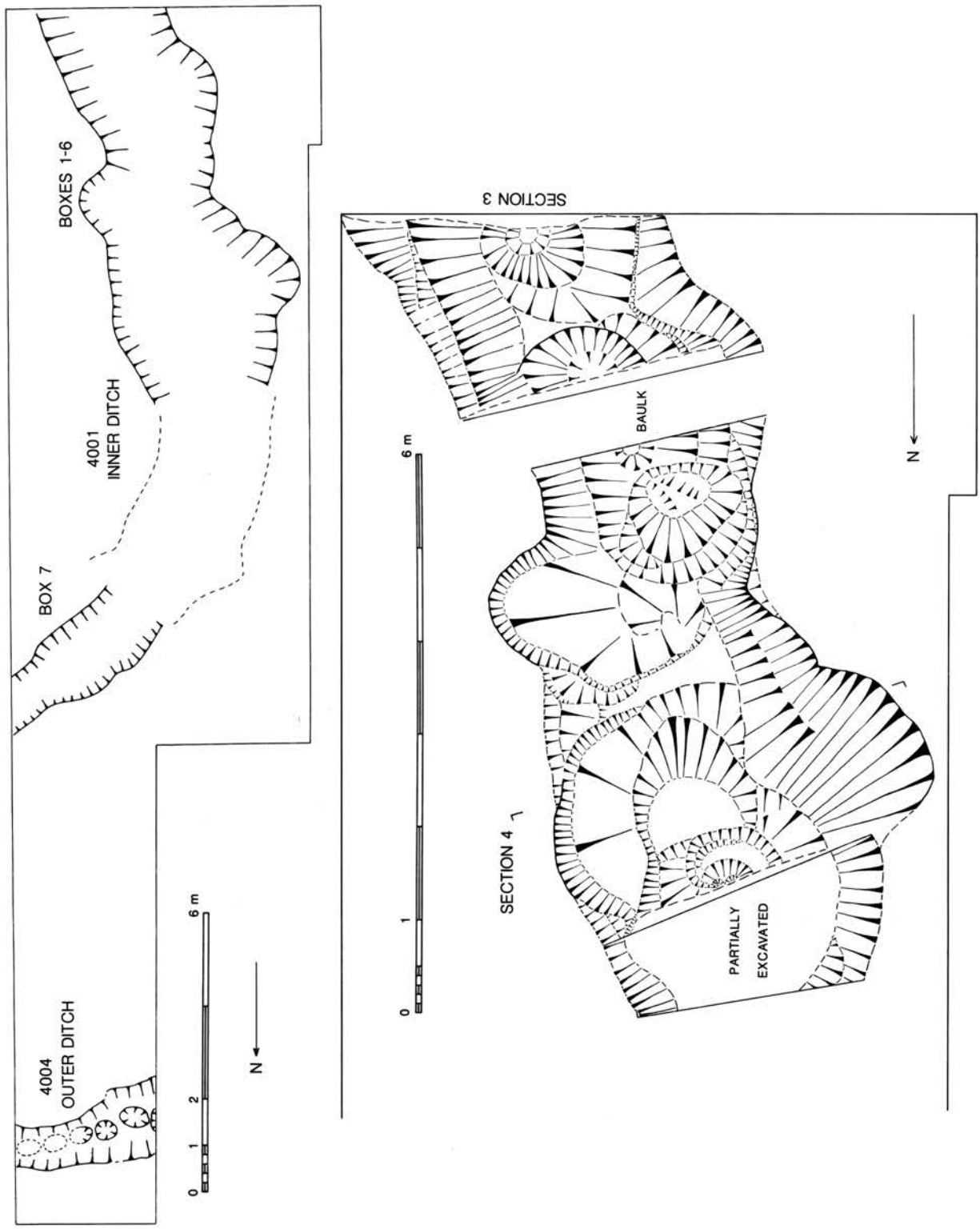

Fig. 49 (Top) Summary plan of Structure 1 within enclosure 2, in Trench Y; (below) detailed plan of the excavated inner ditch in Boxes 1–6

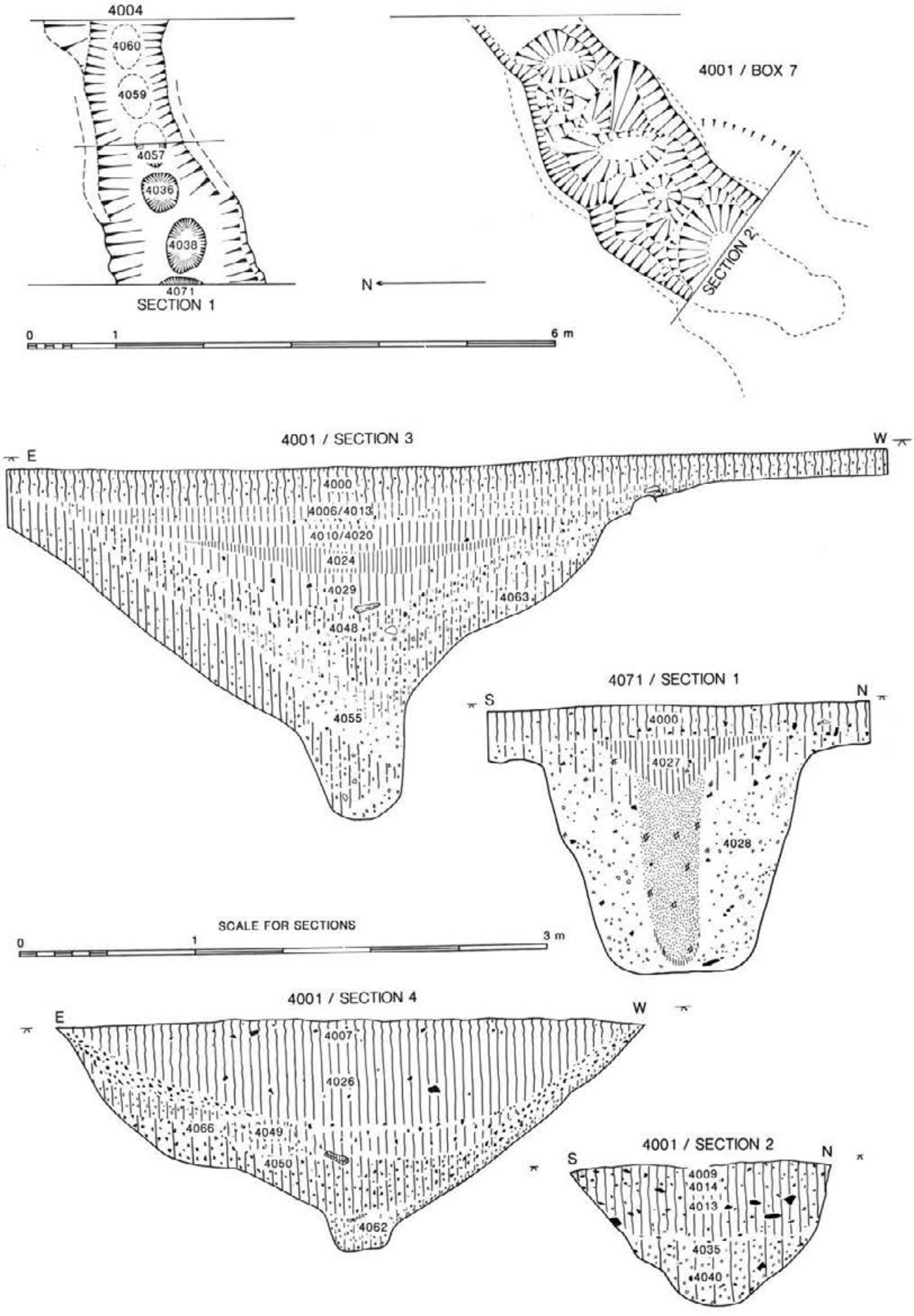

Fig. 50 Structure 1 within enclosure 2, in Trench Y: (top) detailed plans of the outer ditch, and the inner ditch in Box 7; (below) section 1 across the outer ditch and sections 2–4 across the inner ditch

were recorded. The subsoil was characteristically varied, rather chalky close to the outer ditch but more gritty to the east; between these ends the soil was dark, with irregular flints and some chalk fragments (202).

203 was a small oval pit (50 by 60 cm, 35 cm deep) cut into 202. It had a black ashy fill, with some animal bone on its surface. Its edges were not easily defined. It had two sherds of decorated Grooved Ware (fig. 60, 8a–b). Running from this to the south-east was 226, a dark stain up to 30 cm broad but little more than a centimetre or two thick and easily trowelled away. There was some animal bone on and in the surface of 202. In the more gritty surface of the subsoil in the eastern part of the trench (244 and 250–251) were found several pieces of antler and bone. Three areas of softer, stone-free soil were found (243, 252–253). There was a little struck flint in 252 and 253 but the stone-free soil quickly gave way to very flinty subsoil and no definite edges could be defined. These must be tree holes or other irregularities.

Over the eastern 9 m of this varied surface, merging irregularly with 202, was laid a chalky layer up to 10 cm thick (222, 238). This was rather varied, with chalk silt, actual chalk blocks and some soil, whitish-grey overall when dry but pale yellow to brown when wet. This was quite different to the subsoil seen under it and around the outer ditch at the west end of Trench H, and to that seen in Trench J or in Trench M (a cutting across enclosure 2 at the same end of the field). There was some animal bone.

The upper surface of 222 was basically flat, but on the northern side of the cutting a hollow was formed by a slight rise in its surface on the west and by an actual depression in the top of 244. The laid chalk layer was thus here slight dished (here 238). Above this was a dark flinty layer (223) about 5 cm thick. This had one sherd of Grooved Ware. Above this was a mass of animal bone in a matrix of dark soil with some small flints (215). As exposed, this covered an area of about 2 by 1 m. The deposit was up to 15 cm thick at its centre, but there was no discernible layering within it. It consisted of a confused mass of disarticulated and broken bone, some much decayed. Several sherds of decorated Grooved Ware were recovered, and there were plain body sherds. Some almost completely disintegrated sherds were also found, presumably in the same very friable fabric; it was not possible to lift these. The animal bone was predominantly of pig. Two bone samples yielded radiocarbon dates of 2026–1785 BC (CAR-1296) and 1961–1756 BC (CAR-1297) respectively.

The top of 215 lay only 30 cm below the modern surface. Above it (as over the rest of the trench) lay about 10 cm of very flinty soil and 20 cm of topsoil. 215 was recognised in machine stripping of Trench H. It is possible that a little of the deposit was so lost, but the operation was carefully monitored, and it is certain that 215 was a finite feature. It continues into the north section of Trench H.

Trench J. To the south of the inner ditch a small concentration of animal bone and sarsen pieces with some charcoal fragments (300) was observed on the surface of the subsoil but not excavated.

Trench O (fig. 40; pl. 27). The sloping natural surface south of the palisade ditch is capped by a very flinty layer (812). This was presumably cut by the palisade ditch but the junction was unclear because of the uniformity of the flinty gravel. Underlying 812 was 811, a brown silty-clayey, largely stone-free layer, above further gravel. In the natural gravel was a shallow, sub-circular feature without finds (849, with fill 851), probably a tree hollow. In the south end of the trench and continuing into the section, also cut into the natural gravel, was 850, perhaps circular, with a fill of brown soil above more flinty soil (852–853). This had a little struck flint. Its relationship with the palisade ditch cannot be determined. As 812 is disturbed above it, 850 could have been cut through 812, at any date before the formation of 805.

Above 812, 805 was further brown, largely stone-free soil, beneath 804 (described above).

Trench U. From approximately the central portion of Trench U into its lower part there was a discontinuous series of features of probably recent date. Apart from a stone and brick wall there were rafts of chalk, sand and tile, and areas of flinty cobbling. These can be seen as the foundations of barns and pens. None of the features was more than superficially excavated.

1989 watching brief. In the north section of the 1989 pipe trench immediately west of Gunsight Lane a broad, shallow scoop about 3 m long was seen in the surface of the subsoil, with a fill of dark soil about 20 cm thick. No finds were observed.

Palisade enclosure 2

The palisade ditch

GENERAL CHARACTER (FIGS 30, 44; PLS 32–34)

The palisade ditch was identical in general character to those of enclosure 1, comprising again backfilled ditch with basal sockets, and closely spaced postpipes. Most of the postpipes were of larger diameter than in enclosure 1.

Trench M (figs 30, 44; pl. 33). The palisade ditch (630) was located from aerial photographs and magnetometer survey, and investigated by a cutting just over 2 m wide. Topsoil about 20 cm thick and a further 20 cm of flinty subsoil were machined off to reveal the dark stripe of the ditch within the subsoil of flinty and chalky coombe rock (which became progressively chalky with depth). No other certain features were seen.

The ditch was approximately 1.8 m wide and 2.4 m deep to its main base; post sockets reached a depth of 2.6 m. The

Fig. 51 The inner ditch of Structure 2 within enclosure 2 in Trench Z, defined at an early stage of excavation, from the north

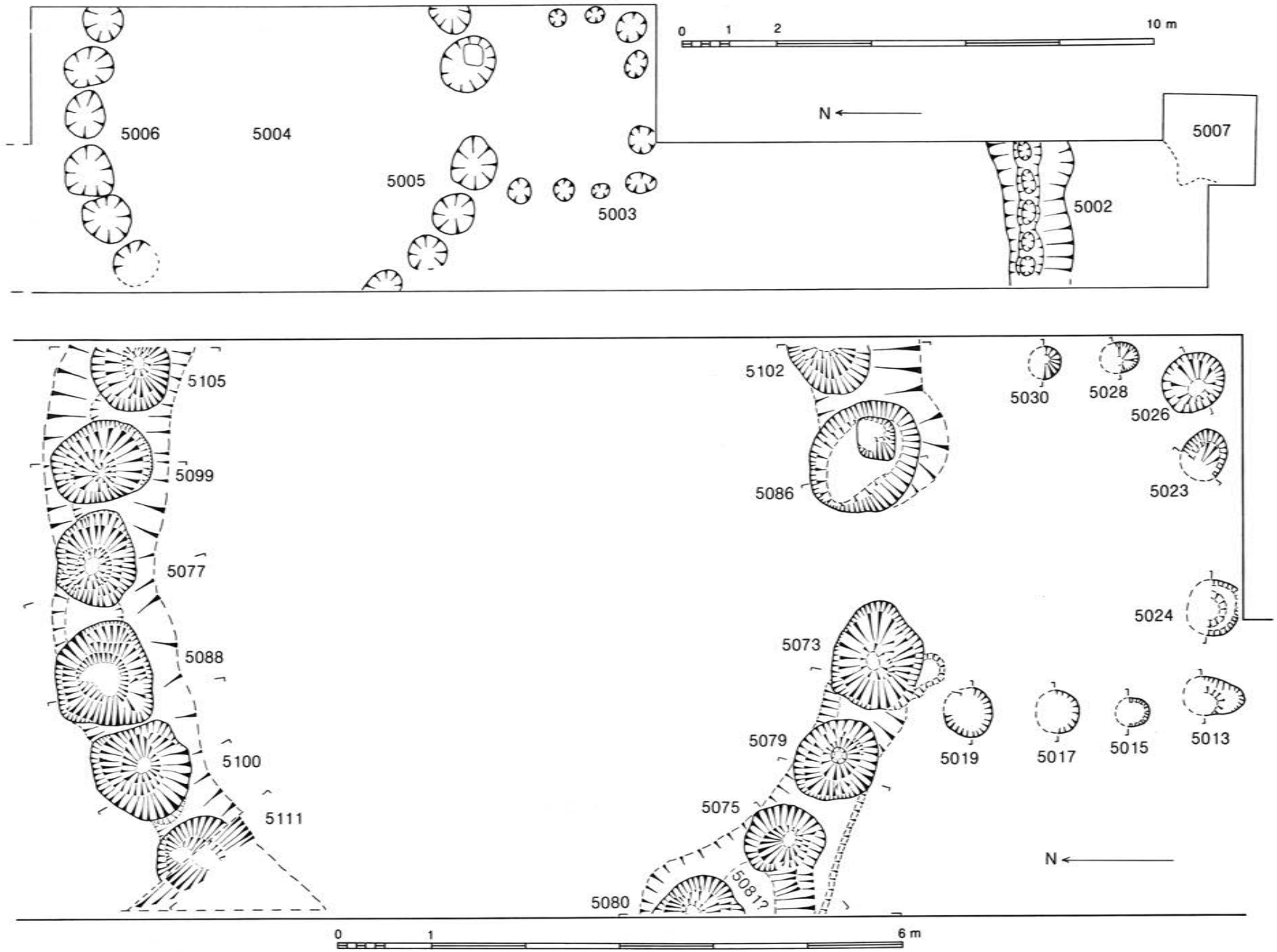

Fig. 52 (Top) Summary plan of Structure 2 within enclosure 2, in Trench Z; (below) plan of the inner ring and context 5003

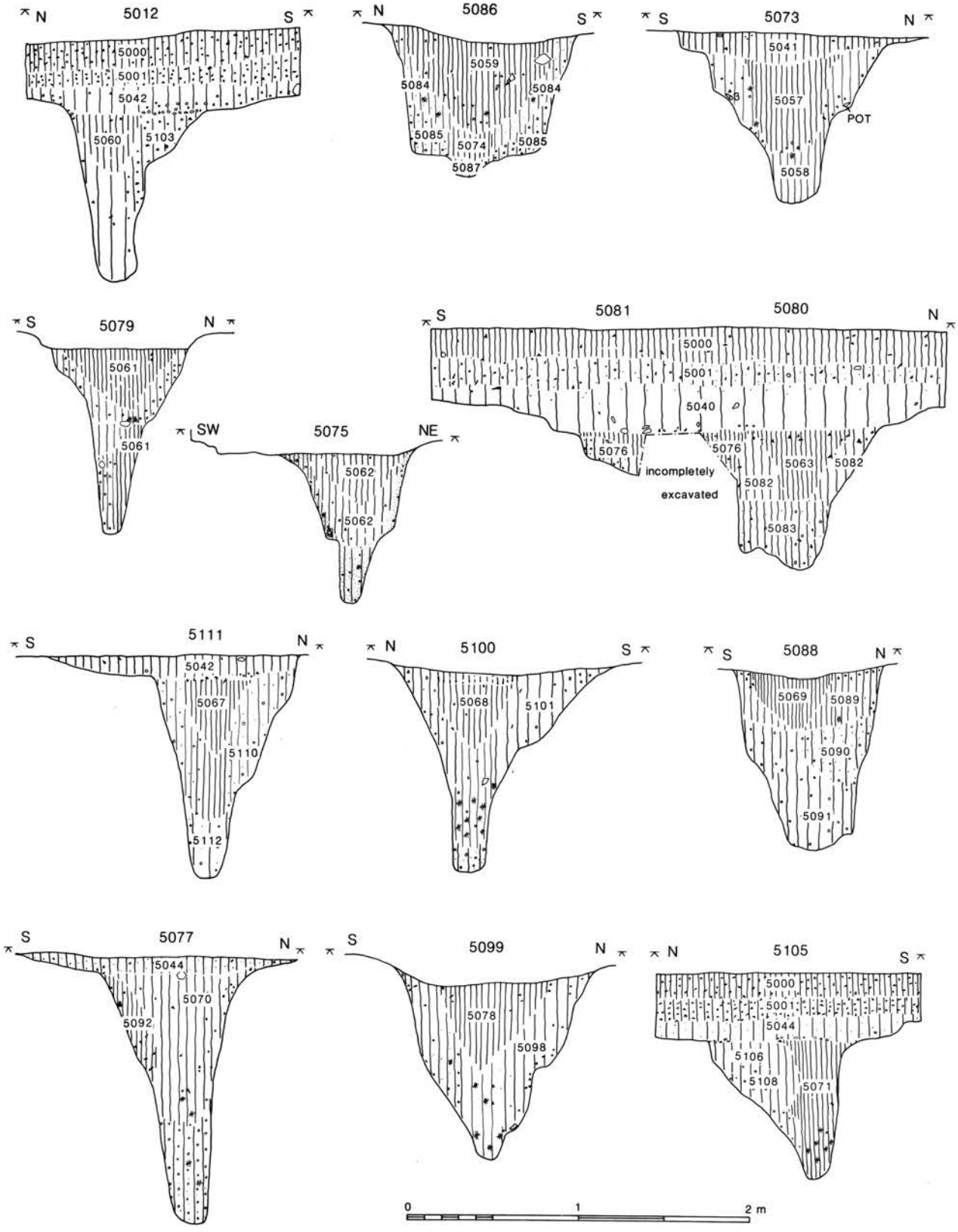

Fig. 53 Sections of the postpits of the inner ring of Structure 2 within enclosure 2, in Trench Z

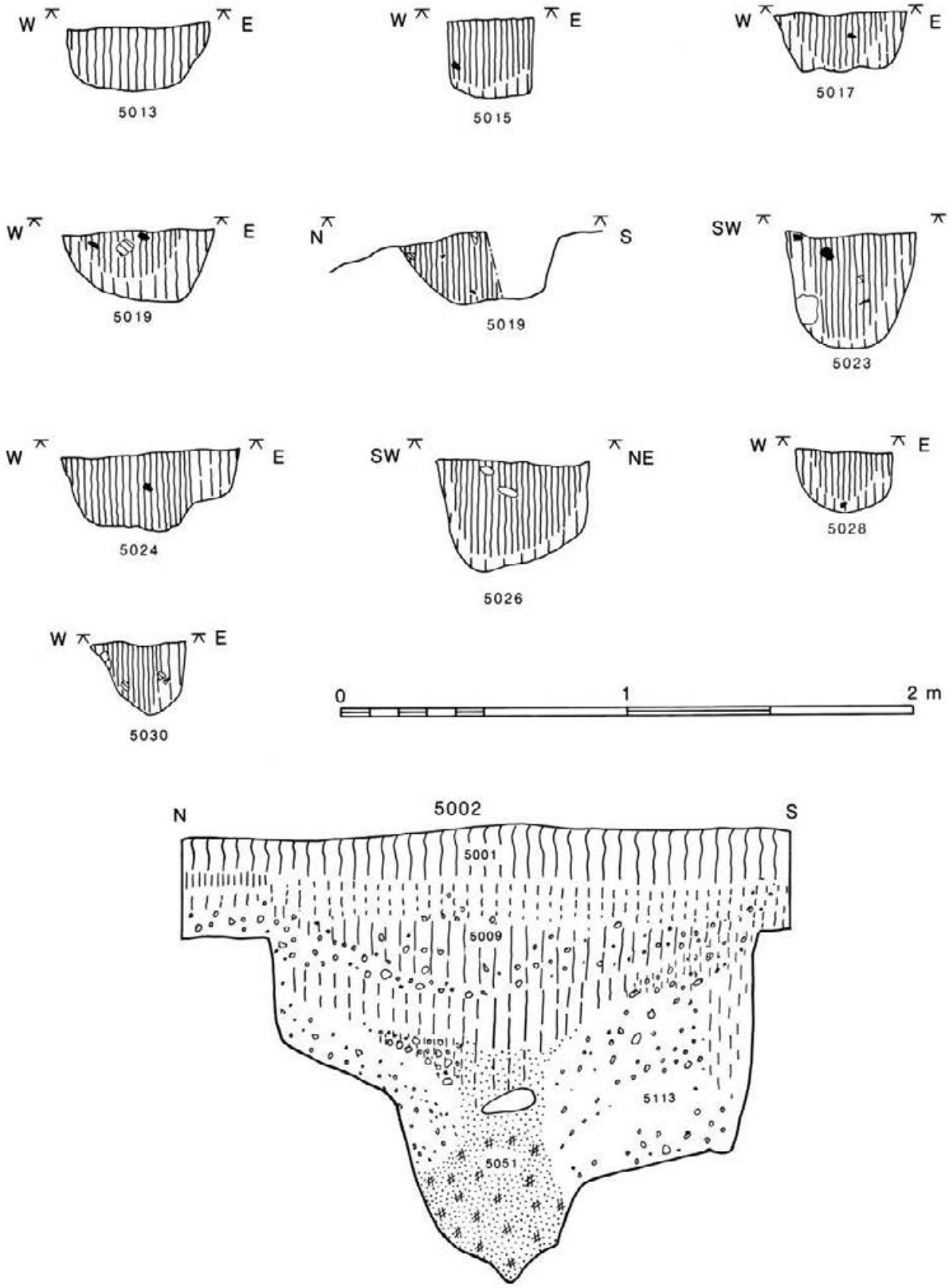

Fig. 54 (Top) Sections of the postholes of context 5003 adjacent to the inner ring of Structure 2; (below) section of the outer ditch of Structure 2

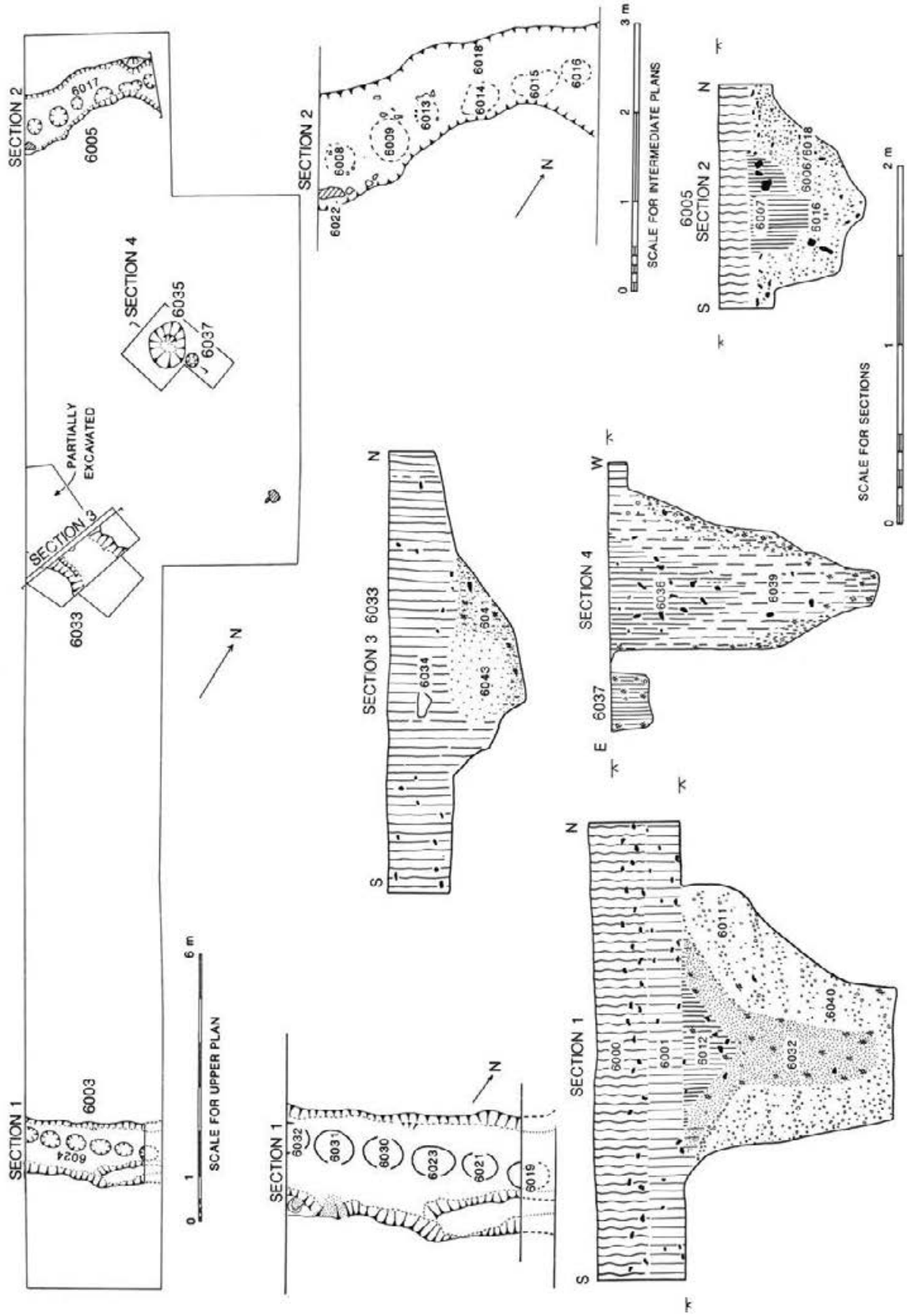

Fig. 55 (Top) Summary plan of Structure 3 within enclosure 2, in Trench AA; (below) plans of the outer ditch and the north inner ditch, and sections 1–4

inner side was nearly vertical, the base slightly rounded, and the outer side sloping. The main fill of the ditch was a dense, chalky deposit (629), largely devoid of animal bone or other finds. This had been deliberately deposited, and was not a product of natural erosion.

Within the backfill was a row of four substantial postpipes (625–628). These represent former posts, which had been let into shallow, slightly irregular sockets up to 20 cm deep (and not more than 50 cm across) in the base of the ditch. More or less circular, the postpipes had diameters between 50 and 80 cm. They extended through the fill of the ditch, to merge with a dark layer (600/604/605/607) in the upper part of the ditch. The postpipes were more differentiated internally than in palisade enclosure 1. A very dark, ashy, charcoal-rich core was found in each (608–611), with an outer zone of mixed dark and grey soil, still with abundant charcoal flecking and occasional substantial charcoal pieces (621–624). Some animal bones were found in the outer zones of the postpipes, at varying depths, and there were small sherds of Grooved Ware. Two bone samples from the postpipe cores of 627 and 626 yielded radiocarbon dates of 2113–1884 BC (CAR-1294) and 2850–2468 BC (CAR-1295) respectively.

Within the upper part of the main backfill, posts had been further supported by a row of substantial sarsen packing stones (up to 80 cm across) in the outer part of the ditch. These were disposed in two rough courses (630–634 below, 615–619 above).

Unlike in palisade enclosure 1, the backfill had not filled the ditch completely, but had left an upper hollow. At this level, the postpipes were first observed during excavation, with a smaller diameter and only the dark cores visible. Animal bone (612) was deposited around the outer visible part of postpipe 625, and in the space between postpipes 626 and 627 (613). On the inner side of the ditch, dense chalk packing (620), including large chalk blocks and small pieces of sarsen, was rammed between postpipes and the side of the ditch, and extended up to the top of the ditch. On the outer side, the main upper backfill terminated in a very chalky surface, mounded in the centre of the cutting and strewn with small, rounded chalk blocks and pieces (614). On the north side of the cutting, there was a further mound (606) of chalk blocks and dark soil, over underlying sarsen packing stones.

In the uppermost fill of the ditch, excluding the inner strip of chalk packing already described (620) was a dark layer (600, 604, 605, and 607). 607 was ashy and dark, with abundant small charcoal flecks, and also small pieces of chalk, flint and sarsen; some of the latter were burnt. 604 and 605 were similar but slightly lighter in colour and slightly less ashy and charcoal flecked. 600 was dark brown soil, with little charcoal flecking. Within this whole deposit, there was no discernible sign of postpipes, either in plan or section. Scattered through this layer (both horizontally and vertically) were abundant animal bones, some individual, some in small groups, but without any obvious structure or patterning; bones were first encountered in 600. Sherds of Grooved Ware were found.

Trenches K and T (fig. 44; pl. 34). The same ditch was partially excavated in Trenches K and T, in positions located by aerial photography and magnetometer survey. Both trenches were just over 2 m wide, and topsoil and underlying flinty subsoil were machined off to a depth of about 40 cm to show the darker stripe of the ditch against flinty coombe rock subsoil (which became more chalky with depth in both cases). Only the southern part of Trench K and a middle section of Trench T were fully excavated, the aim in 1990 being to establish the presence and general character of the ditch at different points around its apparent circuit.

The ditch in Trench K (411) was roughly U-shaped, 1.6 m wide at its top and 1.7 m deep to the ditch base (about 2 m deep to the base of post sockets cut from the base of the ditch). The sides of the ditch were increasingly chalky with depth; solid chalk was present only at the base of the ditch. The main ditch fill was a deliberate backfill (428) of chalk silt and chalk pieces up to 10 cm, with some small flints and a little brown soil. This fill did not extend right to the top of the ditch. The fill was virtually devoid of finds, but contained one large antler. Within the fill were three closely placed, substantial postpipes, 406, 409 and 410. These were excavated as individual postholes until it was realised that 428 could be distinguished from the subsoil; a complete section was then dug across 406 and 409. 406 continued into a basal socket 30 cm deep.

The postpipes were 50–60 cm in diameter. 406 had an outer fill of grey-brown flinty soil with occasional charcoal flecks and a core (in its lower two thirds) of dark, flinty soil with quite abundant charcoal flecks. 409 was sub-circular, with a largely undifferentiated fill of dark soil with small flints and pieces of chalk and occasional charcoal flecks; in the eastern part the fill was hard packed chalk, either deliberate packing or slumped from the main backfill. 410 was slightly undercut to the east, giving the impression that the former post might have leaned slightly to the west. Its outer and upper fill was brown soil with small flints and chalk, while the core was loose grey-brown soil with some small flints and chalk and some charcoal flecks. Animal bone was packed around the outer side of the tops of postpipes 406 and 409 (407 and 417 respectively).

The upper surface of the main backfill of the ditch formed a shallow hollow (403) in the top of the ditch, which narrowed in the centre of the ditch to merge with the top of the postpipes. The fill of this hollow was brown soil, quite flinty with small chalk fragments. It contained a few bones. There was one sarsen stone, on the inner side of the ditch above postpipe 410.

The ditch in Trench T was similar (pl. 34). It was excavated to the level at which postpipes appeared at the bottom of a hollow in the top of the ditch, and a box section was then cut across the two postpipes in the middle of the cutting. (The composite section is not illustrated here but is available in the site archive.)

The ditch in Trench T (957) was up to 3 m wide, with a steep inner side and a sloping outer side, and a narrow base only 70 cm wide; it was about 2.2 m deep (with basal sockets a further 30 cm deep). The subsoil became solid chalk 30 cm above the base of the ditch. The main fill of the ditch was chalky silt, with some small chalk fragments (983 and 976). This contained also two small sarsen stones, about half way up in the outer part. As elsewhere on the site, this fill was deliberate backfill. In it were found some animal bones and pieces of antler, and small sherds of Grooved Ware.

Within the backfill were four postpipes, set close to the

inner, steeper edge of the ditch (990, 985, 986, 991). At the top of the main fill these were seen as a series of linked concentrations of dark soil, from 40 to 60 cm across. Some animal bone and small Grooved Ware sherds were found around the tops of the postpipes. (There was some linear disturbance along the inner side of the ditch at this level, probably the result of burrowing animals.) The box cutting subsequently gave most information about 985. This was up to 60 cm in diameter but its profile varied, having either slumped after post replacement or been disturbed by burrowers, and it narrowed to 40 cm at lower depths. Its fill was a very dark silt with much charcoal and quite a lot of small flints. The darkest fill was at the core of the postpipe; patches of light brown flinty soil within the postpipe could be the result of disturbance.

Above the top of the main fill was a thin flinty layer (959/955), in which the positions of the postpipes could just be discerned by a relative lack of flint. Above this in turn was a shallow hollow with brown soil (954), equivalent to 403 in Trench K.

Trench CC (figs 30, 44). A cutting approximately 3 m wide was laid out from the air photographic plot, and machine stripping of the topsoil immediately located the perimeter ditch, its fill contrasting strongly with pale yellow gravelly subsoil. The regular features of ditch, deliberate backfill, and postpipes were all present.

The ditch (8002) was approximately 3.2 m broad and just over 2 m deep from the modern surface. Its outer edge sloped down, while the inner edge was steep. Part of the inner edge was scalloped, two scoops in its line extending from top to bottom, in positions corresponding to postpipes in the ditch. The main fill (8003) was redeposited fine chalky gravel, slightly more humic than the subsoil. Three individual sarsens were found in this fill. A row of postpipes (8004) was set above the line of the base of the ditch, closer to the inner edge therefore than to the outer. The base of the ditch narrowed to little more than 50 cm across, and each of the postpipes ended in an irregularly definable socket cut into loose gravel. There were four large spaced postpipes: 8008, 8015, 8010 and 8009. These were roughly circular and approximately 50 cm in diameter. 8010 and 8015 varied with depth. Higher in the fill 8010 appeared three-cornered, and likewise 8015 appeared first as a broad curve (defined as 8005, 8006 and 8007), which became more concentrated and more circular with depth. The spacing of up to 40 cm between these postpipes was greater than seen in many other perimeter cuttings. The fill of the pipes themselves consisted of fine dark silt, with a little gravel and flint, and much charcoal throughout, except in the weathering cones (e.g. 8023 in fig. 44). Here the fill was much more humic.

Connecting 8015 and 8010, and 8010 and 8009 in the upper fill on the outer side of the ditch were two curved, narrow lines of similar dark silty and charcoally fill. These could be seen as some kind of cladding or shielding of the gaps between the posts (unless they are animal disturbances). There was also one small isolated patch of charcoal-stained soil in the lower fill.

Animal bone was found in the pipes, at the junctions with the main ditch fill, and a little in the fill itself. As elsewhere this material appears to have placed at the time of construction.

Trench BB (fig. 44; pl. 32). A cutting 3 m wide was laid out following the geophysical and air photographic plots, and the ditch was located by machine stripping of the topsoil and the surface of the subsoil, here yellow brown chalky gravel. Ditch, backfill, postpipes and sockets were again found.

The ditch (7002) was basically parallel-sided, though the edges were a little uneven, giving a width from 1.6 to 1.9 m. Sloping quite steeply on the outer side, and very steeply on the inner, the ditch was approximately 1.8 m deep. On the outer edge, there were irregular scoops scalloped into the side and extending to the base of the ditch. This was little more than 50 cm wide, and from it were cut sockets to hold the base of the posts. At this depth the coombe rock was becoming increasingly pale and hard, though pure chalk as such was not encountered. The main fill of the ditch was redeposited yellow brown chalky gravel (7003 and 7006), slightly more humic than the surrounding subsoil. One small sarsen was found at the top of the ditch, a couple in the middle fill, and a small heap of broken sarsen pieces low down in the fill on the outer side.

A row of postpipes (7004) was set close to the inner edge of the ditch. There were four circular to sub-circular postpipes: 7007, 7008, 7014, and 7009. These were approximately 50 cm in diameter, but their dimensions varied, and in the upper fill 7008 appeared rather elongated and up to 80 cm on its long axis. The fill of the postpipes was fine dark silt, with much charcoal, and some patches of reddened soil in the upper parts. Charcoal was not however ubiquitous, there being far more in 7007 and 7008 than in the other two. At their tops pipe fills were replaced by more humic weathering cones (e.g. 7011 in fig. 44), forming a continuous feature along the ditch. Charcoal was not present in the main part of these cones, but was found down their edges (as in the west section). There were two separate linear spreads of charcoal-stained soil, 7010 in the upper and middle fill, 7015 in the middle fill, both between the postpipe row and the outer side of the ditch.

Some animal bone and antler was found on the edges of the postpipes, and a small group of bones 7012 was found in the main fill at a depth of 1 m, on the outer side of postpipe 7008. This material must again have been placed at the time of construction.

One Grooved Ware sherd and one Mortlake rim were found in the upper backfill (fig. 62, 34–5).

Radial ditches

Attached to the ditch of palisade enclosure 2 and visible on both aerial photographs and on the plots of magnetometer survey are further lengths of ditch. These appear to radiate both out and in from the enclosure ditch.

Outer radial ditch 1 (fig. 28)

This runs from the south-east of the enclosure ditch in a more or less straight line. Its probable continuation has been seen across Gunsight Lane on an old aerial photograph held by RCHM(E) (RCHME 1992), leading to a further circular though interrupted feature, some 40 m or more in diameter, which lies over 200 m from the enclosure (? Structure 4).

Trench S (fig. 45). Radial 1 was investigated by a single

cutting, Trench S, close to the junction with the enclosure. Topsoil here was only 20 cm deep, giving on to yellow brown chalky and flinty coombe rock. The radial ditch consisted of a row of postpipes (552, 563, 564, 566 and 554) about 20–30 cm apart and up to 1 m deep from the modern surface, which were contained within an irregular but continuous bedding trench (560), up to and over 1 m wide; the bedding trench narrowed at the north end of the cutting. Each of the postpipes was visible as a band of darker soil, with some small chalk clasts and pieces of flint and some charcoal flecks, and was surrounded by brown soil packing (559) also with small pieces of chalk and flint; the outermost packing was more chalky and hard to distinguish from the natural subsoil. The postpipes were steep-sided though narrowing towards the base, and about 25–30 cm in diameter; there were very shallow sockets cut into the natural. Some animal bone was packed around the west side of the junction of postpipe and packing in the case of 562, and there was further animal bone on the west side of 563 and 564. There was one substantial piece of antler in the main packing next to 566. There were scraps of Grooved Ware. Two bone samples yielded radiocarbon dates of 2489–2313 BC (CAR-1292) and 2450–2142 BC (CAR-1298) respectively.

A circular dark feature, 556, adjacent to 554, was not excavated.

OUTER RADIAL DITCH 2

This curves in a north-easterly direction from the east side of the enclosure ditch and appears from the aerial photographs of 1990 to intersect the outer ditch of palisade enclosure 1 a little to the north-west of Trench G (1990). It was not investigated in the 1990 season. The ditch may continue to the north-east, since in the pipeline works of 1989 a ditch-like feature some 2 m deep was seen in section in the pipe trench, 17 m east of Gunsight Lane (figs 28, 46–47). This was over 2 m broad at its top, with a possible further shallow extension to the west, but narrowed to its base. It had a dark soil fill with some chalk, with charcoal flecks and small pieces of bone; there were small sarsen blocks in the middle fill.

Possible radial seen in the 1993 watching brief. The continuation of the palisade circuit above the Kennet was observed during a pipeline watching brief in 1993 (for location, see fig. 28). Close by, immediately south of the Kennet, another feature was very briefly seen (for safety/engineering reasons) in a deep pipe trench by a team led by Gill Swanton. She reports that the feature was visible only in the south section of the pipe trench, though the other section may have been obscured. The feature, exposed to about 1 m deep, was about 1.2 m broad at its top and 85 cm broad where it disappeared from view. Its fill consisted of very dark soil with large pieces of charcoal, flint and sarsen, with some animal bone. This is strongly reminiscent of palisade and radial ditches, but there were also grass-tempered sherds of probable sub-Roman or later date. It is not impossible that the feature was a pit, being certainly seen on only one side of the pipe trench.

Inner radial ditches 1 and 2. Two inner radials were seen on the magnetometer survey and on the aerial photographs, both in 1990 and the less favourable conditions of 1989. One cutting, Trench R, was laid out to investigate inner radial 1, but nothing was found in the area opened despite the most careful examination of the subsoil. The trench was presumably wrongly placed.

Interior features

STRUCTURE 1 (FIGS 48–50; PLS 35–36)

Magnetometer survey in 1989, 1990 and 1992 and the aerial photographs of both 1989 and 1990 showed a double concentric feature some 40 m in diameter within enclosure 2, straddling the boundary between fields 2 and 3. The outer ring was just over 40 m in diameter, the inner ring about 18 m in diameter; both were more or less circular. The aerial photographs show narrow continuous circles, but the magnetometer survey suggests that the inner ring was less regular; broader anomalies are opposed on the west and east sides. At what appears to be the centre of the feature there is a substantial magnetic anomaly, close to the east side of the hedge line.

Outer ring. In 1990 a small portion of the east side of the outer ring was examined, in Trench L. Another portion to the north was examined in 1992 in Trench Y, which showed that the excavations of 1990 were incomplete. I am grateful to John Barrett and Roger Thomas for their help in resolving this difficulty.

In the narrower north end of Trench Y, a 3 m stretch of the outer ring was defined immediately after machine removal of topsoil (only 15–20 cm deep) as a dark strip contrasting with the pale flinty and gravelly subsoil. The humic weathering cones of closely spaced postpipes were excavated to define six closely spaced postpipes. The western four postpipes (4057, 4036, 4038 and 4071) were excavated, at first in the belief that these were postholes. Further boxing showed, however, that the postpipes were held in backfilled packing (4028) set in a ditch.

The ditch (4004) was c. 1.5 m broad at its top, steep-sided, c. 1.5 m deep and flat-based. It was cut into flinty, chalky coombe rock, which was progressively chalky with depth. Its main fill (4028) was redeposited natural, more humic at the top of the ditch, but distinguishable lower only by a slightly greater humic content than the natural and greater looseness. A row of six close set postpipes was placed centrally within the packing, reaching almost to the base of the ditch but without sockets as in the main perimeter ditch. Only a few centimetres separated one from another. These were mainly oval, about 30–40 cm across and 40 cm and more long. The pipes, which were more or less vertical-sided, consisted of very dark fills, with some small gravel pieces and flints, and many small charcoal fragments throughout. There were some animal bones within and at the edges of the postpipes, and a few sherds of Grooved Ware, from at least two vessels. In the uppermost part of the feature the dark pipes were replaced by more humic weathering cones (4027), slightly broader than the pipes themselves.

In Trench L the topsoil was only 15 cm deep, above pale yellowy brown flinty gravel with much peagrit and small rounded chalk clasts. The outer circle was first seen as a narrow brown linear feature, at most 60 cm broad (502). This was a shallow slot up to 25 deep, with a brown soil fill with much small flint and chalk clasts: with hindsight, the weathering cone zone surrounded by packing. At its base

the slot gave way to five closely spaced postpipes (503–507). These were sub-circular to oval in upper plan (about 30 cm across, and 40–50 long), and very steep-sided, with well defined edges and more or less flat bases. All reached c. 80–90 cm below the subsoil surface. Because they were so narrow for their depth, no half sections were cut. The postpipe fills were more or less homogeneous, with brown to dark brown fairly loose soil, with some smaller flints and chalk clasts and only a very little more and slightly larger flint pieces around the edges. There were flecks of charcoal consistently throughout the fills of all five, and recurrent finds of small pieces of bone.

A box section was cut across the feature after the postpipes had been excavated to check that there was no further bedding trench, but no signs of such were seen. In the light of the results from Trench Y in 1992, it is clear that in the very dry conditions of 1990, the packing around the postpipes was not distinguished from the natural.

Inner ring. The inner ring was exposed in the main part of Trench Y after machine stripping of topsoil (only 15–20 cm deep), and two lengths were excavated, Box 7 and Boxes 1–6. It proved to be an irregular ditch, broader and deeper to the west (in Boxes 1–6) and narrower and shallower to the north (Box 7).

In Box 7, the ditch was 1.6 m wide at the west section, narrowing to 90 cm at the east section (there on the northern arc of its circumference). Its maximum depth was 80 cm. Its base was irregular, with three roughly circular scoops, and the sides were also irregularly cut. Brown clayey flinty gravel lower fill (4035–4040) was succeeded by more clayey and more humic upper fill, with less flint and smaller gravel clasts (4013–4, 4009).

There were some animal bones in the lower fill and one substantial piece of antler.

In Boxes 1–6, the ditch was up to 4 m wide, but narrowed to c. 2.5 m in the centre of this length to give a segmented appearance. It was up to 1.5 m deep at the north end of Boxes 1–6 (thus approximately on the west of the feature), and approximately 2 m deep at the south end, but only 70–80 cm deep in its central, narrower portion. Its sides were irregular, in places scalloped, and the base was also irregular. In the length uncovered in Boxes 1–6, there was a deeper scoop or segment at the north end, two scoops at the south end (the southernmost being the deeper), and a shallower portion in between. The feature was cut into flinty gravel. It was recorded by cumulative sections.

The ditch had a symmetrical primary fill of brown flinty gravel with some clayey soil (4048, 4055, 4070; 4046, 4056, 4067; 4061, 4065, 4069; 4047, 4049–50, 4062, 4066, 4068). This contained scattered sherds of Grooved Ware and some animal bones. There was a concentration of animal bone (4051) on the outer side and across the middle of the ditch in the upper primary fill, towards the northern end of Boxes 1–6. Three pieces of sandstone were found immediately above the bones in the centre of the ditch, contributing to the impression that this was a placed deposit. At the top of the primary fill at the junction with the secondary fill, just by the south section, there was another concentration of animal bone.

The secondary fill was dark soil, much less flinty (4024, 4029; 4025, 4042, 4052–3, 4054; 4026,4041, 4043–4). It contained occasional animal bones, and a few small sherds of Grooved Ware in its lower part.

Above the secondary fill was a soil, slightly darker and no more flinty (dug in spits: 4006/4013, 4010/4020; 4007/4018, 4011/4021; 4019/4008, 4022/4012). This contained a scatter of animal bones and Anglo-Saxon sherds (to be published separately).

No other features were excavated in the surface exposed in Trench Y, either inside the inner ring or between it and the outer ring. A dark area to the north-west of the inner ditch was assumed to be a natural pocket of soil.

The area in field 2 containing the possible central feature as suggested by magnetometer survey was not available for excavation in 1990 or 1992.

Structure 2 (figs 51–54; pls 37–39)

Structure 2 was discovered in the geophysical and air photographic surveys of 1992. It appeared to have two more or less concentric rings. The outer ring was not fully definable, especially on its western side, where the geophysical evidence could suggest a double line and the air photos a more elliptical layout. The outer ring seems to have a diameter of just under 30 m. The inner ring was better defined as about 9 m in diameter, and seemingly continuous. Trench Z enabled good characterisation of the inner ring, and definition of the southern part of the outer ring.

In Trench Z, topsoil about 20 cm thick was machined off. Features were visible in the main part of the trench only after the removal by machine and by hand of up to another 20 cm of gravelly brown soil. Features to the south of the trench, on more sloping ground, were detected slightly higher.

Outer ring. The outer ring was a ditch (5002), poorly defined at the surface because of masking by ploughing. It was dug through flinty clayey gravel, which did not make precise definition of its edges easy, though the inner, lower side was cut through much more sandy, orange subsoil. It was approximately 1.5 m broad at the surface of the subsoil. It had slightly splayed sides, the outer slightly scalloped, converging to form a narrow base 50 cm and less across. It was approximately 1.5 m deep from the modern surface.

The ditch contained a row (5046) of six closely spaced postpipes (5047–51 and 5054), only 10 cm apart or less. These were slightly oval, about 40 by 30 cm. They had very dark fills, with much charcoal flecking. They reached to the base of the ditch. Their upper parts consisted of browner, more humic material: the weathering cones (5009 and subdivisions). Around the pipes (and between them) was packing (5113), backfilled flinty clayey gravel from the digging of the ditch. This had some charcoal flecking and some animal bones.

The inner ring. The inner ring (5004) was defined at a depth of about 40 cm. Under topsoil, the next 20 cm was mixed flinty gravel, which held a quantity of struck flint. Two arcs of the inner ring were seen (5005 to the south, 5006 to the north), first defined by their grey, almost stone-free fill contrasting with the more orange-brown flinty gravel subsoil, and further confirmed by resistivity survey after topsoil stripping. This upper grey fill proved to be a shallow (10–15 cm) weathering zone, with some finds of struck flint and Grooved Ware, connecting individual postpits, which were first distinguishable by narrow ridges of flinty gravelly

subsoil between them. In the south arc there were six postpits, with a seventh partially seen to the west; there was a gap 90 cm wide between 5073 and 5086 to the south. In the north arc six postpits were also found. Geophysical survey indicates that the inner ring was continuous; by extrapolation a ring of some 22 postpits can be suggested. The ring was a perhaps slightly flattened circle, with an inner diameter north to south of approximately 7.5 m, giving a post ring about 8 m in diameter.

Variations of detail can be seen in both plan and section, but the postpits had essentially similar features. They were closely spaced, with ridges of only 10–15 cm between them. They were circular to sub-circular, with diameters around 1 m (though precise upper edges proved hard in some cases precisely to define). They ranged in depth (from the surface of the subsoil) from less than 1 m to 1.2–1.3 m, and tapered with depth, most to narrow lower parts. 5086 had relatively straight sides and a flat base, from which a narrower and squarish lower part continued down. All had some evidence for the former presence of a post, represented by a broader weathering cone in the upper fill, and narrower postpipe of dark, usually lightly charcoal-flecked fill. In 5073, 5079 and 5075, postpipe and packing were not well distinguished, but generally the postpipes were 30 cm or less in the upper parts, narrowing to about 20 cm in the lower fill. Some were straight-sided and roughly circular in plan, others had been distorted by collapsed packing; the lower pipe in 5086 was squarish as noted above. As far as could be seen, the postpipes continued more or less to the base of the postpits. The packing of the post hole was a mixture of brown clayey soil, flints and fine gravel. In the lower part of 5077 there were a couple of sandstone pieces.

The packing was normally lightly flecked with charcoal fragments. Finds of animal bone and antler, struck flint, and sherds of Grooved Ware were recovered from both postpipes and packing. Struck flint in the uppermost weathering fill on the edge of 5073 included a fine oblique, ripple-flaked flint arrowhead.

The space between the postpits was tested, in the light of experience elsewhere on the site, to make sure that there was no encompassing ditch. In one area of the south arc, next to the west baulk, there is an unresolved uncertainty. A possible postpit 5081 was identified between and slightly behind 5075 and 5080, but its excavation was incomplete.

The interior within was carefully searched for features, since the geophysical survey hinted at their presence, but nothing was found.

There were no features immediately to the north of the inner ring.

To its south, struck flint was recorded in the upper, disturbed subsoil 5001. At the same depth as the inner ring, nine small, shallow postholes or postpits were found, forming in the area stripped a rectangular setting (5003) seemingly butted on or aligned on the south arc of the inner ring. These were difficult precisely to define. They were from 30 to 60 cm across, and from 15 to 30 cm deep. They had dark fine fills, with occasional charcoal flecking, which merged at sides and bases with the subsoil, making precise dimensions hard to establish. There was no clear distinction between pipe and packing, except in the cases of 5023 and 5024. 5026 had small pieces of sarsen and sandstone, presumably packing. There were finds of struck flint, including two knives, and sherds of similar fabric to Grooved Ware in 5026. There was no discernible relationship between 5019 and 5073.

No features were found between the south arc of the inner ring and the outer ditch, though there were struck flints in the disturbed upper subsoil.

Bone deposit outside the outer ditch (5007) (pl. 39). Bones and dark soil were found on the upper subsoil after topsoil stripping in the extreme south-east corner of Trench Z. A small extension was made which revealed a greater mass of densely packed animal bone (with a little antler), sherds of Grooved Ware, and dark soil. These formed a linear deposit about 1 m across and at least 2m long, which continued under the baulk. The deposit was only about 10 cm thick, and lay in a very slight hollow in the top of the subsoil. There were some struck flints around the edges of the deposit. An inverted pot base was only 25 cm below the modern topsoil surface. The animal bone was predominantly of pig.

STRUCTURE 3 (FIG. 55)

Aerial photographic survey in 1992 revealed the presence of a double circular feature. Neither ring was complete. The outer ring appeared elliptical, with a maximum width over 40–45 m; the more circular inner ring had a diameter of about 15 m. Geophysical survey at the start of the excavations covered the southern half of the setting. This suggested that the outer ring continued to the west, and may also have intersected the outer ring of Structure 2; slightly off-centre within the inner ring was a strong magnetic anomaly.

The outer ring. The outer ring (6003) was examined in the southern part of Trench AA (though it was only fully excavated on the west side of the cutting). After topsoil removal, it was readily apparent as a dark stain in the surface of the subsoil. It proved to be very similar, in both character and dimensions, to the outer rings of Structures 1 and 2. A steep-sided, flat-based ditch contained a gravel fill (6011, 6040), with a central row (6024) of close set dark, charcoal-flecked postpipes, again about 40 by 30 cm and only 10–15 cm apart, extending through the fill virtually to the base of the ditch (fig. 55). On the west side of the trench there was a weathering zone (e.g. 6012 in fig. 55) in the upper fill. There were animal bones in the gravel fill of the ditch, some struck flint and a few sherds of Grooved Ware. There was an antler fragment in the inner angle of the ditch base.

The inner ring. Over much of the rest of Trench AA, the upper surface of the subsoil was a brown, clayey, flinty soil overlying pale gravel, which re-emerged in the northern part of the trench. Part of the inner ring was located without much difficulty at the north end of the trench, where a narrow and rather shallow ditch (6005) had been cut into the gravel. This was only a maximum of 55 cm deep below the subsoil surface, and a maximum of 85 cm wide. Its fill (6006, 6018) was loose fine gravel with some admixture of soil. A large portion of antler was found on the outer edge of the fill at the level of the subsoil surface. Within this fill were six postpipes, about 20 cm in diameter, visible as slightly darker soil concentrations with some charcoal flecks. Four had irregular sockets in the base of the ditch.

Although this was a slight feature, it was at least easily detectable. The corresponding arc of the inner ring (6033) where it passed through the central part of the cutting proved

very hard to locate, even though it showed on geophysical survey after topsoil removal. The ring was cut through very clayey soil (6034) which masked its position, even though a concentration of struck flakes and larger sarsen stones suggested its presence. After repeated trowellings, a box cutting showed a shallow, narrow ditch (about 80 cm deep below the subsoil surface, and approximately 1.3 m wide) cut into the subsoil, through the clayey brown flinty soil into pale, hard, sandy soil beneath. The lower fill of the ditch was gravel and brown soil with some admixture of flint, (6041), partially cut by a round deposit of yellow sand (6043), interpreted as animal disturbance. There was a sharply differentiated upper fill of brown clayey flinty soil (in which matrix were the sarsen stones noted, just to the west). One postpipe about 30 cm in diameter was found in the middle of the box cutting, its dark flinty fill contrasting with the lower fill of the ditch. It was not detectable in the upper fill, and it was not recorded in section.

The inner postpit. Careful search was made by trowelling for features both between the outer and inner rings and within the inner ring. Nothing was found in the former situation, in the brown clayey flinty subsoil. In the latter situation, ploughmarks had dragged darker soil over the gravel subsoil, at their junction. A large posthole or postpit was located, following the geophysical indications, by repeated trowelling. No other features were found, apart from a small posthole immediately adjacent to the east.

The postpit (6035) was subcircular, about 1 m in diameter and 1.5 m deep, cut into the gravelly subsoil. It had a central dark pipe with dark soil (6036), some flints and some charcoal flecking, which could be traced to approximately half of the depth. The rest of the fill (6039) was lighter brown to grey soil with a strong admixture of fine gravel, and some charcoal flecks. The postpipe was not easily distinguishable in the lower part of the fill. There were a few pieces of bone and a sliver of antler in the main fill, but otherwise no dateable finds.

Other ditches

Ditches of later date will be published separately. These include a narrow ditch of post-Roman date or later in Trenches A and B, the slot seen cutting the palisade ditch in Trench O, and the slots seen within the West Kennet Farm precinct.

A natural channel and valley history

On the aerial photographs there is a prominent crop mark between and concentric with the palisade ditches in the field east of Gunsight Lane. The mark begins abruptly about halfway along the line of the enclosure in that field and continues to the hedge adjoining the floodplain meadow. This was excavated in Trench C and in Trench N, and observed but not excavated in Trench D. The evidence suggests that it was a natural channel.

Another, more diffuse mark can also be seen on the aerial photographs to the south of the enclosure but roughly concentric with it, also in field 1. The aerial evidence does not suggest that this was as definite a feature as the other, and it has not so far been investigated.

The channel (fig. 56; pl. 40)

Trench C (fig. 56). The channel (F17) was not fully sectioned to the west in 1987. Its outer, eastern edge lay 7 m from the inner edge of the outer ditch F19. It sloped gently down to a flat base, 1.8 m below the present surface. There were no signs that the edge had been artificially cut. Solid chalk was only seen on the very base of the ditch. The stratigraphy was straightforward. Dark topsoil (layer 1) was underlain by layer 2, a brown slightly clayey soil with little flint in it. Layer 3 was the lateral continuation of layer 3 above F19 in the eastern end of Trench C, and here was a very flinty grey brown soil. This merged into layer 4, a very fine dark soil, with little flint in it. At the eastern edge of the feature this layer and the underlying layer 6 merged into layer 5, the flinty brown subsoil also seen under layer 3 around the outer ditch F19 and above the chalk there. It was not clear what should be taken as the surface of the subsoil in this area, and the edge of the feature must at some point grade into layer 5, though this was not possible to see clearly in plan or section. Layer 6 was a mid brown soil with a lot of small flint in it, and with a marked boundary with layer 4. Layers 7 and 8 were similar in colour but show respectively less then again similar flintiness to layer 6. At the very edge of the feature layers 6 and 7 merge and were indistinguishable. Layer 10 was slightly sticky or clayey dark brown soil with a lot of flint, the lower part a slightly lighter brown than the upper. Some of the flint pieces were larger than observed above. The basal layer 11 was a light grey sticky chalky deposit with a lot of flint, some of which was iron stained; there were some charcoal flecks. Below came the flat surface of the chalk. The surface of the edge of the feature as far as layer 10 was a hard, fine peagrit chalk and flint subsoil. A concentration of peagrit material was seen at the top of layer 10, and it is possible that this represents an original continuation of this surface above layers 10 and 11.

Animal bone was recovered in some quantity in layers 3 and 4, and also in lesser quantity in underlying layers right down to layer 11; that in layers 10 and 11 was much darker in colour. A little ironwork was recovered from layers 3, 4, 6 and 7. From layer 7 came a Samian sherd and a fragment of Roman tile, and several post-Roman sherds of the fifth to sixth centuries AD, including grass-tempered ware (kindly identified by Bryn Walters). From layer 6 there was a Samian sherd and a glazed late-18th century sherd, while from layers 3 and 4 came three medieval sherds. Details will be published separately.

Trench N (fig. 56). The channel (703) was excavated again in 1990 in the southern part of the floodplain meadow in order to obtain a complete section and to investigate whether it could in fact be an archaeological feature; the 1990 aerial photographs emphasised the very sharp nature of the eastern end or terminal of the feature in the middle of field 1.

The feature was again regarded as a natural feature, at least 10 m wide with gradually sloping sides and an undulating but essentially flat base, reaching over 1.5 m below the meadow surface. Similar stratigraphy was recorded. 700 was topsoil above 701, a flinty layer with some chalk fragments, which in turn overlay 702, a less stony grey lens. 704 was dark grey with much small angular flint and some chalk fragments. 705 was a layer of comparatively stone-free dark grey to dark soil, overlying 706, a very flinty

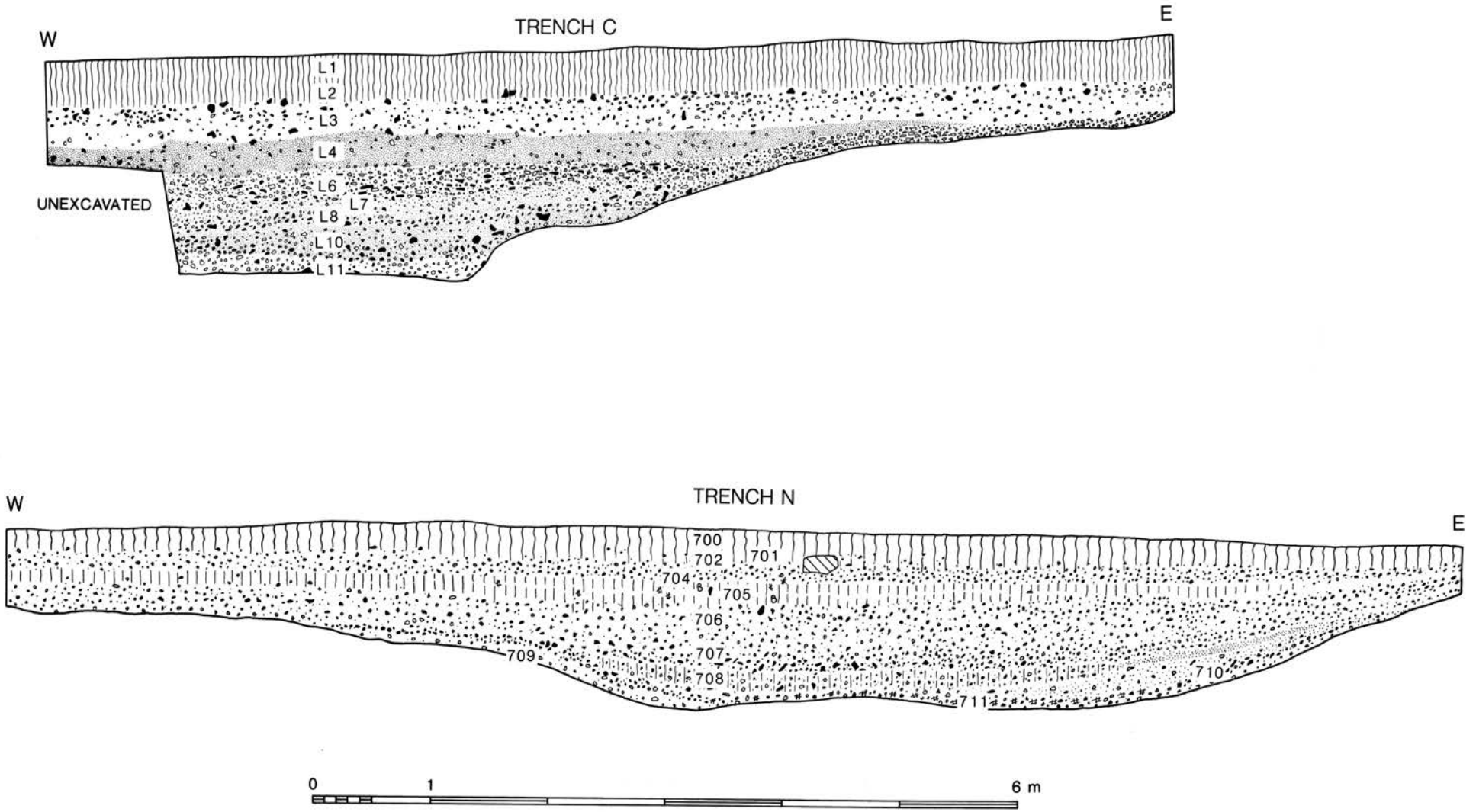

Fig. 56 Sections in Trench C and Trench N of the inner natural channel

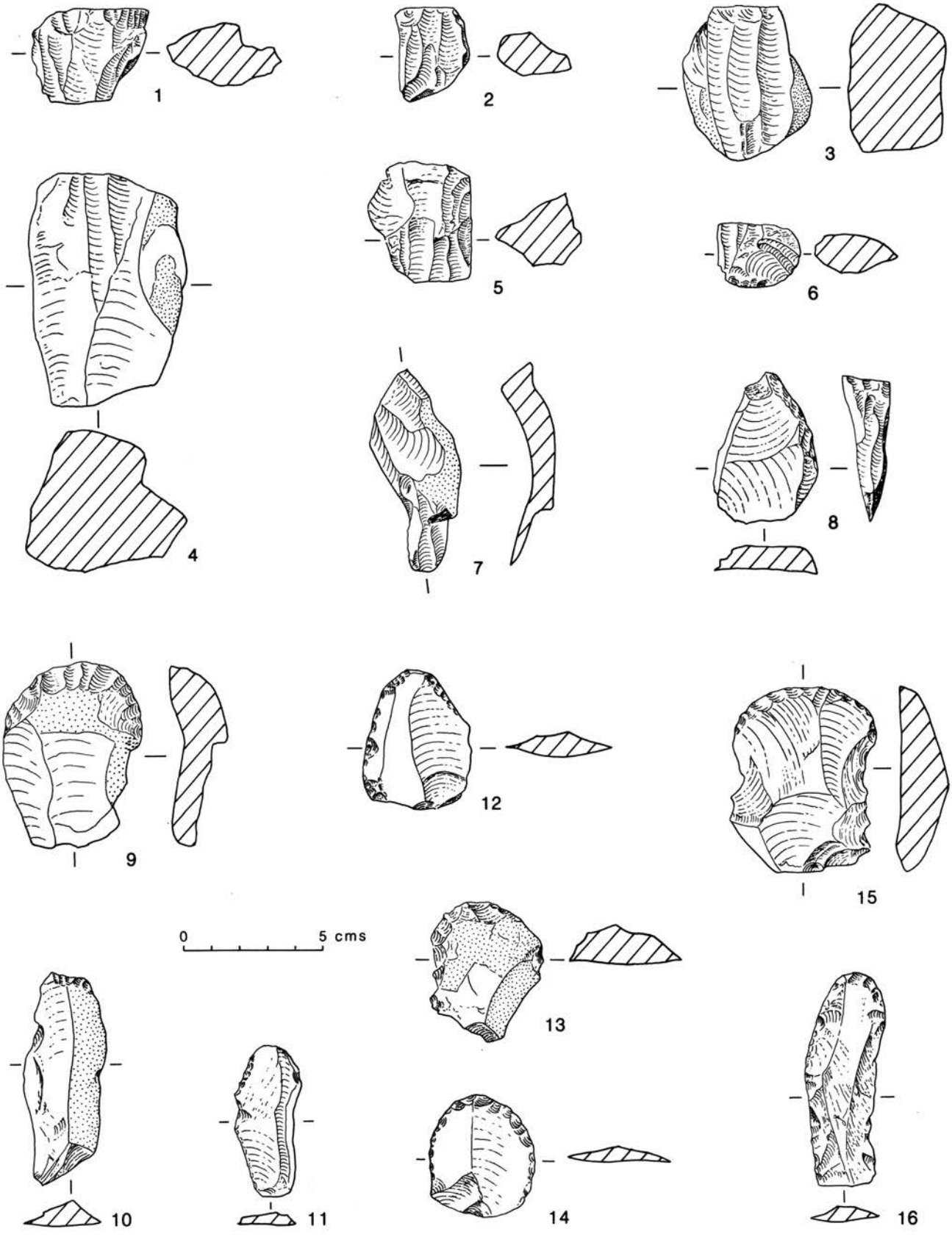

Fig. 57 Worked flint. 1–8: cores; 9–16: scrapers (enclosure 1: 1, 5, 10: Tr O; 9: Tr E; enclosure 2: 2–4, 6–8, 13–16: Tr Z; 11: Tr M; 12: Tr Y)

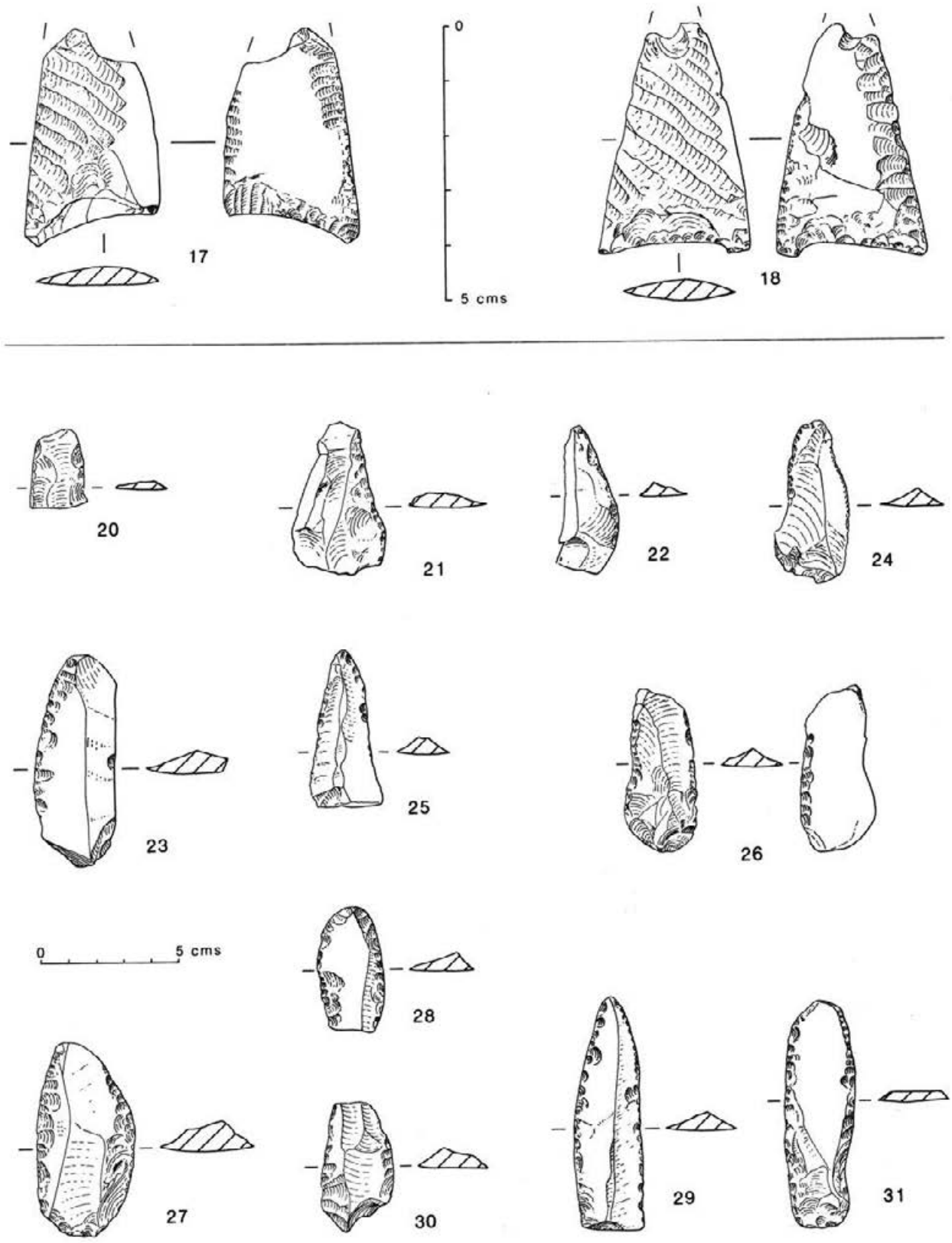

Fig. 58 Worked flint. 17–18: ripple-flaked oblique arrowheads; 20–23, 25–31: one- and two-edge knives; 24: bevelled-edge flake with some irregular retouch (enclosure 1: 17, 20: Tr D, outer ditch; 21: Tr J; 24: Tr H; enclosure 2: 18, 22, 25–8, 30: Tr Z; 23, 29, 31: Tr Y)

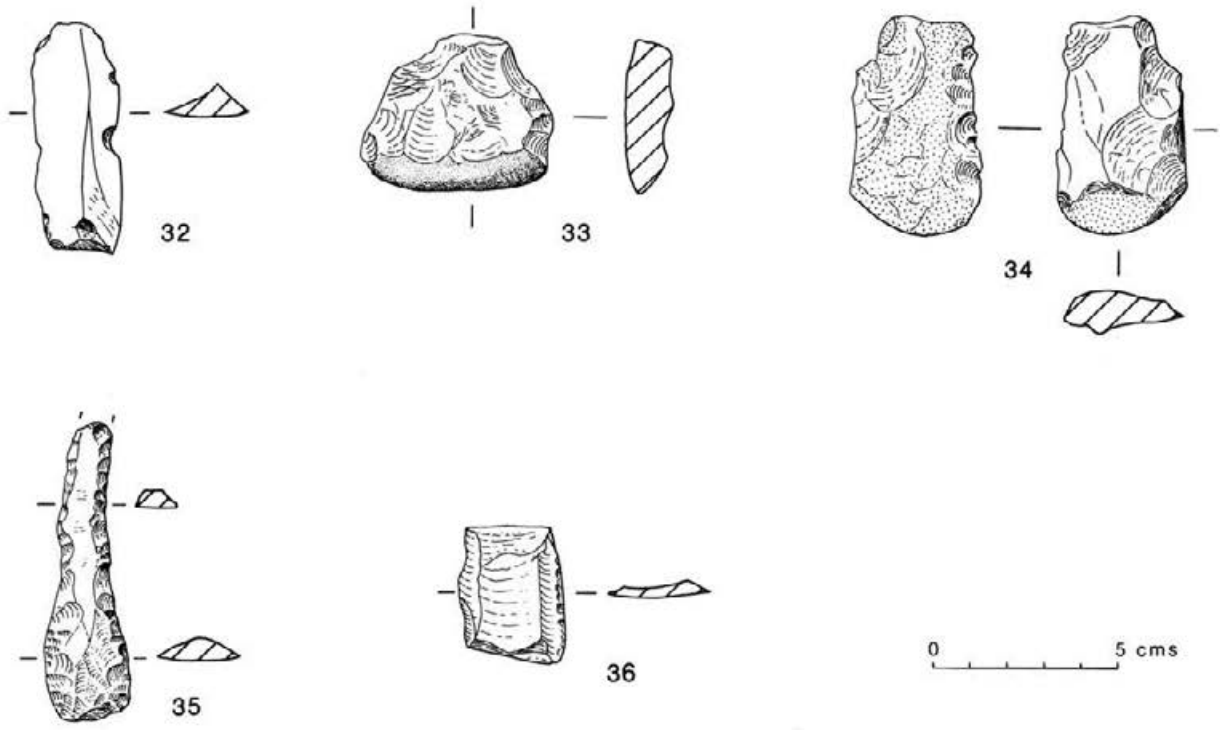

Fig. 59 Worked flint. 32: notched flake; 33–4, 36: irregularly retouched pieces; 35: fabricator (enclosure 1: 32: Tr O; enclosure 2: 33, 36: Tr Y; 34: Tr Z; 35: Tr M)

and chalky grey to light grey layer. 707 was a dark grey to dark layer with much chalk flecking and a lot of small chalk and flint fragments. 708 was a brown to dark grey clayey layer, with some iron panning and relatively little small chalk and flint fragments. This overlay 709 to the west and 710 to the east, irregular chalk blocks and chalk silt. Under this in the centre of the feature was 711, a thin layer of compacted charcoal in a matrix of grey clay and flecked with chalk. This lay over the undulating surface of the natural chalk, 712. The chalk was excavated for a further depth in the hope that it might represent the chalk infill of a large ditch, but this possibility can definitely be discounted. The chalk is natural, stained and compacted by water action. Animal bone was found in layers 702–707, and was present also in 711.

Discussion. The two sections were not far apart and show similar infill. 704–701/layers 2–3 can be seen as the result of cultivation. 705/layer 4 can be seen as a stabilisation horizon or soil, above various layers formed by cultivation (707–706/ layer 8 to layer 6). 708/layer 10 could be another stabilisation horizon, subsequently gleyed. 709–710/layer 11 may reflect erosion of chalk in the feature or nearby, and 711 (and the charcoal seen in layer 11) is the result of human activity. There is no sign that the feature was artificially cut.

The simplest explanation is that this was an old, perhaps Pleistocene, channel, which had silted up little by the Neolithic, leaving a gentle but visible depression in the surface of the terrace above the Kennet. The palisade enclosure was laid out to take advantage of this landform, there being in effect a shallow depression between the inner and outer ditches of the palisade enclosure, on the east side of the site. 711 and 709–710/layer 11 might be connected with the construction or use of the enclosure, resulting in the dumping or erosion of chalk. A soil then formed. Much later, increased cultivation from the Roman period onwards led to the infilling of the channel, during which there was one major period of reduced cultivation.

Evidence from the 1989 evaluation in the precinct of West Kennet Farm (fig. 37)

(Roland Smith)

TWA/Trench H was dug by hand adjacent to the Kennet. Below humic topsoil (102) there were layers of brownish grey clay silt (103–5), considered to be of alluvial origin. Three medieval sherds were found in 103 not deeper than 60 cm. At the base of 105 was a calcareous gravel deposit, 106, which sealed a grey silt deposit, 107, 9 cm thick. 107 sealed river gravel. It contained quantities of carbonised material and bone, and may be seen as a buried landsurface. Its extent was further established by boreholes. A 15–litre sample of soil was analysed for plant remains (see below). The plant remains recovered suggest that the landsurface is of Saxon or medieval date (Allen and Carruthers 1989), and details will be published separately with the other post-Neolithic features and finds.

Finds

Flint (figs 57–59)

1080 pieces of worked flint were recovered from the excavated contexts reported here. Details are set out in table 21. It cannot be certain that all the worked flint belongs to the palisade enclosures, since some in the ditches could be residual and there are some quantities from the subsoil in Trenches H, Z and AA, but there is no definite indication of earlier (or indeed later) styles of working.

Table 21: worked flint from palisade enclosures 1 and 2

	Cores	*Flakes*	*Scraper*	*Ah*	*Knife*	*Bevel*	*Misc.*
Palisade enclosure 1							
Outer ditch							
Tr C	-	4	-	-	-	-	1 (notched flake)
Tr D	3	19	-	1	1	-	-
Tr E	2	14	1	-	-	-	-
Tr H	1	5	-	-	-	2	-
Inner ditch							
Tr F	5	10	-	-	-	-	1 (notched flake)
Tr J	-	-	-	-	1	1	-
Ditch north of Kennet							
Tr O, topsoil etc	8	50	1	-	-	2	-
Tr O	1	23	1	-	-	-	-
TWA/A	-	2	-	-	-	-	-
Interior and surface contexts							
Tr B, F4	-	1	-	-	-	-	-
Tr B, F7	-	1	-	-	-	-	-
Tr C, F18	-	-	-	-	-	1	-
Tr D, surface	1	7	-	-	-	-	-
Tr F, F15	-	5	-	-	-	-	-
Tr H, surface	1	59	-	-	-	1	-
Tr O, adjacent to ditch	4	51	-	-	-	-	1 (notched flake)
TWA/B-G	6	33	-	-	-	-	2 (retouched flakes)
Channel							
F17, Tr C	1	4	1	-	-	-	-
Tr N	1	3	-	-	-	-	-
Palisade enclosure 2							
Palisade ditch							
Tr M	1	25	1	-	-	-	1 (fabricator ?)
Tr T	1	2	1	-	-	-	-
Tr BB	-	1	-	-	-	-	-
Tr CC	-	2	-	-	-	-	-
Radial 1							
Tr S	-	3	-	-	-	-	-
Structure 1 (Tr Y & L)							
outer ditch	-	6	-	-	-	-	-
inner ditch, secondary	2	72	-	-	-	-	1 (utilised blade)
inner ditch, primary	2	6	1	-	3	-	1 (retouched fragment of polished axe)
Structure 2 (Tr Z)							
subsoil	14	175	-	-	1	-	1 (retouched flake)
outer ditch	-	19	-	-	-	-	-
inner ditch, S arc	5	79	7	1	4	-	1 (retouched flake)
inner ditch, N arc	9	111	2	-	3	-	4 (2 retouched flakes; bevelled core rejuv. flake; notched flake)
post setting, 5003	-	1	2	-	-	1	-
bone deposit, 5007	-	12	-	-	-	-	-
Structure 3							
subsoil	10	85	-	-	-	-	-
outer ditch	2	32	1	-	-	1	-
inner ditch	-	20	-	-	-	-	-
central posthole	-	1	-	-	-	-	-
	80	943	19	2	13	9	14

RAW MATERIAL

The main raw material used was dark to dark-grey, often mottled flint with relatively fresh, thin, light brown cortex. This was presumably an import from local chalk sources, for instance on the Marlborough Downs. By comparison the flint on the surface of the site today is much poorer and more rolled. A little of this or something similar was probably used; a few pieces have fresher working on old patinated and stained surfaces. Some brown flint also occurs, for example in the subsoil of Trench H. In the assemblage as a whole, many surfaces were patinated or partly so, but a small quantity could be distinguished of what appears to be a creamy white flint, used principally for knives and a scraper in Structure 2 within palisade enclosure 2. Five small cortical, more or less round, flint balls were found in the Trench H subsoil, and another in the Trench H outer ditch of enclosure 1.

CORES AND FLAKES (FIG. 57, 1–8)

The majority of cores were single-platformed, worked partly round. There were 18 cores with two platforms (two worked from the same edge), and three with three. Most were well worked down, with neat flaking and platform preparation. There were 16 cores which were little more than tested cortical nodules, notably from the subsoil around the presumed inner south ditch of Structure 3 in palisade enclosure 2. (These show the use of nodules up to 12 cm long.) And there were three burnt, unclassifiable small cores.

The majority of the flakes were small (defined arbitrarily as under 5 cm long). Some have broad platforms and pronounced bulbs of percussion, and appear to have been struck with a hard hammer, but the majority have narrow platforms and modest bulbs of percussion, and appear to be the product of soft-hammer technique. I do not offer measurements (if these are useful in any case), since the components of the assemblage from individual contexts are rather small. But it appears insufficient to characterise Later Neolithic core reduction solely in terms of hard-hammer technique (*contra* Holgate 1988) or broad, squat flakes (*contra* Smith 1965a).

SCRAPERS (FIG. 57, 9–16)

Most of the scrapers were made on robust flakes, with steep retouch on the rounded end, extending in some cases down one or both sides. There was one thumbnail flake scraper from the outer ditch of Structure 3 in enclosure 2 (not illustrated). One scraper from the enclosure 1 ditch north of the Kennet was made on a parallel-sided flake or blade, and had a square end (fig. 57, 10).

ARROWHEADS (FIG. 58, 17–18)

Two very fine, ripple-flaked, oblique arrowheads made on creamy grey-white flint were recovered in securely stratified contexts (see above), one from each enclosure. They are strikingly similar. Made on broad, thin flakes, their dorsal faces have fine invasive diagonal pressure-flaking down their long sides, and less regular but flat retouch on their hollow bases. On neither is the opposed dorsal edge intact, but in each case it appears to have virtually no retouch; the pressure-flaking scars end in an exquisitely controlled step-pattern. On the ventral faces there is retouch on all edges: neat invasive retouch on the bases and short edges, longer scaling flat retouch on the long edges. Both tips are broken Both breaks are fresh; that on the example from Structure 2 in enclosure 2 may have an impact scar.

Both can be seen as belonging to Green's subtype c of the ripple-flaked oblique arrowhead category (1980). The ripple-flaked oblique arrowhead belongs to a type with strong Later Neolithic associations. Green (1980) has noted a major concentration in east Yorkshire, and others in the Peak District, the Breckland, Somerset and Wessex, within an overall distribution extending as far as north-east Scotland. The type has direct associations with Grooved Ware and Peterborough Ware and mixed associations with Beakers. It occurs at the henges of Durrington Walls, Woodhenge and Gorsey Bigbury. At Durrington Walls there are four examples from the second phase of the South Circle. There are 46 normal oblique arrowheads from the site as a whole. Elsewhere stray finds have been found. Locally, oblique arrowheads have been recovered from later levels at Windmill Hill, the West Kennet Avenue and beneath the Avebury bank (Smith 1965a), but none matches the quality seen in the West Kennet palisade enclosure examples.

KNIVES (FIG. 58, 20–23 AND 25–31)

The majority of knives came from palisade enclosure 2. They can be defined as roughly parallel-sided, sometimes pointed flakes, with retouch, not generally steep, on one or both edges (fig. 58, 20–23, 25–31). A broken piece from enclosure 1, Trench F, is rather small. An example from Structure 2, enclosure 2 (fig. 58, 28) is not dissimilar to scrapers in form, but the end appears not to be treated as a single unit of retouch and the cross-section of the flake is also different. Whether there was a rigid functional difference between what are classified as knives and scrapers is another matter. 10 were retouched on both edges, three on only one; most of the retouch was on the dorsal surface of the edge, but one of the single-edge and two of the double-edge knives had ventral retouch as well. This might reflect use-life as much as separate categories. Knives can be seen in other local Later Neolithic assemblages, as again at Windmill Hill and the West Kennet Avenue (Smith 1965a, fig. 43, F70, and fig. 81).

BEVELLED FLAKES

Various flakes have deliberately bevelled edges. The illustrated example (fig. 58, 24) has irregular retouch on the other edge; it may have overlapped with the knives in function. There is no sign of serrated flakes, as in Earlier Neolithic assemblages (e.g. Smith 1965a).

MISCELLANEOUS

The majority of the miscellaneous pieces are variously retouched flakes and notched flakes (fig. 59, 34, 36, and 32). One irregularly retouched piece from the primary fill of the inner ditch of Structure 1, enclosure 2, was formed on a fragment of *polished axe*, a part of whose cutting edge is still preserved (fig. 59, 33). This appears to be an unusual find for a Grooved Ware context (Wainwright and Longworth 1971, 256, table XXVIII), although fragments have been found in recent excavations in Cranborne Chase, for example in Grooved Ware association at the Firtree Field site (Barrett *et al.* 1991; Brown 1991), and partially polished flint axes

are recurrent in the so-called macehead complex of the Later Neolithic (e.g. Clarke *et al.* 1985).

A probable *fabricator* was recovered from the uppermost layers of the enclosure 2 ditch in Trench M; its tip is missing and there is no visible sign of wear on the surviving rod-like piece (fig. 59, 35).

DISCUSSION

The assemblage as a whole can satisfactorily be compared with other Grooved Ware assemblages (Wainwright and Longworth). It is distinctive within that spectrum for the ripple-flaked oblique arrowheads and for the number of one- and two-edge knives. The latter are much more numerous in enclosure 2, which also yielded the polished axe fragment and the probable fabricator. It is not clear whether this has any chronological implication for the relative sequence of the two enclosures.

Cores and flakes constitute 95 percent of the assemblage as a whole, and retouched pieces the remaining 5 percent. Flint was both tested and worked on-site. The quantities, however, do not suggest prolonged occupation, and it is not clear from the lithic evidence that occupation must be characterised as domestic. It is striking that the surface and subsoil assemblages (table 21) contain very few retouched pieces apart from cores and flakes. Tools are preferentially distributed in the palisade ditches and internal structures. Scrapers are scattered around the site as a whole, and the largest concentration of scrapers and knives occurs within Structure 2 of enclosure 2 (with knives also noticeable in Structure 1), where one of the ripple-flaked arrowheads occurs. The distribution of pottery in that structure (Hamilton, below) tends to support the notion of structured deposition, which in turn may imply a non-domestic role. The other arrowhead could be seen as a casual loss, accidentally incorporated in the fill of the outer ditch of enclosure 1, but it is more satisfactory to regard it like the majority of the animal bone, also set close to the postpipes, as a deliberate deposition. In this perspective, the flint assemblage suggests a non-domestic role for the enclosures.

Stone

Although sarsen was liberally used as packing for the enclosure ditches, and was used for querns and rubbing stones in earlier contexts at Windmill Hill and in the Later Neolithic site on the West Kennet Avenue (Smith 1965a, 234), there were virtually no sarsen or other stone artefacts from the West Kennet enclosures. One flat sarsen piece from Structure 2 in enclosure 2, some 14 by 11 cm, appears to have been smoothed on one face, and can be classified as a rubbing stone.

This absence can also be taken to imply a non-domestic role for the enclosures.

Pottery (figs 60–71)

(Michael A. Hamilton)

With the exception of one Mortlake sherd, the prehistoric pottery was Grooved Ware. Saxon pottery from Trench Y and other contexts will be reported separately.

METHODOLOGY

Each sherd was examined using a x20 binocular microscope. Specific fabrics were defined by identifying the percentages of inclusions. These fabrics and the various elements of pottery style (sherd thickness, finish, decoration, colour) were used to cluster sherds into groups possibly originating from single vessels. This was then used as an estimate for the minimum number of vessels. However, one may have reservations about the creation of over-precise fabric categories, and while the divisions into vessels are retained, the fabrics are much simplified for this report. One may also doubt the uniformity of inclusions within single vessels, and the repeatability or reliability of fabric descriptions based purely on macroscopic examination by different archaeologists.

FABRIC

There were a small number of sherds in very distinct fabrics, containing much flint, sand, and/or shell. However, typically the Grooved Ware fabrics contained grog, then tiny amounts of other inclusions (flint, shell, sand, voids, iron oxides, and haematite). I have defined the frequency of fabric inclusions as follows:

Rare: 1–4 percent
Sparse: 5–8 percent
Moderate: 9–14 percent
Common: 15 percent and above

VESSELS (FIGS. 60–8)

Using fabric and style (see above), sherds were allocated to vessels. These vessels have each been given a code based on the trench (e.g. Vessel Z/12). Diagnostic sherds are illustrated for each vessel, and contextual information is summarised in tables 22–30.

A number of sherds have a thin white coating, usually on the exterior surface. One sherd (fig. 67, 71) was analysed by Dr. Sue Hardman of the School of History and Archaeology, University of Wales Cardiff, who identified it as calcium hydroxide and calcium carbonate. Though such a deposit could form naturally in some conditions (Hodges 1989, 170–1), its presence on the exterior surface only, its even finish, and the absence of it from other chalkland assemblages suggest that this was a deliberate lime-wash. This paste can easily be removed by washing and could have been more common than now appreciated.

Palisade enclosure 1

INTERIOR

1970s watching brief. During the 1970s watching brief various sherds were recovered. From a scoop in the interior of enclosure 1 came a Grooved Ware rim (fig. 60, 1). This is an incurving rim decorated with closely spaced rows of horizontal fine whipped cord. The fabric is hard and well fired with inclusions of sparse sand, perhaps grog, and a little shell.

Trench B. All the pottery came from context F3.

Vessel B/1 (fabric: moderate grog). Sherd (fig. 60, 2) with vertical cordon decorated with horizontal fingernail impressions, and diameter *c.* 20 cm. From lower in the same fill came five fragments representing another sherd, one of which was a detached cordon.

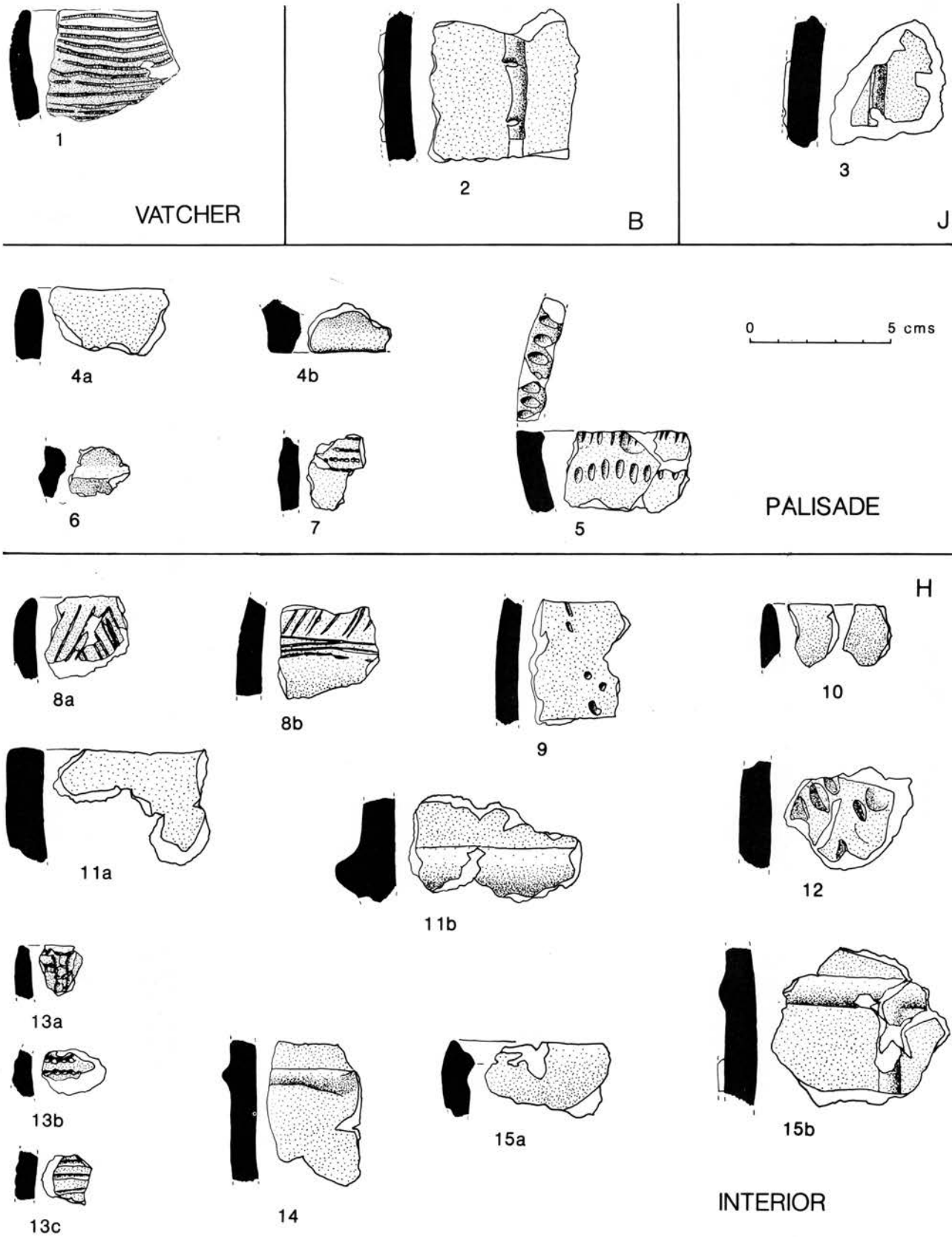

Fig. 60 Grooved Ware pottery from enclosure 1. 1: 1970s pipeline watching brief; others by trench/context as indicated

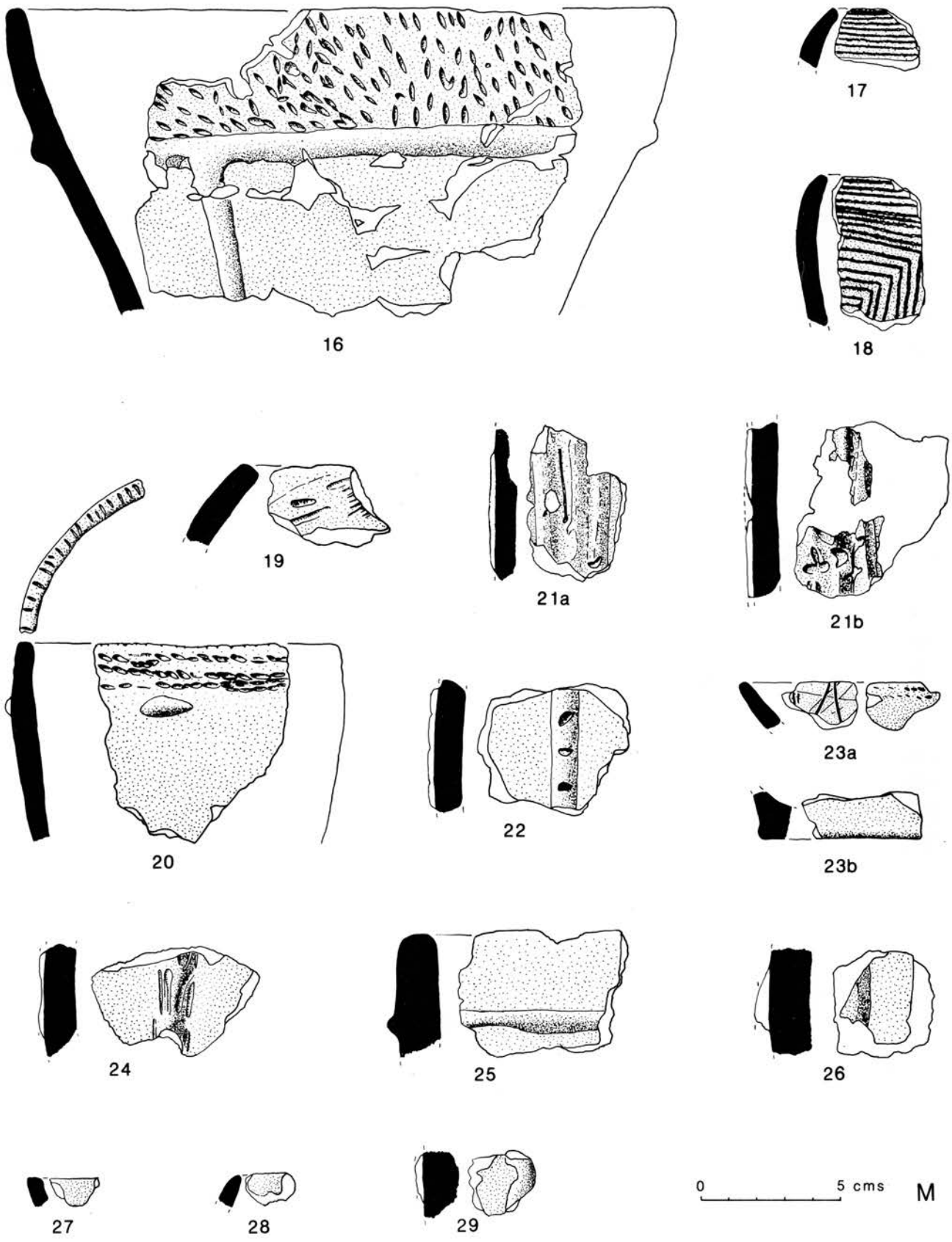

Fig. 61 Grooved Ware pottery from enclosure 2, Trench M

Vessel B/2 (fabric: moderate grog). A plain sherd of a thick walled vessel (13 mm), of diameter *c.* 22–28 cm.

Trench H. All pottery is from context 215 (or occasionally 223) unless specifically stated.

Vessel H/9 (fabric: rare-sparse sand). Rim (fig. 60, 8a) and body sherd (fig. 60, 8b) from context 203. The rim is decorated with an incised opposed line motif. The body sherd has incised diagonal lines, with four horizontal intermittent lines below, and an undecorated zone below that. Diameter of vessel *c.* 20 cm.

Vessel H/10 (fabric: rare-sparse sand). 11 body sherds, one of which is illustrated (fig. 60, 9). The marks on this sherd could represent decoration or damage. This vessel could reflect an undecorated area of Vessel H/9, but the different context (all from 215) suggests a second vessel is represented.

Vessel H/11 (fabric: rare-sparse sand and moderate grog). Two simple rims (fig. 60, 10) and six other sherds, representing a thin-walled vessel with a tentatively suggested diameter of 16–20 cm.

Vessel H/12 (fabric: moderate grog). Flat-topped rim (fig. 60, 11a), horizontal cordon (fig. 60, 11b) and a plain sherd. Suggested diameter of rim and cordon is 32 cm.

Vessel H/13 (fabric: rare-sparse grog and moderate-common shell). 11 sherds, one of which is decorated (fig. 60, 12). This is decorated with irregular diagonal bands of fingernail impressions. The absence of clear decoration on the other ten sherds might indicate a second vessel is represented, and the variation in colour and finish could suggest additional vessels. Two sherds have the white coating.

Vessel H/14 (fabric: moderate grog). 11 sherds, three of which are decorated (fig. 60, 13a, b, c), and one of which is a simple rim. The rim sherd has horizontal and perhaps vertical fine twisted cord. The second has three rows of horizontal twisted cord, and the third sherd may have the same, though damage (possibly over-vigorous washing) has made it appear more like comb. There is some variation in the plain sherds which may suggest another two vessels.

Vessel H/15 (fabric: moderate grog). One sherd with a horizontal cordon (fig. 60, 14). From context 203 came a tiny sherd which could be from the same vessel.

Vessel H/16 (fabric: common grog). A rim (fig. 60, 15a), cordoned sherd (fig. 60, 15b), and a plain sherd. The rim sherd conforms to Longworth (1971a) type 13a. The sherd has a horizontal cordon with a vertical cordon below. The rim diameter is *c.* 20–28 cm.

Vessel H/17 (fabric: rare-sparse sand and moderate grog). Sherd (context 203) probably from a base (13 mm thick).

Vessel H/18 (fabric: moderate grog). Five sherds (*c.* 8 mm thick).

Vessel H/19 (fabric: common grog and common shell). One sherd (5 mm thick).

Vessel H/20 (fabric: moderate grog). One sherd (9 mm thick).

INNER PALISADE DITCH: TRENCH J

Vessel J/1 (fabric: moderate grog). One sherd (fig. 60, 3) with a vertical cordon. This came from almost 2 m deep on the edge of a postpipe (context 313).

OUTER PALISADE DITCH: TRENCH H

Vessel H/1 (fabric: ?moderate grog). A rim (fig. 60, 4a) and base-angle (fig. 40, 4b) but no other sherds. Both came from well down in two different postpipes (*c.* 2 m depth). Diameter at rim of *c.* 18–20 cm and base *c.* 10 cm.

Vessel H/2 (fabric: moderate grog). A rim (fig. 60, 5) with oval impressions on the rim-top. On the exterior rim-edge is incision, possibly done with fingernail. One of these has a possible finger-tip perhaps accidentally imposed on top. Below these is a horizontal band of vertical ovals. The ovals are clearly impressed, but though they have vague diagonal striations, the impressions do not appear to be cord. This sherd came from deep in a postpipe.

There are no obvious other sherds, but there is a sherd similar in colour, appearance, thickness, finish and most inclusions, which came from the same context at approximately the same depth. The main difference is that it has considerable sand inclusions (*c.* 10 percent); this may reflect fabric variability within a single vessel.

Vessel H/3 (fabric: moderate grog). Seven plain sherds and a cordoned sherd (fig. 60, 6). Only two sherds retain their interior surface, as the vessel was poorly fired and fragile. All the pottery came from low in four postpipes, and at least some is recorded as coming from the edge of the postpipes. The one sherd (fig. 60, 6) specifically recorded from the postpipe centre came from the very bottom.

Vessel H/4 (fabric: moderate grog). Two plain sherds which only have internal surfaces surviving. These are very similar to the external surface of H/3, but cannot belong to that vessel, as its internal surface is known and is different. The smooth finish to the internal surface suggests they belong to a bowl. Both came from near the bottom of postpipes.

Vessel H/5 (fabric: sparse grog). One sherd (fig. 60, 7) with four horizontal bands of decoration. Superficially this appears to be comb, but under magnification the impressions can be identified as a narrow stamp, only partly divided into two points. It came from near the bottom of a postpipe.

Vessel H/6 (fabric: moderate grog); *Vessel H/7* (fabric: moderate grog and moderate shell); *Vessel H/8* (fabric: common grog). One plain, thin, sherd in each, all from low in postpipes, one recorded as coming from the pipe-edge.

Palisade enclosure 2

TRENCH M

All the pottery came from the palisade trench.

Vessel M/1 (fabric: sparse-moderate grog). Roughly 25 percent of the rim (fig. 61, 16), plus nine plain sherds. Below the rim is a dense area of diagonal fingernail impressions, sometimes in five horizontal bands. Below is a horizontal cordon, from which drops a vertical cordon. The rim has traces of white coating on the exterior. Only one sherd appears to come from a context other than the uppermost layers, but this sherd, from the packing, has poor contextual detail and may not be precisely located.

Vessel M/2 (fabric: sparse sand). Incurving rim (from the uppermost layers) with nine horizontal lines of fine twisted cord (fig. 61, 17) and diameter of *c.* 16 cm.

Vessel M/3 (fabric Rare-sparse sand and sparse grog).

Table 22: Grooved Ware pottery in Trench H

	H/1	H/2	H/3	H/4	H/5	H/6	H/7	H/8	H/9	H/10	H/11	H/12	H/13	H/14	H/15	H/16	H/17	H/18	H/19	H/20	Brick
?PIT																					
203	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	-	1	-	-	-	crumb
SURFACE DEPOSIT																					
215	-	-	-	-	-	-	-	-	-	11	8	3	11	10	1	3	-	5	1	1	-
223	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
PALISADE TRENCH																					
207	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
209	-	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
217	-	-	4	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
218	1	-	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
219	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	2	2	8	2	1	1	1	1	2	11	8	3	11	11	2	3	1	5	1	1	na

Table 23: Grooved Ware pottery in Trench M

	M/1	M/2	M/3	M/4	M/5	M/6	M/7	M/8	M/9	M/10	M/11	M/12	M/13	M/14	M/15	M/16	M/17	M/18	M/19	M/20	?
600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
604	6	-	-	3	-	-	-	-	-	2	1	9	3	1	1	-	-	-	-	1	1
605	6	1	-	-	-	-	-	-	-	-	2	-	-	1	1	1	1	-	-	-	-
608	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
609	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
610	-	-	1	1	1	2	1	-	1	-	-	-	-	-	-	-	-	1	2	-	-
611	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
612	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
622	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
623	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
627	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
628	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
TOTAL	13	1	1	3	1	2	1	2	2	2	3	10	3	2	4	1	2	1	2	1	1

Table 24: Grooved Ware and other pottery in Trench T

	T/1	T/2	T/3	T/4	T/5	?POT	Saxon
952	-	-	-	1	-	-	-
954	-	-	1	1	1	-	2
955	-	-	-	2	-	-	-
958	-	-	-	-	-	1	-
965	-	3	-	1	-	-	-
971	-	-	-	1	-	-	-
976	1	-	1	-	-	-	-
983	1	1	-	-	-	-	-
985	-	-	-	1	-	-	-
986	-	-	-	1	-	-	-
TOTAL	2	4	2	8	1	1	na

Table 25: Grooved Ware pottery in Trench S

	S/1	S/2	S/3	S/4
554	1	-	-	-
561	-	-	1	-
563	-	1	-	-
567	-	-	-	5
TOTAL	1	1	1	5

Table 26: Grooved Ware and other pottery in Trench Y, Structure 1

	Y/1	Y/2	Y/3	Y/4	Y/5	Y/6	Y/7	Y/8	Y/9	Y/10	Y/11	Y/12	Y/13	Y/14	Y/15	Y/16	Y/17	Y/18	Y/19	?	RB	Saxon	Brick	Modern
4005	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	2	1
4006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-
4007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63	-	-
4008	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	3	5	-	-	28	crumb	-
4009	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
4010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
4011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-
4012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
4013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-
4015	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	-	-
4019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	crumb	-
4019/22	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1	-
4024	-	-	-	-	-	-	1	-	1	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-
4025	-	1	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	5	-
4026	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
4027	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4028	-	-	-	-	5	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
4029	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	1	1	-	-	-
4042	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
4044	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
4046	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-
4048	-	-	-	-	-	-	-	-	-	-	-	1	-	-	3	-	-	-	-	-	-	-	-	-
4051	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-
4053	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4069	-	-	-	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	2	1	1	3	5	5	2	7	1	1	2	3	2	1	4	2	1	3	5	4	na	na	na	na

Table 27: Grooved Ware and other pottery in Trench Z

	Z/1	Z/2	Z/3	Z/4	Z/5	Z/6	Z/7	Z/8	Z/9	Z/10	Z/11	Z/12	Z/13	Z/14	Z/15	Z/16	Z/17	Z/18	Z/19	Z/20	Z/21	Z/22	Z/23	Z/24	Z/25	Z/26	Z/27	Z/28	Z/29	Z/30	?	RB	Saxon	Brick	Modern
5001	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	7	1	-
5011	-	-	-	-	-	-	-	-	-	1	-	-	5	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	3	-	1
5014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
5020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-
5027	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
5036	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
5037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	crumbs	-	-	-	-
5040	-	-	-	-	-	1	-	3	-	13	-	-	-	1	-	-	-	-	-	-	17	-	8	-	-	-	-	-	-	-	7	-	2	-	-
5041	-	-	-	-	-	2	1	-	-	2	-	-	-	-	1	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-
5042	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5043	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-
5044	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
5052	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
5053	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5057	1	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	2	-	4	-	-	-	-
5058	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
5059	-	-	5	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2	1	-	-	-	-
5060	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5061	-	3	-	-	1	-	-	7	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-
5062	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5063	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
5064	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	crumbs	-	-	-	-
5066	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	crumbs	-	-	-	-
5067	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	crumbs	-	-	-	-
5069	-	-	1	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
5070	3	6	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-
5071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5076	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
5078	6	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-
5084	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
5085	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5089	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	crumbs	-	-	-	-
5107	-	-	9	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
5110	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	14	17	15	2	1	9	1	14	2	26	1	2	6	1	1	2	6	8	1	1	27	1	9	1	2	1	2	1	2	3	21	na	na	na	na

Table 28: Grooved Ware and other pottery outside Structure 2, Trench Z

	Z/31	Z/32	Z/33	Z/34	Z/35	Z/36	Z/37	Z/38	Z/39	Z/40	Z/41	Z/42	Z/43	Z/44	Z/45	?
5008	-	-	-	-	-	-	-	-	-	-	-	-	1	3	-	3
5010	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5072	-	3	-	-	6	2	1	1	-	-	-	-	-	-	-	-
5104	-	-	6	1	-	-	1	-	9	3	9	5	3	6	9	1
TOTAL	1	5	6	1	6	2	2	1	9	3	9	5	4	9	9	4

Incurving rim with fine twisted cord lines ranged horizontally and vertically in a right-angled motif (fig. 61, 18) and diameter of *c.* 20 cm. This is similar to Vessel M/2 in appearance and profile, but the twisted cord used in M/2 appears to be more tightly twisted, and the fabric is distinctively different. M/3 came from 1.45 m deep in the palisade trench, at the interface of packing and pipe.

Vessel M/4 (fabric: rare-sparse sand and sparse-moderate grog). Rim (fig. 61, 19) with indistinct diagonal lines, representing a closed vessel of diameter of *c.* 24–28 cm. This came from deep in a postpipe. Three further sherds, all plain, came from the uppermost layers, and as they are suitably abraded, they could reflect the same vessel.

Vessel M/5 (fabric: common grog). Rim (fig. 61, 20) with incised decoration on the rim top. On the exterior are at least three horizontal lines of decoration, though other lines may have been superimposed. This decoration could be very coarse twisted cord impressions, though it could also be done with some sort of tool. Below this decoration is an unperforated horizontal lug. This came from the interface between context 610, a postpipe, and the immediate packing, context 623. The recorded depth was 0.5 m below the subsoil surface.

Vessel M/6 (fabric: sparse grog and common shell). Two sherds (fig. 61, 21a-b) with closely spaced pinched-up vertical cordons. The fingernails of the potter are visible on either side of the cordons. Diameter of *c.* 20 cm. These sherds may have had a white coating. The sherds either came from the postpipe or the surrounding packing.

Vessel M/7 (fabric: sparse-moderate grog and common shell). Sherd (fig. 61, 22) with a vertical cordon, which is decorated with horizontal fingernail impressions. Diameter of *c.* 20 cm. Recorded from a postpipe.

Vessel M/8 (fabric: rare-sparse sand and sparse grog). Rim (fig. 61, 23a) and plain base-angle (fig. 61, 23b). The rim is decorated with internal narrow grooved decoration, perhaps a triangular motif. The exterior appears to have two horizontal rows of fine twisted cord. The diameter of the rim is *c.* 16 cm, and base is *c.* 12 cm. The sherds appear to be abraded, and their location in the ditch packing suggests they are contemporary with or pre-date the construction.

Vessel M/9 (fabric: rare-sparse sand and sparse-common grog). Sherd with vertical pinched up cordon (fig. 61, 24) and diameter of *c.* 24 cm. This came from low in the ditch packing. There is a second sherd with a damaged cordon, which could belong to another vessel, and came from the pipe/packing junction, high in the palisade ditch.

Vessel M/10 (fabric: common grog). Rim (fig. 61, 25) with horizontal cordon, and diameter of *c.* 20–24 cm. There is also a plain sherd. Both came from the uppermost layers.

Vessel M/11 (fabric: rare-sparse sand, moderate grog and common shell). Vertical cordoned sherd (fig. 61, 26) and two plain sherds. Diameter of vessel *c.* 32 cm. All the sherds are highly abraded and came from the uppermost layers.

Vessel M/12 (fabric: rare-sparse sand and common grog). Tiny rim (fig. 61, 27), six plain sherds and some crumbs. The orientation is correct for the rim edge, but if the edge is abraded then perhaps the sherd should be illustrated more upright. Diameter of *c.* 16 cm. The variation in colour and finish could suggest another two vessels are represented. Most sherds came from the uppermost layers or in one case high in a postpipe.

Vessel M/13 (fabric: sparse grog). Tiny rim (fig. 61, 28) of diameter *c.* 12 cm, and two other sherds. All came from the uppermost layers.

Vessel M/14 (fabric: rare-sparse sand and common grog). Two sherds. One sherd has the curvature to suggest it is a body sherd, perhaps just above the base-angle, but some of the apparent breaks appear to be original edges, and could suggest this is a triangular shaped object, though abrasion or excessive pot washing have created ambiguity. A second sherd in the same fabric is a plain body sherd. Both came from the uppermost layers.

Vessel M/15 (fabric: sparse-moderate grog and sparse-moderate shell). Four plain thin sherds. Variation in fabric suggests two vessels are represented. Three sherds came from the uppermost layers, but one came from 1.35 m below the modern surface; as it is tiny, it could have been moved by post-depositional process.

Vessel M/16 (fabric: sparse sand and moderate grog). Sherd with a vertical cordon (fig. 61, 29) from the uppermost layers. This has a white coating.

Vessel M/17 (fabric: moderate sand, sparse grog, and sparse shell). Two abraded sherds which perhaps are not prehistoric and look like the fabric of local medieval/post medieval sherds. However, one of the sherds is securely located from the postpipe, though it is a tiny fragment.

Vessel M/18 (fabric: rare-sparse sand and sparse-common grog). Two plain sherds (9 mm thick), one from low in the packing around a postpipe, the other from a postpipe but not particularly deep.

Vessel M/19 (fabric: moderate sand and sparse grog). Two plain sherds and crumbs (probably one sherd before

Table 29: Grooved Ware and other pottery in Trench AA, Structure 3

	AA/1	AA/2	AA/3	AA/4	Saxon
6004	-	-	1	-	1
6010	-	-	-	-	2
6011	2	-	-	-	1
6019	-	1	-	-	-
6030	-	-	-	1	-
TOTAL	2	1	1	1	na

Table 30: distribution of Grooved Ware pottery by context and element

Context	Sherd No	Min Vessel	Rims	Base-angles	Plain	Grooved	Incised	Impress.	Twisted cord	Comb	Whipped cord	Rusticat.	Stab & drag	Decorat. cordons	Plain cords
							PALISADE 1								
							Palisade trench								
Trench H	18	8	2	1	12	-	1	1	-	1	-	1	-	-	1
Trench J	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Total	19	9	2	1	12	-	1	1	-	-	-	1	-	-	2
							Interior								
Trench H - pit	4	3	1	-	2	-	2	-	-	-	-	-	-	-	-
Trench H - dump	55	10	5	-	38	-	-	?1	3	-	-	1	-	-	3
Trench B	2	2	-	-	1	-	-	-	-	-	-	-	-	1	-
Vatcher	1	1	1	-	-	-	-	-	-	-	1	-	-	-	-
							PALISADE 2								
							Palisade trench								
Trench M	58	19	9	1	41	2	2	1	4	-	-	1	-	1	9
Trench T	18	5	2	-	5	-	-	-	-	-	-	-	-	-	9
Trench BB	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-
Trench CC	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
Total	79	27	12	3	46	2	2	1	4	-	-	1	-	1	18
							EXTERNAL RADIAL								
							Palisade trench								
Trench S	8	4	2	-	5	-	-	-	-	-	-	-	-	?1	1
							STRUCTURE 1								
Outer ring	7	3	2	-	5	-	-	-	-	-	-	-	-	-	1
Inner ring	48	18	2	1	31	2	?1	1	1	-	-	-	-	3	8
Total	55	19	4	1	36	2	?1	1	1	-	-	-	-	3	9
							STRUCTURE 2								
Context 5007	73	16	7	3	29	5	1	-	2 + ?1	-	-	-	-	-	31
Outer ring	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-
Context 5011	7	3	-	-	5	-	-	-	-	-	-	-	-	-	-
Inner ring	187	29	10	1	92	1	-	-	-	-	-	9	-	3	39
Rectang. post set.	1	1	-	-	2	-	-	-	-	-	-	-	-	-	-
Subsoil	5	3	-	-	4	-	-	-	-	-	-	1	-	1	-
Total	273	45	17	4	133	6	1	-	2 + ?1	-	-	10	-	4	70
							STRUCTURE 3								
Outer ring	4	3	-	-	3	-	-	-	-	-	-	-	-	-	1
Interior	1	1	-	-	?1	-	-	-	-	-	-	-	-	-	-
Total	5	4	-	-	4	-	-	-	-	-	-	-	-	-	1
TOTAL	**501**	**124**	**37**	**9**	**277**	**10**	**6+ ?1**	**3 + ?1**	**10 + ?1**	**1**	**1**	**13**	**0.0**	**7**	**104**

excavation) of a thin-walled vessel, from a postpipe.

Vessel M/20 (fabric: sparse-moderate grog). Sherd (5 mm thick) from uppermost layers.

TRENCH T

Vessel T/1 (fabric: moderate shell and moderate chalk). Large vessel (*c.* 30 cm diameter) with thick walls and a vertical cordon (fig. 62, 30). This sherd came from 0.7 m below the subsoil in the packing. A second small fragment came from near the bottom of the palisade. The sherds have white coating.

Vessel T/2 (fabric: moderate grog). Large vessel with flat-topped rim (fig. 62, 31) and a diameter of *c.* 20 cm. This came from the top of the postpipes, whereas a second part of the rim came from the packing.

Vessel T/3 (fabric: moderate grog). Large vessel with internally expanded rim, a horizontal cordon (fig. 62, 32) and a diameter of *c.* 18 cm. This came from the bottom of the packing. Also from this vessel is a cordoned sherd and a plain sherd.

Vessel T/4 (fabric: common grog). At least one large diameter vessel (c. 20 cm) with thick walls, wavy cordons (fig. 62, 33a-b), and irregular closely spaced vertical cordons (fig. 62, 33c). The sherds occur in a range of contexts, from just below the level of the subsoil in the weathering cone, to the packing, and also well down the postpipes. One sherd has a white coating.

Vessel T/5 (fabric: common grog). Sherd of ill-fired fabric (10 mm thick) from 0.65 m below subsoil level in the weathering cone.

TRENCH BB

Vessel BB/1 (fabric: sparse sand and sparse flint/quartz). Mortlake Ware rim (fig. 62, 34). The lowest decoration on the interior is a horizontal line of wedge shapes probably formed by a bone with bifid-shaped end. Above this the same tool may have been used at a more acute angle producing a horizontal line of more closely spaced bone impressions. On the rim-top are wedge-shaped impressions arranged in two irregular circumferential lines. On the exterior body are two bone impressions. The sherd was recovered heavily abraded, from context 7004).

Vessel BB/2 (fabric: rare-sparse sand and sparse grog). A singularly pale red/orange coloured base-angle (fig. 62, 35), 7 cm diameter, from the packing (context 7006) of the palisade trench.

TRENCH CC

Vessel CC/1 (rare-sparse sand and common grog). Simple rim (fig. 62, 36) from deep in the packing (context 8003) of the palisade trench. Diameter *c.* 16–20 cm.

Vessel CC/2 (fabric: sparse grog and rare-sparse shell). A base-angle from a large diameter vessel. The orientation of the illustration (fig. 62, 37) is tentative. Much of the exterior damage appears to be due to excavation, and probably the sherd would have been more impressive when buried. It came from the side of a postpipe deep in the trench (context 8009).

OUTER RADIAL DITCH 1: TRENCH S

Finds came either from the packing or the postpipes. The context of the sherds within the postpipes is not recorded in this instance, but presumably they share the packing/pipe junction of most of the animal bone.

Vessel S/1 (fabric: grog). A detached cordon from a postpipe.

Vessel S/2 (fabric: sparse-moderate grog). Rim with a diagonal cordon (fig. 62, 38) and a diameter of *c.* 16 cm. This sherd was re-assembled from sherds separated by 0.3 m in the postpipe. The two lowest fragments seem too insignificant for a deliberate placement; they might have been moved down by post-depositional movement.

Vessel S/3 (fabric: sparse grog and moderate voids). Possible internal surface of a rim (fig. 62, 39), with an internal diameter of *c.* 14 cm, from a postpipe.

Vessel S/4 (fabric: ?). Seven ill-fired sherds (11 mm thick) perhaps reflecting a single sherd before excavation. One sherd is either a fragment of base-angle or cordon, and another appears to come from just above the base-angle. They came from deep in the packing of a postpipe.

STRUCTURE 1: TRENCH Y

All the pottery came from the inner ditch unless stated.

Vessel Y/1 (fabric: sparse-moderate grog). A thin-walled sherd (fig. 63, 40) in a particularly smooth finish, from a vessel with a *c.* 12 cm diameter. It is decorated with a horizontal cordon which has wedge-shaped impressions on the upper half. This came from 4053, 1.15m deep. A plain sherd came from the same depth, but could belong to another vessel.

Vessel Y/2 (fabric: sparse-moderate grog). Thin-walled sherd from the lower upper fill, but below most of the Saxon pottery.

Vessel Y/3 (fabric: moderate sand). Simple rim (fig. 63, 41), diameter of *c.* 12 cm, from the upper ditch fill.

Vessel Y/4 (fabric: moderate grog). Two thin-walled sherds. One (fig. 63, 42a) has a vertical cordon, with a single possible incision across. To one side of the cordon is a possible low horizontal cordon. The second sherd (fig. 63, 42b) has a linear mark, perhaps a grass impression. It is not clear if this is the internal or exterior surface. Both sherds were found near the ditch edge. A small sherd may belong to the same vessel and came from the lower fill.

Vessel Y/5 (fabric: moderate grog). This is a simple rim (fig. 63, 43a), but it is not clear if the interior surface is correctly illustrated. Another sherd (fig. 63, 43b) has a horizontal cordon. Both of these and another three plain sherds came from close together from near the top of the packing in the outer ditch. The diameter was *c.* 30 cm. From the top of the inner ditch, was a vertical cordon (fig. 63, 43c). It is very fresh-looking and presumably came from the fill against the ditch side. The variation in this sherd's colour suggests it could belong to a second vessel.

Vessel Y/6 (fabric: moderate grog). T-shaped rim (fig. 63, 44) and four plain sherds. It is not clear if there was decoration originally on top of the rim as the fabric is extremely soft and the pitting on the top may be damage. The rim came from the weathering cone of the outer ditch, as did a body sherd. Three more sherds came from the upper fill of the inner ditch.

Vessel Y/7 (fabric: moderate grog). Sherd (fig. 63, 45) with horizontal twisted cord and a diagonal twisted cord line

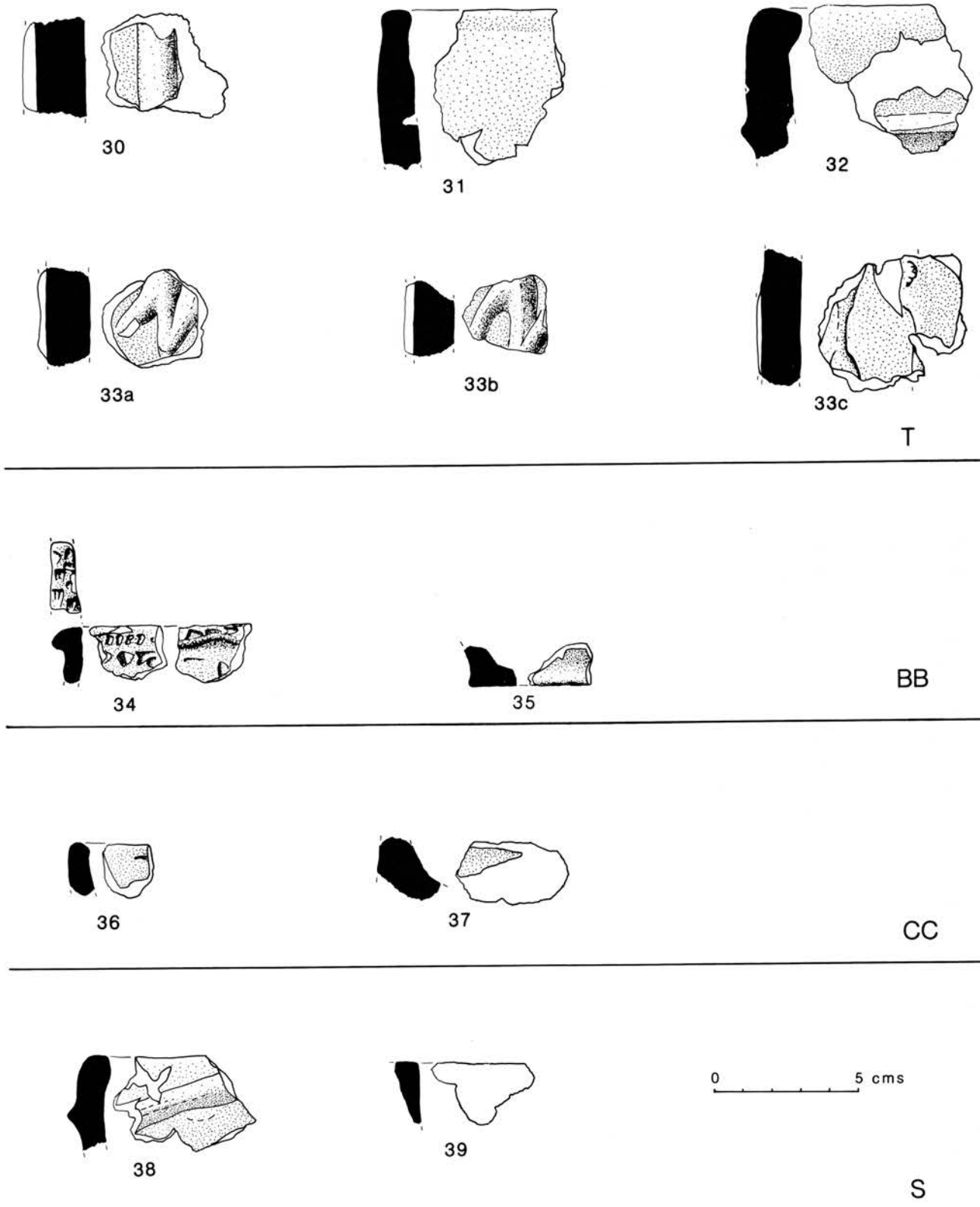

Fig. 62 Grooved Ware pottery and one Mortlake rimsherd (no. 34) from enclosure 2 (trenches as indicated)

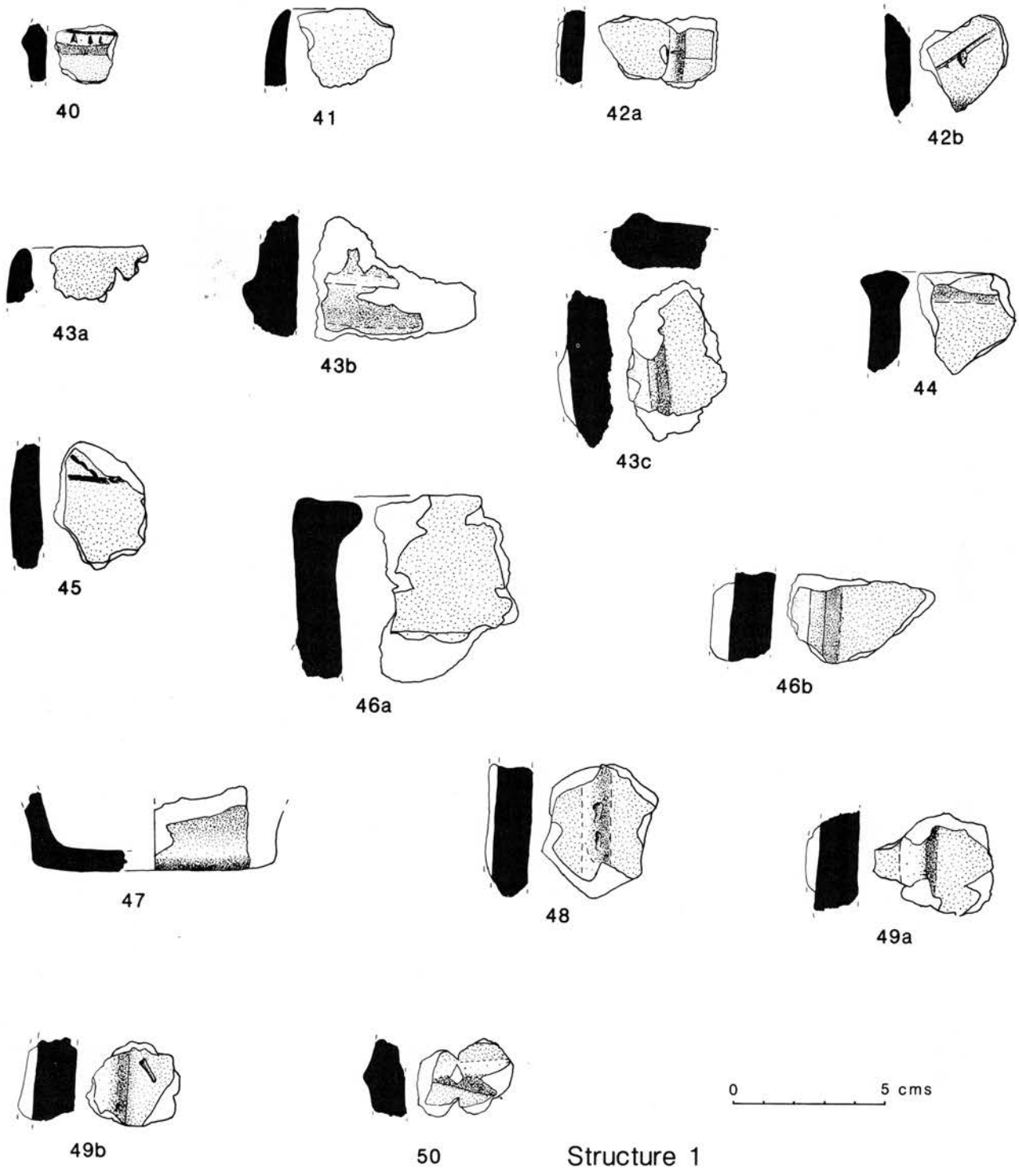

Fig. 63 Grooved Ware pottery from Structure 1, enclosure 2 (Trench Y)

above. This came from the secondary fill. A plain sherd came from the lower fill, but this could reflect a second vessel.

Vessel Y/8 (fabric: sparse sand and sparse-moderate grog). Rim (fig. 63, 46a) with internal expansion and horizontal cordon, from a vessel of diameter *c.* 25 cm. This came from the lower part of the upper fill (4025) below the level of the Saxon pottery. The second sherd (fig. 63, 46b) has a vertical cordon, but variation in colour suggests this might be from a second vessel. This came from the secondary fill (4026). There were an additional four plain sherds from 4026, and the contexts below, and a detached cordon from the upper fill at the ditch edge. One sherd has a white coating.

Vessel Y/9 (fabric: sparse grog and common shell). Base-angle (fig. 63, 47) from the lower upper silt.

Vessel Y/10 (fabric: moderate grog). Sherd with a vertical cordon (fig. 63, 48) from the lower fill. It is not clear if the marks on the cordon are decoration or accidental.

Vessel Y/11 (fabric: moderate grog). Two sherds with vertical cordons (fig. 63, 49a-b) which came from the bone deposit in the lower fill. One sherd has traces of a white coating.

Vessel Y/12 (fabric: common shell and sparse voids). Three body sherds (10 mm thick) from the lower upper silt and below.

Vessel Y/13 (fabric: moderate grog). Two body sherds (10 mm thick) including one measuring 105 by 105 mm. These sherds are similar to those recorded as Saxon, but one sherd came from a feature (4046) in the secondary fill, below the level at which Saxon pottery occurs.

Vessel Y/14 (fabric: sparse sand and sparse-moderate grog). Very thick sherd (18 mm thick) from the packing (4028) of the outer ditch.

Vessel Y/15 (fabric: moderate grog). Sherd with cordon (fig. 63, 50), orientation uncertain, from the lower upper fill. There were two sherds from 4048 in the secondary fill.

Vessel Y/16 (fabric: moderate grog). Two sherds (*c.* 6 mm thick), one from the bone deposit in the lower fill, and the other from the secondary fill.

Vessel Y/17 (fabric: sparse grog and sparse voids). Sherd (10 mm thick) from the lower part of the upper fill.

Vessel Y/18 (fabric: moderate grog). Three sherds (9 mm thick) from the same location in the upper fill, perhaps representing an open bowl.

Vessel Y/19 (fabric: rare-sparse sand and moderate grog). Four sherds (7 mm thick) from the upper fill (same finds number as Vessel Y/18).

STRUCTURE 2 (TRENCH Z)

Only Vessel Z/20 came from the outer ditch.

Vessel Z/1 (fabric: common grog). Probably an open vessel with flat-topped rim (fig. 64, 51a), and vertical (fig. 64, 51b, e) and horizontal cordons (64, 51b). The cordons are decorated with finger-tip impressions. The rest of the vessel exterior seems to be decorated with vertical fingernail impressions (fig. 64, 51b-f). Only the rim lacks fingernail impressions, which could suggest the upper part of the vessel (perhaps above a horizontal cordon) was plain. However, it not certain that the rim sherd belongs to this vessel, as it occurs away from the main scatter of Vessel Z/1 sherds. Most of the pottery came from 5078 (postpipe), but is recorded as coming from the packing. One sherd has a white coating on the exterior and others show traces of it having been washed off.

Vessel Z/2 (fabric: moderate grog and rare-moderate shell). Large diameter vessel with vertical cordons (fig. 64, 52a-d). There is variation in the profile of the cordons, and in the colour/texture of the sherds, and perhaps three vessels could be represented. The majority of the sherds came from the packing around postpipe 5078. Two sherds have an external white coating.

Vessel Z/3 (fabric: moderate grog). This is an open bowl (fig. 63, 53), very poorly fired, with no sign of base-sherds, so a round bottom is feasible. With a single exception all the sherds came from the eastern postpit of the entrance (contexts 5059, 5107), and are clearly primary.

Vessel Z/4 (fabric: moderate grog). Two thick-walled sherds (18 mm), one of which has a cordon perhaps decorated with fingernail (fig. 63, 54). This sherd came from mid-way down a postpipe (5059).

Vessel Z/5 (fabric: common shell). Single thin-walled sherd (6 mm thick) from high in the packing of a postpipe (5061).

Vessel Z/6 (fabric: moderate grog). Thin-walled sherds (*c.*6mm) with rim (fig. 64, 55). Most of the sherds came from the eastern postpit of the entrance (5066, 5084, 5085, 5107) from low in the packing.

Vessel Z/7 (fabric: rare-sparse sand and moderate grog). Thin walled sherd (*c.* 6 mm) from an upper context.

Vessel Z/8 (fabric: rare-sparse sand and moderate grog). Vessel with vertical cordons (fig. 64, 56a-c). Two sherds with external white coating. Most sherds seem to have come from the south-west of the inner ring, with some sherds from the packing of 5061.

Vessel Z/9 (fabric: sparse sand and sparse flint). Two sherds, heavily flint-tempered, one with possible cordon (fig. 64, 57). The latter came from 1m down in a postpipe (5070), appears to be abraded, and thus is likely to be primary. The density of flint-temper is unique for local Grooved Ware, though the sherd appears dissimilar to local Early Neolithic pottery; neither is it obviously Peterborough Ware in form.

Vessel Z/10 (fabric: common grog and rare-sparse shell). There is a base-angle (fig. 65, 58a), a horizontal cordon (fig. 65, 58b-d), though one may be a boss (fig. 65, 58d), from a large diameter vessel. Most of the sherds appear to come from the weathering cone, but a few came from the upper fill of postpipes 5061 and 5063. Almost all the sherds came from the south-west of the post ring.

Vessel Z/11 (fabric: common grog). A large fresh sherd (fig. 65, 59) with multiple vertical cordons from the packing (5089). Diameter of *c.* 30 cm.

Vessel Z/12 (fabric: moderate grog). Two plain sherds (10 mm thick).

Vessel Z/13 (fabric: rare-sparse sand and common grog). Six very thick sherds (*c.* 17 mm). One is notably thicker on one edge and could be near a base or have had a cordon. This sherd came from an external posthole (5027). The remaining sherds came from the subsoil west of the rectangular posthole structure (5003).

Vessel Z/14 (fabric: rare-sparse sand and common grog). Tiny fragment with fingernail impression from an upper context.

Vessel Z/15 (fabric: sparse sand and sparse shell). It is

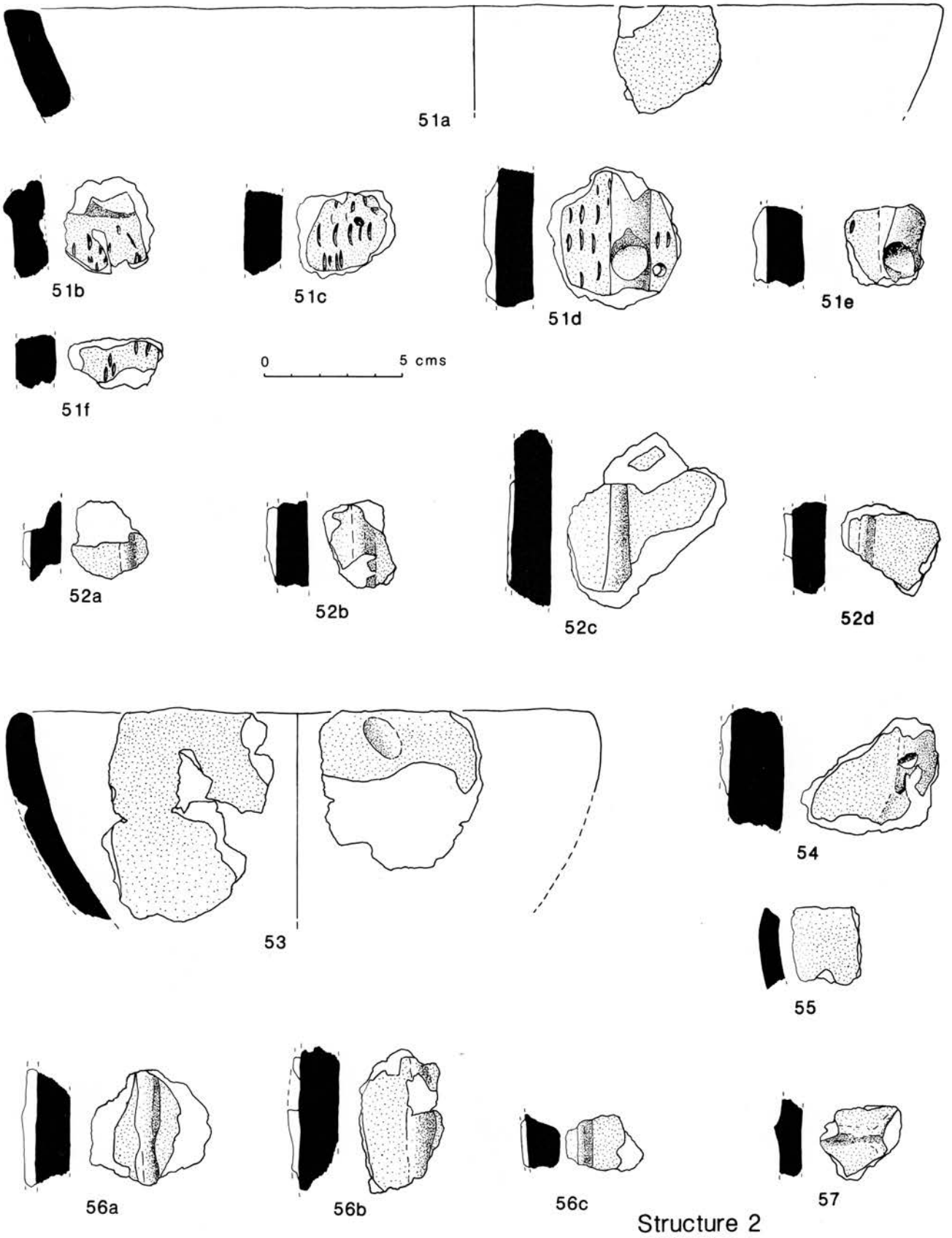

Fig. 64 Grooved Ware pottery from Structure 2, enclosure 2 (Trench Z)

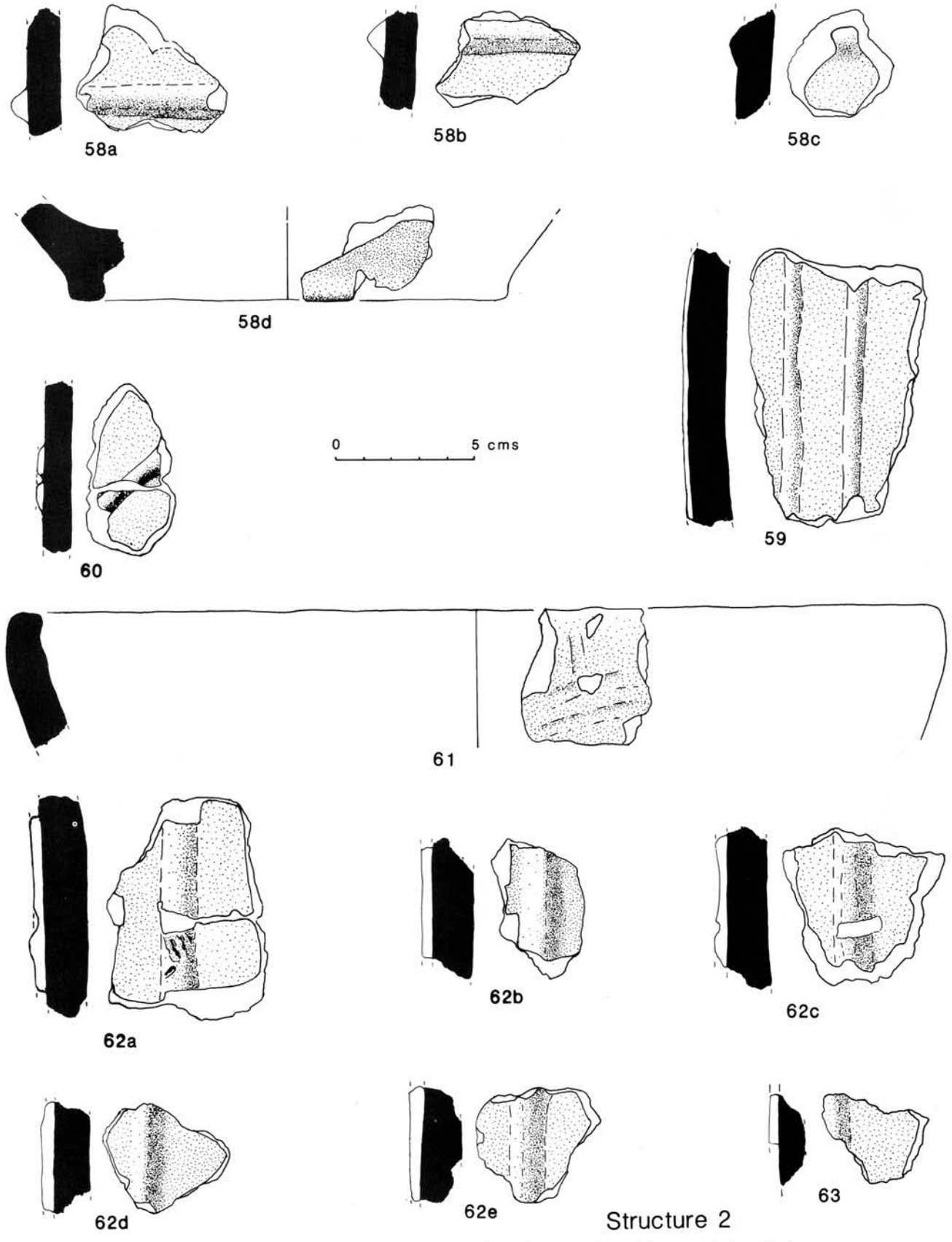

Fig. 65 Grooved Ware pottery from Structure 2, enclosure 2 (Trench Z)

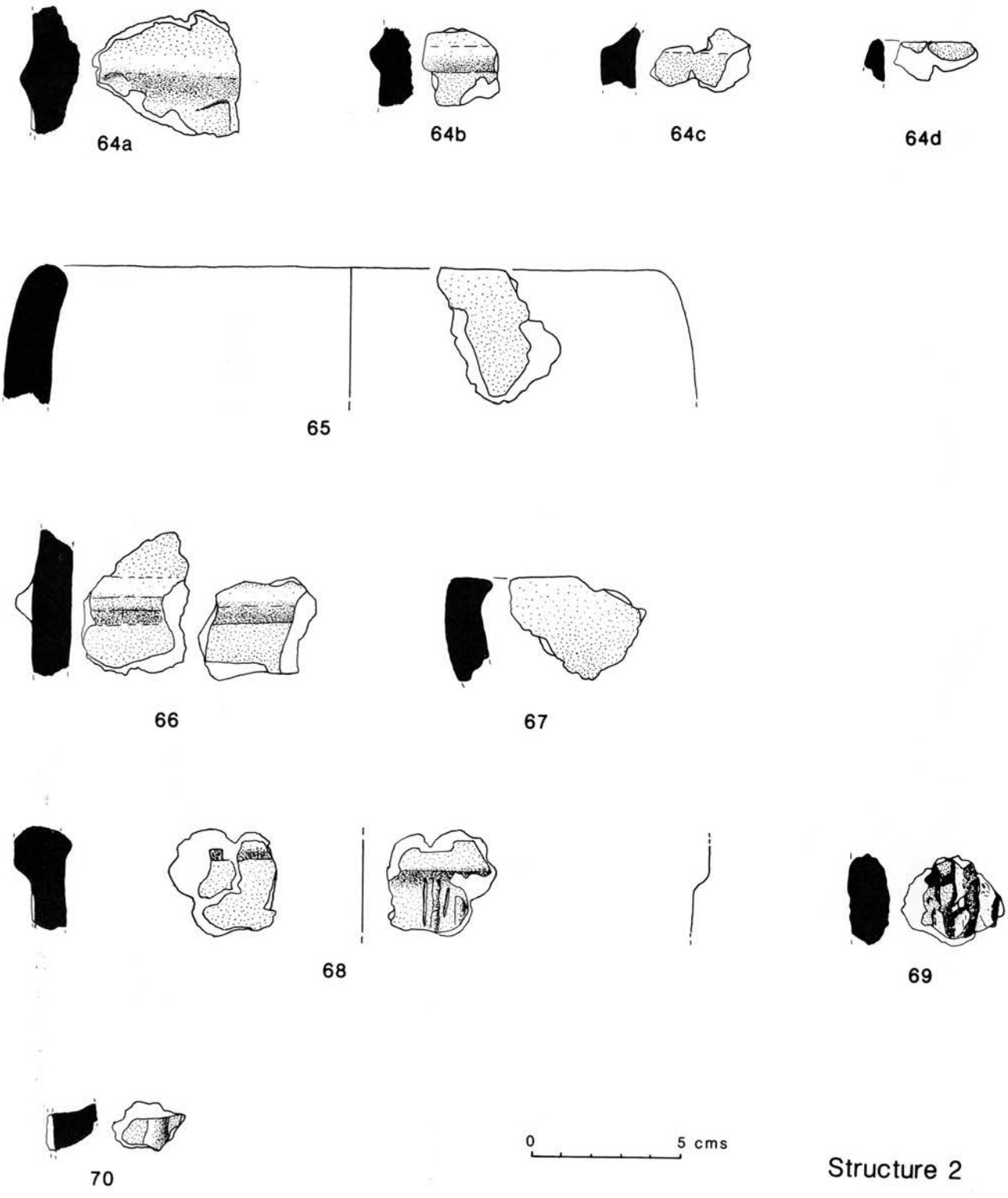

Fig. 66 Grooved Ware pottery from Structure 2, enclosure 2 (Trench Z)

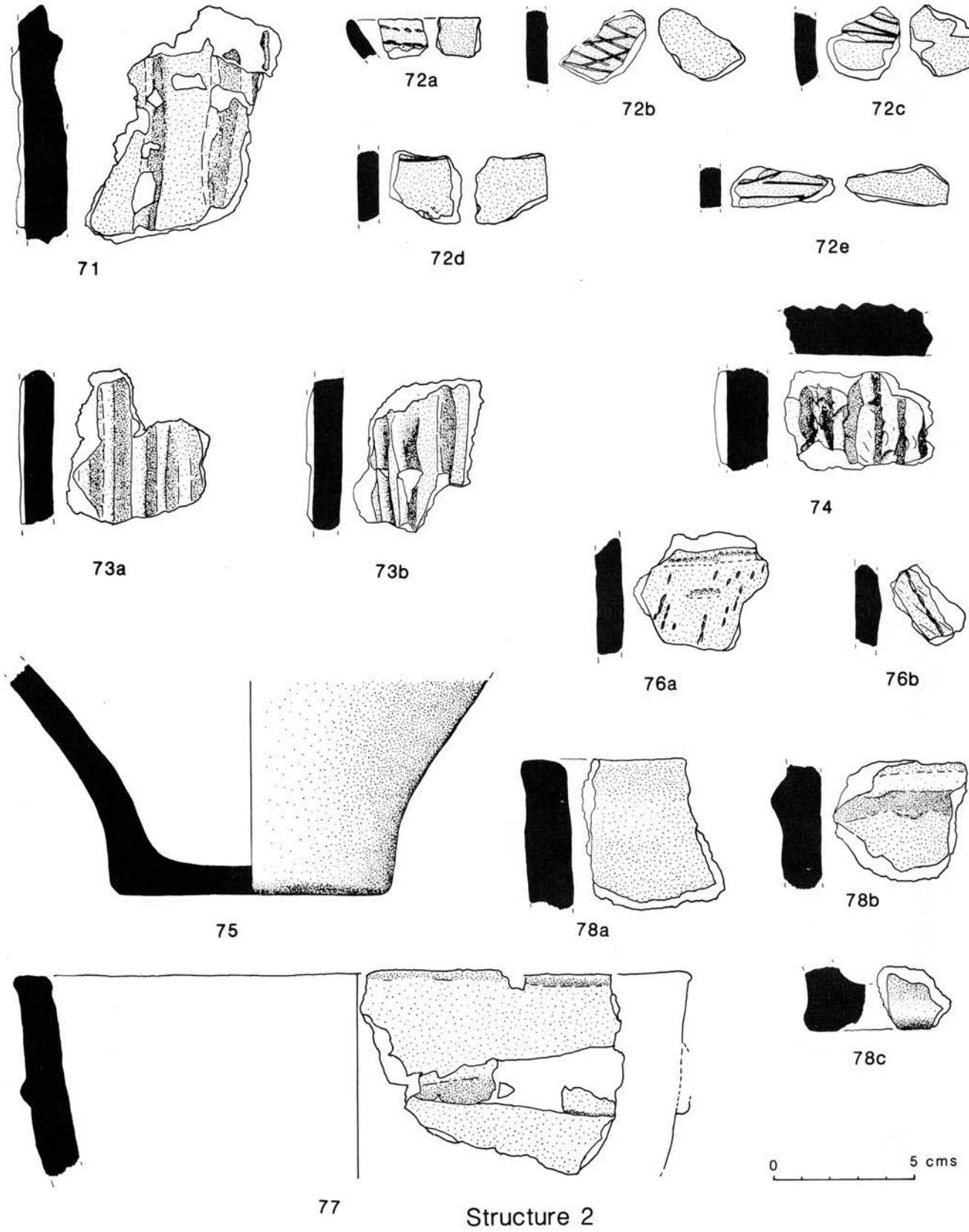

Fig. 67 Grooved Ware pottery from Structure 2, enclosure 2 (Trench Z)

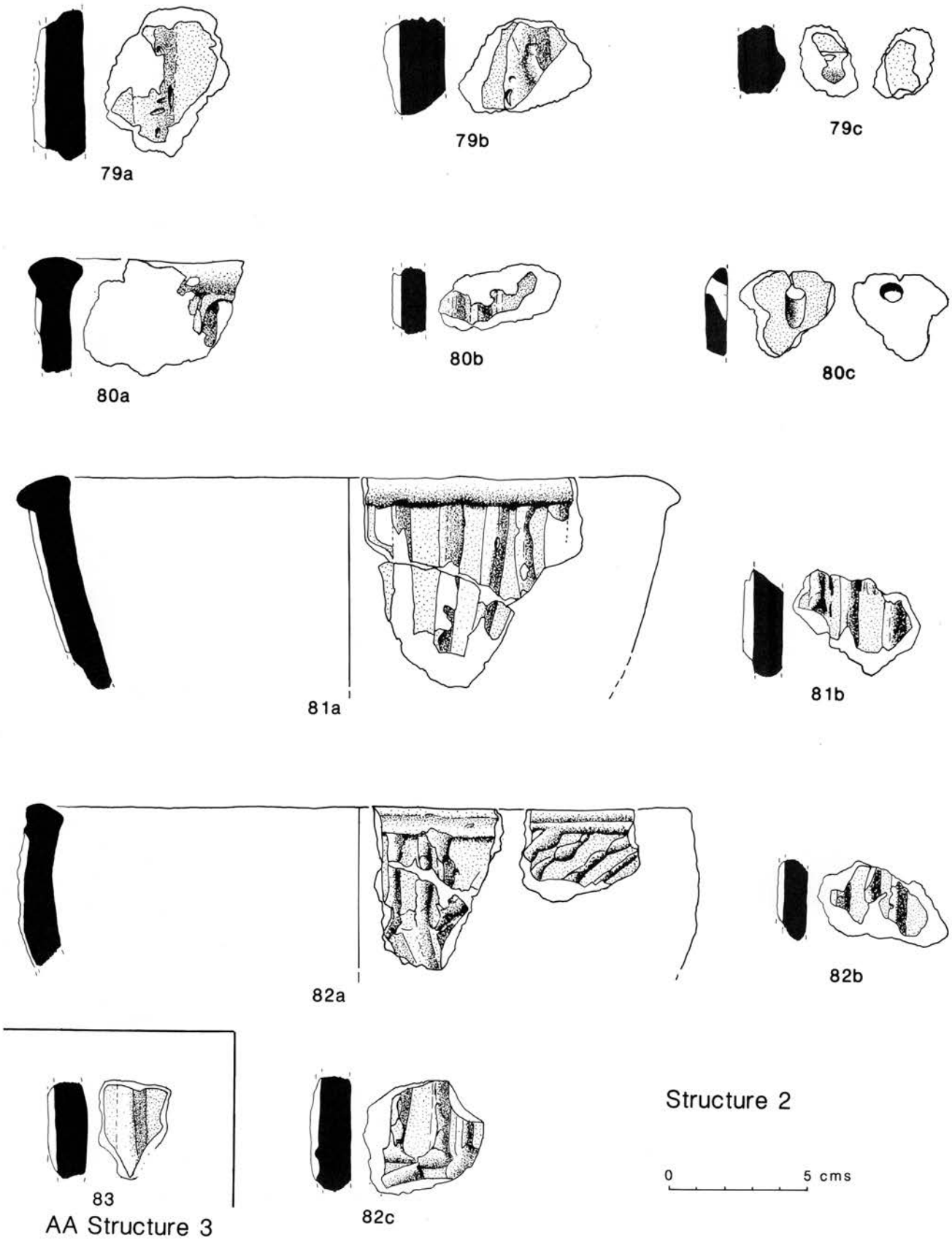

Fig. 68 79a–82c: Grooved Ware pottery from Structure 2, enclosure 2 (Trench Z); 83: Structure 3, enclosure 2 (Trench AA)

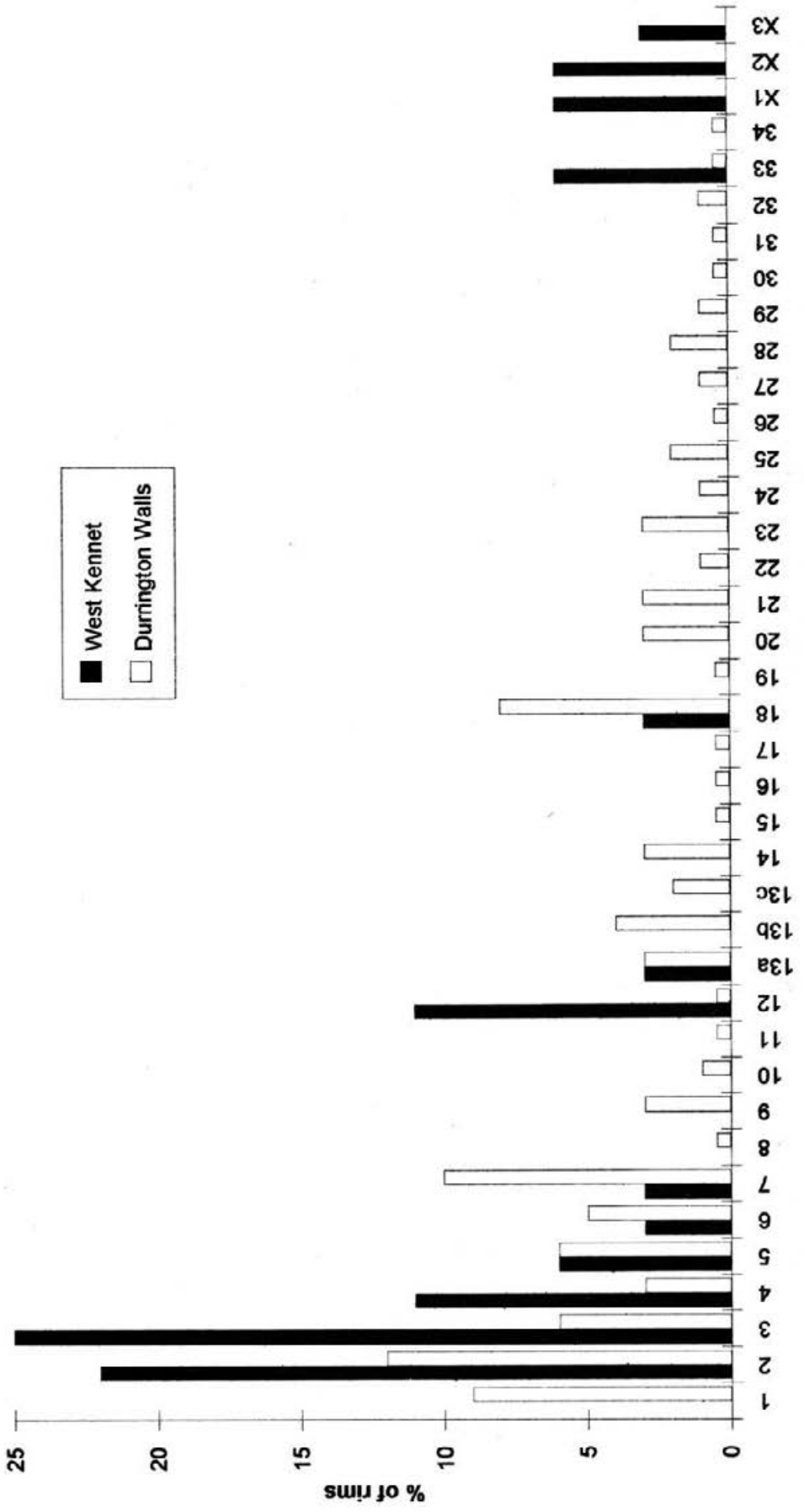

Fig. 69 Analysis of rim forms (following Longworth 1971a) with the addition of X1–X3. X1: T-shaped; X2: open flat-topped; X3: open simple

not clear if the one sherd assigned to this vessel (fig. 65, 60) is a horizontal or diagonal cordon. It came from an upper context.

Vessel Z/16 (fabric: moderate-common sand). Four sand-tempered abraded plain sherds from upper fill.

Vessel Z/17 (fabric: moderate grog). A rim (fig. 65, 61) from the packing of postpipe 5078, and two body sherds from upper contexts.

Vessel Z/18 (fabric: sparse sand and common grog). Sherds with vertical cordons (fig. 65, 62a-e) and one plain sherd, mostly from the packing of 5078. One sherd has external white coating, and there is clear evidence that this was more common before pot washing.

Vessel Z/19 (fabric: moderate grog). Vertical cordon (fig. 65, 63), with external white coating, from the packing of 5078.

Vessel Z/20 (fabric: moderate grog). Similar to Z/6 but clearly a different vessel (6 mm thick). This came from the packing of the outer ditch.

Vessel Z/21 (fabric:?). Two sherds with horizontal cordons (fig. 66, 64a-b) and many plain sherds. There also appear to be a carination/rim (fig. 66, 64c) and a rim (fig. 66, 64d). The sherds are extremely fragile. The largest sherd came from the packing of postpipe 5078.

Vessel Z/22 (fabric:?). A rim (fig. 66, 65) from the weathering cone.

Vessel Z/23 (fabric: rare-sparse sand and common grog). Two horizontal cordons (fig. 66, 66) plus plain sherds and small fragments of cordons. Most sherds came from the weathering cone of the south-west part of the inner ring.

Vessel Z/24 (fabric: common grog). Rim (fig. 66, 67) from high in the fill of postpipe 5058.

Vessel Z/25 (fabric: rare-sparse sand). Collared sherd (fig. 66, 68) from upper fill of postpipe 5063. Below the collar appear to be vertical fingernail and pinched-up vertical cordons. The interior either has a horizontal cordon or begins to thicken. It is possible that this sherd came from near the rim-top. There is a plain sherd possibly in this fabric.

Vessel Z/26 (fabric:?). Very brittle, with lines of fingernail, creating narrow closely spaced cordons, either horizontal or vertical (fig. 66, 69). This came from the top of postpipe 5076.

Vessel Z/27 (fabric: sparse shell and sparse grog). Sherd perhaps decorated or just heavily abraded, from high in postpipe 5069.

Vessel Z/28 (fabric: moderate sand and sparse shell). Cordoned sherd (fig. 66, 70) from deep in postpipe packing (5085).

Vessel Z/29 (fabric: sparse sand and moderate grog). Two plain sherds from near the top of postpipe 5057.

Vessel Z/30 (fabric: moderate grog). One unillustrated sherd from the near the top of postpipe 5059, and another deep in the packing. These sherds are remarkably similar in appearance (finish, texture, fracture, colour) to Vessel Z/30, but the fabric is different.

BONE DEPOSIT 5007

Vessels Z/35, Z/36, Z/38 and sherds from Z/32 and Z/37 were found together and separated in the laboratory. These sherds clearly represent a single depositional event.

Vessel Z/31 (fabric:?). Sherd with vertical cordons (fig.

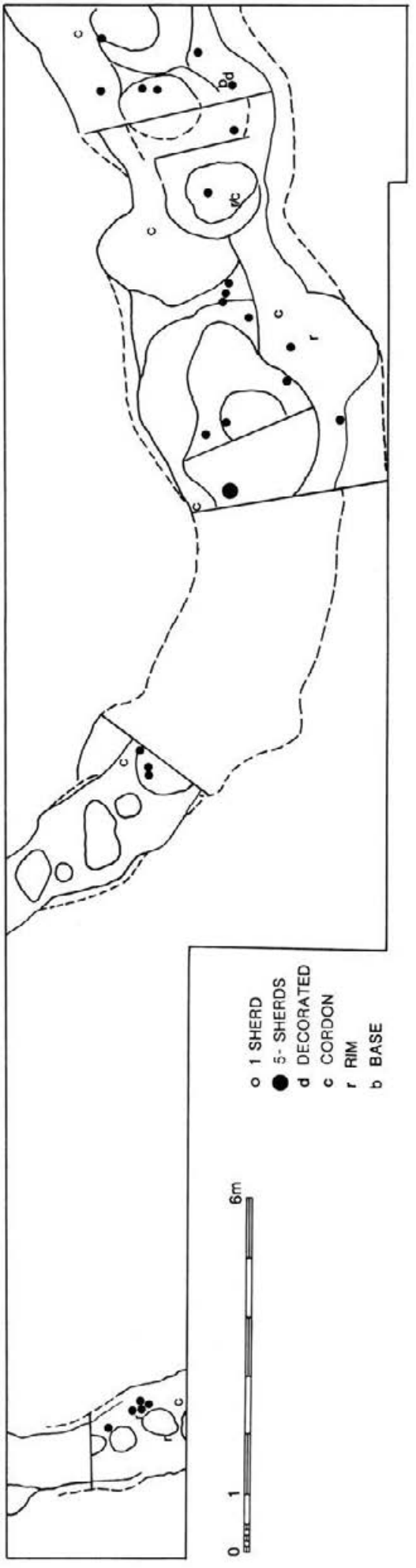

Fig. 70 The distribution of Grooved Ware in Structure 1, enclosure 2 (Trench Y)

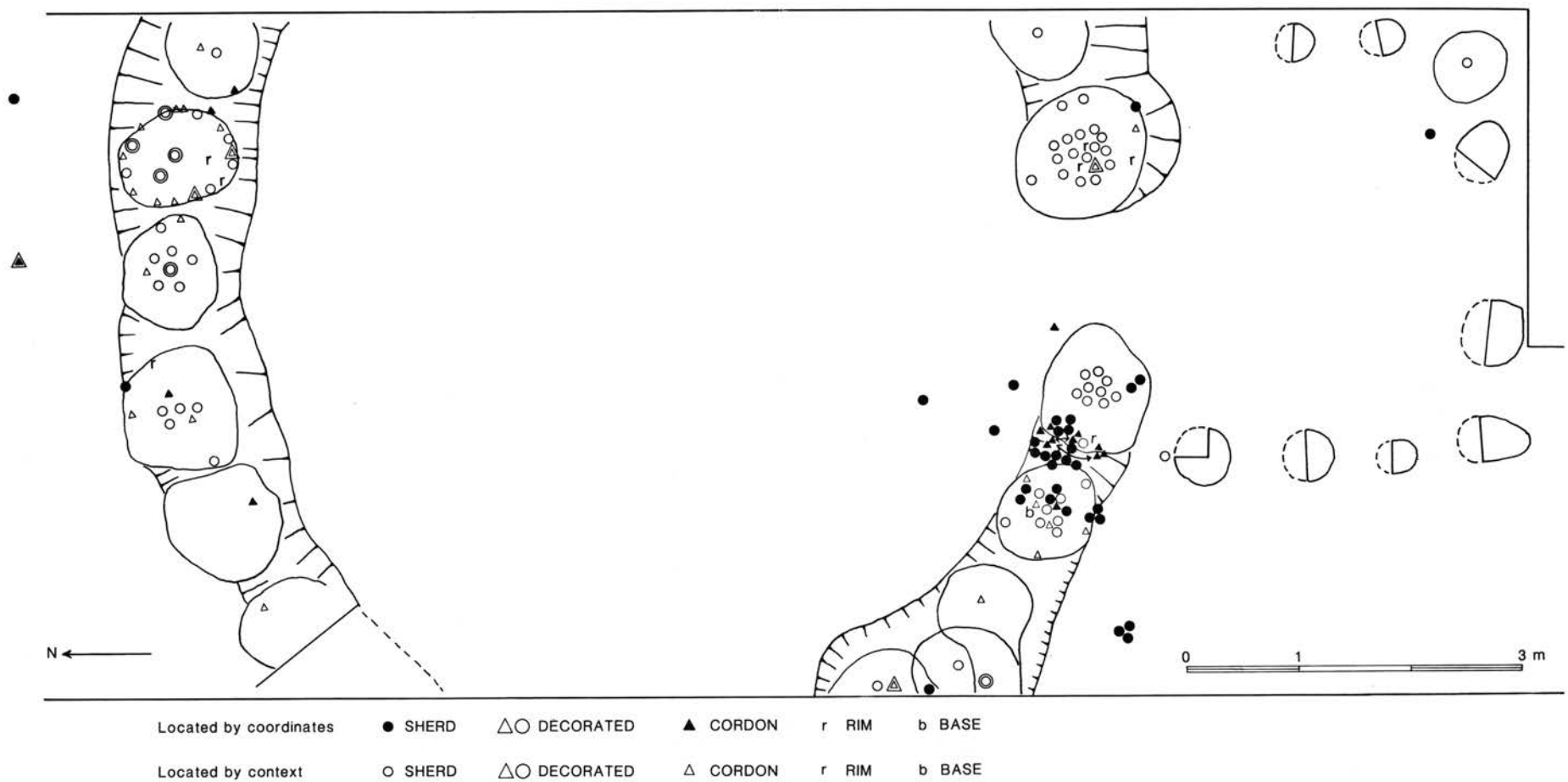

Fig. 71 The distribution of Grooved Ware in Structure 2, enclosure 2 (Trench Z)

67, 71). The sherd is more crumbly than Vessel Z/11 but is perhaps the same vessel.

Vessel Z/32 (fabric: sparse sand and sparse grog). Sherd with internal incised decoration (fig. 67, 72b-e). A rim sherd has two rows of fine twisted cord on the interior (fig.67, 72a).

Vessel Z/33 (fabric: common shell). Three fragile sherds with closely spaced vertical cordons (fig. 67, 73a-b).

Vessel Z/34 (fabric: moderate grog). One sherd with closely spaced vertical cordons (fig. 67, 74).

Vessel Z/35 (fabric: moderate grog and moderate shell). This represents over half of a base (fig. 67, 75).

Vessel Z/36 (fabric: moderate grog). Two sherds probably from the same vessel. One sherd has a horizontal groove (perhaps formed by impressions), with intermittent oblique lines below (technique uncertain) and possibly a horizontal impression (fig. 76, 76a). There may be other faint oblique lines creating a lattice motif. The second sherd has diagonal cord impressions, with fine incision running across (fig. 76, 76b). Both sherds have traces of a white coating.

Vessel Z/37 (fabric: moderate sand). Two plain sherds (9–10 mm thick).

Vessel Z/38 (fabric: common grog). Plain sherd, but perhaps near cordon (15 mm thickness).

Vessel Z/39 (fabric:?). Large rim sherd with horizontal cordon (fig. 67, 77). There is also a large plain sherd from the same vessel (100 by 75 mm) with traces of white coating.

Vessel Z/40 (fabric:?). A rim (fig. 67, 78a), horizontal cordon (fig. 67, 78b), and base-sherd (fig. 67, 78c), all with traces of external white coating.

Vessel Z/41 (fabric: sparse sand and common grog). The majority of sherds reflect very thick sherds with vertical cordons (fig. 68, 79a-b). There is another sherd which could be the same vessel and appears to have a narrow cordon, but the orientation of this, and whether it is exterior or interior, is not clear.

Vessel Z/42 (fabric:?). T-shaped rim sherd with closely spaced vertical cordons (fig. 68, 80a), three other sherds with closely spaced vertical cordons (one illustrated, fig. 68, 80b) and an abraded sherd with a hole made after firing.

Vessel Z/43 (fabric:?). Externally expanded rim with closely spaced vertical cordons (fig. 66, 81a), other sherd with closely spaced vertical cordons (fig. 66, 81b), and two other sherds.

Vessel Z/44 (fabric: sparse shell). Externally expanded rim, a horizontal cordon below the rim, and vertical and diagonal cordons below that (fig. 68, 82a). Other sherds include vertical cordons (fig. 68, 82b) and diagonal and vertical cordons (fig. 68, 82c).

Vessel Z/45 (fabric: sparse sand and common grog). Ten plain sherds, some with white coating.

STRUCTURE 3: TRENCH AA

Vessel AA/1 (fabric: common sand and sparse grog). Sherd with a vertical cordon (fig. 68, 83) and a diameter of *c.* 18 cm. This occurred half way down the packing of the outer ditch. A plain sherd occurred higher up.

Vessel AA/2 (fabric: moderate grog). A plain, ill-fired, and probably thick-walled sherd occurred in one of the postpipes of the outer ditch.

Vessel AA/3 (fabric: moderate grog). A thick, possible Grooved Ware sherd, possibly from just above the base-angle. It occurred in the subsoil between the outer ditch and the inner circle.

Vessel AA/4 (fabric: moderate grog and moderate shell). A small plain thin-walled sherd, from deep in a postpipe in the outer ditch.

Discussion

ELEMENTS OF GROOVED WARE STYLE

Vertical and horizontal cordons. Plain vertical or horizontal cordons are the most typical decoration at West Kennet. Most of the vertical cordons appear to be well spaced, and this is typical of the later Wiltshire Grooved Ware assemblages. However, at West Kennet there is also a high incidence of very closely spaced vertical cordons (fig. 67, 73–4), a phenomenon which appears rare in south Wiltshire and at Marden (Longworth 1971b). At Durrington Walls similar sherds occurred in the lowest fill of the ditch (Longworth 1971a, P26, P35) and were dated by three radiocarbon dates which indicated deposition in the mid-third millennium BC.

I have suggested elsewhere (Hamilton 1995; Hamilton and Whittle forthcoming) that a chronological sub-division might be possible within Wessex Grooved Ware, largely on the presence or absence of vertical decoration. Though there appears to be more use of horizontal cordons at West Kennet than recorded at Durrington Walls (Longworth 1971a), the high numbers of vertical cordons correspond with the later Grooved Ware tradition. The West Kennet radiocarbon dates correspond to a later Grooved Ware tradition spanning 2650–2300/2200BC (Hamilton 1995).

Wavy cordons. Wavy cordons (fig. 62, 33a-b) are a regular but rare component of the later Grooved Ware assemblages (e.g. Durrington Walls: Longworth 1971a, P58; Down Farm: Cleal 1991, P35; Coneybury Henge: Ellison 1990, P60). The West Kennet sherds appear to be the only examples from north Wiltshire.

Grooves/incisions. Grooves and incisions are very rare. One of the characteristics of contemporary assemblages in Wiltshire is the use of incisions/grooves to create opposed line/filled triangle motifs. Only Vessel H/9 (fig. 60, 8a, in a pit separate from the main pottery assemblages), has an opposed line motif.

The only other main use of grooving/incision is on the distinctive internally decorated Grooved Ware bowls (fig. 61, 23 and fig. 67, 72). A list of these is given by Cleal (1991, 142), to which must now be added West Kennet and the unpublished sherds from Amesbury G58 (Ashbee 1984; Hamilton 1995). These vessels display considerable similarity in style, but are widely distributed in southern Britain and have no conformity of context. Within Wessex such pottery occurs largely in henges, but in part this may simply reflect the bias of excavations.

It is notable that there is no use of vertical grooves to create panels in the manner that vertical cordons are utilised, yet this occurs nearby at the West Kennet long barrow (Piggott 1962, R1) and at Windmill Hill (unpublished sherd from Outer Ditch Ib).

Twisted cord. The use of twisted cord has been identified on a number of Grooved Ware sites, and Wainwright and Longworth (1971, 240) argued that this was limited to their

Durrington Walls sub-style, and indeed constitutes a diagnostic feature of such Grooved Ware. Twisted cord is usually utilised for continuous horizontal lines below the rim either externally (fig. 61, 17 and 18) or internally (fig. 67, 72a).

However, at West Kennet twisted cord is put to more complex uses. Vessel H/14 (fig. 60, 13a) appears to show a net or lattice motif. Any sort of lattice motif is rare on Grooved Ware, especially when in twisted cord. The best parallel is from the South Circle, Durrington Walls (Longworth 1971a, P470) where the sherd also features a spiral pattern, and which Cleal (1991, 142) has argued may have been deliberately deposited at the entrance for symbolic reasons.

The motif of Vessel H/3 (fig. 60, 18) is incomplete but may have originally been a rectangular or key pattern. Such motifs would be unique in twisted cord, but did occur at Marden in whipped cord (Longworth 1971b, P39) and perhaps in cordons elsewhere in north Wiltshire (West Overton G6a (Smith and Simpson 1966, fig 8.4, 8.8, 8.11, 8.15) and an unpublished sherd from the Sanctuary). Indeed rectangular motifs may be a characteristic of north Wiltshire Grooved Ware, though Smith (1985) recorded other rectangular motifs, mostly grooved, from southern Britain.

Another uncommon use of twisted cord is the production of triangular motifs (fig. 63, 45). However, this can be matched at Durrington Walls (Longworth 1971a, P397A).

Vessel M/8 (fig. 61, 23a) shows twisted cord in association with internally decorated Grooved Ware. This combination appears to be unique, though the location of the twisted cord, in horizontal lines, on the exterior, below the rim, can be matched in incised decoration (Durrington Walls: Longworth 1971a, P452; Wyke Down: Cleal 1991, P188).

Whipped cord. The only whipped cord came from the 1970s pipeline watching brief (fig. 60, 1). Small amounts of such decoration seem to be typical of large late Grooved Ware assemblages (Smith 1985). Marden is the only other site in north Wiltshire to produce such material, though it may occur at Windmill Hill.

Comb. There is no square-toothed comb, typical of Beaker. While superficially two sherds from Trench H appear to have comb impression, one is made with a two-pronged tool (fig. 60, 7), and the other is abraded cord (fig. 60, 13c). The use of semi-denticulated comb is well demonstrated on Grooved Ware sites (Smith 1985), though the only other north Wiltshire site is an isolated pit from Black Patch, Pewsey (Annable 1977). This probably belongs to the later Grooved Ware tradition (Hamilton 1995).

Rustication. There is no plastic rustication except perhaps Vessel Z/26 (fig. 66, 69). However, this may have been the technique used in the creation of some of the sherds with closely spaced cordons (e.g. fig. 66, 73a-b). Light rustication occurs only occasionally, principally on Vessel M/1 (fig. 61, 16) and Vessel Z/1 (fig. 64, 51). This low occurrence of rustication is typical for Wessex Grooved Ware (Smith 1985) and it should be seen as a feature of later Grooved Ware.

Impressions. There is only one good example of the use of impressions in the assemblage, on Vessel H/2 (fig. 60, 5).

Rim-top decoration. The proportion of two examples of rim-top decoration out of 41 rims is comparable to that at Durrington Walls (18 out of 266 rims).

Lugs. One vessel has a unperforated lug (fig. 61, 20). Lugs are rare on north Wiltshire Grooved Ware, with a single example suggested for Marden (Longworth 1971b, P59). All the other examples for Wessex appear to be perforated (Durrington Walls, Longworth 1971a, 59). Unperforated lugs are recorded from elsewhere (Tye Field, Essex, Smith 1985, P84) but they are generally more prominent. One of the few parallels in Wessex would be the anomalous Peterborough Ware bowl from Easton Down (Stone 1933, plate V.1).

Rim form. In rim form the West Kennet assemblage differs markedly from that of Durrington Walls (fig. 69). The Durrington Walls assemblage is mostly closed (Longworth 1971a, 56), whereas the West Kennet assemblage is mostly open or neutral. It is notable that the Marden assemblage (Longworth 1971b) appears to be more open than the type-site, and this may be a feature of the north Wiltshire material.

If rim form is examined using the Longworth scheme (1971a, fig 20), it is clear that flat-topped and simple types are well represented at West Kennet (e.g. fig. 60, 4a and 11a). However, with the exception of Vessel H/16 (fig. 60, 15a), there is a lack of the complex and bevelled types (mostly type 13) which are so common at Durrington Walls. There are also internally expanded rims (e.g. fig. 63, 46a) which I have counted as Longworth type 12, and externally expanded rims (fig. 68, 81a and 82a), counted as type 33, when probably both rim forms should have been classified as something new. In either event the rim types were uncommon at Durrington Walls (1 percent), but together represent 15 percent of the West Kennet assemblage. There is also a high proportion of rim types which are absent from Durrington Walls. Most important are T-shaped rims (fig. 63, 44 and fig. 68, 80a), and open flat-topped (fig. 64, 51a) and open simple (fig. 67, 72a) types.

Drilled holes. There is a single example of a hole drilled after manufacture. This is not uncommon on Grooved Ware; such repairs could indicate that the vessels in question were not intended for liquids (Cleal 1988; 1991).

The function of West Kennet Grooved Ware

Some of the pottery was well prepared and fired, and comparable to Beaker or well made Collared Urn. However, a significant proportion was extremely poorly fired and was less hard than the dried soil adhering to the sherds. Any kind of cleaning was only possible with a sharp point. It is unlikely that such vessels could ever have contained fluids.

One particular group of vessels, with closely spaced vertical cordons (fig. 61, 21; fig. 66, 69; fig. 67, 73), seem especially soft and poorly fired.

Affinities of the West Kennet assemblage

West Kennet differs from the main Wessex late Grooved Ware assemblages because it is largely plain. It is notable at Durrington Walls that roughly 50 percent of the pottery is decorated, with a high frequency of grooves, incisions and impressions. At Marden the percentage of plain pottery is maintained, though the proportion of grooves, incisions and impressions falls slightly. At West Kennet though the proportion of plain pottery has fallen slightly (*c.* 45 percent), the majority of the decoration is plain cordons (table 30).

Since the early 1970s the dominant framework for the study of Grooved Ware has been the Wainwright and

Longworth (1971) scheme. In their terms the West Kennet assemblage clearly belongs to the Durrington Walls sub-style. Of the eight criteria, five are present: vertical cordons (e.g. fig. 60, 3); a rim possibly of Type 13 (fig. 60, 13); vessels with internal incised geometric motifs (e.g. fig. 67, 72); twisted cord (e.g. fig. 61, 17); and whipped cord (fig. 60, 1). The radiocarbon dates for West Kennet are also in line with the dating of the Durrington Walls sub-style, both indicating assemblages in the mid third millennium BC.

However, there are a number of problems with the Wainwright and Longworth scheme which may mask variation. Because it is a polythetic scheme (Clarke 1978, 36), one diagnostic trait is enough to define a sherd to a sub-style, which usually means the whole assemblage from the site is assigned to a sub-style. But because the scheme is based on a few specific traits, it is a poor guide to the total resemblance between two assemblages. If one continues to examine the West Kennet assemblage using Longworth's (1971a) methodology then quite a divergence from the type site is revealed (table 30). One may note especially an absence of grooved/incised decoration, some new rim types, a different proportion of rim forms, and an emphasis on neutral and open vessels.

I have suggested that Wessex Grooved Ware with essentially horizontal character, consisting mostly of grooves and horizontal cordons, runs from *c.* 2900–2600 BC, and is mostly associated with pits (Hamilton 1995). The emphasis on vertical decoration appears later, and Grooved Ware with this spans *c.* 2650–2300/2200 BC. Within the later tradition is the occasional use of rustication, cord, and comb. This later Grooved Ware occurs in large amounts in henges, but in part this is the product of excavation bias towards such sites.

Regional style

Though the West Kennet long barrow is only 400 m from the enclosure, its Grooved Ware is remarkably different (Piggott 1962). Most of the pottery stresses the horizontal component, and if it were not for the vertical groove of R3 (Piggott 1962, fig 14), it would correspond to an early Grooved Ware assemblage. The Sanctuary assemblage from 700 m to the east is different again. The few sherds illustrated by Cunnington (1931) do not give the full variation, and both these sites deserve expanded publication. There is an internally decorated bowl (Cunnington 1931, plate VII, no 1) and a few vertical cordons, but in general the assemblage seems to stress plain vessels with thin-medium walls. North of the Sanctuary is West Overton G6a (Smith and Simpson 1966) whose assemblage has much in common with that from the palisade enclosures, though grooving was more common. The pottery from Avebury G55 (Smith 1965b), 500 m to the west of palisade enclosure 2 is similar to that illustrated in this report, but also has a curvilinear grooved pattern. An unpublished sherd found on barrow Avebury G24 has a simple pointed rim and an grooved opposed line motif.

All the sites are within 700 m of the enclosures and yet exhibit a considerable degree of difference. This has to be contrasted with the pottery from the palisades and interior structures which comes from a range of contexts and yet shows more conformity, with the absence of grooving/incision, the emphasis on horizontal and vertical cordons, and the occurrence of twisted cord.

If my suggestion of an earlier and later Grooved Ware is followed, then it should be possible to divide the north Wiltshire Grooved Ware into sites which employ horizontal decoration and those with vertical decoration. There does seem to be some spatial separation between these sites. In the first group one might place most of the pottery from Windmill Hill (Smith 1965a), Pit 1 on the West Kennet Avenue (Smith 1965a), most of the West Kennet Long Barrow material, and the few sherds from Cherhill (Evans and Smith 1983), Burderop Down (Cleal 1992a), and Avebury henge (Smith 1965a). Within this group it is possible that the Clacton vessels from Windmill Hill could be early (Smith 1965a, P283–4). Some of this group is associated with large shell temper, including the Windmill Hill Clacton vessels, Pit 1 on the Avenue, and under the bank at Avebury. Vertical decoration is best seen at the West Kennet palisade enclosures, most of the pottery from West Overton G6b, and Avebury G55, and to an extent, the Sanctuary, and a few sherds from Windmill Hill. It is notable that the late Grooved Ware appears to be geographically more nucleated than the earlier material, which is thinly spread over a wider area.

Context and deposition

One of the most significant characteristics of the pottery in the ditches of palisade enclosures is its depth (often 2 m below the surface), its fresh appearance, and its frequent occurrence resting on the edge of postpipes. In general the pottery did not occur elsewhere in the palisade packing, and the only other context with significant amounts of pottery are the weathering cones.

Natural processes for pottery moving down a postpipe would be limited to the very top (Hamilton 1995). Atkinson (1957) suggested at Stonehenge that the rocking of large stones could explain the context of some pottery in a stonehole, but the timber posts as West Kennet were mostly earthfast to the depth of 2 m and such an explanation seems unlikely, especially as the pottery was neither abraded nor crushed. The best explanation of the West Kennet situation is that pottery was placed around posts, as the ditch was backfilled, in much the same way as animal bone.

This would also serve to explain a number of other phenomena. There is an anomalously high proportion of rims, and base sherds. This is particularly noticeable in Trench CC in enclosure 2, where the only two sherds were a base and rim, and in Trench BB, though in the latter case the rim was an abraded Peterborough Ware sherd. However, rims appear to be over-represented in Trench B from enclosure 1 (2 of 18 sherds), as well as Trench M (9 of 56 sherds) and Trench T (2 of 15) from enclosure 2, and perhaps more so from the outer radial ditch in Trench S (2 of 8). In general most of the pottery from lower in the postpipes is larger and decorated, whereas most plain sherds seem to occur higher. There appears to be a higher proportion of decorated pottery in the palisades than recorded from other contexts on the site.

This pattern of deliberate placement around the posts during backfilling has few parallels. Durrington Walls South Circle was similar in that pottery was interpreted as being placed around posts, but this was on the surface, so most of the pottery ended up in the weathering cone of the postholes (Wainwright and Longworth 1971, 25). Though the

excavated length of palisade at Mount Pleasant was *c.* 200 m (Wainwright 1979), the Grooved Ware in the packing or postpipes amounted to 11 sherds, with 28 from disturbed post-robbing contexts. A very similar pattern occurred at Greyhound Yard where some 48 m of large postholes produced only 15 Grooved Ware sherds (Woodward *et al.* 1993). In both cases the associated pottery was not particularly large, decorated or strongly biased towards rim and base. Neither report mentions pottery being found at the junction of pipe and packing. The only site where a similar depositional practice is possible is the Sanctuary. Here the depths recorded by Cunnington (1931) suggest that much of the pottery occurred in the lower half of postholes.

INTERNAL SITE DISTRIBUTION

Only two trenches in enclosure 1 produced pottery (H and a single sherd from J). In enclosure 2, only Trench K failed to produce some pottery, though the quantities in BB and CC are tiny.

Only Trench H in enclosure 1, and M and T in enclosure 2 produced significant amounts. It is notable that the concentration in H is matched by M, the nearest trench across enclosure 2. Trench J, the only other enclosure 1 trench to produce pottery, is nearby.

Structure 1 (fig. 70). Only a very limited amount of the outer ditch was excavated, but it produced a relatively large assemblage including a high proportion of rims (two out of eight sherds). The distribution of sherds from the inner ditch shows no major concentrations though the north-east of the excavated area has no pottery. More significant may be the distribution of cordoned sherds, which occur mostly close to the inside of the ditch, whereas other body sherds were mostly found in the ditch centre. If rims, base and decorated sherds were also examined, together with cordons, then a similar claim could be made for these sherds occurring close to the outer edge of the ditch.

Structure 2 (fig. 71). Context 5007 adjacent to the outer ditch produced over 70 sherds, representing a wide variation in pottery styles. Possibly six vessels had very closely placed vertical cordons (e.g. fig. 68, 74). One had opposing diagonal and vertical cordons (fig. 68, 82c). One of these bowls had a T-shaped rim (fig. 68, 80a) similar to one from the outer ditch of Structure 1. There was internally decorated pottery (Vessel Z/32), and some twisted cord. The outer ditch produced a single thin plain sherd. The inner ring produced over 180 sherds, mostly of plain vessels (e.g. Z/3, Z/5), or well spaced vertical (e.g. Z/4), or horizontal cordons. Sherds from one vessel had fingernail rustication and decorated cordons (Vessel Z/1). There was no internally decorated pottery or cord, and just one doubtful parallel for the closely spaced cordons (fig. 66, 69). There were no sherds from the same vessels found in 5007 and the inner ring. Overall the style of the two assemblages is different, with the inner ring having a very restricted range of pottery style, compared to the main palisades and 5007, but in keeping with the other two structures.

The distribution of pottery, and the occurrence of plain, cordoned, rim or base sherds are shown on fig. 71. The quantities in individual postpits/postpipes are often quite small, but it is notable that the postpits on either side of the causeway are well represented, as are the postpits directly opposite the causeway. There is higher representation of cordons at the back of the ring, and to the south-west. However, cordons are rare (3 out of 36 sherds) in the area of the causeway, and the majority of the pottery is plain. There is a low incidence of rims from the inner ring, but a high proportion of those came from the eastern causeway postpit.

The occurrence of unbounded pottery (plain) and the open part of pots (the rim) at the open part of the structure (the entrance), and bounded pottery (the cordons) along the bounded/closed part of the structure can therefore be noted. Other sites seem to repeat the emphasis on Grooved Ware entrances (e.g. Wyke Down, Dorset: Barrett *et al.* 1991) but the pattern is by no means universal (contradicted, for example, by Site IV, Mount Pleasant: Wainwright 1979). One might simply interpret concentrations of material by entrances as a function of access, but much of the material here comes from lower contexts, and as such must be contemporary with construction. The concentration of pottery at the back of Structure 2 also cannot be explained as accidental. This deposit contains almost all the decorated pottery (other than cordons). This does not seem to be mirrored by other sites. The location of context 5007 perhaps across the entrance line of the inner ring may mirror the location of the Platform at Durrington Walls (Wainwright and Longworth 1971). 5007 also contains complex internally decorated bowls, and there is a strong correlation between this style and entrances, as demonstrated at Durrington Walls and Wyke Down (Wainwright and Longworth 1971; Cleal 1991).

Structure 3. Structure 3 produced very little Grooved Ware, and none from the inner ditch.

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The pottery of 1987 and 1990 was initially examined by Lesley Zienkiewicz and I have had the benefit of her notes and comments. Also thanks to Sue Hardman who analysed the white coating, and Ros Cleal for her comments on this.

Animal bone

(Alice Edwards and Martin Horne)

Introduction

THE PREPARATION OF THIS REPORT

The animal bone from enclosure 1 was analysed by Edwards and that from enclosure 2 by Horne, both using the same methodology and under the supervision of Dr Paul Halstead, as M.Sc. theses for the University of Sheffield. The 1987 data from enclosure 1 were first analysed by Dr Caroline Grigson, to whom grateful thanks are due. The theses were then edited for publication by Dr Amanda Rouse and Alasdair Whittle, in consultation with Paul Halstead and Caroline Grigson. The post-Neolithic bone will be published separately at a later date.

RECOVERY AND METHODOLOGY

Animal bone was mainly recovered from the excavations by hand.

For the purposes of this report, only those bones which

Table 31: fragmentation of cattle and pig bones

Enclosure 1

	Cattle	*Pig*	
Complete or near-complete bone	6.9	14.1	
End with some shaft	6.9	13.3	
End only or shaft only	36.1	38.7	
(New break or irrelevant)	50.0	33.9	(%)

Enclosure 2

	Cattle	*Pig*	
Complete or near-complete bone	7.9	9.8	
End with some shaft	10.4	10.0	
End only or shaft only	28.2	31.5	
(New break or irrelevant)	53.5	48.6	(%)

are identifiable to species level were given further detailed consideration after initial identification and sorting of the whole assemblage. Long-bones, mandibles and maxillae, mandibular and maxillary teeth, atlas, axis, pelves, scapulae, calcanea and astragali were deemed to be identifiable to the required level, but ribs, vertebrae, small tarsals, carpals, lateral metapodials, patellae and parts of the skull not associated with the mandible, were excluded from further detailed consideration. However their presence is clearly significant in contextual terms, and some account is taken of such parts (especially ribs and vertebrae) later in the report.

Identifications were made with the help of the University of Sheffield reference collection and drawings in Schmid (1972). Measurements were taken in accordance with the procedures of von den Driesch (1976). Canines, both mandibular and maxillary, were used to sex pigs. Where possible, cattle pelves were sexed following Grigson (1982b). In the case of dental wear, age was determined for sheep following Payne (1973) and for pigs and cattle following Grant (1982). Fusion data for pig, cattle and sheep were determined following Silver (1969). Distinction between sheep and goat follows Boessneck (1969) and Payne (1985).

All dental and post-cranial data were recorded in terms of minimum number of identifiable fragments. It was considered that a single presence/absence list provides no information concerning the relative abundance of species or their economic importance. However, the quantification methods currently available are of questionable reliability and relevance. Despite the frequent criticisms of NISP (number of identifiable specimens), MNI (minimum number of individuals) and meat weights (e.g. Payne 1972; Grayson 1978; Grayson 1979; Lyman 1992), most reports tend to be based on MNI. The minimum number of identifiable elements counts the proximal and distal halves of long bones separately. Where a single bone retained both proximal and distal ends, both elements were counted separately. If unfused epiphyses fitted long bones exactly, the element (e.g. distal tibia) was only counted once. For the scapula and pelvis, only fragments belonging to particular diagnostic zones were counted: the acetabulum on the pelvis and the glenoid process on the scapula.

In these terms, some 722 bone elements were recorded from Neolithic contexts in enclosure 1, and 1203 from enclosure 2 (tables 33–4); in addition there were 1628 ribs and 506 vertebrae from enclosure 1 and 1342 and 506 from enclosure 2. There were 170 pieces of antler from enclosure 1, and 35 from enclosure 2.

In the report which follows, the assemblages from the two enclosures are considered together where possible (enclosure 1 preceding enclosure 2 in discussions and tables).

Table 32: butchery marks on pig, cattle and dog bones

	Uncut	*Total butchered*	*Filletted*	*Dismembered*	*Chopped*	*'Other'*
Enclosure 1						
Pig	551	80 (12.7%)	24	37	7	12
Cattle	67	5 (6.9%)	2	2	-	1
Dog	5	-	-	-	-	0.0
Enclosure 2						
Pig	785	128 (14%)	76	49	1	2
Cattle	185	17 (8.4%)	6	9	-	2
Dog	27	8 (22.8%)	7	1	-	0.0

Table 33: enclosure 1, species-anatomical element representation

	Cattle	*Pig*	*Sheep/Goat*	*Dog*	*Red deer*	*Roe deer*
Scapula	5	27	-	1	-	-
Humerus prox.	2	46	-	-	-	-
Humerus dist.	4	62	-	-	-	-
Radius prox.	1	7	-	-	-	-
Radius dist.	3	7	-	-	-	-
Metacarp. prox.	-	7	-	-	1	-
Metacarp. dist.	-	1	-	-	1	1
Pelvis	3	82	-	-	-	-
Femur prox.	5	93	3	1	1	-
Femur dist.	3	81	3	1	-	-
Tibia prox.	2	17	1	-	-	-
Tibia dist.	3	24	2	-	-	-
Metatars. prox.	3	3	-	-	-	-
Metatars. dist.	4	4	-	-	-	-
Ulna	1	7	-	-	-	-
Metapod. prox.	-	20	-	-	-	-
Metapod. dist.	1	9	-	2	-	-
Calcaneum	2	20	-	-	-	-
Astragalus	1	19	-	-	-	-
Phalanx I	1	18	1	-	-	-
Phalanx II	-	13	-	-	-	-
Phalanx III	-	5	-	-	-	-
Atlas	6	23	-	-	-	-
Axis	14	-	-	-	-	-
Mandible	-	16	-	-	-	-
Mandibular tooth	8	20	-	-	-	-
Total	72	631	10	5	3	1
% Total	10	87.4	1.4	0.7	0.4	0.1

CONDITION

Bones from the deeper deposits in both enclosures were reasonably well preserved, but those from surface deposits like 215 in enclosure 1 and 5007 in enclosure 2 tended to be brittle and had more surface erosion. Fragmentation varied from species to species. Cattle bone was more fragmented than that of pig (table 31). There were consistent but low numbers of pig and cattle bones with butchery marks, 13–14 percent and 7–8 percent respectively (table 32); some 23 percent of the dog bones from enclosure 2 had also been butchered. Such marks could be variously assigned to dismemberment and filleting (as distinguished by Binford 1981), with a lesser number of chop marks of indeterminate origin. Around one percent or fewer of the bones had marks of canid or other gnawing. A low percentage of bones had been burnt (seven percent in enclosure 1, under four in enclosure 2), largely those in direct contact with palisade posts (above, p. 61, and see below).

Species present

Tables 33–34 present the species composition of the assemblages from the two enclosures, and the frequency of their respective bone elements. Tables 35–36 provide an initial assessment of the relative abundance of species in the different contexts within the two enclosures.

PIG

Both assemblages are dominated by pig. Virtually all the identifiable bones were from domesticated pig (*Sus scrofa*). It is possible that a single scapula from enclosure 2 may belong to a wild boar because of its large size, but this is a poor element for distinction (von den Driesch 1976). Measurements are given in tables 37–38.

Fusion data indicate that the great majority of pigs did not reach 24 months of age (fig. 72); 52 and 53 percent of pig bones from enclosure 1 and 2 respectively were ageable from the fusion data. The samples of mandibles and mandibular teeth (36, enclosure 1; 83, enclosure 2) were too small for reliable information on wear patterns, though examples ranged from pre-stage A to stage G. In enclosure 1, 6 out of eight sexable canine teeth were male, and in enclosure 2, a sample of 18 canine teeth gave a similar male-female ratio of 3.5:1.

In general, body part representation was similar across both enclosures, the only major difference being a greater representation of tibiae and calcanea in enclosure 2 (fig. 73). Within enclosure 1, the representation of body parts was more or less even across the contexts investigated; there may have been slightly more femora in the outer ditch than in other contexts of enclosure 1. In enclosure 2 (see fig. 74), there are variations. For example, the main palisade ditch has relatively more pelves and fewer tibiae and calcanea

Table 34: enclosure 2, species-anatomical element representation

	Cattle	*Pig*	*Sheep/Goat*	*Dog*	*Cat*	*Red deer*
Scapula	4	51	3	-	-	-
Humerus prox.	11	58	-	2	1	1
Humerus dist.	12	67	1	2	1	-
Radius prox.	15	14	3	2	-	1
Radius dist.	3	9	2	3	-	-
Metacarp. prox.	8	10	1	-	-	2
Metacarp. dist.	5	4	1	-	-	2
Pelvis	11	65	4	-	-	-
Femur prox.	20	86	1	3	-	-
Femur dist.	15	119	3	3	-	-
Tibia prox.	8	77	-	5	-	-
Tibia dist.	6	84	-	6	-	-
Metatars. prox.	4	18	2	-	-	-
Metatars. dist.	3	6	-	-	-	-
Ulna	7	22	-	2	-	-
Metapod. prox.	2	8	-	1	-	-
Metapod. dist.	3	19	-	2	-	-
Calcaneum	7	48	-	-	-	-
Astragalus	2	21	-	-	-	-
Phalanx I	8	16	1	-	-	-
Phalanx II	6	8	-	-	-	-
Phalanx III	4	4	-	2	-	-
Atlas	-	14	-	-	-	8
Axis	2	2	-	-	-	-
Mandible	4	39	4	2	-	-
Mandibular tooth	32	44	2	-	-	-
Total	202	913	35	35	2	16
% Total	16.8	75.9	2.9	2.9	0.2	1.3

than the interior structures or the radial ditch, whereas both ditches have more femora than the internal structures.

In enclosure 1, a bias towards the right side is apparent in pelves and femora. Most pelves occurred in the outer ditch and context 215: 14 and 50 respectively out of a total of 82; and of the 50 from context 215, 45 were right and 5 left. Of the 47 femora from the outer ditch, 41 were right, and 3 left; of the 100 femora from context 215, 76 were right, and 11 left (the others being indeterminate). For neither bone does the percentage of right side elements seem likely to be the result of chance (fig. 75). In the palisade ditch of enclosure 2 (therefore especially in the largest assemblage, from Trench M), a similar but less pronounced bias was also observed in the representation of right-side pelves, femora and tibiae (fig. 76). By contrast, the relative importance of femur and pelvis in the palisade ditch is diminished in the interior, where scapula, humerus, tibia and calcaneum, and also radius, metacarpal, metatarsal, ulna, astragalus and phalanges, all increase in frequency.

Cattle

Cattle bones constitute a far smaller proportion of the assemblage than pig. Nearly all the cattle are domesticated (*Bos taurus*). A single proximal metacarpal from enclosure 2 (from Structure 2) with the unusual width of 89 mm is well within the size range of the aurochs (*Bos primigenius*) (Grigson 1989). A massive rib from the inner ditch in enclosure 2 might also belong to aurochs. Measurements are given in tables 39–40. Fusion data for enclosure 2 (fig. 77) (18 ageable from enclosure 1, and 75 from enclosure 2) indicate that while a significant proportion of animals did not reach maturity, there was nonetheless a higher proportion of animals among the cattle compared to the pigs. Mandibles and mandibular teeth were too scarce to provide any meaningful wear pattern, though recorded wear stages ranged from A to K. Of four sexable pelves from enclosure 2, three appear to be male.

The pattern of cattle body part representation is set out in fig. 78.

Sheep/goat

Small numbers of sheep or sheep/goat were found across both enclosures. In enclosure 1, several bones were directly attributable to sheep (*Ovis aries*), but none to goat (*Capra hircus*), and there were some of indeterminate status; in enclosure 2, there were likewise no identifications of goat, but more certain identifications of sheep. Mandibles and mandibular teeth were too scarce to construct mortality patterns from toothwear.

Dog

Dog (*Canis familiaris*) was more frequent than sheep. It

Table 35: enclosure 1, species and anatomical element by main context areas

	Outer ditch						*Inner ditch*						*Interior*						*Context 215*					
	Cattle	Pig	Sheep /goat	Dog	Red deer	Roe deer	Cattle	Pig	Sheep /goat	Dog	Red deer	Roe deer	Cattle	Pig	Sheep /goat	Dog	Red deer	Roe deer	Cattle	Pig	Sheep /goat	Dog	Red deer	Roe deer
Scapula	-	5	-	-	-	-	-	1	-	1	-	-	2	7	-	-	-	-	1	14	-	-	-	-
Humerus	2	46	-	-	-	-	1	6	-	-	-	-	1	17	-	-	-	-	-	39	-	-	-	-
Radius	1	-	-	-	-	-	-	-	-	-	-	-	1	5	-	-	-	-	-	9	-	-	-	-
Metacarpal	-	5	-	-	-	1	-	-	-	-	-	-	-	3	-	-	1	-	-	-	-	-	1	-
Pelvis	1	14	-	-	-	-	-	6	-	-	-	-	-	12	-	-	-	-	2	50	-	-	-	-
Femur	2	47	2	2	-	-	-	8	-	-	-	-	2	19	-	-	-	-	4	100	3	-	1	-
Tibia	2	10	-	-	-	-	1	8	-	-	-	-	1	3	2	-	-	-	1	20	1	-	-	-
Metatarsal	2	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	2	6	-	-	-	-
Ulna	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5	-	-	-	-
Metapodial	-	10	-	1	-	-	-	3	-	1	-	-	-	6	-	-	-	-	1	10	-	-	-	-
Calcaneum	2	4	-	-	-	-	-	4	-	-	-	-	-	1	-	-	-	-	-	11	-	-	-	-
Astragalus	1	7	-	-	-	-	-	6	-	-	-	-	-	1	-	-	-	-	-	5	-	-	-	-
Phalanx I	-	3	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	1	12	1	-	-	-
Phalanx II	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-
Phalanx III	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	4	-	-	-	-
Atlas	-	11	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	4	10	-	-	-	-
Axis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	-	-
Mandible	-	4	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	6	-	-	-	-
Mand. tooth	-	4	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	8	12	-	-	-	-

Table 36: enclosure 2, species and anatomical element by main context areas

	Palisade ditch						*Interior Structures*						*Radial ditch*						*Bone dump 4051*						*Bone dump 5007*					
	Cattle	Pig	Sheep /goat	Dog	Cat	Red deer	Cattle	Pig	Sheep /goat	Dog	Cat	Red deer	Cattle	Pig	Sheep /goat	Dog	Cat	Red deer	Cattle	Pig	Sheep /goat	Dog	Cat	Red deer	Cattle	Pig	Sheep /goat	Dog	Cat	Red
Scapula	-	16	-	-	-	-	1	19	-	-	-	-	-	4	-	-	-	-	3	1	3	-	-	-	-	11	-	-	-	-
Humerus	7	58	1	4	2	-	6	29	-	-	-	-	6	18	-	-	-	1	4	18	-	-	-	-	-	11	-	-	-	-
Radius	6	4	-	5	-	-	3	1	1	-	-	3	-	5	2	-	-	-	9	5	1	-	-	-	-	18	-	-	-	-
Metacarpal	8	3	-	-	-	2	4	2	-	-	-	2	-	2	-	-	-	-	-	-	2	-	-	-	1	7	-	-	-	-
Pelvis	6	54	1	-	-	-	3	5	-	-	-	-	1	2	-	-	-	-	1	1	-	-	-	-	-	3	3	-	-	-
Femur	17	156	1	5	-	-	3	17	-	-	-	-	7	15	-	1	-	-	5	4	1	-	-	-	3	13	2	-	-	-
Tibia	4	56	-	9	-	-	6	45	-	-	-	-	3	18	-	-	-	-	1	8	-	-	-	-	-	34	-	2	-	-
Metatarsal	7	8	-	-	-	-	-	9	-	-	-	-	-	3	1	-	-	-	-	2	1	-	-	-	-	2	-	-	-	-
Ulna	2	6	-	2	-	-	1	9	-	-	-	-	-	2	-	-	-	-	2	2	-	-	-	-	1	3	-	-	-	-
Metapodial	2	10	-	3	-	-	2	4	-	-	-	-	-	7	-	-	-	-	1	-	-	-	-	-	-	6	-	-	-	-
Calcaneum	4	16	-	-	-	-	-	19	-	-	-	-	-	2	-	-	-	-	3	2	-	-	-	-	-	9	-	-	-	-
Astragalus	1	8	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3	-	-	-	-
Phalanx I	8	7	-	-	-	-	-	4	-	-	-	-	-	2	-	-	-	-	-	-	2	-	-	-	-	3	-	-	-	-
Phalanx II	5	1	-	-	-	-	1	4	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-
Phalanx III	4	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-
Atlas	-	12	-	-	-	6	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Axis	2	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mandible	-	24	-	2	-	-	-	8	2	-	-	-	2	2	-	-	-	-	2	4	6	-	-	-	-	1	-	-	-	-
Mand, tooth	4	38	-	-	-	-	4	2	4	-	-	-	6	-	-	-	-	-	6	2	-	-	-	-	12	2	-	-	-	-

Table 37: enclosure 1, pig bone measurements

Element		*Measurement (mm)*
Distal tibia	(greatest distal width)	26.8
Distal tibia	(greatest distal width)	27.8
Distal tibia	(greatest distal width)	29.2
Distal tibia	(greatest distal width)	29.3
Distal tibia	(greatest distal width)	30.1
Distal tibia	(greatest distal width)	30.2
Distal tibia	(greatest distal width)	30.6
Distal tibia	(greatest distal width)	31.3
Mandibular M3	(length)	33.8
	(breadth)	14.1
Calcaneum	(greatest length)	79.3

occurs across both enclosures (in smaller numbers in enclosure 1), largely in the form of fragmented limb bones. 23 percent of the bones from enclosure 2 had marks of butchery, but none were observed on those from enclosure 1. The presence of dog can be contrasted with the low level of gnawing on all bones from both enclosures.

RED DEER

Red deer (*Cervus elaphus*) bone occurred in small quantities on both enclosures, largely in the form of limb fragments. Measurements for an axis and an atlas from enclosure 2 are given in table 40. In addition there were 170 pieces of antler from enclosure 1 and 35 from enclosure 2. Both assemblages included shed and unshed specimens.

ROE DEER

One split distal metacarpal of roe deer (*Capreolus capreolus*), probably used as a tool, was found in enclosure 1, in the outer ditch. There was also one fragment of roe deer antler in enclosure 1.

CAT

A cat (*Felis*) humerus was found in the main palisade ditch in Trench CC. Its fresher colour may suggest that this is an intrusive find.

BEAVER

A single complete cervical vertebra (therefore not listed in table 33) of beaver (*Castor fiber*) was recovered from the inner ditch of enclosure 1, at considerable depth in Trench D (identified by Caroline Grigson).

Interpretation

SUBSISTENCE AND ENVIRONMENT

In both enclosures pig was the numerically dominant animal by far (tables 33–34). Many pigs were being eaten, as indicated by the large numbers of pig bones, including butchered bones. Even making allowance for the greater weight of cattle, it is clear that consumption of pork was a central concern in the events surrounding the construction of the enclosures. Though it is hard to quantify, the slaughter

Table 38: enclosure 2, pig bone measurements

Element		Measurement (mm)
Distal tibia	(greatest distal width)	30.5
Distal tibia	(greatest distal width)	30.3
Distal tibia	(greatest distal width)	32.6
Distal tibia	(greatest distal width)	32.1
Distal tibia	(greatest distal width)	28.8
Mandibular M3	(length)	34.6
	(breadth)	15.1
Mandibular M3	(length)	34.4
	(breadth)	15.8
Mandibular M3	(length)	32.8
	(breadth)	15.7
Atlas	(greatest breadth of the Facies articularis cranialis)	55.3
	(height)	45.1
Proximal femur	(greatest proximal breadth)	53.8
	(greatest depth of the Caput femoris)	25.6

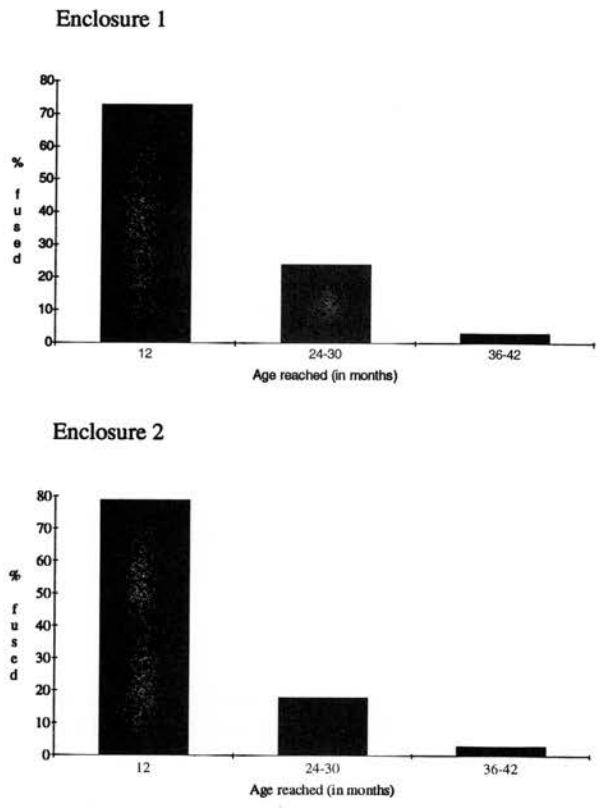

Fig. 72 Age range of pigs from enclosures 1 and 2 on the basis of bone fusion

of young pigs connected with those events must have been on a considerable scale, matching in its way the extent of tree felling needed for the palisades themselves. There was pig bone in every cutting across the palisade ditches. The two assemblages recovered so far might each represent only tens of animals, but from a sample of less than one percent of the total perimeters. Assuming that the pattern of deposition continued in the same fashion more or less around all the palisade ditches, the original total could have run into thousands of animals. Slaughter on this scale speaks for both conspicuous sacrifice and large-scale feasting.

These considerations make it clear that the bone assemblages do not necessarily reflect an everyday subsistence economy, though the social and political concerns they do express were none the less real for that. How atypical the assemblages were is hard to judge in the absence of other contemporary occupations for comparison. Locally in the same general period, away from the monuments, data for purposes of comparison are scarce (see, for example, Evans and Smith 1983; Gingell 1992; Grigson 1980).

The assemblages may therefore principally reflect a situation, perhaps short-lived, in which there were particular concerns for the availability of meat. In favourable conditions, pigs can be highly productive (Grigson 1982a). Females can breed at 12 months, and can produce two litters a year, often with five or six young in each; the gestation period is just under four months. Pigs can consume a very wide range of food, including beechnuts, acorns, grasses, broad-leafed herbaceous plants, corms, roots, insects, earthworms, rodents and carrion. Documentary evidence indicates that from early historic times woodland pannage was fundamental to pig keeping in England. The insect evidence from Silbury Hill suggests that woodland may not have been immediately adjacent. The pigs found in the West Kennet enclosures may have been reared in varied environments through a broad region, not just in the immediate locality.

Pigs might also have been favoured for their ability to clear secondary woodland growth, by their rooting and trampling, though such clearance locally and regionally (cf. Whittle *et al.* 1993) may have been as much the unintended by-product of other events as an aim in its own right. It has also been proposed that pigs were favoured in the Later Neolithic because of their claimed ability to restrict bracken growth (Grigson 1982a; R. Smith 1984). Since bracken spores have been found in Later Neolithic contexts in the Avebury region, it was proposed that bracken infestation became a major problem for cultivators in this period (R. Smith 1984). This both accepts that the representation of bracken reflects original conditions and assumes that cultivation was a major element in subsistence strategy in this period. There is also evidence that bracken is poisonous to pigs just as it is to cattle, sheep and other domesticates. Bracken poisoning in pigs is caused by the enzyme thiaminase which destroys vitamin B1 (thiamine) in food passing through the intestine, resulting in thiamine deficiency. Thiaminase is most concentrated in the bracken rhizome, with lesser quantities in the green parts. The bracken poisoning most frequently seen in cattle, however, is a haemorrhagic syndrome involving damage to membranes especially of the gut (Forsyth 1968; Harding 1972). In one experiment, pigs fed a diet containing bracken died after 55 days, and within six hours of the first symptoms being noted (Harding 1972).

Slaughter on-site or in the immediate vicinity may be indicated. Skull parts were not identified but there are teeth; limb extremities are under-represented, but differential retrieval or destruction of small bones would account for this. The emphasis on particular body parts, and on body side, noted above (and see below), may then be the result of subsequent treatment within the sites. Assuming that large-scale feasting took place, this happened on the spot. The main meat-bearing bones are the ribs and vertebrae, humeri, femora and proximal ends of the radius, ulna and tibia. The lack of gnawing and the placing of bone by palisade posts further indicate the immediacy of bone treatment.

Discussion so far has concentrated on pigs. Cattle too may have been valued for sacrifice and slaughter. The higher frequency of cattle than pig phalanges may indicate more on-site butchery, and the greater fragmentation of cattle bones compared with those of pig may also reflect different treatment, though there is no obvious evidence for marrow extraction. These observations may hint at a continuing important domestic role for cattle, in which could be included the traction of felled wood.

As is well known, other Later Neolithic sites in southern Britain also have bone assemblages dominated by pig, though the figure for enclosure 1 at West Kennet appears to be the most extreme recorded so far (summarised in Grigson 1982a; cf. Thomas 1991). Those sites include other major

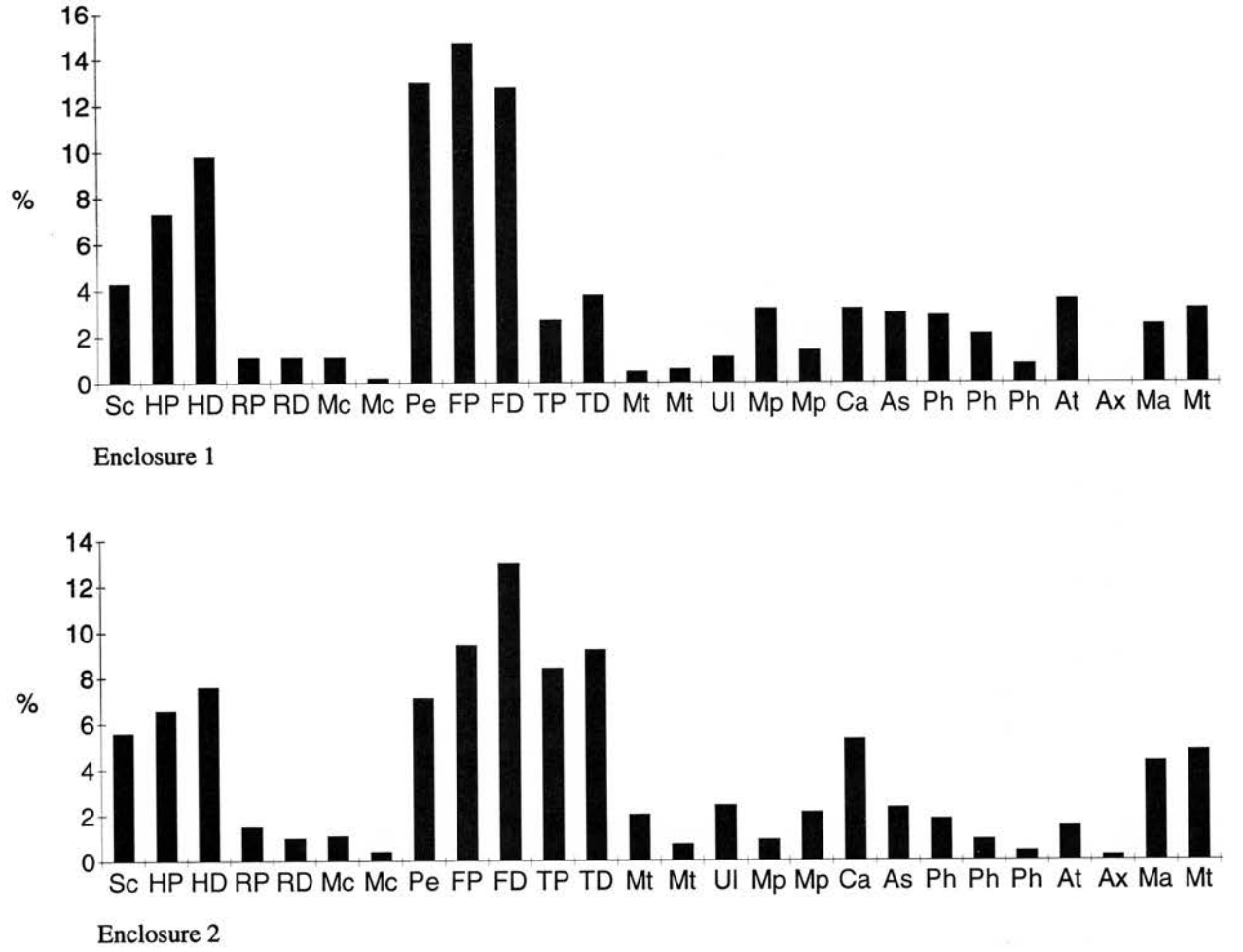

Fig. 73 Summary of pig body part representation from enclosures 1 and 2

monuments such as Durrington Walls, Wiltshire, and Mount Pleasant, Dorset (Harcourt 1971a; Harcourt 1979a). At Marden, however, the nearest major monument to the south, the frequency of pig and cattle bone was more or less identical (Harcourt 1971b).

Deposition and ritual activity

So far it has been argued that pigs were slaughtered on a large scale to provide meat for feasting, and perhaps as sacrifices in their own right. The case for special treatment can be strengthened by noting again the much lower fragmentation of pig bone. Both pig and cattle bone had relatively few butchery marks on them, perhaps suggestive of profligate treatment, and there is virtually no split bone. As well as these indications of special treatment up to the point of consumption, the evidence also suggests special treatment at the stage of deposition.

As already described, animal bone was placed around posts in the process of backfilling the ditches and constructing the palisades. In places, there was selection on the basis of body side. Slaughter, sacrifice, feasting and subsequent deposition were closely related. The animal bone alone suggests that the events of construction were redolent with meaning.

'The cultural innovations of the Neolithic were, among other things, a technology of memory' (Thomas 1993, 32). By the Later Neolithic, there was a long-established tradition of feasting. The arena of West Kennet was overlooked by the ancestors in the West Kennet long barrow. The incorporation of feasting residues in the fabric of the enclosures would serve to unite past and present through shared activity. Most of the bone considered here was probably actually concealed in the process of construction and deposition, but surface deposits may have acted as a visible mnemonic device during later gatherings.

The emphasis on the right side may be connected with a sense of propitiousness, which can be found in many cultures. Thus the Mapuche Indians of Chile associate the right with among other things good, life, day, health, ancestral spirits and abundance, and the left with evil, death, night, sickness, evil spirits and poverty (Faron 1976). Note, however, that it has been suggested that in Neolithic Brittany the left side and movement to the left were propitious (Thomas and Tilley 1993). Much must depend on the individual social context.

It is possible too, arguing from analogy, that pigs had symbolic meaning in their own right, as well as being valued for abundance and availability. A well known example comes from the Tsembaga of the highlands of Papua New Guinea (Rappaport 1968). Pigs were an integral part of that society, though meat constituted overall a very small part of the diet. Pigs were bound up not only with subsistence but also with warfare and peace-making, spirits, and ritual. Pigs were

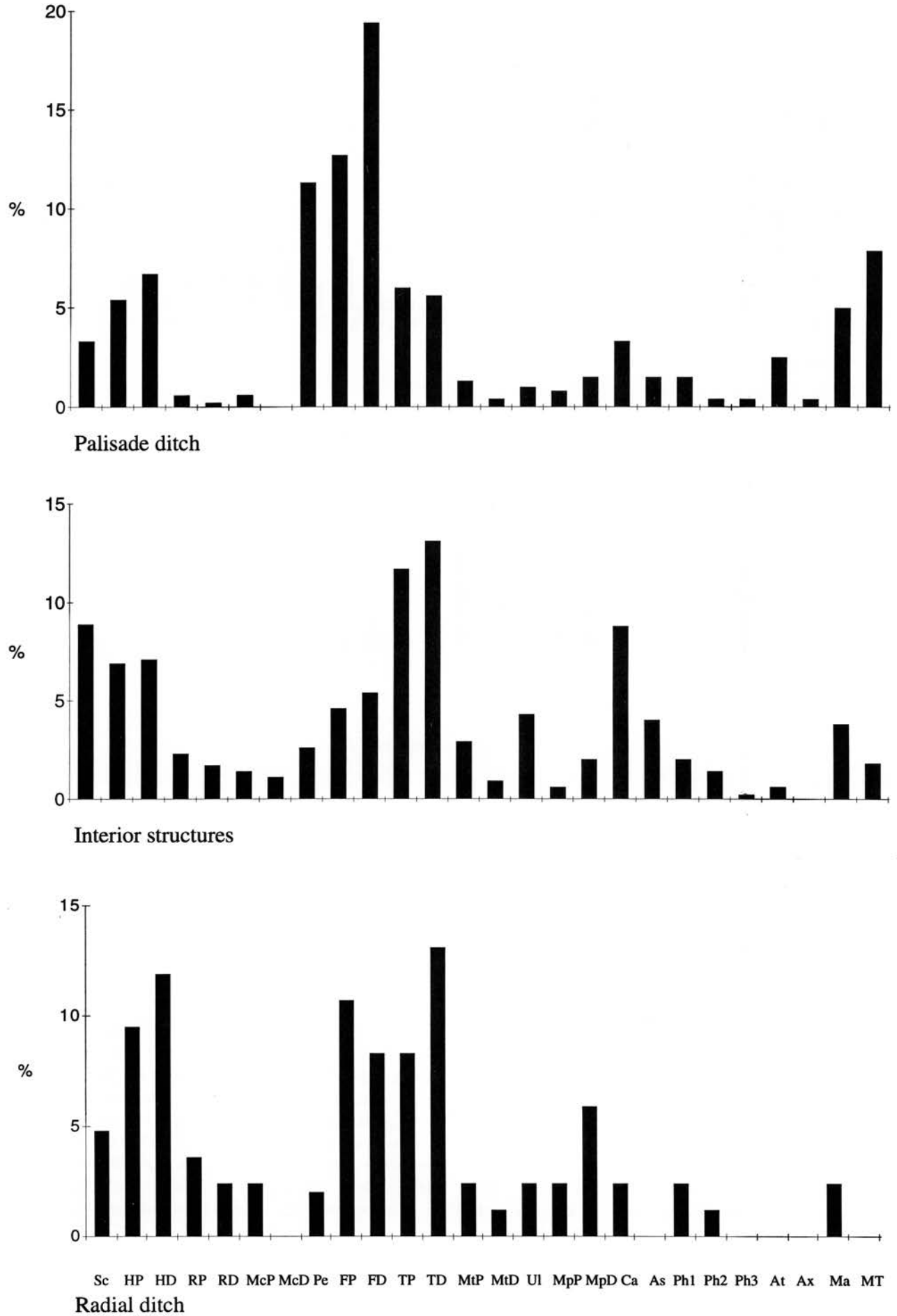

Fig. 74 Summary of pig body part representation from enclosure 2

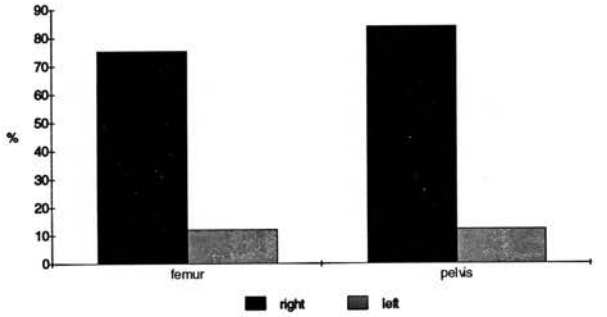

Fig. 75 Summary of the imbalance between left- and right-side bones, as seen in femora and pelves from enclosure 1

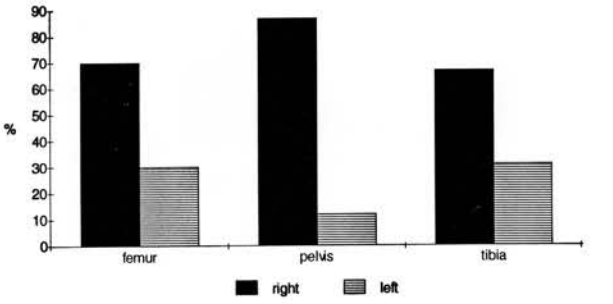

Fig. 76 Summary of the imbalance between left- and right-side bones, as seen in femora, pelves and tibias from enclosure 2

Table 39: enclosure 2, cattle bone measurements

Element		Measurement (mm)
Proximal metacarpal	(greatest width)	89.0
Phalanx I	(greatest length)	62.1
	(greatest proximal width)	35.4
Astragalus	(maximum length)	55.8 (Juv.)
Astragalus	(maximum length)	70.1
Mandibular M3	(maximum length)	37.8
	(maximum breadth)	13.1
Mandibular M3	(maximum breadth)	14.4

Table 40: enclosure 2, red deer axis and atlas measurements

Element		Measurement (mm)
Axis	(greatest length in the region of the corpus in the dens)	103.1
	(greatest breadth of the Facies articularis cranialis)	71.1
	(greatest breadth of the Facies terminalis caudalis)	53.2
Atlas	(greatest length)	87.6
	(greatest breadth)	101.6
Atlas	(greatest length)	90

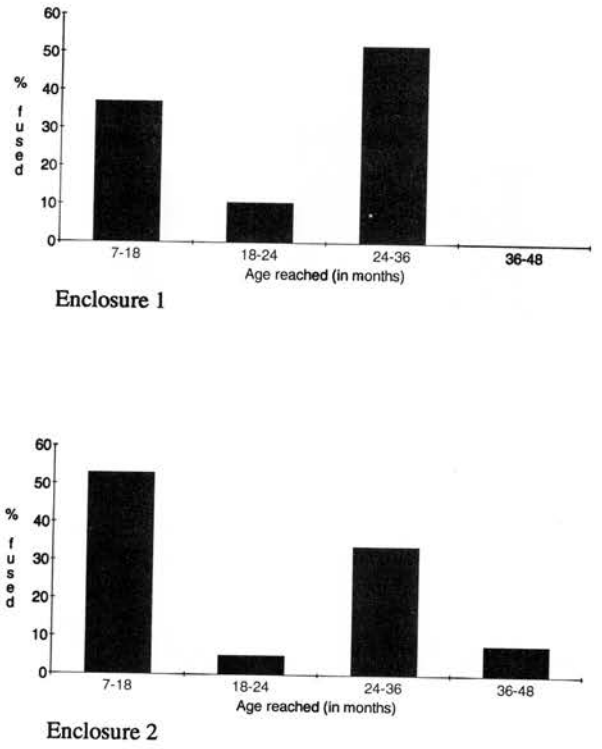

Fig. 77 Age ranges of cattle from enclosures 1 and 2 on the basis of bone fusion

reared from a young age by women, in the house. The amount and state of pigs were seen as a reflection on the status of the community. Pig numbers were built up over time. When they reached their peak, a *kaiko* ceremony was held. This was designed to bring peace with neighbouring tribes, and lasted a full year; at its height all mature, fat and healthy pigs were slaughtered. Many pigs were not eaten, but only killed as sacrifice. When an animal was cooked for consumption, its preparation varied according to whom it had been sacrificed, and its distribution varied according to gender and status.

The Wahgi tribe of the same region have (or had) similar attitudes to pigs (O'Hanlon 1989). Pigs are reserved for use in festivals; much of the diet is vegetarian. The major pig festival, which appears to occur once a generation as part of an extended ritual cycle, presents the community and serves to demonstrate its strength and well-being to neighbours, temporarily uniting usually competitive clans. The festival is mounted by one clan, but co-ordinated with other clans of the same tribe; it is said to dominate Wahgi life. The high point of the festival is the slaughter of most pigs owned. The subsequent distribution of meat cements relationships with neighbouring tribes; pork is given to kin, affines and exchange partners.

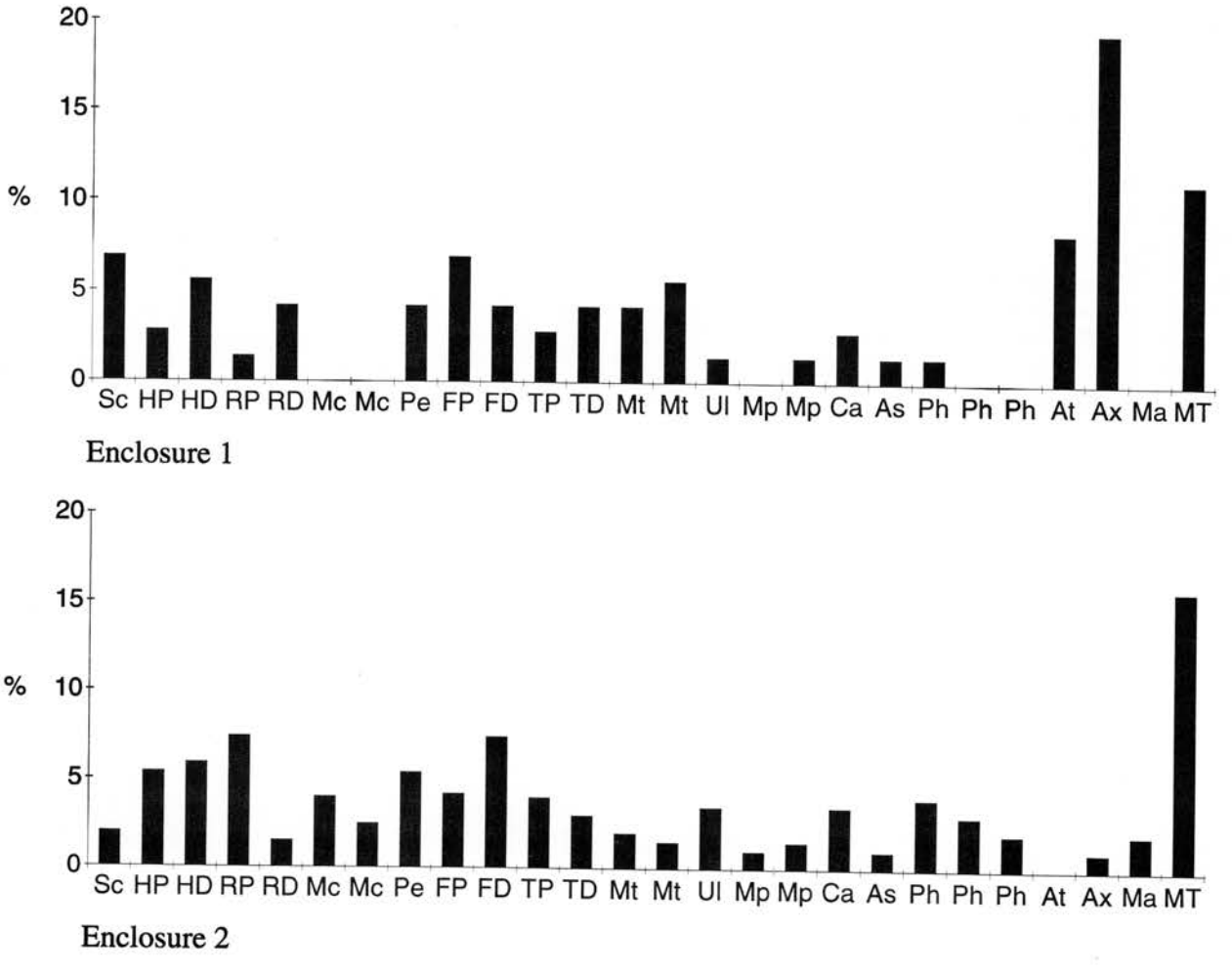

Fig. 78 Summary of cattle body part representation from enclosures 1 and 2

In the absence of directly contemporary graves in the region it is hard to discern any further symbolic gradations according to age or gender. Pig bones were found in the fill of the Earlier Neolithic grave of an adult man at Windmill Hill (Whittle 1990), and a little later than the West Kennet enclosures, an adult man in a Beaker grave at Hemp Knoll, a little to the south-west, was accompanied by the head and hooves of a *Bos*, probably a mature cow (Grigson 1980; Robertson-Mackay 1980); cattle had been prominent in the ditch deposits at the Earlier Neolithic causewayed enclosure at Windmill Hill (Whittle and Pollard forthcoming). Whether the placing and character of the animal bone assemblages further reflect gradations in access and status within the community are questions taken up in the general discussion below.

The wood charcoal

(Caroline R. Cartwright)

Method and theory

Wood charcoal and other charred plant remains were recovered through an extensive programme of flotation and hand-picking of material. Over 5521 g of wood charcoal were identified from a total of 109 contexts in palisade enclosures 1 and 2. Over 57 percent of these contexts containing wood charcoal were identified as postpipes. Table 41 provides a detailed breakdown of the quantities of wood charcoal from all contexts from palisade enclosures 1 and 2, with the identification to taxon.

Following standard procedures, the wood charcoal has been quantified according to relative percentage of taxon by weight in grams. Table 42 summarises the relative percentages for wood charcoal from all contexts associated with palisade enclosure 1 and table 43, palisade enclosure 2. Although this method of expressing relative percentages of wood charcoal taxa present is not entirely satisfactory, it has clear advantages over expressing relative proportions of taxa present by counting fragments or simply recording the presence or absence.

The wood charcoal assemblage from the palisade enclosures has been studied according to the theory of context-related variation which, through repeated examinations of the variation in the taxon composition of wood charcoal assemblages, may allow for particular characterisation of different site contexts and their activities (Gordon Hillman and colleagues, personal communication). In consequence, characteristic groupings of wood charcoal taxa repeatedly associated with contexts whose function has been determined by clear structural evidence or accompanying material such as pottery, stone tools or bone, may be used to infer function where only wood charcoal is present. The nature of the enclosures provided an ideal opportunity to examine this theory of context-related variation in operation as the sampling strategy was broadly suitable and the contextual interpretations reasonably restricted. (It should be stressed that this is an examination of the theory; interpretations which follow can be evaluated in the light of the details contained in table 41.)

The wood charcoal assemblage

Eleven taxa have been identified from the fragments of wood charcoal:

Quercus sp. (oak);
Corylus sp. (hazel);
Crataegus sp. (hawthorn);
Prunus sp. (plum/sloe/cherry);
Maloideae subfamily (e.g. apple/pear) of family Rosaceae (following the taxonomy of Stace 1991);
Fraxinus sp. (ash);
Acer sp. (probably *A. campestre*, field maple);
Sambucus sp. (elder);
Salix/Populus (willow/poplar);
Alnus sp. (alder);
Fagus sp. (beech).

Quercus sp. dominates the wood charcoal assemblages from both palisade enclosures; it is present in over 88 percent of contexts. As few wood charcoal assemblages have been submitted to evaluation using the context-related variation model, it cannot be stated at present whether eleven taxa are too few fully to substantiate any observations, and the following statements should be read with this caution in mind.

In order to examine contextual groupings the location of *Quercus* sp. and any associated taxa was evaluated, firstly from contexts of known function. Some patterning emerges. In contexts designated as postpipes, *Quercus* sp. is present on its own in 30 instances. *Quercus* sp. is present in postpipe contexts associated with *Corylus* sp. in 16 instances, with *Fraxinus* sp. in 14 instances, and in 14 instances with one or more of the following taxa: *Prunus* sp., *Crataegus* sp., *Salix/Populus*, *Alnus* sp. and *Fagus* sp.. Only five of the postpipe contexts (c. 4.6 percent) contained no *Quercus* sp.. It is clear that *Quercus* sp. was by far the most abundant taxon by weight.

On the one hand it could be argued that these observations provide a suggested characterisation for the 12 contexts which bear no specific functional designation (see table 41). On the other hand, since there are 24 cases of general ditch fill or packing contexts (c. 22 percent) which also have *Quercus* sp. alone or associated with several of the taxa noted above, and 13 cases in non-postpipe or ditch-fill contexts (c. 12 percent), it could be argued that there is no conclusive patterning. However, it seems likely from the nature of the site that material included in the backfill of the ditch could be related to the preparation of the main structural timbers.

There seems little doubt that *Quercus* sp. was selected for the main structural timbers of the palisade enclosures. It is possible that *Fraxinus*, *Fagus*, *Alnus*, *Acer* and even *Prunus*, Maloideae and *Salix/Populus* were also used occasionally as structural timbers, when their girths allowed. On the whole, however, it may be supposed that the much smaller quantities of *Corylus* sp., *Fraxinus* sp. and an assortment of fruit-woods, components of mixed oak woodland and understorey (generally with smaller girths) were used for subsidiary structural elements. The choice of secondary structural wood seems only partially attributable to context location. Ten of the eleven taxa represented overall in both palisade enclosures are present in palisade enclosure 1; only *Fagus* sp. (beech) is missing. Nine taxa are present

Table 41: wood charcoal identifications

Trench	*Context*	*Description*	*grams*	*Taxon*
Palisade enclosure 1 (1929 grams total)				
Outer ditch				
C	F19	palisade ditch	22.3	*Quercus* sp. (oak)
			6.0	*Corylus* sp.(hazel)
D	F26	palisade ditch	85.6	*Crataegus* sp.(hawthorn)
			56.5	*Prunus* sp. (plum/sloe)
			36.1	*Quercus* sp.
			14.0	Maloideae (apple/pear)
E	F12	palisade ditch	15.0	*Quercus* sp.
			3.2	*Crataegus* sp.
	F23	postpipe row	89.1	*Quercus* sp.
			13.1	*Corylus* sp.
			2.0	*Fraxinus* sp. (ash)
G	101	postpipe row	17.5	*Quercus* sp.
			9.5	*Corylus* sp.
	111	ditch fill	6.0	*Acer* sp. (field maple)
			5.0	*Quercus* sp.
H	201	postpipe row	0.3	*Corylus* sp.
	205	ditch fill	0.5	*Quercus* sp.
	207	postpipe	122.0	*Quercus* sp.
			20.0	*Corylus* sp.
			6.0	*Acer* sp.
	208	postpipe later	33.0	*Quercus* sp.
		redefined as	16.0	*Corylus* sp.
		217+218	15.0	*Fraxinus* sp.
			4.0	*Crataegus* sp.
			4.0	*Sambucus* sp. (elder)
	217	postpipe	81.0	*Quercus* sp.
			15.0	*Fraxinus* sp.
	218	postpipe	102.0	*Quercus* sp.
			60.0	*Fraxinus* sp.
	209	postpipe	174.0	*Quercus* sp.
			21.0	*Corylus* sp.
	210	postpipe later	31.0	*Quercus* sp.
		redefined as	22.0	*Corylus* sp.
		219+220	7.0	*Fraxinus* sp.
			6.0	*Acer* sp.
	219	postpipe	143.5	*Quercus* sp.
			57.0	*Corylus* sp.
			54.5	*Fraxinus* sp.
Inner ditch				
D	F20	palisade ditch	61.8	*Quercus* sp.
			10.2	*Corylus* sp.
			7.7	*Fraxinus* sp.
	F22	postpipe row	6.9	*Quercus* sp.
			4.0	*Fraxinus* sp.
	F30	postpipe	7.0	*Corylus* sp.
			6.0	*Crataegus* sp.
F	F21	palisade ditch	33.5	*Quercus* sp.
			6.0	*Fraxinus* sp.
			5.6	*Crataegus* sp.
	F31	postpipe row	13.5	*Quercus* sp.
	F34	postpipe	2.1	*Quercus* sp.
J	301	palisade ditch	2.0	*Quercus* sp.
	310	postpipe	93.0	*Quercus* sp.
			18.0	*Corylus* sp.
			11.0	*Prunus* sp.
	311	postpipe	16.0	*Quercus* sp.
			12.0	*Prunus* sp.
	313	postpipe	8.0	*Quercus* sp.
	315	postpipe	2.0	*Quercus* sp.
	325	ditch fill	20.5	*Quercus* sp.
			5.5	*Crataegus* sp.
Ditch north of the Kennet				
O	813	postpipe row	11.0	*Salix/Populus* (willow/poplar)
			6.0	*Quercus* sp.
			2.0	*Alnus* sp. (alder)
	843	postpipe	7.0	*Quercus* sp.
	845	postpipe	7.0	*Quercus* sp.

Trench	*Context*	*Description*	*grams*	*Taxon*
	846	postpipe	31.0	*Quercus* sp.
			18.0	*Corylus* sp.
			9.0	*Salix/Populus*
			5.0	*Fraxinus* sp.
			5.0	*Alnus* sp.
Interior within outer ditch				
H	215	bone deposit	26.0	*Quercus* sp.
			10.0	*Fraxinus* sp.
	216	stain	4.0	*Quercus* sp.
	222	chalky surface	3.0	*Fraxinus* sp.
	223	under 215	15.0	*Crataegus* sp.
			14.0	*Quercus* sp.
	226	linear stain	2.0	*Quercus* sp.
	236	under 215	3.0	*Quercus* sp.
	242	linear stain	2.0	*Quercus* sp.
	243	stain	2.0	*Quercus* sp.
	244	stain	4.0	*Quercus* sp.
	250	subsoil	11.0	*Quercus* sp.
			2.0	*Fraxinus* sp.
	251	subsoil	2.0	*Crataegus* sp.
Palisade enclosure 2 (3592 grams total)				
Palisade ditch				
M	600	upper fill	18.0	*Quercus* sp.
	604	upper fill	41.4	*Quercus* sp.
			19.7	*Corylus* sp.
			6.9	*Crataegus* sp.
	608	postpipe core of 625	49.0	*Quercus* sp.
	609	postpipe core of 626	46.0	*Quercus* sp.
	610	postpipe core of 627	14.0	*Quercus* sp.
	611	postpipe core of 628	47.0	*Quercus* sp.
	612	bone with postpipe 625	2.0	*Fraxinus* sp.
	621	outer postpipe of 625	39.0	*Quercus* sp.
	622	outer postpipe of 626	33.0	*Quercus* sp.
	623	outer postpipe of 627	27.0	*Quercus* sp.
	629	ditch fill	145.7	*Quercus* sp.
			62.6	*Fraxinus* sp.
			61.3	*Corylus* sp.
			23.8	*Acer* sp.
			21.7	*Crataegus* sp.
			12.9	*Prunus* sp.
K	403	weathering cone	12.3	*Quercus* sp.
			10.4	*Crataegus* sp.
			8.2	*Corylus* sp.
			4.1	*Acer* sp.
	406	postpipe	2.0	*Quercus* sp.
	408	main fill of 406	18.0	*Quercus* sp.
	409	postpipe	61.8	*Quercus* sp.
			4.2	*Acer* sp.
	410	postpipe	8.0	*Quercus* sp.
T	954	ditch fill	6.0	*Quercus* sp.
	968	ditch fill	34.0	*Quercus* sp.
	985	postpipe	32.0	*Quercus* sp.
	974	part of 985	29.0	*Quercus* sp.
CC	8003	ditch fill	12.3	*Fagus* sp. (beech)
			12.2	*Corylus* sp.
			10.1	*Quercus* sp.
			9.3	*Crataegus* sp.
			9.1	*Sambucus* sp.
	8004	postpipe row	12.0	*Quercus* sp.
	8005	postpipe	63.4	*Quercus* sp.
			3.6	*Fraxinus* sp.
	8006	postpipe	8.0	*Fraxinus* sp.
	8007	postpipe	57.6	*Quercus* sp.
			21.4	*Corylus* sp.
			3.0	*Fagus* sp.
	8008	postpipe	192.0	*Quercus* sp.
			21.3	*Acer* sp.
			20.0	*Salix/Populus*
			20.4	*Fraxinus* sp.
			17.2	*Corylus* sp.
			16.1	*Prunus* sp.

Trench	*Context*	*Description*	*grams*	*Taxon*
	8009	postpipe	30.7	*Quercus* sp.
			4.3	*Crataegus* sp.
	8010	postpipe	67.5	*Quercus* sp.
			16.5	*Fraxinus* sp.
	8011	band between 8005 and 8010	16.0	*Quercus* sp.
	8015	postpipe	68.0	*Quercus* sp.
			24.5	*Fraxinus* sp.
			10.0	*Corylus* sp.
			8.5	*Fagus* sp.
	8017	fill next to 8010	21.8	*Quercus* sp.
			6.2	*Fraxinus* sp.
	8018	fill at ditch edge	12.7	*Crataegus* sp.
			10.1	*Fagus* sp.
			1.2	*Quercus* sp.
	8019	fill at ditch edge	6.0	*Quercus* sp.
	8021	ditch fill base	5.0	*Quercus* sp.
BB	7003	ditch fill	4.0	*Quercus* sp.
	7004	postpipe row	379.4	*Quercus* sp.
			5.6	*Corylus* sp.
	7006	middle ditch fill	3.0	*Quercus* sp.
	7007	postpipe	53.2	*Quercus* sp.
			4.8	*Corylus* sp.
	7009	postpipe	12.0	*Quercus* sp.
Outer radial ditch 1				
S	552	ditch fill	2.0	*Crataegus* sp.
	553	ditch fill	23.7	*Quercus* sp.
			10.2	*Fraxinus* sp.
			4.1	*Prunus* sp.
	554	postpipe	14.0	*Quercus* sp.
	564	postpipe	16.4	*Quercus* sp.
			7.6	*Corylus* sp.
Structure 1				
Outer ring				
L	503	postpipe	36.0	*Quercus* sp.
			10.0	*Acer* sp.
	504	postpipe	6.0	*Corylus* sp.
	505	postpipe	33.0	*Quercus* sp.
			4.0	*Prunus* sp.
	506	postpipe	15.0	*Quercus* sp.
Structure 2				
Subsoil outside outer ring				
Z	5010	subsoil	6.0	*Crataegus* sp.
			5.8	*Acer* sp.
			5.2	*Quercus* sp.
Outer ring				
	5054	postpipe	480.5	*Quercus* sp.
			7.5	*Fraxinus* sp.
	5055	upper ditch fill	21.3	*Quercus* sp.
			18.4	*Corylus* sp.
			14.5	*Crataegus* sp.
			13.6	*Fraxinus* sp.
			12.9	*Prunus* sp.
			12.3	*Acer* sp.
	5113	ditch fill	9.4	*Quercus* sp.
			6.6	*Crataegus* sp.
Inner ring, south arc				
	5073	postpit	163.0	*Quercus* sp.
			20.0	*Corylus* sp.
	5059	postpipe of postpit 5086	18.0	*Quercus* sp.
	5066	packing of postpit 5086	23.0	*Quercus* sp.
	5075	postpit	21.0	*Quercus* sp.
	5063	postpipe of postpit 5080	168.0	*Quercus* sp.
Inner ring, north arc				
	5067	postpipe of postpit 5111	15.0	*Quercus* sp.
	5068	postpipe of postpit 5100	12.0	*Quercus* sp.
	5069	postpipe of postpit 5088	18.0	*Quercus* sp.

Trench	Context	Description	grams	Taxon
	5090	packing of postpit 5088	8.0	*Corylus* sp.
	5070	postpipe of posthole 5077	2.0	*Quercus* sp.
	5071	postpipe of posthole 5105	28.0	*Quercus* sp.
Bone deposit 5007 outside Structure 2				
	5008	main fill	7.0	*Corylus* sp.
			7.0	*Prunus* sp.
	5104	lower fill	2.0	*Acer* sp.
Structure 3, outer ring				
AA	6003	ditch fill	15.0	*Crataegus* sp.
			5.0	*Fraxinus* sp.
			4.0	*Fagus* sp.
	6012	weathering cone	4.0	*Crataegus* sp.
	6019	postpipe	38.0	*Quercus* sp.
	6021	postpipe	37.0	*Quercus* sp.

Table 42: relative percentages of wood charcoal from enclosure 1 (1929 grams total)

Taxon	weight (g)	percentage
Quercus sp. (oak)	1250.3	64.81
Corylus sp. (hazel)	218.1	11.31
Fraxinus sp. (ash)	191.2	9.91
Crataegus sp. (hawthorn)	126.9	6.58
Prunus sp. (plum, cherry, sloe)	79.5	4.12
Salix/Populus (willow/poplar)	20.0	1.04
Acer sp. (field maple)	18.0	0.93
Maloideae (apple, pear, etc)	14.0	0.73
Alnus sp. (alder)	7.0	0.36
Sambucus sp. (elder)	4.0	0.21

Table 43: relative percentages of wood charcoal from enclosure 2 (3592 grams total)

Taxon	weight (g)	percentage
Quercus sp. (oak)	2863.6	79.72
Corylus sp. (hazel)	227.4	6.33
Fraxinus sp. (ash)	180.1	5.01
Crataegus sp. (hawthorn)	113.4	3.16
Acer sp. (field maple)	83.5	2.32
Prunus sp. (plum, cherry, sloe)	57.0	1.59
Fagus sp. (beech)	37.9	1.06
Salix/Populus (willow/poplar)	20.0	0.56
Sambucus sp. (elder)	9.1	0.25

in palisade enclosure 2; *Alnus* sp. and unspecified Maloideae are absent, though *Fagus* sp. is present. *Crataegus* sp. has an interesting distribution: it occurs twice in postpipes and six times in non-postpipe contexts in enclosure 1, compared to once in a postpipe but eleven times in non-postpipe contexts in enclosure 2. *Salix/Populus* occurs twice in postpipe contexts in enclosure 1, but only once in a postpipe in enclosure 2; neither enclosure has willow/poplar in non-postpipe contexts. *Alnus* sp. is only present in two postpipe contexts in enclosure 1. *Prunus* sp. and Maloideae (combined) are present in two postpipe contexts in both enclosures 1 and 2, and in one postpipe context in enclosure 1. *Prunus* sp. only is present in four non-postpipe contexts in enclosure 2. *Fagus* sp. occurs in two postpipe and three non-postpipe contexts, only in enclosure 2. *Acer* sp. is present mostly in non-postpipe contexts: three times in enclosure 1 and five times in enclosure 2, although it is also present in three postpipe contexts in enclosure 2. *Sambucus* sp. is present in one postpipe context and one non-postpipe context, in enclosures 1 and 2 respectively.

Although the main hypothesis is that ultimately much of the wood charcoal component on this site may derive from the structural palisade timbers, it is tempting to suggest some form of hawthorn hedging, wattling or fencing which may have resulted in the *Crataegus* sp. wood charcoal fragments being distributed in a *consistently* widespread pattern. The excavator discusses below the possibility that the wooden walls of the palisade circuits could have had extra cladding.

The abundant presence of wood charcoal in the postpipes may indicate that post timbers were burnt *in situ*, as discussed further below. Some of the taxa other than *Quercus* might derive from material used to fire the palisades; other such material may come from fires and hearths of all kinds. It is also presumably the case that oak could have been burnt extensively on fires and hearths; it certainly occurs in non-palisade contexts here.

In many respects the taxa present in the wood charcoal assemblage from West Kennet show affinities with the *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland (W8), common on calcareous mull soils in lowland southern Britain, as described by Rodwell (1991). This category is synonymous with former descriptive terms such as 'oak-hazel woods'. This woodland community is very diverse. *Fraxinus excelsior*, *Acer campestre* and *Corylus avellana* often dominate. *Quercus* may be locally important, predominating on heavy moist soils; *Prunus avium* may also display local distributions. *Corylus avellana* is a frequent component of the underwood; it, *Fraxinus excelsior* and *Acer campestre* often form a 'coppice-with-standards' community with *Quercus robur*. A frequent companion is *Crataegus monogyna* or *C. laevigata*, whilst *Sambucus nigra* and *Prunus spinosa* may occur in patchy abundance throughout the woodland scrub. *Salix caprea* and *S. cinerea*, sometimes in coppice form, may occur on moister soils; *Alnus glutinosa* is uncommon, however. *Fagus sylvatica* may be of local importance on calcareous deposits. Scattered individual trees (rarely coppiced) include *Malus sylvestris*, *M. communis* and *Pyrus communis*, which may be an introduced species (Rodwell 1991).

As many of the wood charcoal taxa in the West Kennet Neolithic contexts are likely to be present as a consequence of deliberate human selection whereby the working properties of particular timbers could be used to best advantage, there is a limited application possible for these wood charcoal results for conventional palaeoenvironmental reconstruction. It is useful, however, to compare the relative proportions of taxa present (as shown in tables 42 and 43) with pollen sequences from the region (see this report, above), but the wood charcoal cannot be assumed necessarily to represent the patterns of local tree and shrub cover *strictly in the proportions present in these tables.*

Whilst many features such as the elm decline and the increased diversity and quantity of herbs following land clearance for agriculture remain important markers within Neolithic pollen sequences, the West Kennet wood charcoal taxa seem to indicate that a mosaic of woodland, scrub and cleared land was available for exploitation and management. The proximity of such resources cannot be established with any accuracy, but modern vegetational community analogues such as exemplified by Rodwell's W8 category (1991), described above, can be seen to contain woodland, coppice-with-standards and scrub elements comprising the eleven taxa present as wood charcoal at West Kennet (and more).

Charred plant remains

(Andy Fairbairn)

Introduction

This report details the analysis of the charred seeds, fruits and parenchymatous remains recovered as the result of an extensive sampling and flotation programme completed during the excavation of the two enclosures. Although plant remains from Saxon contexts were recovered the analysis presented here includes only the remains from Neolithic contexts, the Saxon remains being described in another report.

The overall objective of the excavations was to define the extent and nature of the archaeological remains preserved at the site. Excavation and sampling opportunities were, therefore, limited to the deposits excavated during site definition, mainly palisade post-trenches. Such contexts do not provide the greatest potential for the incorporation of rich plant remain assemblages relating directly to human resource use into the archaeological record. This is mainly due to the brief period during which they would have been open to external inputs during, in this case, construction of the palisades. Construction activity in itself is also unlikely to produce the rich charred remain assemblages with which aspects of subsistence practice may be reconstructed. Despite this problem, the archaeobotanical programme of recovery and analysis was completed as it was necessary to collect the maximum possible quantity of information about plant resource use. This was due to the objectives of the excavation itself and to provide additional information concerning British Neolithic plant resource use, a subject which is poorly understood as a whole (Moffett *et al.* 1989). Analysis of the recovered remains aimed to determine the range of wild and cultivated plant resources, especially foods, utilised by the Neolithic population and to improve the understanding of the range of activities during the active life of the enclosures.

Field and Laboratory methods

Most soil samples were collected from the fills of the main palisade ditches of the enclosure perimeters and from the palisade ditches of three structures excavated within enclosure 2. Other sampled features included a pit and charcoal spread (203, 226) in Trench H. Sample volumes varied from 10–15 litres. A total of 77 samples were collected from Neolithic contexts in enclosure 1 and 74 from enclosure 2. All the samples were processed in the field using a Siraf-type flotation tank, with a 0.3 mm diameter mesh sieve used to collect the floating fraction, which was dried prior to storage.

The dried flots were sorted in the laboratory using a binocular dissecting microscope with a x4–x50 magnification range. The volume of the flots was measured and they were then sieved into 4 mm, 2 mm, 1 mm, 0.5 mm and 0.3 mm size classes to aid sorting. All charred non-wood charcoal plant remains were picked out of the flots, any fresh, uncharred plant materials also being recorded. A wide range of uncharred plant remains were collected from the samples including a number of straw fragments and many goosefoot (*Chenopodium* L.) seeds. These uncharred remains were undoubtedly modern and are likely to have blown into the samples during collection or processing. The site is located in a windy spot and the arable fields in which the excavation trenches were dug provide an ample supply of modern contaminants. Due to the potential for contamination all complete seeds recovered from the flots were broken open to ensure that they were charred before they were included in the analysis.

All the flots from enclosure 1 were sorted, as were 50 of those from enclosure 2, the remaining unsorted samples from enclosure 2 being replicates of samples included in the analysis. The recovered charred remains were identified by comparison to reference specimens in the botanical

collections of the Institute of Archaeology, University College London.

Identified Remains

The recovered flots were small in volume and contained few charred non-wood charcoal plant remains. 33 of the 77 samples from enclosure 1 contained identifiable remains, as did 44 out of the 50 analysed samples from enclosure 2. The plant remain assemblages typically consisted of a few remains, mainly of highly fragmented cereal endosperm. The identified remains consisted entirely of seeds, fruits and cereal grains, with two fragments of cereal chaff also recovered. A small number of cereal taxa were identifiable, as were certain wild/weed taxa, although most remains were eroded and highly fragmented making even genus level identification difficult. A number of parenchymatous remains were also recovered from a number of samples, although none were identifiable due to fragmentation and poor preservation.

The identified remains from each of the excavated structures or groups of structures have been summarised together in tables 44–48. In no case were more than a few remains preserved in each sample, and there was no justification to list each of the sample contents individually. The nomenclature of the cereals in the tables follows van Zeist (1984) and Stace (1991) for the wild species. The plant remain record for each of the enclosures will now be considered separately.

Enclosure 1

The sampled pit and charcoal spread from Trench H produced no identifiable remains, all those from Neolithic contexts being recovered from the main palisade perimeter ditch exposed in Trenches D, E, F and J (table 44). Most samples contained few remains, mainly cereal fragments. Several wheat grains were recovered, among them a single well preserved grain identified as emmer wheat (*Triticum dicoccum* Schübl.). Wheat grains are not easily identified to species level, chaff fragments possessing more certain identification criteria, and so the identification has remained tentative. A number of barley (*Hordeum vulgare* L.) grains were also identified, mostly from hulled forms, one being distinctly asymmetrical and probably derived from six-row hulled barley (*Hordeum vulgare* L. var. *hexastichum*). The symmetrical grain may have derived from either a two- or six-rowed form.

Several wild taxa were identified including a single endocarp of blackthorn (*Prunus spinosa* L.), possibly derived from a sloe fruit collected as food. Several wild taxa were only identifiable at the family or genus level, including several poorly preserved grass (Poaceae) fruits; one specimen from the daisy family (Asteraceae); and two cotyledons possibly deriving from the pea family (Fabaceae). The other wild taxa included several which are today typically weeds of disturbed places, some such as poppy (*Papaver* L.), knotweed (*Polygonum* L.) and annual meadow-grass (*Poa annua* L.) also being agricultural weeds.

Enclosure 2

Remains were recovered from samples of the deposits in the main palisade perimeter ditch and the ditches of Structures 1, 2 and 3 which lay within. Again, the assemblages were poor, consisting of a few cereal grain fragments and occasional wild plant seeds and fruits. The remains are summarised in tables 45–48.

Barley grains (*Hordeum vulgare* L.) were identified in all four contexts, with the distinctive asymmetrical grains of six-row hulled barley (*Hordeum vulgare* var. *hexastichum*) recovered from the main perimeter and Structures 1 and 3. Wheat grains (*Triticum* L. sp.) were identified in all the sampled contexts, with the glume wheat emmer (*Triticum dicoccum* Schübl.) identified in Structure 2 and free-threshing bread wheat (*Triticum aestivum* L.) distinguished in Structures 1, 2 and 3. Two rachis fragments were identified as deriving from a wheat species. While fragmentation did not allow species level identification, the morphology of the rachis segments suggested that they were derived from a free-threshing species, such as bread wheat.

Table 44: plant remains from the main palisade ditches of enclosure 1

Taxon	*Component*	*Quantity*
Hordeum vulgare L. (barley)	hulled, symmetrical grain	2
Hordeum vulgare L.(barley)	hulled, asymmetrical grain	2
Hordeum vulgare L.(barley)	hulled grain	1
Hordeum vulgare L.(barley)	grain	4
Triticum cf. *dicoccum* Schübl. (emmer wheat)	grain	1
Triticum L. indet. (wheat)	grain	5
cereal indet.	grain	11
Papaver L. sp. (poppy)	seed	1
Polygonum L. sp. (knotweed)	seed	1
Potentilla L. sp. (cinquefoil)	seed	1
Prunus spinosa L. (blackthorn/sloe)	endocarp	1
Fabaceae (pea family)	seed	2
Asteraceae indet.	seed	1
Poa cf. *annua* L. (annual meadow-grass)	fruit	1
Poaceae (grass family)	fruit	3
indet.	seeds/fruits	6
indet.	parenchyma	5 frags

Table 45: plant remains from the main palisade ditch of enclosure 2

Taxon	*Component*	*Quantity*
Hordeum vulgare L. (barley)	hulled, asymmetrical grain	1
Hordeum vulgare L. (barley)	hulled grain	1
Triticum L. sp. (wheat)	grain	1
Cereal indet.	grain	8
Chenopodium album L. (goosefoot)	seed	1
Chenopodium L./*Atriplex* L. sp.	seed	1
cf. *Poa* L. sp. (meadow-grass)	seed	1
indet.	seed	6
indet.	parenchyma	4 frags

Table 46: plant remains from enclosure 2, Structure 1

Taxon	*Component*	*Quantity*
Hordeum vulgare L. (barley)	hulled, asymmetical grain	2
Hordeum vulgare L. (barley)	hulled grain	1
Hordeum vulgare L. (barley)	grain	2
Triticum cf. *aestivum* L. s.l. (bread wheat)	grain	2
Triticum L. indet. (wheat)	grain	3
cereal46 indet.	grain	26
Corylus avellana (hazel)	nutshell	1 frag
Galium aparine L. (cleavers)	fruit	2
Galium L. sp.	fruit	1
indet.	seed/fruit	2
indet.	parenchyma	1 frag

Table 47: plant remains from enclosure 2, Structure 2

Taxon	*Component*	*Quantity*
Hordeum vulgare L. (barley)	grain	7
Triticum cf. *dicoccum* Schübl. (emmer wheat)	grain	1
Triticum cf. *aestivum* L. s.l. (bread wheat)	grain	3
Triticum sp. (wheat)	grain	4
Triticum sp.(wheat)	rachis internode	2
Avena L. sp.(oat)	fruit	2
cereal indet.	grain	55 frags
Fabaceae - large seeded (pea family)	seed	2
Potentilla L. sp.(cinquefoil)	fruit	1
Bromus L. sp.(brome)	fruit	1
Poaceae (grass family)	fruit	2
indet.	seed/fruit	2
indet.	parenchyma	1 frag

Table 48: plant remains from enclosure 2, Structure 3

Taxon	*Component*	*Quantity*
Hordeum vulgare L. (barley)	hulled, asymmetrical grain	1
Hordeum vulgare L. (barley)	grain	1
Triticum cf. *aestivum* L. s.l. (bread wheat)	grain	4
Triticum L. indet. (wheat)	grain	2
cereal indet.	grain	13
Fabaceae - large seeded (pea family)	seed	1
indet.	seed/fruit	11
indet.	parenchyma	3 frags

Two other possible cultivars were also identified in the samples from enclosure 2. A single fragment of an oat grain (*Avena* L. sp.) was recovered from Structure 2, possibly deriving from cultivated oat (*Avena sativa* L.). Several large fragments of a member of the pea family (Fabaceae) were recovered from three samples in Structures 2 and 3. Poor preservation did not allow identification beyond the family level, although the size and shape of the cotyledon suggested that it may have derived from a cultivated or wild pea species(*Pisum* L. sp.). The significance of these remains is discussed below.

A number of wild taxa were recovered from the enclosure 2 samples including a fragment of hazelnut shell (*Corylus avellana* L.), a commonly recovered remain and well known wild resource (Moffett *et al.* 1989). The seeds of goosefoot (*Chenopodium album* L.), meadow-grass (*Poa* L.), brome (*Bromus* L.), cinquefoil (*Potentilla* L.) and cleavers (*Galium aparine* L.) were also distinguished. These taxa grow in a number of habitats including disturbed and agricultural areas.

Discussion

Despite a considerable sampling and processing effort, few identifiable charred plant remains were recovered from the West Kennet palisade enclosures. The low occurrence of plant remains in the sampled deposits was a general feature of the site. It is suggested that the remains did not derive from deposits of rubbish but were incorporated sporadically and incidentally into the palisade trenches during: construction of the palisade; abandonment and burning of the palisade; or contamination from later plant remain deposits. The remain assemblages are, therefore, inadequate for providing a sound basis for reconstruction of any plant-based activities occurring at the site, as such reconstructions rely on the use of models applied to quantifiable data deriving from assemblages of plant remains produced during single episodes of charring which can confidently be associated together. A more realistic view would see the botanical record from the enclosures providing a rather blurred picture of plant species which were present at the site during its construction and destruction. Contamination of the Neolithic remains due to intrusion by charred remains from later periods is a possibility as rich Saxon remain assemblages have been recovered from parts of the site and nearby. This is further discussed below in respect to enclosure 2, although most of the remain assemblages were recovered from sealed archaeological contexts and contamination is not thought to have played a major part in the accumulation of plant remains at the site.

Despite the considerable problems with understanding the source of the remains, several potential plant resources were identified. Of the cultivated taxa six-row hulled barley (*Hordeum vulgare* L. var. *hexastichum*) was the most securely identified species, with the other barley grains possibly deriving from either two- or six-rowed forms. Glume and free-threshing wheats were identified in the assemblages, although the identifications were of grains which are the least reliable source for species level identification. Emmer wheat (*Triticum dicoccum* Schübl.) and bread wheat (*Triticum aestivum* L.) are both known Neolithic crops, emmer use being restricted in Britain to the Neolithic and Bronze Age. Bread wheat is a less commonly found remain although it is well recorded in Neolithic deposits (Greig 1991). The presence of the identified taxa in a number of separate samples from secure Neolithic contexts suggests that all represent plant remains deposited during or shortly after the Neolithic use of the site.

Other possible agricultural resources were identified, including an oat grain and the remains of a large seeded legume (Fabaceae), possibly pea, recovered from enclosure 2. Pea is unknown in British Neolithic sites, and oat finds are rare (Greig 1991). While the West Kennet remains may be important finds, they may, however, have derived from contamination of the deposits by Saxon activity. A number of well preserved, rich Saxon assemblages were recovered from Trenches B, C and Y, and the 1989 evaluation described Saxon remains from the West Kennet farmyard (Allen and Carruthers 1989). Those assemblages included pea and oat remains. It is possible, but by no means definite, that the pea and oat finds may have derived from the re-working of Saxon deposits into the Neolithic strata. Therefore the oat and pea finds must remain possible, but ultimately insecure Neolithic finds.

Two possible wild foods, sloe (*Prunus spinosa* L.) and hazelnut (*Corylus avellana* L.) were identified amongst the wild taxa. Both of these resources have a long and continuing history of use and are common finds in a range of Neolithic contexts from ceremonial to settlement sites (Moffett *et al.* 1989). They are seasonally abundant resources, with hazelnuts being a storable and possibly heavily used resource during the Mesolithic and Neolithic. Both would have been available amongst the mosaic of woodland and scrub around the site and may have contributed to the wood charcoal assemblages, *Prunus* and *Corylus* charcoal having been identified (Cartwright, this report). Two other possible wild foods, hawthorn (*Crataegus*) and elder (*Sambucus*), were also identified in the charcoal remains and while absent from the seed and fruit assemblages, are regularly identified in Neolithic and Bronze Age deposits (Moffett *et al.* 1989) and may have provided further wild foodstuffs at the site. Several fragments of parenchymatous tissue were also recovered which may have derived from deliberately collected roots and tubers. Finds of roots and tubers are not uncommon in British Neolithic deposits (Moffett 1991), although the presence of such resources in the West Kennet assemblages must remain totally speculative. The other wild taxa represented include several weeds and plants of disturbed places. While possibly deriving from agricultural weeds, the seeds and fruits may also have come from plants which were present at the site when the palisade was burned, and incorporated into the deposits via that process. It is, therefore, impossible to use the remains as an indicator of agricultural production. The cereal remains from the palisade trenches may have derived from production, processing or consumption activities.

Why these food resources were present on the site is open to speculation and they may represent episodes of production, processing or consumption. They may have derived from foods used to sustain those who built and destroyed the site, offerings used during ritual activities, or the residues of otherwise invisible subsistence activities such as crop and

wild food processing. Whatever the source, few remains were accumulated, whether due to the small period of time the ditches were open to external inputs or whether there was simply very little charred plant material being generated. It is almost certain that the overall paucity of remains is unlikely to be due to the recovery and processing techniques applied. The lack of plant remains from the small pit in Trench H was disappointing, as such contexts are often rich sources of remains. However, the similarity of the record from this pit to that of the palisade trenches may suggest that there were indeed few activities being carried out at the site during its construction, use and destruction, which generated plant remains. If so, this lack of remains may indicate that plant resource use beyond the use of wood was limited and even unimportant in the day-to-day existence of the palisade enclosures. It may also indicate a general lack of normal subsistence activities occurring at the palisade sites. While this suggestion remains speculative, the lack of remains appears to be genuine and in itself may have implications of equal or greater importance for the understanding of the activities which occurred at the site compared to the species level identifications discussed above.

The remains from the enclosures represent sporadic inputs of plant material from a society using agricultural produce, including free-threshing and glume wheats and six-row hulled barley. Other cultivars may have been utilised and wild, seasonally abundant resources were also used, although the relative importance and status of wild and cultivated resources cannot adequately be determined by analysis of the remain assemblages described here. A simple presence analysis comparing samples or quantitative comparison of sample contents would give undue importance to any patterns of representation, which in this case are unlikely to represent anything other than random, unidentifiable preservational factors. Analyses dependent on such methodologies using the fragmentary datasets so often recovered from British sites to suggest large-scale patterns of plant use are also unlikely to reach reliable conclusions (e.g. Moffett *et al.* 1989). The only generalisations possible for both enclosures is that both wild and domestic plants were being utilised, possibly brought to the site from local woodland, scrub and arable clearings.

Recent discussions have suggested that domestic cereals and plant resources as a whole were a relatively unimportant source of food in the Neolithic period, cereals having a primarily symbolic role in society (Pryor 1988; Thomas 1992; Thomas 1996a). While the lack of food plants present in the deposits at the West Kennet enclosures may be seen to support such a view, it is possible that the paucity of remains may be due to the function of the site, which may not have included subsistence practices. If the site was primarily of social use, this leads to the possibility of inclusion of plant resources in the social activities at the site, with the conclusion that plants had an active role to play in those activities. While not necessarily supporting Thomas in full, the evidence of the presence of plant resources in this social context could indicate that they had a potentially important non-subsistence or non-economic role. This is rarely considered in primary discussions of plant remain assemblages. It is worth highlighting the strong symbolism and social as well as 'economic' value of plants. In the context of such sites as the West Kennet palisades and the many enigmatic sites which surround it it must be a priority of archaeobotanical research to consider such relevant and untackled issues. The fragmentary remains and limited space allow only a speculative journey down such a road, but indicate that plants may have had a limited role to play in the everyday life of the enclosures and that their role may have been beyond the narrow range of subsistence functions we commonly attribute to our data.

Part Three:
A Later Neolithic complex in north Wiltshire

Dating and sequence

Neither site is precisely dated. The position of Silbury Hill in the local sequence of monument construction is least secure, while the mutual relationship of the two West Kennet enclosures is uncertain. Neither site should simply be referred to a broad or general Later Neolithic period; each demands a specific context. The monumental mound appears to have been constructed in a unified process, as the excavator surmised. It may, like many another major monument, have undergone changes in design – in this case simply enlarging it – but this is still compatible with a shorter rather than longer span of construction. The West Kennet enclosures have little evidence for prolonged use (discussed in more detail further below). There are no signs of post replacement. Perhaps the one enclosure simply replaced the other, if they did not overlap in time as outer radial ditch 2 may suggest, in seeming to connect the two circuits. It is not possible to suggest which enclosure came first. Some features might predate or postdate the main enclosure phase. Simply on grounds of analogy, the internal structures within enclosure 2 would be candidates for an early date, and the radiocarbon dates for the bone deposit 215 within enclosure 1 could point at face value to continued use of the site after a main enclosure phase.

The least insecure starting point may be the combined radiocarbon evidence from the West Kennet enclosures. In calibrated terms this offers a broad range, somewhat at odds with the event-like character of the constructions, of 2600/2500–2200/2100 BC, setting aside the earliest determination, CAR-1295, and the latest four determinations, CAR-1296, CAR-1297, CAR-1294, and BM-3602. If these are not to be set aside, the range is correspondingly increased, to 2800–1800/1700 BC, but that span seems wholly at odds with the lack of other indications for longevity and development. Elsewhere I have defined a lettered sequence of local development (Whittle 1993; table 49 here). Phase F, the last, is defined as 3950–3650 BP, or about 2500–2000 BC. The West Kennet enclosures seem to fall squarely within local Phase F.

The position of Silbury Hill is more problematic. The three most reliable radiocarbon dates (see above, p. 27) suggest a very broad date range of about 2800–2200/2000 BC, and elsewhere I have supported a date for the beginning of construction of around 2800–2500 BC (Whittle 1993). It is also possible, though with greater straining of the internal evidence, because it requires reliance on the experimental dates from the primary turf core, to support a slightly earlier date for construction, bracketing a period of say 3100/3000–2800 BC. Those interpretations place Silbury Hill at the Phase E/F border and in late Phase D or early Phase E respectively (cf. Whittle 1993). It is also important to emphasise another possibility, that Silbury Hill can in fact be dated a little later, within Phase F, if the two determinations from the ditch are given most weight. In that case, both Silbury Hill and the two West Kennet enclosures belong to more or less the same context. There are many uncertainties, since many more dates could be obtained, samples might have been affected in differing ways by groundwater or other factors, and dating has been carried out by three laboratories over a period of time. I offer further arguments below in support of the hypothesis of contemporaneity.

Some initial reference to monument building through the local sequence is useful (Whittle 1993). If the beginning of Silbury Hill were to be dated to the end of Phase D or to early Phase E, the mound would predate most of the rest of Later Neolithic monumental activity. This is not an objection in itself to an early date, but the accompanying context is less convincing, because the great mound would be rather isolated. Speculatively, simple stone circles in the area and the beginnings of the West Kennet Avenue could date here. It is possible that there was early activity at Avebury itself which was later incorporated in the main monument (Pitts and Whittle 1992).

Much more activity belongs to the full Phase E. The main development of Avebury seems to date to this phase, though the main stone circle at the former could belong to Phase F (Pitts and Whittle 1992). Since the Sanctuary is connected by the West Kennet Avenue to Avebury, it too may belong here. Its associations are with plain Grooved Ware, though it has not been possible to obtain radiocarbon dates for the site (Pollard 1992). The chambers of the West Kennet long barrow may have been partially and gradually filled in this phase, though the excavator envisaged a single, later act of blocking (Thomas and Whittle 1986; Piggott 1962). There was also renewed activity at the Windmill Hill enclosure, seen especially in deposits in the upper parts of the outer ditch.

In Phase F, it is possible that the final arrangements were made within Avebury. Deposition continued at Windmill Hill, but did not last into the succeeding Early Bronze Age. Apart from Silbury Hill and the West Kennet enclosures, there are no other known major monumental enterprises. Beaker graves and mounds (much smaller in scale) may belong to Phase F or later, as in the locality at Hemp Knoll, East Kennet,

Table 49: outline summary of phases in the Neolithic of the Avebury area (after Whittle 1993, with additions). (Calibrations based on Stuiver and Reimer (1993), with notional standard deviations of 70 years for each BP date, and results rounded to the nearest ten years.)

Phase	*BP uncal range*	*CAL BC range at 1ó*	*Environment and subsistence*	*Settlement*	*Monuments*
A	5450–5150	4350/4250–4000/3820	Woodland. First clearances ?	?	?
B	5150–4850	4000/3820–3700/3540	Small scattered clearances in woodland. Animal husbandry	Dispersed. Small pit groups	Simple barrows. Shrines ?
C	4850–4550	3700/3540–3360/3100	More clearances, in mosaic pattern. Some plough cultivation and cereals. Animal husbandry; some herding beyond area ?	Dispersed, with ? local nucleation. Small sites, pit groups, lithic scatters	More elaborate and larger barrows (? lineages). Sacred enclosures towards end of C
D	4550–4250	3360/3100–2910/2700	Trend to more scrub or woodland again	Uncertain. Density as in A and B ?	? Simple circles ? Start of West Kennet Avenue
E	4250–3950	2910/2700–2560/2340	Renewed clearances	Small sites and pit groups. Larger lithic scatters	Development of Avebury. *?? Silbury at E/F border*
F	3950–3650	2560/2340–2130/1910	Trend to open country, though timber still available. Cultivation. Pigs emphasised for ritual and feasting	More permanent or marked habitation areas, but still mobility and dispersal	*? Silbury. West Kennet palisade enclosures.* Beaker burials in later F and into Early Bronze Age

the West Kennet Avenue and the Sanctuary (Robertson-Mackay 1980; Kinnes 1978; Smith 1965a; Pollard 1992). They appear also on the high downland of the Marlborough Downs (Fowler 1967; Cleal 1992b). The blocking of the West Kennet long barrow was enacted or completed in this phase (Thomas and Whittle 1986; Piggott 1992), dated by the deposition of Grooved Ware and (presumed) early styles of Beaker (Piggott 1962; cf. Case 1995). The monumental mound, palisade enclosures and the old long barrow are all intervisible. Perhaps events at all three were connected, a possibility explored below.

Environments and the settlement context

(with Mark Robinson and G.W. Dimbleby)

The site evidence

As already described, the mound and the enclosures were both valley sites. The mound scarped the valley edge. Enclosure 1 may have made use of old natural channels in its south-east quadrant to enhance the layout, one linear depression lying outside and one between the palisade circuits. Neither in Trench C nor in Trench N was there any sign of deposits as old as the Overton Formation (Evans *et al.* 1993), perhaps unsurprisingly since those cuttings were right at the edge of the valley. The nature of the local valley bottom remains to be established. Its varying history upstream and downstream has already been noted. At the least it is not certain that the enclosures were traversed by an active or large watercourse, nor that the ditch around Silbury Hill would have been filled regularly from such a watercourse.

That there had been earlier clearance in the locality is suggested by the molluscan evidence from the West Kennet long barrow (Evans 1972), and by the earlier pollen of oak and lime from under Silbury Hill. The abundance of hazel pollen from the upper part of the profiles under Silbury Hill may suggest regenerating woodland, and the regular diameters of the oak posts in the West Kennet enclosures are compatible with the existence somewhere within reach of secondary or managed woodland. Recent change in the area represented in the turf stack may be reflected in high numbers of dead shells of *Helicella itala*. The turves themselves from the primary core also suggest an earlier history of disturbance or cultivation.

The evidence of the insect and plant remains, pollen and land snails from Silbury Hill all suggest strongly that the immediately local environment was open grassland, both in the area of the mound itself and the area from which the turves for the primary stack were derived. This can be characterised as a herb-rich grassland which was grazed, but not so heavily as to prevent the flowering of various herbs. The insect remains suggest a radius of open ground of a few hundred metres. The seeds of weeds like *Urtica*, *Polygonum* and *Ranunculus* are probably over-represented through the seed bank remaining in the soil. Some discrepancies, however, as between the relatively high values of pollen of *Plantago lanceolata* and of Liguliflorae and their very low representation in the plant remains, might better be explained by recent change in the circumstances leading up to mound construction. Disturbance may have preceded or been part of mound construction.

The insect remains do not suggest the close proximity of buildings or habitation. It is unclear what effect, if any, the palisade enclosures and their related structures would have on the insect assemblage; it is doubtful whether insects alone could signal the presence of these sites. The lack of synanthropic species could indicate either that mound and enclosures were not directly contemporary, or that the locality of the enclosures was beyond the catchment of the insects represented in the Silbury samples. Grazing is suggested by the presence of insects which feed on dung, and by the reported evidence of preserved short grass with square ends, from under the mound. It is possible to suggest slightly

different types of grassland for the old land surface under the mound (*Cynosurus cristatus-Centaurea nigra* type) compared with that of the turves from chalk rendsina in the turf stack (*Festuca ovina-Avenula pratensis* type), and the pollen and plant remains provided more detail at species level.

There was no sign in the Silbury evidence of insects, pollen or plant remains for cereal cultivation. However, there are some carbonised cereal remains from the West Kennet palisades and other contexts, and the turves themselves in the primary turf stack in Silbury Hill suggest a previous history of disturbance or cultivation. The evidence as a whole is presumably reflecting both temporal and spatial variation: earlier episodes of clearance and perhaps limited cultivation, and contemporary areas or plots in which cultivation took place, beyond the catchment of the insects under Silbury and without representation in the non-local pollen rain at Silbury. It is not even certain that cultivation occurred close to the enclosures themselves. At the least, the monumental mound seems not to have been constructed in the midst of habitation or cultivated fields.

Other habitats with the exception of woodland are hardly represented. The insect, pollen and plant remains evidence from Silbury is in agreement in showing very little sign of wet ground. There were only two occurrences of insects which normally feed on wet ground plants. This is compatible with the evidence from investigations of valley history for a dry grassland surface in the Kennet valley bottom in the third millennium BC (Evans *et al.* 1993).

The location of the woodland variously represented in the suite of evidence from both Silbury Hill and the West Kennet enclosures is of prime importance. Woodland is indicated primarily by the Silbury pollen (suggesting hazel, alder, elder, oak and other species) and the West Kennet charcoals (predominantly oak for posts, but with other species represented), but also by some of the mosses. The spores do not suggest major bracken growth. The abundance of hazel pollen at the top of the old land surface might be explained by its occurrence in the immediate locality, but in the Silbury insect assemblage, there was only one occurrence (tentatively identified) of a tree- or shrub-dependent beetle. Presumably therefore there was a zone of cleared ground around Silbury Hill. A shifting mosaic of secondary woodland can have existed beyond. It is easy to assume that the turves for the primary stack were derived from as close to the mound as possible, but they might have come from further afield, in the way that small oolitic stones were brought in from a distance for the construction of the West Kennet long barrow (Piggott 1962), and could therefore reflect in part a non-local history. Mosses were not recovered from the Silbury old ground surface. The small quantities of *Mnium punctatum* may have come from woodland or marsh further afield.

It is not possible to tell the location of the oaks which were felled in such numbers for the West Kennet palisades. Oak was part of the regional pollen rain in the upper part of the profiles. Woodland is suggested in Phases C and D, and perhaps into E, by molluscan profiles both relatively nearby, as at South Street long barrow (Ashbee *et al.* 1979), and on higher ground a little to the south-west, as at Easton Down long barrow (Whittle *et al.* 1993). Woodland presumably extended also on to the areas of clay-with-flints, which are distributed at the present day on parts of the higher ground to the east, roughly in a chevron running from Monkton Down to Marlborough and from Lockeridge to Golden Ball Hill, with the larger area of Savernake Forest to the east (information from Gill Swanton). The distance from the site to the nearest main deposits of clay-with-flints is roughly 4 km, though there may have been outlying patches in earlier times. Perhaps there were specific areas of managed woodland, or perhaps oak was derived from the region generally, given the frequency by the second millennium BC of buried soils which reflect open conditions of low diversity (Evans 1993) and given the general onset of alluviation in the upper Kennet valley also from the start of the second millennium BC, as represented by the Overton Formation (Evans *et al.* 1993).

Neither the contextual conditions of preservation nor the character of the sites are conducive to full representation of the local subsistence economy, but it may be suggested that the subsistence evidence from the mound and the enclosures is compatible with the suite of environmental evidence. A range of practices is indicated, including use of wild plant resources, cultivation of cereals, some hunting, and herding of pigs and cattle. Of this range the dominant element appears to have been pig-rearing, probably, as discussed further below, in the atypical context of monument construction and feasting. No one element demands extensive local clearance; each is compatible with a mosaic of woodland and clearance.

The site-specific evidence can now be considered in relation to that from the wider area over a period of time.

The regional evidence

The history of environmental change and settlement in the wider area is very important for evaluating the context of both mound and the two enclosures.

In late Phase D or early Phase E, the earliest stage to which the beginnings of Silbury Hill might belong, the Kennet valley upstream and downstream had a dry grassland surface, which had developed after clearance earlier in the Neolithic; earlier too there had been some paludification at Avebury and some alluviation at West Overton (Evans *et al.* 1993). The herb-rich grassland reflected in the Silbury evidence may perhaps have extended up and down the valley. Mature grassland (with incipient decalcification of the turf) is also documented under the bank of the Avebury enclosure (Evans 1972; Evans *et al.* 1985). Since that can now be dated to around 2800–2500 BC (Pitts and Whittle 1992), and thus to Phase E, the grassland here could already have been established in early Phase E or Phase D. Elsewhere Phase D can be characterised from the molluscan evidence of long barrow and causewayed enclosure ditches as a period of woodland or scrub, which has been documented from a number of differing locations including the higher ground of the Easton Down long barrow (Whittle *et al.* 1993), the chalk hill of Windmill Hill (Whittle 1993), and the lower-lying situations of South Street long barrow and Millbarrow on the plateau south and north of Windmill Hill respectively (Ashbee *et al.* 1979; Whittle 1994). Settlement evidence is elusive in this phase, and the nature of land-use uncertain; I have suggested that some kind of extensive 'wood-pasture' system could have been in operation (Whittle 1993).

Subsequently there was renewed clearance on the slopes

and plateaus, as reflected in the same set of ditch profiles. The dry grassland surface of the valley remained until the onset of the alluvial West Overton Formation, probably coeval with the use of Beakers and overlapping with my Phase F. The date of renewed clearance on slopes and plateaus is not precisely established. It is easy to assume that it must belong to Phase E, since the development of Avebury and its related monuments belongs there, but it may now be better to integrate the evidence from valley and elsewhere into one regional trend. The Millbarrow sequence is indirectly dated by two partly polished plano-convex knives; that of Windmill Hill by a mixture of developed Peterborough pottery, Grooved Ware and some Beaker pottery; that of South Street by Beaker pottery; and that of Easton Down indirectly by a plain accessory vessel of Early Bronze Age affinity. Some if not the bulk of renewed clearance may belong to Phase F rather than Phase E. The process could be seen as cumulative, and the regional trend to open country (and lower ecological diversity) the result of monument building through Phases E and F rather than its pre-condition. And in Phase F the valley at last began to reflect the regional scale, its alluviation presumably the indirect effect of extensively changed conditions on the slopes and plateaus. At South Street, cultivation is shown by ard marks flanking the ditches and by runs of chalk into the ditches, which have also been seen at Millbarrow and Easton Down.

In Phase E, and perhaps running on into Phase F, there is more settlement or occupation evidence. This takes the form of small pit groups, as preserved under round barrows, such as West Overton G6b (Smith and Simpson 1966) and Avebury G55 (Smith 1965b), and recorded on the slopes of Windmill Hill (unpublished research by the author) and on the line of the West Kennet Avenue (Smith 1965a). None of these sites is known to be large, and the fills of pits are compatible with deposition under special circumstances. These sites need not therefore be regarded as everyday occupations. The number and size of lithic scatters probably increased compared with earlier phases (Holgate 1988; Thomas 1991). One site only is known in the vicinity of Silbury Hill, a scatter probably of Later Neolithic date some 500 m to the north (Holgate 1988, table 4, no. 56); geophysical survey along this line in advance of sewerage works has not produced any accompanying features of obviously Neolithic date (Wessex Archaeology 1992; Powell *et al.* 1996; Soffe 1993). The general nature of lithic production, with less emphasis on planned curation, may be consistent with a less mobile population than in earlier phases (Bradley 1987), but the development is perhaps one of degree. For example, on the south slope of Windmill Hill there was a considerable concentration of surface lithics which may originally (before picking out by collectors) have totalled something in the order of tens of thousands. It included many finished tool forms, including axes and Later Neolithic arrowheads, and it is likely that the scatter represents repeated but episodic gatherings rather than regular occupation (unpublished research by the author; cf. Holgate 1988). Its use perhaps spanned Phases E and F. The best candidate for mundane activity is Cherhill on the scarp foot to the west of Avebury (Evans and Smith 1983). Its Later Neolithic use began with the deposition of a large quantity of Peterborough pottery of Mortlake style. Later, when (presumably) middle and late Beaker and Food Vessel pottery were in use (in Phase F or later ?), part of the site was ploughed over, and small ditches, perhaps part of a system of land boundaries, were dug. At most, this was on the edge of a habitation area (perhaps closer in the phase of Mortlake pot use), and its occupation appears to have been episodic. The number of sites with specifically Grooved Ware associations in the region is small (Hamilton and Whittle forthcoming). We can list Avebury itself and the West Kennet Avenue (Smith 1965a); the West Kennet long barrow (Piggott 1962); West Overton G6b (Smith and Simpson 1966); Avebury G55 (Smith 1965b); and the Sanctuary (Pollard 1992, and references) and further afield, Cherhill, where three sherds represent two vessels (Evans and Smith 1983); Burderop Down, on the Marlborough Downs (Gingell 1992)); and Black Patch, in the Vale of Pewsey (Annable 1977). As discussed above, these may divide into earlier and later sites, and not all certainly within Phase E. In Phase E generally, neither the character of known pit and other possible occupation sites like Cherhill, nor lithic scatters, nor the environmental evidence, demand the presence of a major concentration of population in the area.

The same may hold good in Phase F. As noted above, the trend to open country may have been accentuated in this phase, and the beginnings of sustained alluviation in the valley may be linked to this. It is perhaps then no accident that there should be renewed ditch digging at Cherhill, perhaps to define plots or boundaries, and a perhaps more widespread distribution of activity in the area, as witnessed by the appearance of Beaker burials and small Beaker pit groups on the Marlborough Downs, a part of the area with apparently rather little activity in earlier phases (Fowler 1967; Gingell 1992; Cleal 1992b). Beaker burials in the area as a whole occur in a variety of styles, in small mounds, in stone-marked graves or associated with existing monuments, especially at the feet of standing stones (cf. Case 1995). They appear generally well dispersed across the landscape and again do not demand the presence of a major concentration of population. The best indication of subsistence concerns may be the cow in the Hemp Knoll grave pit (Robertson-Mackay 1980; Grigson 1980).

Silbury Hill: interpretations and comparisons

Interpretation: general theory, context and analogy

The Neolithic past of the Avebury region was demonstrably very different to our own world, and the evidence for it is very incomplete. How then can we begin to seek understanding of that Neolithic world ? Most archaeologists interested in more than mere description would probably have recourse to two props: first, the body of general theory or theories, to do with societal formations, processes of change, the meanings of monument building, and so on, which now involves considerable choice among often competing styles of interpretation (see Thomas 1991; Hodder 1992; Bradley 1993; Barrett 1994; Tilley 1994; and others), and second, a feel for the local and regional detail, which can constitute a contextual archaeology (Hodder 1986;

Shanks and Hodder 1995; Shanks 1995). Such an approach is often avowedly inductive, though there may too be hidden agendas determined by general theory which influence what is accepted as relevant and meaningful. Though many archaeologists make use of analogy, rather few now openly admit to its value, other than in indirect terms. The distinction has been made between formal and relational analogies (Hodder 1982), the former seen as a potentially dangerous recourse to one-to-one comparison, taken out of cultural context, but the latter as potentially informative, indicating significant underlying principles of common interest. Moreover, the post-processual approach has emphasised the importance both of individual action and of historical context.

Few archaeologists will therefore now admit to use of formal analogies. The difference, however, is artificial, since the one (formal) can so easily be recast in the form of the other (relational). The difference is also suspect, since relational analogy seems to appeal to some sort of sense of universal meanings and principles. It is simpler, and more honest, to admit that we need some sense of analogy in interpretation. To begin with, we interpret in a language (our own), which uses concepts which may be quite foreign to the prehistoric world, but we cannot do other than use our language if we wish to proceed. This problem is not unique to prehistoric archaeology; it faces the anthropologist working at translating the language of living people (e.g. Campbell 1995). Secondly, it is difficult to think of general theory which is not in the end based on some sense of analogy. (Science too is dependent on metaphor and analogy; see, for example, Hesse 1970.) More important than making artificial distinctions between supposed kinds of analogy is the recognition that if we must start somewhere in trying to interpret an incomplete and perhaps unknowable past world, one good point of departure is situations and experiences of perceived comparability. The challenge then is not to circumvent analogy, but to assess its relevance and limitations, and not least its slipperiness; analogy, like general theory and contextual approaches, cannot be seen as a key to unlock a knowable past (cf. Shanks and Tilley 1987).

In the discussion that follows, I therefore make use of general theory, a contextual approach and analogy. Socio-political analogy has dominated many interpretations. I try to show its limitations, and turn in part to other analogies to do with meaning and symbolism. My comparative approach is to present a series of cases, whose textures may help to generate understanding. This procedure can be called *collage* as much as or rather than analogy (see Shanks 1992, 188–93; Shanks 1996; I am grateful to Michael Shanks for discussion of this issue). I try to draw out the possible connections, to some extent as I go along, and then more fully in the concluding discussion.

Socio-political analogies

Silbury Hill both demands and thwarts explanation. In the search for satisfactory interpretation of this and other large earthworks, many scholars (especially but not exclusively processualists) have understandably turned to comparisons with other cultures and situations, since monument building has been a recurrent feature of many societies. On the face of things, this approach seems very promising, and might be expected to fill the gaps in the evidence of a case like that of north Wiltshire in the Later Neolithic. Three examples (two ancient, one more recent) can illustrate potential and expectations.

Late Predynastic, Early Dynastic, and Old Kingdom Egypt. In common with many other situations, several processes seem to have come together at the end of the Predynastic and the beginning of the Dynastic period in Egypt, around 3000 BC: population increase, increasing settlement hierarchy, political centralisation and unification (James 1979). The Predynastic cemetery at Naqada already suggests considerable complexity (Bard 1994). Accompanying these trends after about 3000 BC were built the first monuments of the Nile valley, the *mastaba* burial platforms. These were large mudbrick superstructures above subterranean chambers (Edwards 1947). Two important cemeteries were at Abydos and Saqqara. After some centuries the first pyramids were constructed in Egypt from about 2700 BC (from the start of the Old Kingdom, from 2686 BC). Early examples include the Step pyramid of Djoser (the second ruler of the Third Dynasty, which lasted from 2686 to 2613 BC) at Saqqara, and then the Dahshur pyramid of Sneferu and the Great Pyramid of Cheops at Giza (respectively the first and second rulers of the Fourth Dynasty, which lasted from 2613 to 2494 BC) (James 1979; Edwards 1947). Their creation could have been genuinely coercive acts, expressing both political as well as religious control, but there is little evidence in the Old Kingdom for slavery, and some evidence from the Fourth Dynasty that pyramid labour could have been contributed voluntarily as a means of sharing in the immortality of the god-kings (Strouhal 1992, 184). The Step Pyramid rose in six steps to a height of some 60 m, with a base some 125 by 110 m. Its burial chamber lay below, and the pyramid was accompanied by a large stone enclosure with elaborate entrance, containing a mastaba, a mortuary temple and other structures (Edwards 1947, fig. 3; Kemp 1989).

Mesopotamia in the fifth and fourth millennia BC. By the Ubaid and early Uruk phases, the sheer scale of sites like Eridu suggests a radically altering social landscape (Redman 1978; Postgate 1992). Population increase, and settlement hierarchy and nucleation, were accompanied by increasing political control, at the level of both sites and regions. One striking monumental manifestation of these changes were the early temple platforms, for example from Eridu, Uruk and Uqair. None of these has been fully excavated because of overlying constructions and estimates of size are difficult (information from Joan Oates). The temples at Eridu were superimposed one above the other, with a steady increase in size. Temple VII, of Ubaid date, measures about 19 by 14.5 m, sitting on a platform little bigger than itself (information from Joan Oates). Larger temples were built without platforms, for example at Tepe Gawra. One view is that the temples were 'indicative of a religious elite with well-defined canons of architecture and a modest control over the populace' (Redman 1978, 257). In the Late Uruk phase of the later fourth millennium BC, the monumentality of the temple complexes changed along with many other aspects of society, including even larger settlement nucleations. The Anu platform at Warka (Uruk) was built of sun-dried mud-brick, over 50 m square and several metres high. It supported the massive and impressive White Temple, some 17 by 22 m. The very similar Uqair temple

measured 23 by 19 m, on a platform some 58 by 46 m, and about 5.5 m high (information from Joan Oates). One calculation has been that the Anu complex required some 7,500 man-years of labour (Mallowan 1965). The complex has suggested 'an elite with tremendous control over a highly organised labour force' and 'an institutionalised hierarchy with access to large economic resources, pools of labourers, and skilled craftsmen' (Redman 1978, 257). Further development of enormous mud-brick ziggurats, which will be referred to again below, belonged to the Early Dynastic period of the third millennium BC.

Mississippian culture of the south-eastern United States, 10th-16th centuries AD. Mississippian cultures extended from west of the Mississippi to the Atlantic coast (summarised in Fagan 1991; Bense 1994). Their development followed on from Late Woodland cultures of the late first millennium AD. Trajectories of change varied from region to region, but many were at some kind of peak in the period 1200–1400 AD. In social evolutionary terms, many Mississippian societies can be termed chiefdoms, of varying complexity. Their appearance was regularly connected with: the adoption or further consolidation of maize agriculture and the further intensification of hunting, fishing and gathering; increases in population and some evidence for resource stress in preceding generations; increased sedentism of the population, together with enhanced settlement hierarchy; and more developed, in some cases pronounced, ranking within society, as measurable especially through variations in treatment at death. Each of these generalisations can be qualified. In some areas, such as the lower Mississippi, maize agriculture was not adopted until after other features had appeared. There were still empty spaces in the landscape. Coastal populations may have followed a more mobile existence, and in riverine situations, the bulk of the population still lived in small hamlets or households dispersed around the less common, larger centres. Ranking as reflected in burials was not a feature of all Mississippian groups, though it seems to have accompanied the largest centres.

Such an interesting horizon of change is marked by the further features of recurrent and often intense ceremonialism, and of regional interaction by long-distance exchange. The ceremonial aspect is of particular interest here. Mississippian centres are characterised by platform mounds, ranging from the single mound to over 100 at Cahokia, Illinois. Mounds could also be accompanied by plazas, palisaded enclosures, and other ritual settings and structures. Mounds existed as sacred structures in their own right, without structures set on them (Knight 1989, 285), or as the base for 'mortuary temples' or charnel houses/ancestral shrines, or as the base for elite residences. Their meanings may have been varied. They were an expression of broadly based communal cult, centred on ideas of earth, fertility and purification (Knight 1989, 287), and they seem also to have been at the heart of the maintenance of an institutionalised elite, which engaged in warfare, ancestor worship and fertility ritual, combining political and religious control.

Cahokia, Illinois, is the most spectacular example of a Mississippian centre. It also belongs relatively early in the overall sequence. At its peak it encompassed some 100 mounds, the largest of which were arranged around a central plaza within a wooden stockade, burial sites, astronomical settings, and residences over some 800 ha. The largest construction, Monk's Mound, was like most others built up in stages, eventually becoming a four-terraced affair, some 316 by 240 m and 30 m high, containing over 600,000 cu m of earth. This was at least twice as large as any other Mississippian mound. At Moundville, in the Black Warrior Valley, Alabama, the number of mounds reached 20 (at a later date than Cahokia), also arranged around a plaza, and later enclosed by a palisade, with burials (in later phases for non-resident as well as resident population) and residences over an area of some 120 ha (summarised in Peebles 1986; Peebles 1987; Steponaitis 1991). Mounds were again used as the base for charnel houses/shrines and for elite residences. Their volumes ranged up to 80,000 cu m (Steponaitis 1981). The mounds may have been a metaphor for the earth, controlled or managed by the living and ancestral elite (Steponaitis 1991), and their symmetrical layout around the plaza may have mapped important features of kinship and political affiliation within the elite; monumentalised ranking rendered the social order tangible, inviolable, immovable and sacred (Knight 1993). The symbolism of mounds is important (Knight 1986, 678–9; Knight 1989). Their form may reflect a cosmological concept of earth as flat and oriented to four world quarters. Recorded traditions among the Muskogee, Yuchi, Choctaw, Chickasaw and Cherokee of the historic period related moundbuilding to a range of ideas: of birth and fertility, ancestral origins, symbolic burial and death, purification and the placation of and protection by earth powers; the addition of fresh earth could be seen as an act both of burial and purification/renewal for the mound itself. Mounds may have stood for the earth, in a symbolic scheme which linked earth and sky with notions of disorder and purity. The mound became a temporary means of achieving purification by communal rites (Knight 1986, 678; Knight 1989, 285).

Research over a century and more has begun to show the conditions in which the Mississippian phenomenon, including mound building, emerged. The Moundville complex has been particularly intensively studied (summarised in Peebles 1986; Peebles 1987; Steponaitis 1991; Welch 1991). In the transitional West Jefferson phase (about 900–1050 AD) the population was scattered along the Black Warrior and adjacent river valleys; there were settlements from 0.2–0.5 ha, and both smaller, perhaps seasonal sites, and some larger aggregations (perhaps favoured and re-occupied locales). The economy was diverse, embracing hunting, fishing, gathering and gardening: the small-scale cultivation of maize. Maize cultivation was already being intensified by the end of the West Jefferson phase. No sites had mounds, and there were no elaborate burials, burials being anyway elusive in the Black Warrior valley itself at this stage. In the Moundville I phase (1050–1250 AD) the population seems to have dispersed into small farmsteads. Maize cultivation stabilised at new levels of production already within the Moundville I phase. At Moundville itself sherd scatters and middens indicate an unusually high concentration of population, possibly in farmsteads rather than a single village (compare Steponaitis 1991, 198, and Peebles 1987, 6–7). Moundville and three other sites along the valley, at intervals of about 3–13 km, each had a single pyramidal mound, replacing a former village or large aggregation site. No mound was very large. That at 1Tu50 eventually reached 3 m in height. The first mound at Moundville itself was an

early stage of Mound O, which ultimately measured little more than 25 by 25 m at its base (Steponaitis 1981). There were some cemeteries, with some more elaborate burials. Late in the Moundville I phase, about 1200–1250 AD, Moundville itself emerged as the dominant civic-ceremonial precinct of the region. The plaza was laid out and construction of mounds began around it. In the Moundville II phase (1250–1400 AD) perhaps up to ten mounds were constructed, with a further ten added in the Moundville III phase (1400–1550 AD).

It is instructive to note the rapidity with which both the intensification of maize cultivation and the elaboration of the Moundville centre itself occurred, each taking place over as little as one or two centuries. Since the intensification of maize cultivation shortly precedes the beginnings of ritual and perhaps political centralisation, a causal link is implied (Steponaitis 1991, 204). In other cases it is possible that there is evidence for Late Woodland subsistence stress (summarised in Bense 1994, 201–2). It is also clear that ritual elaboration and centralisation could take place without significant intensification of cultivation, for example in more coastal regions (Bense 1994, 205).

Early mounds were regularly modest in size (Bense 1994, 203f). Nearly all seem to have been built in stages. Other impressive mounds, for example at Spiro, Oklahoma, or Etowah, Georgia, were the product of long histories. Many seem to have been low relative to the dimensions of their bases. That at Pocahontas, Mississippi, was 51 m square but only 6 m high (Steponaitis 1991, 218). Most mounds seem to have been monuments in their own right (Knight 1989, 285) or the base for structures or residences. The Craig Mound, Spiro, is a notable exception for having covered burials in its first phase (Bense 1994, 225–6; and compare Knight 1989, for myths about ancestors and others contained or hidden within mounds). Many mounds occurred on their own, as part of less developed political or ceremonial centres (for studies of outlying complexes in the Moundville region, see Welch 1990; Welch 1993; Peebles 1987). The largest mounds, like Cahokia, Moundville, Spiro, and Etowah, already discussed, or Ocmulgee, Georgia, whose largest mound was some 16–17 m high, were part of smaller and larger mound complexes. It is not possible to show that the largest complexes were sited on better land; in the end the explanation of variation may best be sought at the level of individual political circumstance, special events or charismatic leaders perhaps having mobilised the labour for unusual constructions (Steponaitis 1991, 227).

A final feature of interest is the decline of Mississippian culture. Judging by midden deposits, residential population actually at Moundville may have declined in later phases, after 1300–1400 AD, despite continued mound construction and increased use of the site for burial (Peebles 1987; Steponaitis 1991). The maintenance and use of Moundville as a ceremonial complex seems to have collapsed around 1500 AD. This may have been due to internal process, the result of economic and political instability, rather than to external, European influence (Peebles 1987, 3–4). The Cahokia complex had waned much earlier. But other centres continued in the late Mississippian phase, like Parkin, Arkansas, or Toqua, Tennessee (Bense 1994). In this kind of society, ends could be as swift as beginnings. Unstable political conditions, resource stress, and increased competition and warfare, could all have contributed to the demise of established political and ceremonial centres (Peebles 1987, 23–4; Bense 1994, 197).

Implications of such analogies: size, labour and social organisation

That the Silbury Hill mound required a massive investment of labour has been the starting point for most explanations. The piled volume of the mound has been roughly calculated as 250,000 cu m (Atkinson 1967). It has been suggested that a permanent workforce of 500 people would have taken ten years to construct the mound (Atkinson 1978). Another calculation suggests that if Avebury and similar monuments absorbed a million hours of work or more each, the Silbury mound would have required some 18 million (reported in Renfrew 1973, 548). Further calculations reduce the figures required to about half a million hours of labour for earthworks like Avebury and Durrington Walls, and four million hours for Silbury Hill itself (Startin and Bradley 1981; Startin 1982); another computation on this basis suggests 1000 people working for two years (Parker Pearson 1993, 71). The precise calculations do not matter; what is important is the relative order of increase in scale represented by the Silbury mound. As suggested above (p. 27), construction could have gone on for longer than ten years, though it is unlikely from the stratigraphic evidence (using the apparent absence of turflines in the mound) that the span lasted more than one or two generations. It is also possible, though by the nature of the site uncertain, that the mound was unfinished; early medieval activity at the top of the mound has probably obscured the evidence.

On the basis of the analogies reviewed above, there is a *prima facie* case for relating the construction of Silbury Hill to a horizon of social change and centralisation. It might be argued that only a system of political centralisation would have the ability and motive to undertake an earthwork of such colossal scale. Many models have been offered in both the processual and post-processual literature of such social structures. I will briefly and selectively note aspects of five such models, concentrating on the concept of chiefdoms and related ideas.

Some formal models

Drawing on the social evolutionary models of Fried, Service and Sahlins, Renfrew (1973) was the first British scholar formally to propose a chiefdom model for Late Neolithic and Early Bronze Age Wessex (for these purposes I am setting aside earlier discussions by Childe). Chiefdoms were seen as ranked societies, with specialisation, redistribution and centralisation. Twenty general or recurrent features of chiefdom society were listed, which are worth repeating: ranked society; redistribution of produce organised by the chief; greater population density; increase in total size; increase in size of residence groups; greater productivity; greater territoriality; more integration with more 'socio-centric' statuses; centres coordinating social and religious as well as economic activity; frequent ceremonies serving wide social purposes; emergent priesthoods; a tendency to some ecological diversity and thence specialisation in production; specialisation, together with the pooling of skills in large co-operative endeavours; organisation and deployment of public labour for agricultural and monumental

tasks; improvement in craft specialisation; potential for territorial expansion; reduction of internal strife; pervasive inequality of persons or groups in society associated with permanent leadership; distinctive dress or ornament for high-status persons; and the lack of 'true' government to back up decisions by legalised force (Renfrew 1973, 543). Although many of these features cannot be examined adequately in the archaeological record, the labour requirements and density of changing monument types were used to suggest emerging chiefdoms in the Earlier Neolithic, and by the Later Neolithic and Early Bronze Age a confederation of established chiefdoms or a greater, unified chiefdom with constituent tribes. Silbury Hill was seen as part of the last stage (Renfrew 1973, 554).

In a refinement of the chiefdom model formulated in connection with analysis and interpretation of the Moundville complex, Peebles and Kus (1977) abandoned the idea that redistribution was a recurrent feature, since it could not adequately be demonstrated in chiefdoms in Hawaii. Chiefdoms were again seen as ranked societies, with increased complexity of organisation, productivity and population density, together with institutionalised offices of leadership, reliant on sanctified (rather than legalised) authority. Peebles and Kus advocated attention to variation in five key aspects of society: ascribed ranking of persons; a hierarchy of settlement types and sizes; settlement location in areas assuring a high degree of local subsistence autonomy; organisation of productive activities transcending the basic household group, such as the construction of monuments requiring planning and large labour forces, and part-time craft specialisation and 'intersocietal' trade; and society-wide organisational ability and activity to buffer fluctuations in basic environmental, economic and other conditions (Peebles and Kus 1997, 431–3). Though Moundville constituted the main test of the model, there was explicit reference to Neolithic Wessex, which it was claimed demonstrated the second, third and fourth criteria just noted (Peebles and Kus 1977, 432).

In a discussion of early state formation notable for its analysis of social dynamics rather than listing of criteria, Cherry (1978) observed that the establishment of a socially visible hierarchy required more support than its maintenance. The greatest input of energy into monuments in favour of the charismatic authority of central persons was likely in the period of formation, and again in periods of fragility or decline. The earlier pyramids were built of huge blocks of quarried limestone, but the later ones only of rubble and Nile mud (Cherry 1978, 429). The heretical phase of Amenophis IV or Akhenaten (1379–1362 BC) in the Eighteenth Dynasty of the New Kingdom led to the re-establishment of the capital in Amarna and involved a fundamental change in religious outlook and practice, accompanied by fresh temple building (James 1979).

Much of the post-processual literature has not been concerned with such large-scale models of society, with a very different theoretical emphasis on individual action and consciousness. One analysis of Late Neolithic Wessex and Yorkshire did, however, offer a model of the replacement of 'ritual authority structures' by 'prestige goods economies' (Thorpe and Richards 1984). Drawing again on anthropological literature, a ritual authority structure was defined as having: close links between the living and the ancestors and the supernatural; rigid ranking, with reference to founding ancestors; and affinal and indirect exchange. Surplus domestic product is converted into prestige, rank status and tribute. Rank status is a group achievement, and formalised ritual practice emphasises the group and blocks argument about hierarchy (Thorpe and Richards 1984, 67–8). The more open and fluid prestige goods economy, by contrast, is characterised by: competition for ritual and esoteric knowledge; opportunistic alliance; the creation of status by direct political control; and the control and circulation of resources and wealth items (Thorpe and Richards 1984, 68). The discussion of Wessex emphasises southern Wiltshire, where the following sequence is envisaged (Thorpe and Richards 1984, 75–9). Small henges indicate the emergence of social hierarchy rooted in control of ritual. Ritual centralisation and specialisation in the Stonehenge region in the main part of the Later Neolithic indicate greater ritual power and the existence of an elite operating on behalf of the whole population. Social differentiation was expressed overtly in the material culture of the Grooved Ware and Peterborough complexes. An aristocracy concerned with ritual was separated from a commoner group, of lower ranking but more or less autonomous lineages in peripheral areas. The introduction of Beakers and associated material culture was the result of the competitive activities of lower status 'Big Men' and lower ranking elite lineages, in contact with high ranking continental groups. At this point the ritual authority structure began to be penetrated by the prestige goods economy, as emphasis shifted from monuments to artefacts.

A more recent post-processual discussion of the Avebury area, based not on anthropological analogy but on models of individual agency generated in social theory, generally rejects any simple idea that the large monuments reflect clear-cut social hierarchy (Barrett 1994). Large monuments were constructed over long periods of time, and relied on obligations and traditions of communal labour and participation. An already established elite did not simply initiate large building projects, but was created out of their realisation (Barrett 1994, 29). Silbury Hill is taken to show this process above all other monuments. Its sheer scale ceremonially presented a restricted number of people on an elevated and widely visible platform. Those relatively few people are argued to constitute an elite (Barrett 1994, 29–32).

Difficulties with socio-political analogy

This is not the place extensively to review the history and success of the chiefdom concept and other models, but difficulties with all the above possible starting points must be noted. The ritual authority structure/prestige goods economy model can referred to the same kind of intellectual endeavour as chiefdom models, since it is both based on wide cross-cultural generalisation and explicitly evolutionary in character.

The analogies with which I began are only partial. There is no evidence, other than the nature of monuments, for the political centralisation seen in Egypt, and none for the increasing settlement nucleation and then urbanisation seen in Mesopotamia. There is no evidence, other than the nature of monuments, to support the ranking of persons, seen for example in mortuary analyses at Moundville.

Two general problems beset the use of chiefdom and

related models: the diversity of the phenomena which they attempt to encompass, and the difficulty of fitting a general model to specific archaeological situations. The chiefdom model has continued to be used and debated (e.g. Earle 1991), and it remains useful in that it orders and makes sense of a lot of diverse data and situations. But that diversity is the root of difficulty. Redistribution may be a feature of some chiefdoms, but hardly of all. The 'catch-all' nature of definitions has been explicitly recognised from the outset (e.g. Renfrew 1973, 542, 557; cf. Steward 1955, 53, on tribal society). Further examination seems to serve only to offer more and more examples of variation (e.g. Drennan and Uribe 1987). Once the imperatives are broken to reduce societal arrangements to a manageable number of types and to arrange these in evolutionary paths (cf. Leach 1982; Yoffee 1993), there seems less and less reason to retain the general model. Even the discussion of, say, the Mississippian complex in terms of a *range* of chiefdom types, from simple to complex to paramount (e.g. Bense 1994; cf. Peebles and Kus 1977, 422) may be questioned (cf. Steponaitis 1991).

Far less can one feature such as monument construction be taken out of context to imply the existence of a societal type for which there is no or little other supporting evidence. Strikingly, neither the discussion of Renfrew (1973) nor that of Thorpe and Richards (1984) can find evidence for all the criteria listed. As Barrett notes (1994, 28), there is no evidence in Wessex for emergent institutionalised authority before the onset of monumental construction. Perhaps only one out of twenty criteria listed by Renfrew (1973, 543) is actually demonstrable in the archaeological record, that of the organisation and deployment of public labour (themselves all loaded terms): that is, the very phenomenon which is the focus of investigation in the first place. And Cherry's very general model may underestimate the power of monuments themselves, once created, to affect what came after (cf. Bradley 1993). Monuments are consigned to a role which only reflects the social and political context.

Does sanctity imply power ? Other analogies

Two underlying assumptions can be found in many, if not most, interpretations of the kind reviewed: that monumental activity is to be related at bottom to social and political frameworks, and that imbalances in relations of power steadily intensified through time. The first assumption may conflate separate processes, apart from reducing the range of human experience to a single dimension. For example, discussing sites other than Moundville in west-central Alabama, Welch (1990, 219–20) has noted that whereas at Lubbub a politically and economically dominant centre acquired 'a modest degree of sanctification', at Bessemer a sanctified institution was later promoted to a politically and economically dominant position. Mound building was involved in both cases, but different processes were at work in each. And it has been suggested that in the Mississippian culture there was communal as well as chiefly and priestly cult, the former with a focus on the earth, fertility and purification, the latter expressed in various restricted uses of mound summits (Knight 1986; Knight 1989, 285–7). The following further examples introduce monuments and religious fervour and activity in a variety of social contexts. They suggest variously (and perhaps unsurprisingly) that impressive monuments are not confined to centralised societies, that people regularly interact over long distances, and that religious motivation cannot wholly be reduced to social or political causes.

Late Archaic and Woodland monuments in America. The great ceremonial monument at Poverty Point, Louisiana, overlooking the Mississippian floodplain, belonged to a much earlier culture than the Mississippian ones discussed above. It belongs to the Poverty Point culture of the Eastern Woodlands in the second to earlier first millennium BC (summarised in Fagan 1991; Bense 1994). Hunting, gathering and fishing were main elements of the subsistence economy. Gathering involved intensive nut harvesting and storage of small, starchy seed crops. There was some deliberate cultivation in small gardens of indigenous wild plants, including bottle gourds and squash. Poverty Point itself may date to around and after 1000 BC. It consists of a semicircle of six concentric banks or 'midden ridges', interrupted by four symmetrical entrance ways and butted on a bayou, with one larger and one smaller mound outside. The diameter of the site is some 1200 m. The larger mound is more than 20 m high and 200 m long, though it rises to its highest only at one end. The layout of the complex could be connected with solar observations. The middens on top of the ridges included hearths and prolific artefact spreads, perhaps the result of feasts and gatherings; lithic artefacts were from sources far distant from the site. The site seems to have been part of a regional cultural grouping. It and mounds and earthworks at other sites have raised the possibility of some kind of chiefdom development, but other evidence for ranking is generally absent (Steponaitis 1986).

Other intriguing analogies for the context of Silbury Hill come from the Middle Woodland Hopewell culture, which flourished in the Eastern Woodlands from about 200 BC-400 AD, especially in Ohio and Illinois (summarised in Fagan 1991; cf. Bense 1994). Though neither is well understood, both subsistence economy and population density may have intensified in this stage, with more use of native seed plants and at least some concentrations of population. The acquisition of a great array of non-local materials drew on the whole area of the Eastern Woodlands: the renowned Hopewell 'interaction sphere'. Many of these materials ended up in burials, some richer than others, found in a great variety of mounds and earthworks. In social evolutionary terms, the relative provision of grave goods has encouraged discussion of the possibility of some kind of 'Big Man' society. Of particular interest here is the combination of long-distance interaction and large earthworks. The most famous examples come from the Ohio valley. At Hopewell itself there were 38 mounds within a 45 ha enclosure, including the largest mound of the whole complex. At Newark, the complex of earthworks of varied shapes, and encompassing burial mounds, covers over 6 sq km. The celebrated Great Serpent Mound, Ohio, is some 380 m long, its coils ending in a head consisting of an oval burial mound.

In general, 'Big Man' models face many of the same difficulties as chiefdom models (cf. Chapman 1987, 73). There are evolutionary assumptions that a stage between tribal and chiefdom society can be found, and 'Big Man' activity being based on display rather than permanent accumulation may rarely have been sustained enough to leave a discernible mark in the archaeological record. But the

Hopewell example is instructive nonetheless. Long-distance interaction and monumentality (here connected with mortuary ritual) were evident in a social context presumably much different to that of the Mississippian culture and other analogies discussed earlier.

'Inter-urban' sanctuaries and cult places in Dark Age and Archaic Greece. This analogy is discussed especially with reference to long-distance interaction. There were a great many shrines, sanctuaries and cult places of various kinds, not only in the Archaic and on into the Classical periods in Greece, but also in the preceding so-called Dark Age (summarised in Morgan 1993; Marinatos 1993; cf. Alcock and Osborne 1994). Early forms included roadside shrines, places of deposition, caves, and early versions of temples. There were also hero cults, some of which made use of existing Bronze Age monuments (Antonaccio 1994). Some of these sites were closely associated with settlements, especially the emergent *poleis*, and others were set out in the landscape (for example Osborne 1994, on Attica). A much smaller number served as neutral or communal places of special significance, notably Olympia, Delphi, Isthmia and Nemea.

In some ways, these 'inter-urban' or 'pan-Hellenic' sanctuaries hardly support the general argument of this discussion. There was some regionality in patterns of use. Olympia tended to serve the Peloponnese, and Delphi Attica and other regions to the north and east; in later periods, the Athenians had no treasury at Olympia (Morgan 1993). Sanctuaries were places at which to display and compete. At first such emulation may have been between petty chiefs, for example in the western Peloponnese around Olympia (Morgan 1993, 26), but from the Archaic period onwards much activity was sanctioned and organised by the *polis*, and the geographical orbit widened. There were then conflicts between aristocratic practice and emerging city-state interests. Much of the monumentalisation of sanctuaries, in the form of temples, coincided with the beginnings of city-state involvement (Marinatos 1993, 229). Much Greek cult practice was also 'this-worldly', concerned with change and control in this world (Osborne 1994, 144).

The communal, political dimension is not in doubt; and no pan-Hellenic system may have preceded the distinctive social formation of the *polis* (Morgan 1993, 37). But other features are of considerable interest here. Special places were chosen or emerged for special activity, and remained in such use for centuries (Olympia and Delphi for longer than Nemea and Isthmia). They drew people from far away. Although many activities took place at pan-Hellenic sanctuaries, including theatrical and musical performances, and athletic competitions, there was an important religious dimension as well. There were hero-cults and -myths (Morgan 1993, 36), and the major temples at Olympia and Delphi were dedicated to Zeus and Apollo respectively. Sanctuaries in general helped to mediate between the human community and its divine neighbours (de Polignac 1984; de Polignac 1994). It has been suggested that there was a long tradition of religious activity at Delphi, beginning with the worship in late Mycenaean times of an earth-goddess. Later, Apollo was instated as the god of divination and prophecy, though there was also a role for the female deities Athena Pronaia and Ge (Parke 1967).

Cart cults and medieval cathedral building. Medieval cathedral building belonged to the world of the feudal state and organised religion. Eleventh-century cathedrals in France 'were for the glory of God, but they also expressed episcopal prestige and affirmed the bishop's power in the face of his secular rivals' (Duby 1991, 4). There was a further burst of building in the later twelfth century. The broader political, ecclesiastical and social context is important. There had been ecclesiastical reform, cities had grown in power and the monarchy was stronger (Duby 1991, 190). From the late twelfth century 'new symbols placed upon the facades of French cathedrals became the primary vehicle for the expression of royal power' (Duby 1991, 228). Such a context is far removed from that of Silbury Hill. But it provides nonetheless glimpses of religious fervour which need not be explained away entirely in terms of social and political prerogative. Medieval Christianity inspired attention to religious observance, and popular devotions in the form of votive masses, the cult of the saints, the cult of relics, pilgrimages and indulgences (Hamilton 1986). Chartres cathedral was one of at least twelve major constructions undertaken in the later twelfth century, in a period of religious fervour. A 'wave of lay enthusiasm', going beyond diocesan bounds, provided voluntary unskilled labour for the construction of some of these (Reynolds 1984, 80). Closely associated with the actual building at Chartres was a 'cart cult' (Henderson 1968, 36–7). In this, religious devotion took the practical form of devotees themselves dragging by hand carts laden with stone for the early building phases.

A Nuer prophet's mound. In his classic study of the Nuer of Anglo-Egyptian Sudan in the 1930s, Evans-Pritchard (1956) devoted one volume to their religion. The cattle-keeping Nuer were not a centralised society (but neither was their world timeless or unchanging), nor did they have an organised religion. They lacked dogma, liturgy and sacraments, and any developed cult or mythology (Evans-Pritchard 1956, v). Nonetheless, their lives were permeated with notions of the sacred, in the form of a hierarchy of spirits, and of symbolic schemes, which emphasised amongst other things spears, cattle and sacrifice. This belief-system was played out through daily life, by ordinary people, who were not always fully conscious of the deeper meanings of particular practices. Evans-Pritchard also describes two kinds of religious specialist: priest and prophet. Leopard-skin priests were mistaken by the Anglo-Egyptian authorities for chiefs of some kind, but they had no political, administrative or judicial office (though they had some political influence). Priests had a role in conducting important sacrifices in certain social situations, especially in cases of homicide and blood-feud, when they communicated with the spirits. Their powers were transmitted by descent. Prophets seem to have been a more recent development (for a much fuller account, see Johnson 1994). These were charismatic, feared figures, possessed by and possessors of a spirit, and speaking for and as that spirit: 'mantic' (Johnson 1994, 35). They were often unkempt figures. A Dinka prophet (Dinka being the neighbours of the Nuer; see Lienhardt 1961) was recorded as wandering in the bush, 'where for many days he sat under a tree without eating. When found he was engaged in collecting hundreds of shells of the giant land snail and arranging them in rows' (Evans-Pritchard 1956, 306).

One of the first prophets to acquire fame was one Ngundeng, who had died some time before Evans-Pritchard's

fieldwork (Evans-Pritchard 1956, 305–6; Coriat 1939; Johnson 1994; cf. Lienhardt 1961). His family belonged to a 'leopard-skin' clan, possibly of Dinka extraction (Coriat 1939, 221). He became a prophet of the spirit *deng* (the greatest of the spirits of the air) among other processes by fasting (Evans-Pritchard 1956). His slowly growing credit was also enhanced by successful leadership of a raid against the neighbouring Lou, and by a reputation as a 'provider and protector of life', especially by his advice during epidemics of smallpox and rinderpest (Johnson 1994, 85–8). Nuer said that he could climb into the air without support, and was given also to climbing to the top of byres.

To bury all the bad things associated with smallpox and rinderpest, Ngundeng built his famous mound or pyramid, probably in the 1890s (Johnson 1994, 88), on the top of which he would spend the day shouting, perhaps symbolising his essential relation to his spirit of the air. It is worth quoting Evans-Pritchard in full (1956, 306: by permission of Oxford University Press, with my additions in square brackets):

> The construction of this so-called pyramid (*bie*), a conspicuous landmark in Lou tribal territory, was begun by Ngundeng and completed by Gwek [or Guek, his son, shot by the authorities before Evans-Pritchard's fieldwork; and see Coriat 1939; Johnson 1994]. It was a huge mound of earth and debris some fifty to sixty feet high with a base diameter of about a hundred feet. It was surmounted by elephant tusks and a spear decorated with an ostrich egg and feathers and encircled at the base with dozens of elephant tusks, numbers of which were also buried in the mound. The purpose of the mound seems to have been to honour *deng* and increase the prestige of his prophet, though it may have expressed also the feeling of the above quality of Spirit. It became a cult centre, people from the whole of eastern Nuerland, and even from the west of the Nile [a range of some 300 km or more], bringing cattle there for sacrifice; and Ngundeng and Gwek kept in a kraal near by a herd of cattle with black and white markings (*rial*) dedicated to *bungdit*, mother of *deng*, with whom these markings are associated. All this is more in accordance with Dinka than Nuer thought and custom, and there is some reason to suppose that the idea of the mound was, like the *deng* conception itself, borrowed from the Dinka. There is said to be a similar, though smaller, mound at Thoc, in eastern Gaajak country, built by a prophet called Deng, son of Dul. Ngundeng's mound was blown up with high explosive by the British administration during a punitive expedition in 1928 against his son's followers [for further description see Coriat 1939; Johnson 1994]. However, much of it still remains, and Dr. Lienhardt tells me that it is said at the present time that sometimes at night a strange light is seen shining from it; and when a recent eclipse of the sun occurred people said that Ngundeng was returning.

This was not a monumental mound measured against, say, Hopewellian or Mississippian examples. It is not fully recorded with what assistance the mound was constructed by Ngundeng. It is stated that clients of Ngundeng's powerful magic were required to offer labour, food and materials as payment and to avoid his displeasure, resources which were gathered over three years before a vast gathering began the construction of the mound, which lasted four years (Coriat 1939, 223–4); thousands of people seem to have been involved (Johnson 1994, 91).

It is not fully clear how Ngundeng should be characterised. Evans-Pritchard did not regard prophets as established political or social leaders, but another sketch of him, by a member of the Sudan Political Service, declares that 'Ngungdeng was a leader of great magical powers, through which he gained unusual authority over the Nuer of that area; he was thrown up like some dictator, in a time of great adversity, when the Nuer were facing the threat of foreign invasion, first by the Dervish and later by the present Government' (Howell 1948, 53). Another description of Ngungdeng, by another political officer involved with Gwek, says that 'fame brought wives and cattle in untold numbers but wealth alone did not satisfy him. It was by his success as a magician that he measured his ambition' (Coriat 1939, 223). But though Ngundeng's influence had local political impact, it also served to transcend political and social boundaries, and the role of the prophet has to be seen in part as an expression of the prevailing moral community or set of values and ideals, not simply as a response to political crisis (Johnson 1994, 100, and 327–9). The nature of the role also changed through time. Ngundeng's son Gwek too was possessed by spirit, and was given to 'peculiar antics, balancing on his head on the top of the Pyramid, yelling and chattering in an unknown tongue during the small hours of the night, turning himself into a goat and other habits of a similar nature' (Coriat 1939, 226). Gwek was involved in a series of raids on Anglo-Egyptian forces and the Dinka and in other actions from 1918 until the punitive response of 1928, and was finally killed in 1929 during an attempt to capture him, after an armed confrontation in front of the pyramid (Coriat 1939). Perhaps the role of the son, so like his father in some ways, has misrepresented that of his father.

Other mounds are known in Dinka territory, for example the mound of Ayeuil and the mound of Ayong Dit, which were both older than the mound of Ngungdeng (Howell 1948; cf. Johnson 1994). Built perhaps to resemble cattle byres, 'the tradition of their origin is of some great spiritual leader of surprising oracular powers who ordered its construction' (Howell 1948, 52). Stories told about the mounds emphasised the great labour involved, and there were periodic gatherings for ritual and maintenance at the mound of Ayong Dit. Small earth mounds were also constructed, only a few feet high, as shrines within the settlements of pre-eminent Dinka clans, dedicated to ancestors and proclaiming genealogy (Lienhardt 1961).

The Nuer/Dinka cases and the others noted above need not be offered as direct comparisons for the beginnings of the Silbury mound. But they usefully invoke the importance of the sacred as well as the secular, the significance of the moral as well as the political order, and the ability of monuments and charismatic figures to mobilise people over long distances and thereby to create new situations.

It is time to return to the Silbury Hill monument itself and its own local and regional context.

The local and regional context

The uniqueness of Silbury Hill: points of comparison

The great size of the mound makes it unique, which has also been the common starting point for explanations. The only other possible points of comparison within the region are the Marlborough Mound and the former Hatfield Barrow within the Marden henge in the Vale of Pewsey. Their volumes have been estimated as 53,000 and 10,000 cu m respectively (Burl 1979). However, neither site has been dated. The Marlborough Mound, described and discussed in the appendix by Joanne Best, might only be a medieval

motte. And nothing else in Later Neolithic Wessex prepares one for either the scale or the form of the Silbury mound.

While the size of the mound has often been stressed, its unusual character has perhaps been less often rehearsed (though emphasised by the excavator (Atkinson 1967, 261)). Its form if not its scale finds echoes perhaps in large round mounds in Yorkshire, such as Duggleby Howe (with an estimated volume of 3200 cu m (Burl 1979, 255, note 51; but see Kinnes *et al.* 1983); in large round cairns in Orkney, such as Quanterness or Maes Howe (the former with a volume of under 1000 cu m (Renfrew 1979); and in the major passage tombs of Ireland, such as Newgrange and Knowth (O'Kelly 1982; Eogan 1986), with estimated volumes of about 60,000 cu m (Burl 1979, 255. note 51). Though much earlier, stepped stone cairns above passage graves in Brittany might also be relevant to a remembered tradition (Thomas and Tilley 1993). The mounds of Yorkshire and possibly the latest in Orkney could be more or less contemporary with Silbury, while the major passage tombs are probably some four radiocarbon centuries earlier. The possibility suggested by earlier researchers of a basal stone circle at Silbury (above, p. 8) could strengthen the echo of Newgrange, even though the surrounding stone circle there could now be seen as later than the mound (see Sweetman 1985; Mount 1994; but I am grateful to Richard Bradley for discussion of the ambiguity of this evidence).

The striping of the mound at Knowth (Eogan 1986) recalls the striping of the primary core at Silbury and constitutes another possible specific link. The size of Newgrange, Knowth and Dowth is closest to that of Silbury. There are possible links between Yorkshire, the Orkneys and Ireland through the interconnections of Grooved Ware design and passage tomb ornamentation, and Silbury Hill could perhaps be added to this orbit. The significance of long-distance connections for the establishment and maintenance of local social position has frequently been commented on (e.g. Bradley 1984; cf. Helms 1988). Many groups of monuments in fact contain one or more exotic structures. Thus in the upper Thames valley, the Big Rings double-ditched henge monument appears late in the long sequence at Dorchester-on-Thames as an unusual structure without definite local antecedents (Bradley and Chambers 1988; Whittle *et al.* 1991). It is possible simply to dismiss this kind of example as a stylistic oddity, or the result of some vague external influence; many older discussions of megaliths follow this approach. More plausibly, exotic designs can be seen quite deliberately to evoke long-range connections. In the case of the Big Rings, the connection is again with Yorkshire.

It is not absurd to entertain the possibility that there were yet further flung connections and connotations. Silbury is not pyramidical in shape, nor did it necessarily share the stepped constructional technique of Djoser's monument, but the whole scale of the enterprise could have owed much to the pre-existence of the early pyramids. It was presumably the intention of Flinders Petrie in 1922 to test for the presence of passages or other structures which might strengthen the comparison, though in the event his investigations on the east causeway were fruitless in this respect. A connection of this kind might have required an individual or individuals to have travelled to Egypt, or communication via third parties. To the same third millennium BC world, but yet further away, belonged the newly created great ziggurats of the Early Dynastic period in Mesopotamia (Redman 1978). Fashionable consensus presently requires prehistoric people to have been largely rooted in local domesticity, but there is nothing to have prevented individuals moving about. The role of individual seasonal movements at the inception of the Neolithic has been advocated by Case (1969), and can certainly be contemplated in the Late Neolithic in Europe as a whole, across which there were several cross-cutting long-range connections expressed in shared artefact styles (Whittle 1996). The unusual may require unusual explanation. Had someone from southern Britain seen one of these wonders ? Or had word gone down the wind of their existence, filtered and embroidered in numerous retellings? And was the construction or elaboration of the mound an annexation of the distant and exotic for political advantage, or an act of devotion to the power of gods or spirits ? I will return to these questions in the final section.

Local meanings

Little discussion has specified what might have been the connotations, associations or meanings of the mound itself. Such there must have been, for the monument to have had significance. There are several competing possibilities. A favoured view, both academic and popular, has been that the mound took its real significance from an underlying burial of rich and exotic character. This was, for example, the view of the excavator (Atkinson 1967; Atkinson 1978), though he cautioned from the outset that such would not necessarily be found in the 1968–70 campaign. Setting aside Merewether's aged informants, there is no evidence from the investigations in the mound so far for any burial. The 1776–7 shaft could have missed a modest deposit, of say cremated bone. After all, if there is still a Later Neolithic burial awaiting discovery, it is likely by analogy with others of the period elsewhere in Britain to have been modest rather than rich in character. An off-centre deposit would have been missed, just as a central shaft down from the top of Newgrange would have failed to locate the large cruciform chamber there; but other off-centre, non-monumental burials under mounds in the Later Neolithic are not known. There was also a local tradition of cenotaph barrows in the local Earlier Neolithic, represented by Horslip, South Street, and Beckhampton Road long barrows (Ashbee *et al.* 1979), the latter two perhaps of relatively late date. Disturbance may have removed burials in the cases of South Street and Beckhampton Road, though this does not really seem likely to have destroyed all traces of burials. It is also possible that bones were circulated through such monuments (Thomas and Whittle 1986; Thomas 1988). With these local precedents, it is not impossible for there to have been a primary mound covering a modest burial or without a burial at all, which was then elaborated into its final monumental form. A final point about burials re-evokes the pyramids. Burials within pyramids were concealed; the areas round about were also used for burial. Very little of the Silbury mound has been investigated, and virtually nothing of the surrounding Neolithic surface of the valley.

The mound could have drawn its significance from its actual location. Clearly monumentality alone was not the only consideration in its construction; had it been so, we

might have expected the monument on the top of, say, Waden Hill. There are at least two possibilities. The spur on which the mound was created could have been special. It could have held an earlier site of some kind, or an open air shrine, such as preceded many temples in Archaic Greece, as noted above. There are many other cross-cultural examples of natural places imbued with sanctity and special power (see, for example, Carmichael *et al.* 1994). The mound could also have had special association with the valley. Petrie suggested (1924) that the ditch was dug to trap water. Many of the local monuments, both of the Earlier and Later Neolithic, are sited within reach of, overlooking or in the Kennet valley. From Overton Hill upstream, the list includes the Sanctuary, the West Kennet palisade enclosures, the West Kennet long barrow, Silbury Hill itself, Avebury and the Beckhampton Avenue, Windmill Hill and Millbarrow. Some association with water flow, even if that flow was only periodic (Evans *et al.* 1993), could indeed be suggested (just as there may be an association between some henges and water, an idea currently under discussion by Colin Richards). Could the position of the mound even closer to the valley than earlier monuments be related in some way to the changing environment of the valley ?

A different possibility is that the mound itself was the key element of the site. One hypothesis discussed above (Cherry 1978) outlines the unifying effects of such large-scale collective enterprise. On this view, construction itself could have been the main reason for the monument. It is implausible, however, to separate construction from the form which construction produced. Here one can invoke again the possible connotations of passage graves or even pyramids, these in their turn having associations with ancestors, gods, an afterlife and special ritual knowledge.

By analogy with Mississippian mounds, the mound might have served as the base for other activities, in the American case for charnel houses and elite residences. But there is no specific evidence, as noted above (p. 21), for activity or structures on the top of the mound. The mound could then have served as a point of vantage, for example over the panorama of the upper Kennet valley, or as a point of access, to ancestors, spirits or gods. Perhaps we could envisage prophets shouting at the sky from the top.

The top of the mound could also be seen as a vantage point for observation of sun, moon or stars. The bearing towards the Marlborough mound is nearly due east, though the two are not intervisible. The date of the Marlborough mound remains to be established (see Appendix). It has been observed that when seen from other monuments in the locality, such as the West and East Kennet long barrows, the Beckhampton Road long barrows and the Sanctuary, the skyline or horizon behind the monument intersects the mound at the level of the upper ledge (here described as terrace 1) (Devereux 1991). From within Avebury itself, the very top of Silbury Hill is visible from beside the former obelisk within the South Inner Circle. On the mound itself on the upper ledge or terrace 1 it is possible to obtain a 'double sunrise effect' looking to the east over Waden Hill. At certain times of the year (early May and early August) one can see the sunrise on the far horizon of the Marlborough Downs, visible beyond the top of Waden Hill, and then a second sunrise over the top of Waden Hill if one moves down to the upper ledge or terrace. On this argument, the mound was very precisely located and built to achieve both the intersecting sight-lines and the presumably ceremonial double sunrise effect (figs 79–81).

Such sight-lines link the new monument to existing places in the sacred landscape of the area. The mound may therefore in part derive its significance from such an association, to do again with ancestors and a sense of place, and the whole tradition of those who had gone before. But we should not neglect, finally, the possible meanings that might have been attached to the mound itself. The Egyptian pyramids were intimately connected with the cult of the sun-god, and the shining sides of the pyramids may have symbolised the rays of the sun (Edwards 1947). The fresh, white chalk sides of Silbury Hill might be seen in the same (metaphorical) light. There was a hieroglyph in the Pyramid texts for the Primeval Mound, 'the first piece of earth to emerge from the watery chaos at the creation'; the hieroglyph, strikingly, is in the form of a stepped mound (Jenkins 1980, 148). By Mississippian analogy again, the mound could be suggested as a metaphor for the earth (Knight 1986), a symbol of renewal, linked to the ancestral past by its general and specific location but indicating the future too by the rebirth of the world.

Whether the mound was a political statement or an act of religious devotion (if the two can meaningfully be separated), an emblem and means of social differentiation or an icon of spiritual belief, we cannot easily say. My preference is for the latter possibilities. I will try to put those further into local and regional context after considering now the use of the West Kennet palisade enclosures.

The West Kennet palisade enclosures: interpretations and comparisons

In this section I follow a reverse order compared to the preceding section, and discuss the particular before the general.

Construction

THE PALISADES OF BOTH ENCLOSURES

The ditches were dug in a uniform manner, though dimensions varied. In all instances it is likely that the original surface from which they were dug has been altered. The uppermost parts of most of the postpipes appear to have gone. Few have upper weathering cones produced by the rotting *in situ* of timbers and in which finds may be expected to collect, as was the case for example in the South Circle at Durrington Walls (Wainwright and Longworth 1971) or in the palisade enclosure at Mount Pleasant (Wainwright 1979, figs 34–36). Truncation by cultivation is the most likely mechanism. Both ditches and posts would therefore have originally been slightly larger.

The ditches were dug to receive posts. One side was normally steeper than the other (though some are both steep on both sides and more or less symmetrical in cross-section), and posts (as discussed further below) may have been slid in from the more sloping side. In enclosure 1, that was normally the inner side, in enclosure 2 the outer side. The ditches were deliberately backfilled, probably very soon

after being emptied. There is very little humic material in the fills. A little was noted at the base of the outer ditch in Trench E, in enclosure 1. In most cases the fill is very similar to the surrounding subsoil, but in one or two instances there may have been a little lateral movement of spoil. In Trench H, for example, the fill is perhaps chalkier throughout than the immediate subsoil would produce.

Posts, normally single, were set up in the ditches, lodged in basal sockets and packed or held by backfill and sarsens. The sockets are varied. It is possible that they were tailored to the varying shapes of individual posts, which may have been only roughly dressed. The depth of backfill alone should have been more than sufficient to keep posts upright and firm, with the additional support of a few sarsen stones. The diameter of postpipes varied from cutting to cutting as described above. Many postpipes were in the range from 25–40 cm, with some larger. The evidence excavated to date may suggest that the posts of enclosure 2 were a little thicker than those used in enclosure 1. In both cases, the charcoal evidence strongly suggests that posts were of oak, though other species may have been used occasionally.

The extraordinary abundance of stones in Trenches F, J and O requires some explanation. It could mark lengths of posts of unusual height. In the case of F and J, it might mark the proximity of an entrance, since the ditch in F narrows to the west and there is a change in alignment of the inner ditch corresponding to the position of Gunsight Lane. The entrances at Mount Pleasant were very narrow (less than 1 m broad) (Wainwright 1979). There is no other sign of them in either enclosure at West Kennet, for example on the aerial photographs or the magnetometer surveys.

Animal bone was deliberately placed against the posts as these were covered up with backfill. It is possible that some bone has become incorporated in the process of post replacement, but the upright bones observed in Trench H suggest otherwise. Antler was also placed against posts, but occurred more frequently in the backfill. The differentiation seems deliberate. The few sherds recovered from considerable depths in Trenches H and J need only be accidental inclusions. The animal most used for such initial depositions was pig. As discussed above (p. 124), the constructors seem to have been conscious of body part and even body side. These were presumably ritual or commemorative deposits.

The posts were placed in close-set lines. The interval between them was recurrently 10–15 cm. As far as could be seen by planning the cuttings at different depths, most posts were more or less straight. Some may have been less regular or twisted. This is one interpretation of the detail recorded in the inner ditch in for example Trench D. If twists and curves continued above ground, and if the timbers were only crudely dressed, then the close spacing within the ditch would effectively have been reduced to nothing above ground, presenting more or less solid walls of wood, though cladding with daub or other wood is an alternative. The natural decay process of post replacement may have led in some cases to settling (as in the voids seen in Trench H and in the outer ditch in Trench D; see Atkinson 1985) and distortion, so that the plans of the postpipes through the ditch fills perhaps cannot be used as a precise record of the original shape of all posts.

The sections and plans already presented above (pp. 53–86) may not adequately convey the impression, so striking over three seasons of excavation, of uniformity of construction of both enclosures, embracing both major and minor features and foundation deposits of pig bone.

The radial ditches and the outer palisade ditches of the inner structures within enclosure 2

Such uniformity extended also to the radial ditches and the outer palisade ditches of Structures 1–3 within enclosure 2. On present evidence the radial ditches appear to have been an integral part of enclosure 2, or at least to have been laid out to respect it. There is no sign that the radials were not butted on to the enclosure 2 ditch. Outer radial 1 can be seen as a substantial fence or small palisade line. The careful packing of bone against the west side of some of the posts suggests that it was invested with some special significance. Outer radial 2 may have been more substantial, more like the various enclosure ditches themselves.

The outer rings of all three structures were basically

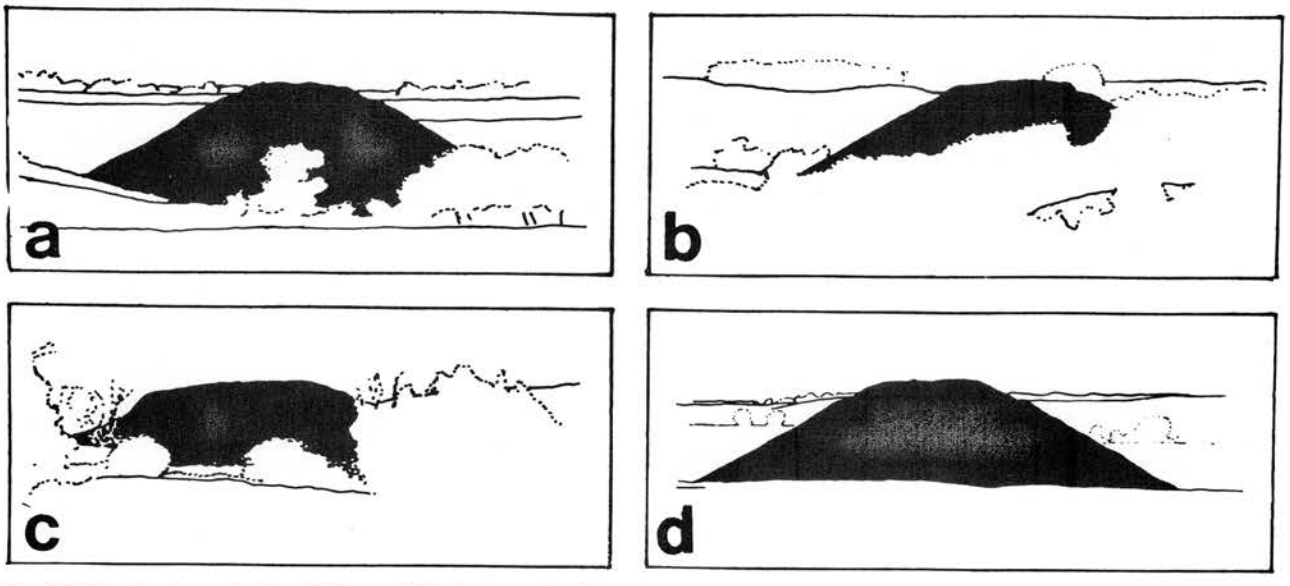

Fig. 79 The horizons behind Silbury Hill, from a: the East Kennet long barrow; b: the Sanctuary; c: Beckhampton long barrow; d: the West Kennet long barrow (reproduced by permission of Paul Devereux and Antiquity Publications Ltd)

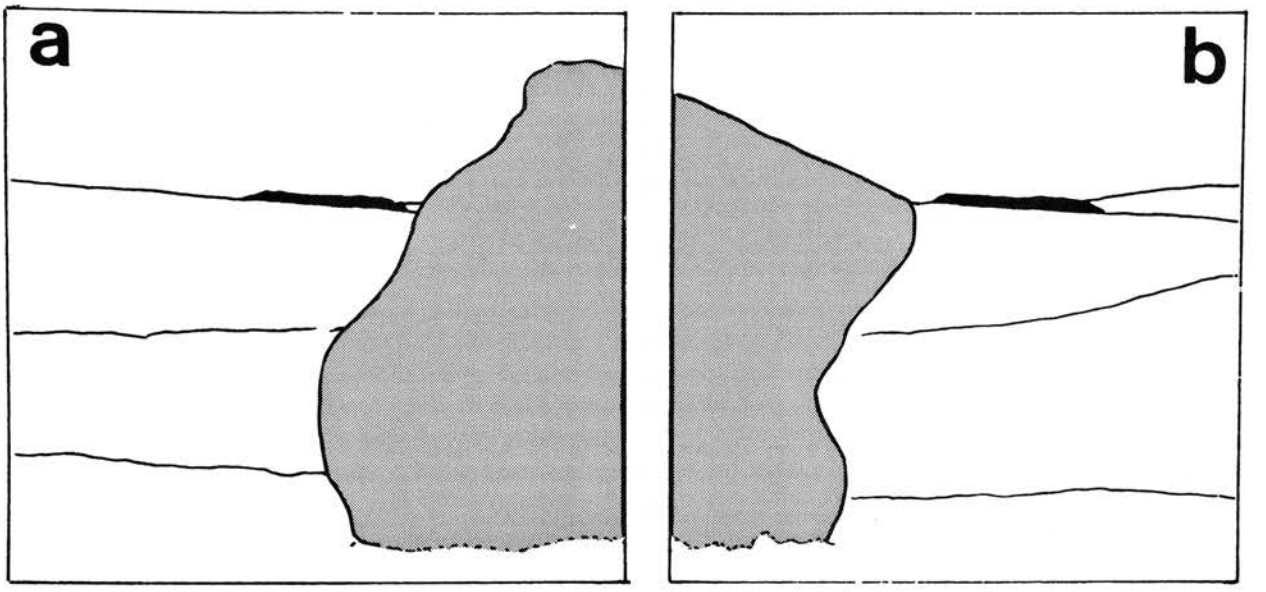

Fig. 80 The view south-west towards the top of Silbury Hill past stone 102 in the south inner circle of the Avebury enclosure (following the numbering of Smith 1965a), from (a) the east side of the position of the obelisk within the south inner circle, and (b) the west side of the obelisk position (reproduced by permission of Paul Devereux and Antiquity Publications Ltd)

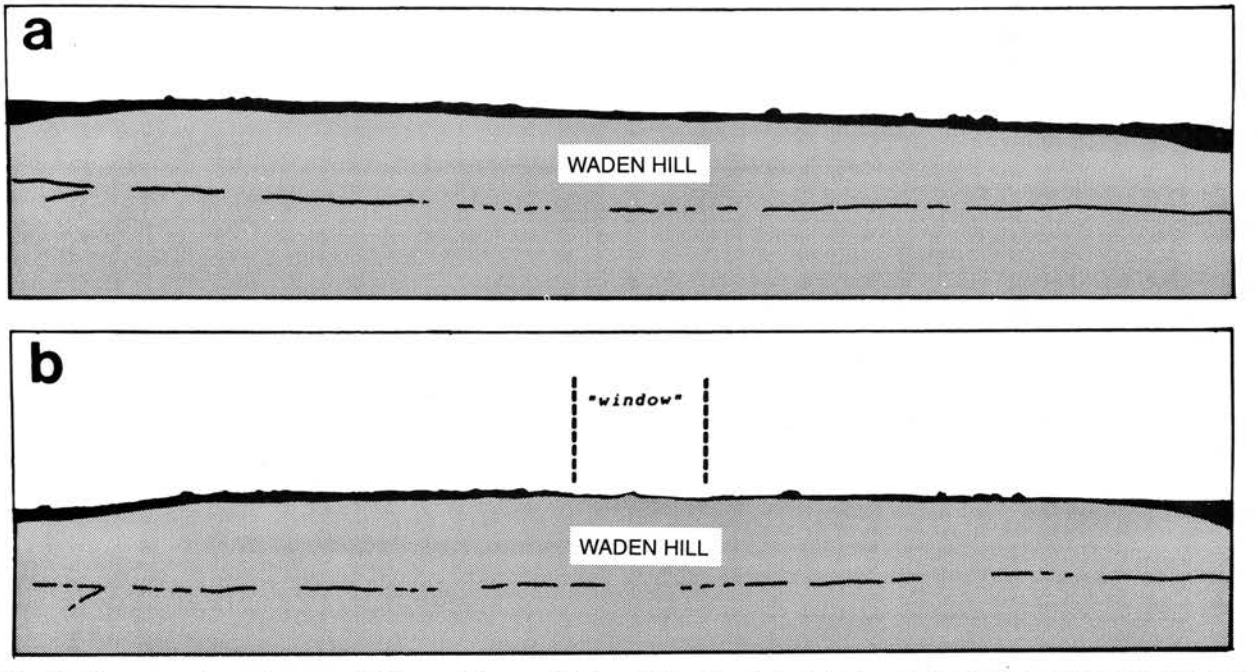

Fig. 81 Views east from the top of Silbury Hill over Waden Hill to the distant horizons, (above) from the summit, and (below) from terrace 1. The double sunrise effect occurs within the window indicated (reproduced by permission of Paul Devereux and Antiquity Publications Ltd)

miniature versions of the main palisade circuits of the enclosures, with matching deposition of animal bone in at least two of the three cases, Structures 2 and 3. The inner parts were of different character: an irregular but in part substantial ditch in Structure 1, individual postpits in Structure 2, and a shallow ditch seemingly with internal posts in Structure 3. It is worth taking them in turn.

The inner ring of Structure 1. The irregular ditch had silted naturally and slowly. There is no sign in the silting of accompanying ditch or mound, but the top of the ditch must have been visible as a slight hollow in Saxon times. The inner ring of Structure 1 encompasses a right angle in the existing field boundary. These two features would be compatible with the existence of some kind of internal mound.

The inner ring of Structure 2. The inner ring appears to have consisted of a ring of posts about 8 m in diameter. The posts tapered below ground, from a diameter of about 30 cm; they were placed about 80 cm apart, but not exactly or uniformly so. They appear to have rotted *in situ*. The fills of the postpipes include finds either deliberately or accidentally incorporated. Finds from the upper weathering fill may have been placed near the foot of posts or have eroded in from an original surface subsequently destroyed by cultivation.

Post setting 5003 adjacent to the inner ring of Structure 2. The excavated features appear to represent the truncated

remains of posts. It is possible that there are others under the unexcavated baulks. There is, however, coherence of plan in the area stripped, and there are finds of Late Neolithic character from one of the features. Though the conclusion must be tentative, it is likely that the setting represents a light wooden structure attached to or aligned on the gap opening into the south arc of the inner ring.

The inner ring of Structure 3. The inner ring appears again to have consisted of a ditch holding posts by means of backfilled spoil and sarsens; in the southern portion the backfilling was layered, presumably deliberately. In strong contrast to Structures 1 and 2, the inner ring was shallow, suggesting a much slighter wooden construction. That appears to have rotted *in situ*.

The inner postpit within Structure 3. A substantial post was set up and rotted *in situ*, though it is surprising perhaps that the postpipe was not more distinct throughout the fill. There is no guarantee that post and rings belonged together, and it is again perhaps surprising that there were not more finds in the postpit. At face value, however, the focus within the wooden rings of Structure 3 appears to have been a large, slightly off-centre, wooden post, which could have stood high above ground.

The height and appearance of the palisades and other posts above ground (fig. 82)

It has been suggested that posts could have stood as much as three or four times above ground compared to their depth below ground. A ratio for socket depth to post height of 1:3.5 was empirically derived by examining postholes in Later Neolithic contexts with insertion ramps. The distance from the edge of the ramp to the far side of the posthole is assumed to be approximately half the timber length, allowing easy insertion using the point of balance (Mercer 1981, 150). Simply applying this formula, given that the enclosure ditches were regularly 2 m deep, and in some places deeper, and that there may have been some loss of surface, the palisades of both enclosures could easily have been as high as 6 or 8 m, if not more. The width of the ditches, taking the frequent occurrence of one side more sloping than the other, is also compatible with this kind of calculation. It would theoretically be possible for even taller posts to have been inserted, since in a linear ditch posts could have been inserted along the axis of the line rather than at right angles to it, and pulled upright with ropes. But perhaps considering the weight of timber (cf. Startin 1978), the easier procedure of slipping already substantial posts down the ditch edge is more likely. There is no evidence for the final appearance of the posts. Cladding cannot be excluded, though there is no excavated sign of it. There is no evidence for supporting structures, if we discount the small postholes noted inside the outer ditch in Trench D (enclosure 1). The range of species other than oak from the postpipes, as seen in the wood charcoal identifications, does allow the possibility of subsidiary wood having been used.

Quantities of bone, wood, woodland and labour

It has already been calculated above (p. 124) that the pig bone in the circuits of both enclosures might represent thousands of pigs. A parallel calculation can be undertaken for the quantities of wood in the two enclosures. The length of the perimeters of enclosure 1 can be taken in total as some 1400 m, (some 800 m for the outer circuit, and 600 m for the inner, assuming for the purposes of discussion that: both circuits were complete and crossed the Kennet valley bottom, and the circuit north of the river was the inner ditch). The length of the perimeter of enclosure 2 can be taken as over 800 m (assuming for the purposes of discussion that the circuit was complete and returned in its northern part along the Kennet terrace). On average each linear metre of ditch included two or more posts. Enclosure 1 will thus have required some 2800 posts, and enclosure 2 some 1600. If the full length of each post is assumed for the purposes of discussion to have been 9 m (2 m below ground, and 7 m above), a total of some 25,200 m of prepared timber can be suggested for enclosure 1, and 14,400 m for enclosure 2: a grand total of 39,600 m. This excludes the radial ditches and the inner structures within enclosure 2. The figures can be adjusted downwards. The circuits may not have been complete in the ways assumed for the purposes of calculation, and assuming posts 6 m high above ground would give figures of 22,400 m and 12,800 m for the timber lengths required for enclosure 1 and 2 respectively. But the order of magnitude is clear.

It is difficult to know how much woodland would have been required to supply such a quantity of timber. We do not know how intensively each felled tree was used, nor whether primary or secondary woodland was involved, and therefore neither the size nor the density of the trees can be inferred. As a preliminary guide, it has been noted that *Quercus robur* may reach a height of 30 m in favourable British conditions, though 21–24 m is common in closed canopies. In mature woodland there may be 150–250 trees per hectare, those with diameters less than 0.5 m being in the majority, with perhaps over 100–200 per hectare (Wainwright 1989, 136, 153). Taking these figures at face value, and assuming that two posts could be obtained from each felled tree and that there were 150 trees of the required diameter per hectare, enclosure 1 and 2 would have required the felling of some 1400 and 800 trees respectively, from an area of 9.3 ha and 5.3 ha respectively. These figures, once again, can only provide an order of magnitude. We do not know what kind of woodland was involved. By comparison with the evidence of the Somerset Levels trackways (Coles and Coles 1986), one could well envisage the management of secondary woodland within the region. How far away a source or sources of oak in these quantities were from West Kennet is unknown. The pollen and insect evidence suggests that the oak was not derived from the immediate locality. The clay-with-flints subsoil to the east, presumably wooded in the Neolithic and favourable then as now to oak, begins at a distance of some 4 km (see above).

Following the nineteenth-century rule of thumb that a team of three could excavate a cubic yard of soil by hand (with simple tools) in an hour (Startin and Bradley 1981), and assuming that each linear metre of palisade ditch would have yielded some 3 cu yds, the digging of the enclosure 1 ditches would only have required 12,600 hours of labour, and the enclosure 2 ditch some 7,200 hours. To those figures must be added the time required not only for tree felling and the setting up of the palisades, but also for the transport of timber (cf. Startin 1978). The totals are likely to have been

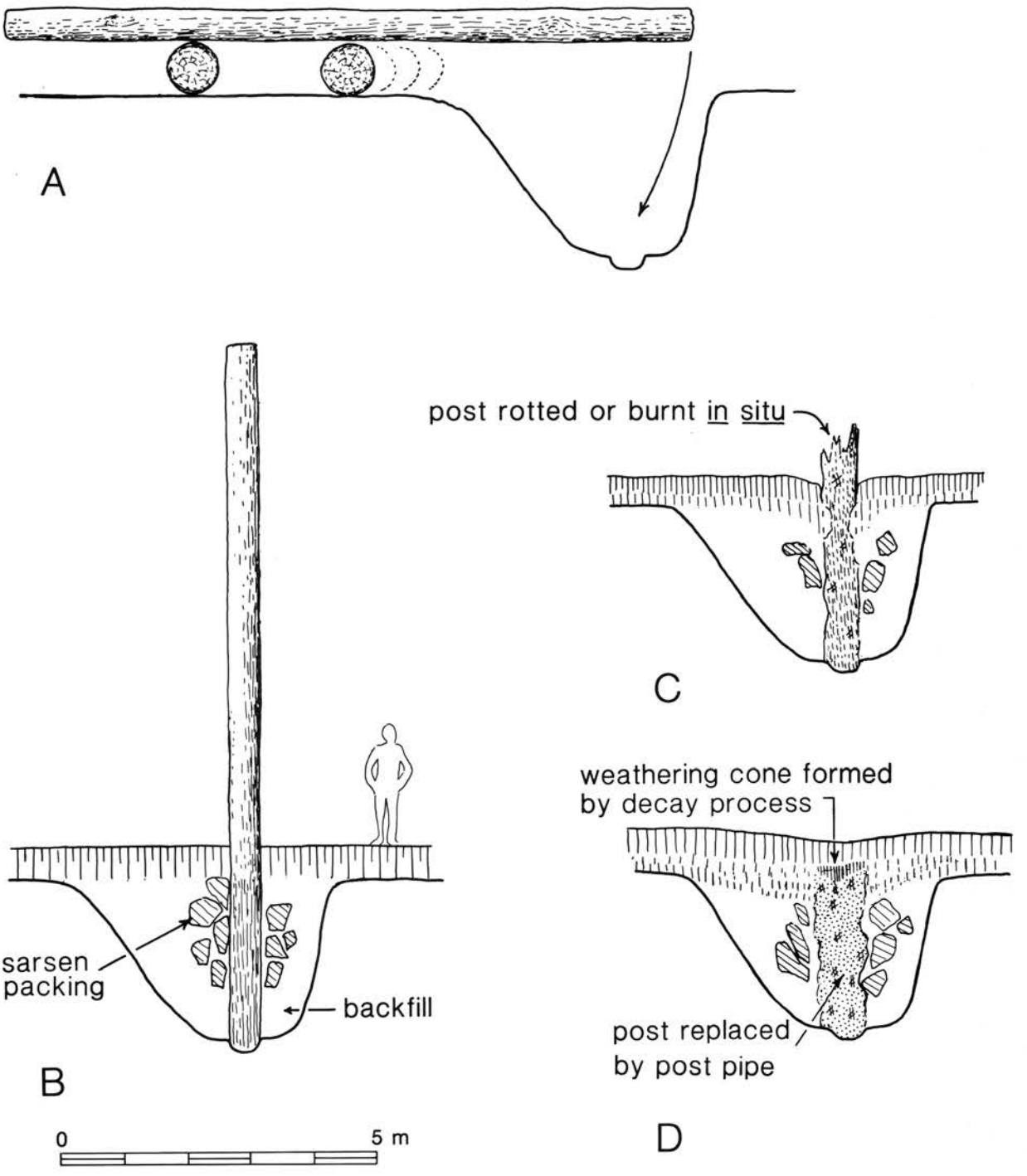

Fig. 82 Palisade construction and decay (following Woodward et al. *1993)*

substantial, but trifling by comparison with both Avebury and Silbury Hill. In labour terms the combined enterprises at West Kennet probably fall well short of a large, elaborate causewayed enclosure of the Earlier Neolithic, for which an upper figure of some 100,000 hours (about 63,000 locally, for Windmill Hill) of labour has been suggested (Startin and Bradley 1981; Startin 1982).

The importance of the palisade enclosures does not therefore lie in the total amount of labour that needed to be mobilised. However, both constructions appear unitary, and may have been effected over short periods of time. Just as the slaughter of thousands of pigs may have stretched the animal economy, even if geared to such an event, so the short-term demands on labour may have been considerable. This could have been a task which could be carried out by a much smaller labour force than that required for the larger earthworks (cf. Whittle 1993, 47), but equally it could have been a task taken on when large numbers of people had already been or were in the process of being mobilised for one of the larger enterprises.

Sequence and duration

Sequence

Investigation to date has produced no clear evidence for the relative sequence or contemporaneity of the enclosures. They cannot be separated by differences in construction, associated finds and depositions, or radiocarbon dates, though those for enclosure 1 have a wider span than those for enclosure 2. The succession of constructions, if such it was, must be presumed to have been swift, to be undetectable by the imprecision of the radiocarbon method. The radial ditches, especially outer radial ditch 2, may in the future give a better idea of relationship. I presume, but cannot demonstrate, that one enclosure succeeded or overlapped the other, within a relatively short space of time. That interval is linked to the question of duration.

Duration

There is no sign within the ditches or postpipes of maintenance, in the form of recutting or post replacement. It is no easy matter anyway to extract a large and heavy post from a deep matrix, and replacements had they occurred should therefore be archaeologically very visible. There are no certain figures for the longevity of oak posts in the ground, and it is possible anyway (see below) that each enclosure was brought to an end before its posts had finally rotted away. It is likely that oak posts of the diameters in question could have lasted at least a couple of generations. The length of life of an oak post increases in direct proportion to its diameter; a life of 15 years for each 5 cm diameter of heartwood has been suggested (Wainwright 1989, 155). The posts in the West Kennet palisade enclosures could therefore have survived a hundred years or more, though younger trees with less heartwood may have rotted more quickly. But an interval of a century, more or less, could not be expected to show up clearly in the radiocarbon dates.

As noted above, the uppermost portions of the palisade ditches appear to have been lost. Only the deposits at the top of Trench M in enclosure 2 may give some indication of continued deposition after construction. The deposits in question are not thick, and as discussed below they may relate anyway to a period after the decay of the palisade.

The best guess may be that the enclosures were constructed and used in succession, perhaps overlapping, within a cycle of a few generations. The labour and resources required may belong to a context rather different to that of the large earthworks of the locality, but they could equally be linked to the mobilisation of very large workforces for other purposes as well.

Use

Defensive, domestic and ceremonial or sacred roles can be considered for the enclosures, though these need not be seen as necessarily mutually exclusive.

The near-continuous and presumably high walls of the palisades, with narrow entrances, could have provided stout defensive rings. Defence might have been necessary in the context of hypothetically increasing population, and of increased social tension focused both on resources and the control of important monuments. There are many arguments, however, against such a role. There are no other signs of an *increase* in conflict in this period compared with earlier phases, as measurable for example by archery equipment or other weapons, or the nature of other sites. That does not exclude recurrent, endemic bickering between groups or individuals (cf. Chagnon 1990). The New Guinea Wahgi, mentioned above (p. 128), distinguish between brawling and all-out warfare, and between temporary and permanent enemies. Their highly ritualised conflicts do not seem to have involved fortifications (O'Hanlon 1989, 82–5). As discussed above, there is no certain evidence for a markedly increased local density of population in north Wiltshire in the Later Neolithic. Both West Kennet enclosures are low-lying, and their long perimeters would have been vulnerable to attack unless manned by a considerable force. In other situations, defence is often achieved by fortifications in remote locations, or by mobility, though admittedly there are also plenty of examples of strongholds and fortified villages, as in Fijian and Colombian chiefdoms (Carneiro 1990).

A variation on this kind of interpretation would be to see the enclosures as a highly visible statement of social power. The palisades might have offered the threat of conflict, either to outsiders or to the local community. The case of Mount Pleasant, the closest formal parallel for the West Kennet enclosures, discussed below, argues against such an interpretation.

The enclosures might be taken to mark the main habitation or at least provide a focus for the settlement system of a more numerous and more settled local population. An analogy could be the indications of changing population size and density in several Mississippian polities, discussed above. Mound building, ceremonialism, and social ranking were often accompanied or preceded by increased sedentism and increased population. There is however, no specific on-site evidence to support such a view, though that is not to exclude the possibility of its future recovery in excavations over a broader area. The structures within enclosure 2 need not be seen as domestic (discussed further below). The surface deposits of animal bone away from the ditches need not be seen as mundane, since their composition largely matches that of foundation deposits in the ditches. There is no obvious sign of any quantity of lithic waste or tools across the modern surfaces of the site, which might be expected had there been a large or prolonged habitation here.

The enclosures could have had a ceremonial or sacred role. The setting was surely propitious, equidistant between the Sanctuary and Silbury Hill, within sight of part of the West Kennet Avenue, and overlooked by both the West Kennet long barrow, nearby, and the East Kennet long barrow a little further off. The construction of the perimeters of the enclosures was accompanied by animal slaughter and presumably feasting on the grand scale. There were further depositions of animal bones at locations within the enclosures. The pattern of deposition of pottery within Structure 2 inside enclosure 2 strongly suggests non-mundane activity. The internal structures themselves, as discussed further below, can be related to a much wider series of circular structures in the Late Neolithic to which it is difficult to assign a mundane or domestic role. Other palisade enclosures of this period, apart from the West Kennet pair and Mount Pleasant, had individual postpits, often spaced (discussed below), and it is hard to envisage that these had a defensive role. There are therefore strong grounds for

assigning the West Kennet palisade enclosures to a tradition of ceremonial or sacred enclosure.

The possible properties or qualities of wood itself should be considered. What was the significance of using wood rather than stone or earth-cut ditches, if not just for convenience or speed of construction ? The wooden enclosures were within sight of the stone rows of the West Kennet Avenue. By analogy, both stone and wood could have been invested with specific qualities, admired for specific qualities of, say, hardness and durability, desired for their colour or patterning, or associated metaphorically with other properties and virtues. Two examples from the ethnographic record indicate the kind of possibilities to which I refer. For Aborigines in western Arnhem Land in northern Australia, stone tools have had aesthetic and symbolic value (Taçon 1991). Hardness, durability, and colour have been valued. Stone tools have been associated with particular social roles, for example those of initiated males, and with the beginnings and final resting places of Ancestral Beings, who in other guises framed the whole landscape. For the Zafimaniry, shifting cultivators in Madagascar, especial importance was attached to the properties of wood, which was used for fires and houses, and associated metaphorically with the development of people, the bones of ancestors and other symbolic transformations (Bloch 1993). In the case here, it may be possible to posit some kind of relationship between stone and wood, of either opposition or complementarity. These were usually kept apart, but were combined, perhaps, in the layout of the Sanctuary (Pollard 1992). Could stone have stood for durability and unmeasurable time, and wood for renewal and cyclical time ?

The archaeology of the Mississippian culture and the ethnography of the southeastern Indians in the historic period again provide a third kind of analogy. Large free-standing wooden poles were a recurrent feature of ceremonial complexes. Some may have served simply as the focus of a ball game, but they seem also to have had a basic symbolic significance as earth symbols, and were connected also with oracular powers, clan symbolism and an opportunity for martial and other display (Knight 1985, 106).

What specific form ceremonial activity took within the West Kennet palisade enclosures is hard to say. The radial fence or palisade lines seem to emphasise the business of approaching these putatively sacred precincts. This might have been part of prescribed ways of moving around the landscape (cf. Thomas 1993b; Pollard 1992), the obvious possibility being that there was a connection with the placing of other monuments like the Avenue, the Sanctuary and Silbury Hill. The high wooden walls of the enclosures would also have served to direct movement and experience, people and animals being funnelled through tight entrances. The wooden walls would have acted to exclude sight of what lay within. The wooden posts of outer and inner enclosures may have had an active symbolism, linked (whether in opposition or in harmony) to that of stones in other monuments; and sarsen stones were deliberately incorporated into the palisade ditch filling, sometimes in numbers far greater than practical necessity would dictate. The inner structures within enclosure 2, if contemporary, could have been a further point in a prescribed progression of approach, entry and circulation. The further content of such presumed rites is so far elusive. At Structure 2 there was further deposition of animal bone, and Grooved Ware and flintwork of unusual quality were in use. Within Structure 3, the focus appears to have been a large free-standing post.

As at Silbury Hill, part of the concern may have been with the past, with old monuments and their contents. The West Kennet long barrow uphill would not yet have received its closing facade, whether or not its chambers and passage were by now partially filled up (Piggott 1962; Thomas and Whittle 1986).

In the last section below I will consider further ways of linking the West Kennet palisade enclosures and Silbury Hill.

Decay (fig. 82)

Rotting and burning

There is no sign of recutting. The posts rotted *in situ*, and were replaced by postpipes in the normal way. In some, the upper weathering cone has survived, with brown humic material. In enclosure 2, for example, Trench K, T and CC appear to show the weathering cones of former posts, with subsequent natural infill, with no ash, dark soil or charcoal in the upper hollow. In the main, the postpipes consist of fine, generally dark soil, as may be expected. Some material may have been incorporated into the postpipes from above during the replacement process. There is no evidence for the withdrawal of posts, which would anyway have been extremely difficult with such deeply set and well packed examples.

The frequency of charcoal suggests that the posts may first, before final decay, have been burned. In general, the evidence for burning is extensive, and charcoal pieces up to 2–3 cm long were regularly recovered, and less frequently others up to 5 cm and occasionally longer. It is not necessary to envisage the complete destruction by fire of everything above ground, since the oak frames of fire-damaged medieval buildings usually survive reasonably well (I am grateful to Brian Davison for this point). It is by no means impossible that posts set alight above ground could have also continued to smoulder below ground. The recurrence of oak charcoal is consistent with this interpretation. It has been suggested that this is most likely with decayed timber (Atkinson 1985), but one wonders if it would not also be possible with seasoned wood in dry subsoil conditions. It is also possible that the charcoal reflects only burning above ground and its subsequent inclusion during the process of postpipe replacement. In this case, however, it is hard to see how charcoal could become incorporated so evenly throughout the depth of the postpipes. It is also possible that the charcoal reflects other burnings, contemporary with standing posts or later, which became incorporated during the process of postpipe replacement. In both cases, worm action has been suggested as one mechanism, gravity and voiding followed by collapses as others (Reynolds and Barber 1984; Atkinson 1985). Several objections apply. The charcoal is mainly oak, suggesting structural timber, and not other kinds of fire. The charcoal is evenly distributed through the postpipes, and its size precludes the majority of it having passed through the gut of earthworms (Atkinson 1985). There are voids, as noted above, but charcoal is not confined to those postpipes with voids. One other possibility is that posts were charred before insertion in the belief that this would increase their durability. Whether or not this was effective is beside the point (Atkinson 1985). The practice of charring coffins, for

example, was in operation from at least the Roman to the early medieval period (Rodwell 1989, 163). This does not, however, seem to have been normal practice with timbers in the Later Neolithic or Early Bronze Age. The strong possibility is that each of the palisades came to an end in a massive conflagration.

This is not just a technical question, since it may provide further important clues to the character and meaning of these putatively sacred precincts. Such a burning could hardly be accidental. If it were hostile, it would suggest rather more conflict than the other local evidence supports. The other possibility is that the enclosures were conceived as belonging to a specific context, and perhaps as part of a ritual cycle. Their ends were perhaps predetermined from the outset. Both enclosures may have been contemporary, as discussed above, but it seems most plausible to envisage an overlap or swift replacement. From the flames of one conflagration a successor arose. The enclosures could have stood for both impermanence *and* renewal.

Post-decay use

The character of the upper part of the ditch in Trench M (enclosure 2) was different to that preserved elsewhere around the circuits. It is possible that the upper dark layer formed at the same time as standing posts. In this interpretation, the dark layer would be derived from fires and deposits elsewhere, and would have been deposited gradually along with successive depositions of unburnt bone. This does not easily explain the undifferentiated character of the lenses, nor the lack of burning of bones already present. It is perhaps more likely that the deposit formed after post burning or post decay. In this interpretation, the dark layer is a by-product of the firing of the palisade, progressively lighter as it goes upwards, including into 600. This view perhaps more easily explains the nature of the lenses and the unburnt state of the successively deposited bones. In this portion of one enclosure at least, the precinct continued to be marked *after* the palisade had perished. This might be a clue to the relative sequence of the enclosures (2 preceding 1), or indicate simply that the precinct remained significant even after above-ground structures had gone.

Analogies

Palisade enclosures within the broader tradition of Neolithic ceremonial enclosures (figs 83–85)

If the West Kennet palisade enclosures have correctly been identified as sacred precincts, they belong to a much broader tradition of ceremonial enclosure which goes back into the Earlier Neolithic, exemplified locally of course by the causewayed enclosures at Windmill Hill, Knap Hill and probably Rybury. As the tradition changed through the Neolithic, it also broadened, in more than one sense. In the Later Neolithic, enclosures appeared in regions where previously they had been scarce or absent, such as eastern Ireland and the Orkney Islands (Stout 1991; Renfrew 1984). The repertoire of forms also expanded, embracing not only considerable variation within the henge tradition, but also a wide range of stone circles (Harding with Lee 1987; Clare 1986; Clare 1987; Burl 1976). Something of that diversity can be seen in the Avebury area, from Avebury itself and Marden in the Vale of Pewsey (Wainwright 1989) to smaller stone circles and unexplored small ditched enclosures in the Vale of Pewsey (Burl 1979; RCHME, *pers. comm.*). It is likely that some variation was sequential. Further afield, the circular ditched enclosures at Stonehenge (in its first phase) and Flagstones, near Dorchester, Dorset, may belong to a period transitional between the Earlier and Later Neolithic (Bradley 1991; Cleal *et al.* 1995; Woodward and Smith 1988). Avebury itself may be the product of more than one phase of construction (Pitts and Whittle 1992).

There are slighter palisades of earlier date, for example in Ireland twin concentric arcs under Knowth (Eogan 1986), within the earthwork of Lyles Hill, Co. Antrim, though not certainly part of a circuit, and adjacent to causewayed ditches at nearby Donegore Hill (Gibson and Simpson 1987), and in eastern Britain associated with causewayed enclosures, for example Orsett, Essex, and Haddenham, Cambridgeshire (Hedges and Buckley 1978; Evans 1988). But palisade enclosures on their own appear to have been an innovation of the Later Neolithic period, in a context of change and diversity.

Later Neolithic palisade enclosures

To date, two kinds of palisade enclosure can be identified, though the position of neither within the Later Neolithic sequence is certain: continuous post-palisades set within ditches, and circuits of spaced posts set in pits, often with elaborate entrances.

Mount Pleasant, Dorset, exemplifies the former category along with the West Kennet palisade enclosures. There are no other certain or probable examples, and it is hard to see how such can be identified without excavation. The Mount Pleasant palisade lies within a very large henge (Wainwright 1979; Wainwright 1989). It comprises one circuit, though it might not be impossible for another to have existed further out, say between the ditch and bank or beyond the bank (fig. 84). Its form is irregular, roughly oval, defining an area some 270 by 245 m in maximum dimensions. It was constructed in a manner closely similar to the West Kennet examples, with close-set posts held by a backfilled ditch. The ditch was of variable width, normally 1–2 m, and 2.5–3 m deep, with fairly straight sides, often recalling the outer ditch of West Kennet enclosure 1 in Trench D. Posts were close-set, of 30–50 cm diameter. Unlike at West Kennet, they were butted on the base of the ditch, not let into sockets. Much larger posts formed the two known narrow entrances, less than a metre wide.

There are two radiocarbon dates for the Mount Pleasant palisade enclosure, 2112–1936 BC (BM-665) and 2121–1897 BC (BM-662), on charcoal and antler respectively. Though in close agreement, could it be that these are in fact a little late ? Of the first two dates obtained for West Kennet enclosure 1, one (BM-2602) proved, with the addition of others, to be younger than most. The associated pottery in the palisade at Mount Pleasant was largely Beaker, but included also Grooved Ware, Food Vessel, and Peterborough. All sherds were weathered, and came from the weathering cones of the posts. It is far from clear therefore that this was a Beaker-associated construction. The earliest dates from the earthwork are 2616–2477 BC (BM-793) and 2853–2470

Fig. 83 Distribution of palisade enclosures in Britain and Ireland

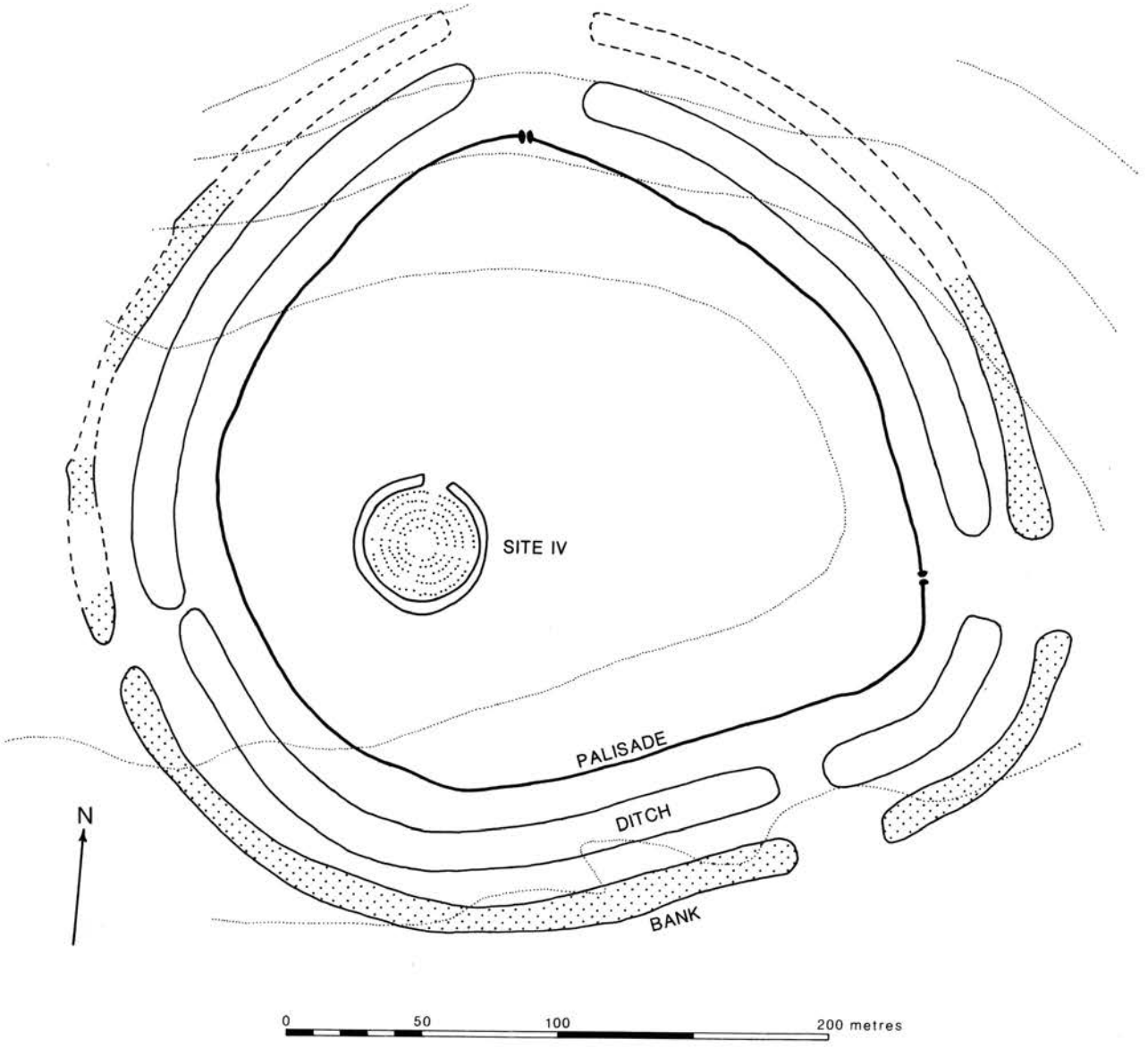

Fig. 84 Plan of Mount Pleasant as a single-phase monument (after Wainwright)

BC (BM-792), from the primary fill at the north entrance. These were, however, charcoal samples. Those in a comparable position from the west entrance, 2192–2039 BC (BM-645) and 2196–1988 BC (BM-646), were significantly later. These were on antler samples.

It was the view of the excavator that the palisade succeeded the henge, and was coeval with the construction of the stone cove in the middle of the earlier wooden setting or structure of Site IV, in the interior of the monument (Wainwright 1979; and see also Thomas 1996b). The date of the cove has already been challenged, the alternative being that it belongs with the timber setting rather than after it (Pollard 1992). We should also seriously consider whether the palisade was not part of the same ensemble. A layout of, from the outside in, bank, ditch, palisade and internal timber setting, would be unitary, all the more so given that the north entrance of the earthwork gives *directly* on to the north entrance of the palisade enclosure, which in turn leads to the only opening in the penannular ditch around Site IV (see Wainwright 1979, fig. 3). The east entrance of the palisade corresponds to the east entrance of the earthwork, but there are no corresponding entrances in the palisade opposite the other two ways into the earthwork.

Tentatively, therefore, the continuous palisade enclosures could belong to a relatively late phase of the Later Neolithic, in the timespan c. 2500–22/2100 BC, and yet still be associated with the use of Grooved Ware rather than Beaker. The suggested interpretation of Mount Pleasant, if correct, would serve to underline the strongly ceremonial or sacred role of this type. A considerable length (not an enclosure) of ditched palisading north of Stonehenge, possibly of Later Neolithic date (Cleal *et al.* 1995), can also be noted, but the uncertainty over its dating does not allow it to be brought further into the argument at this stage.

The other form of palisade enclosure comprised spaced posts in individual postpits (figs 87 and 89). It is exemplified, with variation, by Greyhound Yard, Dorchester (thus a close neighbour of Mount Pleasant), and Meldon Bridge,

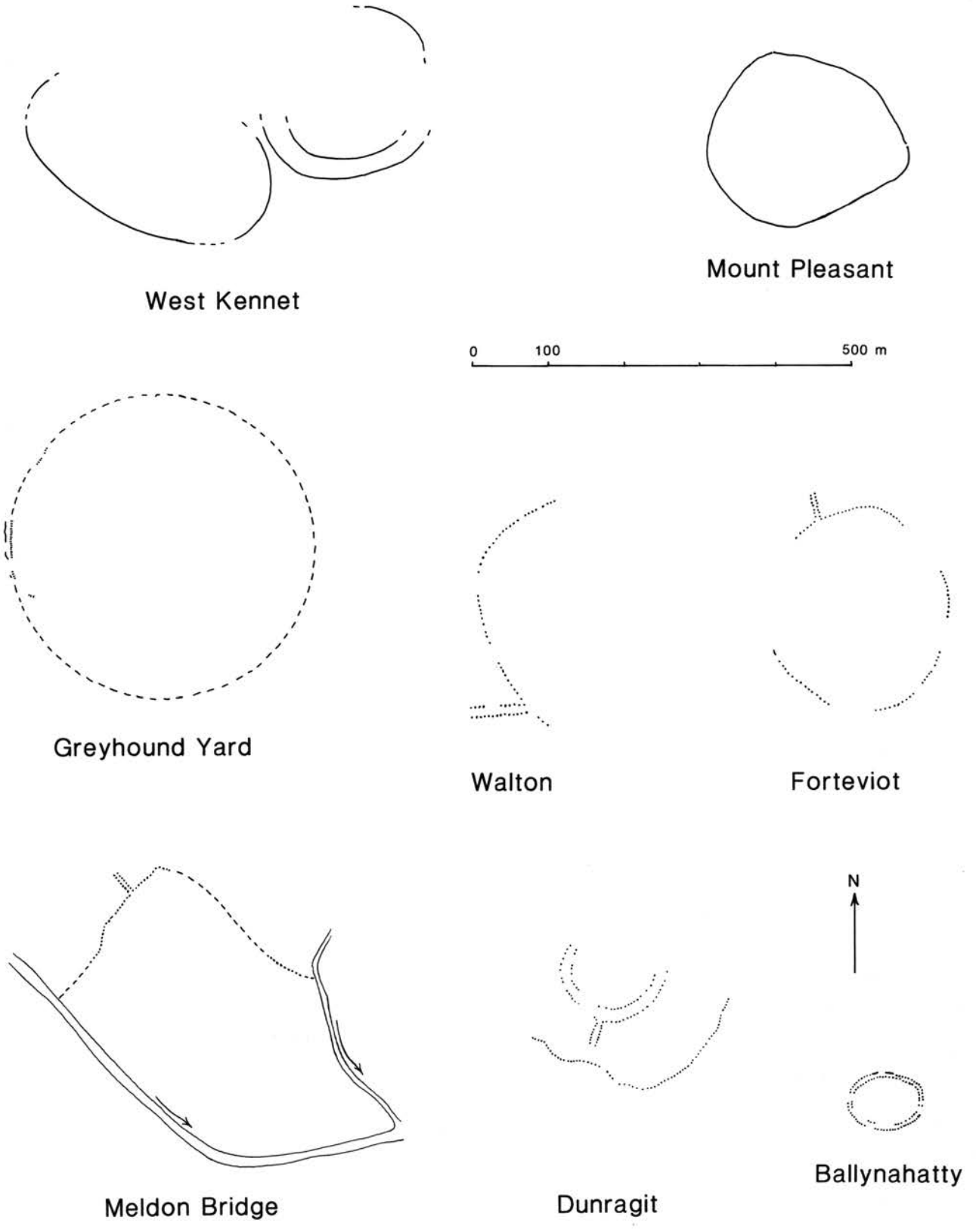

Fig. 85 Palisade enclosures of Britain and Ireland (Mount Pleasant after Wainwright; Greyhound Yard after Woodward et al.*; Walton after St Joseph and Gibson; Forteviot after St Joseph; Meldon Bridge after Burgess; Dunragit: crown copyright, RCAHMS; Ballynahatty after Hartwell)*

Peebleshire (Woodward *et al.* 1993; Burgess 1976), and in Ireland by Ballynahatty 5, Co. Down (Hartwell 1991; Hartwell 1994). The Late Neolithic pit circle at Newgrange might be something comparable (Sweetman 1985). Similar enclosures with spaced pits are also known from air photos at the so far undated sites in the Walton basin, Powys (St Joseph 1980; and information from Alex Gibson, Clwyd-Powys Archaeological Trust), Dunragit, Wigtonshire (information from Historic Scotland and the Royal Commission on the Ancient and Historical Monuments of Scotland), and Forteviot, Perthshire (St Joseph 1978). The pre-bank phase at Durrington Walls, Wiltshire (Wainwright and Longworth 1971; Stone *et al.* 1954) and the post phase at Blackhouse Burn, Lanarkshire (Discovery and Excavation Scotland 1985; RCAHMS 1978) may be related.

The Greyhound Yard site presents one variation on the theme, in that its posts were contained in separate but closely spaced pits. It consists of an arc, observed over 40 m, of 21 close-set, substantial, ramped postpits (Woodward *et al.* 1993). The pits ranged from 3–6 by 2–3 m, and were up to 2.8 m deep; they contained postpipes from 0.8–1.2 m in diameter. If projected, the arc would form a circular enclosure some 380 m in diameter. The pits were almost contiguous, though there would have been an interval of about 1–1.5 m between the posts themselves. A shallow ditch or gully was dug just outside the arc of posts. Charcoal was a notable component of the postpipes, and was taken to be the residue of above-ground burning (Woodward *et al.* 1993, 30). The associated pottery was Grooved Ware and Peterborough, and six radiocarbon dates were concentrated in the span c. 2800–2450 BC.

Meldon Bridge exemplifies the type with more spaced postpits. It consists of an arc of spaced post-pits, curving over 400 m between two convergent streams, the area thus defined being some 20 acres (Burgess 1976). Spaced posts form a projecting double-sided entrance some 25 m long, roughly in the centre of the arc. The pits are some 3 m apart, with a pair of smaller postholes in between. Most pits were 1 m in diameter (though surviving only to a depth of 1 m), and contained postpipes 25–30 cm in diameter; on the northern perimeter the pits were larger, with postpipes up to 60 cm in diameter. Various pits and irregular post settings are known within the enclosure. The associated pottery is best characterised as a regional variant of Peterborough Ware, and two radiocarbon dates span a range of 2900–2450 BC; no Grooved Ware was found.

The Ballynahatty palisade enclosure (BNH5) is part of a larger complex including the near-circular earthwork, the Giant's Ring, some 200 m in diameter, which encircles a passage tomb (Hartwell 1991; Hartwell 1994). The palisade enclosure lies a little to the north. It is oval in form, some 70 by 90 m, and consists of a double circuit of radially paired spaced post-pits. Up to 1.8 m deep, these contained postpipes of former timbers, c. 30 cm in diameter. There was some charcoal, perhaps from above-ground burning of the posts. This material, which may include old wood, provided dates with a span of c. 3000–2800 BC. The enclosure contains a smaller penannular double ring of postholes, some 15 m in diameter (BNH6), discussed further below. A line of postholes clips the east side of the enclosure, on the alignment of the Giant's Ring. These features cut the backfilled post-holes of BNH5, and are dated to the span c. 2800–2500 BC.

By analogy, Walton, Dunragit and Forteviot should be of similar date. The Walton site has a single circuit of pits (presumably postpits) spaced some 10 m apart, and may have a diameter of over 300 m; there is also a projecting double-sided entrance, presumed to be part of the same layout (St Joseph 1980, and information from Alex Gibson). Nearby in the Walton basin is another, larger pit circle at Hindwell, currently under investigation (information from Alex Gibson). At Dunragit, features known from preliminary aerial reconnaissance include three roughly concentric circular layouts defined by spaced pits, the inner perhaps 120 m in diameter, the second some 160 m in diameter, and the outer some 300 m or more; dimensions are approximate (information from RCAHMS). At Forteviot, a single circuit of spaced pits, again with a projecting double-sided entrance, forms an enclosure some 260 by 220 m; within there are two smaller circular settings, and just outside, a further four (St Joseph 1978).

Although different in detail, it may be worth noting the pit-circle outside Newgrange (Sweetman 1985; Mount 1994). This consists of an arc of closely spaced pits, three to five deep, which could have formed a circular layout some 90 m or more in diameter. Though the majority of these pits did not contain posts but cremated animal bone, the outer circle did. Charcoal from them is dated to the span 2550–2150 BC, and the arc is said to be cut by the stone circle around Newgrange (I am grateful to Richard Bradley for discussion of the uncertainties). The few directly associated finds include sherds of Irish Grooved Ware; Beaker sherds in the vicinity appear to come from secondary activity.

The pre-bank phase at Durrington Walls and the post phase at Blackhouse Burn may be relevant, though neither is certainly a palisade enclosure in the sense defined here. Excavations on the west side of Durrington showed the existence of closely spaced postholes, about 30 cm in diameter and not more than 45 cm deep; there was no accompanying ditch and the complete layout has not been established (Wainwright and Longworth 1971; Stone *et al.* 1954). At Blackhouse Burn, phases of bank construction (forming a roughly circular 6.5 ha arena) were interleaved with the setting up of large timbers, without any accompanying ditch; one radiocarbon determination supported a late Neolithic date, but the full extent of the post layout has yet to be established (Discovery and Excavation Scotland 1985; RCAHMS 1978; information from Gordon Barclay). Both sites could be taken to show that post-settings preceded major earthworks, and therefore to support the general argument advanced here.

Spaced-post enclosures may therefore date to a slightly earlier period than the less widely distributed continuous palisade enclosures, and their ceramic associations are with Peterborough Ware as well as with Grooved Ware. They include larger circuits, but were presumably of a ceremonial or sacred character. Greyhound Yard and Ballynahatty were part of larger monument complexes. There are signs that this kind of enclosure too was liable to meet its end by burning, presumably deliberate.

It is possible therefore that continuous palisade enclosures in some way developed out of spaced-post enclosures. The origin of the latter may be sought in the broadening repertoire

of bounded monuments in the Later Neolithic. Perhaps such a site remains to be found in the Avebury region, since the Dorchester complex contains an example of both types. But the first layout of Avebury (Pitts and Whittle 1992) could have provided an equivalent kind of special, bounded space. So far, the continuous palisade type is confined to Wessex, but even within Wessex, is it confined only to the largest monument complexes?

SMALLER CIRCULAR TIMBER STRUCTURES (FIG. 86)

All three Structures within enclosure 2 had outer rings about 40 m in diameter formed in the same manner as that of the main palisade circuits themselves, with close-set timbers held in backfilled ditches. It is likely, though unproven, that these outer rings were continuous and circular. Structure 3 had an inner ring of small timbers set in a shallow ditch, around a central large post; Structure 2 had an inner ring of individual postpits, with a small rectangular post-setting attached. Structure 1 had an irregular inner ditch, which did not appear to have held posts; there is magnetometer evidence suggestive of a central feature, and circumstantial evidence suggests that the inner area might have been mounded. Structures 2 and 3, and the outer ring of Structure 1, can all be accommodated in the broad range of circular timber settings known from the Later Neolithic. The small rectangular setting within Structure 2 and the inner ditch of Structure 1 are more unusual, though neither is unprecedented. None of these kinds of settings and structures need be assigned a domestic role.

Gibson (1994) has recently drawn fresh attention to the great range of timber circles in Britain and Ireland (fig. 86). He defines single circular, double circular and multiple circular forms, whose details and sizes vary greatly. The date range is also broad; some may have persisted into the second millennium BC, and even later perhaps in Ireland (Alex Gibson, *pers. comm.*), though the majority appear to belong to the third millennium BC. Many are in association with larger complexes, such as the recent discoveries at Newgrange (a double circle: Sweetman 1987), Knowth (sub-circular, with Grooved Ware associations: Eogan and Roche 1993) and Ballynahatty (Hartwell 1991; Hartwell 1994). Those with actual Grooved Ware associations include (full references in Gibson 1994): Balfarg, Fife; Coneybury, Durrington Walls North and South Circles, and Marden, Wilts; Dorchester 3, Oxon; Knowth; Lawford, Essex; Machrie Moor 1, Arran; Mount Pleasant, Dorset; Street House, Cleveland; and Whitton Hill, Northumberland. These encompass the range of forms already noted. Others can be assigned to the same horizon by radiocarbon dating, including North Mains A, Perthshire and Sarn-y-bryn-caled, Powys (Gibson 1994).

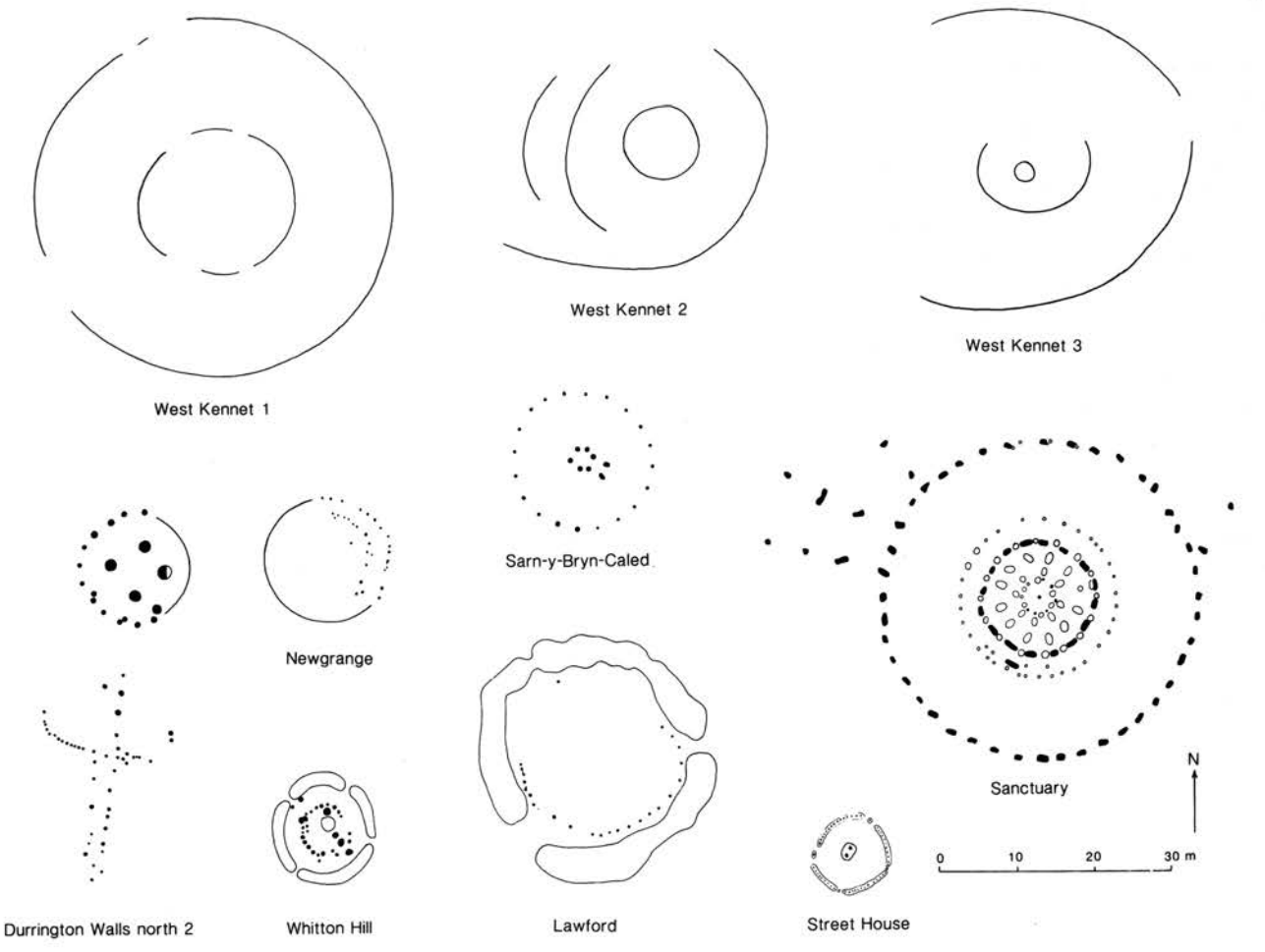

Fig. 86 Some circular structures in Britain and Ireland (comparative plans after Gibson). Postholes are shown in black, except in the Sanctuary where stoneholes are shown in black

All such sites are individual to a greater or lesser extent. That the outer rings of West Kennet Structures 1–3 cannot be exactly paralleled (fig. 86) is therefore no surprise. The idea of close-set posts in a shallow ditch can be found, however, in the small monument at Street House (Vyner 1988); this site also serves as a reasonable parallel for the inner ring of Structure 3. The idea of outer and inner rings can be paralleled in the double circular settings, for example in the putative early stage at Stonehenge, or at Sarn-y-bryn-caled. Perhaps the closest resemblance is offered by the second phase of the North Circle within Durrington Walls, where an outer facade (not certainly a ring) of close-set smaller posts (in chalk-cut postholes rather than in a separate ditch) fronts a more substantial inner post-setting, with an interval of approximately 18 m between (Wainwright and Longworth 1971). Locally, the kind of layout offered by the West Kennet inner structures can also be seen in that of the Sanctuary, which has an outer stone ring at a distance from inner settings combining stone and timber (Pollard 1992). If this implies structured movement or ritual progression, the same kind of layout can also be claimed in Avebury, in the combination of outer circuit (earthwork and main stone circle) and inner circles. Both Inner Circles repeat, with their inner settings, the notion of progression. And as well as the known inner stone circles, geophysical survey has suggested another double inner circular structure, possibly wooden, with diameters of approximately 30 m and 50 m (Ucko *et al.* 1991, pl. 67).

The inner ring of Structure 3 can, as suggested, be paralleled at Street House. That of Structure 2 can be roughly matched in a number of settings, both single circular and the inner parts of double circular settings. Among others, the inner setting of Ballynahatty (BNH6) offers close resemblances, not for its specific form of a double ring, but for the nature of contiguous individual post-pits (Hartwell 1994). The rectangular setting attached to the inner ring of Structure 2 can also be paralleled at Ballynahatty 6, at the centre of which there was a light post-framed structure 3.8 by 2 m. The same kind of idea is also seen in the rectangular stone setting within the South Inner Circle at Avebury (Smith 1965a), and further afield in the cove within Site IV inside Mount Pleasant (Wainwright 1979). Finally, the form of the inner ditch of Structure 1 is unusual. One solution would be to suppose that it bounded a further post setting or settings *within* it, in the part not excavated, in the manner of Bleasdale, Lancs, Whitton Hill, Lawford, or Arminghall, Norfolk (Gibson 1994, with full references).

None of these timber settings need be seen as domestic. Gibson (1994) has reviewed a range of depositional practice associated with them, connected among other things with feasting and burial. There may also be deliberate orientations. The most detailed argument for ritual use remains the analysis of deposition within and around the South and North Circles at Durrington Walls (Richards and Thomas 1984). And at West Kennet the less abundant finds from Structure 2 are certainly compatible with such an interpretation.

Charcoal was present in the postpipes of the outer rings of the West Kennet inner structures, though less abundantly than in the main palisade circuits of the enclosures. It was also present, but more sporadically, in the postpipes of the inner ring of Structure 2, and in the innermost posthole within Structure 3. It is possible that the outer rings at least met their ends by burning, a further demonstration of a ritual or ceremonial cycle suggested by the fate of the main palisade circuits. This can also be paralleled elsewhere, for example at Ballynahatty 6 (Hartwell 1994).

Cross-cultural analogies

Cross-cultural analogies are harder to find, and the lesser labour requirements of palisades and stockades, compared to monumental mounds, do not hold out the same promise for societal investigation. Uses may also be rather varied.

The Mississippian culture usefully offers two contrasting roles. At various points in their histories, large settlements were surrounded or partially enclosed by palisades or bastioned stockades. Examples include Moundville (Steponaitis 1991) and the smaller site of Lubbub (Peebles 1987). These generally belong to phases when sites were established as regional centres, and when warfare was conducted at a polity or regional level; by contrast the incidence of wounds from more localised conflict was probably rather higher in the periods preceding the emergence of centralised authority (Steponaitis 1991). Fortification remained a feature of some late Mississippian areas, after the collapse of previously established ceremonial-civic centres (Fagan 1991; Bense 1994). Fortification can be paralleled in many other situations, for example again in the Cauca Valley, Colombia, where villages were defended by palisades of stout bamboo (Carneiro 1990).

The other Mississippian use of the palisade was to define and bound, and perhaps to exclude from, the plazas which are associated with many of the Mississippian ceremonial centres, for example at the heart of Cahokia (Fagan 1991; Bense 1994). Here mound building and palisade construction were directly combined. At Cahokia, other posts were placed in circular and other settings, as part of a system of astronomical observation. Not all such plazas were so bounded. That at Moundville, for example (discussed extensively above), was left open (Knight 1993).

The social and the sacred: settlement and monumentality in the Avebury area and beyond

Both the monumental mound and the palisade enclosures must have involved large numbers of people. Although the relative sequence of mound and enclosures is uncertain, it is possible that they overlapped in time, and I have suggested that the enclosures could have been constructed when labour was mobilised for other, larger tasks. The slaughter of pigs and likely attendant feasting, seen in the foundation deposits of the West Kennet palisade circuits, are the best evidence locally for substantial gatherings. It may be most economical to combine these possibilities. Though I have argued elsewhere for a succession from mound to enclosures (Whittle 1993), the palisade enclosures may have been inextricably linked with the context in which Silbury Hill arose. Sacred precincts – holy rings – were perhaps part of the process of labour mobilisation for the monumental undertaking of the mound. It seems unlikely that the two

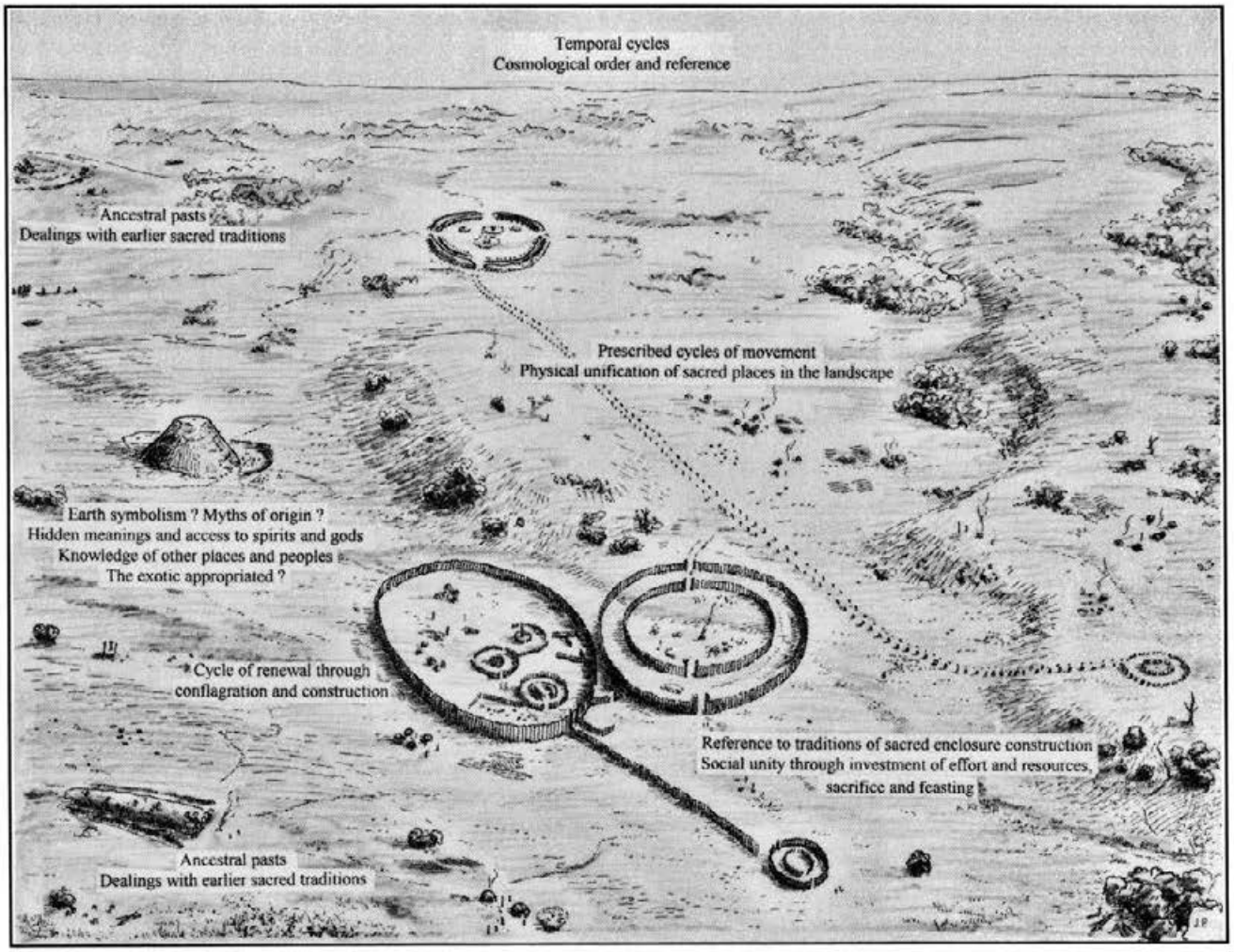

Fig. 87 Summary representation of suggested main elements in the symbolic landscape around Silbury Hill and the West Kennet palisade enclosures. Drawing: Joshua Pollard

enclosures are directly contemporary. I have suggested a cycle of construction, use, and deliberate burning, followed by renewal through fresh construction. Such a cycle could have been played out against the drama of the emergence of Silbury Hill (fig. 87). The timescales remain uncertain, but it is likely that this was an effort sustained through more than one generation.

Where did the people involved come from ? It seems unlikely, from the local evidence for environment and settlement, that only a local population was involved. There is no certain evidence for either large or permanent settlements in the area, or indeed beyond, and the scale of cereal cultivation, though undoubtedly being practised as witnessed by a range of evidence including from the palisade enclosures themselves, is unclear. The analogies reviewed above, especially the Mississippian culture, indicate that while monument building is often preceded by increased sedentism and intensification of production, it is not invariably so preconditioned. We do not know enough about the scale of mobility or the size of annual ranges in local Phases D, E or F (table 49). But I envisage the possibility of people being drawn from the vales and river valleys beyond the immediate locality of the Avebury area, and further analogy, for example the Hopewell phenomenon or Archaic Greece, would allow an even wider orbit of interaction.

How did people combine for the tasks of construction, and what motivated them ? They might have been coerced, or compelled by obligations generated by kinship or alliance. One analogy would be the single-mound centres of the Mississippian culture, often interpreted as simple chiefdoms. I have argued that there is little other convincing evidence in the case of the Avebury area for such chiefdoms (apart from general problems with the concept). If coercion or sustained control could be sustained for so relatively long, we are entitled to ask why there are not more signs of other suggested facets of chiefdom society, for example from the simpler list of Peebles and Kus (1977), rank status as seen in mortuary treatment, established settlement hierarchy, craft specialisation (of a kind not already in existence) or economic/environmental buffering. Nor does the Beaker horizon of the later part of Phase F and subsequently meet the criteria of chiefdom society; equally there is no need to regard it as a 'collapse' phenomenon (cf. Tainter 1988; Yoffee and Cowgill 1988).

As an alternative to the model of coercion, I have argued from analogy that people can be motivated to contribute labour voluntarily, including for strong religious reasons. To this can be added the compulsion of shame, in a common value system. The coercion model is good at explaining how people might be organised for large labour tasks, but less

satisfactory in showing how they can actually be compelled. The model of voluntary contribution is strong for explaining motivation, but more silent on the mechanics of planning and work organisation. But one can invoke considerable stored knowledge, available through tradition, of how to set about building monuments in general (cf. Barrett 1994).

The power of the monumental mound and the sacred enclosures should not be underestimated. Both could have had strong associations with specific places (cf. Bradley 1993). Both could have been sanctioned by their belonging to an already old sacred landscape inhabited by spirits and ancestors. Both were looked down upon by, among other older monuments, the West Kennet long barrow, with its associations and connotations of an ancestral past and distant, perhaps unmeasurable time. Such a link with time past may have been bonded to a sense of time to come. By analogy, the mound itself might have stood as a metaphor of the earth, and as a symbol of renewal, which I argued above can also be seen in the cycle of construction and conflagration at the enclosures. The mound may have brought strong echoes of other great constructions far away, and the enclosures renewed a long tradition of sacred arenas. The construction of both mound and enclosures brought large numbers of people together, with attendant feasting. Both imposed or embellished prescribed ways of seeing and moving. This list of possibilities should make it clear that the motivation for undertaking these enterprises is not problematic.

Who then began it all, and organised the undertakings? By analogy, I have argued that beginnings are as likely to have been in the hands of a charismatic figure, perhaps lacking political influence or any institutionalised office, drawing on myth and in deference to tradition, in an attempt to honour and placate the spirits and emulate the ancestors, as under the control of an already established centralised authority. We cannot exclude the emergence of leaders through the construction process and subsequently (cf. Barrett 1994; Knight 1986), but the absence of other evidence for such a phenomenon – in contrast, say, to the situation at Moundville in the Mississippian culture – does not encourage this interpretation.

Why should these feats of felling, digging and piling have been attempted at *this* time ? Many models of Neolithic society have been determinedly evolutionary and teleological. The logic of both economic practice and social relations from the beginning of the Neolithic is seen to have led, inexorably, to more people in the landscape under the control of a progressively narrower elite. This study has helped to encourage a different perspective. If the context remains one of dispersal, relative mobility, and a lack of pronounced ranking, we have to consider other kinds of time than our own. People in the Neolithic appear to have been driven by a strong sense of the past, as witnessed by the attention given to old places, the dead, ancestors, and enduring monuments. That past may have determined a sense of cyclicity, as opposed to our own linearity, and by itself motivated further activity (cf. Gosden 1994; Bloch 1977; Barnes 1971). Myths of return, and belief in renewal, allied to a desire to both honour and emulate the ancestors, in a matrix of cyclical, ritual time, could have produced the patterning in monument construction seen through the Neolithic period.

In any one region, monument building was not constant, and the regional periodicities vary. Locally, little construction is evident in Phase D, and there was no monumental activity from the end of Phase F into the Early Bronze Age, unless the main stone circle at Avebury could be demonstrated to belong that late. It is as though the cycle had gone dormant again, with the spirits and ancestors satisfied and at rest, apart from the exhaustion of the people involved. Change and periodicity might be understood in other ways as well. In one Mississippian culture context, a taboo on all past ritual configurations has been suggested, as part of rites of intensification and an oscillating sense of time (Knight 1985, 114). In the north Wiltshire case, the past was not forgotten at the end of the sequence considered here. The West Kennet long barrow was finally closed in the latter part of Phase F. A round barrow cemetery at Beckhampton overlooked Silbury Hill (cf. Powell *et al.* 1996), and another was built across Windmill Hill. Several in the region look down upon the Avebury monument, and the area as a whole has a major concentration of round barrows (cf. Fleming 1971; and see figs 1–2).

This is not the place to explore other regional sequences in detail, but they are relevant for two reasons. First, they demonstrate different ritual periodicities and intensities. As we understand the chronology at present, the major linear constructions in the middle of the sequences in the Stonehenge area (the Stonehenge cursus: Richards 1990), Cranborne Chase (the Dorset cursus: Barrett *et al.* 1991; cf. Tilley 1994), and the Dorchester area (Maiden Castle bank barrow: Sharples 1991), are not matched by anything comparable in the Avebury area, though it is not impossible that the West Kennet Avenue began this early. There are different spatial configurations. Most monuments were clustered, but the Dorset cursus could have served as a liminal processional way to the distant 'death island' (Tilley 1994, 201) of the Hambledon Hill causewayed enclosure some distance to the west. In the Later Neolithic, there was much less activity in Cranborne Chase, whereas in the Vale of Pewsey, which may have seen little earlier in the sequence, the great earthwork at Marden was constructed (Wainwright 1989). Both around Stonehenge and Dorchester, the intensity and range of monument building at the height of the Later Neolithic appear greater than in the Avebury area. The new radiocarbon chronology available for Stonehenge suggests the beginning of the sarsen circle at 2580–2480 BC, and the construction of the sarsen trilithons at 2450–2110 BC (Cleal *et al.* 1995). Silbury Hill (and the West Kennet palisade enclosures) may then have been the regional counterpart to the monumental lithicisation of Stonehenge. Instead of supposing the operation of more or less common socio-political process, we may envisage different ritual times at work.

The comparison of Stonehenge and Silbury Hill introduces the second significant point about regional sequences. My emphasis on the mythic, ritual or sacred dimensions of Neolithic life is not an attempt to remove any sense of conflict, competition or difference, but better to characterise the nature of Neolithic social relations. Regional sacred centres may have mediated patterns of local competition and conflict, which we can well imagine to have existed, as witnessed by the man in the ditch around Stonehenge

who had been shot at close range from behind (Evans 1984). They may also have served as the focus for competition on a regional level. Emulation of the activities of others may have been a further motive for undertaking major enterprises.

Material culture was not strongly regionalised in either the Later Neolithic or the Early Bronze Age. Regional identity seems not to have been expressed through it, in any way congruent with monument distributions. Indeed Beaker material culture may have served further to integrate interaction between scattered communities on a greater scale than in the Grooved Ware horizon. The shift advocated here is rather different to that in the ritual authority structure-prestige goods economy succession (Thorpe and Richards 1984), or the rather similar model of a claimed succession from prescriptive to performative structures (Garwood 1991). Perhaps the most visible change in the post-monument horizon in central-southern England as a whole is the greater prominence given to individual males in Beaker burials. Hemp Knoll and West Overton G6b serve as local examples in the Avebury area (Robertson-Mackay 1980; Smith and Simpson 1966). This could represent more emphasis on lineage affiliations (cf. Thomas 1991), but the men in such burials cannot themselves be regarded as lineage founders, and they must therefore represent already established patterns of descent. As already noted, mortuary rites were anyway varied in the Beaker horizon, and included depositions in older monuments. The great monuments of the Later Neolithic were not necessarily the symptoms of radically more centralised authority, nor did they produce a more differentiated society in their immediate aftermath.

Coda

Petrie (1924, 217) had asked after his work in 1922: 'From the digging of the shaft to the cutting of the tunnel was seventy-two years, from the tunnelling to my cutting was seventy three years; are we to wait seventy-two years more for further exploration ?'. In the event, there has been another span over seventy years from his to this report. It is impossible to predict how long the next interval may be, but it is hard to envisage that future researchers will resist the challenge of the unanswered aspects of Silbury Hill and now the West Kennet enclosures. Fresh dating for Silbury Hill, better exploration of the top and sides, a new ditch cutting, and investigation of the immediate surrounds, could be linked to further, more extensive excavation of the West Kennet palisade enclosures. Much basic investigation remains to be done.

Appendix: The Marlborough Mound

(Joanne Best)

Location and present condition

The Mound sits, on the west side of Marlborough within the grounds of Marlborough College, on the edge of the Kennet valley, a few hundred m from the Kennet itself, and above the confluence of the Kennet and the Ogg. To the north, chalk rises steeply to 175 m OD on Marlborough Common.

The Mound is 19.8 m high, with a base diameter of c. 84 m and a summit diameter of c. 30 m. The Mound is covered in trees and ground plants. Its slopes are terraced by a spiral pathway, created in the seventeenth century. To the same date belong a grotto at the base, on the south-east side, and a smaller grotto on the third tier of the east side. There are telegraph poles on the sides and summit. On the summit a water tank has existed since the seventeenth century; there is an early twentieth-century brick chimney; and a wall belonging to the Norman castle, revealed by excavations in 1936, can be seen just below the summit on the north-west side.

Possible indications of date

Prehistoric/Neolithic

There has been much speculation about a possible prehistoric date (e.g. Burl 1979; Malone 1989; Thomas 1991; Parker Pearson 1993), but the direct evidence is slender. In 1912 the building of the new Field House necessitated increasing the height and capacity of the water tank on top of the Mound, and new machinery also had to be installed in a boiler house which removed a portion of the base of the west side of the mound (Brentnall 1912). This provided a section through the edge of the Mound down to the old ground surface. Above alluvium was a thin layer, thought to be charcoal (but presumably a buried turfline), covered in turn by a thin layer of reddish clay and then chalk rubble. About half way up the six-seven feet deep cutting were found several very brittle pieces of red deer antler, identified by the Natural History Museum (Brentnall 1912, 25). Two pieces fitted together to form a main shaft. Half were thought to have traces of rough usage on the burr. The subsequent presumption has been that these finds could be Neolithic, because of the frequency with which antlers occur on Neolithic sites, especially monuments, where they were used as digging tools. These antler finds cannot now be traced in the Natural History Museum, nor is there any record of their accession there.

Struck flints, though hardly constituting a major concentration, were recovered from fields between the school and the Kennet, to the south and south-west of the Mound (Clark 1924).

Pre-Roman

As noted above, the Roman road to Bath can be seen to divert around the foot of Silbury Hill, as first observed by the eighteenth-century antiquary Stukeley. In *Itinerarium curiosum* Stukeley described the Roman road from Newbury to Marlborough, which he equated with the Roman site of Cunetio. He located the *castrum* in the grounds of Marlborough castle (that is, adjacent to the Mound) and claimed to trace part of the rampart and ditch towards the Kennet. The centre of Cunetio has now been located south of the Kennet, in Blackfield in the Mildenhall watermeadows, and the ditch noted by Stukeley corresponds exactly to the moat of the fourteenth-century castle (Brentnall 1939). The course of the Roman road cannot be traced through modern Marlborough, though following its position at North Farm, West Overton, a few kilometres westward, it might have been roughly on the course of the present road, to the north of the Mound (cf. Margary 1973). Brentnall (1939, 139) claimed, but without supporting evidence, that it should run along the boundary between royal and parish land, including across the college court and chapel, and thus closer to the Mound. There is no evidence of date from the relationship of road and Mound.

Medieval

There is ample evidence that the mound existed in the medieval period, when it was part of the castle complex. The castle was one of the most important in Wiltshire in the twelfth and thirteenth centuries; royal patronage was generous and royal visits were frequent (Brentnall 1938). The earliest literary reference appears to come (Brentnall 1939, 142) in a couplet of the poem, *The praise of divine wisdom*, by Alexander Neckham, a twelfth-century abbot of Cirencester:

Great Merlin's grave
Its name to Marlborough in Saxon gave.

Marlborough was a royal borough frequently visited by the Norman kings. Its castle belonged to the crown, standing within the royal manor of the Barton of Marlborough. The first evidence for the existence of the castle is during the reign of Stephen, who held it in 1139 for the Empress Maud. It is possible that it existed earlier (Allen-Brown *et al.* 1963, 734); the importance of the town is demonstrated by the fact that Henry I held his Easter court there in 1110 (Plummer and Earle 1892–9). Repairs and construction of a ring wall around the motte are recorded for 1209–1211 (Brentnall 1939), and further building in the reign of Henry III, including a Great Tower. It is presumed that the tower was placed on the motte.

Later history

By the early fifteenth century the castle had greatly deteriorated. In the sixteenth century Lord Seymour built a mansion on its site, beyond the limits of earlier fortifications. In 1642 the Cromwellian defenders of the town retired to the 'mount' in the grounds and put it into a state of defence (Brentnall 1938). Between 1642 and 1652 the spiral walkway was cut, and a summerhouse and pond constructed on the summit. The new garden features were described soon after by Sir Robert Moray (1664). Subsequent features, including the two grottoes noted above, were added by the Hertfords, to whom ownership passed in the later seventeenth century. The greater part of the Norman moat was filled in in the mid-nineteenth century.

Dating by analogy

PREHISTORIC/NEOLITHIC

Other analogies have already been explored above. It cannot be excluded that the Marlborough Mound was a Later Neolithic construction which could have matched the earlier stages of Silbury Hill. Such an assumption, however, has tended to ignore the comparative evidence of medieval castle mounds or mottes.

MEDIEVAL

Mottes, constructed of earth or stone and sometimes revetted by timber, were an integral part of the classic medieval motte and bailey castle. There is no certain evidence for pre-Conquest mottes, which became numerous after 1068 (Higham and Barker 1992, 57). Though relatively few mottes have been extensively investigated, it is known that many made some use of pre-existing earthworks, mainly of late prehistoric or Roman date; in early campaigns, speed and convenience were major considerations (Higham and Barker 1992). There are examples where it is possible that a pre-existing barrow has been re-used, as in the unexcavated cases of Tenbury Wells, Hereford and Worcester, or Eglwys Cross, Bronington, Clwyd (Higham and Barker 1992, 212). At Clifford's Tower, York, a crouched burial was found below the level of the 7m high motte (King 1983). Examples of re-use from Ireland include the motte overlying a rath at Rathmullan, Co. Down (Lynn 1982).

While it cannot be excluded that the Marlborough Mound was a pre-existing earthwork opportunistically incorporated into a motte and bailey complex, it is important to consider the distribution, density and size range of mottes in England and Wales. Mottes are widely distributed, normally at intervals (King 1972). Three height classes can be suggested (Müller-Wille 1966), and of 741 mottes in England and Wales, heights were recorded for 679 (King 1972):

Class One: 10 m or more; 47 (7 percent)
Class Two: 5–10 m; 167 (24 percent)
Class Three: under 5 m; 465 (69 percent).

By height alone, the Marlborough Mound is not extraordinarily tall for a motte. (Measurements are provided partly by King (1972), and partly from the appropriate volumes of the *Victoria County History*.) Four other are higher: Clare, Suffolk (30.5 m); Tickhill, Yorkshire (22.8 m); Richard's Castle, Herefordshire (22.3 m); and Arundel Castle, Sussex (21.3 m from the bottom of the ditch on its south side, 15.2 on the north side). The Oxford Castle, at 19.8 m, is roughly the same height as the Marlborough Mound. The top of Clare Castle is narrower than that of the Marlborough Mound. Three of the four largest mottes are on naturally defended sites, and one third of the motte at Tickhill is natural rock. Other Class One mottes also incorporate natural features; most were in prominent locations, unlike that of the Marlborough Mound.

In Wiltshire itself, eight other mottes are known (King 1983): Ogbourne St. Andrew; Sherrington; Stourton; West Dean; Binknoll Castle, Broad Hinton; Great Somerford; Clack Mount, Bradenstoke; and Norwood Castle, Oaksey. Most are Class Three, though Sherrington and Great Somerford may be Class Two. Other important castles in Wiltshire, such as Old Sarum, Malmesbury and Devizes, do not have mottes.

The Marlborough Mound fits quite comfortably within the category of mottes. That category is broad, owing to the individual, expedient and entrepreneurial nature of medieval castle building. The aspect which does appear unusual is its location, but that might be explained by the location of the town or the main road.

Conclusion

While the Marlborough Mound could be prehistoric, it cannot be excluded that it is a large Class One motte of medieval date. As with Silbury Hill, further work remains to be done.

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