Late Bronze Age Ritual and Habitation on a Thames Eyot at Whitecross Farm, Wallingford

THE ARCHAEOLOGY OF THE WALLINGFORD BYPASS 1986-92

by Anne Marie Cromarty, Alistair Barclay, George Lambrick and Mark Robinson

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Summary

This report presents the results of a series of excavations along the proposed route of the Wallingford Bypass which are of particular interest for three aspects: excavation of a high-status late Bronze Age settlement on an island (eyot) in the Thames; confirmation of the existence of cord-rig cultivation in southern England; and dating of the south Oxfordshire Grim's Ditch, which places it within a major sequence of earthwork construction in the late Iron Age and early Roman period in the Upper Thames region.

The proposal to construct a bypass to the south and west of Wallingford prompted a series of archaeological investigations between 1985–92. Excavations were carried out where the route crossed part of Mongewell Grim's Ditch, as well as at the known Bronze Age riverside site near Whitecross Farm and a new site at Bradford's Brook further west that was revealed by fieldwalking.

The site at Whitecross Farm was located on a former eyot in the river, with a broad palaeochannel to the west. Initial evaluation of the site enabled the bypass bridge to be designed to minimise its impact on the surviving archaeology. Thus only areas that would be directly affected by the bridge construction were fully excavated. The results of these and earlier limited excavations are presented, together with metalwork recovered from the river nearby. Bringing all this evidence together has allowed the site to be more fully characterised than previously. The site, including timber structures located on the edge of the eyot, and a substantial midden and occupation deposit, has been securely radiocarbon-dated to the late Bronze Age. The late Bronze Age artefact assemblages are suggestive of a high-status site, with a range of domestic and ritual activities represented.

The bank of the Grim's Ditch earthwork was found to have preserved evidence of earlier settlement, dating to the Neolithic and Bronze Age, and a sequence of cultivation, including ard marks and 'cord-rig' cultivation ridges. Pottery and radiocarbon analysis dated the earthwork to the end of the late Iron Age or the early Roman period.

A multi-period settlement, consisting of pits, a waterhole, postholes, gullies and field systems, was identified at Bradford's Brook, Cholsey. The main periods represented are late Bronze Age and Romano-British, while a small quantity of Saxon pottery indicates limited Saxon activity. A large pit containing late Bronze Age pottery, a cattle skull, waterlogged wood and plant remains, a complete loomweight and flint flakes has been interpreted as a waterhole. A series of radiocarbon dates were obtained for deposits within this feature.

All three sites are discussed individually as well as within their local, regional and national contexts. Chapter 7 provides an overall discussion of later Bronze Age themes that have arisen through the excavation and analysis of these sites.

Résumé

Ce rapport présente les résultats d'une série de fouilles réalisées le long du tracé de la bretelle de contournement de Wallingford, dont l'intérêt particulier repose sur trois aspects. Le premier est la fouille d'un site d'habitation de statut élevé de la fin de l'âge du Bronze sur une île de la Tamise. Le deuxième est la confirmation de l'existence de culture cord-rig dans le sud de l'Angleterre. Finalement le dernier aspect est la datation du fossé de Grim's Ditch, au sud de l'Oxfordshire, qui le situe dans une séquence majeure de construction d'ouvrages de terre à la fin de l'âge du Fer et au début de l'époque romaine dans la région de la haute Tamise.

Le projet de construction d'une bretelle de contournement au sud et à l'ouest de Walingford entraîna une série d'investigations archéologiques entre 1985 et 1992. Les fouilles furent entreprises au carrefour entre le tracé de la route et d'une partie de Mogewell Grim's Ditch, mais aussi au site bien connu de l'âge du Bronze situé au bord de la rivière près de Whitecross Farm et au nouveau site découvert par prospection un peu plus à l'ouest, à Bradford's Book.

Le site de Whitecross Farm était situé sur un ancien îlot de la rivière, avec l'ancien lit comblé d'un large cours de'eau à l'ouest. L'évaluation initiale du site permis au pont de déviation d'être conçu en vu de minimiser son impact sur l'archéologie subsistante. Par conséquent, uniquement les zones directement affectées par la construction du pont furent fouillées entièrement. Les résultats de ces dernières et des précédentes fouilles restreintes sont exposés conjointement avec les découvertes de mobilier métallique provenant de la rivière voisine. Rassembler toutes ces preuves ensembles a permis de caractériser le site de manière plus complète que précédemment. Le site, y compris les structures sur poutres situées à la limite de l'île, une quantité importante de déchets domestiques et un dépôt d'occupation, a été daté avec certitude à la fin de l'âge du Bronze par radiocarbone. L'ensemble d'artefacts de la fin de l'âge du Bronze suggère un site de statut élevé, avec un éventail varié d'activités domestiques et rituelles représentées.

Le talus de l'ouvrage de terre de Grim's Ditch s'avéra avoir préservé des indices de site d'occupation de date antérieure, du Néolithique et de l'âge du Bronze, et une succession de cultures, y compris des marques d'anciens sillons et des billons de cultures à cord-rig. L'étude céramique et l'analyse radiocarbone ont daté l'ouvrage de terre à la fin de l'âge du Fer ou au début de l'époque romaine.

Un site d'occupation s'étendant sur plusieurs époques, composé de fosses, de points d'eau, de trous de poteaux, de petits fossés et de systèmes agraires, a été identifié à Bradford's Brook, Cholsey. Les principales époques représentées sont la fin de l'âge du Bronze et la période romaine, tandis qu'une petite quantité de poterie saxonne indique une activité saxonne limitée. Une large fosse, interprétée comme étant un point d'eau, contenait de la poterie de la fin de l'âge du Bronze, un crâne de bovin, du bois et des restes botaniques imprégnés d'eau, un poids à tisser entier et des éclats de silex. Une série de datation au radiocarbone a été obtenue pour certains des dépôts contenus dans ce fait archéologique.

Les trois sites sont examinés individuellement aussi bien dans leur contexte local et régional que national. Le chapitre 7 fournit une discussion générale des thèmes de la fin de l'âge du Bronze qui ont émergé a l'issu de la fouille et de l'analyse de ces sites.

Zusammenfassung

Der vorliegende Bericht enthält die Ergebnisse einer Serie von Ausgrabungen entlang des vorgesehenen Verlaufs der Umgehungsstraße von Wallingford. Die Grabungen sind besonders in Bezug auf drei Aspekte von besonderem Interesse: der Ausgrabung einer hochrangigen spätbronzezeitlichen Siedlung auf einer kleinen Themseinsel, dem Existenzbeleg besonderer Ackerbaustrukturen ("cord-rig") in Südengland und der Datierung des Grim's Ditch in Süd-Oxfordshire, wodurch die Anlage mit dem Bau mehrerer Erdwerke in eine Reihe gestellt wurde, die in der späten Eisen- und frühen Römerzeit im oberen Themsegebiet entstanden.

Der Plan zum Bau einer Umgehungsstraße südlich und westlich von Wallingford führte zwischen 1985 und 1992 zu einer Reihe archäologischer Untersuchungen. Dort, wo die Route einen Teil des Mongewell Grim's Ditch überquert, wurden ebenso Ausgrabungen vorgenommen wie an einer bereits bekannten bronzezeitlichen Stätte am Fluss nahe der Whitecross Farm und an einer neu identifizierten Stätte weiter westlich am Bradford's Brook, die bei einer Feldbegehung auffiel.

Die Stätte an der Whitecross Farm lag auf einer kleinen früheren Flussinsel mit einem breiten Paläokanal im Westen. Nach einer ersten Evaluation der Stätte konnte beim Entwurf der neuen Straßenbrücke deren Einfluss auf die vorhandenen archäologischen Reste minimiert werden. Aus diesem Grund wurden nur die vom Brückenbau direkt betroffenen Bereiche komplett ausgegraben. Neben den Resultaten dieser und früherer, eingeschränkter Ausgrabungen werden auch die Metallgegenstände, die aus dem nahe gelegenen Fluss geborgen wurden, präsentiert. Durch die Zusammenfügung all dieser Funde war es möglich, die Stätte weit genauer zu beschreiben als zuvor. Mithilfe von Radiokarbonuntersuchungen, darunter von Holzstrukturen am Rand der Insel und von umfangreichen Abfall- und Siedlungsablagerungen, konnte die Stätte eindeutig auf die späte Bronzezeit datiert werden. Das Artefaktinventar aus der späten Bronzezeit weist auf eine hochrangige Stätte hin, für die ein breites Spektrum häuslicher und ritueller Tätigkeiten nachgewiesen wurde.

Der Wall der Grim's-Ditch-Erdanlage enthielt Belege einer früheren Besiedlung aus der Jungsteinzeit und Bronzezeit sowie eine Abfolge von Anbauspuren, darunter Merkmale von Furchstöcken und besonderer Wölbäcker ("cord-rig"). Mithilfe von Töpferware und Radiokarbonanalysen konnte das Erdwerk auf die späte Eisen- oder frühe Römerzeit datiert werden.

Am Bradford's Brook, Cholsey, wurde eine mehrere Perioden umfassende Siedlung identifiziert, die Gruben, ein Wasserloch, Pfostenlöcher, Abzugskanäle und Flursysteme aufwies. Die wichtigsten vertretenen Perioden sind die späte Bronze- und die Römerzeit, dazu weist eine geringe Menge angelsächsischer Töpferware auch auf begrenzte Aktivitäten in jener Zeit hin. Eine große Grube mit spätbronzezeitlicher Töpferware, einem Rinderschädel, vernässten Holz- und Pflanzenresten, einem kompletten Webgewicht und Feuersteinabschlägen wurde als Wasserloch interpretiert. An mehreren Gegenständen aus der Grube wurden Radiokarbonmessungen durchgeführt.

Alle drei Stätten werden einzeln sowie in ihrem lokalen, regionalen und nationalen Kontext diskutiert. Kapitel 7 liefert eine Gesamterörterung der durch die Ausgrabung angestoßenen spätbronzezeitlichen Thematik und eine Analyse der dazugehörigen

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Engineering design

John Darby, County Bridge Engineer for OCC County Engineers, provided invaluable expertise with his imaginative design for the Thames Bridge, which incorporated numerous engineering solutions that minimised its impact on the archaeology at the same time as being a cost-effective and elegant design. Mike Prior (OCC County Engineers), Gray Priestley (OCC County Surveyor and Engineer) and Don Warner (OCC Project Engineer) also provided invaluable assistance and advice during the design and construction stages of the project.

Excavation

The 1985–8 excavations were funded by English Heritage and the 1991–2 season was funded by the Oxfordshire County Council with a 45% grant from English Heritage. Work on the CAB International carpark watching brief was funded in full by the Oxfordshire County Council. The fieldwork for the whole of the Wallingford Bypass was undertaken by OAU under the general direction of George Lambrick, who also directed the excavations at Whitecross Farm and was responsible for the 1987 evaluation of Grim's Ditch and designing the subsequent mitigation strategy. Peter Wardle initially supervised the 1992 excavation at Grim's Ditch, and John Moore and Mark Roberts undertook subsequent work. Mark Roberts supervised fieldwork on the Bradford's Brook section of the bypass and also undertook the watching brief of the whole route. The initial fieldwalking was undertaken by the volunteers of the Wallingford Archaeological and Historical Society, who also contributed local knowledge of the area and assisted with the 1986 Whitecross Farm excavations. The riverbed survey was undertaken by members of the Oxford branch of the British Sub-Aqua Group under the leadership of Colin Fox. Gratitude is expressed to them and to all those who worked on any of the sites.

The landowners (the late Mr A J Brasher, Mr Davis and Mr Zeckler) are thanked for their cooperation during the excavations and for agreeing to donate the finds from these excavations to the Oxfordshire County Museums Service. CAB International kindly provided access during the excavations at Grim's Ditch in 1992. Tony Fleming, Steve Trow, Roger Thomas and Rob Perrin (successive English Heritage Inspectors of Ancient Monuments) are thanked for their help and advice during the course of the project. Paul Smith (Oxfordshire County Council Archaeological Officer) has also provided invaluable advice and assistance throughout the project.

Post-excavation

Post-excavation analysis was funded by English Heritage and Oxfordshire County Council, whose support is gratefully acknowledged. Alistair Barclay and Mark Roberts undertook the post-excavation assessment. Frances Healy and Philippa Bradley managed the post-excavation assessment phase. Alistair Barclay managed the project from 1996. All the contributors have worked generously and wholeheartedly towards the completion of this project, and thanks are extended to all of them. Leigh Allen and Alison Gledhill (OAU) provided valuable support and assistance with the finds. Denise Price and Helen Green (OAU) have provided secretarial support for which the authors are grateful. Steve Trow, Roger Thomas, Rob Perrin, Jon Humble and Helen Keeley (English Heritage) have all provided advice and assistance during the post-excavation assessment and analytical stages of the project for which the authors are also grateful.

Four samples were processed by the Queen's University of Belfast Radiocarbon Laboratory in 1989, three by the Oxford Radiocarbon Accelerator Unit in 1997, and three by the Scottish Universities Research and Reactor Centre at East Kilbride in 1998 to obtain radiocarbon age determinations. Alex Bayliss of English Heritage calibrated and analysed these determinations for inclusion in this report.

Cathy Capel-Davies of the Wallingford Archaeological and Historical Society provided a report of their finds from fieldwalking. The specialists are thanked for their hard work. Initial assessments were made by Catherine Underwood-Keevill (Saxon and later pottery) and Dale Serjeantson (animal bone). Julian Henderson undertook analytical work on the late Bronze Age bead from Whitecross Farm. All other assessments were undertaken by the respective authors. Initial work on the pottery was undertaken by Niall Donald.

Extensive sampling of the waterlogged deposits at Whitecross Farm was undertaken and the samples were analysed by the Environmental Archaeology Unit at the University Museum, Oxford. In addition subsamples of the waterlogged samples were analysed by Professor F Chambers and E M Botterill (pollen). Rowena Gale identified the wood recovered by hand excavation and George Lambrick undertook initial analysis; Maisie Taylor collated these analyses and produced the publication text. The work was funded by the Ancient Monuments Laboratory of English Heritage.

Vanessa Fell assessed the condition and conservation requirements of the finds and undertook the necessary conservation measures using facilities at the University of Oxford covered by a grant from English Heritage.

The illustrations are the work of Sam Potter, Lesley Collett, Mel Costello, and Jeff Wallis. Ros Smith and Amy Hemingway prepared the figures and plates for publication.

Jill Greenaway (Reading Museum Service), and Emily Leach and Suzie Tilbury (River and Rowing Museum, Henley on Thames) are thanked for supplying images (Plate 3.1 and the cover).

Vanessa Guiver and her father are thanked for making the recent metalwork finds available for study.

Chapter 1: Introduction

by Anne Marie Cromarty with Alistair Barclay

INTRODUCTION

In the 1980s the construction of a bypass to the south and west of Wallingford (Figs 1.1–2) was proposed by the Oxfordshire County Council, to run from the A4074 Crowmarsh–Reading road across the River Thames, the old Great Western Railway route and Bradford's Brook before joining the A4130 Wantage Road at Slade End. This prompted a series of archaeological excavations and watching briefs.

GEOLOGY, TOPOGRAPHY AND ENVIRONMENTAL BACKGROUND

This route cut across an area of Lower Chalk of Cretaceous age overlain by a drift deposit of what is called Valley Gravel on the Geological Survey map of 1948. This is a mixed and variable deposit of orange and white patchy sandy loam with decayed chalk fragments and a high proportion of gravel, which may be described as a chalky head deposit and would have formed at the base of slopes here beyond the Pleistocene ice limits. This is overlain by a narrow strip of alluvium at either side of the River Thames and around the tributary stream known as Bradford's Brook that joins the river from the west, a little to the north of where the proposed bypass was to cross it (see Fig. 1.2).

The soils derived from this geology tend to be fairly sandy or silty loams with some decaying chalk and flint gravel, having higher proportions of clay in the alluvial areas nearer to the river, and have largely been cultivated throughout history, though to the east of the river the bypass crosses the grounds of Mongewell house which were landscaped in the 18th century and planted with avenues and clumps of trees.

The area is fairly low-lying with gently undulating topography, largely smoothed by centuries of ploughing and the landscaping in Mongewell Park. The ground level at the river lies at about 43.5 m OD. To the east it rises to a slight scarp around 45 m, about 30 m back from the riverbank, before rising again, fairly steadily, to just over 63 m OD, where the proposed bypass was to meet the existing Reading–Crowmarsh road. To the west of the river, the ground is flatter between the river and where the road was to cross Bradford's Brook at SU 594 889, lying at around 46 m OD, except for a small ridge rising to 51 m to the west of the line of the Great Western Railway. This is part of the lower slopes of Cholsey Hill and though very small is quite pronounced in the open countryside here. To the north of Bradford's Brook the ground slopes only very gently up to around 54 m OD near Slade End Farm.

ARCHAEOLOGICAL BACKGROUND

This area, within the river corridor of the alluvial floodplain and the gravel terrace, was known to be of some archaeological interest, as is much of the Thames Valley with many sites preserved within the alluvium and gravel terraces. In the immediate area activity was known from the Neolithic and late Bronze Age through to the medieval and post-medieval periods, including the Grim's Ditch monument of unknown, but possibly Iron Age, date. Many finds have been dredged from this stretch of the River Thames from the 19th century onwards.

The Neolithic material includes three Mortlake Ware bowls dredged from the river at Mongewell adjacent to the end of Grim's Ditch (SU 608 882). These have been interpreted as votive deposits (Holgate 1988a, 283). A stone axe was recovered from the river slightly to the south (*c* SU 607 878; ibid., 304). In 1959 a middle Neolithic double ring ditch with central burial was excavated by the Oxford University Archaeological Society at Newnham Murren (SU 603 888; Moorey 1982). This feature, together with several similar circular cropmarks preserved in the valley gravel, had been known from aerial photographs of the area (Benson and Miles 1974). Three circular cropmarks (at approximately SU 602 883, SU 602 881 and SU 601 881) lie in a field through which the proposed bypass was to cut (field 0001). The latter two are particularly close to the route. These cropmarks have been tentatively identified as barrows of Bronze Age date, but may be of similar date to that excavated by Moorey (1982) a little to the north; they have not been investigated.

In the wider area several monuments of similar date have been investigated. These include the middle Neolithic long mortuary enclosure and bank barrow *c* 2 km down the river south of North Stoke (at SU 611 856), described by Case (1982a), and the possibly Neolithic cursus monument further upstream at Benson to the north of Wallingford (SU 629 919–SU 624 910, first published in Leeds 1934; Benson and Miles 1974, map 41).

A riverside settlement, sealed under alluvium near Whitecross Farm, on the west bank of the Thames (at approximately SU 607 882; see Fig. 1.2), was also known. An occupation layer was visible where the bank of the river was actively eroding. Several successive investigations had been carried out on this settlement between 1948 and 1980, the results of which are synthesised in Thomas *et al.* (1986). These excavations were small and did not reveal the extent or full nature of this settlement.

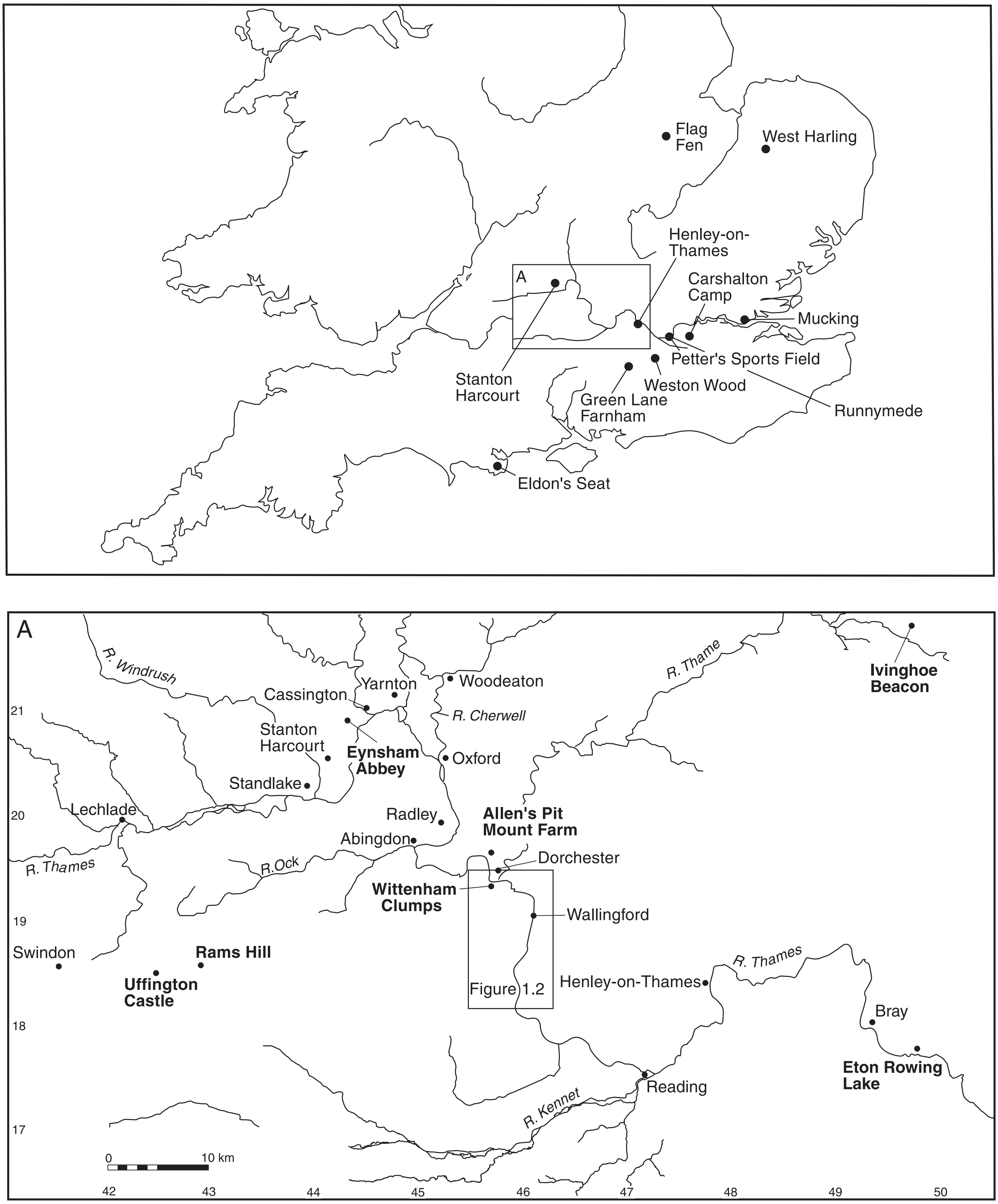
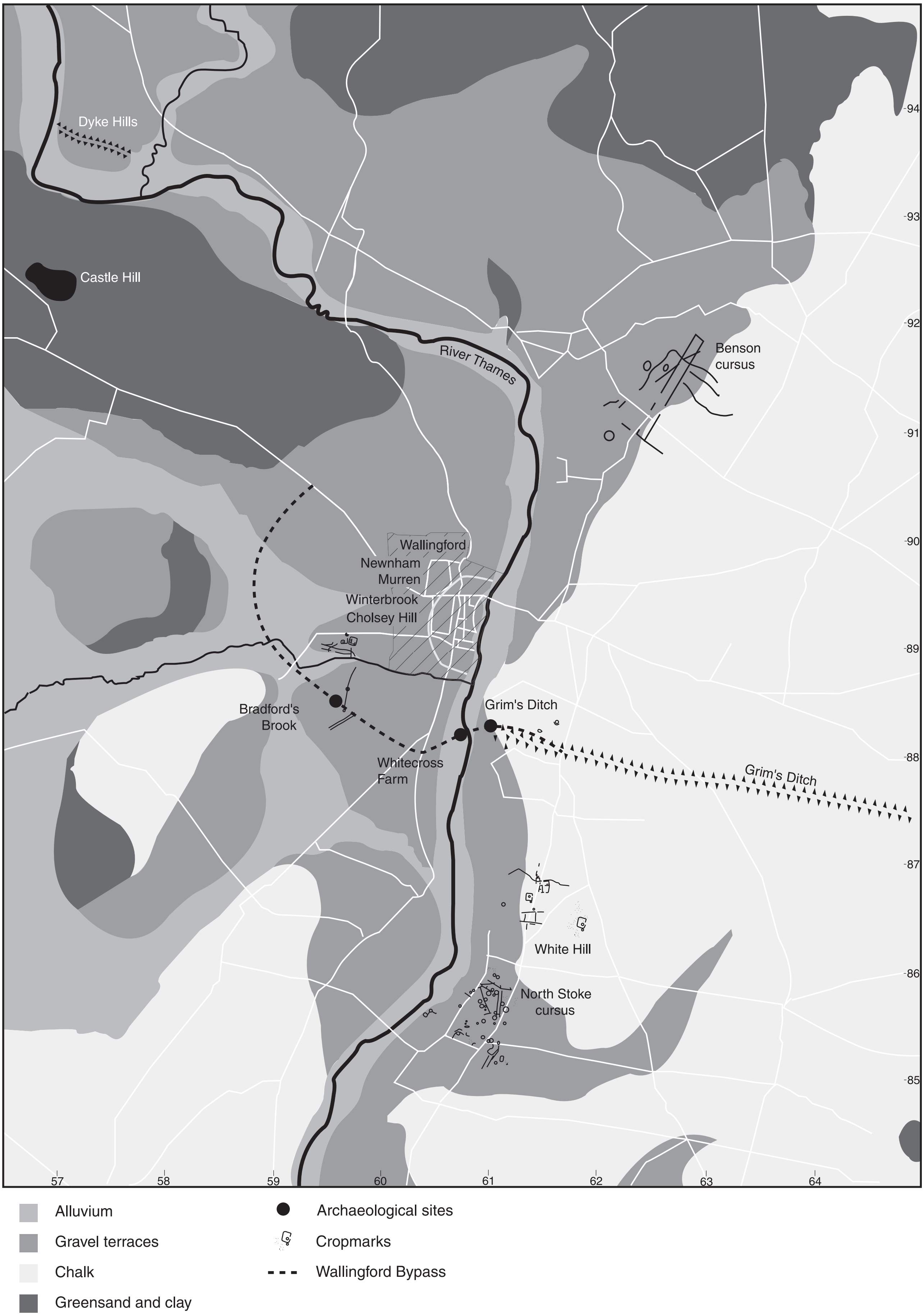


Figure 1.1 Location map showing Wallingford and other relevant sites

Figure 1.2 (facing page) Site location plan also showing geology and other surrounding cropmark and earthwork sites mentioned in the text


Dyke Hills
Castle Hill
River Thames
Benson cursus
Wallingford
Newnham Murren
Winterbrook
Cholsey Hill
Bradford's Brook
Grim's Ditch
Whitecross Farm
Grim's Ditch
White Hill
North Stoke cursus
94
93
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89
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87
86
85
57
58
59
60
61
62
63
64
Alluvium
Gravel terraces
Chalk
Greensand and clay
Archaeological sites
Cropmarks
Wallingford Bypass

The pottery was originally identified by Collins as Iron Age, but it was subsequently re-examined and found to be of late Bronze Age date (see Barclay, Chapter 3). The environmental evidence taken from the eroding section of bank in 1980 showed the progressive clearance of a partially wooded landscape at the time of occupation; the rich artefact assemblage recovered includes metalwork, pottery and evidence for textile production, metalworking and leatherworking, though no structures or features were found in the limited areas excavated.

In addition to the metalwork derived from these excavations, a number of pieces dating from the middle Bronze Age to the end of the late Bronze Age had been dredged from this stretch of the river between 1850 and 1964, the majority of which survives and is readily identifiable as to type and date. This metalwork may be derived from or associated with the activity at this site, suggesting the site may be of high status. This metalwork is summarised by Thomas (1984), and is also discussed by Peter Northover (see Chapter 3).

The other main site known on the line of the proposed bypass is Grim's Ditch (see Fig. 1.2). This is a linear earthwork running approximately east–west, with a ditch to the south, from the crest of the Chiltern escarpment to the Thames at Mongewell on the east side of the river to the south of Wallingford. Part of this is a Scheduled Ancient Monument (SAM no. 32), though the less well-preserved western part where the bypass was to cross it is not and has been modified by the 18th-century landscaping within Mongewell Park. The field evidence for this monument was reviewed by Bradley (1968), who inferred an Iron Age date for the earthwork. A section was dug across this monument to the east of the Reading–Crowmarsh road (A4074) at SU 620 878 by the Southern Gas Board in 1959. This showed the bank to spread over *c* 9 m sealing a cultivation soil, while the ditch to the south was *c* 7.2 m wide but was not fully excavated. No revetment or other structure was observed and no dating material was recovered (Case and Sturdy 1959). Another small section of the monument was later excavated by Hinchliffe (1975) in advance of the widening of this road at SU 617 879, some 600 m to the east of the bypass route. Some pottery was recovered from the underlying old land surface and from the bank core. This was thought to be of middle Iron Age date, and further pottery of Iron Age date was recovered from a pit, though a stratigraphic relationship between this pit and the bank could not be defined. It remained unclear whether the Iron Age pottery was contemporary with the construction of the earthwork or was derived from the earlier occupation, represented by the pit; as a result the dating of the monument was still uncertain.

Some other Iron Age activity was also known from the vicinity of the bypass route. Near the excavated ring ditch was a cropmark rectilinear enclosure, also investigated by Moorey (1982). This produced pottery of early Iron Age date and was thought to belong with other more or less rectilinear ditched enclosures of this date in the region. Iron Age pottery and an early Iron Age occupation site were found during the construction of a new gas main at SU 6008 8865 in 1948. This site consisted of Iron Age pottery associated with cattle and sheep bones and concentrations of burnt quartzite pebbles interpreted as hearths (Collins 1948–9). A little further from the bypass route there is a hillfort on Blewburton Hill at Aston Upthorpe (SU 548 861). Work on this monument was undertaken by Collins over several seasons between 1947–67 and it was concluded to have been in use during the 5th–6th centuries BC and reused and partially rebuilt in the 1st century BC (Harding 1972). Traces of such a structure have also been suggested, though not confirmed, on Cholsey Hill at SU 573 879 overlooking the western part of the bypass route. Some 5 km to the north-west is the Iron Age hillfort known as Castle Hill (see Fig. 1.2). The hillfort is known to be early Iron Age in date and limited fieldwork has indicated that it was preceded by an adjacent late Bronze Age midden (Hingley 1979–80). Across the river from this site is the major Iron Age enclosed settlement of Dyke Hills (see Fig. 1.2), which is thought to be late Iron Age in date and is generally interpreted as an oppidum.

Roman activity in the area is largely known though stray finds, the exact provenance of which is uncertain. However, an extended inhumation burial accompanied by an unglazed red bowl of 4th-century date was found during construction of a new gas mains at SU 6008 8870, a little to the north of the bypass route (PRN 2992).

The fragmentary remains of three unaccompanied inhumations were found in the bank of Grim's Ditch during Hinchliffe's excavations, and a fourth a little to the south on the lip of the ditch (Hinchliffe 1975, 125–8). These could not be dated, but inhumations accompanied by iron spearheads are reported to have been found during ploughing in the general area of Grim's Ditch at approximately SU 615 880 (information from the Wallingford Archaeological and Historical Society). It is possible that these are of Saxon date. The town of Wallingford was a Saxon burh, mentioned in the Burghal Hidage compiled *c* 919, and a Saxon cemetery was discovered immediately south-west of the later town defences in the 20th century (Airs *et al*. 1975). The deserted medieval village of Mongewell is thought to lie somewhere on or close to the proposed route of the bypass where it approaches the east bank of the River Thames, though the precise location is not known.

RESEARCH OBJECTIVES

On the basis of this known archaeology the proposal to construct the bypass prompted a series of archaeological investigations undertaken between 1985–92 with the object of establishing the nature of the archaeological remains that would be affected by its construction and of carrying out work to mitigate its impact. The specific research objectives of this work were mostly related to the two main sites on the route – the important late Bronze Age occupation site at Whitecross Farm and the Grim's Ditch earthwork – though to record any other archaeological remains found during the construction of the bypass was also an objective. At Whitecross Farm the objectives were to investigate and define the extent of the site and to recover artefactual and environmental remains. The latter, it was hoped, would confirm and refine the dating of the site and characterise its nature, as the earlier very limited investigations had never achieved this adequately. It was suggested from environmental samples taken in 1980 that the site was underlain by filled-in river-channel deposits though the occupation layer indicated dried ground, so the objective to investigate the relationship between the channel silts and the late Bronze Age occupation horizon was included in the Research Design for post-excavation analysis in 1987–8 (Lambrick 1988). At the Grim's Ditch site the objectives were to determine the structural history and date of the earthwork, identify and investigate the deserted medieval village of Mongewell and define the extent of post-medieval landscaping on Grim's Ditch. As fieldwork progressed it became clear that the Grim's Ditch earthwork was underlain by earlier cultivation horizons and traces of settlement, and the research aims were expanded to include the examination and dating of these features. The fieldwalking also suggested a previously unknown Iron Age site to the south of Bradford's Brook; the objective here was merely to examine the site to determine the nature and confirm the date of the archaeology in the area to be affected by the bypass.

After the fieldwork had been completed there was an assessment on how well these objectives had been met and on the evidence collected (Barclay *et al*. 1995). The results from the various episodes of fieldwork were judged to have met the above objectives to varying extents. Virtually all the initial questions were answered for the two main sites – Whitecross Farm and Grim's Ditch. The possible Iron Age site near Bradford's Brook was found to be multi-period with late Bronze Age, Roman and Saxon activity. The watching brief demonstrated these were the only significant sites on the route of the bypass.

A great deal of information about land use and settlement patterns across two different landscape zones – floodplain and gravel terrace – from the early prehistoric to the post-medieval period had been gathered from this work and several research aims were defined for the post-excavation analysis stage. Some were site-specific while others were more general, relating to how this study could enhance the knowledge of activity during these periods, understanding of the process of social change and transformation of the landscapes and the evidence for patterns of craftsmanship and industry.

The specific aims relating to Grim's Ditch were to establish the significance of the Neolithic activity at the riverside site, the date and character of the pre-earthwork settlement, the character and significance of the cultivation episodes, the date and function of the earthwork, and the evidence for Roman and medieval reuse of the earthwork, and how this relates to the known settlement evidence. At Whitecross Farm the specific aims were to establish the function, date and status of the island settlement, what the evidence from this site can contribute to the understanding of the formation of midden deposits, refuse management and changes in function/activity on the site, and what the artefactual evidence contributes to the understanding of regional and national material culture studies. At the smaller and more ephemeral Bradford's Brook site the objectives were merely to establish the character and significance of the late Bronze Age settlement and that of the Iron Age, Roman and Saxon activity on the site.

EXCAVATION OBJECTIVES, 1991–2

The programme of fieldwalking along the route as well as the evaluation excavations at the specific sites in 1985–7 provided the basis for the mitigation plan developed by the Oxford County Council Engineers in consultation with the Oxford Archaeological Unit. Proposals for archaeological work in 1991–2 were integrated with this. The objectives for this work were modified in light of what was now known of the archaeology along the route.

A wide swathe across the Grim's Ditch earthwork was to be fully excavated, not only to date the earthwork but also to date and examine the traces of cultivation preserved beneath it. This was to be considered in relation to other traces of prehistoric fields. The basal sediments in the earthwork ditch were to be dated and a sequence through them established. Biological and sedimentary samples were to be obtained to elucidate the character of the environment of this sequence, and especially of the environment of Grim's Ditch. The sociopolitical context of the monument was also to be considered in relation to the wider settlement pattern. The nature of the medieval settlement traces recorded during the evaluation were to be clarified and considered in relation to the documentary evidence for the existence and abandonment of Mongewell deserted medieval village.

The Whitecross Farm site was found to lie on a former gravel island with a silted-up palaeochannel to its landward side. For this site, together with the Mongewell riverside site, the main objective of the mitigation work was to preserve *in situ* the important prehistoric deposits on either side of the river through careful design of the bridge and approach, so the aim of the further archaeological work to be carried out here was merely to record prior to disturbance the very limited area of the western waterfront late Bronze Age settlement which would be affected by bridge building.

The possible Iron Age site near Bradford's Brook identified by fieldwalking was to be evaluated and watching briefs were to be carried out to record any other sites uncovered during construction of the road.

FIELD SURVEY: METHODS AND RESULTS

by Anne Marie Cromarty with Cathy Capel-Davies

During 1985–6, fieldwalking was undertaken by the Wallingford Archaeological and Historical Society along the proposed route of the bypass. A 90 m wide corridor was walked which followed the centre-line of the proposed road through the fields under cultivation. Transects were laid out at 15 m intervals covering this corridor. Each line was walked twice, by different walkers each time. Walking was undertaken during the autumn of each year after ploughing. Conditions were variable but often poor. David Miles of the Oxford Archaeological Unit initially identified the finds, but subsequently some material was re-examined during the post-excavation analysis. Further details of the survey and a full catalogue of the finds can be found in the archive.

Little of significance was found during the fieldwalking, though a small quantity of Iron Age pottery (nine coarse black sherds) and early Roman pottery (two rim sherds of greyware) were found to the south of Bradford's Brook around SU 595 886 (field 5255) (see Fig. 1.2). On the basis of this pottery the site was singled out for further investigation as part of the bypass project. Scatters of flint and pottery were found at various points along the route walked. The most notable flint was a finely made leaf-shaped arrowhead of earlier Neolithic date. A probable Anglo-Saxon glass bead was recovered from chainage 440/10 (see Chapter 6).

A more recent field survey around Winterbrook (see Fig. 1.2) produced only a few pieces of prehistoric and Roman pottery, a quantity of flint flakes and some post-medieval material (Dingwall and Hancocks 1998).

WATCHING BRIEF: METHODS AND RESULTS

Mark R Roberts undertook the watching brief for the Oxford Archaeological Unit in 1992 during the construction of the road. The stripped areas were 'fieldwalked' in addition to the monitoring of drainage and other works. A section through the estate bank to the south of Grim's Ditch was recorded. On the west bank of the river, the cutting of a field drain enabled a section of the palaeochannel, first identified in 1985, to be recorded. Dispersed features and finds were located throughout the watching brief. Another watching brief was carried out at the nearby CAB International carpark during 1993, where a single undated feature was found. Flintwork from the topsoil was largely undiagnostic but may be contemporary with material from Whitecross Farm (see Brown and Bradley, Chapter 3). Further details of the watching-brief methodology and results together with a full catalogue of the finds can be found in the archive.

STRUCTURE OF THE REPORT

The report has been broken down into a description and discussion of the investigation, stratigraphy, artefactual and environmental evidence of the two major sites, Whitecross Farm (Chapters 2–4) and Grim's Ditch (Chapter 5), followed by a similar description of the smaller site at Bradford's Brook (Chapter 6). This is followed by an overview and discussion of the archaeology of the area, together with a wider discussion of the pertinent aspects raised by the excavation and analysis of these important sites (Chapter 7). The radiocarbon determinations obtained from each of these three sites are discussed in full in Appendix 1.

Radiocarbon determinations

The radiocarbon results have been calculated using datasets published by Stuiver and Pearson (1986) and the computer program OxCal (v2.18 and v3beta2) (Bronk Ramsey 1994; 1995). The calibrated date ranges cited in the text are those for 95% confidence. They have been calculated according to the maximum intercept method (Stuiver and Reimer 1986) and are quoted with the end points rounded outwards to ten years as recommended by Mook (1986). Probability distributions have been calculated in the usual probability method (Stuiver and Reimer 1993).

These dates are quoted in the text in the form: calibrated date range in calendar years BC or AD followed in brackets by the confidence percentage, the laboratory number and the uncalibrated date ± the appropriate margin of error in years BP (for example 2340–2040 cal BC (OxA-7175; 3765±40 BP)) to enable readers to perform their own analysis of the results easily.

Bronze Age dates

The dates used in this volume for the conventional divisions of the Bronze Age are as follows:

Early Bronze Age 2100/2200–1600 BC
Middle Bronze Age 1600–1150 BC
Late Bronze Age 1150–700/750 BC

LOCATION OF THE ARCHIVES

All the original site records, together with the finds and material generated during the post-excavation analysis, have been deposited with the Oxfordshire County Museums Service. A master copy of the paper archive on microfilm has also been lodged with the National Archaeological Record, RCHM(E), Swindon.

Accession numbers

Because the fieldwork for this project was funded and completed in several stages, the various parts of the archive were received by the museum at different times and accession numbers were issued individually. The Whitecross Farm archive was issued the numbers 1986.6 and 1995.182 for the 1985–6 and 1991 seasons respectively. The Grim's Ditch archive is held under the numbers 1988.59 for the 1987 evaluation and 1988 trial trenches, and 1995.183 for the main area excavation and the other trenches excavated in 1992. Accession number 1995.181 was issued for the evaluation stage of the excavations at Bradford's Brook in 1991, while the number 1995.184 was used for the archive generated by the watching brief carried out during construction of the road. This includes the further work at the Bradford's Brook site. The archive for the watching brief in the CAB International carpark undertaken in 1993 is held under the accession number 1993.88.

Chapter 2: Whitecross Farm, Cholsey: A Late Bronze Age Waterfront Site

by Anne Marie Cromarty, Alistair Barclay, George Lambrick and Mark Robinson

INTRODUCTION

by George Lambrick and Anne Marie Cromarty

It has been known for some time that there was a late Bronze Age riverside settlement, sealed under alluvium, on the west bank of the Thames near Whitecross Farm (1.4 km downriver from Wallingford at approximately SU 607 882). Pottery and other finds eroded out of an occupation layer exposed in the bank of the river led to the discovery of the site. Small-scale investigation had been carried out on four previous occasions, the results of which have been synthesised by Thomas *et al.* (1986, 174–5) and are briefly presented here: in 1948–9 E Abery of Wallingford reported pottery, animal bones and bronze artefacts from the riverbank (Collins 1948–9). In 1951 A E P Collins excavated four trenches (Anon. 1952–3, 125), and in 1959 John Wymer excavated three trenches (Anon. 1960, 55–8). In 1980 Mark Robinson took samples for environmental analysis from the eroding riverbank (Thomas *et al.* 1986, 175, 178–84). The first and last of these investigations were concerned with material from the riverbank itself, while the excavations of 1951 and 1959 were located *c* 6 m back from the bank (Fig. 2.1). The site was known only as an occupation layer extending along the riverbank for *c* 37 m, and reaching at least 9 m back from the bank, but its landward limit was unknown, and it was not clear whether it also stretched further along the river but was only visible where the bank had eroded to form a long narrow bay.

As this site lay on the proposed route of the bypass, an evaluation was carried out to establish the extent of the site, its character, and its potential in terms of stratigraphy, finds and organic preservation. The work was carried out in several stages in 1985, 1986 and 1991 (see Chapter 1, Excavation objectives).

Topographical context

The site lies on the western bank of the River Thames below Wallingford, where the river runs through an alluvial floodplain which is 300 m wide at this point. The site is located on an island which forms part of this floodplain, lying at just below 44 m OD. The greatest part of the expanse of the floodplain lies on this western side of the river, the land lying at this level for 250 m to the west before rising to *c* 44.5 m on the edge of the First Gravel Terrace. On the eastern side of the river the floodplain is only *c* 25 m wide. The general character and the topographical and geological situation of the site as it was known before work began is described by Thomas *et al*. (1986, 175–8, although the discovery of the island is also mentioned in the postscript on page 198).

The excavations

In the first stage of the new investigation, a detailed section was drawn of the riverbank exposure, and initial trial trenches were dug to establish that the limits of the site were excavated. Three trenches were dug radially outwards from its known area (trenches I–III, see Fig. 2.1, Pl. 2.1), stripping the superficial layers off by machine until the top of the occupation layer was reached. Its surface was then followed until finds and other signs of its presence clearly seemed to have petered out. Sondages were dug to natural at the ends of these trenches (again by machine). These demonstrated the existence of a buried, north–south orientated, river channel (see Fig. 2.1). A further series of deep sondages (IV, V and XXIII) were excavated by machine and confirmed the existence of channel deposits at least 70 m back from the present riverbank opposite the middle of the known extent of the occupation layer. Additional machine sondages (VI–XVI) were dug along the riverbank, immediately next to the towpath, only down to the surface of the occupation layer to establish its north–south extent along the river. The following spring (1986), trenches XVII and XVIII were dug where these trial pits suggested the occupation layer was ending. Again, deep sondages were dug into underlying charred deposits within the trenches, and at the north end a further series of deep sondages (XIX–XXII) were excavated to establish the course of the buried channel. In the summer of 1986 a larger trench (XXIV) was dug to provide an east–west section across the occupation area and into the river channel. The west end of the trench was enlarged to establish the character of a timber structure revealed by the discovery of two piles in the bottom of the channel in 1985.

This trench (XXIV) revealed evidence of a timber revetment along the eastern edge of the buried channel, 20 m back from the western bank of the modern river. In addition, late Bronze Age pottery (see Figs 3.8–17), worked flint (see Figs 3.4–6), a copper-alloy pin (see Fig. 3.1.1) and much worked wood (see Figs 2.9, 4.7–11) were recovered from the channel silts, indicating that this channel was open at the time of the late Bronze Age occupation.

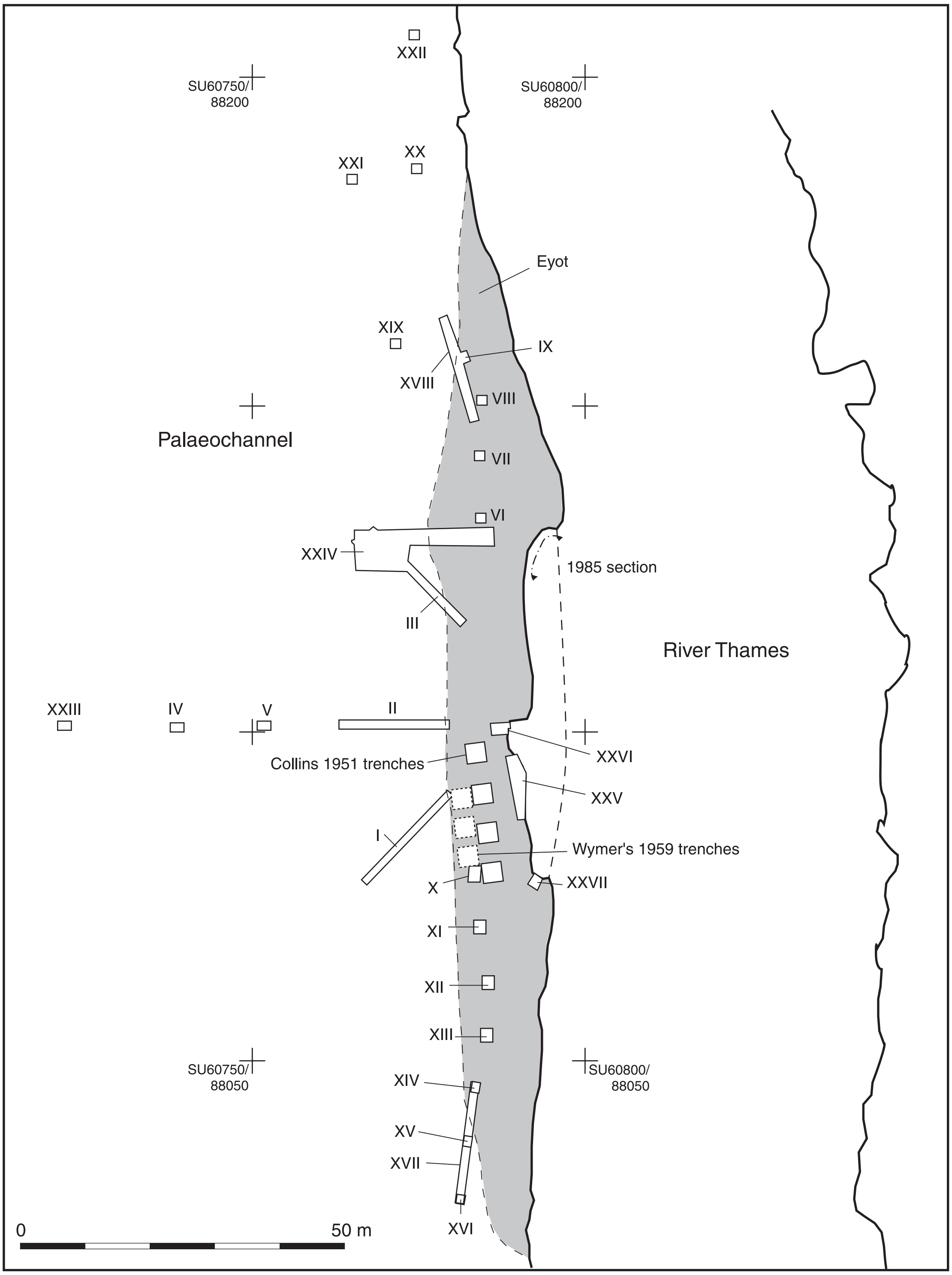


Figure 2.1 Trench location plan showing all trenches and test pits, including the approximate locations of Collins' and Wymer's early trenches, with the inferred extent of the eyot

Plate 2.1 A general view, looking north, of the 1984 trenches and test pits dug to determine the extent of the occupation layer.

Careful examination of a 7 m section at the northern end of the long bay in the modern riverbank showed that the late Bronze Age horizon splits into an upper and lower layer, of which the latter dips 0.7 m downwards towards the present channel, being cut off at about normal water level (Fig. 2.2). The upper layer continues roughly horizontally over an intervening layer of apparently sterile alluvium. The molluscan evidence from this sequence and from the occupation horizon close to present water level at the south end of the bay, suggests that the dipping layers may be associated with the edge of a contemporary channel on a similar line as the present-day river (see Robinson, Chapter 4). Unfortunately these deposits are too truncated for the evidence to be definite, but it is reasonable to suggest that the late Bronze Age occupation area occupied a narrow strip between the channels. The stratigraphy and molluscan evidence (Robinson 1986, and Chapter 4) shows that this strip was formed by riverborne gravel followed by sands and alluvial loam. This upward fining of the sediments and corresponding transition of molluscan fauna from flowing-water aquatic species to those enjoying a terrestrial habitat indicates the gradual stabilisation of this from being an active channel to being dry ground. In the context of a long narrow area between two channels this process is best seen as the formation of a cigar-shaped island or eyot – a familiar feature of many parts of the modern river.

At the southern end of the late Bronze Age occupation area, the buried channel (revealed in trench XVII, see Fig. 2.1) is close to the modern river, and may indicate the approximate southern limit of the eyot. To the north, similarly, the evidence for the buried channel in trench XVIII shows that it is very close to the present river. In this case, however, the modern channel may well have eroded the northern end of the Bronze Age eyot. A line drawn between the outer limits of the bay where the late Bronze Age occupation layer dips to the modern river level should indicate the approximate line of the contemporary channel east of the eyot. The modern riverbank corresponds to this in the south, but to the north the river only adopts this line having swung substantially eastwards from a more westerly course where its bank is more closely aligned on the west side of the eyot, rather than the east side. The occupation horizon is not easily identified north of trench XVIII because of the scarcity of finds or any clear soil differences. However, the deposits in the riverbank further north are still relatively sandy compared with the more clayey upper fill of the buried channel, and the occurrence of two or three animal bones at about the right level may indicate that the eyot did extend much further northwards, but that now only a sliver of its western edge survives.

Having thus established the approximate extent of the late Bronze Age occupation, the bridge to carry the bypass over the river at this point could be designed in such a way as to limit disturbance to the site (see Lambrick below). As a result, only a small part of the riverside edge of the eyot was to be affected where land in the bay was to be reclaimed and on to which a pier to support the bridge was to be set. As a result, three further small trenches (XXV–XXVII), a few metres to the east of Collins' 1951 trenches, were excavated in 1991 in advance of construction.

River channel survey

In addition to the excavations and the work on the riverbank, a survey of the modern river channel was carried out by members of the Oxford branch of the British Sub-Aqua Group under the leadership of Colin Fox. An east–west profile of the riverbed was recorded from each end of the bay, and an area 30 m x 12 m was surveyed in 2 m wide transects aligned north–south towards the northern end of the bay, together with another two 2 m x 25 m transects continuing to the south of the outermost of the first transects. This showed that dredging and erosion have modified the original river profile and no *in situ* structures or deposits which might relate to the late Bronze Age occupation site were found. The only wood found was a single piece of modern timber to the south end of the bay. The riverbed was found to be composed of silt and gravel with some stratified and flaky rock further away from the bank.

Magnetometer survey and surface collection

A magnetometer survey and limited surface-collection survey (see Chapter 1 and details in the archive) were carried out on the areas of gravel terrace adjoining the floodplain either side of the river opposite the site. Alister Bartlett and Andrew David (Ancient Monuments Laboratory) undertook the magnetometer survey in 1986; nothing of archaeological significance was found. The surface survey produced a range of finds but there was little of significance.

BRIDGE CONSTRUCTION AND PRESERVATION OF *IN SITU* ARCHAEOLOGICAL DEPOSITS

by George Lambrick with Anne Marie Cromarty

It was considered essential for the known late Bronze Age settlement at Whitecross Farm lying on the route of the bypass to be protected *in situ*, as recommended by Thomas *et al.* (1986). The evaluations undertaken at Whitecross Farm in 1985–6 revealed that the occupation was restricted to a narrow eyot some 18 m wide, stretching around 170 m along the western bank of the river, with some activity in the form of middens and timber structures stretching out into the broad, completely silted palaeochannel behind for around another 10 m. It was decided that the most expedient method of constructing a river crossing at this point while protecting these archaeological deposits would be

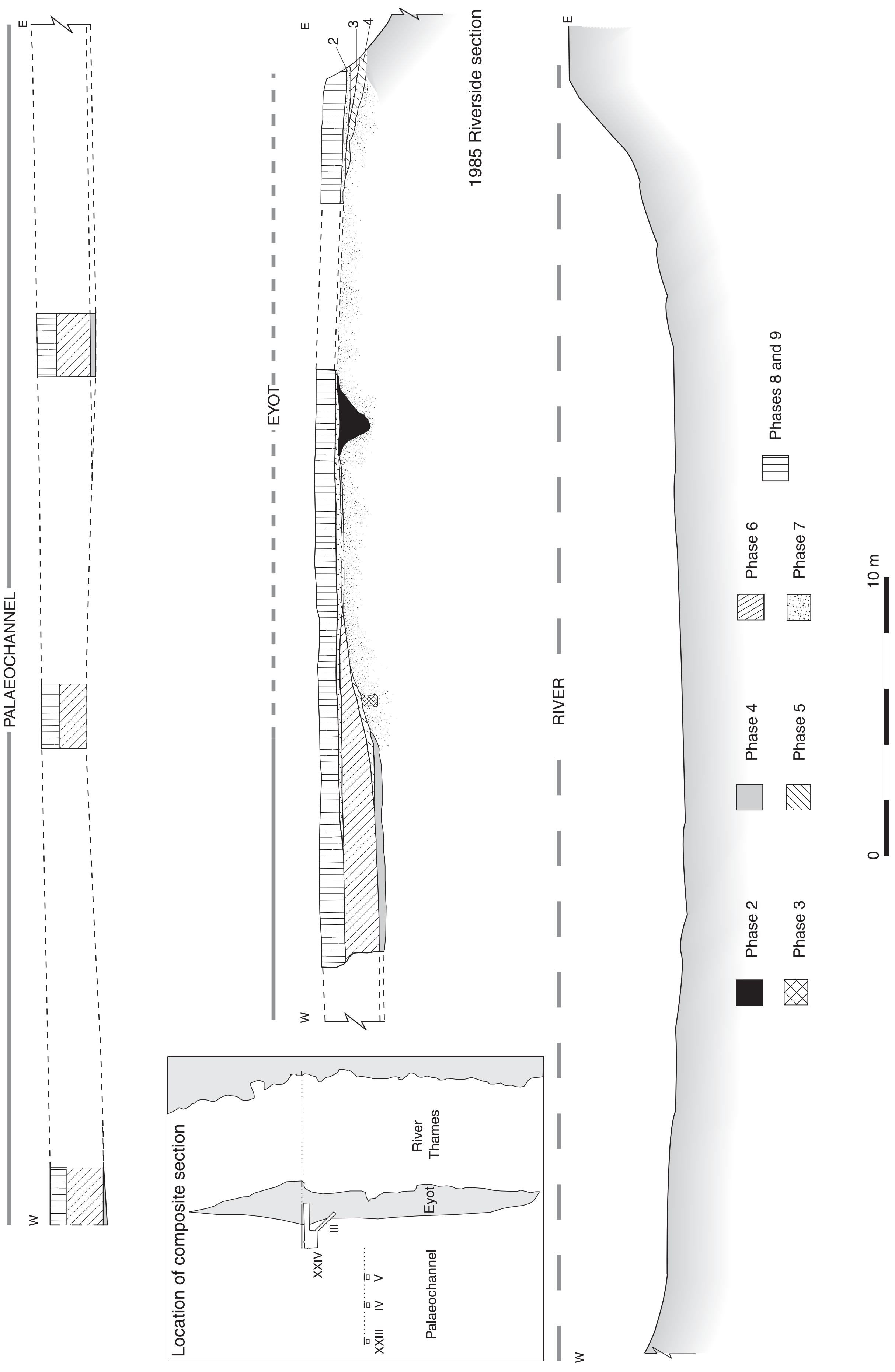


Figure 2.2 Composite section through the palaeochannel, late Bronze Age and modern River Thames, showing the 1985 riverside section

Plate 2.2 Winterbrook Bridge from the air looking north towards Wallingford. The bridge was carefully designed to span the width of the late Bronze Age eyot at Whitecross Farm on the western bank of the modern River Thames as well as the river itself

to design the bridge in such a way that it spanned the site in addition to the river (Pl. 2.2).

As illustrated in Ralston and Thomas (1993, 17, fig. 3), this was achieved by means of the construction of reinforced earth embankments, overlying the palaeochannel to the west and the possible prehistoric settlement site on the eastern side of the river found during the later evaluation undertaken there, to form the foundations of the bridge terminals. This left the topsoil and any underlying archaeology undisturbed in both cases. The bridge was supported by two piers set on reclaimed land at either edge of the river. These were set on sheet piles to limit foundation width and avoid disturbance to the archaeology on the western bank. Trench sheets protected the face of the archaeological site from disturbance. The main part of the eyot was not affected as it was to be spanned by the western section of the bridge, and covered by geotextile separator and granular blanket to protect it during construction.

THE GRAVEL EYOT AND THE EARLY CHANNEL FILL: PHASE 1

This section of the bypass crosses an area of the Thames floodplain which was found to have once been a narrow gravel eyot, with a wide channel of the river, as it was then, to the west. The underlying geology in this area is composed of gravel. This level was not reached during the excavations as the gravels are overlain by fluvial silty clays, sands and gravels. In the few of the test pits and trenches where these fluvio-glacial deposits were reached, it was evident that the eyot was composed of several overlying layers. For example, in the main trench XXIV (Fig. 2.3) the natural, 2410, a yellow very sandy clay silt mottled with dark brown iron pan and pale grey sandy clay, which formed the surface of the eyot, was overlain on the western edge by waterlain sand and gravel with strong iron panning (2448) around intrusive feature 2422. This in turn was overlain by a thick (*c* 0.5 m) deposit of sands and clays (2426=2427). The light brown-grey sand with silty clay bands through it became less clayey to the east away from the channel. Overlying this to the east was 2447, a grey clay sand mottled with yellow and with occasional gravel and charcoal flecks, and to the west 2446, a lens of fine pale blue-grey silt. These successive layers indicate that the eyot accumulated over a period of time, with successive depositional episodes.

The natural deposits were not fully investigated, as the excavation was primarily concerned with the archaeology of the area. However, accumulation of sediment as a result of eddying round an irregularity in the bed of the river began probably early in the Holocene, and continued, forming a braid within the river. The channel to the east of this braid became, for whatever reason, the preferred channel for flow which would have decreased as the ice receded and conditions became drier during the Boreal. Flow within the western channel – the palaeochannel discovered during the excavation – eventually slowed to the point where it silted up entirely.

The original bed of the palaeochannel was not reached during these excavations. The earliest fill of the feature excavated in trench XXIV was 2446, a lens of fine pale blue-grey silt 0.1 m deep, on the slope of the western edge of the eyot. This silt lens was found to be overlain by a deposit (2406) which appeared to have been laid while the channel was still, at least relatively, active.

Channel fills of a similarly early date to 2446 were not recorded in the other trenches which cut the edge of the eyot (I, II, III, IX and XVIII). Some of the lower deposits recorded within the test pits dug in the palaeochannel may be of a similar phase though not matching the description of this deposit. The deposits within these test pits were recorded at depth intervals, but how they related to the deposits on the edge of the eyot could not be determined by the limited nature of this type of excavation.

In test pit XXI to the north-west of the eyot, the lowest deposit recorded at 2.5 m below ground level was described as a dark grey gravel, succeeded by dark grey silty sand or gravel at 2.3 m. The latter may be a similar deposit to 2406, but the lowest gravel may have related to an early phase of the channel bed. A similar sequence was recorded in test pit XX to the north of the eyot. Test pit XX was excavated only to the level of sandy silt and gravel at 2.2 m, which is likely to be equivalent to the deposit at 2.3 m in test pit XXI and relate to 2406, particularly as it is described as organic.

To the west of the eyot, in what is likely to have been mid channel, the test pits (IV, V and XXIII) were dug only to the level of the dark grey sandy deposit recorded in the more northerly test pits as overlying early gravels. No signs of human activity were found during the excavation of these test pits unlike the trenches nearer the shore of the eyot.

EARLY OCCUPATION: PHASE 2

It is not clear when the eyot was first used by humans but one feature earlier than the general occupation layer on the eyot was identified in trench XXIV (Fig. 2.4). This feature was either a large ditch, a gully or a long pit orientated north–south along the long axis of the eyot. It contained several fills (see Fig. 2.3): 2413/A/4, the primary fill, consisted of very silty clay; overlying this was a light brown-grey sandy silt (2413/A/3) with a high proportion of grit/gravel; above this 2413/A/2 consisted of light brown-grey sandy loam and extended down the western side of the feature; the final fill (2413/A/1) was grey silty loam very similar to the earliest layer of soil and occupation debris, 2403/2 (Pl. 2.3). Each of these fills yielded finds of flint, shell and animal bone, with the exception of the primary fill (2413/4) from which no flint was recovered. None of these finds is very closely datable, so the main evidence for the date of this feature comes from stratigraphy. The relationship of this feature to others recorded from other parts of the site is not clear. Though a test pit (VI) to the north of this trench, roughly where a continuation of this feature might be expected, was dug in the previous season (1985), the feature was not seen. It may be that the feature terminated just to the north of the 1986 trench, or that the feature did continue to the north but was not recognised due to the similarity of its top fill to the surrounding occupation layer.

If this feature is indeed a ditch, then it would seem likely that it belonged to either an enclosure or a barrow. Its date is at least late Bronze Age, but it could be somewhat earlier. Unfortunately, not enough of this feature was revealed to determine its true character and the only dating evidence to come from it was a single flint of probable Neolithic date (see Brown and Bradley, Chapter 3).

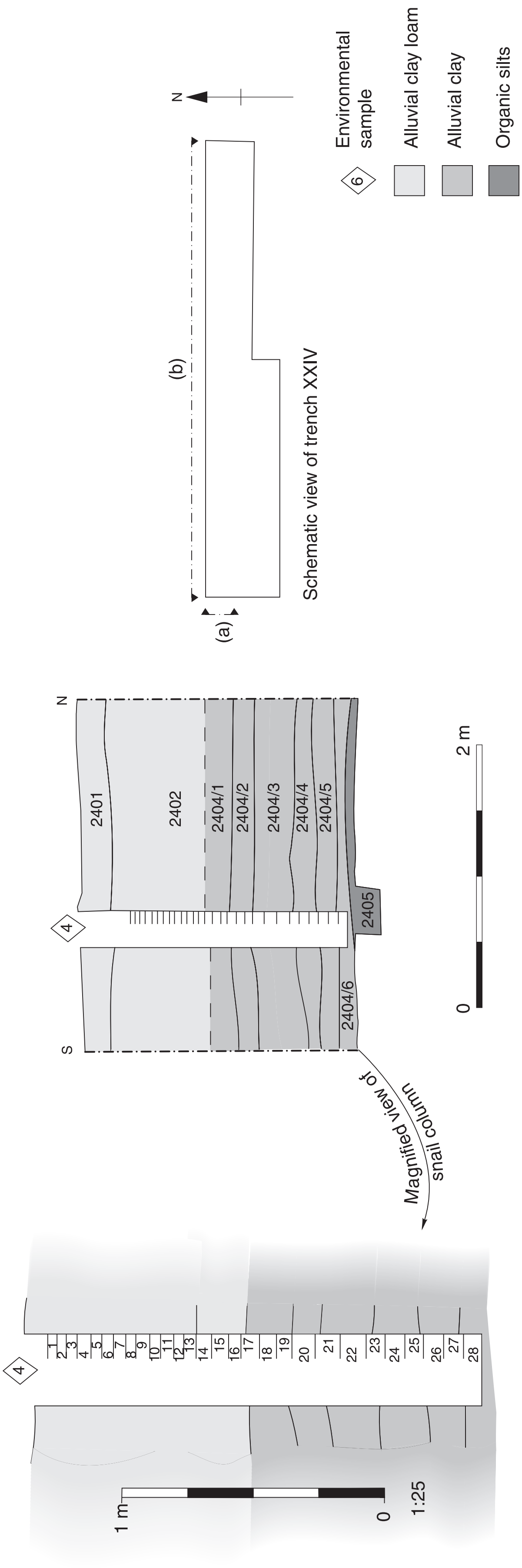
STRUCTURES IN THE CHANNEL AND THE PALISADE: PHASE 3

Two wooden uprights embedded in the channel bed were found within the palaeochannel deposits excavated in trench III in 1985 (308=2429 and 307=2432). These were left *in situ* and a larger area within the palaeochannel was excavated round them in the next season (trench XXIV). Several more similar wooden uprights were found during the course of this excavation (2430–1 and 2433–43, see Fig. 2.4). The timbers are interpreted as piles. These may represent two jetties or other waterfront structure(s). No piles or postholes were found in any of the other trenches which were excavated through the palaeochannel.

On the sloping bank of the eyot evidence of another structure was found. This was a trench or slot running parallel to the edge of the eyot with regularly spaced postpipes within it. This may represent some sort of revetment or palisade. It is not clear if the construction of this feature is contemporary with the structures within the palaeochannel, as no absolute dates were obtained from it and there is no stratigraphic relationship between this feature and the structures, except that all three were sealed by the same midden deposits, but it does seem likely that they were in some way related. However, the feature could be earlier, and possibly even related to the early ditch.

The wooden structure(s) in the channel *(Fig. 2.5)*

The wooden structure or structures within the palaeochannel consisted of 16 timber uprights embedded in the base of the channel (2406). These were preserved within waterlogged organic deposits (2405) in the channel up to 0.28 m above the bed of the channel as excavated.



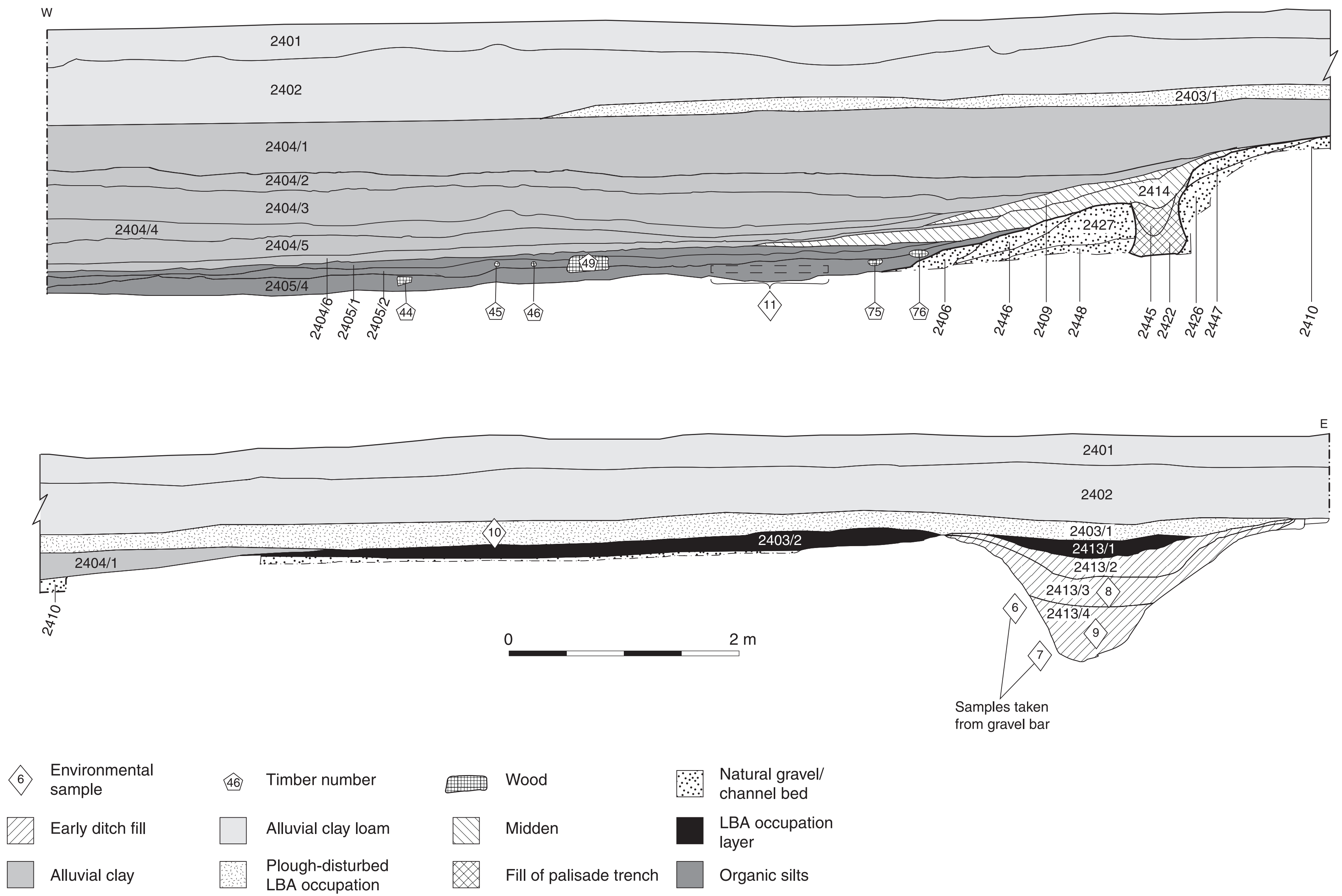


Figure 2.3 (and facing page) East–west section through the palaeochannel and late Bronze Age eyot in trench XXIV, showing location of environmental samples and waterlogged wood in section

Figure 2.4 Plan of trench XXIV with phased section

Plate 2.3 The south-facing section of the early ditch 2413 in trench XXIV, showing overlying plough-disturbed late Bronze Age occupation layer

Due to the restricted nature of this investigation it was deemed best to leave these timbers *in situ* as the structures may extend beyond the excavated area, so the exact length of the piles is not known. However, evidence from contemporary structures would suggest that they probably had axe-sharpened points and that they were somehow driven into the gravel of the underlying channel bed. Clear facets interpreted as sharpening of the points were observed on two of the piles (2429 wood sample 95; and 2431 wood sample 97). This does not prove anything about the length of the piles below the surface. From contemporary structures it is likely that the sharpened points were about 0.5 m long, but this is not certain to be the case as neither showed any sign of tapering, and the sharpening must have begun some way up the timber to bring it to a point. It is probable that the other piles were also sharpened in a similar way though no trace of this was observed above the surface.

Little is known of the original height of the piles above ground either, but one pile (2430 wood sample 96) was observed to have been shaped at its upper end (see Taylor *et al*., Chapter 4). This suggested that this had been the full height of the pile and that another timber had fitted on to it at this level. The other piles were not well enough preserved to say whether the same was true for them also. The tops of two other timbers were recorded in the field as having been seen in layer 2428=2405/2 (ie 0.2 m above the surface), but it is unclear if this was merely the top of the pile as it survived rather than the original top. (These timbers were not sampled for analysis.)

All the piles were roughly circular, with diameters in the range 0.13–0.2 m. Of the four sampled (2429–31 and 2439; wood samples 95–8 respectively) all were *Quercus* (oak); two were observed to have 35 annual rings (97 and 98) and the others 30 rings (95 and 96). Three had been trimmed to remove the bark and some sapwood, while the other had been worked to form an elongated point. Broad bands of late wood growth were present in all four indicating that they were from fast-growing trees. As these included the piles of the largest diameters, it is likely that the others were of a similar age or slightly younger when felled. Together this would suggest that there was some degree of forest management to produce this amount of quickly grown, relatively regular timber for construction.

One group (2429–35) seemed to be in regularly spaced (*c* 1.7 m apart) pairs (from 1.6 m apart tapering to 1.2 m at the western end) to form possible Structure A. This extended at least 2.5 m west into the channel from 0.5 m out from the base of the sloping edge of the gravel eyot below the

Figure 2.5 Detail plan of the palaeochannel in trench XXIV showing possible structures and special deposits

Table 2.1 Piles forming possible Structure A

Context	2435	2434	2430	2433	2432	2429	2431
Sample			96			95	97
Diameter (m)	0.14	0.15	0.17	0.15	0.17	0.17	0.2
Radiocarbon date							2736±45 BP (UB-33141)
Annual rings	-	-	30	-	-	30	35
Charred	N	Y	N	Y	N	N	N
Grid reference	153/507	151/507	153/509	151/509	153/511	151/511	153/513
Paired with	2434	2435	2433	2430	2429	2432	-

possible revetment or palisade (see Fig. 2.5). These piles are described in Table 2.1.

Another timber upright was found within this area (2440 grid ref. 153/511), but it was of slightly smaller diameter (0.14 m) and was inclined to the north-west. It was not sampled so it is uncertain if it was also of oak, but it was observed to have been heavily charred. It is not seen as having been part of the same structure as those described above unless in the capacity of a support to the nearby pile 2432 towards which it was roughly inclined. No other supports were observed, and no horizontal timbers were found *in situ*.

Pile 2432 was slightly out of the alignment formed by the other two piles (2435 and 2430) in the northern row of this structure. Pile 2440 may have been a support intended to compensate for the slight misalignment of pile 2432. If it is accepted that the alignment of the structure is that indicated by 2435 and 2430 – more closely parallel with those of the southern row – then this may explain why no pile was found to pair with 2431; it would have been located outside the excavated area. However, that no piles were found west of 2431 makes it impossible to say whether the structure continued further into the channel.

The other eight upright timber piles (2436–9 and 2441–4) may form another linear structure (B) projecting out to the west, into the channel, from the bank of the eyot *c* 1 m to the south of Structure A (see Fig. 2.5). These are grouped into two groups of four: 2441–4 1.2 m out from the base of the sloping edge of the eyot; 2436–9 some 4.2 m further west. These may be seen as being paired in the same way as in Structure A, but this is less certain. Again no horizontal timbers were found associated with these uprights. Almost all these piles seemed to have been charred but it is not clear if this occurred before use or after. It is possible that they were charred before use to help preserve them in the water as the variable water level within this channel would have tended to cause fairly rapid deterioration of any wood not continuously under water, but it is more likely to have resulted from destruction of the structure by fire. The idea of charring as a method of preserving wood has now been discredited.

The structural interpretation discussed above is only one of several possibilities: they form part of the same structure as A; they form two separate structures projecting from Structure A; they form linear structures parallel to the eyot rather than projecting out from it. Because of the limited area excavated as part of this evaluation it is not known whether or by how far these structures extend beyond the excavated area. It is very possible that they do as they were not known before excavations began and no other trenches were dug in the immediate vicinity.

The two radiocarbon determinations obtained for these structures are statistically indistinguishable and when taken together place the structures to within the period 1000–800 BC of the late Bronze Age (see Appendix 1).

Discussion of pile-built structures

At Whitecross Farm, not enough of the channel was dug to ascertain if the structure(s) continued across the whole width of the palaeochannel, and the full width of the palaeochannel is not known for certain. It would seem to have been fairly wide from the fact that the deposits within trench XXIII were still clearly palaeochannel fill, with no evidence of human activity such as was found nearer the bank of the eyot, in its lower fills. The structure was very narrow for a bridge, and would have been a foot bridge, if at all. If the piles did not significantly exceed the suggested height of 2430, it seems doubtful if the structure would have been much above the water level most of the time and possibly below during flood. It would seem unlikely that late Bronze Age society had the infrastructure to build and maintain such a structure over a major channel of the Thames as this seems to have been, and it is not clear why this would have been needed at a time when the main and easiest mode of transport would have been by boat. A more likely interpretation is that it was some sort of jetty, where boats could be brought in, and which would provide easier and safer access to the water than afforded by the, probably fairly marshy, bank of the eyot.

Several parallels for these structures have been identified in the Thames Valley. Further downriver, in the Middle Thames Valley, at the Eton Rowing Lake site, Dorney, Buckinghamshire, several crossings of the river have been identified comprising paired wooden uprights driven into the bed of a palaeochannel of the Thames (Allen and Welsh 1997, 32, fig. 10). These are thought to represent a

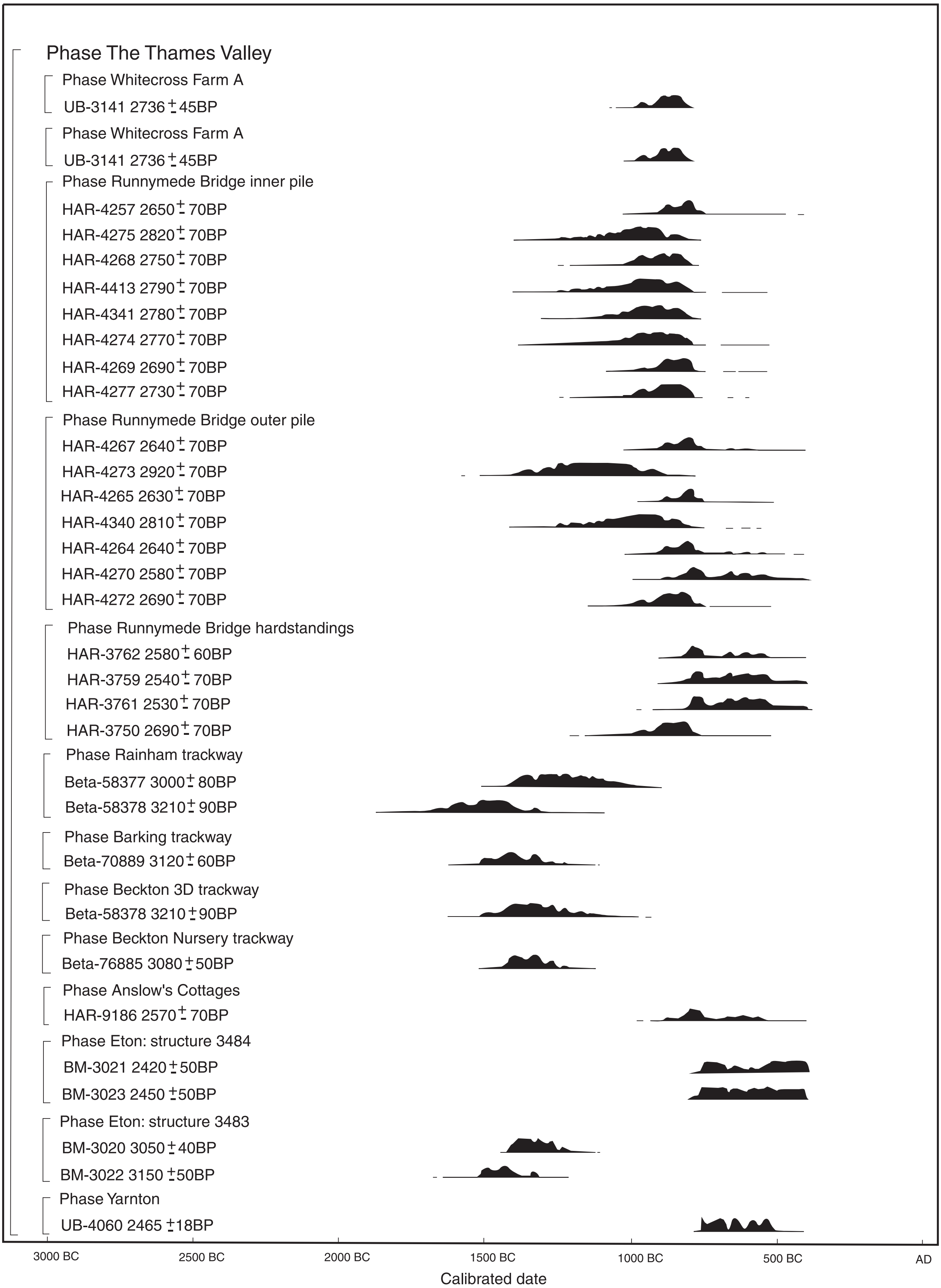


Figure 2.6 Radiocarbon determinations from Bronze Age timber waterfront sites in the Thames Valley

sequence of bridges or some form of river crossing, and dates have been obtained for two of these so far (Fig. 2.6). One bridge is thought to date to the middle Bronze Age (structure 3483) while the others appear to date to the early Iron Age (eg structure 3484, ibid., 33). The piles of the Bronze Age structure are larger than those recorded at Whitecross Farm while those of the later one are slighter. The widths of these structures are also greater than those recorded at Whitecross Farm, though the Iron Age one does narrow towards the middle of the channel. As such, these structures may not be the closest parallels for the Whitecross Farm structures.

Another possible river crossing of two parallel rows of upright timbers *c* 1 m apart has been found further upstream in the Thames Valley at Yarnton, Oxfordshire (Hey *et al*. 1993, 84–5, fig. 14; Hey in prep.). This structure is not of paired timbers as at Whitecross Farm and is judged not to have been substantial enough to support a bridge. The upright timbers are of smaller diameter than those at Whitecross Farm. It is thought it could have retained a brushwood trackway across the partially silted-up channel. Two radiocarbon dates have been obtained for wood from this structure which have placed it in the early Iron Age (770–410 cal BC), later than those at Whitecross Farm (see Fig. 2.6). This type of trackway has parallels further downstream around the river estuary (Meddens 1996). However, it seems unlikely that the structures at Whitecross Farm represent this type of trackway. Unlike the site at Yarnton the timbers are carefully paired and the nature of the channel is very different.

Perhaps the closest parallel for the Whitecross Farm Structure A is from outside the Thames Valley at Caldicot, Gwent in the Severn estuary (Nayling and Caseldine 1997). Here there are two parallel lines of paired substantial oak and, in two cases, ash piles at regular *c* 2 m intervals into or across a channel. These piles varied in diameter but were all in a range fairly similar to those at Whitecross Farm. A radiocarbon date of 2940±70 bp (CAR-1214) was obtained for one of these oak piles. Between and among these piles small stakes (0.02–0.08 m) of ash and hazel had been driven into the channel bed. Nothing parallel to these was found at Whitecross Farm but the spread of wood pieces in the surrounding fills has similarities with Whitecross Farm. A jetty structure or a bridge are the most favoured interpretations for this structure.

The palisade or revetment

Halfway up the sloping edge of the gravel eyot a slot (2422) was found cut into the natural deposits. This feature, some 0.3–0.4 m at its widest extent, 0.54 m deep, and extending across the full width of the 2 m trench in which it was located, was found to contain seven features (2419–21, 2423–4, 2445 and 2449) fairly evenly spaced *c* 0.3 m apart. These were roughly circular in plan and varying in diameter from 0.14 m to 0.3 m (though mostly around 0.15 m). On excavation they were mainly found to be voids within the silt clays that made up the fill of cut 2422 and extending to its full depth in most cases. One did contain a few wood fragments, which were not identified or kept, and 2445 (seen in section, Fig. 2.3, Pl. 2.4) was filled with silty clay similar to 2422/2. These features were interpreted as postpipes of posts which had decomposed *in situ* or had been removed by pulling them out.

These posts were sunk to a depth of only 0.54 m, suggesting a height above ground of only around a metre, assuming that there was a third of the length of the post in the ground to make it stable as an upright (although taller posts could have been braced). This would have brought them to only slightly above the height of the ground surface at the top of the slope into which the late Bronze Age features on the eyot are cut. It is uncertain how effective this would have been as a fence for keeping livestock in, or to keep out people arriving from the river.

The feature was observed only in trench XXIV, so it could not have extended very far to the south, as it was not observed in trench III, and does not seem to have been present at the north end of the eyot (in trench XVIII). It would seem that it was in some way connected with the structures in the palaeochannel and/or the adjacent late Bronze Age features on the eyot. Assuming it to be contemporary with Structure A in the palaeochannel it seems very unlikely to have been intended to impede access to the river at this point and does not seem to have been such that it could have seriously impeded access by intruders from the river; it cannot have been intended as a barrier. Its actual function is difficult to determine from this very short section.

A few parallels can be suggested from other sites within the Thames Valley which are roughly contemporary. Two rows of stakeholes were found along the edge of the gravel terrace at Eton Rowing Lake. These have so far not been dated, and need not be contemporary. These stakeholes have been interpreted as fences, perhaps like that found collapsed, but intact, from another part of that site. However, they do not provide very close parallels for the Whitecross Farm example, as these stakeholes are much smaller – only *c* 0.08–0.1 m in diameter.

A closer parallel may be the timber waterfronts at Runnymede Bridge further downriver (Needham 1991). Here two parallel rows of closely spaced piles were found along the edge of the gravel island. Four of these piles from each of the outer and inner rows have been dated and have yielded radiocarbon dates in a very similar range (generally 1200–700 cal BC, ibid., 346, table 64) to the piles from the structures within the palaeochannel at Whitecross Farm (see Fig. 2.6). The piles at Runnymede Bridge were sharpened at the points as is suggested for the piles that form these structures, and were driven much deeper than those in the possible palisade at Whitecross Farm and did not appear to have been set in a post trench in the same way. Due to the depth the piles at Runnymede Bridge were driven, it was thought that they could have supported a fairly substantial superstructure forming some sort of platform or walkway (ibid.). A similar though less substantial structure may have been present at Whitecross Farm. Any timbers from such a structure would have disintegrated so it is not surprising that they were not found. There was no evidence observed for where any platform may have rested or been supported further up the slope, as possible posthole 2418, the nearest feature at the top of the slope of the eyot, is too far away to be part of the same structure.

At Anslow's Cottages, Burghfield (Butterworth and Lobb 1992) 10 or 11 vertical, pointed wooden stakes were found on the edge of a palaeochannel of the River Kennet, a tributary of the Thames. These were arranged in two parallel rows 0.5 m apart and with distances of 0.15–1.15 m between

Plate 2.4 The palisade trench 2422 within trench XXIV, partially excavated with its profile sealed by the dark layer of the phase 5 midden clearly visible in the background

them. They were dated to 2570±70 BP (HAR-9186), only slightly later than the Whitecross Farm structures (see Fig. 2.6). These stakes were somewhat smaller in diameter than the Whitecross Farm postpipes and were merely driven into the gravel rather than set in a trench. Some horizontal timbers were found between and near the stakes though not attached to them. This structure was interpreted as a landing stage, or possibly a revetment to prevent erosion. An alignment of close-set postholes was also found 2 m back from this structure. The usual distance between these postholes (0.2–0.4 m) was very similar to that between the postpipes at Whitecross Farm, and the diameter of the postholes (0.25–0.35 m) does not necessarily indicate that the posts were much bigger than the posts set within the post trench at Whitecross Farm. This arrangement of a landing point on the river backed by a line of close-set posts may be the closest parallel to the features at Whitecross Farm though it is not entirely clear what the function of this line of upright posts was in either case, or, in fact, if they were contemporary with the other features.

The suggestion that the waterfront structure at Anslow's Cottages may have been some form of revetment may hold true for the post alignment at Whitecross Farm, but there is little evidence to suggest a very erosive environment at this section of the bank. Indeed there is some indication from the environmental evidence (see Robinson, Chapter 4) that the water near the bank was relatively shallow and slow moving though the channel was active all year round and did contain species indicative of faster-flowing water further out. There is no marked discontinuity in the sediment sequence to indicate any period of significant erosion. Thus a revetment to prevent erosion does not seem very plausible.

TIMBER DEPOSIT AND REMOVAL OF THE PALISADE: PHASE 4

The next phase of this site is represented by the build-up of organic silts on the active channel deposits (2406) in the base of the palaeochannel, with a large deposit of timber in the channel around the timber Structures A and B and the probable removal of the palisade/revetment structure (Pl. 2.5). It is a phase of renewed activity on and around the eyot as the channel begins to silt up.

The active channel-bed deposit was overlain by a fairly thick deposit (2405) of waterlogged organic silts which also contained much wood, lenses of dense charcoal, peaty deposits and snail-rich deposits. The wood included split beams/planks and smaller branches and twigs. Much of this was charred, and some were worked (mainly from 2405/2). This is discussed below (see also Taylor *et al*., Chapter 4). Radiocarbon dates have been obtained from two pieces of this wood and were found statistically not to be significantly different in date from the wood from the structures (see Appendix 1). This has given late Bronze Age dates for the wood which roughly tie in with the dates from the finds. Finds from this deposit were not kept by layer but included flint nodules, some of which were burnt, as well as daub, late Bronze Age pottery sherds, shell and animal bone, including one fragment of burnt bone. The 179 pieces of animal bone included cattle, pig, sheep, one piece of red deer antler and a possible wild boar canine (see Chapters 3 and 4, and Figs 2.4–5).

Though the finds were not recorded by layer the whole deposit was separated into several layers: 2405/5 consisted of very dense charcoal mainly underlying 2405/2, but also sometimes interstratified with it and with 2405/4; 2405/4 was a dark grey-brown organic silt with wood fragments beneath 2405/2, mainly in the eastern part of the trench but probably also beneath 2405/3 which was not fully excavated; 2405/3 consisted of dark grey sand and silt with very dense snail shells, up to 0.15 m at the western end of the trench; it interfluved with 2405/2, which was a dark grey-brown organic silt with peaty lenses and much wood; and 2405/1 was brown organic silt with occasional wood and charcoal flecks. Within this a yellow-grey gravel lens was recorded between 2405/1 and 2405/4 (the relationship with 2405/2 was not clear and it may be that it represented part of this layer). Two of the wooden piles which make up Structure B (2442 and 2443) were found within 2405/2 and another (2444) was found within 2428. It was not clear if these originally protruded through 2405/1. They may have done so, but this was not recognised when this layer was dug. It is possible that the soft sediments which make up this layer slumped down into the voids left by rotting of these timbers.

Similar deposits were found in the other trenches cutting the eyot's western edge. In trench III, which in part cut across the area later to be excavated as trench XXIV, a deposit of dark grey sandy gravel with some silt (306) overlay the layer of yellow sandy silt mottled with brown and grey, 310, which can be correlated with 2406. Layer 306 was in turn overlain by one of organic silt, 305, described as dark grey sandy silt with abundant charcoal, wood (some with cut marks), shell and bone. These layers clearly correspond to 2405. In the trenches to the south (II and I) similar sequences of deposits including organic layers were also recorded (204–6 and 105–7) with several finds of stone, flint, shell, animal bone and charcoal together with some rotten wood in 105. This wood deposit was not on the same scale as that found in trench XXIV.

In the trenches further away from the eyot such as XXII there was a dark grey silty sandy clay layer (2208) containing very abundant molluscan fragments, bone and burnt flint, which is correlated with 2405 though lacking the wood found nearer the shore of the eyot.

The wood deposit

Within the lowest fill of the palaeochannel (2405) was a fairly large deposit of wood (Figs 2.5 and 2.7–9). This did not form any discernible structure. Much of it was sampled for analysis as to species identification and for signs of woodworking (see Figs 2.8–9). It was found to contain a number of species including oak, hazel, alder, ash, blackthorn, wild cherry and a group containing hawthorn, apple, whitebeam and mountain ash (see Fig. 2.8). Oak and hazel were the most numerous of these species. They were also the largest component among the worked wood and the charred pieces. The other species occurred mostly as driftwood or were not charred. The tool marks recorded on several pieces of this wood suggest the use of late Bronze Age socketed axes (see Taylor *et al*., Chapter 4). This accords well with

Plate 2.5 Trench XXIV, as excavated, looking east towards the modern river channel over the gravel eyot from the early palaeochannel. The large flint hearthstones deposited from the end of the jetty, wood deposit and timber uprights that make up the jetty structures can be seen on the palaeochannel bed in the foreground

Figure 2.7 Detail plan of the palaeochannel in trench XXIV showing charred timbers present in the wood deposit

Figure 2.8 Detail plan of the palaeochannel in trench XXIV showing the wood species present in the wood deposit

Figure 2.9 Detail plan of the palaeochannel in trench XXIV showing worked and driftwood among the wood deposit

the two radiocarbon determinations obtained for this deposit of between 1000–800 BC (see Appendix 1).

Figure 2.8 shows the distribution of species, while Figures 2.7 and 2.9 show the distribution of charred and worked pieces. From this it would seem that most of the oak occurred in the area around and just upstream of Structure A. The few pieces of oak away from this group have largely been identified as offcuts rather than structural timbers (see Taylor *et al*., Chapter 4). Most of the hazel rods occur in this area too. Several of these were worked, and many of them were charred. The driftwood by contrast cannot be said to be concentrated in any particular area, though it made up a large proportion of the wood towards the southern side of the excavated area downstream from Structure A.

The quantity of worked pieces among this deposit, but the fact that no woodchips, indicating woodworking, were recovered, suggest that the debris is from a nearby structure, or possibly dismantled material being reused or discarded here. These large oak timbers and hazel rods may have formed a superstructure to Structure A, but it is more probable that they came from a structure located nearby on the island. The quantity of charred pieces may suggest that the structure was burnt and dismantled and then discarded into the stream. That they occur upstream of Structure B suggests that they could not have fallen into the stream from there. The spreads of charcoal possibly representing disintegrated charred wood occur to the east of Structure A, between Structures A and B and among the piles of Structure B, making this last suggestion less certain as such disintegrated material could not have been transported without dispersal and must have been deposited more or less where they were observed.

Among the wood scattered in the area of Structure A, a split oak plank was found adjacent to pile 2430. This plank (wood sample 58, see Figs 2.4, 4.7.4, Pl. 2.6) had a square notch in one end and from this notch it measured 1.68 m long. This corresponds to the distance between the centres of piles 2430 and 2435 or 2432. This may be purely coincidental, but it may very well be part of the structure. Some charring was observed on this plank; the other end may have originally been similarly notched, but this did not survive. Another similar timber nearby (71) had been burnt so severely that only charcoal remained and it could not be lifted or identified as to species. A third (49) was only seen projecting from the northern baulk nearby, but was also of oak and may have been of a similar length.

Plate 2.6 Detail of part of the wood deposit, showing worked planks, wood samples 58 and 49, split oaks 52 and 54, hazel rods 40 and 50–1, and timber upright 96 with notched end

Removal of the palisade

There is little direct evidence for the removal of the palisade, or whatever structure the series of postpipes within slot 2422 relate to, but this seems very likely. Very little wood was found within these postpipes despite the fact that they extended to a similar level to that in which the wooden piles and wood deposit were preserved within the palaeo-channel close by. There was no cut to suggest that the posts had been dug up, but they could have been pulled out to leave the postpipes that were observed. The surrounding packing, 2422/2, was observed to have slumped inwards to partially fill these watery voids. A depression was left at the tops of these voids which was filled by the later midden deposits (2422/1), rather than this having slumped in as the posts decayed *in situ*, as was initially thought.

MIDDEN AND OCCUPATION: PHASE 5

After the phase of disuse and destruction of the waterfront structures on the eyot, there was a phase of occupation and deposition of midden material into the edge of the silting palaeochannel. It is not certain if the midden is contemporary with the occupation, or if the features are all contemporary.

The midden

Overlying the remains of the palisade structure and extending down the slope of the eyot and out across the palaeochannel for some 2–3 m – sealing the waterfront structures and the organic silt layer (2405) which incorporates the wood deposit – was a layer (2414) of mid dark grey sandy clay with large red-brown mottles, some gravel and abundant large charcoal flecks, flint (Fig. 3.4.1), shell, animal bone, late Bronze Age pottery (see Fig. 3.11) and a copper-alloy pin (Fig. 3.1.1). The estimated 340 pieces of bone included cattle, pig, sheep and some duck. It may be that the deposit represents material eroded from the eyot but this is judged to be unlikely due to the high proportion of charcoal and domestic refuse. It is thought more likely that it represents rubbish dumped in the edge of the channel. This implies that late Bronze Age activity continued after the revetment and waterfront structure(s) went out of use.

Above this wet layer of midden material was a layer (2409) of pale grey-brown sandy clay mottled with red-brown and with a sandy lens at the bottom. This was situated at the interface of the upper channel fill and the slope of the eyot. This deposit yielded flint, stone, charcoal, shell, animal bone and late Bronze Age pottery sherds. The 91 pieces of animal bone included a similar mix of cattle, pig, sheep and red deer, represented by antler, but with the addition of goat and horse. This would also appear to be deliberately dumped midden material, and is likely to be part of the same feature, as the mix of material is similar and joining sherds were found from the two contexts (see Barclay, Chapter 3). The lower layer merely appeared darker due to waterlogging.

The occupation deposits

In the eastern part of trench XXIV through the gravel eyot, the natural (2410) was overlain by loam (2403) which contained occupation deposits. This loam was divided into two layers. The lower layer (2403/2) consisted of yellow-grey slightly sandy silt which merged with 2410 below. This layer may constitute the original soil surface of the eyot, derived from 2410 (the presence of some late Bronze Age material within this layer may be due to worm sorting, but no clear horizon of worm-sorted material was observed at its base). Most of the archaeological features cut this layer, with the exception of the earliest feature, ditch 2413 (described above). Though layer 2403/2 was not recorded as extending across this feature, the similarities between its top fill, 2413/1, and 2403/2 suggest that the soil does in fact continue across this early ditch.

Cut into this final fill of 2413 were two postholes, 2411 and 2415 (see Fig. 2.4). The first of these was situated towards the north-east corner of the trench on the eastern side of ditch 2413. It appeared as a dark stain 0.15 m in diameter within fill 2413/1. This feature yielded flint, daub and late Bronze Age pottery. The second posthole was larger (0.26 m in diameter and 0.16 m deep), and was located at the southern side of the trench. It was filled by dark grey-brown clay loam with occasional gravel and small charcoal flecks. This fill yielded flint, shell and animal bone. The late Bronze Age date of the former of these features indicates that ditch 2413 is of late Bronze Age or earlier date.

Three other postholes (2416, 2417 and 2418) were identified in this trench towards the slope down to the palaeochannel and cutting 2403/2 (see Fig. 2.4). Feature 2416 was the truncated base of an oval posthole (0.32 m x 0.22 m orientated WSW–ENE) with many rounded cobbles packed into the bottom. One, possibly utilised, flint was also recovered from this feature. A second feature, 2417, *c* 0.2 m to the west of 2416, was also oval with its long axis 0.3 m, filled by very grey sandy silt and packed with pebbles. The third posthole in this group, 2418, was circular with a diameter of 0.38 m and filled by friable light brown-grey clay loam with some grit and gravel. Flint, animal bone and late Bronze Age pottery were recovered from this feature.

A little to the east of these postholes was a small slightly oval pit or large posthole (2412; maximum diameter 0.56 m). The fill of this feature was grey-brown clay with patches of orange sand and stones protruding up into 2403/1 (it is unclear if this was cut into layer 2403/1 and intruding into 2403/2, or merely into 2403/2). The fill of this feature produced some animal bone, but no datable finds.

Overlying all these features (with the possible exception of 2412) and extending over 2404, at least as far as 2422, was a layer (2403/1) of gritty grey-brown sandy loam with some gravel. This layer produced flint, stone artefacts, daub, shell, animal bone, late Bronze Age pottery and a piece of copper corrosion, and is interpreted as an occupation layer that has been disturbed by ploughing (see phase 7, below). This was sealed by the alluvial layer 2402 that covered the whole area. This layer produced a piece of metalworking waste (see Northover, Chapter 3).

Another posthole was located in trench XVIII to the north. The feature, 1805, was *c* 0.23 m in diameter and 0.25 m deep; it was cut into the sandy clay natural (1804). It was filled with dark grey sandy clay with charcoal flecks and red-brown mottles. This was overlain by a layer (1803/1) of dark grey loam with charcoal and lenses of yellow-brown clay loam. This produced finds of animal bone and late Bronze Age pottery and corresponds to the occupation layer 2403/1 in trench XXIV.

Fairly similar sequences were recorded from the other trenches on the eyot. Going south along the eyot, trenches III, II and I all contained a layer of gritty grey-brown loam with some gravel, charcoal flecks and iron pan nodules. This material yielded finds of flint, stone artefacts, daub, shell, animal bone and late Bronze Age pottery. A dark translucent green glass bead was also recovered from layer 103 (see Fig. 3.3, Pl. 3.2). No features on the gravel eyot were recorded in any of these trenches; 303 occupied a hollow in the underlying deposit 309, but this was judged to be a natural feature rather than an archaeological one.

On the eastern side of the eyot, in trench XXVI a possible posthole (2606) was identified cutting the alluvium below and possibly the bottom spit of the occupation layer (2605). The posthole was *c* 0.3 m in diameter and 0.15 m deep with a U-shaped profile. Its fill was very similar to 2605 though slightly darker. Layer 2605 comprised mid dark grey-brown clay loam with shell; it produced some pottery, animal bone, flint and worked stone, and clearly corresponds to 2403/1 on the western side of the eyot. Similar deposits, though no features, were recorded in the other two trenches on the riverside of the eyot (contexts 2505 and 2705). This corresponds to layer 4 seen in the eroding riverbank section recorded by the OAU in 1985.

SILTING OF THE CHANNEL: PHASE 6

Another layer of alluvium or channel fill sealed the midden deposits on the western side of the eyot and can be compared to a layer visible in the eroded riverbank section on the eastern side. This layer consisted of pale brown-grey silty or sandy clay mottled with yellow and orange iron-staining, becoming bluer with a higher proportion of clay with depth (107, 204, 304, 1704, 1804 and 2404). This material had certain similarities with layer 3 in the north end of the riverbank section. This layer was very similar to the deposits found near the base of the palaeochannel, where brown-grey mottled yellow silty sand to sandy clay (5, 104, 207 and 309) overlay the pale grey-brown silty sand and fine gravel that formed the natural in the bed of the channel (310, 403 and 2406).

Within the main trench, XXIV, this layer was broken down into a series of alluvial deposits: 2404/6 (immediately overlying 2405) consisted of light blue-grey clay silt with fine sand lenses and containing snail shells; 2404/5, above this, was similar material without the lenses; 2404/4 was light grey-brown sandy clay mottled with iron pan and merging with 2404/3 above; 2404/3 consisted of light brown-yellow coarser sandy clay with a higher sand content and more snail shells; 2404/2 was similar to 2404/4; 2404/1, the uppermost of these layers, consisted of grey-brown silty clay mottled with orange iron pan. This was overlain by 2403/1 along the eastern edge and sealed by the alluvial layer 2402 which overlaid the whole site.

PLOUGHING: PHASE 7

It is suggested that an episode of ploughing disturbed the occupation spread 2403. This layer (2403/1) extended horizontally across the eyot and over the channel silt deposits (see Fig. 2.3). It is likely that the occupation layer 2403/2 was disturbed and truncated by this activity. On the eyot, finds from the underlying occupation layer had become mixed into the ploughsoil.

Plough disturbance was recorded in the upper layers of the occupation horizon in trenches XVIII, XXV, XXVI and XXVII, together with the riverbank section (1803, 2403/1, 2504, 2604, 2704 and 2). It was not recorded in the trenches and test pits further south on the eyot but this may be because it was not distinguished from the main occupation layer. It does, however, represent a later phase from the evidence recorded in trench XXIV and the riverbank section. In trench XXIV, the plough-disturbed horizon 2403/1, described as gritty brown sandy loam with some gravel and iron pan nodules, extended out to the west over the phase 6 alluvial deposits, while the earlier loam layer 2403/2 did not extend beyond the eyot. Though both 2403/1 and /2 were recorded as fading indeterminately into alluvial deposit 2404, it seems likely that the latter precedes phase 6, as this alluvial phase seals the midden which is thought to be contemporary with occupation on the eyot, while the former is later. In the riverside section (see Fig. 2.2) layer 2, described as dark grey clay turning to sandy silt with some gravel, may relate to this phase of ploughing and clearly overlies alluvial layer 3 at the riverward side, merging with occupation layer 4 to the west and south.

In the former palaeochannel, evidence of this phase is less clear and it may not in fact have extended far beyond the limits of the former eyot as the ground in the area of the former palaeochannel may still have been too wet for ploughing.

However, at 0.9 m below the surface in trench XX, a stony horizon (2004) was recorded. This may have related to ploughing.

One sherd of flint-tempered pottery was recovered from this layer, while layer 2504 produced a small amount of pottery and bone. Similarly, pottery, animal bone and flint were recovered from 2403/1. It is difficult to date this phase of activity as the finds are likely to be residual.

ALLUVIUM AND TOPSOIL: PHASES 8 AND 9

Alluvium: phase 8

A layer of yellow-brown silt or clay loam, which has been interpreted as alluvium, could be traced through all trenches (102, 202, 302, 402, 1702, 1802, ?1806, 2202, 2402, 2503, 2603 and 2703). Layer 2402 yielded several finds of flint, daub, stone, shell, animal bone and prehistoric pottery, including a flint scraper, several possible quernstone fragments, copper-alloy slag and waste, and an iron horseshoe. It is difficult to date this layer; it may be Iron Age or later.

Topsoil: phase 9

A layer of dark grey-brown, humus-rich, loam topsoil (1, 101, 201, 301, 401, 1701, 1801, 2201, 2401, 2502, 2602 and 2702) overlies the whole area.

DISCUSSION

by Anne Marie Cromarty and Alistair Barclay

Why settle on an eyot?

A small narrow eyot within a river appears to be an unlikely choice for settlement, offering very limited space and resources for occupation and agriculture. In some respects the river would have been an obstacle for movement, the land would have been prone to flooding, especially during the winter, and insects would have been a problem during the summer months. However, such sites also had advantages. The river provided a means of transport and links to other areas. The eyot would have been a naturally safe and exclusive place encircled by the river, which would have restricted access and allowed any access to be monitored and controlled, though the size of the eyot would have restricted the size of the settlement or population that could have occupied it.

There is little evidence for the use of eyots in general, of which there are a considerable number in the Thames, until the late Bronze Age when several eyots are known to have been occupied by high-status sites, for example Runnymede (Needham 1991) and Bray (Wymer 1960). The choice of eyots for such sites would have been linked to the river for the reasons outlined above, but more important was the ritual use of the river during this period. Many votive deposits were made in the river at this time, including fine bronze metalwork of the kind found a little way upstream from the Whitecross Farm eyot at Wallingford, and human remains, particularly skulls (Bradley and Gordon 1988).

Early use of the eyot

Little evidence for early use of the eyot has emerged from these and earlier excavations on the site. The environmental evidence suggests that the eyot was Neolithic or more recent in origin (see Robinson, Chapter 4). The earliest artefacts on the eyot are nine pieces of worked flint of Neolithic or early Bronze Age character, although most were residual within later deposits. Only one feature can be attributed to this phase – a ditch or pit, the fills of which produced only one piece of probable Neolithic flint. This limited evidence suggests that some use was made of the eyot prior to the late Bronze Age occupation when dry open conditions prevailed, though activity was probably at a fairly low density.

The single flint was the only dating evidence for the pre-late Bronze Age ditch. The ditch had almost fully silted up before the postholes were cut into it, suggesting that a considerable length of time separated the features. The limited area excavated means that little is known of the form of the ditch, other than its profile in this short section. It is not known if, or how, the feature extends beyond the area investigated. It is possible that the feature is not a ditch, merely a pit, but assuming it is indeed a linear feature it seems unlikely that it would have functioned as a field boundary, given its apparent orientation down the long axis of the eyot as known today.

Given that the riverbank eroded significantly during the 20th century alone, it seems likely that the eyot would have been wider in antiquity, but it is not clear how far it originally extended to the east. Exploration of the modern river channel revealed a step in the bed which could indicate an earlier alignment of the riverbank. This was roughly in line with the eastern edge of the 1985 section. This section shows the occupation layer sloping down towards the river, suggesting both that the site was indeed on an eyot with the modern river channel open at this time, and that the available area did not extend much beyond this. Finds of three complete Mortlake Ware bowls and a stone axe from the present river at the end of Grim's Ditch opposite the eyot (Holgate 1988a, 283, 304) provide evidence that the present channel was open at this time.

It seems more likely that the ditch forms part of some kind of enclosure or boundary, the nature or exact location of which is uncertain. It could have formed the western boundary of an enclosure that extended to the east of trench XXIV, or the eastern boundary of an enclosure that was formed with the channel bank. The possible palisade trench at the bank of the channel, included tentatively in the next phase here, may have been associated with this enclosure as no dating evidence was retrieved from it and the feature could not be related with any other stratigraphically, except in that it was sealed by late Bronze Age midden deposits. Timber revetments or palisades are known from earlier Neolithic contexts, where they are often associated with mortuary structures. Alternatively, a number of late Neolithic timber structures and palisades are known (Kinnes 1992; Whittle 1997).

If the ditch does not belong to an early late Bronze Age phase, it would seem likely that it could be of Neolithic date, and it may be that these two features – the ditch and the timber structure – represent a mortuary enclosure with some sort of wattle screen associated with it. This would fit with the low level of activity indicated by the low proportion of early flints within the fairly sizeable assemblage from the site overall. This may only have been of local significance, relating to the Neolithic settlement on the eastern bank of the river suggested by other excavations as part of the bypass project (see Chapter 5). This interpretation of the early activity on the site, and this feature in particular, is tentative, as not enough evidence was recovered from the excavations for any more definite conclusions to be drawn.

Late Bronze Age use of the eyot

The main body of the archaeological evidence recovered by these excavations dates from the late Bronze Age. This evidence is mainly composed of a group of timber uprights, and a spread of artefacts within a layer of organic loam continuing as a midden into the waterlogged organic-rich silt layer with preserved wood within the palaeochannel. These deposits were sealed by alluvium, forming a fairly closed deposit with some later plough disturbance. There is little evidence for Iron Age and later activity on the eyot.

Dating of this activity to the late Bronze Age is fairly secure, based on an agreement of alluvium-sealed, artefact-rich stratified deposits and radiocarbon determinations. A few distinct phases of activity are evident, but these all may have occurred within a fairly short period of time, approximately 900–700 cal BC. The structures within the channel represented by the timber uprights would appear to have gone out of use before a substantial deposit of wood was dumped in the channel at this point. The timing of these events could not be separated by the radiocarbon dates obtained on the two samples from each phase, although it is likely to have happened sometime before 830 cal BC. The deposition of the wood was succeeded by the accumulation of midden material in the edge of the channel at a time when it was still open. How this sequence relates to the occupation layer on the eyot is not clear from the observed stratigraphy, but the pottery indicates that it is broadly contemporary, at least in part, with the midden. Some of the observed features and occupation layer may relate to the earlier phases in this period.

A few pits or postholes were found cut into the gravel of the eyot. These are dated to the late Bronze Age period, but little could be determined of their relationship or function from the very small trenches and test pits that were excavated. They are likely to have been associated with buildings. A large enough area was opened in trench XXIV, around the timber uprights, to suggest that these formed some sort of jetty or landing stage, which would have allowed access between the eyot and the river on the eyot's central west side. This structure is such that it suggests that this access was important, at least for a limited period, and important enough to merit the expenditure of a significant amount of time to construct and probably involved specially managed oak woodland to produce the wood for the structure. Why this access was needed is less clear. The finds recovered from the midden and occupation layer provide most of what is known about the activity on the site during this period.

The evidence for habitation on the eyot

Although no structures could be reconstructed as dwellings, examination of the artefacts and environmental evidence provides clear indications of habitation on the site. The wood deposit found within channel fill 2405 is largely made up of structural timbers. These are likely to come from a nearby structure which was accidentally or deliberately destroyed by fire. This may or may not have been associated with the pits or postholes found on the eyot nearby, but the finds and environmental remains indicate human activity and settlement.

The presence of small quantities of daub among the finds suggests that there were at least some structures, probably ovens, on the eyot, possibly representing a settlement. Other evidence for settlement on the eyot includes hearths and the quantities of potboilers recovered from the margins of the eyot. A deposit of large, burnt flint nodules was found in the channel at the end of jetty Structure A, in trench XXIV (see Fig. 2.5). These have been interpreted as hearthstones. Small to moderate quantities of charcoal were spread throughout the occupation layer, and a single feature filled with frequent charcoal fragments was found in Collins' trench D (Thomas *et al.* 1986) close to the northern end of the recent trench XXV. Wilson (1986, 194) suggests on the basis of the bone assemblage from the earlier excavations, including that by Collins, that the bones had accumulated within *c* 20 m of a hearth.

Weeds indicative of nitrogen-rich disturbed ground, such as occurs around settlements, were identified from the eyot. In the later samples from waterlogged layer 2405 a higher percentage of certain terrestrial Coleoptera which feed on foul organic matter were found than would be expected independently of human activity. These samples also contained high numbers of beetles which favour manure. Puparia of the housefly and beetles favouring old damp hay, thatch and stable litter were also present, together with other species to suggest that domestic and agricultural refuse, crop-processing waste and manure were being dumped on the channel bank. The insects present suggest that though the refuse being dumped was of the sort which accumulates around settlement, it was not accumulating within buildings. The buildings are likely to have been a little removed from this dump of material, to the north or the south of the eyot (see Robinson, Chapter 4).

The environmental evidence also suggests that the vegetation of the eyot consisted of short turf with trampled patches. The extent of trample is unlikely to occur merely as a result of refuse being brought from the surrounding area to be dumped on the edge of the eyot. The eyot was obviously used fairly intensively for settlement, with animals possibly being kept on the eyot at times, from the evidence of dung beetles and bracken apparently brought to the eyot from outside the immediate area, presumably for animal bedding. Grazing would have been limited on the eyot. Parts of the eyot were obviously not grazed at all, the vegetation dominated by tall herbs, possibly with some shrubs and trees around the water margins. The Coleoptera evidence suggests that the surrounding area was characterised by grazed pasture far more than the eyot itself. Any herbivores kept by the occupants of the eyot were probably pastured in the surrounding area (see Robinson, Chapter 4). Other types of animal, particularly pigs, may have been kept on the eyot, the riverside location providing a suitable environment.

The high numbers of pig represented within the animal bone assemblage (see Powell and Clark, Chapter 4) may also be an indicator of permanent settlement with a low element of pastoralism as would be appropriate for settlement on such a small eyot. There is a noticeable similarity between the proportions of the main species and mortality rates for pig and sheep/goat for this site and that at Runnymede Bridge (Done 1991). It is not clear if this is typical of late Bronze Age settlements or if the apparent emphasis on pig is real and a feature of these island settlements, perhaps a reflection of high status, and an indicator of feasting occurring at these sites.

Cattle do not seem to have been particularly dominant, making up the lowest proportion of the main species from this site (see Powell and Clark, Chapter 4). Among the cattle present are elderly individuals in complete contrast to the sheep/goat and pigs, few of which survived beyond their second year. It is not certain if the cattle were kept for secondary products, such as milk, as much as for meat. That some were consumed is clear from the butchery marks identified on a cattle vertebra. Leather may also have been an important secondary product on the basis of evidence for skinning and the presence of tools which could be used for leatherworking among the metalwork from this site (see Powell and Clark, Chapter 4, and Northover, Chapter 3).

Hunting of wild animals may have been a relatively significant activity, with wild boar, red and roe deer, goose and duck being represented in addition to fox and wild cat. These species would have been naturally present in the surroundings of the eyot, the environment being well suited to these species, and the eyot population are likely to have taken advantage of this. It is possible that their status gave them hunting rights over areas off the eyot.

The finds

The finds recovered include most classes of artefact and indicate a wide range of such activities as flint knapping, crop-processing, woodworking, textile manufacture, skinning and butchering of animals, leatherworking and possibly metalworking.

One metal chisel found on the site was of a type used for leatherworking but could have been used for other purposes (see Northover, Chapter 3). Some of the flints could also have been used in leather-working, though the level of analysis used here was insufficient to tell if this was the actual use of these pieces (see Brown and Bradley, Chapter 3).

The metal finds indicate that bronze was melted, though no moulds or crucibles were found to suggest that the kinds of bronzes found on site, or from the river, were being produced here. Woodworking is also likely given the quantity of worked wood found, though there was little waste indicative of this (see Taylor *et al*., Chapter 4). Some worked bone and worked stone were also found.

The pottery from the site includes both coarse-wares and finewares. The overall fineness of the pottery and metalwork, together with a single piece of gold found during the earlier excavations (Anon. 1960, 58) – though this may have been intrusive – and a glass bead of late Bronze Age date from the midden may be indicative of a fairly high-status site.

The evidence for textile manufacture was limited to spindlewhorls; no loomweights were found. This together with the lack of older sheep/goat perhaps suggest that animals were kept for consumption rather than for wool production, and it may be that textile production was not a particularly important aspect of the activities practised at this site.

The quernstones among the worked stone suggest the processing of cereals. This accords well with the environmental findings which include evidence for crop-processing and cultivation. Cereals are represented among the charred plant remains and the pollen. The main cereal species are emmer and spelt wheat, but other crops present include barley and flax. Cereals were processed on this site, or at least crop-processing waste was being dumped here. The composition of this material suggests that it had been burnt as rubbish rather than that it was the accidental or deliberate burning of stored wheat. If cleaned wheat was imported to the site and stored it is unlikely to have included this level of waste. Transportation of the cereal would also have been much easier if the wheat was cleaned of waste material first. The weed species identified were also indicative of spring-sown cereals, together with root crops.

Wheat, barley and flax are common finds on other sites, suggesting that in some aspects the activity at Whitecross Farm did not vary significantly from other contemporary sites. One aspect of the Whitecross Farm environmental assemblage which is unusual is the presence of opium poppy. This does not seem likely to have occurred merely as a weed in cereal due to the quantity of seeds recovered. It is more likely that a stand of poppies grew in the vicinity, whether wild or cultivated. It is not unknown for this species to have been cultivated for its edible seeds or medicinal/drug properties on Neolithic and Bronze Age sites in Europe, and Iron Age sites in Britain (Renfrew 1973, 161–2; Waterbolk and van Zeist 1966, 575–6; Robinson 1989, 83; G Campbell pers. comm.). It may have been deliberately grown at Whitecross Farm, though this is unusual for the late Bronze Age in Britain. This may be another indication of the status of Whitecross Farm with links to outside influences making it more liable to adopt such innovations than the small open settlements more characteristic of the Upper Thames Valley at this time.

It is not entirely certain if the eyot was used for permanent occupation, rather than just the disposal of refuse from an adjacent settlement. Further downstream at the Eton Rowing Lake site, sandbanks are known to have been used for ritual deposition with no occupation occurring (Allen and Welsh 1997, 34), but this is not a very close parallel for Whitecross Farm. The material at Whitecross Farm is clearly mainly refuse with clear indications of settlement close by. The nature of the flint finds, including waste, cores, chips and flakes, suggests that flint was worked on site rather than being transported from another site. It is unlikely that all this debris together with the finished pieces would have found their way to the eyot from elsewhere.

Settlement on the eyot

Features indicating settlement or activity of some kind within midden material are known from other sites, particularly Potterne (Gingell and Lawson 1985), but also at Castle Hill (Hingley 1979–80). At Potterne it would appear as if this activity took the form of organised totting, with people living on the huge tip, processing the refuse. There is insufficient evidence to say this was also occurring, albeit at a smaller scale, at Whitecross Farm.

The size of the settlement at Whitecross Farm would have been limited by the size of the eyot, and it may be possible to infer the size of this settlement by comparison of the settlement area available on the eyot with other late Bronze Age island sites. The area of the eyot as it is known today is in the order of 1960 m^2, and would have been only slightly larger at around 2272 m^2 before 20th-century erosion of the riverbank (based on the 1913 edition OS map and the ledge observed during the riverbed survey). The island at Runnymede was much larger, over 2 ha – almost ten times the area of the Whitecross Farm eyot. Though only a small proportion of the Runnymede Bridge site has been available for archaeological investigation due to the built-up nature of this area, several structures including a possible shrine have been identified together with clusters of postholes which may also represent structures (Needham 1992, 56, fig. 5). The settlement on the Whitecross Farm eyot could not have been on nearly such a large scale as this, restricted by the much smaller size of the eyot. The Runnymede example does indicate that settlement on this type of site may have been fairly dense, but other parallels were sought to give an indication of what size of settlement was likely in an area the size of the Whitecross Farm eyot.

The eyot may be compared with enclosure sites of this date, with the river acting as an enclosure ditch. It is possible that there are close parallels in the way the two were regarded. Special deposits and refuse were placed in enclosure ditches and the same appears to be true of the river around the eyot at Whitecross Farm (see below). Bronze Age enclosures known within southern England show a considerable range in size. At the upper end of the size range is the Rams Hill enclosure which is thought to span the middle–late Bronze Age transition (Needham and Ambers 1994) and encloses an area in the region of 6125 m^2. Towards the lower end of the range are ring forts, for example Mucking North Ring. This ring fort is around 1257 m^2 (Bond 1988) in internal area. The area enclosed by the inner ditch of the late Bronze Age settlement enclosure at Lofts Farm (Brown 1988), also at the lower end of the size range, is around 1330 m^2. The inferred extent of the Whitecross Farm eyot is slightly over a third of the size of the Rams Hill example, and around 1.8 times and 1.7 times the size of the two smaller enclosures respectively. The Mucking North Ring seems to have enclosed up to two houses in its first phase and only one in its second, while Lofts Farm contained only one house structure, one possible byre or barn and several two- and four-post structures. The enclosure at Rams Hill has not been fully excavated, so it is not known how many dwellings were contained within it at any one time. Slightly over a quarter of the area has been excavated, and the approximately 1920 m^2 of this within the interior is close to the extent of the Whitecross Farm eyot. This area was found to contain up to four structures (Bradley and Ellison 1975, A–D). These are not necessarily all contemporary. Structure A is thought to date to the 13th century BC and is therefore much earlier than the Whitecross Farm site. The other structures are likely to be later, though it is not clear if these are all contemporary.

Fencelines partitioned off parts of each of the smaller enclosures cited here. These appear to divide the structures from the other parts of the enclosures, though it is not known whether they represent purely functional aids to livestock management, or had some greater significance in screening off the occupational areas from other areas of the enclosure and restricting views of the interior of the enclosure. It is not clear from the available evidence that any part of the area was cordoned off and not used for settlement. It may be that there was some division of the space on the eyot and different areas had different functions. If this was the case, it is likely that these areas changed through the period as finds were found distributed throughout all the trenches excavated. This is discussed more fully below.

As the eyot was slightly larger than the excavated area within the Rams Hill enclosure, around three or four dwellings might be expected within the area on this basis. It is almost twice the size of the smaller enclosures, and as activity seemed to be fairly dense on the Runnymede Bridge site, which may be one of the closest parallels for the Whitecross Farm site, it seems likely that the settlement on the eyot would have been twice the size of that within these enclosures. This would still not have been very large, again between two and four dwellings at any one time during the life of the settlement. The eyot settlement was not self-sufficient, as is evident from the presence of bracken, and probably other commodities, brought in from outside, and would have had ties with others in the surrounding area. Extramural activity was evident around the Mucking North Ring enclosure and this could have been the case for the Whitecross Farm eyot, though no evidence has been recovered to date in the immediate surroundings with the exception of that *c* 300 m to the east at Grim's Ditch (see Chapter 5) and the settlement at Bradford's Brook around a kilometre away on the western side of the river (see Chapter 6).

Midden and occupation layer

The midden and occupation layer form a major part of this site. It was hoped that the evidence could contribute something to the understanding of the formation of midden deposits, refuse management and changes in the function/activity on the site. Unfortunately the method of excavation – being primarily aimed at determining the extent of the settlement in order to design the bypass in such a way as to minimise damage to the site – was not ideal for in-depth analysis of the midden. Finds were merely recorded by context and 2 m square. This was not tightly controlled enough to analyse the dispersal of finds within the depth of the deposits, and thus to determine different phases in the build-up of the layer and midden as was done at Potterne (Gingell and Lawson 1985) and Runnymede (Needham and Sørensen 1988).

Stratigraphy/vertical differentiation *(Table 2.2)*

During excavation it was thought that the midden deposit could be separated into two distinct layers: a wet one (2414) and a dry one (2409), suggesting that some stratigraphy could be observed within this feature (see Fig. 2.3). Analysis of the finds recovered from these two contexts showed that this was not the case. Finds were similar and joining pottery sherds were found from the two contexts (see Barclay, Chapter 3). This apparent stratification may have been the result of slumping and differential wetting and drying. This leaves the midden as an apparently homogeneous deposit, but as is clear from the examples at Potterne and Runnymede, such features can on closer inspection be found to contain a more subtle structure relating to different episodes of dumping.

Little stratigraphy was observed within the occupation layer either. Early observations of this layer assumed it to be homogeneous, and it was recorded as one single layer within most of the trenches excavated as part of this project. Only in trench XXIV, where a much larger section was revealed, did it become clear that it was really composed of two distinct parts. Most of the depth of the occupation layer had been disturbed presumably by ploughing which dragged some of the occupation material out over the phase 6 alluvium. This disturbance is likely to have led to a loss of data here and within the other smaller trenches, though this plough disturbance was not recognised during excavation. Features within the archaeological deposits will have been destroyed and their fills scattered.

It is not clear when in the sequence the features recorded within trenches XXIV, XVIII and Collins' trench D (Thomas *et al*. 1986), together with the possible feature in trench XXVI, were cut. The features in trench XXIV were only recognised after removal of the uppermost, plough-disturbed part of the occupation layer (2403/1), but in one instance (2412) there is some suggestion that the feature was actually dug into that layer though not recognised as such at the time of excavation. It may be that other features may also have existed in this archaeological deposit, but it is only where they cut the gravel that they are clearly visible.

Spatial patterning of finds *(Fig. 2.10a–j)*

The finds were scattered throughout the midden and the occupation layer in all trenches excavated across the eyot, so each class of find was plotted by the 2 m square in which it was found on a plan of the eyot to see if any spatial patterning was apparent, possibly indicating the organisation of

Table 2.2 *Summary of the stratigraphic sequence in the main excavation trenches across the Whitecross Farm eyot*

Eyot	*West side*									*East side*				
Trench	*I*	*II*	*III*	*XXIV*			*IV*	*XVII*	*XVIII*	*XXII*	*XXV*	*XXVI*	*XXVII*
Topsoil	101	201	301	2401			401	1701	1801	2201	2501	2601	2701
Alluvial layers, some disturbance from ploughing	102	202	302	2402			402	1702	1802	2202	2502	2602	2702
	103	203	303	2403/1(plough-disturbed alluvium/occupation layer)					1806	2203	2503	2603	2703
Channel fills, cultural deposits and features	104	204	309	2404/1–5 alluvium	2409 dry midden	2403/2 occupation layer		1703	1807=1803	2204	2504	2604	2704
	105	205	305	2404/6	2414 wet midden	postholes (2412, 6–8) ditch 2413		1704	1805 (posthole)	2205	2505	2605, 2606 (posthole)	2705
	106	206	306	2405/1–5 organic silts, wood deposit and piles	2445, 2422 palisade (2419–21, 2423–4, 2449)					2206			
Natural sands and gravels		207	310	2406 active channel bed 2410, 2426–7, 2446–8			403	1705	1804	2207 2208	2506		2706

space on the eyot during this period with different areas used for different activities. These plots (Fig. 2.10a–j) were only of limited use to this end as most types of find were distributed throughout. A finer resolution might have brought out more detail but this was impossible due to the on-site recording strategy employed. However, some possible patterns have been identified from these plots (see relevant finds reports in Chapter 3) and are discussed further here.

That the greatest activity was occurring on the eyot rather than the channel is evident in all cases and is not very surprising, but it does lend support to the idea that the waste was generated on the eyot rather than having been brought from outside and dumped to be washed away by the river. Among the flint assemblage it was found that the majority of the struck flint came from the area of the eyot. Such pieces were densest in the parts of the site where cut features were located, but were spread across the whole eyot (Fig. 2.10f). Examination of the used pieces suggests that there was a concentration of boring tools in trench XXIV, while traces of cutting/whittling and scraping are fairly evenly distributed across the land area of the eyot as known from these excavations (Fig. 2.10g). A higher proportion of preparation and trimming flakes were found in the midden than in the occupation soil and a markedly higher density of burnt stone was found here and on the edges of the eyot than in the interior in general. The exception to this are the densities of burnt stone in trenches XXV–XXVII, which would have been in the interior of the eyot before the collapse of the riverbank. The difference may be due, in part at least, to the types of collection strategies employed by the excavating teams, although the distribution is so striking that this alone cannot account for the pattern.

Looking at some of the other distributions, there are also differences in these trenches from the rest of the area. There is a slightly higher density of all pottery in these trenches, particularly trench XXV, than in the other parts of the eyot and this is almost as high as the density in the midden (Fig. 2.10a). The difference is only very slight, and may not by itself be particularly significant. However, if the number of decorated sherds (Fig. 2.10b–c) is examined these trenches have the highest densities, possibly indicating that the activity in this area is somewhat later than in other areas, or at least of a different character. This contrasts with the midden where decorated sherds were few, and refired or overfired sherds and a repaired vessel were found (Fig. 2.10b–d). The two notched sherds, possibly used as fishing weights, both came from the edge of the channel, as might be expected from their interpretation (Fig. 2.10d).

The assemblage of fired clay is too small for anything much to be said of it, other than that the spindlewhorls from these and earlier investigations of the site all came from the area around trench XXV (Fig. 2.10j), again suggesting that activity may have

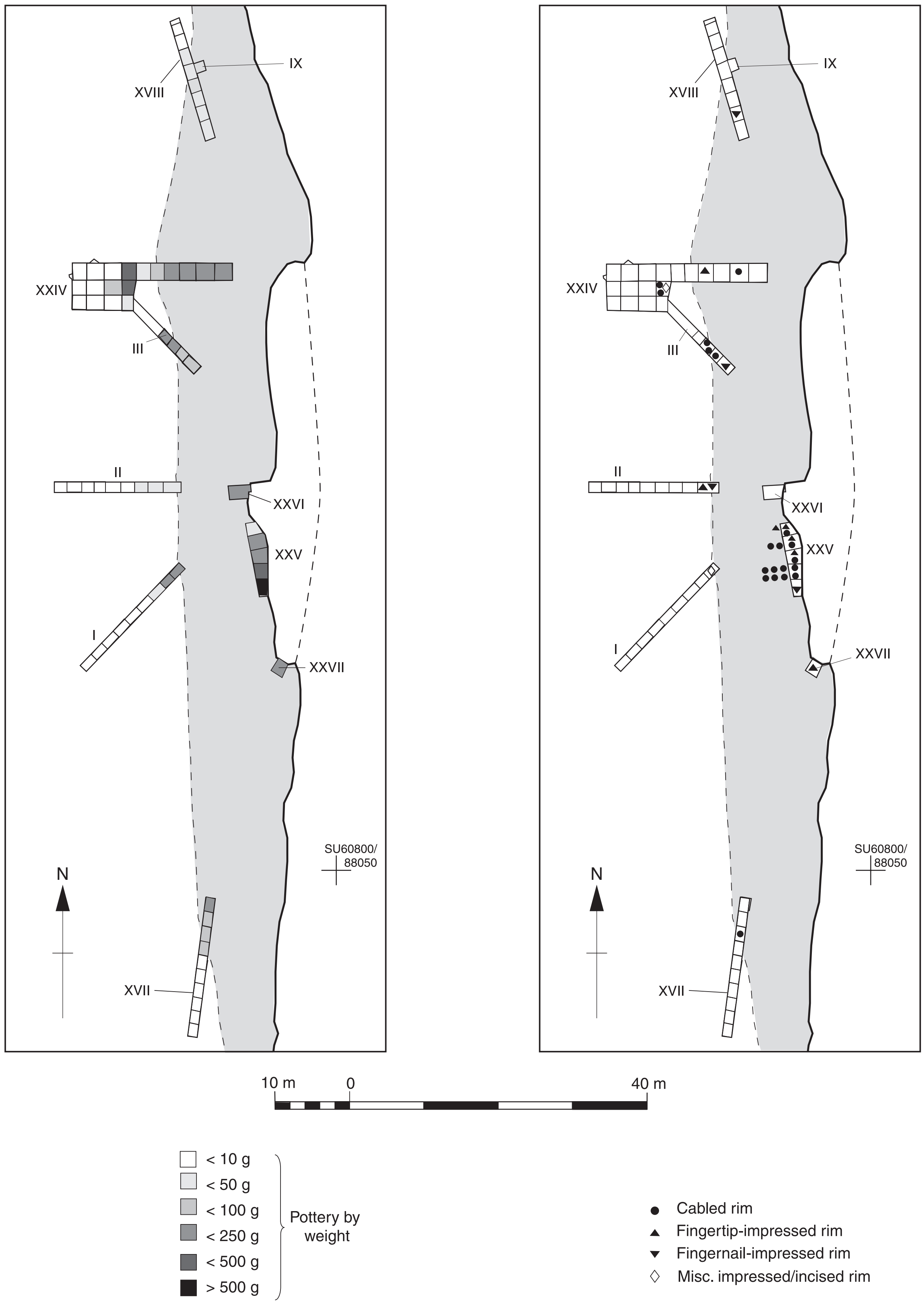


Figure 2.10 Finds distributions across the eyot: a: pottery sherds

Figure 2.10b Decorated rim sherds

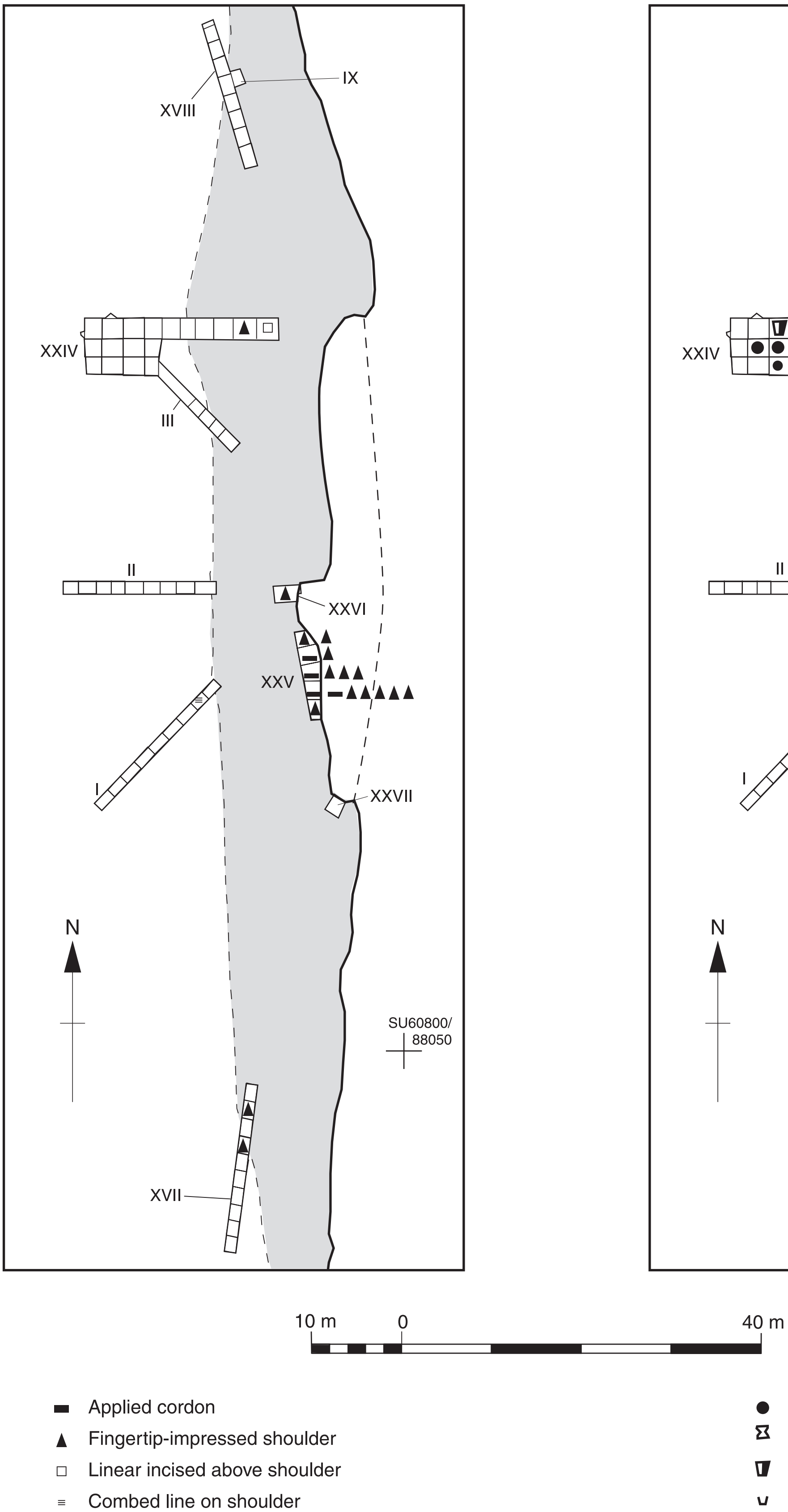


Figure 2.10c Cordoned sherds and decorated shoulder sherds

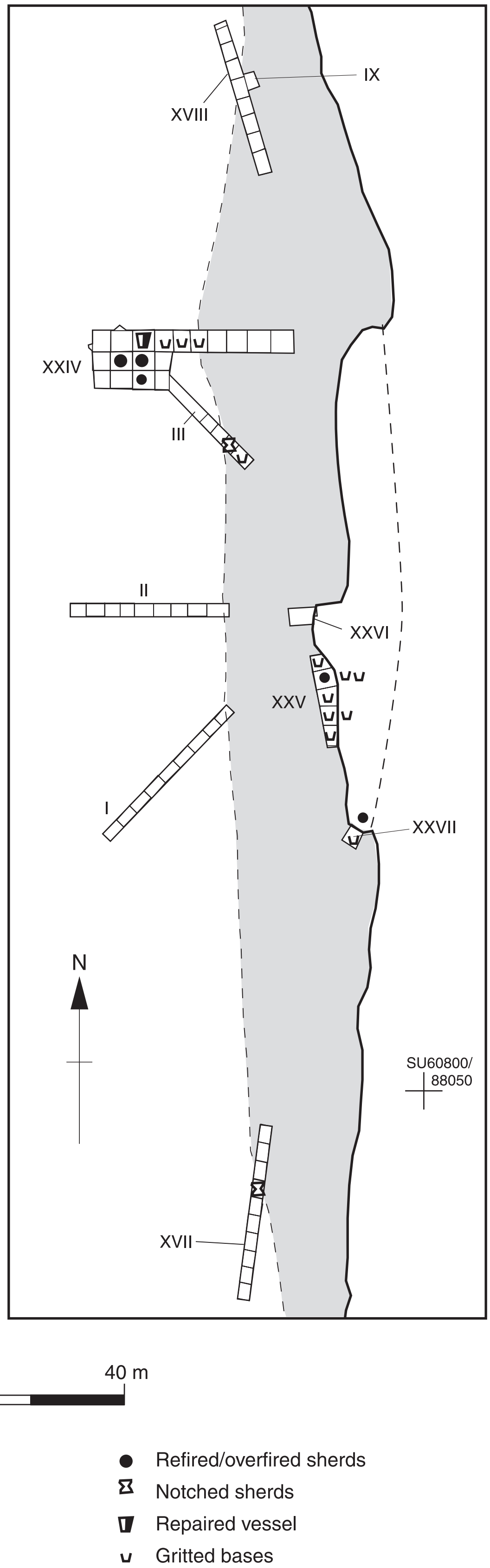


Figure 2.10d Miscellaneous categories of featured sherds

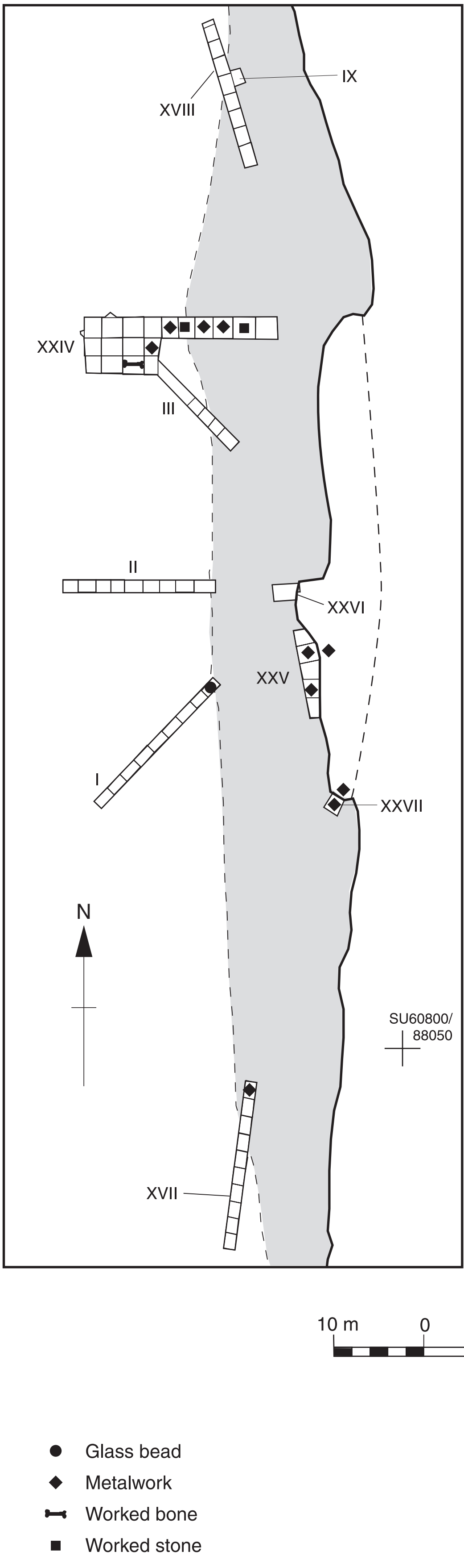


Figure 2.10e Other finds

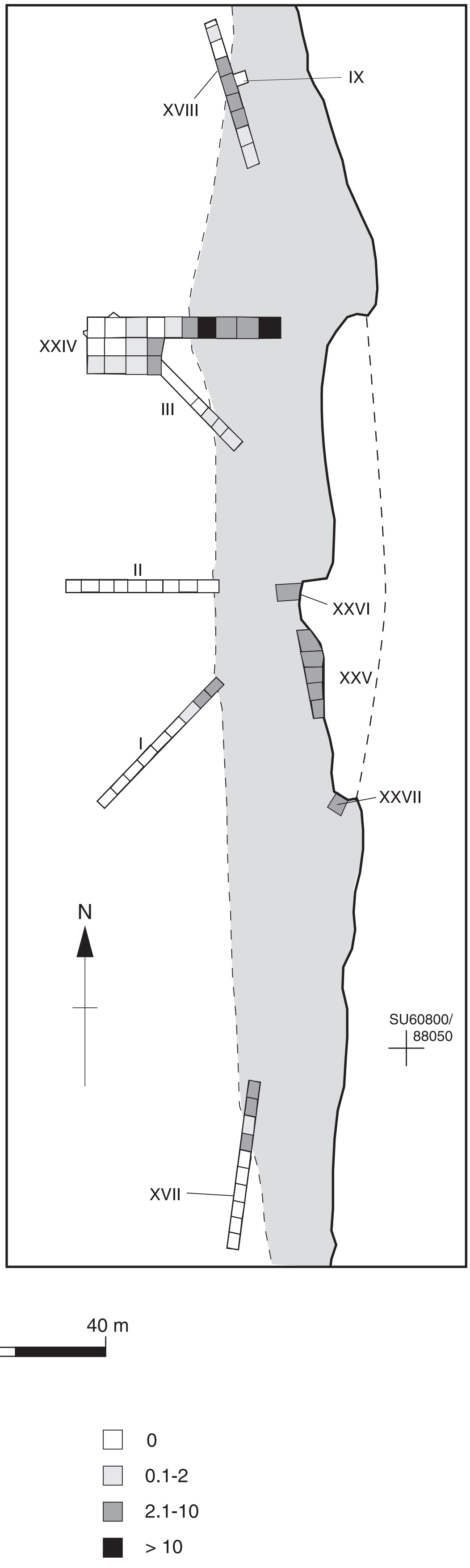


Figure 2.10f Total worked flint

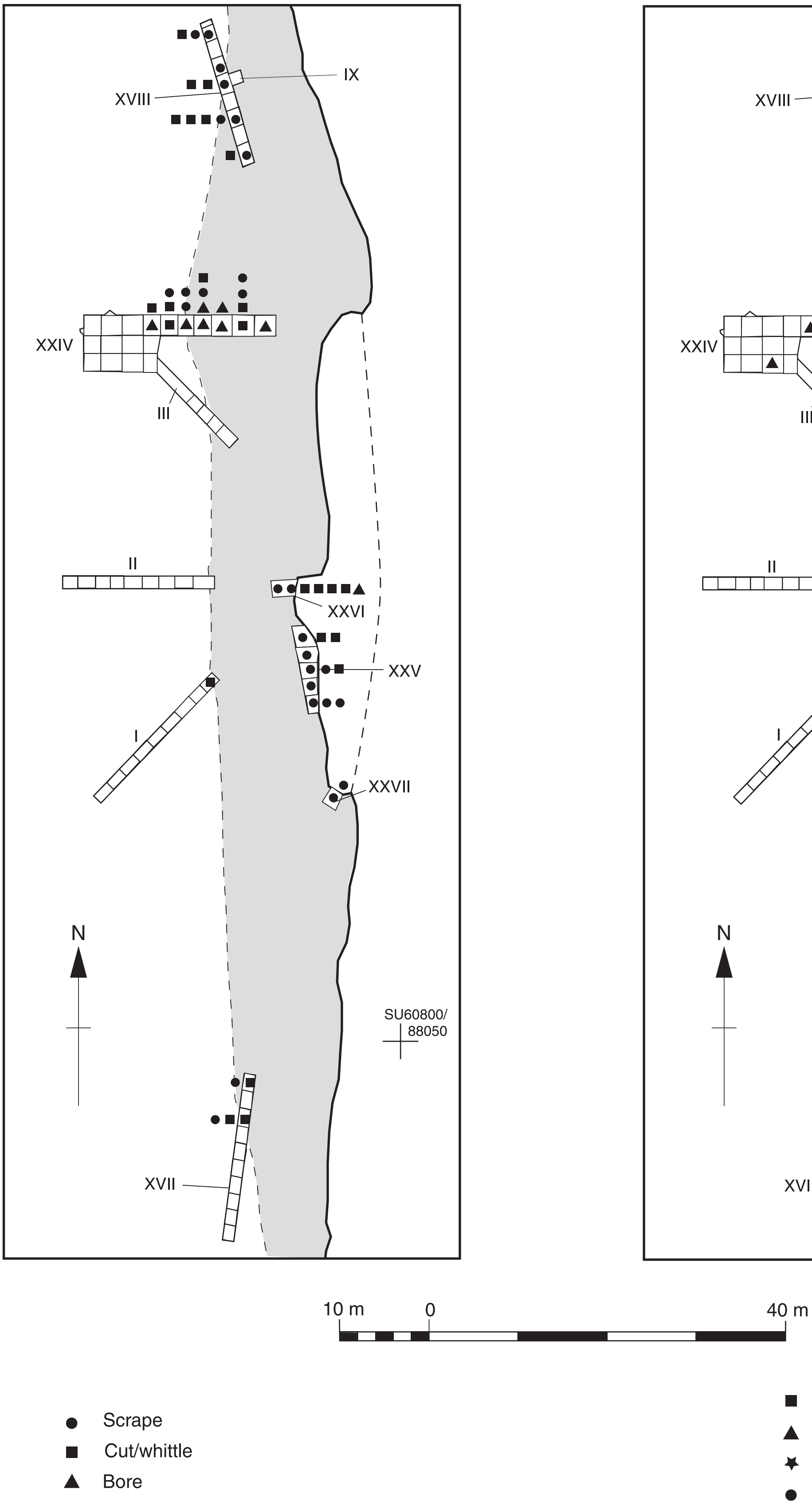


Figure 2.10g Used pieces

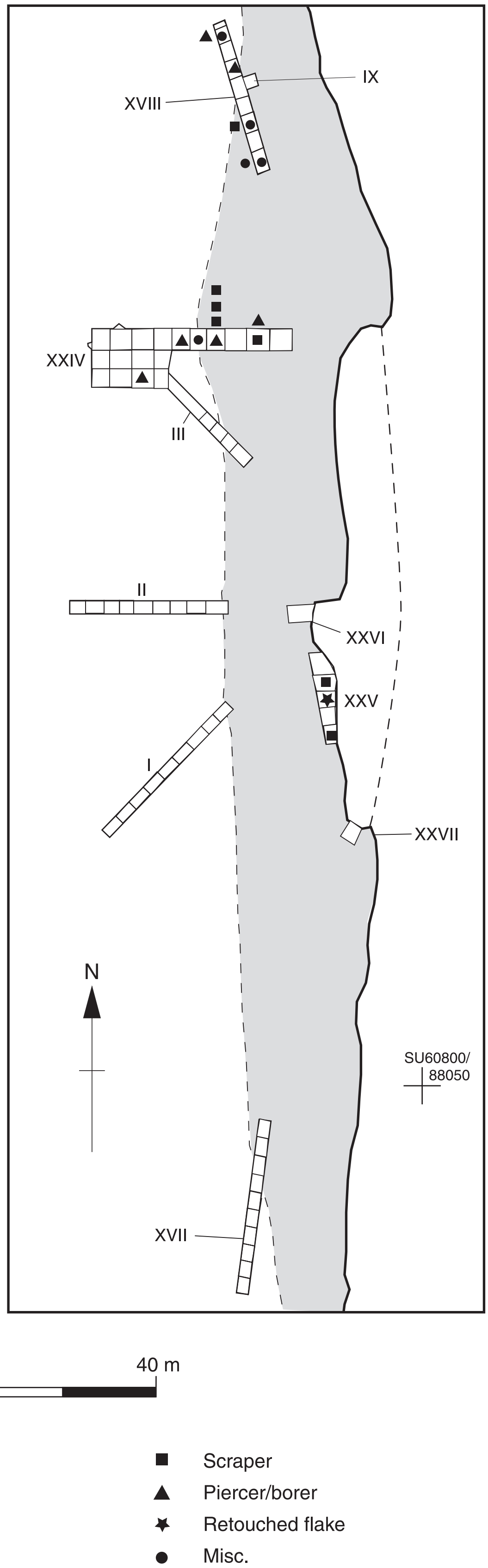


Figure 2.10h Retouched forms

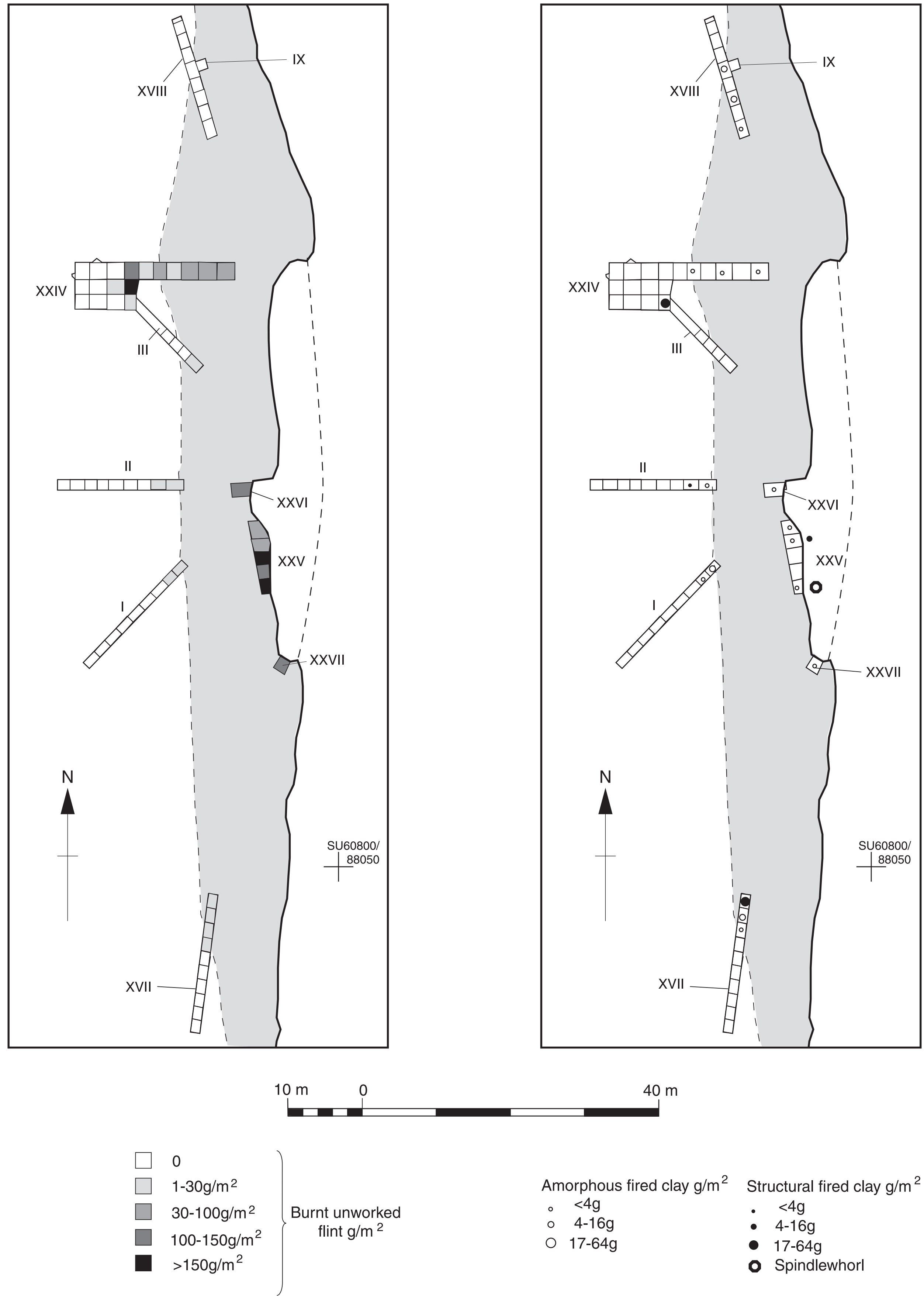


Figure 2.10i Density of burnt unworked flint

Figure 2.10j Fired clay

been different in this area. All four of the fragments of worked stone came from the area of the eyot. The metalwork assemblage recovered from these excavations is also very small and was mostly found in the land area of the eyot with the exception of one copper-alloy pin from the midden (Fig. 3.1.1). The pieces from the latest excavations are mainly restricted to a few small fragments of slag or waste, an unidentified object and a possible awl and piece of copper-alloy strip. A large bronze knife/razor was also found in trench XVII (Fig. 3.1.2). This assemblage on its own is too small to say very much about the distribution of this class of finds, but the results of the earlier investigations suggest that most of the metal also comes from the eastern side of the eyot around trench XXV (Fig. 2.10e). The earlier finds included some broken tools grouped together, possibly as a founder's hoard (see Northover, Chapter 3).

From this then it may be suggested that waste with little further use such as pottery wasters, burnt flint and small flint flakes are more likely to be found on the margins of the eyot, while the tools and better pieces of pottery were found on the land area of the eyot. Within the eyot some activities such as metalworking and textile production may have been grouped towards the centre of the eyot on the eastern side around trench XXV, or at least this was the area in which refuse from these activities was deposited, together with the later decorated pottery and the four human skull fragments found during earlier excavations. How these patterns may have arisen needs to be considered.

Mechanisms of deposition

Needham and Sørensen (1988) discuss various mechanisms for the formation and alteration of occupation layers with reference to the deposits found on the site at Runnymede Bridge. Those described for Runnymede that seem to be most applicable to the eyot at Wallingford are as follows. Regular churning under damp conditions and intermittent occupation over the whole site with midden-formed soil (mechanisms 4, 7 and 2) seem the most likely explanations for the observed distribution of finds spread fairly evenly across the whole area of the occupation layer, but other mechanisms such as *in situ* groups in shallow features which are archaeologically invisible (mechanism 5) are entirely possible. Also possible are a midden-formed soil mechanism whereby organic matter, deliberate soil cover and further inorganic rubbish are dumped in a midden area which shifted during occupation and was disturbed sporadically by trampling, and possibly by dogs, rodents or pigs to an unknown degree. If such middens were formed on the eyot it seems likely that they could not be protected at least from pig disturbance given the likelihood of pigs being kept on the eyot. This kind of mechanism particularly combined with shifting occupation, which may be suggested by the concentration of later decorated pottery in a restricted area of the site, and probable churning, given the low-lying nature of the eyot, could very easily account for the organic-rich soils with frequent finds scattered throughout an apparently homogeneous layer.

Unfortunately, the supposed plough disturbance at Whitecross Farm has destroyed any traces of the microstratigraphy that may have existed within the occupation layer and thus any traces of the mechanisms involved in the formation of the deposit. Though the material has probably not been transported far from its place of deposition by this action, some movement obviously occurred to form the spread of material (contexts 2 and 2403/1) stretching out over the phase 6 alluvium (contexts 3 and 2404), evident in both the riverbank section to the east and trench XXIV to the west of the eyot. This movement makes it impossible to say with any certainty which, if any, of the possible mechanisms suggested fit this site. The level of detail at which the finds were recorded may also contribute to this uncertainty.

Something more of the mechanisms involved in the formation of the midden should be able to be discerned on the site as this deposit was sealed and protected from later disturbance by alluvium (2404). No real stratigraphy was observed within this deposit, and finds were apparently fairly evenly dispersed through its depth. The finds distributions suggest that there may have been a relatively significant deposit of pottery concentrated in the area of the midden overlying the land end of earlier Structure A, but in general the finds would seem to be fairly evenly distributed through the deposit (see Fig. 2.10a and Chapter 3, Late Bronze Age pottery). It may be that the deposit was formed by a single dump of material, but it is more likely to have been built up gradually, and several mechanisms could have been involved which would have destroyed any stratification within it. Churning is very likely as this area would have been very damp or wet for most of the time. This is likely to have been caused by human and animal trampling and animal burrowing and digging among the midden material. There is evidence to suggest that pigs were kept on the site which would have led to considerable disturbance in the middens, and the animal bone assemblage shows signs of canine and rodent gnawing (see Powell and Clark, Chapter 4). Alluviation may also have been involved and a fairly rapid episode of alluviation is the most likely explanation for context 2408 which overlies the main body of the midden. This context, which is principally alluvial silts, also contains a certain amount of midden material, though this episode may have occurred after the midden had ceased to be active.

Movement of refuse

The movement of refuse after its initial discard to its incorporation in archaeological contexts is also considered by Needham and Sørensen (1988). Consideration of this aspect of the midden material and refuse incorporated in the occupation layer at Whitecross Farm may shed some light on the formation of these deposits. It seems that some form of refuse management was being practised since the distribution plots of finds from this site suggest that the debris from the preparation and trimming of flakes in flint knapping makes up a higher proportion of the flint assemblage from the midden than from the occupation layer; the burnt flint was concentrated around the margins of the eyot, and the tools were generally retrieved from the area of the eyot.

It is likely that several of Needham and Sørensen's (1988, 125) four broad categories of reasons for the accumulation and movement of refuse – rubbish clearance, expedient use, midden as resource, and incidental movement – apply to the material at Whitecross Farm. The collection and movement of the flint waste to the midden on the edge of the eyot beyond the settled area is clear evidence for rubbish clearance, while the apparent retention of most of the tools on the eyot surface may have been deliberate retention of refuse viewed as a resource. This last applies to the group of bronze tools found in the earlier investigations of the site and possibly representing a founder's hoard, but may also apply to other types of finds such as the flint. There is some evidence of reuse of flint tools, and the two notched sherds may indicate the reuse of pottery sherds. The discard of burnt stone may have followed the same pattern as the worked flint, although its distribution near the edge of the eyot might be expected if its use was associated with burnt-mound-related activities. Other materials, some of which would not be viewed as a resource today, may also have been reused in ways we do not appreciate now.

Incidental movement of material due to churning in wet ground and animal disturbance, particularly given that pigs were probably kept on the eyot, is likely to have been a factor during the formation of the occupation layer and the midden deposit. Post-depositional disturbance (eg ploughing) is also likely to have had an uncertain influence on the underlying stratified deposits.

There is less evidence for expedient use of rubbish on this site as there are no instances of, for example, deliberate make-up of wet patches or irregularities in the ground with refuse, and as no buildings were recorded from the limited and discontinuous area dug, nothing can be said of possible expedient use of refuse as infill. Expedient use of rubbish in ritual would be much harder to discern especially given the disturbed nature of most of the occupation layer, but it is possible that some of the metal tools and the four fragments of human skull incorporated into the occupation layer (Thomas *et al*. 1986) may have been used in this way.

Human remains

The human skull fragments found within the occupation layer during the course of earlier excavations (Thomas *et al*. 1986, 195) may have had a particular resonance for the occupants of the eyot and were specially deposited within that context. As Brück (1995) points out, burials are rare from this period, but human bone has been found to occur on various sites that would not be considered appropriate from the 20th-century perspective, including settlement sites. These bones do not appear to have been deposited randomly, however. The bones are only included in certain types of context within settlements. This includes middens, and it is often skulls or fragments of skull as at Whitecross Farm. A large amount of, mainly fragmentary, human bone was found within the 9th–8th-century BC midden at Runnymede Bridge (Needham 1992); 32 skull fragments, some of which had been worked, were found scattered through the midden at All Cannings Cross, Wiltshire (Cunnington 1923, 40); a number of skull fragments have been found within the midden dating between the 11th and 7th centuries BC at Potterne (Lawson 1994); 13 pieces of human bone, including 9 skull fragments, 1 of which had been worked into an amulet, were found from the occupation layers and a posthole at the hillfort at Ivinghoe Beacon (Cotton and Frere 1968); an incomplete perforated disc, possibly originally suspended by the perforation, made from a fragment of human skull was recovered from the fill of a waterhole at the late Bronze Age settlement excavated at Reading Business Park (Brossler *et al*. 1994); three cranial fragments were found within the occupation layer, or midden, at Wittenham Clumps, Berkshire (Hingley 1979–80) around 6 km north-west of Whitecross Farm; and a parietal bone was found at Bray which may be the closest parallel for Whitecross Farm (Anon. 1963–4).

These bones obviously had some significance, particularly those pieces showing evidence of having been worked, and must have been specially chosen for incorporation in these contexts rather than undergoing whatever were the normal, archaeologically invisible, procedures for dealing with the remains of the dead at this time. The skull fragment found at East Chisenbury, Wiltshire, apparently placed on a prepared surface within the midden, together with a group of pottery and a small fragment of sarsen, supports the idea that the skull fragments were of special significance. The midden itself at this site, constructed to be a particularly prominent landscape feature, probably held special significance for the community which created it (McOrmish 1996), and this significance may have been increased or re-emphasised by the incorporation of the skull fragment. The plough disturbance at Whitecross Farm has destroyed any evidence for any special placing of the skull fragments, but it is still likely that their deposition in this area of the site – which was identified as slightly different from the distributions of other types of find – might be significant.

Other special deposits

A few other finds which had not been subjected to incidental movement in this way were identified as possibly having been specially deposited in a structured manner. These were retrieved from the base of the channel where subsequent alluviation had sealed and protected them from further disturbance. Principal among these is a semi-complete jar found at the base of the organic silt layer 2405 at the landward end of the jetty Structure A (see Figs 2.4, 3.10.1). That this jar was almost complete distinguishes it from the other sherds found within the later midden layers and suggests that it was specially placed within the channel (see Barclay, Chapter 3). Other distinctive deposits within this context, beyond the wood deposit, are large burnt flint nodules which may represent hearthstones and two shed red deer antlers (see Fig. 2.5). Why the hearth was dismantled and apparently dropped into the middle of the channel from the end of the jetty is not clear and may have been related to ritual, as might the deposition of the antler in a similar position.

As Needham (1992, 60) states, a range of different depositional practices of broadly ritual character existed in the early 1st millennium BC. Many of these rituals were associated with the dead and the entrances and margins of sites. Both were probably related to transition between different states and may be represented at this site. The human remains found are discussed above; the depositions around the jetty may be compared to the rituals surrounding entrances and margins. The jetty is certainly marginal to the settlement on the eyot and may be regarded as an entrance to the enclosure formed by the river around the settlement area. A broad range of deposits have been recovered from the entrances of enclosures of this date, including pottery. These deposits probably helped to draw attention to the boundaries and enhance the status of the residents within the enclosure, particularly the deposition of serviceable items such as this jar and the hearthstones. This would be within the tradition of votive deposits of prestige items such as fine bronze metalwork like that found from this stretch of the river (see Northover, Chapter 3).

The end of the late Bronze Age settlement and later use of the eyot

It is not clear exactly when the settlement was abandoned, but occupation was ongoing until, at least, the Ewart Park, or possibly the later Llynfawr, phase on the grounds of the metalwork recovered from the occupation layer (see Northover, Chapter 3). The pottery confirms this dating (see Barclay, Chapter 3). Around this time the environment on the eyot began to deteriorate. During the late Bronze Age the eyot had been dry, experiencing no, or very infrequent, flooding, but now it became wetter as the climate deteriorated and changes in river flow occurred. The channel was silting up. From an active channel with fast-flowing water, it was now only seasonally active with increasing areas of seasonally exposed mud.

In time, alluviation of the channel was almost complete and the site became one of meadow or pasture with occasional winter flooding, though possibly slightly better drained than some areas of the Thames Valley floodplain. This may have prompted the attempt to bring the area of the eyot into cultivation by ploughing during a relatively drier period, possibly during Roman or later times, and disturbing the late Bronze Age deposits. A 4th-century AD Romano-British coin has been found from the site. The molluscan assemblages from this layer in the channel area were not typical of cultivation, so it may be that cultivation was restricted to the area of the former eyot, or that the area was ploughed only once and then reverted to meadow as it was found to be unsuitable for cultivation. After this the area again became wetter, and experienced a further phase of alluviation. The area was never used for occupation again, and its use is likely to have been restricted to meadow, pasture and recreation, as it has been in post-medieval and modern times. The later finds, such as the bronze ring dated to the later middle ages (see Northover, Chapter 3) and the recent horseshoes, can be explained by accidental loss (see Allen, Chapter 3).

Chapter 3: Whitecross Farm: Artefactual Evidence

COPPER-ALLOY METALWORK

by J Peter Northover

Introduction

The Wallingford section of the River Thames has been very productive of Bronze Age metalwork, especially late Bronze Age material, since the mid 19th century. The material that has been dredged from the river itself has been carefully considered by Thomas (1984), while investigation of an occupation layer at Whitecross Farm on a number of occasions since 1949 has yielded an assemblage of Bronze Age and later metalwork. The metalwork recovered from these previous interventions has also been discussed by Thomas *et al.* (1986). The most recent excavations at Whitecross Farm have added further items, as has metal-detector exploration in the vicinity (see Table 3.1 for a summary of this material). This report discusses the metallurgical analysis of artefacts recovered from the most recent excavations and metal-detector finds, as well as some of the earlier finds. The results of the analysis will be used to extend our understanding of Bronze Age metal use in the area in relation to the river and the settlement. As the results affect some of the published descriptions in Thomas *et al.* (1986), the objects analysed are described again below, together with their analyses and metallographic descriptions.

Methods

With the exceptions of two pieces of waste material and fragments of sheet and wire which were simply sectioned, all objects were sampled using a hand-held modelmaker's electric drill with a 0.7 mm diameter bit. All samples were hot-mounted in a conducting resin, ground and polished to a 1μm diamond finish. Analysis was by electron probe microanalysis with wavelength dispersive spectrometry; 12 elements (13 for the most recent finds) were analysed with detection limits generally in the range 100–200 ppm. Three analyses were made per sample, and these analyses and their means, normalised to 100%, are set out in Table 3.2. All concentrations are given in weight %.

In one case, the stop-ridge flanged axe, a lead isotope analysis was made because of the object's important place in understanding the development of middle Bronze Age metalworking styles (see Appendix 2). Where drilled samples were used, metallographic examination was not possible; all the other samples were examined under an optical microscope.

Catalogue of metalwork of confirmed Bronze Age date

Five objects of Bronze Age date, either whole or fragmentary, were analysed from the material published by Thomas *et al.* (1986) (Figs 3.1.3, 3.2.1–3); three further metal-detector finds are also definitely Bronze Age (Figs 3.2.4–6). A further three artefacts from Whitecross Farm are from late Bronze Age contexts (Figs 3.1.1–2, 3.1.4). Two were recovered from layers stratigraphically later than wood dated in the range 1000–800 cal BC (see Appendix 1), and therefore potentially of Ewart Park date; although rather lacking exact parallels, they certainly have Bronze Age typological affinities. See Table 3.2 for composition.

Pin *(Fig. 3.1.1)*

Whitecross Farm excavations (WBP86, TrXXIV, SF 2411, layer 2414, the LBA midden); sample no. Ox 40: complete; roughly circular nail-head with flat base and slightly domed top; shaft is subrectangular in section, becoming more circular near the point; the shaft is corroded in places and slightly bent; the point is long and gently tapered. L: 84 mm; head Dia.: 5.2 mm.

In a Bronze Age context this would be classed as a nail-headed pin (O'Connor 1980, 200; list 180) with a date extending from the Wilburton to the Llyn Fawr periods. These pins occur in both hoard and settlement contexts. However, most, if not all, of the published examples have a round shaft and, usually, a slightly conical lower profile to the head. In the absence of contextual evidence the flat base to the head and the square shaft would raise doubts about the dating of this piece. An alternative might be that it is a nail, but the slender point would not be suitable for such a use. The object, therefore, must be a pin, but on the basis of typology alone cannot be assigned a specific Bronze Age date.

The moderately leaded bronze composition with low impurities except for arsenic is typical of much Ewart Park bronze in southern Britain, particularly where metal is influenced by the import of Carp's Tongue material where, characteristically, As » Sb. It could, perhaps, be of late Iron Age or Roman date, but the pin is not an Iron Age type, and Roman pins frequently contain alloy levels of zinc. Thus the compositional evidence (see Table 3.2) is consistent with the dating of the context in which the pin was found. Future excavations in the Thames Valley may uncover further examples.

Table 3.1 Copper-alloy metalwork from Wallingford

Date	*Group/class*	*Location*	*Publication*
Early/middle Bronze Age transition			
Ribbed dagger or dirk?	?Group I dirk	Lost	Thomas 1984, no. 11
Stop-ridge flanged axe	Rowlands class 2 flanged axe	OAU	This report: Fig. 3.2.4
Acton Park period			
Unlooped palstave	Acton Park	Reading 1271.64	Thomas 1984, no. 16
Taunton period			
Basal-looped spearhead	Leaf-shaped	OAU	This report: Fig. 3.2.5
Dirk	Group III	Reading 1088.64	Thomas 1984, no. 12
Basal-looped spearhead	Hybrid	Reading 1270.64	Thomas 1984, no. 15
Penard period (1350–1150 BC)			
Leaf-shaped sword	Ballintober	Reading 177.61	Thomas 1984, no. 10
Rapier	Group IV	Reading 1268.64	Thomas 1984, no. 14
Dirk	Group IV	Reading 173.65	Thomas 1984, no. 18
Wilburton period and Ewart Park transition			
Socketed sickle with mid-rib blade	Ring socketed	Reading 1949.80/65	Thomas *et al.* 1986, no. 3: Fig. 3.2.2
Ewart Park period (1050–750 BC)			
Barbed spearhead	Group II	Reading 1091.164	Thomas 1984, no. 13
Leaf-shaped pegged spearhead, ribbed socket		Reading 1949.80/64	Thomas *et al.* 1986, nos 4–5: Fig. 3.2.1
Leaf-shaped pegged spearhead		Ashmolean, Pr 374	Thomas 1984, no. 3
Five-ribbed socketed axe	cf. Croxton type	Ashmolean, Pr 372	Thomas 1984, no. 1
Three-ribbed socketed axe, edge ribs	cf. Croxton type	Lost	Thomas 1984, no. 4
Faceted socketed axe		Ashmolean 1927.2707	Thomas 1984, no. 5
Socketed knife	Thorndon type	Ashmolean, Pr 373	Thomas 1984, no. 2
Socketed knife	Thorndon type	Ashmolean, 1927.2708	Thomas 1984, no. 6
Socketed knife	Thorndon type	Reading 173.65	Thomas 1984, no. 19
Socketed knife	Dungiven type	OAU	This report: Fig. 3.2.6
Socketed gouge		Ashmolean, 1927.2709	Thomas 1984, no. 7
Sickle socket	Fox Thames series	Reading 1949.80/65	Thomas *et al.* 1986, no. 2: Fig. 3.2.3
Bifid razor, ribbed shaft	Class II	Ashmolean, 1927.2711	Thomas 1984, no. 9
Tanged leatherworking knife	Roth type II	Ashmolean, 1927.2710	Thomas 1984, no. 8
Tanged leatherworking knife	Roth type II	Reading 1949.80/63	Thomas *et al.* 1986, no. 1: Fig. 3.1.3
Pin	Nail-headed	OAU, WBP86 SF2411	This report: Fig. 3.1.1
Knife/razor		OAU, WBP86 SF2415	This report: Fig. 3.1.2
Flat-section awl		OAU, WBP91 SF1	This report: Fig. 3.1.4
Llyn Fawr period			
Faceted socketed axe	Blandford type	Reading 1272.64	Thomas 1984, no. 17
Uncertain, probably later Bronze Age			
Awl	Round section, flat tang	Reading	Thomas *et al.* 1986, no. 6
?Awl point or tang	Square section	Reading	Thomas *et al.* 1986, no. 7
Sheet fragment		Reading	Thomas *et al.* 1986, no. 8
Crumpled sheet fragment		Reading	Thomas *et al.* 1986, no. 11
Thin plate		Reading	Thomas *et al.* 1986, no. 9
Wire fragment		Reading	Thomas *et al.* 1986, no. 12
Wire fragment		OAU, WBP91 SF2	This report
Two droplets casting waste		Reading	Thomas *et al.* 1986, no. 10
Oxidised bronze		OAU, WBP86 SF2406	This report
Uncertain date			
Ring		OAU, WBP86 SF1	This report
Recent			
Crumpled sheet	Brass	OAU, WBP91 SF3	This report

Razor *(Fig. 3.1.2)*

Whitecross Farm excavations (WBP86, SF 2415, layer 1703, a LBA context); sample no. Ox 38: complete; possible scraper in the form of a bronze disc truncated along a chord; it comprises a plate thickened around a hole located at the centre of the circular arc, and thinning to a sharp edge at the circumference; back edge rounded off where it meets the circumference. Dia.: 76 mm; Ht: 48 mm; hole Dia.: 5.5 mm; Th.: 2.5 mm (max.).

Good parallels for this object are not found in southern Britain and we must look further afield among continental razors and razor knives. More particularly, reasonably close comparisons can be made with objects in Jockenhövel's type description *Einscheidige Halbmodrasiermesser ohne Griff* (Jockenhövel 1971; 1980). A typical example is from Mörigen, Kanton Bern in Switzerland (Jockenhövel

Table 3.2 Analysis of copper-alloy metalwork from Wallingford

Sample number	*Object*	*Location of sample*	*Fe*	*Co*	*Ni*	*Cu*	*Zn*	*As*	*Sb*	*Sn*	*Ag*	*Bi*	*Pb*	*Au*	*S*
Ox151a	Basal-looped spearhead	socket	0.07	0.03	0.47	84.18	0.00	1.69	0.06	13.20	0.01	0.01	0.06	0.00	0.21
Ox151b			0.04	0.02	0.47	86.36	0.01	0.39	0.07	12.53	0.00	0.01	0.07	0.00	0.03
Ox151c			0.07	0.04	0.43	85.81	0.00	0.82	0.04	12.44	0.03	0.00	0.11	0.00	0.22
Ox151d			0.06	0.04	0.50	85.76	0.00	0.00	0.04	13.41	0.00	0.00	0.09	0.00	0.11
Ox152a	Stop-ridge axe	blade	0.14	0.01	0.14	89.83	0.01	0.00	0.02	9.66	0.00	0.00	0.13	0.00	0.05
Ox152b			0.17	0.01	0.12	88.12	0.00	1.20	0.01	10.25	0.02	0.00	0.03	0.03	0.03
Ox152c			0.14	0.00	0.14	89.04	0.00	0.07	0.01	10.38	0.05	0.01	0.13	0.00	0.03
Ox152d			0.15	0.01	0.15	90.04	0.02	0.00	0.02	9.41	0.00	0.00	0.11	0.00	0.09
Ox153a	Socketed knife	fracture	0.02	0.01	0.21	87.16	0.00	0.53	0.77	8.36	0.27	0.00	2.46	0.04	0.19
Ox153b			0.03	0.01	0.16	83.16	0.00	0.00	0.45	6.36	0.24	0.00	9.58	0.00	0.01
Ox153c			0.01	0.00	0.17	88.72	0.00	0.00	0.48	7.61	0.19	0.00	2.62	0.00	0.19
Ox153d			0.02	0.00	0.21	82.43	0.00	0.00	1.11	10.51	0.44	0.00	5.17	0.04	0.07
Ox154a	Flat awl (WBP91 SF1)		0.04	0.02	0.08	90.35	0.03	0.00	0.10	8.58	0.02	0.06	0.56	0.15	0.01
Ox154b			0.14	0.00	0.09	88.95	0.00	0.17	0.15	9.71	0.09	0.00	0.56	0.11	0.04
Ox154c			0.00	0.01	0.11	87.56	0.05	0.75	0.17	10.15	0.12	0.00	0.83	0.14	0.12
Ox155a	Wire (WBP91 SF2)		0.03	0.00	0.02	91.34	0.00	1.51	1.56	4.34	1.03	0.00	0.04	0.11	0.02
Ox155b			0.17	0.00	0.06	92.47	0.01	0.00	1.57	4.01	1.00	0.00	0.00	0.00	0.72
Ox155c			0.36	0.00	0.04	91.88	0.00	0.10	1.54	4.08	1.05	0.01	0.19	0.00	0.76
Ox156a	Crumpled sheet (WBP91)		0.11	0.00	0.09	73.76	22.80	1.80	0.02	0.01	0.10	0.18	1.12	0.00	0.01
Ox156b			0.15	0.01	0.06	74.77	24.73	0.00	0.07	0.02	0.01	0.00	0.17	0.00	0.00
Ox156c			0.15	0.00	0.07	75.36	23.86	0.00	0.01	0.04	0.00	0.05	0.27	0.00	0.20
Ox151/Mean	Basal-looped spearhead	socket	0.06	0.03	0.47	85.53	0.00	0.73	0.05	12.89	0.01	0.01	0.08	0.00	0.14
Ox152/Mean	Stop-ridge axe	blade	0.15	0.01	0.14	89.26	0.01	0.32	0.02	9.92	0.02	0.00	0.10	0.01	0.05
Ox153/Mean	Socketed knife	fracture	0.02	0.00	0.19	85.37	0.00	0.13	0.70	8.21	0.28	0.00	4.96	0.02	0.11
Ox154/Mean	Flat awl		0.06	0.01	0.09	88.95	0.02	0.31	0.14	9.48	0.08	0.02	0.65	0.13	0.06
Ox155/Mean	Wire		0.19	0.00	0.04	91.90	0.00	0.54	1.56	4.14	1.03	0.00	0.08	0.04	0.50
Ox156/Mean	Crumpled sheet		0.14	0.00	0.07	74.63	23.80	0.60	0.03	0.02	0.04	0.08	0.52	0.00	0.07
Ox33	Sickle socket		0.03	0.01	0.05	87.58	0.01	0.12	0.12	11.25	0.06	0.02	0.75	0.00	0.00
Ox34	Sickle blade		0.01	0.03	0.20	85.61	0.01	0.40	0.55	8.63	0.26	0.02	4.25	0.03	0.00
Ox35	Spear point		0.04	0.09	0.22	86.22	0.03	0.46	0.32	10.04	0.11	0.02	2.45	0.00	0.00
Ox36	Spear socket		0.03	0.08	0.22	85.71	0.00	0.40	0.36	11.04	0.11	0.03	2.02	0.00	0.00
Ox37	Tanged leatherworking knife		0.03	0.05	0.22	90.83	0.00	0.31	0.59	6.07	0.24	0.01	1.65	0.00	0.00
Ox38	Disc		0.07	0.05	0.35	86.97	0.00	0.09	0.10	12.22	0.06	0.01	0.08	0.00	0.00
Ox39	Ring		0.02	0.01	0.06	86.37	0.09	1.11	1.02	6.93	0.50	0.13	0.43	0.02	0.00
Ox40	Pin, nail-headed		0.07	0.01	0.09	85.98	0.00	0.20	0.04	9.77	0.08	0.02	3.74	0.00	0.00

Fe = iron, Co = cobalt, Ni = nickel, Cu = copper, Zn = zinc, As = arsenic, Sb = antimony, Sn = tin, Ag = silver, Bi = bismuth, Pb = lead, Au = gold, S = sulphur

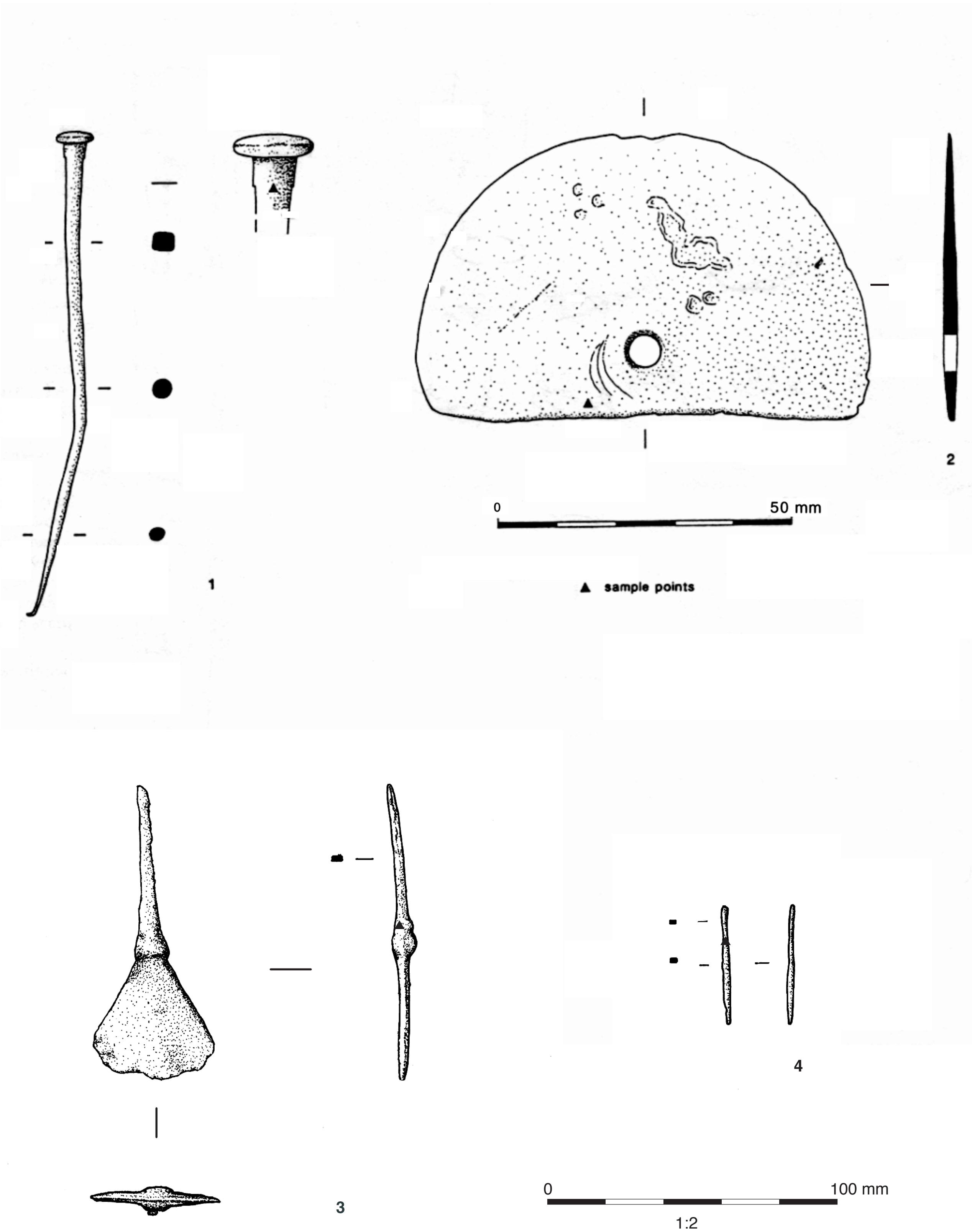


Figure 3.1 Metalwork from Whitecross Farm and riverbank: pin (1), razor (2), tanged chisel (3), awl (4)

1971, no. 546); other good parallels can be found elsewhere in Switzerland and in eastern France. Further west they are much rarer, but they can be found in the large hoard from Vénat, Charente, on the Atlantic coast of France, and associated with an unfinished Ewart Park sword (Coffyn *et al.* 1981, pls 25–6). The composition is of interest in this context. The alloy is a medium tin unleaded bronze with no zinc, which suggests an origin further east than Atlantic Europe where a leaded bronze would be expected. The impurity pattern is consistent with this.

The association of impurity pattern and alloy content may be more informative. There are similarities between the composition of the disc and that of the basal-looped spearhead (see below) and, indeed, the best match for the disc composition is in the Taunton/Cemmaes period (15th into the 14th century BC). However, the piece cannot be paralleled in that period.

Tanged chisel (leatherworking knife) *(Fig. 3.1.3, Pl. 3.1)*

Recovered from the occupation layer in the riverbank in 1949 (Thomas *et al.* 1986, no. 1); sample no. Ox 37: complete but worn; rectangular section but slightly tapered tang, possibly with extreme tip missing; the stop is in the form of a slightly rounded swelling of the tang; the blade has widely splayed straight sides and a thin lenticular cross-section; the cutting edge is curved and asymmetrically worn; chipped; sandy brown colour on surface. L: 101 mm; W: (blade) 41 mm. Now in Reading Museum (no. 1949.80/63).

Tanged chisels or blades of this type have been identified as leatherworking knives by Roth (1974); the asymmetrical wear on both this and the second example found in the Wallingford area (Thomas 1984) are compatible with this use. However, this definition is probably too restrictive as the tools would have been adequate for other cutting purposes, including uses akin to a modern paring chisel or marquetry knife, and might even have had uses with materials other than wood or leather.

This type is first established in the Penard period (13th century BC; Needham 1996) in the Burgess Meadow hoard near Oxford. They probably evolved from plain chisels through an expansion of the cutting edge. This example belongs to Roth's type II, with a triangular or nearly straight-sided blade. This has a wide distribution in the Ewart Park period, perhaps extending into the Llyn Fawr period. The distribution is concentrated in south-east England and the Thames Valley, with other clusters in south-west England and Yorkshire, and a

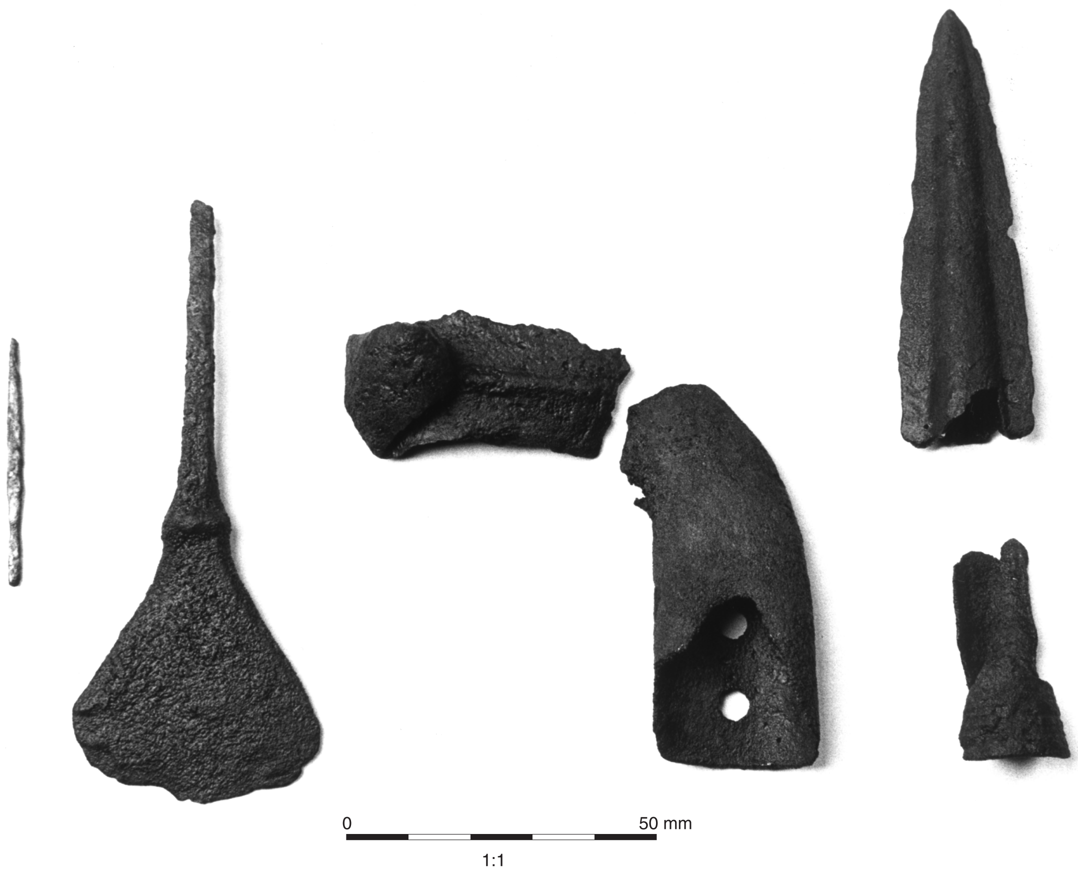


Plate 3.1 Metalwork recovered from the riverbank in 1949. From left to right: awl, tanged chisel, sickle blade and socket, and socketed spearhead. Copyright Reading Museum Service.

scatter elsewhere. Roth's list is far from complete and there have been more recent discoveries, especially from metal-detector finds in southern and eastern England. The composition is of 'S' type and closely parallels that of the sickle blade, including the relatively low tin content. The composition is also not unlike that of the spearhead and it is quite possible that the three are roughly contemporary. While the metal type is entirely consistent with a date in the earlier part of the Ewart Park period, it is also possible that this knife could be dated to the Wilburton period.

***Awl** (Fig. 3.1.4, Pl. 3.1)*

Whitecross Farm excavations (WBP91, SF 1, context 2505/B/2, a context dated by pottery to the end of the LBA, perhaps after 800 BC); sample no. Ox 154: small rectangular section awl or cutting tool with circular section point. L: 35 mm; W: 4 mm (max.); Th.: 3 mm (max.).

This awl fragment, despite having a rather low lead content, could well be of Ewart Park date or even later. It is typical of many small tools from later Bronze Age sites in Britain, for example at Flag Fen (Northover and Rohl 1996).

***Socketed spearhead** (Fig. 3.2.1, Pl. 3.1)*

Recovered from the occupation layer in the riverbank in 1949 (Thomas *et al.* 1986, nos 4–5); sample nos Ox 35–6: fragmentary. Thomas *et al.* (1986) illustrate this as two fragments but indicate that the socket has now been reduced to a number of small fragments. It is quite clear that the illustrated point and socket are part of the same spearhead, and this has been confirmed by the analyses. Long, narrow, elliptical blade with chipped, corroded edges; long, tapering, rather broad, circular section mid-rib; medium-length socket with two rivet holes and horizontal ribbing around mouth. L: (point) 76 mm; W: 22 mm (max.); L: (socket) 50 mm; W: 19 mm. Now in Reading Museum (no. 1949.80/64).

The plain pegged spearhead became established in Britain at the end of the middle Bronze Age, the Penard period (Burgess 1968; Needham 1996). The range of elaboration on this basic theme reached a maximum in the Wilburton period with elaborate blade sections, hollow blades, and so forth. At the same time decorated sockets became part of the repertoire; usually grooved decoration round the socket is engraved but cast decoration is also known and casting skills also reached a peak in the Wilburton period. The variety of spearhead types became more restricted in the Ewart Park period and the plain pegged type in a range of sizes came to be predominant. Decorated sockets persisted into the Ewart Park period, but for how long is problematic. Ehrenberg (1977, 60, fig. 22.102) suggests that the ribbing on a spearhead of possible Hallstatt date from Sonning, Berkshire is a parallel for the apparently cast decoration on the Wallingford spearhead. However, this spearhead is of a very different solid bladed type and the decoration is in the form of separate, cast, raised ribs (it is not even certain, given its present condition, that the decoration on the Wallingford spearhead is cast). A better parallel is a spearhead with a narrow, stepped blade from Taplow, Buckinghamshire (ibid., 47, fig. 21.110), or one from Maidenhead, Buckinghamshire (ibid., 41, fig. 21.76). All these finds cited are from the River Thames itself.

The type of spearhead cannot necessarily be dated too closely, although Wilburton to earlier Ewart Park is perhaps most plausible. The impurity pattern and alloy content would tend to favour the latter part of that range.

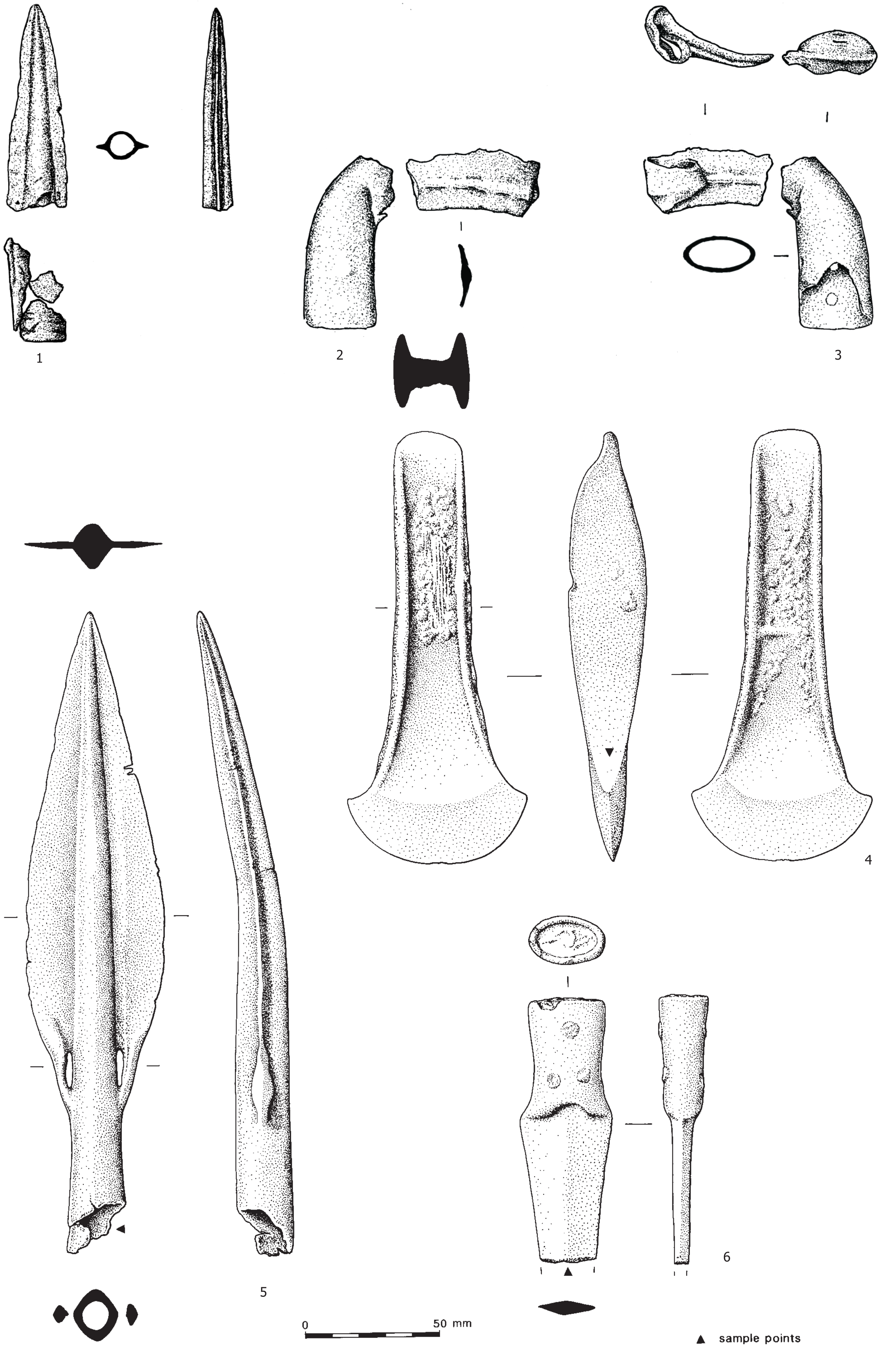
***Sickle blade** (Fig. 3.2.2, Pl. 3.1)*

Recovered from the occupation layer in the riverbank in 1949 (Thomas *et al.* 1986, no. 3); sample no. Ox 34: fragmentary; a length of sickle blade, narrowing towards the tip, with a rounded, slightly curved mid-rib; the blade edges are damaged and bent over; the tip has been rolled upon itself; corroded pitted surface; brown. L: (present) 46 mm; L: (unrolled) 90 mm; W: 22 mm (max.). Now in Reading Museum (no. 1949.80/65).

Both form and composition demonstrate that this blade does not belong with the socket described below (Fig. 3.2.3). Many of the sickles in Fox's evolutionary scheme for socketed sickles have some form of ribbing on the blade. However, only the earliest ring-socketed sickles, with open or closed sockets, where the blade either curves upwards slightly from the socket or meets it at right angles, have blades with a simple mid-rib. The sickles in the Isleham, Cambridgeshire hoard tend to have a sublozengic cross-section with a central arris rather than rib, but other classes of object in the hoard show both rib and ridge existing together. Thus, typologically, we might suggest that this sickle is relatively early in the late Bronze Age, either coming towards the end of the Wilburton period or soon after the beginning of the Ewart Park period.

This proposal is supported by the analysis: a leaded medium tin bronze with significant arsenic, antimony, nickel and silver impurities, just within the definition of 'S' metal in a scheme for labelling Bronze Age impurity patterns (Northover 1980; 1982). 'S' metal, generally with higher levels of impurities than this, was the characteristic metal of the Wilburton period and was imported ultimately from Alpine or central Europe, via northern and north-western France. The use of 'S' metal did not

Figure 3.2 (opposite) Metalwork from riverbank and river dredging: socketed spearhead (1), sickle blade (2), sickle socket (3), stop-ridge flanged axe (4), basal-looped spearhead (5), socketed knife (6)


1
2
3
4
5
6
0
50 mm
▲ sample points

cease abruptly with the end of the Wilburton period but generally declined, most rapidly in the west and more slowly in East Anglia and other parts of the east coast. On compositional grounds a Wilburton or early Ewart Park date is sensible, and a good parallel is the hoard from Marston St Lawrence near Banbury, north Oxfordshire (Brown and Blin-Stoyle 1959).

Sickle socket *(Fig. 3.2.3, Pl. 3.1)*

Recovered from the occupation layer in the river-bank in 1949 (Thomas *et al.* 1986, no. 2); sample no. Ox 33: fragmentary; the blade is broken off close to its base and one side of the socket is also missing; socket has flattened oval cross-section and two rivet holes on surviving side; the socket is closed and curved at the top, the curve being continued by the line of the missing blade; where the thickness of the socket narrows to that of the blade there is a marked step at a small angle to the vertical. L: 64 mm (max.); W: 30 mm (max.). Now in Reading Museum (no. 1949.80/65).

Comparison of the analyses of the sickle socket and sickle blade (described above: Fig. 3.2.2) shows very clearly that they are not from the same object; this difference can also be supported typologically. The form of the sickle socket, with the blade and socket joined in a smooth curve, places it in Fox's Thames series (Fox 1939). In the Thames series the blade is smooth, as appears to be the case here, while the blade fragment (see above) has a mid-rib. The Thames series cannot be closely dated because there are no helpful associations. Fox assumed that it broke away early from the main series of socketed sickles (his group I) and that it followed an independent evolution in the Thames Valley. Discoveries made since Fox wrote have some bearing on this question. The Isleham hoard can be firmly dated to the end of the Wilburton period of the late Bronze Age in the 11th century BC (Needham 1996). All the socketed sickles in that hoard are of the open ring-socket type found at the head of group I (O'Connor 1980; Northover 1982). There is therefore a strong probability that the Wallingford sickle dates to the subsequent Ewart Park period, the 10th–8th centuries BC, or even a little later. Another influence on the type might be Fox's group II, essentially derived from the double-edged socketed knife by curving the blade into a sickle-like form. The double-edged socketed knife is also prototyped in the Isleham hoard, while several group II sickles have also been found in East Anglia. There are two examples in Ireland where there is also one example of a Thames series sickle. Since Fox wrote, another has been found outside the Thames Valley, at Halkyn, Clwyd, in north-east Wales (Green 1985; *pace* Green, this is not a ring-socketed type).

Thus the typological evidence, such as it is, places the socket in the Ewart Park period, or possibly in the succeeding Llyn Fawr period, into the 7th century BC. The low-lead medium–high tin alloy could support any of these dates. The impurity pattern is equally undiagnostic other than being typical of the Ewart Park and Llyn Fawr periods as a whole.

Stop-ridge flanged axe *(Fig. 3.2.4)*

Metal-detector find from river dredgings. Sample no. Ox 152: complete; slightly rounded butt protruding above long, leaf-shaped flanges; splayed blade; well-curved, expanded cutting edge with large bevel; well-defined stop-ridge with slight ledge on one face, less well defined on the other; no flash line on either flange; blue-green corrosion products with earth and lime encrustations. L: 161 mm; W: (blade) 67 mm; W: (butt) 25 mm; Th.: 28 mm (max.); Wt: 455 g. Private ownership.

This axe represents part of the transition to the long-flanged axe with expanded cutting edge of the end of the early Bronze Age, of which the Arreton type is one of the principal forms (Schmidt and Burgess 1981). This axe fits into Rowlands' class 2 of flanged axes although this class is rather loosely defined (Rowlands 1976). The small hoard from Dorchester-on-Thames (Ashmolean Museum 1927.2679–80) offers a close parallel and others can be found along the Thames down to London.

The developments that have occurred in the Wallingford axe are a shift towards a more palstave-like outline and the formation of stop-ridges on both faces; however, the 'septum' is still almost the same thickness as the blade and the flanges are still full length, extending well below the stop-ridge. The form probably represents a mixture of influences, the stop-ridge perhaps deriving from the north-west of the European mainland, as evidenced in hoards such as Ilsmoor in northern Germany, while the palstave outline could have developed in Britain. The development of early unlooped palstaves of Llandderfel and Acton Park type seems to have proceeded most rapidly in Wales. The composition fits well in this transitional phase and can be compared with that of some early palstaves in the Burley, Hampshire hoard (Rohl 1995). This is further supported by the lead isotope analysis (see Appendix 2) where this axe groups with palstaves in the Burley hoard.

Basal-looped spearhead *(Fig. 3.2.5)*

Metal-detector find from river dredgings. Sample no. Ox 151: complete; long leaf-shaped blade with flat section and wide, shallow, hammered bevels along edges; some small cuts on edge; lozengic section mid-rib; long loops with tear-shaped covering with marked flash line; broken, circular section socket. Blue-green patina with some earthy encrustation. L: (present) 241 mm; blade 190 mm x 51 mm; socket Dia. (present) 20 mm; Wt: 226 g. Private ownership.

This is a well-developed leaf-shaped basal-looped spearhead, perhaps with a flatter blade than most specimens. The composition, with its relatively high nickel and arsenic content, defines the metal as dating to the Taunton/Cemmaes period of the middle Bronze Age, from the 15th into the 14th century BC (Northover 1980; Needham 1996), rather than the later Penard period. In the region of the Upper Thames Valley, Ehrenberg (1977) shows basal-looped spearheads as largely confined to the Thames and Kennet rivers, with some separation between leaf-shaped and triangular blades. The latter tend to be later although there is some overlap.

Socketed knife (Fig. 3.2.6)

Metal-detector find from river dredgings; sample no. Ox 153: fragmentary; rivet holes on both faces of flattened, oval socket; step at base of socket is concave in outline; tapered blade with lozengic cross-section and no edge bevels; edges slightly concave; rough pale blue-green to brown surface; blade broken off at half to two-thirds length; socket full of ?soil concreted with corrosion products. L: (present) 96 mm; W: 36 mm (max.); socket 30 mm x 18 mm. Private ownership.

The concave lower edge to the socket defines this knife as being of Dungiven type rather than the more common Thorndon type where the socket has a straight lower edge. Socketed knives are essentially a Ewart Park type although their prototype is to be found in the Wilburton-period hoard from Isleham, Cambridgeshire. As discussed with the other Ewart Park period objects above, the 'S' type composition indicates that this knife is likely to date either to the earlier part of the Ewart Park period or to the Wilburton period. It should be noted that in the composition quoted in Table 3.2 the arsenic content is an underestimate due to the instrumental complications in analysing arsenic in the presence of lead (Northover 1986); a more accurate estimate would be of the order of 0.4%. The composition, as noted already, can be closely paralleled in the Oxfordshire region in the Marston St Lawrence hoard, typologically very early in Ewart Park.

Catalogue of metalwork of uncertain date

There is one item which can be described as a recognisable artefact rather than a fragment or waste but for which a clear typological identification is not possible because of a lack of parallels. It is from a disturbed context.

Ring

Whitecross Farm excavations (WBP86, SF 1, layer 3); sample no. Ox 39. The ring is elliptical rather than circular, one half having a simple D-shaped cross-section, the other being expanded into a flattened, undecorated oval. Overall Dia.: 14 mm x 10 mm; internal: 11 mm x 7 mm; Th.: (hoop) 3 mm; plate: 14 mm x 9 mm.

Because of its small size this piece could only be regarded as being a finger ring if it were for a child or young person. Alternatively it might have been designed as decoration for some other object. The earliest date the object could be is Roman, earlier rings being of completely different forms. The alloy is a low tin unleaded bronze; the principal impurities are high levels of arsenic, antimony and silver; zinc was also observed. As/Sb/Ag levels of this order are very rare in the Roman period and a medieval or later date would be more plausible (eg Lewis *et al.* 1987, especially no. 19). More usually, though, bronze of this type in medieval England was heavily leaded. Of course, a late date would be consistent with a surface find.

Catalogue of waste

Corrosion

Whitecross Farm excavations (WBP86, SF 2407, layer 2403, a plough-disturbed LBA occupation layer); sample no. Ox 41: proved to be soil concreted with copper corrosion products and so was not studied further.

Metalworking waste

Whitecross Farm excavations (WBP86, SF 2406, layer 2402, medieval alluvium); sample no. Ox 42: of uncertain date, although externally this appeared to be a fragment of a late Bronze Age planoconvex copper ingot. These are typical of the Ewart Park period in southern and eastern England, but are rare as far up the Thames as Oxfordshire. The lump was sectioned and metallographic examination at once showed it to be extensively oxidised bronze, largely comprised of copper with abundant cuprite (Cu_2O) inclusions and needles and rhombs of cassiterite (SnO_2). Low to medium tin bronze melts are unstable in excess oxygen and will freeze to give just these products. As tin contents increase the ∂ phase will be found to remain as it can exist in equilibrium with SnO_2 (Hoffmann and Klein 1966). Patches of low tin bronze can remain segregated within lumps like this, although this was not the case here. Some small particles of a glassy slag were attached. The state of oxidation means that the only elements likely to remain unoxidised in the copper are silver and small amounts of residual arsenic, and this was seen here. The other impurities, as oxides, react with the slag or are lost to the vapour phase; here there was insufficient slag remaining for a quantitative analysis to identify impurities.

The occurrence of this material indicates the melting, but not necessarily the making, of bronze on site. So far this type of waste has not been identified in a hoard of late Bronze Age or other date, indicating that it was regarded as something not worth recovering. Given the presence of fragments of metalwork in scrap condition, such as the pieces of two sickles, the melting of bronze could well have been occurring in the Bronze Age on the site. If this lump is indeed of Bronze Age date it is probably the first example to be identified on a British Bronze Age site, although similar material has been described and analysed from Bronze Age sites in Switzerland (Fischer 1997). In Britain it has been more commonly recorded on Iron Age sites (eg Northover 1987). The formation of this type of waste is consistent with the residues recorded in Bronze Age crucibles (Whewell 1998). In later periods crucibles were generally used in a less wasteful way.

Wire

Whitecross Farm excavations (WBP91, SF 2, context 2505/B/2, a context associated with LBA pottery); sample no. Ox 155: fragment of corroded bronze wire; the surface of the wire is too damaged by corrosion to determine its method of manufacture.

Given its context as a near-surface find there is no direct evidence for the dating of this piece. Interestingly the composition is remarkably similar to that of the ring (sample no. Ox 39, see above) and the wire could very well be contemporary with it. The microstructure could have belonged to either a drawn or a hammered wire.

Crumpled sheet (Roman or later in date)

Whitecross Farm excavations (WBP91, SF 3, context 2505/D/3, a context associated with LBA pottery); sample no. Ox 156: crumpled fragment of thin copper-alloy sheet.

The alloy used in this sheet is brass which determines that it is of Roman or later date. Roman brass ingots are of clean, tin-free brass, but the great majority of Roman brass objects carry a greater tin impurity than is seen here. The same applies to English medieval brass, so it is probably more likely that this metal is post-medieval in date.

Discussion

Table 3.1 lists 40 items of copper-alloy metalwork as coming from the river and riverside at Wallingford, of which 15 are described in detail above (including 12 that are directly associated with the eyot and 3 that are new finds); of the total, 29 have been assigned to recognisable artefact types belonging to one or other period of the Bronze Age. A further 8 items are either of uncertain type or are simply fragments or waste, but whose contexts are most probably of later Bronze Age date. The remaining 3 pieces are near-surface finds and are most probably no earlier than medieval in date; 1 further find submitted proved to be soil impregnated with corrosion products and is not included in this discussion. The distribution through time of the Bronze Age material is of great interest, with patterns of deposition showing a clear differentiation between the middle and late Bronze Ages.

With a rather small number of finds from the middle Bronze Age, 9 in all, it is not possible to say whether the metalwork points to a continuity of activity through that period. The first 3 finds – 2 axes and 1 ribbed dagger or dirk – cluster round the transition from the early to middle Bronze Age as defined in terms of the metalwork, although none is strictly of the early Bronze Age. It is interesting to note that the axes have also been dredged from the river, although the other findspots of palstaves in Oxfordshire suggest that they are not normally river finds. It is of course possible that, like some of the late Bronze Age material, they have eroded from the bank as the channel has moved with time. There could well be a time gap before the next episode of deposition which consists entirely of weapons, and dates to the Taunton and Penard periods. The types involved are basal-looped spearheads, group III and group IV dirks or rapiers, and a Ballintober sword; the spearheads, dirks and rapiers are intact but the sword is bent and broken, although this may be a result of being recovered by a dredger in 1868. The group IV dirk and rapier are both of a type with rather numerous Thames findspots (Burgess and Gerloff 1981), while basal-looped spearheads are shown by Ehrenberg (1977) to have a small concentration in the Wallingford/Dorchester stretch of the Thames with relatively little overlap with other spearhead types.

There is then a gap in the record until the late Bronze Age, more specifically the end of the Wilburton period and the beginning of Ewart Park. Of the 17 larger objects from the late Bronze Age only one bronze, a linear faceted axe of Blandford type, can definitely be attributed to the latest phase of the late Bronze Age, the Llyn Fawr period. With the other 16 any typological dating evidence, such as the barbed spearhead, the sickle fragments and, perhaps, the ribbing on the plain spearhead, tends to cluster in the first half of the Ewart Park period. As discussed earlier, there is good support for this view from the analyses with the possibility that at least one piece can be dated even earlier, to the end of the Wilburton period. On this basis, although it cannot be proved, it is reasonable to believe that the majority of the metalwork represents activity in and around the reach below Wallingford Bridge in the first half of the Ewart Park period, from the end of the 11th into the 10th century BC.

The nature of that activity appears to be strongly domestic, with an emphasis on tools and personal effects, and with a hint of industrial activity. This last is immediately indicated by the metalworking waste, as well as by some of the fragmentary items. Some of these, of course, may simply be losses of broken parts of artefacts but some, for example the sickle fragments, could equally be scrap metal for local reprocessing. The large number of intact objects, mainly the axes and socketed knives recovered from the river, is not what would be expected from normal occupation layers which usually yield either personal items or small fragments (Needham and Burgess 1980). Neither are axes and knives usual candidates for river deposition: it seems most plausible to accept that a dispersed hoard, possibly eroded from the riverbank, is involved, a hoard that could include knives and spearheads as well as axes.

The objects that are demonstrably from the occupation layers and of late Bronze Age date are the two joining pieces of the spearhead with a ribbed socket, the sickle fragments and a tanged leatherworking knife, plus the awls and awl fragments, the pin, sheet and wire fragments, and casting waste. This assemblage is indeed typical of domestic occupation. The obvious site from which to seek comparisons is Runnymede (Needham 1991; Needham and Spence 1996). The sites at Runnymede have produced a variety of small fragments similar to the wire, sheet and small pieces of awl, as well as somewhat larger items such as a section of a socketed knife. While some of the fragments, and maybe the pin, are the result of casual loss or breakage, the presence of a small amount of industrial waste implies that some might be scrap or the debris of metalworking activities such as patching sheet-metal vessels. Although the dating of the metalworking at Wallingford cannot be more precise than an assignment to part of the Ewart Park period, there is no evidence to suggest that it continued beyond that period. The one Llyn Fawr-period item, the linear faceted axe, is a non-utilitarian type and is from the river.

While the great majority of the bronze artefacts can be considered local types, or at least manufactured in southern England, one is almost certainly exotic and that is the knife/razor which could have come from as far as Switzerland or eastern France. Two other sites in southern Britain show connections in that direction: Flag Fen, Peterborough, with its tin objects (Northover and Rohl 1996), and Caldicot Castle, Gwent, with not only another tin object, but also a miniature late Urnfield scabbard chape for which there are parallels in the same area of Switzerland as those for the knife/razor (Northover 1997).

Conclusions

Forty items of copper-alloy metalwork have been studied from Wallingford; analysis indicates that three items are relatively recent while the remainder can be attributed with some confidence to the Bronze Age. The Bronze Age metalwork comprises three main categories: deposition in or close to the river through the middle Bronze Age, and both hoard and occupation contexts in the late Bronze Age. This last includes some small industrial activity, evidenced at the very least by casting waste and oxidised bronze. This type of economic activity had almost certainly ceased by the end of the Ewart Park period.

FERROUS METALWORK

by Leigh Allen

Three iron objects (two horseshoes and a miscellaneous fragment) were recovered from alluvium and later contexts; further details of these objects may be found in the archive. These objects are not particularly datable, but indicate sporadic use of the site from the medieval period onwards.

GLASS BEAD

by Angela Boyle and Julian Henderson

A single glass bead was recovered from the occupation layer 103. The bead was analysed and identified as high magnesium glass (Henderson 1988).

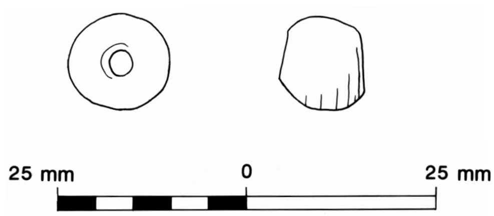


Figure 3.3 Green glass bead recovered from layer 103

Plate 3.2 The glass bead

Catalogue

Glass bead *(Fig. 3.3, Pl. 3.2)*

Dark translucent green glass bead, spherical with cylindrical central perforation. Complete. Ht: 8.9 mm; W: 10.7 mm; width of perforation 1.2 mm.

British high magnesium glass (HMG) has been found in 13th- and 12th-century BC contexts at St Martin's, Isles of Scilly (Stone 1952) and Glentrool, Tayside; and Potterne, Wiltshire of *c* 9th- to 7th-century BC date (Gingell and Lawson 1984; 1985), and Aderbrock, Isle of Lewis (Anderson 1911). It is likely that either raw high magnesium glass or the finished beads derived from the Near East or the Mediterranean, although the possibility that it was made and worked in Bronze Age Europe using imported raw material cannot be ruled out (Henderson 1988, 447).

The majority of glass beads of this date have been found in funerary contexts, frequently in association with cremation urns, though six are known from occupation sites including Potterne, Wiltshire and Runnymede Bridge, Surrey (Henderson 1989, 23).

Glass beads of slightly different composition are also known from an earlier Bronze Age context at Wilsford, Wiltshire (Guido *et al.* 1984) and from the LBA/EIA site at All Cannings Cross (Cunnington 1923; Guido 1978, 177, fig. 23.1).

WORKED FLINT

by Andrew Brown and Philippa Bradley

Introduction

The lithic material provides a rare opportunity to investigate and characterise a sealed late Bronze Age assemblage. The flint was recovered from contexts sealed by alluvium and channel deposits in association with other late Bronze Age settlement debris and is therefore comparable in condition with material that has been recovered from waterlogged sites elsewhere. As a result, the questions addressed in this report are to some extent different from those tackled at other later prehistoric sites such as Black Patch (Drewett 1982) or Winnall Down (Winham 1985). Unlike those reports, the potential exists at Whitecross Farm to characterise late Bronze Age technology through a study of reduction strategies and refitting rather than purely in statistical terms. The flintwork can therefore be characterised on its own merits rather than as an abstract continuation of the degeneration of knapping competence from the late Neolithic onwards (eg Ford *et al*. 1984).

The worked flint from the 1985–6 excavations was initially recorded by George Lambrick but subsequently analysed in detail by Andrew Brown, and that work forms the basis of this report. Further excavations in 1991 produced more flintwork, which was analysed by Philippa Bradley using Andrew Brown's methodology. Further details of the assemblages may be found in the site archive. The assemblage is summarised in Table 3.3, and selected pieces are described in the catalogue below and illustrated in Figures 3.4–6. The distribution of the flint is presented in Figures 2.10f–i.

Approach

The approach employed combines both use-wear analysis and an understanding of the reduction strategies used. Use-wear data can aid the understanding of the uses to which flint artefacts were put, and are particularly helpful where raw material was used unmodified without retouch. The Whitecross Farm material lends itself to this sort of approach by virtue of its excellent preservation. Despite the fact that some of the occupation layers were plough disturbed (see Chapter 3), there was no evidence for plough damage on any of the flints. At the same time, this perspective deals with the assemblage on its own merits rather than with constant pejorative reference to earlier reduction techniques. It is recognised that reduction in the late Bronze Age was no longer orientated towards blade production (Pitts 1978) and that retouching was reserved for particular tool types (eg Ford *et al*. 1984, 167). This report tries to understand late Bronze Age reduction strategies and what types of artefact they were orientated towards producing.

With this approach in mind, the starting place for the analysis is the use-wear data, thereby defining, in utilitarian terms, the demands made by the users on flint as a raw material. The technological aspects of the assemblage can then be considered within the constraints placed by that available raw material. Within this framework, it will be noted that retouched items are seen alongside unretouched ones as products designed to meet a need. In this way, retouch is seen as an option rather than the natural end-point of the reduction sequence. Retouched items are therefore removed from their usual prominence to a position more suited by their numerical representation. Why, in these exceptional cases, the option of retouch *was* taken up then becomes a valid question.

Summary quantification

A total of 1130 pieces of flint were recovered from the excavations, 537 of which were struck and the remainder were burnt and fire-cracked beyond recognition as struck or otherwise. The unstruck totals also include a small quantity of unflaked raw materials/tested pieces. The material was recovered by hand throughout, and no particular sample bias is evident in the collections from different trenches, although no small chips were recovered. The majority of the flint was recovered from phases 7 (ploughing) and 5 (midden and occupation; Table 3.4). The plough disturbance to the midden might explain the lack of chips, and although approximately one-third of the material came from these layers it is likely that it still derives from the same activity and may not have moved far from its original place of deposition.

In addition, 12 pieces from earlier excavations (as reported in Thomas *et al*. 1986) were examined, although they are not included in the summary tables. At least three of those illustrated (ibid., 192,

Table 3.3 Summary of flint composition by trench

Trench	*Unflaked raw materials/tested pieces*	*Hammerstones*	*Split pebbles*	*Cores, core fragments*	*Preparation flakes*	*Trimming flakes*	*Whole unretouched flakes*	*Snapped flakes*	*Retouched flakes*	*Burnt*	*Total*
I	-	-	1	1 core	-	-	21	7	-	Unstruck 6 Cores 1 Flakes 2	39
II	-	-	-	-	-	1	13	5	-	Unstruck 5 Cores 1 Flakes 1	26
III	-	-	-	-	-	-	5	-	-	Unstruck 1	6
XVII	-	-	1	1 core	6	1	12	4	-	Unstruck 78 Cores 3 Flakes 7	113
XVIII	1	1	1	4 cores 3 core fragments	6	3	36	22	6	Unstruck 15 Cores 1 Flakes 2	101
XXIV	29	-	11	15 cores 9 fragments	31	28	81	20	10	Unstruck 144 Cores 7 Flakes 15	400
XXV	-	-	27	1 core 1 core fragment	14	9	32	17	3	Unstruck 245 Flakes 2	351
XXVI	-	-	2	1 core fragment	3	3	7	4	-	Unstruck 29 Flakes 1	50
XXVII	-	-	5	1 fragment	3	1	5	1	-	Unstruck 25	41
U/S	-	-	-	1 core fragment	-	-	-	-	-	Unstruck 2	3
Total	30	1	48	38	63	46	212	80	19	593	1130

Table 3.4 Flint assemblage composition by phase

Phase	Unflaked raw material tested pieces, hammer-stone, split pebbles	Cores, core fragments	Flakes	Retouched flakes	Burnt (worked/unworked)	Total
8 Alluvium	2	5	37	4	16	64
7 Ploughing	12	20	174	11	124	341
6 Alluvium/silting of channel	-	1	-	-	2	3
5 Midden/occupation with pits/ postholes	30	10	184	3	360	587
4 Organic silt/timber deposit/ removal of palisade	13	2	4	1	91	111
3 Structures/palisade	-	-	1	-	-	1
2 Earlier occupation	22	-	1	-	-	23
Total	79	38	401	19	593	1130

nos 2, 6 and 7) are pre-late Bronze Age in date on the grounds that their technological attributes and raw materials are wholly different from the recently excavated sample. Six more from the recent work can be ascribed similarly to the Neolithic and earlier Bronze Age. The material represents an insignificant presence of residual material on the site, whose very different characteristics from the great majority of the assemblage support the assertion that all the remaining 526 struck pieces from the recent excavations belong to the late Bronze Age phase. The burnt material cannot be distinguished in the same way, but where the condition of the cortex and the nature of the flint can be discerned it is of the same type as the LBA material and different from the earlier. It has therefore been treated in its entirety as contemporary with the majority of the struck flint.

Use-wear data

Use-wear data were recorded using what is known as the 'low-power' approach. Magnifications of 10–30 times, occasionally 50 times, were used to pinpoint the damaged areas of flake edges. The combined distribution and nature of the scars (particularly the proportions of damaged flakes with abrupt terminations) was used first to distinguish the pre- or post-depositional incidence of the damage and then the mode of use (cutting/ whittling, scraping and boring) and the likely resistance of the worked material. The methodology is based on the pioneering work of Tringham *et al*. (1974), which was explored further by George Odell and others (Odell 1975; 1981; Odell and Odell-Veryeecken 1980; Lawrence 1979; Akoshima 1987). Experimental work by one of the authors (A Brown) has suggested that the main drawback of the methodology is that the working of some soft, yielding materials may go unnoticed, especially in the cutting/whittling mode of action, unless fragile edges were used. Although no attempts can be made to identify specific uses at this level of analysis, for interpretative assistance materials of the resistance of unseasoned wood are likely to be represented in the medium hardness category. Hard wood, bone and antler should be represented towards the hard end of the range while soft woody or vegetable matter, hideworking and meat-cutting with sinew, cartilage or slight bone contact should figure at the soft end. Thus the overall distribution of the damage types may be used to give an indication of the balance of resources exploited at a site.

Of the edges of the 410 unburnt and potentially usable flakes (ie excluding split pebbles, cores and core fragments), only 59 instances of use-damage were identified (Table 3.5). This forms just over 14% of the usable flakes and such a small sample precludes attempts at spatial analysis of specific activities, for which purposes it would be necessary anyway to demonstrate the primary nature of the refuse deposition. Figure 2.10g illustrates the distribution of used edges (individual pieces may have more than one used edge) irrespective of use. The used pieces are concentrated in trenches XVIII, XXIV, XXV and XXVI, and although the sample is too small to attempt any detailed analysis, a few general observations may be made. Pieces used for boring are concentrated in the eastern part of trench

Table 3.5 Summary of use-damage (pieces may have more than one used edge)

Type of use-damage	Soft/medium	Medium	Medium/hard	Total
Cut/whittle	7	10	7	24
Scrape	8	10	9	27
Bore/piercer	3	2	3	8
Total	18	22	19	59

Table 3.6 Summary of use-damage by phase

Phase	*Cut/whittle*	*Scrape*	*Bore/pierce*	*Total*
8 Alluvium	2	3	2	7
7 Ploughing	16	10	3	29
5 Midden/occupation with pits/postholes	5	13	2	20
4 Organic silt/timber deposit/removal of palisade	-	1	1	2
3 Structures/palisade	1	-	-	1
Total	24	27	8	59

XXIV; only a single flake with boring damage was recovered from trench XXVI. Of the formally retouched pieces, two artefacts classed as piercers/borers were recovered from trench XVIII (Fig. 2.10h), neither of which had been used for boring, but one had scraping damage on it. Scraping damage and cutting/whittling damage seem to have been equally important in trenches XVIII and XXIV (Fig. 2.10g). Scraping damage was much more frequently recorded in trenches XXV and XXVII, but less so in trench XXVI. To the south, trench XVII produced an even number of scraping damage and cutting/whittling damage (Fig. 2.10g). Apart from the concentration of boring damage in trench XXIV, it seems likely that the use of flint was not tied to a specific task as it was at later sites such as the shale-working flint industries on the Isle of Purbeck, Dorset (Calkin 1953; Woodward 1987a, 110; Cox and Woodward 1987, 172).

Numerically trench XXIV produced the greatest number of used edges (19); however, as a percentage of the worked total it is only 8.4% as compared with 16.9% for trench XVIII, 33% for trench XXVI, 12.9% for trench XXV, 12.5% for trench XXVII and 15.5% for trench XVII. These figures are perhaps slightly misleading for the last two trenches as they are based on relatively low numbers of used pieces out of quite small overall totals. As with the majority of the flint assemblage as a whole, the used pieces are concentrated in phases 7 and 5 (Table 3.6), suggesting that the occupation was quite intensive and that the later ploughing has simply disturbed these midden and occupation deposits. It is interesting that the apparent concentration around trenches XXV and XXVI is located on the eroded bank of the modern River Thames (see Fig. 2.10), perhaps suggesting that any focus of activity lay immediately to the east of this area which is now thought to be a destroyed part of the eyot.

The small number of retouched pieces (19; Table 3.7) had all been used on at least one edge but so too had many other, unretouched edges. The selection of flakes for use and retouch appears to have been made, unsurprisingly, on the basis of overall flake size, perhaps for comfort of handling, and edge form: a short length of an edge straight in profile was generally adequate, the mode of use depending on the appropriateness of the edge angle. Examples of the used pieces are illustrated in Figures 3.4–6. The used pieces tended to be larger than the unused. Beyond the properties of a particular edge and size of flake, little notice seems to have been taken of the form of the flake. Core fragments and cortical flakes were used alongside non-cortical ones: indeed a cortical backing to a flake seems often to have been preferred, presumably to facilitate holding, protecting the hand from sharp edges. There is no evidence of hafting of flint tools at Whitecross Farm; the irregularity of many of the flakes would have made this very difficult.

Table 3.7 Retouched forms by phase

Phase	*Palaeochannel*	*Eyot*	*Riverside*
8 Alluvium		1 scraper 1 piercer/borer 1 scraper 1 miscellaneous retouch	
7 Ploughing		3 scrapers 3 piercers/borers 4 miscellaneous retouch	1 retouched flake
5 Midden/occupation with pits/postholes	1 piercer/borer		2 scrapers
4 Organic silt/timber deposit/removal of palisade	1 piercer/borer		
Total	2	14	3

Use of retouch

The retouched pieces are of limited form (7 scrapers, 4 denticulates, 2 piercer/borers, 1 retouched flake and 5 unclassifiable pieces; see Table 3.7) and were difficult to assess, especially in the case of the denticulates. A denticulated effect – by which is meant a coarsely toothed edge comprising perhaps just two or three 'teeth' separated by concavities produced by single, relatively large retouch removals – can be intended to create either points or concavities or may sometimes be accidental, perhaps the effect of using a flake as a core or even as an anvil for écaille flaking. Many of the Whitecross Farm pieces had such an edge, but low-power use-wear analysis located only six cases where either points or concavities had been used, the points predominating slightly. It seems probable that the term 'denticulate' covers a variety of conceptualised 'tools', the manufacture of which coincided in the removal of these large retouch flakes, although the intended uses for the resulting edge were different. Of the other used pieces, scraping edges were frequently unretouched, but there are two examples where scrapers with retouch have been resharpened, one of which may have broken during this process or subsequently during use. Here retouch may have been used to rejuvenate dulled edges (Fig. 3.5.13, 18). The distribution of the retouched pieces is presented in Figure 2.10h, which can be compared with that of the used pieces (Fig. 2.10g). Unsurprisingly there is an overlap between these two groups.

The lack of control over the final forms of retouched pieces, which makes categorisation so difficult, and the *ad hoc* usage of retouch to create short sections of usable edge, contrast markedly with the use of retouch during the Neolithic and earlier Bronze Age. Early Neolithic assemblages in the region, for example, may be characterised by their small range of retouched items (Holgate 1988a) but contain a high proportion of easily categorised artefacts such as regular scrapers, symmetrical piercers and leaf-shaped arrowheads. In a review of later prehistoric flintworking by Ford *et al*. (1984), the range of classifiable retouched forms has been shown to diminish through the Bronze Age, yet the unclassifiable 'deliberately modified pieces' rose as a proportion of total assemblages. Such changes are difficult to explain at a purely utilitarian level. Late Bronze Age points presumably perforated as effectively as most Neolithic ones and the knives presumably cut as cleanly. It may be that it is necessary to see the reduction of control over final form of retouched pieces in the context of changes in the social and symbolic uses of flint though prehistory (Brown 1991a).

Technological aspects

Having defined the limits of usability of flint flakes, it is now appropriate to turn to the techniques used to produce such flakes, given the constraints of the raw materials. These raw materials were exclusively flint pebbles or cobbles, commonly fist-sized but sometimes larger. Such cobbles do not occur in the clay loam of the site, which is almost stoneless, but may be found in the gravel terraces of the Thames floodplain in the immediate locality. The surfaces of these cobbles are both smoothed and cortical or patinated brown. Internally, the flint varies in colour from very dark grey through mottled grey/brown, and frequent cherty and crystalline inclusions were noted. Larger nodules of chalk flint, although available within a 2 km radius of the site, seem not to have been exploited. The very few reworked earlier flakes present show that the collection of usable raw materials formed an insignificant part of the raw material acquisition strategy.

The battering which the flint cobbles have experienced has left them with a severely weakened internal structure, resulting in ventral fractures with sharp changes in angle where faults were encountered. As a result, debitage is often angular and irregular, and it is difficult in such circumstances to determine the part played in the reduction sequence by these pieces. Experimental flaking of similar raw material, however, has facilitated the description of the reduction sequence through the recognition of technological indicators in the material usually pushed aside as 'waste'.

In order to avoid using the general category of 'waste' or 'irregular workshop waste', the products of flaking were divided into those resulting from initial core preparation, from production of flakes and from trimming the core again ready for more removals. **Preparation flakes** are often the largest and are frequently wholly or mostly cortical. They show scant or no signs of previous flaking in the form of dorsal scars, and correspond broadly to primary flakes (Bradley 1970), although they need not be cortical if the material is already split and/or patinated as is often the case at Whitecross Farm. A **trimming flake,** by contrast, can never be wholly cortical, as it is defined as being a flake which demonstrates a change in the orientation of flaking by bearing dorsal scars struck from a different direction from itself. Core tablet rejuvenation flakes and crested blades are distinctive subsets of trimming flakes – most simply remove overhangs or hinge fractures which have arrested temporarily the reduction of the core; as such, they are thicker than the majority of ordinary flakes.

Flakes, unretouched or retouched, are the only other product of flaking under this classification; no distinction is drawn between flakes and blades as they represent the same stage in reduction. A flake may be classed as such, even if it is very irregular, as long as it shows sign of previous flaking (ie is not wholly cortical) and is struck from the same platform as those flakes whose scars it bears on its dorsal face. All retouched pieces are classed as flakes and subdivided as appropriate in terms of functional categories, such as scrapers, denticulates and borers/piercers. The remaining artefacts, cores

Table 3.8 1985–6 and 1991 assemblages: proportions of artefacts as a percentage of the total struck assemblage

Technological category	*1985–6 number*	*%*	*1991 number*	*%*
Unflaked raw material/tested pieces	30	-	-	-
Hammerstone	1	0.1	-	-
Split pebbles	12	2.1	29	7.2
Cores/core fragments	34	5.1	3	0.7
Preparation flakes	43	6.5	17	4.2
Trimming flakes	33	5.0	12	2.9
Whole unretouched flakes	168	25.5	39	9.7
Snapped flakes	58	8.8	21	5.2
Retouched flakes	16	2.4	3	0.7
Burnt				
Unstruck	250	-	274	-
Cores/core fragments	13	3.2	-	-
Flakes	27	6.7	3	2.4
Total struck (worked and burnt)	405	-	127	-
Total unstruck (burnt and unflaked raw materials etc.)	280	-	274	-
Overall total	685	-	401	1086

and core fragments, are the by-products of reduction. Cores are self-explanatory, but must bear more than a single scar from any one platform in order to exclude split pebbles/cobbles or accidentally flaked pieces, perhaps the result of dropping. **Core fragments** are the result of accidental breakage of cores, usually as flaws in the structure of the raw materials, and so bear truncated flakes' scars on one or more of the faces adjacent to the split.

Such a system allows the characterisation of the reduction sequence(s) at a site in terms of, for example, the approach to platform creation through the proportion of preparation flakes, or the length of the flaking episodes through the ratio of flakes to trimming and preparation flakes. Its other uses might include the identification and possible contrast of areas of production and consumption debris. The application of this classificatory system at a general level (Table 3.8) reveals that trimming flakes are outnumbered by preparation flakes, an indicator that cores were not exhaustively reduced and that fresh platforms tended to be created rather than existing platforms being maintained by further trimming and rejuvenation. This is supported by the statistic that each core recovered had yielded on average only seven flakes of all types. This figure is in accordance with the appearance of the cores themselves and suggests that a representative sample of debitage has been recovered; a discrepancy between the figures would be expected if the cores and flakes had been deposited separately.

Four individual approaches to reduction can be seen in the assemblage; an example of each is illustrated (Fig. 3.4.1–4). The first and most simple was the removal of a small number of flakes directly from a cobble, a technique which could only be applied to a cobble with a relatively sharp corner to provide a platform. The resulting flakes may be blade-like if the cobble is narrow (Fig. 3.4.1). A second takes the first a little further: a cobble with an existing platform, an old split surface for example, was flaked from a number of directions, sometimes resulting in long flakes and other times in very squat flakes (Fig. 3.4.2). In either of these first two cases no trimming is required, a fresh platform area being selected instead. The third and fourth techniques involved the splitting of a cobble. If the resulting cobble fragment was sizeable it was flaked as a conventional core, with multi-polarity being exhibited largely on the more exhausted cores of better-quality flint (Fig. 3.4.3). It is from such cores that few trimming flakes are likely to have resulted. If the original split piece was thinner (in fact a thick preparation flake), it could be flaked on its ventral face to give usefully sized products (Fig. 3.4.4). For 33 trimming flakes to have been produced from just one of the four possible techniques suggests that the third, fairly conventional, core reduction was actually the most frequent.

Spatial aspects

The overall distribution of the worked flint is presented in Figure 2.10f. It is apparent that this distribution coincides with that of burnt flint (not illustrated), and shows that the greatest activity was occurring on the island. There are three possible foci for activity: trench XVIII to the north, trench XXIV immediately south and the area around trenches XXV, XXVI and XXVII on the eastern edge of the island (Figs 2.10f–i). Two aspects of the organisation of activities at Whitecross Farm can be examined using the technological classification outlined above. Differences in the types of materials deposited on and off the island itself may be explored to some extent, although the area of channel deposits investigated was small. The main contrasts, however, can be drawn between the activities represented at the different locations on the island.

Only trench XXIV included a significant area of excavated channel deposits (48 m² up to grid line 507). The finds from layer 2405, the channel deposits, can be compared with those from 2403, the dry-land occupation layer, and with 2409 and 2414, the midden deposits within the channel (Table 3.9). The midden deposit was divided into two layers (2409 and 2414), the lower of which was waterlogged. Immediately noticeable is the meagre proportion of struck pieces from the channel deposits. Indeed, 2405 contained only one used piece in comparison with six from the 18 m² of layer 2403. When the 23 burnt unstruck pieces from 2405 are added to the unflaked/tested pieces, which are in fact exceptionally large flint nodules, some of which are burnt on one side (Table 3.10), it becomes evident that the channel was an area largely reserved for deposition of burnt stone. Furthermore, the average density of 'potboilers', recorded in the field, from the channel contexts was three times higher than for the island when trenches XVIII and XXIV were grouped, and a sondage into the channel deposits of trench XVII confirmed that the pattern was widespread. This is not to say, however, that the converse also applied; burnt material, as the table shows, was deposited on the drier areas too, but in smaller quantity. The 14 nodules, some of which are burnt and others tested (see Table 3.10), from the channel deposits (layer 2405) are best interpreted as hearthstones. They were recovered from an area of approximately 4 m² and they may have been dumped together. Their considerable size makes it likely that they were dropped rather than tossed into the deeper water some 6–7 m offshore, presumably from the end of the jetty or other timber structure that existed in the locality.

It is interesting to note, before moving on to broader analysis, that the midden (layers 2409 and 2414) has a character of its own, in terms of its lithics, rather than being identical to the occupation layer (2403) as might be expected. There was very little difference between the composition of 2409, the upper part of the midden, and 2414, the lower, waterlogged layer, and as such they have been treated as the same deposit. The main difference between the midden and the occupation layer is the higher proportion of preparation and trimming flakes – 23.2% against 11.5% – and lower proportion of whole unretouched flakes – 12.0% against 29.7% (see Table 3.9). Interestingly the percentage for snapped flakes is much lower from the midden than the occupation layer, 2.5% as opposed to 6.1% (see Table 3.9), perhaps indicating that discarded flint is more likely to become broken in an occupation area than in a midden deposit. More cores, core fragments and retouched flakes were recovered from the occupation layer (see Table 3.9). The midden was also rich in 'potboilers'. This may simply reflect deposition of knapping waste and burnt stone within the midden away from the occupation areas. Although the overall totals from each of these contexts is small, there does seem to be

Table 3.9 Comparison of flint from layers within trench XXIV

Technological category	*Channel deposits (2405)*	*%*	*Midden (2409, 2414)*	*%*	*Dry land occupation (2403)*	*%*
Unstruck raw materials/tested pieces	14	31.1	1	0.8	5	3.4
Split pebbles	-	-	6	5.1	3	2.0
Cores	2	4.4	3	2.5	7	4.7
Core fragments	-	-	1	0.8	4	2.7
Preparation flakes	1	2.2	12	10.3	9	6.1
Trimming flakes	1	2.2	15	12.9	8	5.4
Whole unretouched flakes	2	4.4	14	12.0	44	29.7
Snapped flake fragments	-	-	3	2.5	9	6.1
Retouched flake	1	2.2	1	0.8	5	3.4
Burnt pieces						
Unstruck ('thermal')	23	51.1	55	47.4	48	32.4
Struck (cores/core fragments)	-	-	1	0.8	3	2.0
Struck (flakes)	1	2.2	4	3.4	3	2.0
Total struck (worked and burnt)	8	17.7	60	51.7	95	64.2
Total unstruck (burnt and unflaked raw materials etc.)	37	82.2	56	48.2	53	35.8
Overall total	45		116		148	

Table 3.10 Details of flint nodules from trench XXIV, layer 2405

Number	*Type of nodule*	*Burnt*	*Tested*	*Weight (g)*	*Comments*
1	rounded	*	-	310	
1	rounded	-	-	975	Two flakes one of which refits another nodule
1	rounded	-	-	2275	
1	rounded	-	-	1825	
1	tabular	-	*	800	Refitting flake – see above. One other flake recovered which does not seem to refit any other nodule but is of a similar character
1	rounded	*	*	800	
1	rounded	*	-	1500	
1	rounded	*	-	1325	
1	rounded	-	-	2080	
1	tabular	*	-	1275	
1	tabular	-	*	750	
1	rounded	-	*	1000	
1	rounded	*	-	2250	
1	rounded	-	-	1025	

some patterning which supports the suggestion of different activity areas on the island.

In order to look for differences in the organisation of activities across the island, the occurrence of the technological categories was compared between the occupation layers of the trenches (Table 3.11). This analysis assumes that activity and discard were more or less *in situ*. Initially the numbers of core fragments, preparation and trimming flakes were combined as evidence of production activities (these being less likely to be moved than usable cores or flakes). In the second test, the proportions of the unretouched flakes that had been snapped were compared to seek evidence of more intensive activity that might have led to trampling breakage. Lastly, the presence or absence of refitting pieces was considered.

Two trenches in the north of the island, XVIII and XXIV, and trench XXV to the east show markedly higher quantities of production debris than those further south and west, although the seven pieces in trench XVII represent a high proportion of the struck material (32%). As noted above, layer 2414 contains the most production debris. Layer 1803 contains a high proportion of snapped flakes (as well as the highest proportion of used flakes – 13% of unburnt material), suggesting that this trench was close to an area of more intensive activity. Layers 2505 and 2605 also contained quite high proportions of snapped flakes (see Table 3.11) which together with the overall distribution of material, the numbers of used pieces and the incidence of retouched pieces might suggest another area of activity was situated in the vicinity of these trenches.

The general absence of refitting pieces, which might have indicated *in situ* flaking or at least redeposition of quantities of debitage, from the 'occupation layers' is of interest and it suggests that most of the debitage was moved from its primary location, perhaps to the island edge if the refits from 2414 and the channel end of 1803 are representative. Material from 2405, the channel deposits proper, refitted most frequently although the numbers of

Table 3.11 Indicators of activities from occupation layers compared across trenches

Trench/layer	*Production debris (number of pieces)*	*% of whole unretouched flakes snapped (numbers snapped)*	*Refits*
I/103	0	28.5 (6)	None
II/203	1	38.5 (5)	None
III/303	0	0.0	None
XVII/1703	7	25.0 (3)	None
XVIII/1803	11	66.6 (22)	Some – including a core on a flake with a refitting segment, Fig. 3.6.28
XXIV/2403	21	20.4 (9)	None
XXV/2505	19	28.0 (16)	None
XXVI/2605	1	33.3 (4)	None
XXVII/2705	4	11.1 (4)	None

refitting pieces was generally low. The best conjoining group was a series of exfoliation flakes from a burnt nodule which seems likely to have been dropped into water while still hot and thus is the result of a specific action of deposition rather than knapping *per se.*

Discussion

The implications of the lithic analysis can be divided into those that relate to the use of the site itself and those of relevance to the wider context of the study of later prehistoric flintwork. Whether flint can be said to have been an important resource for tools at Whitecross Farm is more equivocal than the fact of its frequent and varied usage. Local cobbles from the gravel terraces were brought to the site and flaked effectively if not efficiently, the resulting debitage being sifted for usable edges and the remainder moved, presumably to a less obtrusive location. Edges were sometimes retouched, but were equally often used in an unmodified form. The use-damage evidence suggests a broad range of applications for edges of flint, but it is likely also that soft use-damage has been underestimated (see above). In comparison with similar analyses (eg Brown 1996), the use of points for boring is strongly represented at Whitecross Farm.

Differences in the organisation of activities on the site may be indicated by the high rate of breakage at the north end and the eastern side of the island, the concentration of discarded used pieces in the same areas and the high proportion of genuine waste at the south end of the island. The combined evidence from the lithics would suggest that activity gravitated towards the north end and eastern side of the island. The deposition of waste seems to have been organised, to the extent that burnt flint (sometimes barely perceptibly so) was thrown to the island margins and especially into the river itself. Very little flint was deposited into the features in trench XXIV, but the material that was recovered shared the attributes of the late Bronze Age material.

In the broader context of late Bronze Age flintworking, the Whitecross Farm material assumes a particular importance because of the sealed nature of the flint assemblage; it can be stated with some certainty that it was contemporary with the other LBA activity on the island. Every piece of flint was brought to the site and worked (or reused) in the late Bronze Age, with the possible exception of the single (probably Neolithic) blade from the earlier ditch in trench XXIV. Although approximately one-third of the assemblage was recovered from a plough-disturbed layer of the midden, it would seem likely that the material has not moved far. The smallest element of the reduction sequence is missing. This seems to have resulted from a combination of collection biases and post-depositional factors. It is also likely given the nature of the deposits that knapping may have taken place elsewhere and that the tiny chips and spalls were not collected and placed on the midden.

Later prehistoric flintworking, other than the specific industries such as those associated with shaleworking in Dorset, has long been recognised (eg Fasham and Ross 1978), and since the important paper by Ford *et al*. (1984) there has been renewed interest in the subject. Later Bronze Age assemblages have begun to be characterised (eg Pryor 1980; Drewett 1982; Ford *et al*. 1984; Holgate 1988b; Brown 1991b; 1992; Montague 1995) and research is ongoing into this area of lithic analysis. A recognised typology has been established for the products and by-products of the flint associated with Kimmeridge shaleworking in Dorset (Calkin 1953; Woodward 1987; Cox and Woodward 1987). The technology of this material has also been studied in depth. It is perhaps easier to establish typologies and understand the technology of this material given the relatively regular nature of the by-products and tools produced (Calkin 1953).

There are few published examples of securely stratified later prehistoric lithic assemblages within the region so it is difficult to compare the results from Whitecross Farm with other sites. The preservation of the Whitecross Farm material and its almost complete lack of contamination from earlier material are unique within the region and this also makes comparison difficult. A small element of later Bronze Age flint was recovered from excavations at Grim's Ditch (see Bradley, Chapter 5) and Bradford's Brook (see Bradley, Chapter 6). Late Bronze Age activity has been found at Yarnton, but associated lithics are relatively sparse (Bradley and Cramp in prep.). Later Bronze Age lithics have been found at Weathercock Hill and Rams Hill. However, little of the flintwork from these sites was stratified and there were earlier elements present in each assemblage (Bowden *et al*. 1991–3, 77; Bradley 1975, 86). Further downstream in the Middle and Lower Thames Valleys and into Kent and Essex there is much more evidence for later Bronze Age flintworking. At sites like Reading Business Park (Brown 1992, 92; Bradley 2004), Bray (Montague 1995, 22), Woodley (Bradley 1999b), Runnymede Bridge (Bevan in prep.), Lofts Farm (Holgate 1988b, 276–7), Gravesend (Bradley 1994, 397) and Hollingbourne (Bradley 1997) the retouched component of later Bronze Age flint assemblages is dominated by scrapers, retouched flakes, points, denticulates and notched pieces. Retouch is often perfunctory and, as has been noted at Whitecross Farm, it should be seen as one option within the production and use of flint artefacts.

A major problem with the advancement of our appreciation of when and how lithic raw materials declined in, and finally disappeared from, general use is the resistance of excavators to collect struck flint and stone from late prehistoric sites with the same care as they might from earlier periods, thus limiting the usefulness of those pieces that are recovered. The Whitecross Farm material perhaps demonstrates that much useful archaeological information can be derived from the analysis of this material provided that the standard of recovery is high. Now that later prehistoric flintworking has been widely recognised and characterised, the challenge will be to further illuminate the role of lithics alongside other materials such as metal. Perhaps until recently somewhat inappropriate analytical frameworks have been applied to later prehistoric lithics, which has compounded the problems of characterisation, and has led to a series of uninformative and unimaginative descriptions of flake shapes and scant retouched forms as if these were the only approaches available to analysts. The very nature of these assemblages means that they require a different approach to analysis than that used for earlier prehistoric lithics. If 'waste' is to be the overwhelming component of these late assemblages, then surely a new framework that exploits the potential of this material is needed and such an approach has been attempted here.

Catalogue of worked flint *(Figs 3.4–6)*

Entries are ordered as follows: trench number, context, grid square, small find number (SF), brief description of object with use-wear data.

1. Trench XXIV, 2414, 153/505. Used flake. Right side used, cutting/whittling, medium.
2. Trench XXIV, 2402, 153/497. Used flake. Right side used, cutting/whittling, soft/medium.
3. Trench XXIV, 2403, 153/501. Used flake. Left side used, cutting/whittling, soft.
4. Trench XXIV, 2422, 153/505, SF 2420. Used flake. Left side used, cutting/whittling, soft.
5. Trench XXIV, 2413/2, 153/497, SF 2410. Used blade. Both edges used, cutting/whittling, medium. ?Neolithic.
6. Trench XXIV, 2416, 153/503, SF 2409. Used flake. Tip used for boring/piercing, soft.
7. Trench XXIV, 2402, 153/495. Used flake. Tip used for boring/piercing, soft/medium.
8. Trench XXIV, 2403, 153/501, SF 2422. Used flake. Tip used for boring/piercing, hard.
9. Trench XXIV, 2403, 153/499. Used flake. Tip used for boring/piercing, hard.
10. Trench XXIV, 2403, 153/499. Used piece. Left tip used for boring/piercing, medium. On probable core fragment.
11. Trench XXV, 2505/E/4. Scraper with denticulated edge. Distal end and right-hand side hard scraping.
12. Trench XXIV, 2403, 153/501. Broken scraper, soft scraping damage on retouched edge.
13. Trench XXIV, 2403, 153/501. Retouched flake with scraping damage across distal end and right-hand side, medium. Attempted resharpening.
14. Trench XXIV, 2403, 153/503. Miscellaneous retouched flake, distal end used for scraping, medium.
15. Trench XXIV, 2403, 153/503. Thick miscellaneous retouched flake. Point at distal end used for scraping, soft/medium.
16. Trench XXV, 2505/C/2. Retouched flake. Scraping medium along whole of ventral right-hand side.
17. Trench XXIV, 2402, 153/497, SF 2416. Scraper, reworked Neolithic example. Soft scraping damage at distal end. Very heavy rounding on scraping edge.
18. Trench XXV, 2505/B/2. Broken scraper. Scraping medium left-hand side. Resharpening damage at distal end, possibly broken during resharpening or subsequent use.
19. Trench XXV, 2505/C/1. Used flake. Scraping hard left-hand side, cutting/whittling soft right-hand side.
20. Trench XXIV, 2402, 153/497. Possible denticulate formed at proximal end of flake. Small concave edge used for scraping, medium.
21. Trench XXIV, 2402, 153/501. Combined scraper and borer/piercer. Scraping edge broken and subsequently a point was formed on the opposite edge. Scraping damage right-hand side, soft/medium; boring/piercing left-hand side, soft/medium.
22. Trench XXIV, 2402, 153/497. Large trimming flake with scraping and cutting/whittling damage. Scraping right upper, hard; cutting/whittling lower right, hard.
23. Trench XXIV, 2403, 153/501. Scraper/spurred piece, used edge obscured by cortex. Possible scraping damage upper left-hand side, soft/medium.
24. Trench XXIV, 2402, 153/499. Core. Single platform with edge abrasion, lightly corticated, ?Mesolithic.
25. Trench XXIV, 2403, 153/503. Core. Simple core with one platform.
26. Trench XXIV, 2403/1, 153/501. Core. Core on tabular flint showing extensive flaking.
27. Trench XVIII, 1803/1804 (interface 10.5–12.5 m). Multiplatform core, exhausted.
28. Trench XVIII, 1803/1804 (interface 10.5–12.5 m). Core on a flake with a refitting segment. Removals made before and after breakage.

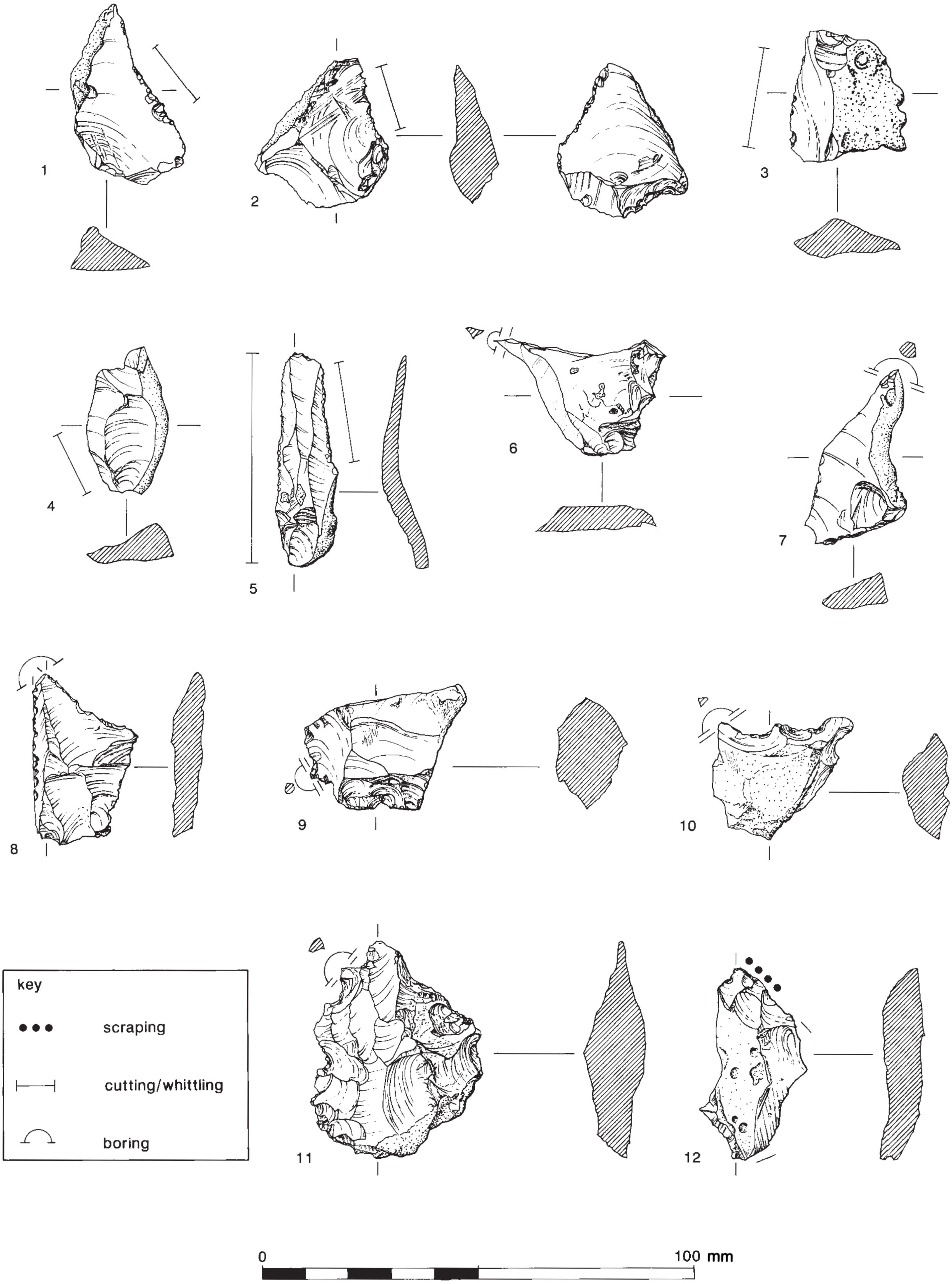


Figure 3.4 Worked flint (details in catalogue)

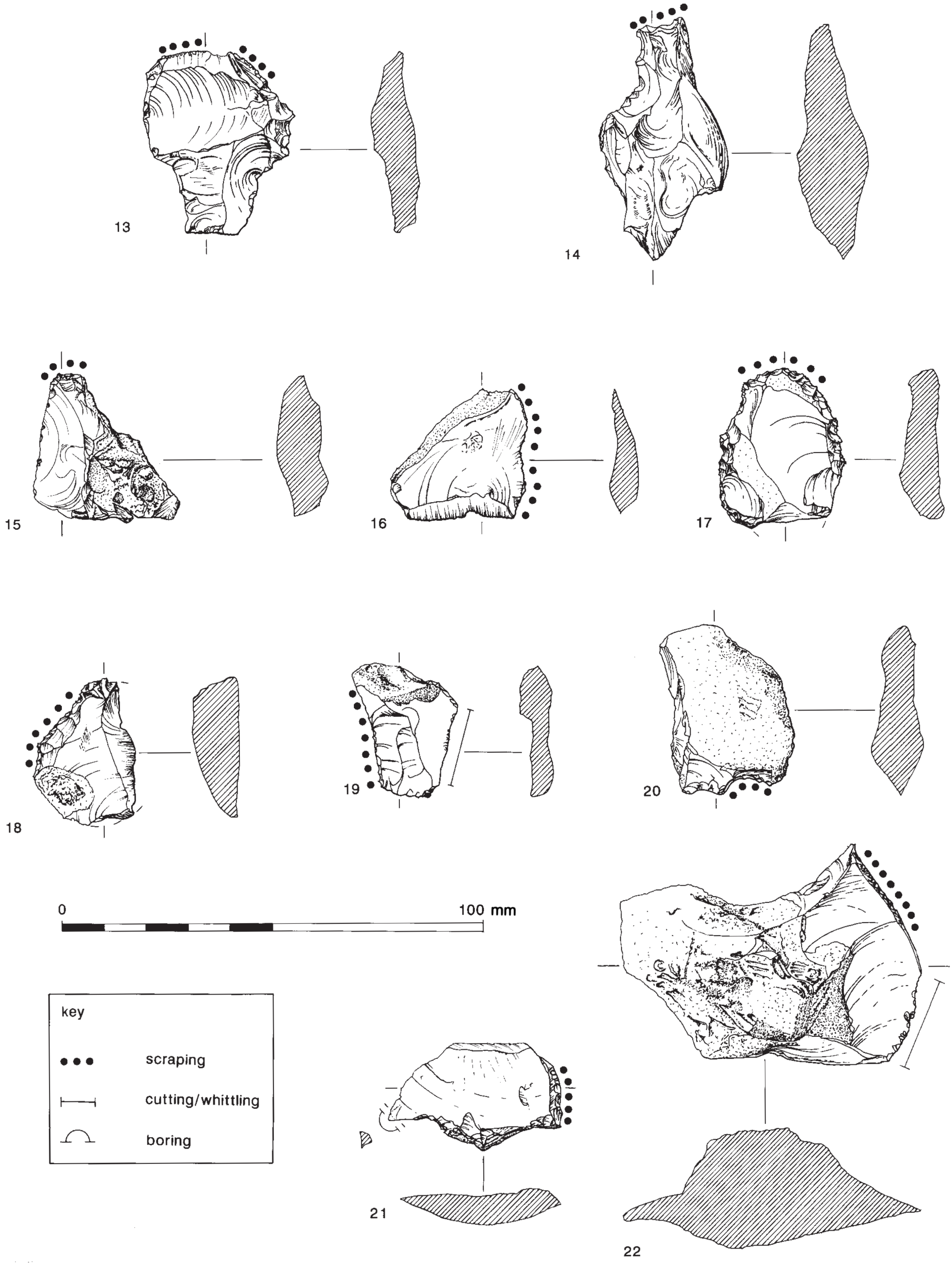


Figure 3.5 Worked flint (details in catalogue)

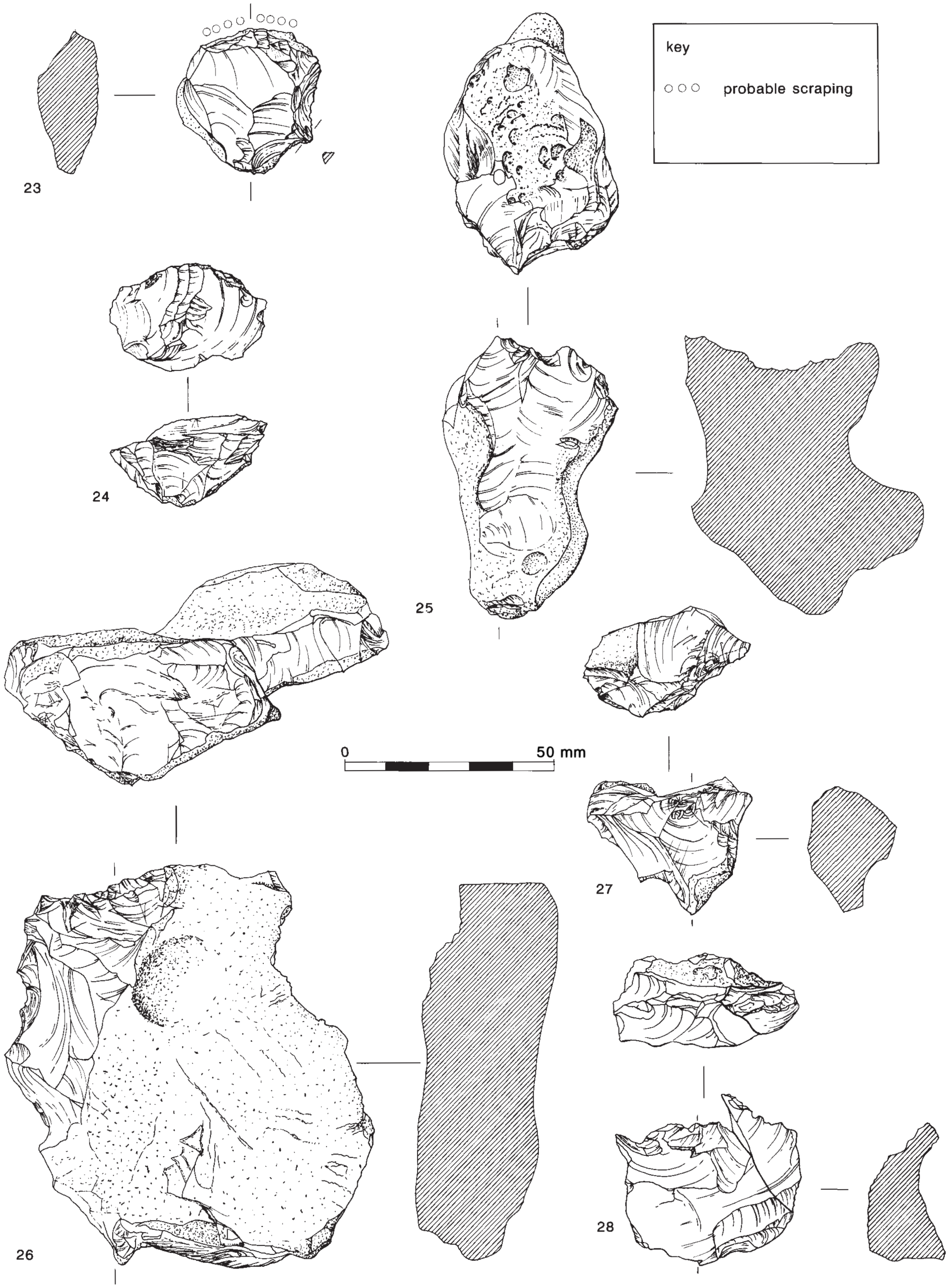


Figure 3.6 Worked flint (details in catalogue)

WORKED AND BURNT STONE

by Fiona Roe and Alistair Barclay

Three quern fragments, two hammerstones and a quantity of burnt stone were recovered. The worked stone, utilising Lower Calcareous Grit and quartzite, is described in the catalogue, and selected pieces are illustrated in Figure 3.7.

Discussion

Neither of the two varieties of stone used for the five objects described below came from any great distance. The Lower Calcareous Grit occurs in a band to the north-west of Abingdon (Arkell 1939), and a journey of only 9.7 km or so would have been needed to acquire suitable quern material. Quartzite pebbles could have been collected without difficulty from local Quaternary deposits, since they occur in the Clay-with-Flints, in undated gravel deposits and in the river terraces (Jukes-Browne and Osborne White 1908, 78; see also map Sheet 254, 1980), one of which, the First Gravel Terrace, occurs just to the west of the site.

Similar pebbles were often available elsewhere in Pleistocene or later deposits, and so were frequently used on prehistoric sites as hammerstones or other artefacts for which a hard, compact stone was suitable. Other Bronze Age finds of quartzite hammerstones are known from Reading Business Park (Moore and Jennings 1992, 94), and also from Yarnton, Oxfordshire, where they were used from the Neolithic onwards (Roe in prep.).

Lower Calcareous Grit was quite commonly used for saddle querns on early and middle Iron Age sites in southern Oxfordshire, as for instance at Gravelly Guy, Stanton Harcourt (Bradley *et al*. in prep.), while evidence is gradually accumulating for its use on earlier prehistoric sites. A saddle quern was retrieved from a Bronze Age waterhole (context 162) at Mount Farm, Dorchester-on-Thames (Barclay and Lambrick 1995), while a second one came from another Bronze Age waterhole at the Abingdon Multiplex site (Pugh 1998). A worked fragment was found in a section of the palisaded enclosure (K 71 CA) at Corporation Farm, Wilsham Road, Abingdon (Shand *et al*. 2003). The same material was being used for querns both from a Neolithic/Bronze Age ground surface and from Bronze Age contexts at Yarnton (Roe in prep.). The use of Lower Calcareous Grit for saddle querns at Whitecross Farm can thus be seen as part of a lengthy tradition in the area.

Burnt stone

The burnt stone consists mainly of fragments of quartzite pebbles, amounting to 8.449 kg in weight. The burnt unworked flint is discussed together with the worked flint (see Brown and Bradley, above). A few further burnt fragments of greensand suggest that this variety of stone may also have been used for saddle querns on the site. Similar collections of burnt pebbles, again consisting mainly of quartzite, are known from Corporation Farm, Abingdon (Shand *et al*. 2003), and sites on Yarnton floodplain (Roe in prep.). The use to which this burnt stone was put remains somewhat enigmatic. Some pieces may represent the opportune use of freely available local pebbles as fire surrounds, both to support cooking pots and to keep hot ashes and embers in place, perhaps even as an aid to slow cooking, with both the pebbles and ashes retaining the heat. Many pebbles might have become damaged in this way, but could always easily have been replaced.

The distribution of the burnt stone (not illustrated) is almost identical to that of burnt flint (not illustrated) with notable concentrations or densities in trenches XXIV–XXVII and smaller quantities in trenches XVII–XVIII (full details of the contexts are available in the archive). This distribution corresponds to the midden and occupation deposits. Both burnt stone and burnt flint are likely to have been used for similar purposes (see above). However, burnt flint could also have been purposefully burnt for use as potting temper.

Angular white quartz/quartzite

In addition to the burnt stone a small number of angular fragments of quartzite or vein quartz were identified from trenches XXV–XXVI. Unfortunately the stone from the earlier trenches had been discarded and therefore was not available for re-examination by the present authors. It is likely that the distribution extended further across the eyot. Angular quartzite is found as temper in some of the pottery and it is possible that this represents unused temper. If this assumption is correct then it provides evidence for pottery production on the site.

Catalogue of worked stone *(Fig. 3.7)*

1. WBP86 trench XVII, occupation layer 1703, LBA. Fig. 3.7.1. Fragment from saddle quern, with worn, slightly concave grinding surface. L: (now) 149 mm; W: 92 mm (max.); D: 64 mm (max.); Wt: 932 g. Lower Calcareous Grit.
2. WBP86 trench XXIV, 153/495, context 2402, an alluvial layer which covered the whole of the trench beneath the topsoil, LBA. Fig. 3.7.2. Fragment from probable saddle quern, with small area of grinding surface, and part of the curved side and underside of the quern. Grinding surface: (now) 29 mm x 22 mm; D: 100 mm; Wt: 250 g. Lower Calcareous Grit.
3. WBP86 trench XXIV,153/501, SF 2405, context 2402, alluvial layer, as for no. 2, LBA. Not illustrated. Small fragment with weathered and worn surface, probably from saddle quern or rubber. L: (now) 84 mm; W: 50 mm; D: 23 mm; Wt: 106 g. Lower Calcareous Grit.
4. WBP91 trench XXV, context 2505, occupation layer (west), LBA. Not illustrated. Quartzite pebble

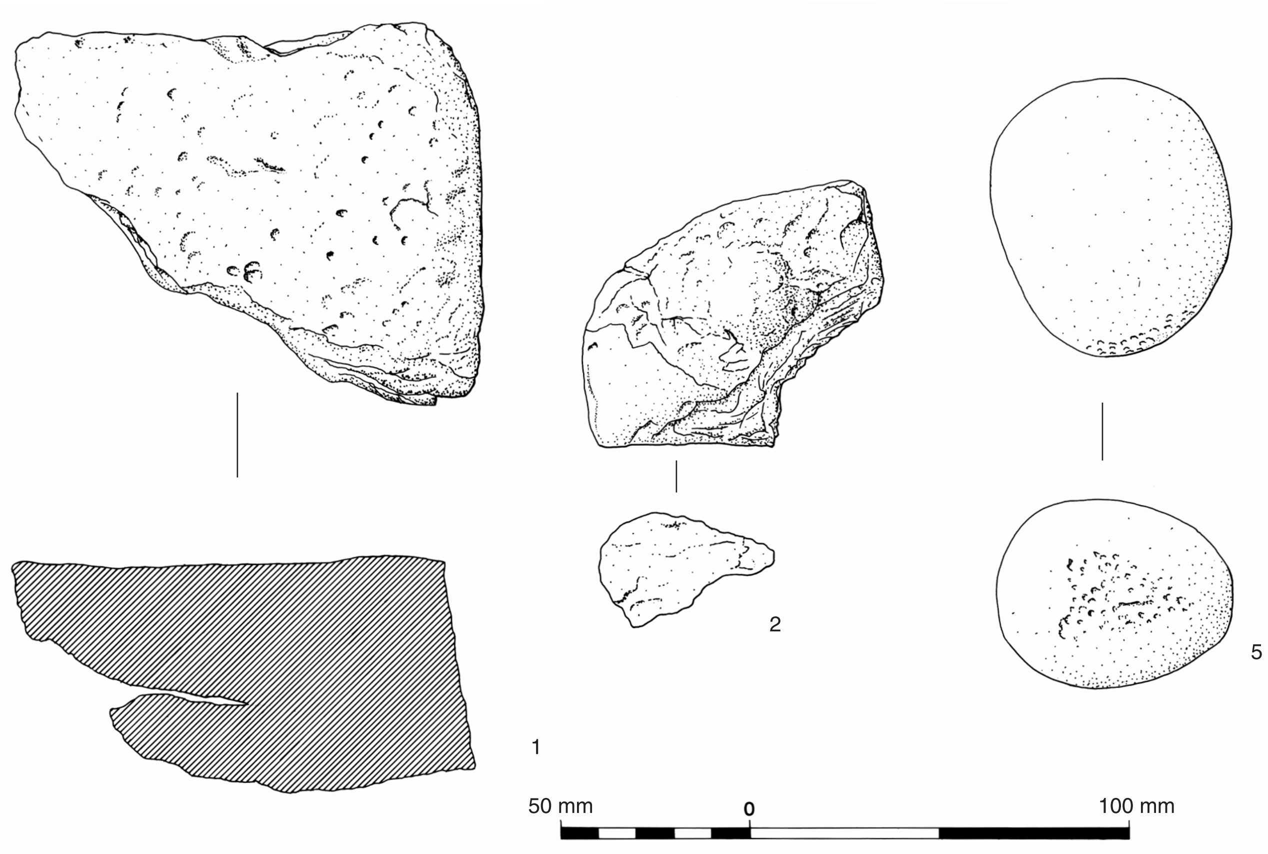


Figure 3.7 Worked stone (details in catalogue)

utilised in two ways. There are flattened areas of wear across an old break, suggesting use as a rubber, while areas of fine pecking at each end suggest lightweight use as a hammerstone. L: 90 mm; W: 77 mm; D: 61 mm; Wt: 560 g.

5. WBP91 trench XXVII, context 2703, the same alluvial layer as for nos 2 and 3, but from another trench, ?IA and later. Fig. 3.7.3. Quartzite pebble used as hammerstone, with clear evidence of battering at one end. The pebble appears to have been burnt before utilisation. The quartzite is reddened and cracked, leading to the loss of a fragment of burnt stone. L: 73 mm; W: 62 mm, D: 51 mm; Wt: 322 g.

WORKED BONE

by Adrienne Powell and Kate M Clark

Two pieces of worked bone were identified among the assemblage from contexts 2505 and 2428. One is a distal shaft of a sheep/goat radius which has been chopped longitudinally from the proximal end down both the dorsal and ventral surfaces (2505), the other is a *c* 96 mm segment of beam from a red deer antler, chopped at both ends and bearing a small tine (2428).

LATE BRONZE AGE POTTERY

by Alistair Barclay with a report on the ceramic petrology by Chris Doherty

Introduction

The excavations produced a total of 2444 sherds (12.6 kg) of late Bronze Age pottery representing at least 132 vessels. The entire assemblage was recovered from a series of related stratified deposits on the eyot within the former course of the River Thames and was sealed by alluvium. Most of the assemblage was recovered from occupation layers that are believed to extend over part of this island, although in places these deposits had been disturbed by more recent ploughing. Other important groups of material came from the channel deposits and a midden located in trench XXIV. The assemblage includes no material earlier than the late Bronze Age; very small quantities of Iron Age, Roman and medieval sherds are present, mostly from layers that are stratigraphically later within the sequence of deposits or as intrusive material (see Booth and Whittingham, below).

Condition and preservation of the assemblage

The overall condition of the assemblage is largely characterised by a high degree of fragmentation. This no doubt reflects the character of the site with much of the assemblage being recovered from a midden deposit in trench XXIV and from an occupation layer that appears to have covered a large part of the island. It would appear that much of the assemblage was deposited in a fragmentary state with very little evidence for refitting sherds or for groups of sherds from the same vessel. In most of the excavated trenches the stratified sequence was short and uncomplicated with much of the pottery deriving from a single occupation layer, that in many of the trenches had been disturbed and truncated by ploughing (see Chapter 2). The only complex stratified sequence is that found in trench XXIV where groups of material occurred in basal channel deposits, in an overlying midden, in a later occupation horizon and as derived material in post-Bronze Age ploughsoil.

Methods

Table 3.12 provides a quantification of the assemblage by weight and sherd number (excluding refitting fresh breaks). The pottery was characterised by fabric, form, surface treatment, decoration and colour. The sherds were analysed using a binocular microscope (x20) and were divided into fabric groups by principal inclusion type. OAU standard codes are used to denote inclusion types: A = sand (quartz and other mineral matter), B = black sand (glauconite), C = calcareous limestone, F = flint, G = grog, O = organic, Q = quartzite, S = shell. Size range for inclusions: 1 = <1 mm fine; 2 = 1–3 mm fine–medium; 3 = medium–coarse up to and over 3 mm. Frequency range for inclusions: rare = <3%; sparse = <7%; moderate = 10%; common = 15%; abundant = >20%.

Fabrics

In total 23 fabrics were defined on the basis of principal inclusions. These are divided into the following fabric groups: flint-tempered (F1–3, FA1–3); grog-tempered (G2, GF2/GFA2, GQ2); limestone-tempered (L2); quartzite-tempered (Q1–3, QA1–3); mixed flint–quartzite (FQ2/3); organic-tempered (O1/2); sand-tempered (A1, BO1); shell-tempered (S2, SA2, SF 2).

In addition a series of sherds were selected for thin-section (see Doherty, below); samples were given the prefix TS.

Flint-tempered

F1 Hard fabric with moderate fine flint. Some fabrics also contain rare grog and burnt-out organics (TS1).

F2 Hard fabric with moderate medium flint. Some fabric may also contain rare ferruginous pellets, clay pellets, grog, shell or voids from burnt-out organics (TS2–3).

F3 Hard fabric with sparse–moderate coarse flint, although in some sherds the temper is quite dense. Some fabrics may also contain voids from burnt-out organics. One sherd contains gravel flint inclusions as well as calcined flint. One sherd contains possible bone fragments as well.

FA1 Hard fabric with moderate fine flint and sparse–rare quartz sand.

Table 3.12 A breakdown and quantification of fabrics by temper group (number of sherds, weight)

Trench	*Flint*	*Quartzite*	*Mixed flint & quartzite*	*Sand*	*Shell*	*Grog*	*Organic*	*Limestone*	*Other*	*Total*	*%*
Riverbank	16, 63 g	5, 25 g		2, 5 g	1, 2 g				4, 2 g	28, 97 g	
I	132, 347 g	40, 159 g	1, 8 g	12, 45 g	1, 1 g				44, 32 g	230, 592 g	9%, 5%
II	81, 207 g	16, 34 g		17, 30 g	2, 2 g	3, 10 g			17, 8 g	136, 291 g	6%, 2%
III	137, 484 g	26, 87 g	11, 59 g	29, 101 g	2, 2 g	4, 18 g			6, 5 g	215, 756 g	9%, 6%
XVII	117, 384 g	44, 146 g	23, 92 g	8, 36 g	6, 26 g			1, 7 g	4, 2 g	203, 693 g	8% 6%
XVIII	34, 129 g	8, 48 g	1, 2 g	9, 33 g	1, 4 g				22, 16 g	75, 232 g	3%, 2%
XXIV	361, 2278 g	130, 1087 g	15, 150 g	34, 143 g	12, 65 g	11, 33 g	16, 37 g		11, 9 g	590, 3802 g	24%, 30%
XXV	509, 2841 g	228, 1809 g	31, 427 g	26, 90 g	6, 42 g	8, 50 g	7, 25 g		5, 3 g	820, 5287 g	34%, 42%
XXVI	73, 339 g	15, 64 g		8, 55 g						96, 458 g	4%, 4%
XXVII	67, 395 g	6, 52 g	2, 15 g	1, 1 g			2, 22 g		1, 3 g	79, 488 g	3%, 4%
Total	1527, 7467 g	518, 3511 g	84, 753 g	146, 539 g	31, 144 g	26, 111 g	25, 84 g	1, 7 g	114, 80 g	2472, 12696 g	
%	62%, 59%	21%, 28%	3%, 6%	6%, 4%	2%, 1%	1%, 1%	1%, 1%	<1%, <1%	4%, 1%		

FA2 Hard fabric with moderate medium flint and sparse–rare quartz sand (sometimes glauconitic). Some sherds also contain either rare ferruginous or clay pellets. (TS13).

FA3 Hard fabric with sparse–moderate coarse flint and sparse to rare quartz sand.

Grog-tempered

G2 Soft fabric with moderate angular grog. Some fabrics also contain rare shell and quartz sand.

GF2/GFA2 Soft fabric with moderate grog (either subangular or subrounded), rare flint and sometimes quartz sand.

GQ2 Soft fabric with moderate grog (either subangular or subrounded) and rare angular quartzite.

Limestone-tempered

L2 Soft fabric with moderate angular limestone fragments.

Quartzite-tempered

Q1 Hard fabric with moderate fine angular quartzite. Some fabrics also contain rare rounded grog or clay pellets.

Q2 Hard fabric with moderate medium angular quartzite. Some fabrics also contain rare clay pellets, rounded grog, chalk, sandstone or organics (TS4, 6).

Q3 Hard fabric with moderate medium-coarse quartzite.

QA1 Hard fabric with moderate fine quartzite and rare quartz sand.

QA2 Hard fabric with moderate medium angular quartzite and rare quartz sand. Some fabrics also contain rare clay or ferruginous pellets, rounded grog, sandstone or organics (TS8, 9). One sherd has the addition of black (?glauconitic) sand (TS7).

QA3 Hard fabric with moderate medium-coarse quartzite and rare quartz sand. Some fabrics also contain rare rounded grog.

Mixed flint- and quartzite-tempered

FQ2/3 Hard fabric with both medium and medium-coarse flint and quartzite. Some fabrics also contain either sand, and/or ferruginous pellets. One sherd also contains black (?glauconitic) sand (TS5).

Organic-tempered

O1/2 Soft fabric with burnt-out organics. Either with no other temper or with the addition of rare amounts of either sand, flint, quartzite and/or ferruginous pellets (TS11–12).

Sand-tempered

A1 Hard fabric with medium-coarse white or colourless quartz sand (sometimes black sand may also be present). Some fabrics also contain rare flint, quartzite, sandstone, clay or ferruginous pellets, rounded grog or organics. One sherd also contains rare bone fragments (TS10).

BO1 Hard fabric with fine black sand and rare voids from burnt-out organic inclusions.

Shell-tempered

S2 Soft fabric with moderate medium shell platelets. One sherd also contains bone fragments (TS15).

SA2 Soft fabric with moderate medium shell platelets and rare quartz sand. One sherd also contains bone fragments.

SF 2 Soft fabric with moderate medium shell platelets and rare angular flint (TS14).

Discussion of fabrics

The pottery assemblage from Whitecross Farm is manufactured from a wide range of fabric types (see Table 3.12), although between 80–90% of the overall total is tempered principally with flint, quartzite or a mixture of the two inclusions. Flint-tempered fabrics predominate within the assemblage and account for approximately 60% of the total, while quartzite accounts for between 20–30%. Sand usually mixed with other inclusion types is a minor fabric group, while rare fabrics containing either shell, grog or limestone also occur.

The use of a wide range of inclusion types is not unusual as a similar situation is found at both Yarnton and Eynsham (Barclay and Edwards in prep a; Barclay 2001). Certainly in the eastern part of the Upper Thames Valley both flint and quartzite appear to have been predominantly used to temper late Bronze Age pottery. Whitecross Farm is situated close to the Chalk, and flint nodules would have been readily available. Both flint and quartzite (most probably vein quartz) are siliceous in character and would have had similar properties. They could have been worked in a similar way by the potters and would have had a very similar appearance. However, although their occurrence in the same fabrics (FQ2/3) would suggest that they could have been interchangeable, there is some evidence from Whitecross Farm to indicate that some distinction was made. Of the two inclusion types only flint was used to grit bases even when the fabric of the pot was quartzite-tempered (see eg Forms, below). At Eynsham, and probably at Yarnton too, the use of flint temper is rare, which can be explained by the distance from good sources of flint nodules. However, at both these sites the use of quartzite temper is very common. Pebbles of vein quartz would have been locally available in deposits derived from the gravel terraces near all three sites.

A small number of sherds were manufactured from a very dense flint-tempered fabric. No featured sherds were recovered, although it is possible that all the sherds came from the same vessel.

The use of sand and shell at Wallingford can be paralleled at both Yarnton and Eynsham (Barclay and Edwards in prep. a; Barclay 2001). At the latter site the use of shell, and shell mixed with quartzite, was quite common (over 40%), although this could be a reflection of the early date for this assemblage. Fossil shell was widely used in this area for the manufacture of middle Bronze Age (Deverel-Rimbury) fabrics and would have been readily available as derived fossil material within the Thames gravels. At Wallingford there is only limited evidence for the use of shell to temper vessels. Most if not all the purely shell-tempered sherds are from vessel bodies, but at least one sherd in a mixed shell and flint fabric is from the rim of a small, probably bipartite vessel (Fig. 3.8.13). However, many of these sherds in shell-tempered fabrics are from stratified contexts and while it is possible that some of these represent intrusive early Iron Age sherds it nonetheless seems probably that shell-tempered fabrics were still manufactured during the late Bronze Age.

A small number of sherds in a range of fabrics (F3, A1, S2 and SA2) contained fragments of bone. In nearly every case the bone occurred as a secondary rather than as the main inclusion type. There is no ready explanation as to why bone should be added and its occurrence in generally relatively small quantities could suggest accidental rather than deliberate inclusion. The relatively small size of these inclusions (up to 3 mm) negates any further identification. The occurrence of bone temper has been noted in the Upper Thames at Yarnton where it is used in both Iron Age and late Neolithic pottery (Barclay and Edwards in prep. a) and an early Neolithic bowl from the Hazleton North long cairn (Smith and Darvill 1990, 152).

From the range of inclusions present it can be suggested that all the pottery could be of local manufacture (see below).

Petrographic analysis

by Chris Doherty

Petrographic analysis was undertaken in order to verify the principal temper/inclusions present, as these form the basis for the working fabric groups constructed from visual examination. In addition, similarities and differences between these fabrics and knowledge of the local clays allow comment to be made on whether any of these ceramics are inconsistent with a local production. Fifteen sherds were submitted for examination. Following consolidation (by impregnation with epoxy resin), the sherds were prepared as standard thin-sections and analysed with a polarising microscope (magnification range x40–x400).

Results

Table 3.13 summarises the main inclusion/temper types identified by thin-section analysis and compares these to the fabric groups assigned previously. Photomicrographs and brief descriptions of these fabrics are given in Appendix 4.

Discussion

The main point to emphasise is the good agreement between the fabric groups originally assigned and those based on the identification of the main types of inclusion/temper by thin-section analysis. Only in a few cases were original fabric groups significantly revised; instead only minor refinements were made to the descriptions, which largely reflect the greater resolving power of the polarising microscope. This verification provides strong support for the ability of field observations to correctly identify the main fabric characteristics of this pottery. The main fabrics and recognised subfabrics will now be discussed.

Table 3.13 Thin-section samples

TS sample no.	*Reference*	*Fabric group (key)*	*Thin-section*
1	2414	Flint (F1)	Flint
2	2505/B/3	Flint (F2)	Flint (fine clay) (Plate A4.1)
3	2403 151/501	Flint (F3)	Flint (temper rich) (Plate A4.2)
4	2414 141/507	Quartzite (Q2)	Quartzite (Plate A4.3)
5	2505/D/3	Quartzite, flint & sand (QFA3)	Quartzite & flint (Plate A4.4)
6	2505/C/3	Quartzite with flint-gritted base (Q2)	Quartzite with basal flint
7	2505/D/3	Quartzite with flint-gritted base	Quartzite with basal flint
8	2414	Grog (GAQ2)	Quartzite, grog, flint & shell (Plate A4.5)
9	2402	Grog (GAQ2)	Grog & quartzite
10	2505/C/1	Sand (AFP1)	Organic & sand
11	2414	Organic (AO1)	Greensand
12	1703	Organic (O1)	Greensand & organic
13	2403	Flint & black sand (FB2)	Greensand & flint (Plate A4.6)
14	203/3	Shell & flint (SF2)	Shell & flint
15	1703	Shell & bone (S2)	Bone & shell (Plate A4.7)

Flint

Flint-dominated fabrics have few if any other coarse inclusions. The flint is mostly calcined, giving it a mosaic appearance in thin-section. Distribution is uniform throughout the section, a feature that distinguishes these fabrics from those with flint-gritted bases (see below). Subfabrics are defined on the basis of the abundance of flint temper and the nature of the clay matrix. Considering TS1 as our standard reference, TS2 is defined as a subfabric characterised by having a similar proportion of flint temper as TS1 and also a sand-free clay. TS3 differs by having a much greater abundance of flint, again in a sand-free clay.

Quartzite

Two quartzite-dominated fabrics have been defined: one with quartzite as the only coarse inclusion in a fine sandy clay, and the other with quartzite and flint in a fine sandy clay. In both cases the morphology of the quartzite grains shows that these do not represent naturally transported grains but have been added as temper. The flint-gritted bases of TS4 and TS5 are modifications of the quartzite plus sand body fabrics and therefore are not considered as separate subfabrics.

Grog

Two grog-based fabrics have been defined. One (TS8) has grog accompanied by a range of other coarse inclusions – flint, quartzite and shell. The other (TS9) has only quartzite as the other main temper type (plus minor flint). Both have fine sandy clay bodies.

Sand

A single sand-tempered fabric has been defined (TS10) but was shown by thin-section analysis to also contain organic temper. This sand is distinguished from the fine sand which characterises most of the clay bodies in being coarser and very well rounded.

Greensand

The term 'blacksand-tempered' has been used to describe those fabrics in which the sand component also contains numerous black or dark red grains (TS7). In thin-section these are recognised as sand-sized grains of the mineral glauconite which occurs in the Greensand geological formation that outcrops directly beneath the Chalk. The restricted distribution of Greensand means that its occurrence in pottery clay restricts the possible provenance of the latter.

Shell

Shell is present as a minor inclusion in several of these fabrics, but is only dominant in two of these – TS14 (with flint) and TS15 (with bone). In all cases this represents fossil shell derived from the erosion of fossil limestone.

Bone

As noted above, bone temper is observed in TS15 where it is associated with shell temper in a fine sandy matrix. This is the only observation of bone in thin-section.

Provenance

The principal inclusion/temper types represented are flint, grog, quartzite, sand, organics, shell and bone. All of these materials can be sourced locally and therefore the inclusion/temper types do not suggest an imported origin for any of these sherds. This conclusion is also supported by the nature of the clay matrix of these fabrics. Although the fine sand/silt content of the clays differs, there is nothing to suggest the use of significantly different clay sources.

Consideration of the geology of the region shows that all the main inclusion types which have been observed in these fabrics – quartzite, flint, sand, shell and Greensand – would have been available locally. It can be shown that, whereas quartzite and sand can be found in sediments along the entire length of the Thames floodplain in this region, flint and Greensand have a distribution restricted approximately to the south of the Ridgeway. This distribution is geologically controlled as Greensand outcrops at the base of the chalk escarpment and flint is a residual product from the erosion of the chalk.

This fortunate division into geological distinct zones may therefore allow us to predict that local fabrics can be further subdivided into those made from clays north or south of the Ridgeway. Previous studies have shown that the Thames alluvial clays to the north contain natural inclusions of sand, quartzite, ironstone, shell and limestone; whereas south of the chalk, sand and quartzite persist, but ironstone, shell and limestone become rare and are replaced by flint and (occasionally) Greensand. However, it is necessary to apply some caution here as tempering materials may have been derived from non-local sources. This is particularly the case where recycled materials such as grog and flint-knapping waste have possibly been used.

With these limitations in mind it is possible to state that all of these fabrics have types of inclusions/temper which indicate that they were made from floodplain clay on or south of the intersection of the Thames with the Ridgeway. All of these fabrics are therefore consistent with production in the vicinity of the Whitecross Farm site.

In addition to the use of several temper types, minor variations are also seen in the clay matrices. The main variation is in the amount of fine sand

Table 3.14 Rim forms by fabric

Rim form	*Flint*	*Quartzite*	*Mixed flint & quartzite*	*Sand*	*Shell*	*Grog*	*Other*	*Total*
1	15	1		1	1		3	21
2	2	1	4	2	1	1	1	12
3		4					1	5
4	5	1	1	1				8
5	3	2				1		6
6	4	1	1	1				7
7	10		1				1	12
8	15	5	1	2			1	24
9	8	7		3		1	1	20
10	4			1			1	6
11	2							2
12	3	1						4
13	4	2					3	9
Total	75	25	8	11	2	3	12	136

present, which may range from abundant (eg TS1) to absent (eg TS3). Although a conspicuous difference in thin-section, such variations are to be expected over short distances (lateral and vertical) within floodplain clay deposits and therefore cannot reliably indicate the use of different clay sources.

One exception is TS11, which has very abundant Greensand. This abundance plus morphological characteristics of the grains suggest that this fabric does not represent alluvial clay tempered with Greensand but that it may be clay derived from the *in situ* weathering of a Greensand outcrop. This would still imply a local source and could be easily checked by field observation of Greensand outcrops.

Conclusion

The thin-section analysis verifies field fabric groups without major revision. All fabrics have been shown to be consistent with a local provenance (the vicinity of Wallingford or immediately south), and all but one of the fabrics are made from Thames alluvial clay. This exception may be made from clay derived from a weathered Greensand outcrop.

Forms

The following approach was adopted in analysing the assemblage. Because of the very fragmentary nature of the assemblage it was not possible to identify many complete vessel profiles. In order to characterise the assemblage, various rim, neck, shoulder and base forms were defined and these are outlined below. Rarely was it possible to link base forms to upper portions of vessels, while this task was somewhat easier with featured sherds (eg rims, necks and shoulders) from the upper halves of vessels. In the absence of profiles the type of analysis is restricted with the categorisation of vessel forms largely dependent on rim and shoulder forms. Given the limitations, no attempt is made to categorise the assemblage into functional groups such as bowl, jar and cup, although a subjective comment is made below in the discussion.

Rims *(Tables 3.14–15)*

R1 Simple, upright squared or flattened
R2 Simple, upright rounded
R3 Simple, upright pointed
R4 Simple, out-turned squared
R5 Simple, in-turned
R6 Beaded
R7 Everted squared
R8 Everted rounded or pointed
R9 Flared (sometimes only slightly) with either decorated or plain rim bevels
R10 In-turned or hooked usually rounded or pointed
R11 In-turned or hooked squared
R12 Expanded
R13 Indeterminate

Twelve different rim forms were recognised. A correlation of rim forms by fabric group is given in Table 3.14. Nearly every identified rim form was manufactured from a variety of fabrics. However, very high proportions (55%) of the rim forms were manufactured from flint-tempered fabrics, and many of these rims were also made in fabrics tempered with quartzite, sand and more rarely shell or grog. Rim form R3 was more often manufactured from quartzite-tempered fabrics. Of the three most numerous rim forms, R1 and R8 were predominantly made from flint-tempered fabrics, while R9 was equally likely to be manufactured from flint- or quartzite-tempered fabrics. Of the two most numerous fabric groups, rim form R3 is the only one not to be flint-tempered, while forms R7, 10 and 11 were never manufactured from quartzite-tempered fabrics. Principally sand-tempered fabrics were used to manufacture a wide range of rim forms. The

Table 3.15 A breakdown of rim forms by trench

Rim form	*I*	*II*	*III*	*XVII*	*XVIII*	*XXIV*	*XXV*	*XXVI*	*XXVII*	*Total*
1	3	1	6			3	8			21
2	1	2	3	2		2	2			12
3	1					3	1			5
4		1	4	1			1	1		8
5		1			1		3		1	6
6		1				1	5			7
7		1	3	2	1	2	3			12
8				1	1	6	12	2	2	24
9	1		1			5	12	1		20
10	1			1		2		1	1	6
11				2						2
12						1	2		1	4
13		1	1	2		2	2	1		9
Total	7	8	18	11	3	27	51	6	5	136

use of shell- and grog-tempered fabrics was restricted to rim forms R1–2 and R2, 5 and 9, respectively. Table 3.15 gives a breakdown of the occurrence of the rims by trench, the significance of which is discussed below.

Neck cordons

A small number of applied neck cordons were recorded. These varied from plain (Fig. 3.15.49), to fingertip impressed (Fig. 3.15.48) to cabled (Fig. 3.14.26). Vessels with neck cordons had a limited distribution and were only found in trench XXV. In two cases the neck cordons belonged to very large vessels, probably jars. Their purpose could have been to facilitate lifting or handling. Neck cordons are a feature found on vessels of late Bronze Age date and their use continues into the start of the early Iron Age.

Shoulders

A variety of shoulder forms occur although most are rounded (eg Figs 3.8.3, 3.9.12, 3.10.4, 3.10.6, 3.11.4, 3.13.14, 3.14.27, 3.15.48, 3.15.54 and 3.17.10) and very few are angular (eg Figs 3.8.7, 3.13.11, 3.15.55, 3.15.57 and 3.17.13). The rounded forms vary from slack (Figs 3.11.8, 3.13.10) or humped (Fig. 3.9.5) to distinctly globular (Figs 3.10.5, 3.11.4). Impressed decoration mostly in the form of fingertipping or fingernail occurs on a number of these (eg Figs 3.9.12, 3.13.10, 3.13.14, 3.13.16, 3.16.67), while at least two vessels have distinct finger moulding on the inside (Fig. 3.13.10 and 14).

Bases

Sherds from approximately 55 separate bases were recorded and these can be grouped into either flat with a rounded base angle (B1 (5%) eg Fig. 3.8.5–6), flat with an angular or squared section (B2 (29%) eg Figs 3.10.8, 3.11.10) or flat with an expanded/protruding foot (B3 (33%) eg Figs 3.8.23, 3.11.11–12, 3.12.18, 3.13.18–19). A number of the latter carry crude finger-pinched or dimple impressions around the base (Figs 3.11.11, 3.12.18). One base fragment has finger dimples impressed on the interior surface (Fig. 3.8.16). Ten bases of B2–3 type have been deliberately flint-gritted and there is one example where the gritting involves clay pellets or grog (Fig. 3.15.56). In two cases the vessel is manufactured in a non-flint fabric, while the base is gritted with flint, and although quartzite is used instead of flint to temper pottery, it is not used to grit bases.

Vessel forms

Ten basic vessel forms (V1–10) were identified and these are defined and discussed below.

V1 Straight-sided or slack-shouldered vessels, probably jars, with simple rims. More rarely rims may be in-turned and/or decorated. Fabrics F1, FA1, F2. Plain. Surface treatment includes wiping (eg Figs 3.8.2, 3.8.17, 3.8.26, 3.12.17).

V2 Hooked-rimmed jars with either in-turned, incurved or hooked rims. Closed form. Fabrics A1, F2, FA2, QA2. Plain. Surface treatment includes wiping (eg Figs 3.8.11, 3.9.6, 3.10.1, 3.12.14, 3.17.1).

V3 Slack-shouldered vessels with simple rims. Fabrics F2, FA2, FQ2/3, Q2, QA2 (eg Figs 3.8.3, 3.9.3, 3.9.5, 3.17.11; Barrett 1986, fig. 4.1).

V4 Biconical vessels with angular profiles and simple rims. Fabrics A1, G2, SF 2 (eg Figs ?3.8.13, 3.13.9, 3.14.34).

V5 Bipartite vessels, mostly jars, with high rounded or angular shoulders. Closed forms. Fabrics A1, F1, FA1–2, FQ2, QA2 (eg Figs 3.8.19, 3.9.12, 3.10.2, 3.11.2–3, 3.11.8, 3.12.16, 3.13.10, 3.13.14, 3.13.23, 3.14.27, 3.14.29, 3.14.31, 3.14.35, 3.15.55, 3.15.57, 3.17.6, 3.17.10).

V6 Round-bodied vessels, jars/bowls, with simple rims. Fabrics FA2, Q2 (eg Figs 3.10.5–6, 3.16.64; Barrett 1986, fig. 4.12).

Table 3.16 A breakdown of vessel forms by fabric

Vessel form	Flint	Quartzite	Mixed flint & quartzite	Sand	Shell	Grog	Total
1	5	1					6
2	3	1		1			5
3	3	2	2				7
4				1	1	1	3
5	11	1	3	1		1	17
6	1	1					2
7	1						1
8	5						5
9	9	7	3	1		1	21
Total	38	13	8	4	1	3	67

V7 High-shouldered round-bodied vessels. Fabric F2 (eg Figs 3.11.4, 3.14.38; Barrett 1986, fig. 4.14).

V8 Vessels with short flaring rims. Fabrics FA1, F2 (eg Figs 3.8.24, 3.9.1, 3.12.23, 3.13.12, 3.13.24, 3.16.62, 3.17.13; Anon. 1960, fig. 1.6).

V9 Vessels with either angular or S-profiles with long flaring rims. Rims often squared or bevelled and either plain or decorated with fingertipping or cabling. Necks may carry applied cordons. Shoulders sometimes decorated. Fabrics FA1–2, F2–3, G2, O1/2, Q2, QA2, FQ2/3 (eg Figs 3.8.18, 3.8.29, 3.11.1, 3.11.9, 3.11.14, 3.12.12, 3.12.25, 3.13.1, 3.13.4–5, 3.13.7, 3.13.22, 3.14.28, ?3.14.30, ?3.14.43, 3.15.48–51, 3.15.58, 3.16.63; Barrett 1986, fig. 4.20; Anon. 1960, figs 1.1 and 1.3).

V10 Vessels with upright or flaring rims that are probably tripartite. Fabric Q2 (eg Fig. 3.17.8).

Discussion of vessel forms

The assemblage can be characterised by a high degree of fragmentation. Vessel profiles are rare with only one occurrence of a complete vessel profile (Fig. 3.10.1). Approximately 75% of this vessel survived and this represents the most complete vessel from the site. It is estimated that from the remaining vessels identified many are represented by no more than 7% of the actual pot. In only one case was it possible to match a base to a pot profile. The assemblage is dominated by shouldered forms (84%) of which a high number of the recognised vessels have either flaring or everted rims (56%). Hooked-rimmed and simple straight-sided jars are rare and account for only 16% of the assemblage. The assemblage also contains a small number of globular forms, some of which could be bowls rather than jars.

It is assumed that many of the rims are of jar rather than bowl form; however, this cannot be proved with any certainty because of the relatively high brokenness of the assemblage. Possible bowls include Figures 3.11.4, 3.11.8 and 3.16.64. Some vessels are quite small and could have functioned as cups or small bowls (eg Fig. 3.17.10).

From a total of 67 identifiable vessel forms (see Table 3.16) and with the exception of forms 4 (biconical vessels) and 10 (probable tripartite vessels), 38 vessels are made out of flint-tempered fabrics and 13 are made out of quartzite-tempered fabrics. It can be noted that there is a direct relationship between the most numerous vessel forms (V3, 5 and 9) and the most abundant fabrics (flint-, quartzite- and sand-tempered groups) (see Tables 3.12 and 3.16). Typologically early forms are predominantly but not exclusive made from flint-tempered fabrics, although this is of course based on a statistically low number of vessels (11). Similarly the angular bipartite form (V4) that could typologically be late within

Table 3.17 A breakdown of vessel forms by trench

Vessel form	I	II	III	XVII	XXIV	XXV	XXVI	XXVII	Total
1	1		1		3	1			6
2		1		1	2		1		5
3	1			1	1	3		1	7
4		1				2			3
5			1	2	4	6	2	1	16
6					1	1			2
7					1				1
8				1	3	1		1	6
9			1	1	5	14			21
Total	2	2	3	6	20	28	3	3	67

the late Bronze Age sequence (as outlined below) does not occur in either the flint- or quartzite-tempered fabrics. Again the number of vessels is small (3).

Table 3.16 illustrates that all the identified vessel forms were made in a wide range of fabrics most of which can be described as fine-medium wares with inclusion size ranges varying from 1 mm to 3 mm (52 of the 67 vessels). Table 3.17 provides the distribution of vessel forms across the site and the significant of this is discussed below.

Form analysis

Use of the vessel classification as outlined by Barrett (1980, 302–3) is limited because of the general lack of vessel profiles and brokenness of the assemblage, and precise quantification would be impossible. However, the following subjective comment is made. The assemblage appears to be dominated by jar forms (class I – eg Figs 3.9.12, 3.13.14, 3.15.48–9, 3.15.51, 3.15.57), although bowls (classes III–IV – eg Fig. 3.11.4, 3.11.8 and possibly the shoulder Fig. 3.10.5) and cups (class V – eg Fig. 3.17.10) are also present. Some class II jars could be present although these are defined on the criteria of finer fabric and burnished surfaces alone, while class II jars with complex incised decoration are notably absent.

In terms of ware the assemblage can be divided into two categories: fineware and coarseware vessels, with the latter divided into medium coarse and very coarse. The relative fineness of the fabric, wall thickness range and surface finish can be used as criteria in order to define these categories. In terms of fabric approximately 20% of the total assemblage is manufactured from very fine fabrics, 75% is made from fabrics that are of medium size (1–3 mm) and only 5% is made from fabrics with coarse inclusions (exceeding 3 mm). Wall thickness has a maximum range of between 3–14 mm, although the vast majority of the assemblage falls between a minimum range of 5–10 mm. Very rarely were sherds found that had a wall thickness greater than 10 mm. The more common fine fabrics (F1, FA1, Q1 and QA1) have a wall thickness range towards the lower end of this range (3–7 mm), while the medium-coarse and coarse fabrics tend to fall in the higher range of 5–10 mm. In general terms many of the fine vessels tend to be better finished with more effort put into the smoothing and/or burnishing of surfaces. These vessels are very rarely decorated. This includes two of the three examples of linear decoration from the whole site. There are only three examples where the use of impressed decoration occurs on vessels made from fine fabrics. This includes a cabled rim, an impressed rim and a shoulder sherd with fingernail decoration. In contrast many of the impressed decorated rim and shoulder sherds tended to be manufactured from the medium to coarse fabrics. They also fall within the wall thickness range of 5–10 mm and, while burnishing and smoothing still occur, there is a greater incidence for the use of wiping as a surface treatment.

In general terms the assemblage can be characterised as one that contains a significant number of coarseware vessels, although even these tend to be relatively thin walled and well made (a characteristic of the period), while its general fineness overall in terms of fabric and manufacture might be a reflection of the site's overall status. The wider significance of this point is further discussed below.

Manufacture and surface treatment

There was little direct evidence for pottery manufacture from the eyot. All the pottery can be assumed to have been hand-made, with construction employing either the ring or the slab method. Tempering materials could all have been procured locally (see Doherty, above). Both calcined flint and quartzite were found on the eyot (see Roe and Barclay, above). The presence of glauconitic sand, sometimes quite fine, in some fabrics indicates more than one clay source.

It is possible that the few refired or overfired sherds could indicate production, with the latter perhaps representing the remains of wasters, although none was found in an obvious deposit and other explanations as to how they became refired could just as easily apply (Barclay 2002). At least one example of spalling was observed. Surface treatment included wiping, smoothing and burnishing. Both smoothing and burnishing were used to finish either outer or inner surfaces, and sometimes both. In one case burnishing has left clear deep facets on the vessel's surface (Fig. 3.10.4). These techniques were mostly used on sherds belonging to fineware vessels, although some use on coarseware vessels was also noted. In contrast, wiping and finger smearing tended to be used on coarseware vessels. Some bases were given a coating or backing of grits, usually flint, although one example unusually has clay pellets (see section on Bases, above). In a number of cases flint grit was preferred even when the pot was tempered with a different material.

Decoration

The total assemblage includes 59 instances (sherd number) of decoration. A variety of decorative techniques were used although most involve some form of finger impression (eg fingertipping). The use of decoration is limited to rims, shoulders and necks, and is summarised in Table 3.18. The most common form of rim decoration is cabling (Figs 3.12.23, 3.15.48, 3.15.50–1), although fingertipping and fingernail impressions also occur (Figs 3.8.11–12, 3.9.17). Necks are rarely decorated, although neck cordons are decorated in a variety of ways (Figs 3.14.26, 3.15.48, 3.15.51). The most common form of shoulder decoration is by

Table 3.18 Summary of all decorated sherds by context

Context	Rims						Necks		Shoulder		Total
	Cabled	*Fingertip*	*Fingernail*	*Misc. impressed/incised*	*Fingernail*	*Applied cordon*	*Fingertip*	*Fingernail*	*Incised*	*Combed*	
103				1						1	2
203		1	1						1		3
303	3		1	1							5
1703					1			2			3
1803			1								1
2402	1										1
2403		1					1				2
2409	2										2
2411									1		1
2414	1			1							2
2505	12	3	1	2		4	13				35
2605							1				1
2703		1									1

impressed fingertipping (Figs 3.9.9, 3.13.10, 3.13.14, 3.14.27), although fingernail is also used (Fig. 3.9.12). Two possible examples of linear incised decoration occur (the sherds are too small to be illustrated), while there is one rare example of combing (Fig. 3.8.7).

The range of decoration found in the Whitecross Farm assemblage is perhaps typical for the late Bronze Age period, while the near absence of linear incised motifs may reflect the overall date range of the assemblage, with this type of decoration being more common during the transitional late Bronze Age/early Iron Age (or earliest Iron Age). In terms of decoration the assemblage has certain similarities with Runnymede and Ivinghoe Beacon (Cotton and Frere 1968).

Decoration is not common at Whitecross Farm with no more than 24% of rims and 13% of shoulders being decorated. Across the site there is the suggestion that trenches XXIV and XXV contained a higher incidence of decorated vessels (see Fig. 2.10b–c). Both trenches, however, produced significantly large quantities of pottery. In trench XXIV decoration became more common higher up the stratigraphic sequence. But in the case of trench XXV this difference could be real, perhaps chronological, and the implication of this aspect is further discussed below. The shoulder sherd with combed lines (Fig. 3.8.7) is unusual, although examples of this technique are found at Runnymede (Longley 1980, 70, fig. 36, 376–82). One further decorated sherd not listed in Table 3.18 is a fragment of base with internal all-over finger dimples (Fig. 3.8.16). Similar decorated bases have been found on other LBA sites (eg Reading Business Park and Runnymede; Hall 1992, fig. 48, 155).

Function and use

Some surface traces such as burnt residues and sooting on the surfaces of pots survived, but no examples of limescale were found. There were no obvious signs of physical wear, although such traces would be difficult to recognise given the degree of sherd fragmentation. In general, such residues indicate that part of the assemblage was used for cooking and the preparation of food, while it can be assumed that many of the finer vessels would have been used for serving.

Repair and reuse

There is slight evidence for both the repair of vessels and the reuse of broken sherds. One vessel (Fig. 3.10.1), which was fragmentary, had a single drilled hole near the rim and next to an old break. The hole is most likely for repair in an effort to prolong the use of the vessel. This was the most complete vessel from the site and although it was only three-quarters complete, it was possibly curated before being deposited in the channel. Two examples of sherd reuse were recorded (Figs 3.8.21, 3.9.14); in both cases body sherds appeared to have been deliberately notched. This could have been caused by rubbing the fracture against a sharp edge. Their exact function is unknown, but the occurrence of paired notches suggests that they could have been used as weights.

A small number of refired or overfired sherds were found (two body sherds and possibly a shoulder sherd from 2405, a body sherd from 2505/B/1 and a rim fragment from 2705/2). These sherds tend to be a whitish-grey in colour, sometimes crazed and relatively light in weight. Such alteration may have happened at different stages of a vessel's use-life. Possible explanations include the overfiring of pots during initial firing or the reuse and subsequent refiring as a result of pyrotechnical-related activities such as metal-working, cooking or pottery production. Some sherds may have been refired either accidentally or deliberately by the use of burning to remove abandoned structures, rubbish or vegetation. One suggestion is that refired sherds could represent a residue of ritual activity, perhaps tied to the deliberate destruction of other possessions and maybe linked to the death of an individual and the funerary rite of cremation (Barclay 2002).

Discussion of the context groups

Pottery was recovered from nine of the excavation trenches. These are treated as context groups and are described and illustrated below.

Trench I *(Fig. 3.8.1–10)*

This trench produced a total of 230 sherds (592 g). With the exception of a sherd from context 105, all the pottery came from layer 103. The group of pottery from this layer contains a number of simple, out-turned or everted rims (Fig. 3.8.1–4, 8–10) including some from straight or slack-shouldered vessels (Fig. 3.8.2–3). Most of this pottery is plain with the exception of a decorated rim fragment (not illustrated) and a shoulder sherd with combed lines (Fig. 3.8.7). The majority of pottery from 103 was flint-tempered (some 59% by weight), while most of the remainder was quartzite-tempered (27%). Twelve sherds from 103 were principally sand-tempered and one was shell-tempered.

Trench II *(Fig. 3.8.11–13)*

All the pottery from this trench came from layer 203 (136 sherds, 291 g). This group of pottery includes the rims from at least eight vessels. Most of the rims are simple or everted, although one is beaded (not illus. 203/1 2–3 m). Decoration occurs on two rims and one body sherd. One in-turned rim from a possible hooked-rimmed jar has fingernail decoration (Fig. 3.8.11). An everted rim has fingertip decoration (Fig. 3.8.12) and a body sherd (not illus. 203/4 2–3 m) may have originally had linear decoration. The rim illustrated as Figure 3.8.13 is possibly from a thin-walled bipartite vessel and is made from a fabric tempered principally with shell but also with flint. Approximately 71% of the sherds by weight are made from flint-tempered fabrics, while of the remainder sand- and quartzite-tempered fabrics occur in almost equal amounts. Two sherds were shell-tempered while three were grog-tempered.

Trench III *(Fig. 3.8.14–31)*

All the pottery from this trench came from layer 303 (215 sherds, 756 g). This includes the rims from a minimum of 18 vessels, a neck sherd and three base sherds.

Most of the rims are simple (eg Fig. 3.8.14, 17, 20, 25–8), some are everted (Fig. 3.8.19) and two are flared (Fig. 3.8.18, 29). Decoration occurs on 5 of the 18 rims. One rim has fingernail impressions (Fig. 3.8.14), three are cabled (eg Fig. 3.8.18, 31) and one has an incised line (Fig. 3.8.20). A base fragment from 303/1 (0–1 m) illustrated as Figure 3.8.16 has deep finger dimples on the interior surface and flint-gritting on the exterior surface. Approximately 64% of the sherds by weight were flint-tempered, while from the remainder sand- and quartzite-tempered fabrics occur in almost equal amounts. Four sherds were grog-tempered and two were shell-tempered. One sherd from 303 had been notched and reused as a possible weight (Fig. 3.8.21).

Trench XVII *(Fig. 3.9.1–16)*

All the pottery from this trench came from layer 1703 (203 sherds, 693 g). This includes the rims from a minimum of 14 vessels. There is a wide range of rim forms which includes simple (Fig. 3.9.3, 7, 12), everted (Fig. 3.9.2, 16), flared (Fig. 3.9.1, 11) and hooked types (Fig. 3.9.6, 13). Vessel forms include shouldered jars (Fig. 3.9.1–3), a possible hooked-rimmed jar (Fig. 3.9.6) and jars with everted or flared rims (Fig. 3.9.1, 11, 16). In at least two cases the representative sherds suggest that the vessels could have been quite angular in profile. Decoration is quite rare and occurs on a minimum of three vessels. Fingernail decoration occurs on one shoulder (Fig. 3.9.9), and on the neck and shoulder of the same vessel (Fig. 3.9.12). In addition, one rim has cabled decoration (Fig. 3.9.11).

Approximately 55% of the sherds by weight were flint-tempered, while sand- (5%) and quartzite-tempered fabrics (21%) accounted for much of the rest. Four sherds were grog-tempered and two were shell-tempered. One sherd from 1703 had been notched and reused as a possible weight (Fig. 3.9.14).

Trench XVIII *(Fig. 3.9.17–8)*

This trench produced a total of 75 sherds (232 g) most of which was recovered from 1803, although seven body sherds are recorded as coming from 1803–4 as well as one from 1806. The group from 1803 includes three rim sherds and three base fragments. Two flaring rims are probably from vessels of shouldered form (Fig. 3.9.17–18). One of the rims (no. 17) has fingernail decoration and represents the only occurrence of a decorated vessel in this trench. The majority of sherds from layers 1803 and 1803–4 in this trench were flint-tempered, and of the remainder most were either quartzite- or sand-tempered. Layer 1803 contained one shell-tempered sherd, while the sherd from 1806 was principally sand-tempered.

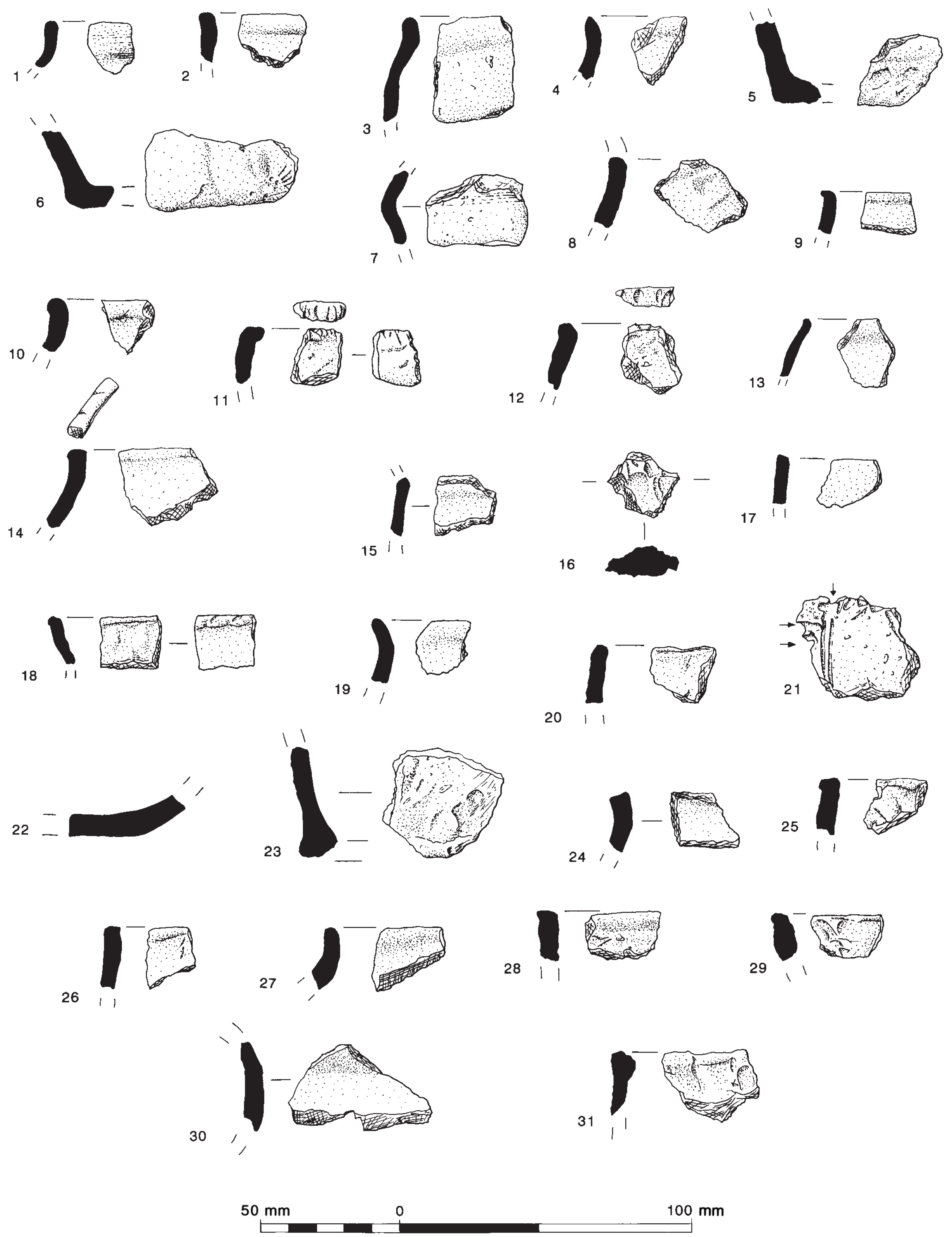


Figure 3.8 Late Bronze Age pottery (details in catalogue)

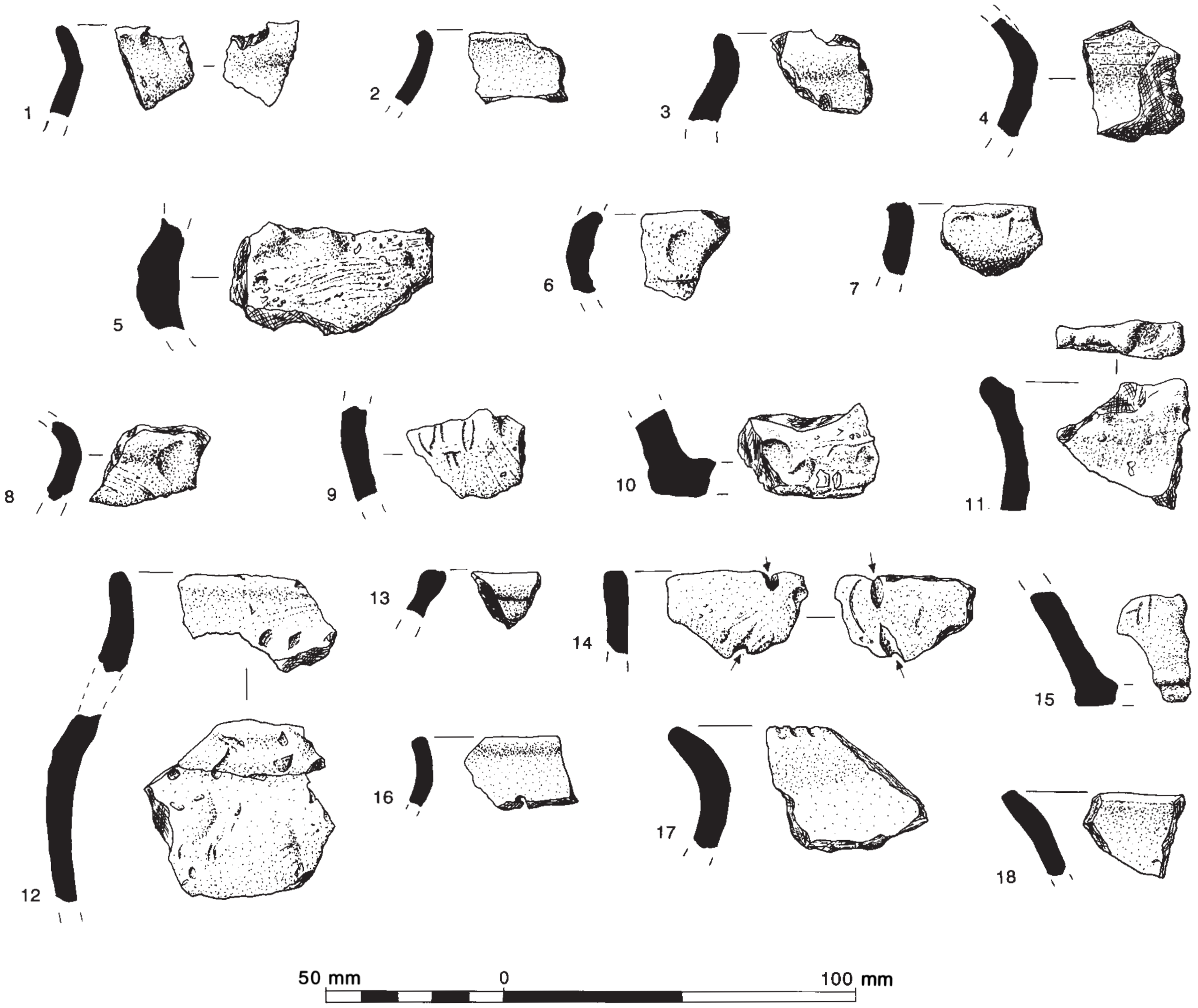


Figure 3.9 Late Bronze Age pottery (details in catalogue)

Trench XXIV *(Figs 3.10.1–8, 3.11.1–14 and 3.12.1–25)*

This trench has the most complex stratigraphic sequence. A total of 590 sherds (3802 g) were recovered.

The earliest deposit is 2405 from the base of the channel. This deposit contained 29 sherds from a relatively small number of vessels including 3 rims, 6 shoulders and 4 bases. This includes the hooked-rimmed jar (Fig. 3.10.1), which is the most complete vessel from the whole site. Approximately one-quarter of the vessel is missing and a repair hole had been drilled near the rim against an old break (see above). The pot may represent a deliberate deposit as it was recovered at the shore end of timber Structure A. The fact that the vessel was repaired may indicate that it had some value as an object; however, it seems to have been deposited in an incomplete state. Other sherds from this layer include the rim and shoulder from a small bead-rimmed bowl or jar (Fig. 3.10.2) and the rim from a small cup or bowl (not illus.). Most of the shoulders are from rounded or globular vessels (Fig. 3.10.2, 4–6). None of the pottery from this deposit is decorated.

A number of sherds from this layer are burnished and this includes an unillustrated rim fragment, the rim and shoulder fragment (Fig. 3.10.2), a base wall sherd (Fig. 3.10.3) and shoulder sherds (Fig. 3.10.4–5). Three body sherds from this layer had been refired.

Stratified above this deposit are the midden deposits, which are subdivided into a lower wet level (2409) and an upper dry level (2414). However, it is thought that this distinction reflects only a state of post-depositional preservation. The two deposits, 2409 and 2414, produced totals of 51 sherds (259 g) and 144 sherds (1332 g), respectively. That the two contexts could be part of the same overall deposit is possibly indicated by the recovery of six sherds, some refitting, from the same vessel (Fig. 3.11.4). In total these contexts produced the rims from at least ten vessels that included both everted types (Fig. 3.11.2–3, 7, 8) and flared types (Fig. 3.11.1, 4, 9, 14).

Figure 3.10 Late Bronze Age pottery (details in catalogue)

Decoration is restricted to flared rims that are mostly cabled, although one is impressed. Shoulders are on the whole rounded and none is decorated. Bases are varied, although none is flint-gritted. A small number of vessels have smoothed or burnished surfaces.

The majority of sherds from this deposit were flint-tempered, and of the remainder most were quartzite-tempered, although a significant number were sand-tempered. Of interest is the use of sand-tempered fabrics to manufacture vessels with everted and flaring rims (Fig. 3.11.7, 9). Four shell-tempered sherds came from this deposit.

Stratified above the midden deposits is the occupation layer 2403. The top half of this layer has been interpreted as a ploughsoil (2403/1) and this layer extends over the upper alluvial channel fills (2404/1) and the silted-up ditch 2413. It is almost certain that layer 2403/1 derives from other later deposits and therefore not all the pottery need derive from the occupation deposit. The distinction between 2403/1 and 2403/2 was not always made when retrieving finds from this layer.

Context 2403 produced a total of 216 sherds (954 g) from which only 31 were securely stratified within the actual undisturbed occupation layer. Within this group of material the only featured sherd was a minute rim fragment. It is argued above that layer 2403/1 is a post-Bronze Age ploughsoil (phase 7). However, Figure 2.10a illustrates that the part of the trench that corresponds with layer 2403 contained most of this pottery (630 g), while only 17 g of pottery was found from above the alluvial deposit 2404/1 and a further 132 g came from above the silted ditch (2413).

The total assemblage from 2403 includes rims from at least seven vessels. Decoration is rare and includes one shoulder sherd with fingertip impressions (Fig. 3.12.6) and a cabled rim (Fig. 3.12.12). Vessel forms include probable hooked-rimmed and

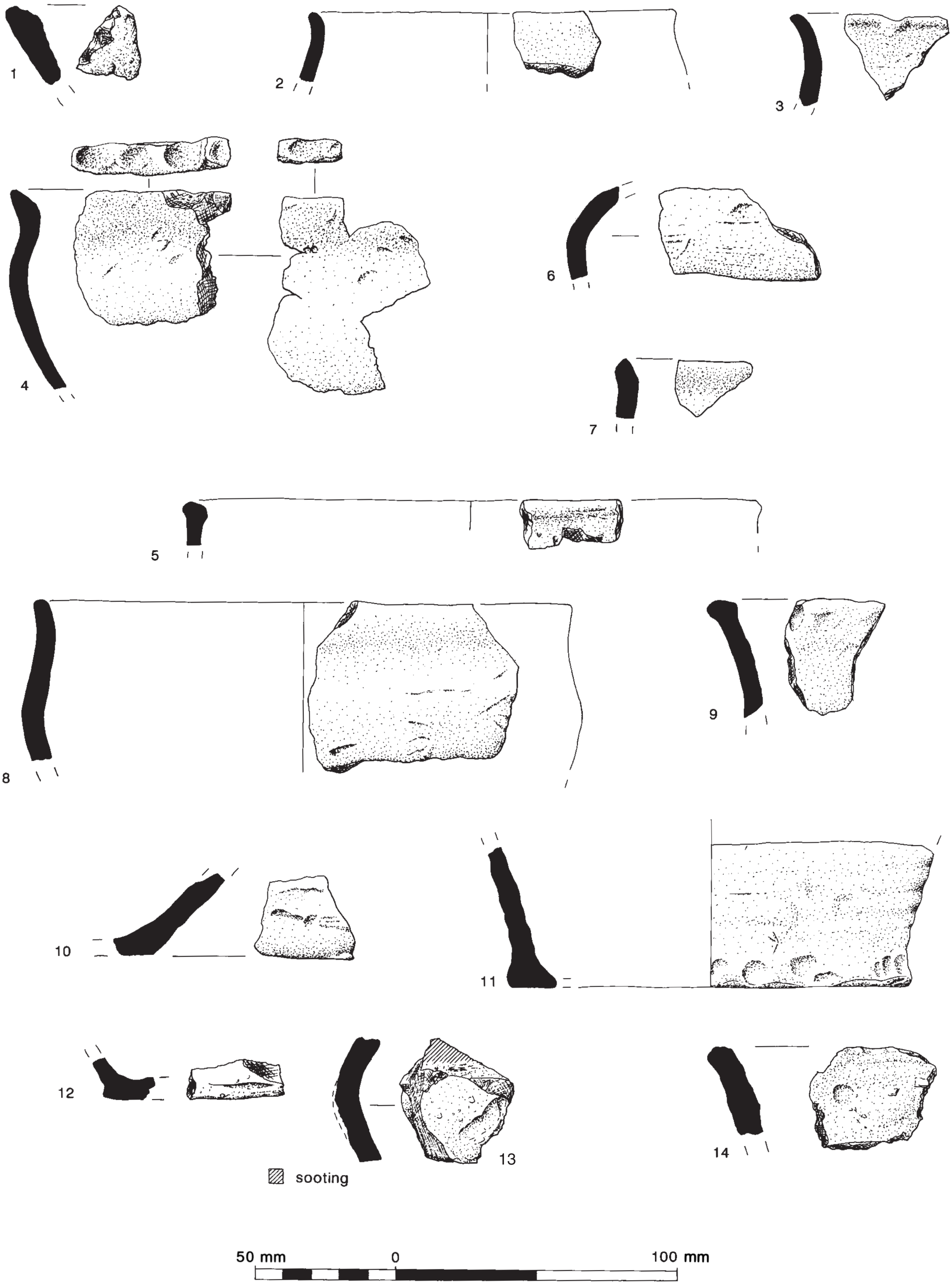


Figure 3.11 Late Bronze Age pottery (details in catalogue)

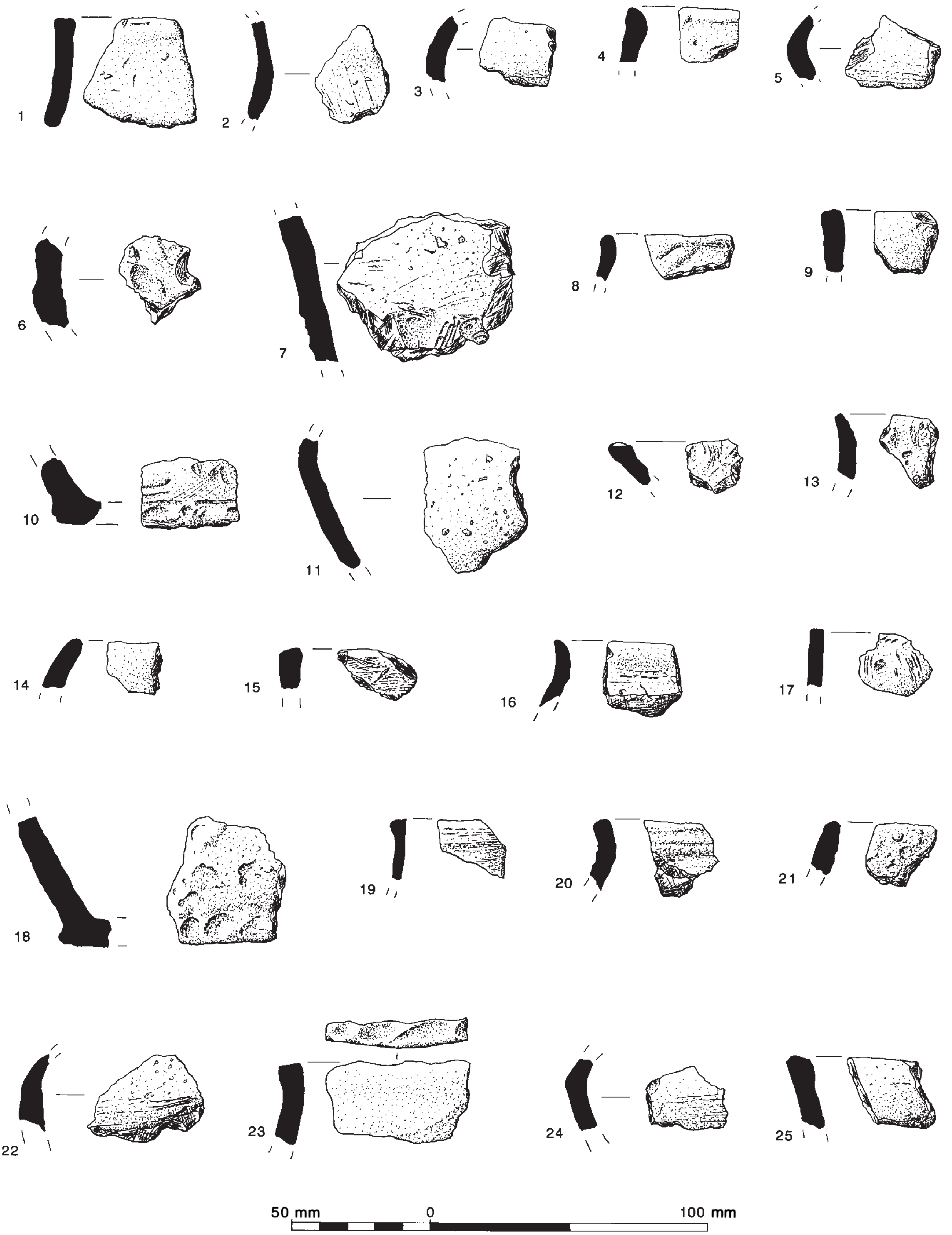


Figure 3.12 Late Bronze Age pottery (details in catalogue)

slack-shouldered jars as well as other round-shouldered jars. Of the two base fragments recovered from this context, one has been deliberately flint-gritted. At least two shoulders appeared to be from quite angular vessels, while a neck sherd (Fig. 3.12.2) may come from a tripartite vessel.

The pottery was predominantly made from flint-tempered fabrics (some 61% by weight) and of the remainder most was quartzite-tempered. However, other minor fabrics such as grog, sand, organic and shell also occur. This includes five shell-tempered sherds from which one came from the *in situ* deposit 2403/2.

Layer 2402 produced a total of 114 sherds (562 g) of pottery which includes the rims from six vessels. Most of the rims are of simple form (Fig. 3.12.16–17, 18–21), but one is long flared (Fig. 3.12.25) and another is short flared with cabled decoration (Fig. 3.12.23). Four base fragments include two flint-gritted types. The only occurrence of decoration is a cabled rim. The pottery was predominantly flint-tempered (72% by weight), and of the remainder most was quartzite-tempered.

Pottery from small features

A small number of sherds came from the ditch 2413 and postholes 2418 and 2422 (see Fig. 2.4). A single sherd in a fine flint-tempered fabric (F1) came from the fill of ditch 2413. This sherd was worn and weighed only 1 g and could easily be residual. The fill of posthole 2418 produced three sherds, of which two were flint-tempered (FA2 and F2) and one was shell-tempered (S2). Two of the sherds are of average size (weighing 5 g and 7 g) but all are in a worn state. The fill of posthole 2411/A produced two flint-tempered sherds (FA2 and F1). Both are small sherds from fine vessels, although only one is in a worn state. The smaller of the two sherds is of interest as it is a tiny shoulder fragment from an angular vessel with incised decoration, which was unfortunately too small to illustrate. This sherd represents the only evidence for an incised decorated vessel from the whole site.

These sherds are not necessarily residual, although they could have been redeposited when either the posthole was dug or the post was removed. If the postholes belong to structures then it is quite likely that small sherds accumulated near the upstanding posts and became trapped in any voids around the post base. As such they could well be broadly contemporary with the postholes.

Trench XXIV: stratigraphic sequence

The sequence in this trench reflects the known later Bronze Age occupation on the eyot. Pottery was recovered from basal deposits in the channel (2405) and from around the timber structures and deposits of wood, from the overlying midden (2409, 2414) and from the occupation layer (2403). Several trends can be observed in this sequence. Decoration is notably absent towards the bottom of the sequence, although the number of sherds and vessels represented is small. In the midden deposits decoration is restricted to rims and again is generally rare, and only present towards the top of the sequence. There is also a slight change in the use of fabrics. Flint-tempered fabrics are the most common throughout the sequence, although their relative frequency decreases with time. Quartzite- and sand-tempered fabrics are found throughout the sequence and become more common, while shell-tempered fabrics appear in the middle and upper part of the sequence only.

Trench XXV *(Figs 3.13.1–25, 3.14.26–47, 3.15.48–59 and 3.16.60–7)*

This trench produced the largest group of pottery (820 sherds, 5.3 kg) (see Fig. 2.10a). Nearly all the pottery was recovered from layer 2505 (spits A–E), although one sherd came from 2506. This includes the rims from a minimum of 50 vessels. A wide range of rim forms is present, although a high proportion are either everted or flared. It is possible to recognise at least 28 separate vessel forms mostly from the rims present. Of these just over half are shouldered vessels with mostly long flaring rims (Figs 3.13.1, 4–7, 22, 3.14.28, 30, 43, 3.15.48–51, 58, 3.16.63), although one vessel with a short rim is also present (Fig. 3.16.62). Of the remaining vessels six are bipartite round-shouldered jars (Figs 3.13.13, 23, 25, 3.14.31, 3.15.57), one is rounded (Fig. 3.16.64), two are biconical (Figs 3.13.9, 3.14.34) and four are slack shouldered or straight sided (Figs 3.13.10, 16, 24, 3.15.59). The bases from some 22 vessels were recorded, although none could be assigned a vessel type. Seven of these have deliberately added basal grits, usually crushed flint, although one rare example has clay pellets (2505/E/2). Most of these bases belong to vessels that were manufactured from principally flint-tempered fabrics, but two instances of quartzite-tempered fabrics were noted. This trench produced the highest number of decorated sherds from the whole site. Of the 50 identified rims, 19 are decorated. Most of these are cabled but a smaller number have either fingertip or fingernail impressions. In addition the shoulders from 14 different vessels have been decorated with fingertip impressions, while 3 vessels have applied neck cordons. There are two cases where vessels with neck cordons have decorated rims and two where vessels with decorated rims also have decorated shoulders.

Approximately 53% of the sherds by weight were manufactured from principally flint-tempered fabrics, while 34% were quartzite-tempered and 8% were mixed flint and quartzite. Of the remainder a small number of sherds were manufactured from either grog-, organic-, sand- or shell-tempered fabrics.

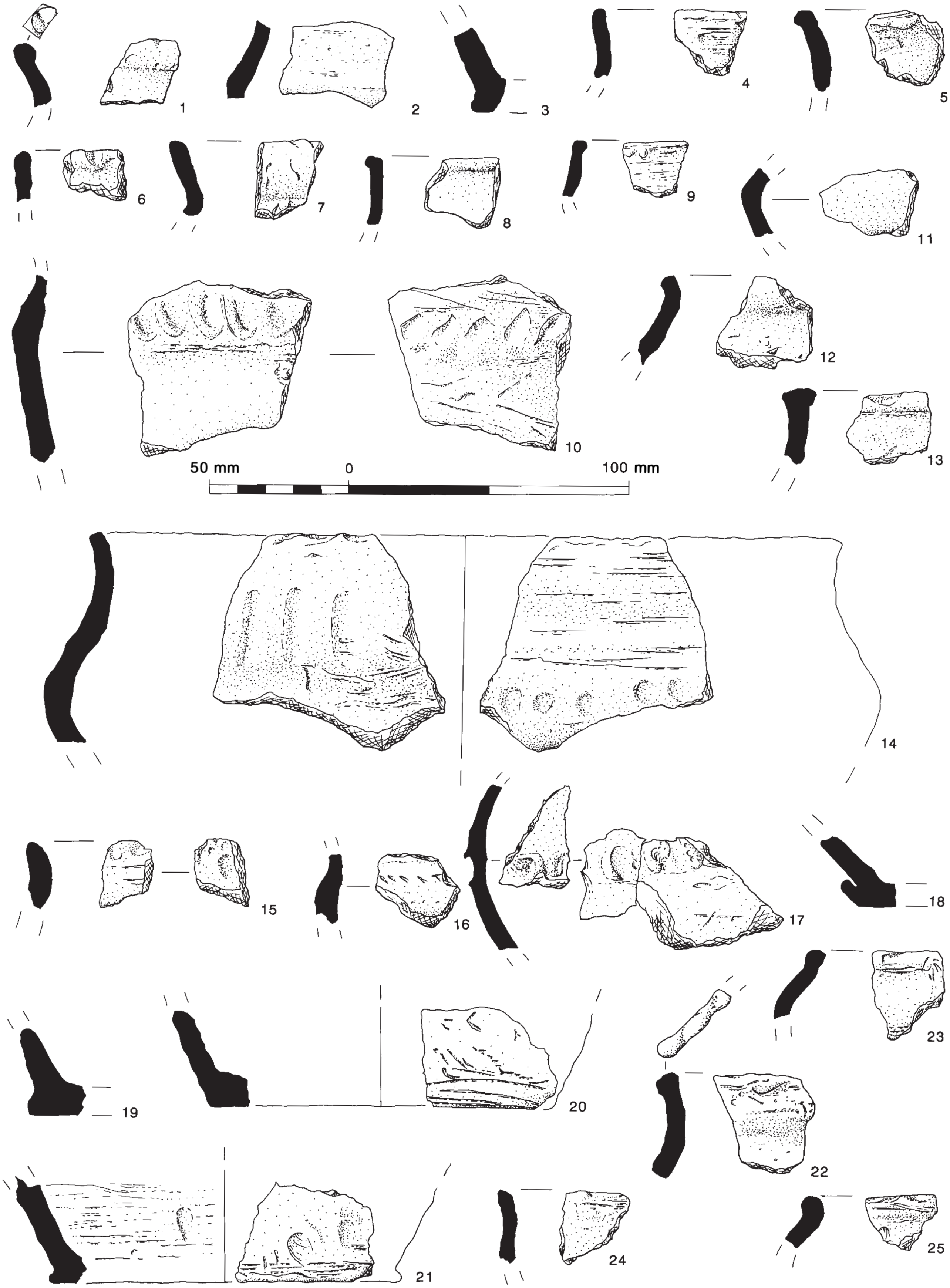


Figure 3.13 Late Bronze Age pottery (details in catalogue)

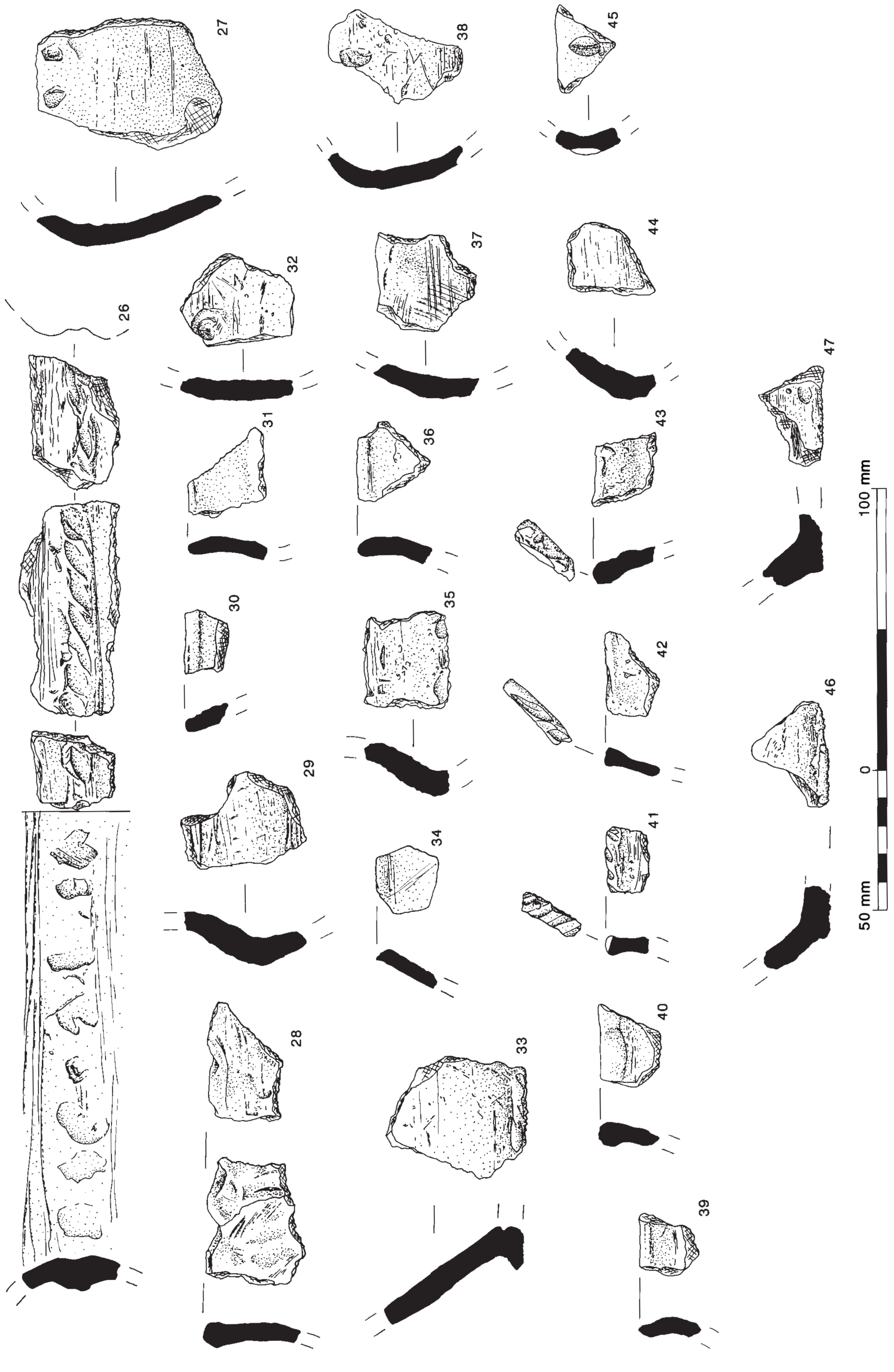


Figure 3.14 Late Bronze Age pottery (details in catalogue)

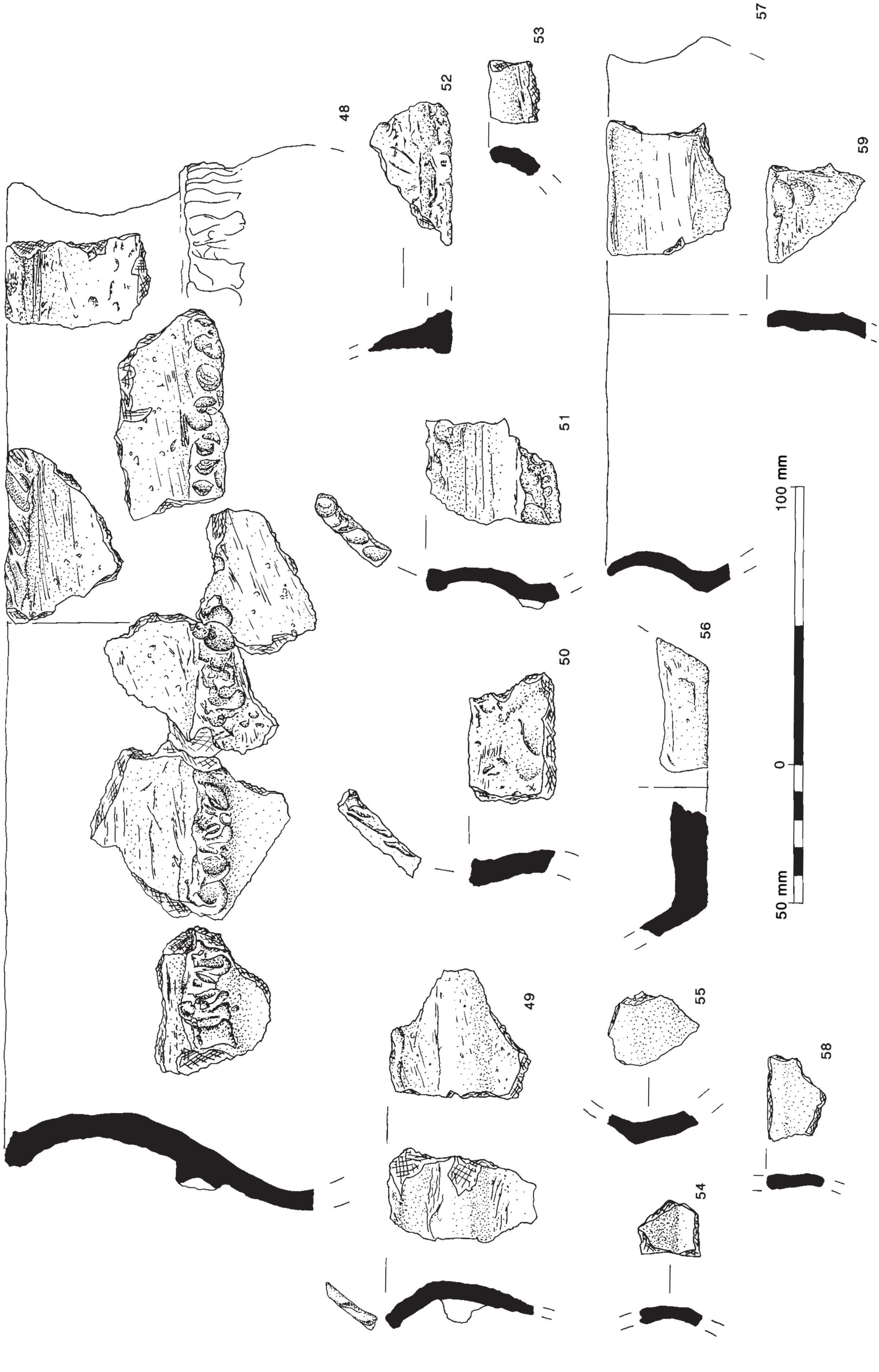


Figure 3.15 *Late Bronze Age pottery (details in catalogue)*

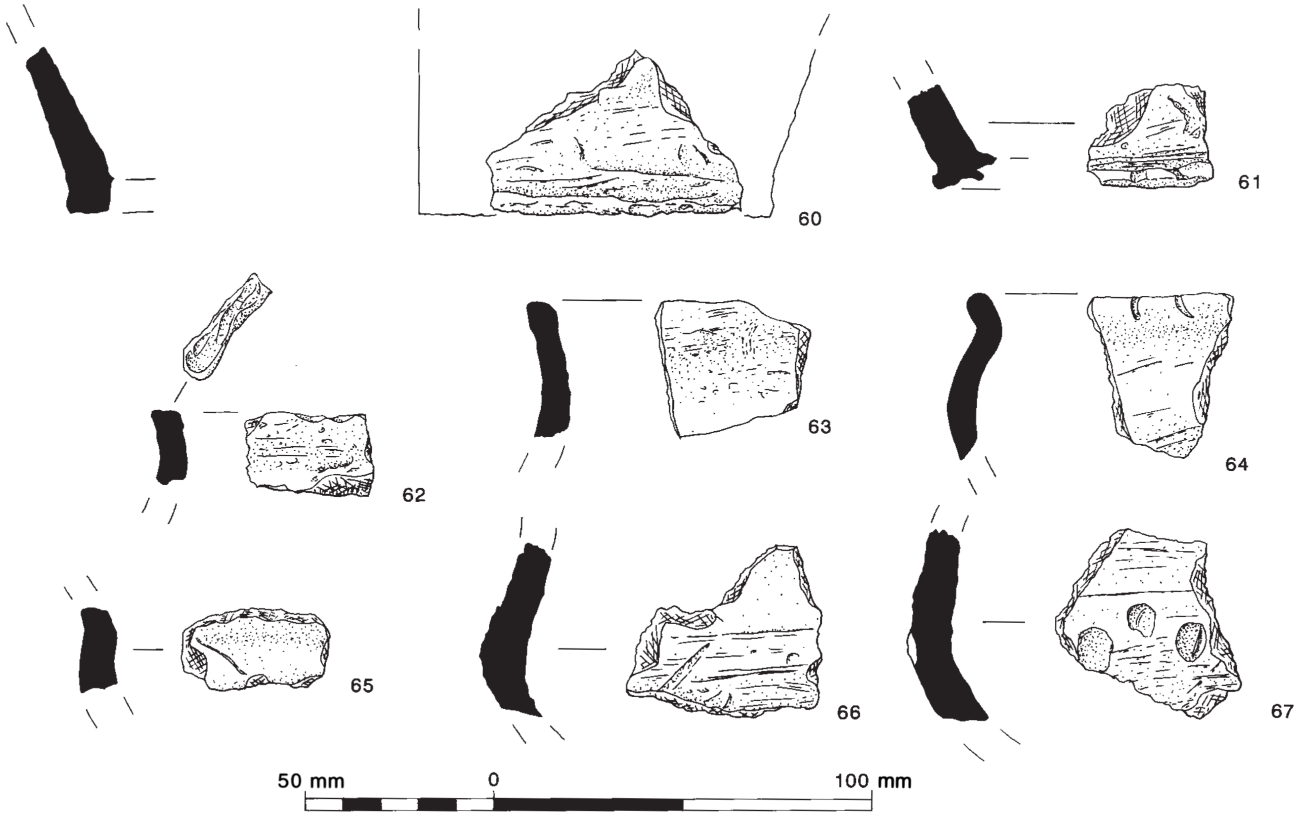


Figure 3.16 Late Bronze Age pottery (details in catalogue)

Trench XXVI *(Fig. 3.17.1–8)*

This trench produced a total of 96 sherds (458 g) of pottery from layers 2604–6 from which only three vessel forms could be recognised. The lowest of these layers, 2606, contained only a single body sherd. Layer 2605 was stratified above 2606 and produced the largest quantity of pottery (72 sherds) including the rims from four different vessels. Two of these rims are everted (Fig. 3.17.6–7) and a third is simple and in-turned (Fig. 3.17.4). A probable fourth rim (Fig. 3.17.8) is flared with a very sharp neck carination. Such rim forms tend to be of early Iron Age date, although rare examples do occur in late Bronze Age assemblages (form 18: Longley 1980). It is possible that this rim comes from an angular tripartite vessel of early Iron Age form, although it can be noted that the fabric (Q2) is quartzite-tempered. Only one sherd had been decorated. This was a neck and shoulder sherd with fingertip impressions (Fig. 3.17.3). The upper layer, 2604, produced a further 23 sherds which include the rims from two vessels; one is simple (Fig. 3.17.1) and the other is upright and squared.

Trench XXVII *(Fig. 3.17.9–15)*

This trench produced 79 sherds (488 g) of pottery. Most of the pottery came from spits within layer 2705, although small quantities also came from spits within layers 2703 (6 sherds, 27 g) and 2704 (2 sherds, 7 g).

Layer 2705 is interpreted as forming part of the occupation layer and is stratified beneath 2704 (ploughsoil) and 2703 (alluvium), respectively. Layer 2705 produced a small group of 71 sherds. This includes the rims from at least four vessels as well as a small number of shoulder sherds. Two of these rims are everted (Fig. 3.17.10–11), one is hooked and the other is expanded (Fig. 3.17.13). Vessel forms are mostly shouldered, either slack, rounded or angular. It is assumed that most of these vessels are jars, although one would appear to be a small cup or bowl (Fig. 3.17.10). None of the pottery from 2705 appears to have been decorated. The small quantity of pottery from the two overlying layers (2703–4) probably derived from this deposit. These groups of pottery consist of plain body sherds with the exception of a finger-impressed rim from 2703/3 (Fig. 3.17.9). A high proportion (81% by weight) of the pottery from trench XXVII was manufactured from flint-tempered fabrics, while only 11% was quartzite-tempered. Of the remainder, sherds were either manufactured from mixed flint and quartzite fabrics, the organic-tempered fabrics or sand-tempered.

The ceramic sequence

The earliest deposits containing ceramics are those from the base of the channel (phase 4). Some of this pottery, for example the hooked-rimmed jar (Fig. 3.10.1), could have been deposited at a time when the timber structures were in use, while other sherds could have been discarded along with the timber deposit that overlies these structures. All the pottery from the phase 6 deposits is plain. Radiocarbon dating indicates that these events probably took place in the 10th–9th centuries and before the end of the 9th century. The midden in trench XXIV (contexts 2409 and 2414) may represent a number of dumps of material rather than a single event. Decorated pottery appears for the first time in the sequence, although this is restricted to a small number of rims. The interval between the dumping of the timber deposit and the first dumping of the midden need not be great, and the whole deposit could fall within the 9th century. The occupation layer from the same trench (2403) and from other trenches on the eyot could post-date the midden. Certainly the pottery from trenches XXV–XXVII is of a somewhat different character with a much higher proportion of decorated vessels. This could simply represent differential dumping of material on the eyot, although alternatively it could have a temporal dimension. The pottery from trenches XXV–XXVII fits within Barrett's Decorated phase of the 8th and 7th centuries BC and some of the

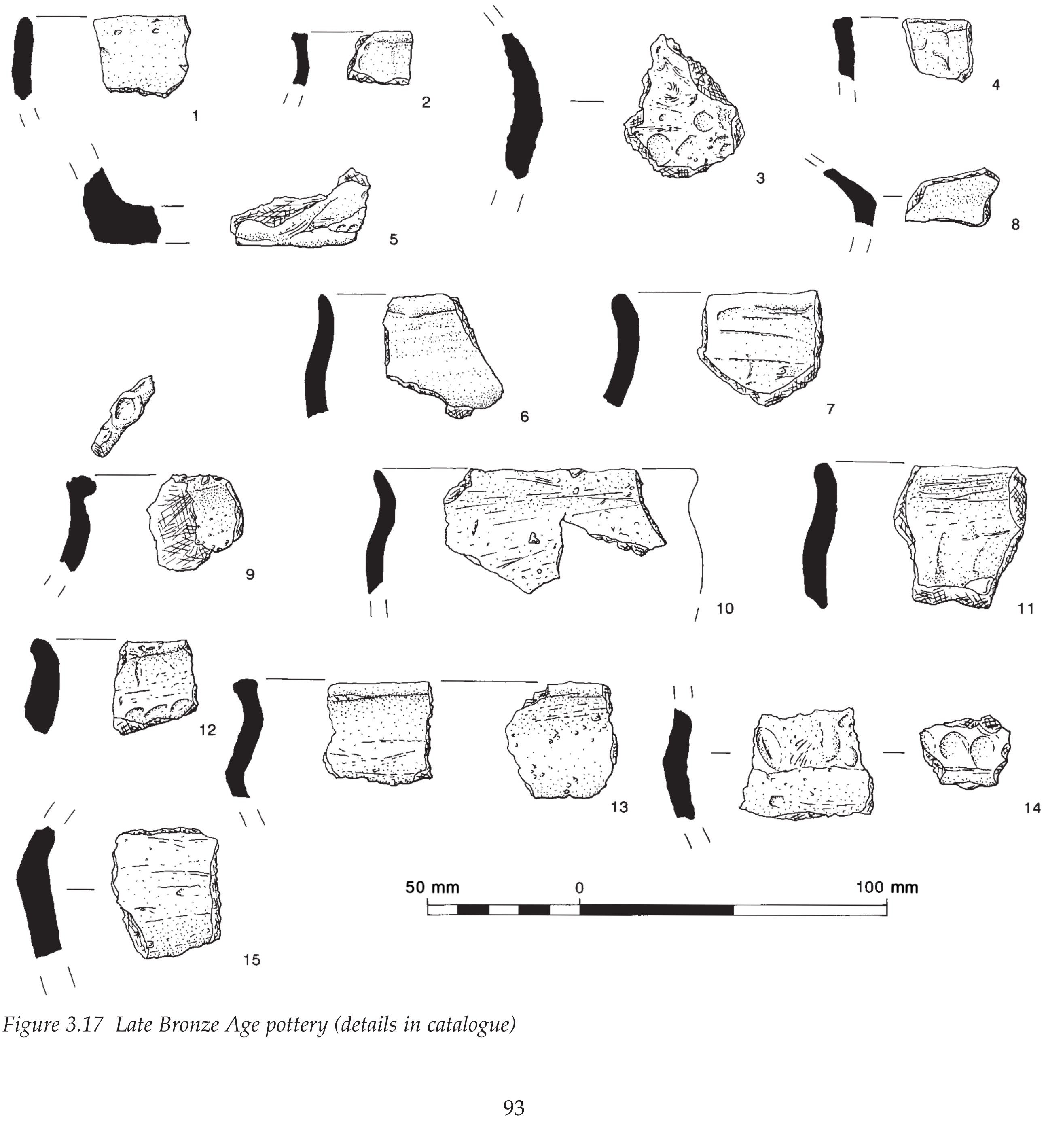


Figure 3.17 Late Bronze Age pottery (details in catalogue)

pottery published from the earlier excavations is also likely to be of this date (Barrett 1986, 187). The general absence of pottery of transitional date and the lack of early Iron Age forms suggest that the ceramic sequence does not continue any later than the 7th century.

In conclusion, the pottery from Whitecross Farm appears to span the period from the 10th to 7th century cal BC in which there was a development from plain to decorated wares. The assemblage is dominated by shouldered jars, although other forms include bowls and possibly cups. Overall decoration is restricted to no more than about 25% of the assemblage and mostly consists of fingertip or fingernail impressions on coarser jars. Decoration on fineware vessels is very rare. Burnishing and smoothing are found on a number of otherwise plain and generally finer jars, but is difficult to quantify because of the factors of wear and fragmentation. Vessels were made in a variety of fabrics. The evidence from Whitecross Farm indicates that a wide range of fabrics were used of which the most common was the flint-tempered group. Vessels made from flint-tempered fabrics were also made from ones containing quartzite. Other fabrics that appear to be contemporary can be made from shell temper or sand.

Spatial patterns

Analysis was undertaken to try and identify any spatial patterning of ceramics across the island. On other types of late Bronze Age site (eg ring works and enclosures) there is considerable evidence for such patterning. At Lofts Farm, Essex there was a notable concentration of fineware around the enclosure's entrance (Brown 1988, 270), while at the North Ring, Mucking there was some evidence for the selection and separate deposition of finewares from coarsewares. Similar patterns are also evident at Iron Age enclosures (Parker Pearson 1996). However, these sites have a recognisable ground plan unlike such midden sites as Whitecross Farm. At the enclosure sites, deposits of ceramics often mark out boundary or entrance locations. At Whitecross Farm the river edges of the island or eyot could have been treated in a similar way to an enclosing ditch.

The following themes were considered: overall sherd density across the island (Fig. 2.10a), the occurrence of finewares and coarsewares; the distribution of decorated sherds and vessels (Fig. 2.10b–c); and various miscellaneous categories (eg refired sherds, notched sherds and deliberately gritted bases) (Fig. 2.10d). For the purpose of this analysis, some material from disturbed layers was also included (eg the plough-disturbed occupation layer 2403). This is on the grounds that any post-depositional bias was likely to be minimal given the general character of the site and that much of this material can be considered as locally derived from otherwise *in situ* deposits.

In terms of density there are notable concentrations that centre on trench XXV and on the midden and occupation layers in trenches III and XXIV. However, pottery appears to have been deposited across much of the surface of the eyot and was found in most of the trenches (Fig. 2.10a). Although the total excavated area of the island is in the region of only 7% there is evidence that pottery spread across much of the island's surface in what is described as the occupation layer. In some of the trenches there is slight evidence that the density of pottery increased towards the island's edge (eg trenches I, III, XXIV). However, in relative terms the pottery concentrations were far denser in trenches XXV–XXVII, which would have originally been away from the river's edge.

In terms of the proportion of fabric types there is very little difference between the trenches. Both finewares and coarsewares appear to have occurred alongside each other in all the trenches. There is some evidence that trenches XXV–XXVII contained higher concentrations of coarsewares. One trait of coarseware jars is the use of impressed decoration on rims and/or shoulders. Decorated sherds occurred in nearly all the trenches (Fig. 2.10b–c). Many of the trenches contained decorated rims (mostly impressed) from coarseware vessels, although there was a significant concentration in trench XXV. This pattern is even more marked when decorated shoulders are considered, with the majority of fingertip-impressed types from coarseware vessels coming from trench XXV. The distribution of deliberately gritted base sherds from coarseware vessels also had a notable concentration within trench XXV. In addition, the occurrence of neck-cordoned vessels was restricted to this trench. The occurrence of decorated fineware vessels with incised linear or combed motifs was generally rare; such vessels were notably absent from the large assemblage from trench XXV with the only examples occurring in trenches I and XXIV. Many of the coarseware vessels are considered to have been used for cooking or storage. Burnt and soot residues on surfaces are predominantly associated with sherds from coarseware vessels, with notable concentrations occurring in trenches XXIV and XXV. There is no evidence to suggest that finewares and coarsewares were treated any differently upon breakage despite their probable different functional uses in life, and both types appear to have been deposited or discarded in the same areas of the site. The relative difference between the high number of coarsewares against a low number of finewares could simply reflect differential rates of breakage. The near-absence of incised-decorated finewares is difficult to interpret as such vessels can and often are rare on late Bronze Age sites. At Whitecross Farm the only incised-decorated sherd came from the fill of a posthole in trench XXIV, which indicates that such vessels were at least present and in use on the island. The context for this sherd perhaps favours incidental inclusion rather than deliberate discard. The absence of similar material from the rest of the site and from trench XXV in particular is difficult to interpret, although this might just be a factor of the small scale of the excavations. Taken at face value it might suggest that such decorated vessels received special treatment upon breakage and were separated out from what was considered to be more ordinary domestic rubbish.

In general there is little evidence from the pottery assemblage for structured deposition, although to some extent this might reflect the excavation strategy which concentrated on defining the limits of the eyot. The only clear evidence for a placed deposit is in trench XXIV, where the semi-complete hooked-rimmed jar was recovered from one end of a timber structure at the base of the channel (see Fig. 2.4). The occurrence of this vessel alongside other deposits of wood, flint and antler make this suggestion likely and it is of interest that such deposits occur close to what is clearly a way on to the island or what can be considered as an entrance location. With the exception of this vessel, the highly fragmentary nature of the assemblage fits with the idea that much of this material suffered further breakage within the occupation layers from activity such as trampling and no doubt became further mixed at this stage. The general absence of sherd refits and groups of related sherds suggest that much of this material did not accumulate *in situ* near zones of activity. The midden deposit in trench XXIV (contexts 2409 and 2414) indicates that at least some material was taken to the island edge and dumped.

In addition there are a small number of categories that are worthy of further consideration (Fig. 2.10d). Refired or overfired sherds were found in trenches XXIV, XXV and XXVII. It has been argued that these sherds could indicate activities such as pottery production or perhaps metalworking. However, another possibility is that they provide evidence for deliberate destruction of household structures. With this in mind it might be significant that the three sherds from trench XXIV come from a layer (2405) that also contained a deposit of burnt timber.

Regional comparisons

The late Bronze Age pottery from this region was reconsidered by Barrett in his article on 'The pottery of the later Bronze Age in lowland England' (1980). Before this, Harding had drawn attention to a number of possible sites with late Bronze Age pottery (1972, 82–4), although little mention was made of Wallingford. There are still relatively few late Bronze Age assemblages from the Upper Thames Valley in comparison to other areas of the Thames Valley catchment (eg the Lower Kennet Valley around Reading), although important assemblages have been found to the north-west of Oxford at Yarnton and Eynsham Abbey (Barclay and Edwards in prep. a; Barclay 2001).

Apart from Whitecross Farm the only other relatively large published assemblage from this region comes from the Rams Hill enclosure, located some 20 km to the west (Bradley and Ellison 1975). However, there are a number of unpublished assemblages from the Eynsham–Yarnton area of the Upper Thames gravels. The assemblage from Eynsham Abbey is dominated by simple and hooked-rimmed jars (Barclay 2001) and, therefore, could largely predate Wallingford. The site at Eynsham is associated with a series of six directly associated radiocarbon dates, five of which were obtained on burnt residues that adhered to pottery surfaces (Bayliss *et al*. 2001). Calibrated at two sigma these dates have ranges that fall within the last quarter of the 2nd millennium BC. A similar late Bronze Age Plain Ware assemblage came from a site (as yet unpublished) just to the north of Eynsham Abbey at Mead Lane near Cassington. The excavations at Yarnton have produced a complete sequence of late Bronze Age pottery, which includes an important group of transitional late Bronze Age/early Iron Age, or earliest Iron Age, pottery, although this pottery comes from a number of small-scale settlement features that are dispersed over a wide area.

Among the older-published assemblages are from those sites listed by Barrett: Allen's Pit, Dorchester and Long Wittenham (1980, 308). Harding also illustrates material from Standlake, Kirtlington and New Wintles Farm, Hanborough that would not be out of place in a transitional late Bronze Age/early Iron Age context (1972, pls 47–9). Added to this is material from Gravelly Guy and a number of other sites around Stanton Harcourt (Duncan *et al*. in prep.) which is of similar transitional date. Some of the pottery from Woodeaton would also appear to be of this date, especially that published by Bradford (1942, fig. 13), whereas the assemblage published by Harding (1987) is mostly early Iron Age. Similarly material published by Bradford as coming from Wytham would also appear to be of late Bronze Age and transitional date (1942, fig. 12). A multi-period site at Appleford has also produced some late Bronze Age pottery (De Roche and Lambrick 1980), which includes a significant group of pottery from a single large pit. This group includes both decorated coarseware jars and fineware bowls in a range of shell-, flint- or sand-tempered fabrics. The pottery published by Hingley (1979–80) from the settlement outside the hillfort at Wittenham Clumps includes both late Bronze Age and early Iron Age forms. A limited stratigraphic sequence of occupation deposits occurs and coincides with a change in ceramics from plain late Bronze Age to earliest Iron Age. The latter includes a large number of highly decorated sherds that would not be out of place in an 'All Cannings Cross' type assemblage of transitional date. This type of material has yet to be found at Whitecross Farm. Further along the Upper Thames Valley at Lechlade a number of late Bronze Age and transitional late Bronze Age/early Iron Age assemblages have now been recovered. These include two small late Bronze Age assemblages from Butler's Field and Gassons Lane (Barclay 1998; Timby 1998).

An intra-regional ceramic sequence

From the available evidence it is possible to outline the following sequence for the development of ceramics during the late Bronze Age over a period of some 500 years (see Fig. 7.2). Similar to this period, there is now considerably more middle Bronze Age pottery known from the Upper Thames Valley since Barrett produced his review in 1980. New and important groups of material have been found from sites in the Yarnton/Eynsham area (Barclay and Edwards in prep. a; Barclay 2001; OAU unpubl. info.), while comparable material has been found at ongoing excavations at Appleford (Paul Booth pers. comm.).

It is suggested that the late Bronze Age ceramic sequence in the Upper Thames Valley can be divided into three stages. The first stage spans the period of 1250/1150–950 cal BC and is marked by assemblages dominated by simple straight-sided and hooked-rimmed jars. In the Upper Thames Valley such assemblages are rare, but include here part of the assemblages from the enclosure ditch beneath Eynsham Abbey and Rams Hill (Barclay 2001; Bradley 1975). Another unpublished assemblage comes from Mead Lane, Cassington, and similar material – some of which is associated with a roundhouse – comes from Yarnton (Gill Hey pers. comm.). Such assemblages are thought to replace the Deverel-Rimbury style Bucket Urn dominated assemblages of the middle Bronze Age. The date for this transformation would on present evidence lie somewhere in the 12th century, but could perhaps be as early as the 13th. At Eynsham most of the pottery is shell-tempered which would suggest some continuity in fabric as most of the locally manufactured Deverel-Rimbury pottery is made from similar calcareous-tempered fabrics.

Only at Rams Hill is it possible to recognise a near-complete ceramic sequence from a single site, while at Eynsham Abbey the assemblage comprised a sequence of post-Deverel-Rimbury plain jars followed by a range of shouldered forms of phases 2–3. Another important unpublished assemblage from Mead Lane near Eynsham (Miles 1997, 10) may span the transition from middle Bronze Age (Deverel-Rimbury) to Plain Ware. Shouldered vessels are rare but become more common during the 10th–9th centuries; assemblages now include a greater range of vessels although decoration is rare (stage 2). Decoration becomes more common during and after the 8th century (stage 3). It is possible that all three phases are represented among the assemblages from Yarnton/Cassington, although this awaits further investigation (Barclay and Edwards in prep. a). Although groups of pottery belonging to all three stages can be recognised at Yarnton, the relevant sites are spread across a wide tract of excavated landscape. The Wallingford assemblage would appear to span stages 2–3 with a progression from Plain to Decorated Ware, although there is little indication that this assemblage continues into the late Bronze Age/early Iron Age transition (750–650 BC). The group of pottery from Appleford belongs to this final stage, while the pottery from Wittenham Clumps may belong to a sequence that starts in the late Bronze Age and continues into at least the early Iron Age.

Towards the end of the late Bronze Age more angular forms were adopted and the use of complex decoration becomes more common. Assemblages spanning the late Bronze Age/Iron Age transition and dating to approximately the 8th–7th centuries have been found at Yarnton on the Second Gravel Terrace where extensive early Iron Age settlements have been excavated. At Yarnton it is argued that pottery of transitional date coincides with a greater use of fabrics that contain a mixture of inclusions (eg shell and quartzite), and towards the start of the early Iron Age there is a greater use of shell- and sand-tempered fabrics (Booth and Biddulph in prep.). A similar ceramic sequence is described for Gravelly Guy and the Stanton Harcourt area (Duncan *et al*. in prep.). The well-known assemblage from Allen's Pit, Dorchester along with some of the comparable material listed by Bradford from Wytham, Stanton Harcourt and Woodeaton is also likely to belong to this phase. On the Chalk Downs a number of sites, mostly enclosures, have produced pottery of this date. At Uffington decorated pottery of north Wiltshire type (All Cannings Cross) has been found during recent excavations at the hillfort and similar material has come from an open settlement at Tower Hill, Ashbury and from ditches that abut the Wayland's Smithy long barrow (Miles *et al.* 2004). The settlement site at Tower Hill also produced a large hoard of contemporary metalwork.

Inter-regional comparisons

Overall the Wallingford assemblage is of typical late Bronze Age character and fits within the general sequence for lowland England as outlined by Barrett (1980). It is also from a limited stratified sequence with metalwork associations and a series of radiocarbon dates.

It can be compared with a number of assemblages in the Middle Thames and the Lower Kennet Valley. It has been argued that the Wallingford site was established during the 10th or 9th century BC, and the site could have been abandoned sometime before the foundation of many of the Iron Age settlements on the gravel terraces – perhaps during the 7th century BC. The ceramic evidence for the Lower Thames Valley is well known with a series of key assemblages already published (Bradley *et al*. 1980; Hall 1992; Morris 2004), and follows a similar sequence to the Upper Thames with transitional mid–late Bronze Age pottery coming from Pingewood and early Plain Ware recorded from Reading Business Park (Bradley 1983–5; Morris 2004). The latter site has now produced pottery belonging to all three stages as outlined above, while the pottery from

Aldermaston and Knight's Farm, Burghfield may represent a similar sequence. In the Kennet Valley the large assemblages from Aldermaston Wharf and Knight's Farm, Burghfield are characteristically similar to the range of vessels from Wallingford (Bradley *et al*. 1980). Aldermaston Wharf produced an earlier Plain Ware assemblage that contained a high number of shoulderless jars and pots (some 44% of the recognised vessels). It is possible that the assemblage spans the period 1150–800 cal BC with both phases 1–2 of the Plain Ware sequence represented. At Knight's Farm the assemblage is characterised by a range of fine and coarse shouldered vessels. Decoration occurs on a relatively high number of these vessels and includes a number of vessels with complex motifs. The presence of these vessels could indicate that the site continued into the transitional late Bronze Age/early Iron Age period. Such decoration is absent at Whitecross Farm which may, along with other factors, be taken to suggest that the site had been abandoned before this stage.

A number of assemblages have now been found in the Middle Thames Valley, although few can be placed earlier than the 10th century BC; many of these sites have been discussed by Barrett (1980), Longley (1980) and Adkins and Needham (1985). The Plain and Decorated Ware assemblages from Runnymede and Petters Sports Field, respectively, have much in common with the range of ceramics from Wallingford (Longley 1980; O'Connell 1986). Like Whitecross Farm, the earlier of the two sites, Runnymede Bridge, produced an assemblage dominated by shouldered vessels. It is argued that this site was established *c* 900 cal BC, while the adjacent site at Petters Sports Field may have continued into the transitional late Bronze Age/early Iron Age period (Needham 1991). The assemblage from the ring work at Queen Mary's Hospital, Carshalton (Adkins and Needham 1985) would appear to be of a broadly similar date to that of Runnymede. In the Chilterns the hillfort site at Ivinghoe Beacon, Buckinghamshire produced a Decorated Ware assemblage that is characteristically similar to the later material from Whitecross Farm (Cotton and Frere 1968). Around the Thames estuary the assemblages from the ring works at Mucking again recall that from Whitecross Farm.

The Whitecross Farm assemblage is characteristic of those assemblages from sites of early 1st-millennium BC date that are found in lowland England. The closest similarities are perhaps with sites of special character, such as middens and ring works, while the open settlements, in particular around the Lower Kennet, appear to contain a coarseware element that is generally not found at these sites. This slight difference could partly be chronological, but it could also be functional both in terms of economy and as a reflection of the types of social practices performed (eg feasting) at sites like Whitecross Farm.

Catalogue of late Bronze Age pottery

Figure 3.8.1–31: context groups 103, 105, 203 and 303

3.8.1 Context 103/1. Rim R1 (2 g). Fabric F1. Colour: grey throughout. Condition: worn.

3.8.2 Context 103/1. Rim R1, V1 (3 g). Fabric F1. Colour: black throughout. Condition: average.

3.8.3 Context 103/1. Rim R2, V3 (8 g). Fabric FA2. Colour: reddish-brown throughout. Condition: average.

3.8.4 Context 103/1. Rim R3 (2 g). Fabric QA2. Colour: grey throughout. Condition: average-worn.

3.8.5 Context 103/1 (0–1 m). Base B2 (7 g). Fabric QA3. Colour: ext. reddish-brown: core and int. dark grey. Condition: worn.

3.8.6 Context 103/1 (0–1 m). Base B1 (18 g). Fabric QA2. Colour: yellowish-brown throughout. Condition: average.

3.8.7 Context 103/1 (2–3 m). Shoulder decorated with combed lines (5 g). Fabric FA2. Colour: dark grey. Condition: worn.

3.8.8 Context 103/2 (2–3 m). Rim R1 (4 g). Fabric QA2. Colour: ext. yellowish-brown: core and int. grey. Condition: average-worn.

3.8.9 Context 103/3 (0–1 m). Rim R4 (2 g). Fabric F2. Colour: brown throughout. Condition: worn.

3.8.10 Context 105. Rim R6. Smoothed surfaces. Fabric FA2. Colour: dark grey throughout. Condition: average.

3.8.11 Context 203/2 (2–3 m). In-turned rim R5 (1 g) with fingertip decoration. ?V2. Fabric QA2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: worn.

3.8.12 Context 203/2 (2–3 m). Pointed everted rim R8 with fingertip decoration. Fabric FA2. Colour: ext. brown: core grey: int. brown. Condition: average.

3.8.13 Context 203/3 (2–3 m). Rim R7, ?V4 (3 g). Fabric SF 2. Colour: ext. dark brown: core and int. black. Condition: average-worn. TS14.

3.8.14 Context 303/1 (0–1 m). Simple upright out-turned rim R4 decorated with fingernail impressions (8 g). Fabric FA2. Colour: ext. brown: core grey: int. brown. Condition: average.

3.8.15 Context 303/1 (0–1 m). Neck (2 g). Fabric FA2. Colour: reddish-brown throughout. Condition: average.

3.8.16 Context 303/1 (0–1 m). Base (3 g) with finger dimples on the interior surface and flint gritting on the bottom surface. Fabric FA2. Colour: ext. brown: core grey: int. brown. Condition: average.

3.8.17 Context 303/1 (2–3 m). Simple upright rim R1, V1 (1 g). Smoothed surfaces. Fabric FA1. Colour: ext. brown: core and int. black. Condition: average.

3.8.18 Context 303/1 (2–3 m). Flared rim R9, V9 (2 g) with cabled decoration. Fabric FA1. Colour: ext. brown: core grey: int. brown. Condition: average.

3.8.19 Context 303/1 (2–3 m). Pointed everted rim R8, V5 (2 g). Fabric FA1. Colour: ext. brown: core grey: int. brown. Condition: average.

3.8.20 Context 303/1 (2–3 m). Simple squared rim R1 (3 g) decorated with an incised line. Fabric A1. Colour: yellowish-brown throughout. Condition: average-worn.

3.8.21 Context 303/1 (2–3 m). Body reused with notched edges (15 g). Fabric FA2. Colour: ext. reddish-brown: core and int. dark greyish-brown. Condition: worn.
3.8.22 Context 303/1 (2–3 m). Base B1 (14 g). Burnished exterior surface. Fabric FA2. Colour: dark grey throughout. Condition: average.
3.8.23 Context 303/1 (2–3 m). Base B3 (17 g). Fabric FA2. Colour: ext. reddish-brown: core grey: int. reddish-brown. Condition: average-worn.
3.8.24 Context 303/1 (4–5 m). Squared everted rim R7, V8 (4 g) with cabled decoration. Fabric FQ2. Colour: ext. greyish-brown: core and int. grey. Condition: average-worn.
3.8.25 Context 303/1 (4–5 m). Simple out-turned rim R4 (1 g). Fabric F2. Colour: ext. greyish-brown: core dark grey: int. brown. Condition: average.
3.8.26 Context 303/1 (4–5 m). Simple squared rim R1, V1 (2 g). Fabric A1. Colour: ext. and core grey: int. brown. Condition: average.
3.8.27 Context 303/1 (4–5 m). Simple rounded rim R2 (2 g). Fabric G2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average-worn.
3.8.28 Context 303/1 (4–5 m). Simple out-turned rim R4 (4 g) with cabled decoration. Fabric QA2. Colour: ext. brown: core grey: int. brown. Condition: average.
3.8.29 Context 303/1 (4–5 m). Simple out-turned rim R4, V9 (3 g). Fabric A1. Colour: dark grey throughout. Condition: average.
3.8.30 Context 303/1 (5–6 m). Neck (8 g). Fabric QA2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: worn.
3.8.31 Context 303/1 (5–6 m). Rim of indeterminate form R13 (5 g). Fabric FQ2. Colour: grey throughout. Condition: worn.

Figure 3.9.1–18: context groups 1703 and 1803

3.9.1 Context 1703 (0 m). Pointed everted rim R8, V8 (3 g). Fabric FA1. Colour: ext. greyish-yellow: core grey: int. greyish-yellow. Condition: average.
3.9.2 Context 1703 (0–1 m). Squared everted rim R7 (3 g). Burnished on both surfaces. Fabric F1. Colour: ext. greyish-brown: core and int. grey. Condition: average.
3.9.3 Context 1703 (0–1 m). Simple rounded rim R2, V3 (5 g). Fabric FQ2. Colour: ext. yellowish-brown: core grey: int. brown. Condition: worn.
3.9.4 Context 1703 (0–1 m). Neck (6 g) with smoothed surfaces. Fabric S2 (includes some bone temper). Colour: grey throughout. Condition: average.
3.9.5 Context 1703 (0–1 m). Shoulder V3 (21 g). Fabric F2. Colour: ext. greyish-brown: core grey: int. brown. Condition: average.
3.9.6 Context 1703 (2–3 m). Hooked rim R10, V2 (7 g). Fabric F2. Colour: ext. dark brown: core grey: int. dark brown. Condition: average.
3.9.7 Context 1703 (2–3 m). Rim R4 (4 g). Fabric A1. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average-worn.
3.9.8 Context 1703 (2–3 m). Neck (5 g). Fabric FA2. Colour: ext. yellowish-brown: core and int. grey. Condition: average.
3.9.9 Context 1703 (2–3 m). Shoulder (4 g) with fingertip decoration. Fabric A1. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average-worn.
3.9.10 Context 1703 (2–3 m). Base B2 (12 g). Fabric FQ3. Colour: ext. yellowish-brown: core grey: int. black. Condition: worn.
3.9.11 Context 1703 (4–5 m). Flared rim R9 with cabled decoration (8 g). Fabric F2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average-worn.
3.9.12 Context 1703 (4–5 m). Simple rim R2, V5 and shoulder sherds with fingernail decoration (33 g). Fabric FQ2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average.
3.9.13 Context 1703 (6–7 m). Simple in-turned rim R11 (1 g). Fabric F2. Colour: dark grey throughout. Condition: average.
3.9.14 Context 1703 (6–7 m). Notched body reused (5 g). Fabric FQ2. Colour: grey throughout. Condition: worn.
3.9.15 Context 1703 (6–7 m). Base B2 (5 g). Fabric A1. Colour: reddish-brown throughout. Condition: average-worn.
3.9.16 Context 1703 (9–10 m). Squared everted rim R7 with burnished surfaces (3 g). Fabric F2. Colour: grey throughout. Condition: average.
3.9.17 Context 1803/1 (1–2 m). Pointed everted rim R8 (12 g) with fingernail decoration. Fabric FA2. Colour ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average.
3.9.18 Context 1803 (2–3 m). Flared rim R9 (5 g) with burnished surfaces. Fabric FA1. Colour: yellowish-brown throughout. Condition: average.

Figure 3.10.1–8: context group 2405

3.10.1 Context 2405/5. Hooked-rimmed jar V2 (415 g). Approx. 75% complete. Drilled hole possibly for repair. Smoothed interior surface, finger-wiped and grass-wiped exterior surface. Fabric FA2. Colour: ext. greyish-brown: core grey: int. greyish-brown. Condition: average.
3.10.2 Context 2405 (149/507). Beaded rim R6, V5 (3 g) and shoulder. Fabric FA1. Colour: greyish-brown throughout. Condition: average.
3.10.3 Context 2405 (149/511). Sherd broken at base angle (14 g). Fabric FA2. Colour: grey throughout. Condition: average.
3.10.4 Context 2405 (149/511). Rounded shoulder (5 g) with horizontally burnished surface. Fabric FQ2. Colour: dark grey throughout. Condition: average.
3.10.5 Context 2405 (151/509). Neck and shoulder from a globular vessel with highly burnished surfaces V6 (19 g). Fabric Q2. Very hard fired. Colour: ext. black: core grey: int. black. Condition: average.
3.10.6 Context 2405 (151/509). Large rounded shoulder V6 (44 g) with grass-wiped surface. Sooting on the exterior and charred residue on the interior. Fabric FQ2. Colour: ext. black: core grey: int. brownish-grey. Condition: average.
3.10.7 Context 2405 (151/509). Base with expanded foot B3 (4 g). Charred residue on interior surface. Fabric FA3. Colour: dark grey throughout. Condition: average.
3.10.8 Context 2405/5. Base B2 (12 g). Fabric A1.

Colour: ext. reddish-brown: core and int. black. Condition: average-worn.

Figure 3.11.1–14: context groups 2414 and 2409

3.11.1 Context 2414 (149/507). Flared rim R9, V9 (4 g). Fabric F3. Colour: grey throughout. Condition: average.
3.11.2 Context 2414 (151/507). Everted rim R8, V5 (6 g). Fabric F1. Colour: grey throughout. Condition: average.
3.11.3 Context 2414 (151/507). Everted rim R8, V5 (6 g) with impressed decoration on rim and sooted exterior surface. Fabric F1. Colour: grey to yellowish-brown throughout. Condition: average.
3.11.4 Context 2414 and 2409. Several refitting sherds from the same round-shouldered vessel (44 g). Cabled flared rim R9, V7. Sooting on exterior surface. Fabric F2. Colour: dark grey throughout. Condition: average.
3.11.5 Context 2414 (153/505). Expanded rim R12 (5 g). Dia. 200 mm. Fabric QA2. Colour: ext. brown: core and int. dark grey. Condition: average.
3.11.6 Context 2414 (153/503). Rounded shoulder with smoothed surfaces (15 g). Fabric QA2. Colour: ext. and core grey: int. dark grey. Condition: average.
3.11.7 Context 2414 (153/507). Squared everted rim R7 (4 g). Fabric A1. Colour: grey throughout. Condition: average.
3.11.8 Context 2414 (153/507). Rim and shoulder V5 (46 g). Fabric F1. Colour: grey throughout. Condition: average.
3.11.9 Context 2414 (153/507). Expanded flaring rim R9, V9 (8 g). Fabric A1. Colour: yellowish-grey throughout. Condition: average-worn.
3.11.10 Context 2414 (153/507). Base B2 (13 g). Burnished surfaces. Fabric Q2. Colour: grey throughout. Condition: average-worn.
3.11.11 Context 2414 (153/507). Base with slight protruding foot B3 (30 g). Finger-dimple impressions around base. Smoothed surfaces. Dia. 140 mm. Fabric QA2. Colour: grey throughout. Condition: average.
3.11.12 Context 2409. Base with slight protruding foot B3 (7 g). Fabric FA2. Colour: ext. greyish-brown: core grey: int. dark grey. Condition: average.
3.11.13 Context 2409 (151/507). Shoulder (13 g). Some surface loss. Sooting on exterior surface. Fabric F2. Colour: grey throughout. Condition: average-worn.
3.11.14 Context 2409 (151/507). Flaring rim R9, V9 (13 g) with cabled decoration. Fabric QA2. Colour: ext. greyish-brown: core and int. grey. Condition: average.

Figure 3.12.1–25: context groups 2403 and 2402

3.12.1 Context 2403 (top of layer). Simple squared rim R1 (11 g) broken at the shoulder. Fabric F2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: worn.
3.12.2 Context 2403 (top of layer). Neck (6 g) with grass-wiped exterior surface. Fabric QA2. Colour: grey throughout. Condition: average-worn.
3.12.3 Context 2403 (top of layer). Rounded shoulder (5 g). Fabric F1. Colour: ext. brown: core and int. black. Condition: average.
3.12.4 Context 2403 (153/495). Upright pointed rim R3 (4 g). Fabric FQ2. Colour: ext. grey to reddish-brown: core and int. grey. Condition: average-worn.
3.12.5 Context 2403 (153/499). Rounded angular shoulder (7 g). Fabric A1. Colour: grey throughout. Condition: average.
3.12.6 Context 2403 (153/495). Shoulder with fingertip impressions (9 g). Fabric FA2. Colour: ext. reddish-brown: core grey: int. greyish-brown. Condition: average.
3.12.7 Context 2403 (153/499). Large sherd broken at base angle with finger dimples around the base (37 g). Fabric F2. Colour: ext. reddish-brown: core and int. grey. Condition: average.
3.12.8 Context 2403 (153/501). Upright rounded rim R2 (4 g). Fabric FA2. Colour: ext. brown: core grey: int. greyish-brown. Condition: average-worn.
3.12.9 Context 2403 (153/501). Upright squared rim R1 (5 g). Fabric FA1. Colour: ext. brown: core grey: int. yellowish-brown. Condition: average-worn.
3.12.10 Context 2403 (153/501). Base B2 (17 g). Fabric FQ2. Colour: ext. and core grey: int. brown. Condition: average.
3.12.11 Context 2403 (153/501). Shoulder. Fabric Q2. Colour: ext. and core grey: int. dark grey. Condition: average-worn.
3.12.12 Context 2403 (155/503). Flared rim R9, V9 (3 g) with fingertip decoration. Fabric FA2. Colour: ext. reddish-brown: core grey: int. reddish-brown. Condition: average.
3.12.13 Context 2403 (155/503). Everted rim R8 (2 g). Fabric FA2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average-worn.
3.12.14 Context 2403 (155/503). Hooked rim R10 (3 g) probably from a jar V2. Fabric A1. Colour: ext. and core greyish-brown: int. yellowish-brown. Condition: average.
3.12.15 Context 2402 (153/495). Simple squared rim R1 (2 g). Fabric FA2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average-worn.
3.12.16 Context 2402 (153/495). Upright pointed rim R3, V5 with smoothed surfaces (5 g). Fabric QA2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average.
3.12.17 Context 2402 (153/495). Simple squared rim R1, V1 (3 g) with grass-wiped surfaces. Fabric F1. Colour: black throughout. Condition: average.
3.12.18 Context 2402 (153/495). Base with protruding foot B3 (25 g). Finger-dimple impressions around foot. Fabric F2. Colour: ext. reddish-brown: core grey: int. greyish-brown. Condition: average-worn.
3.12.19 Context 2402 (153/497). Simple squared rim R1 (2 g). Fabric GF2. Colour: ext. brown: core grey: int. brown. Condition: average.
3.12.20 Context 2402 (153/497). Squared everted rim R7 (7 g). Fabric FA2. Colour: ext. brown: core grey: int. brown. Condition: average.
3.12.21 Context 2402 (153/497). In-turned rim R10 (4 g). Fabric QA2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: worn.

3.12.22 Context 2402 (153/497). Rounded shoulder (9 g). Fabric FA2. Colour: ext. brown: core grey: int. brown. Condition: average.

3.12.23 Context 2402 (153/499). Squared slightly everted rim R7, V8 (15 g) with cabled decoration. Fabric FA2. Colour: grey throughout. Condition: worn.

3.12.24 Context 2402 (153/499). Angular shoulder (5 g). Fabric QA1. Colour: ext. brown: core and int. grey. Condition: average.

3.12.25 Context 2402 (153/503). Flared rim R9, V9 (5 g). Fabric FA2. Colour: ext. and core grey: int. yellowish-grey. Condition: average-worn.

Figure 3.13.1–25: context group 2505 (A–C)

3.13.1 Context 2505/A/1. Flared rim R9, V9 (4 g) with fingertip decoration. Fabric F2. Colour: ext. brown: core and int. black. Condition: average.

3.13.2 Context 2505/A/1. Angular shoulder (11 g). Fabric F3. Colour: ext. brown: core and int. grey. Condition: average.

3.13.3 Context 2505/A/1. Base B3 (18 g). Fabric F2. Colour: ext. reddish-brown: core grey: int. black. Condition: average.

3.13.4 Context 2505/A/2. Flared rim R9, V9 (4 g). Fabric Q2. Colour: ext. brown: core grey: int. greyish-brown. Condition: average.

3.13.5 Context 2505/A/2. Flared rim R9, V9 with cabled decoration (5 g). Fabric Q2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average-worn.

3.13.6 Context 2505/A/2. Indeterminate rim with fingertip decoration (3 g). Fabric Q2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average-worn.

3.13.7 Context 2505/A/2. Flared rim R9, V9 (4 g). Fabric G2. Colour: grey throughout. Condition: worn.

3.13.8 Context 2505/A/2. Simple out-turned squared rim R4 (4 g). Fabric F1. Colour: black throughout. Condition: average-worn.

3.13.9 Context 2505/A/2. Simple in-turned rim R5, V4 (3 g) from a bipartite vessel. Smoothed surfaces. Fabric G2. Colour: black throughout. Condition: average.

3.13.10 Context 2505/A/2. Large shoulder V5 (46 g) decorated with diagonal fingertip impressions. Interior carries oblique finger moulding. Neck and interior have grass-wiped surfaces. Fabric F2. Colour: ext. black and yellowish-brown: core black: int. brown to black. Condition: average.

3.13.11 Context 2505/A/3. Angular shoulder (6 g) with smoothed surfaces. Fabric F1. Colour: grey throughout. Condition: average.

3.13.12 Context 2505/B/1. Squared everted rim R7, V8. Fabric F2. Colour: dark grey throughout. Condition: average.

3.13.13 Context 2505/B/2. In-turned rim R5 (7 g) with cable decoration. Fabric F2. Colour: dark grey throughout. Condition: average.

3.13.14 Context 2505/B/2. Rim and shoulder from a large decorated jar (68 g). Rim is squared everted R7, V5, and cable decorated. The shoulder has fingertip impressions. The neck has been wiped and the interior has vertical finger marks. Rim Dia. 260 mm. Fabric F2. Colour: ext. brown: core grey: int. dark grey. Condition: average.

3.13.15 Context 2505/B/2. Pointed everted rim R8 (4 g) which is decorated with fingertipping. Fabric FA2. Colour: ext. brown: core grey: int. brown. Condition: average.

3.13.16 Context 2505/B/2. Rounded slack shoulder (5 g) with fingernail impressions. Fabric Q2. Colour: dark grey throughout. Condition: average.

3.13.17 Context 2505/B2. Three shoulder sherds (34 g) from the same vessel decorated with fingertip impressions. Fabric QA2. Colour: ext. brown: core grey: int. brown. Condition: average.

3.13.18 Context 2505/B/2. Base with protruding foot B3 (21 g). Fabric F3 (the fabric contains calcined flint as well as gravel flint). Colour: ext. reddish-brown: core grey: int. reddish-brown. Condition: worn.

3.13.19 Context 2505/B/2. Base (5 g) with protruding foot B3. Fabric QA3. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average.

3.13.20 Context 2505/B/2. Base B2 (22 g). Dia. 120 mm. Fabric F2. Colour: ext. dark brown: core and int. dark grey. Condition: average.

3.13.21 Context 2505/B/3. Base with protruding foot B3 and with flint gritting on basal surface (22 g). Dia. 120 mm. Fabric F2. Colour: ext. brown: core black: int. reddish-brown. Condition: average.

3.13.22 Context 2505/C/1. Slightly flared rim R9, V9 (9 g) with cabled decoration. Fabric QA2. Colour: ext. yellowish-brown: core grey: int. reddish-brown. Condition: worn.

3.13.23 Context 2505/C/1. Beaded rim R6, V5 and shoulder (5 g). Fabric A1. Colour: ext. reddish-brown: core grey: int. reddish-brown. Condition: worn.

3.13.24 Context 2505/C/1. Pointed everted rim R8, V8 (3 g). Fabric QA2. Colour: grey throughout. Condition: worn.

3.13.25 Context 2505/C/2. Beaded rim R6 (3 g) with smoothed surfaces. Fabric FQ2. Colour: ext. reddish-brown: core and int. grey. Condition: average.

Figure 3.14.26–47: context group 2505 continued (C–D)

3.14.26 Context 2505/C/2–3, 2506/2. Three neck sherds (54 g) with cabled cordon from the same vessel. Fabric Q2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average.

3.14.27 Context 2505/C/3. Three sherds including a rounded shoulder (40 g) with fingertip impressions all from the same vessel V5. Fabric F2. Colour: ext. reddish-brown: core and int. grey. Condition: average.

3.14.28 Context 2505/C/2. Two slightly flaring rim sherds R9, V9 (22 g) with cabled decoration. Fabric F2. Colour: ext. dark brown: core grey: int. reddish-brown. Condition: average.

3.14.29 Context 2505/C/2. Neck and shoulder V5 (12 g). Fabric F2. Colour: ext. yellowish-brown: core and int. grey. Condition: average.

3.14.30 Context 2505/C/2. Indeterminate rim (2 g), possibly flared. Smoothed surfaces. Fabric F2. Colour: grey throughout. Condition: average.

3.14.31 Context 2505/C/2. Rounded everted rim R8, V5 (4 g) broken above the shoulder. Fabric FQ2. Colour: black throughout. Condition: average.

3.14.32 Context 2505/C/3. Slack shoulder (9 g) with impressed decoration. Fabric QA2. Colour: ext. dark grey: core and int. grey. Condition: average.

3.14.33 Context 2505/C/3. Base with protruding foot B3 (22 g) with flint gritting on basal surface. Fabric Q1. Colour: yellowish-brown throughout. Condition: average.

3.14.34 Context 2505/D/2. Everted pointed rim R8, V4 (2 g) probably from a bipartite vessel. Fabric A1. Colour: ext. brown: core grey: int. brown. Condition: worn.

3.14.35 Context 2505/D/2. Rounded shoulder V5 (13 g) with fingertip decoration. Fabric QA2. Colour: ext. brown: core and int. grey. Condition: average.

3.14.36 Context 2505/D/3. Rounded everted rim R8 (4 g). Burnished surfaces. Fabric FA1. Colour: grey throughout. Condition: average.

3.14.37 Context 2505/D/3. Rounded shoulder (10 g) with wiped surface. Fabric FA2. Colour: ext. and core dark grey: int. dark brownish-grey. Condition: average.

3.14.38 Context 2505/D/3. Rounded shoulder V7 (8 g) with fingertip decoration. Fabric F2. Colour: grey throughout. Condition: worn.

3.14.39 Context 2505/D/3. Pointed everted rim R8 (3 g). Fabric A1. Colour: ext. and core dark grey: int. brown. Condition: average.

3.14.40 Context 2505/D/3. Beaded rim R6 (6 g). Fabric FA1. Colour: ext. brown: core grey: int. brown. Condition: average.

3.14.41 Context 2505/D/3. Expanded rim R12 (2 g) with impressed decoration. Fabric FA2. Colour: yellowish-brown throughout. Condition: average.

3.14.42 Context 2505/D/3. Simple squared rim (3 g) with cabled decoration. Fabric F2. Colour: ext. yellowish-grey: core and int. grey. Condition: worn.

3.14.43 Context 2505/D/3. Flared rim R9, ?V9 (3 g) with cabled decoration. Fabric FA2. Colour: ext. yellowish-grey: core and int. grey. Condition: average.

3.14.44 Context 2505/D/3. Rounded shoulder (7 g). Fabric FA2. Colour: ext. and core brown: int. grey. Condition: worn.

3.14.45 Context 2505/D/3. Rounded shoulder (2 g) with fingertip decoration. Fabric F2. Colour: ext. brown: core and int. grey. Condition: worn.

3.14.46 Context 2505/D/3. Base B2 (9 g). Fabric QA2. Colour: ext. yellowish-grey: core grey: int. yellowish-grey. Condition: average.

3.14.47 Context 2505/D/3. Base B2 (8 g). Fabric F2. Colour: grey throughout. Condition: average.

Figure 3.15.48–59: context group 2505 continued (D–E)

3.15.48 Context 2505/D/2–4. Rim R9, V9, neck and shoulder from a large vessel (202 g). The rim is flared with cabled decoration. The neck carries an applied cordon with fingertip impressions. Rim Dia. 350 mm. Fabric FQ3. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average-worn.

3.15.49 Context 2505/D/4. Four rim R9, V9 and neck sherds (49 g) probably from the same vessel. Rim is cabled and the neck has a plain cordon. Fabric FQ2. Colour: ext. grey: core dark grey: int. grey. Condition: worn.

3.15.50 Context 2505/D/4. Flaring rim R9, V9 (13 g) with cabled decoration. Sooting on exterior surface. Fabric QA2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: average.

3.15.51 Context 2505/D/4. Rim and shoulder V9 (14 g). Rim is cabled and expanded and slightly flared. Shoulder has fingertip impressions. Fabric FQ2. Colour: ext. reddish-brown: core grey: int. yellowish-brown. Condition: average.

3.15.52 Context 2505/D/4. Base with slight protruding foot B3 (13 g). Fabric FQ2. Colour: ext. reddish-brown: core and int. dark grey. Condition: average.

3.15.53 Context 2505/E/1. Simple rounded rim R2 (2 g). Fabric QA2. Colour: ext. yellowish-brown: core grey: int. black. Condition: worn.

3.15.54 Context 2505/E/1. Neck (2 g). Fabric F2. Colour: ext. brown: core black: int. brown. Condition: average.

3.15.55 Context 2505/E/1. Angular shoulder V5 (6 g). Smoothed surfaces. Fabric QA2. Colour: grey throughout. Condition: average.

3.15.56 Context 2505/E/2. Two base sherds B2 (40 g). Dia. 80 mm. Fabric F2. Colour: ext. brown: core and int. black. Condition: average.

3.15.57 Context 2505/E/3. Rim R8, V5, and shoulder (17 g) from a bipartite jar. Smoothed surfaces. Fabric FA2. Colour: ext. and core grey: int. dark grey. Condition: average.

3.15.58 Context 2505/E/3. Simple upright rounded rim R2, V9 (3 g). Fabric QA2. Colour: grey throughout. Condition: worn.

3.15.59 Context 2505/E/3. Simple upright squared rim R1 (6 g). Fabric F2. Colour: grey throughout. Condition: average.

Figure 3.16.60–7: context group 2505 continued (E)

3.16.60 Context 2505/E/3. Base B2 (26 g). Fabric FQ2. Colour: ext. reddish-brown: core and int. grey. Condition: average-worn.

3.16.61 Context 2505/E/4. Base with protruding foot B3 (10 g). Fabric F2. Colour: ext. yellowish-brown: core grey: int. black. Condition: average-worn.

3.16.62 Context 2505/E/4. Everted squared rim R7, V8 (6 g) decorated with cabling. Fabric F2. Colour: ext. yellowish-grey: core and int. grey. Condition: average.

3.16.63 Context 2505/E/4. Flaring rim R9, V9 (11 g) broken at neck. Smoothed surfaces. Fabric QA2. Colour: ext. yellowish-grey: core grey: int. yellowish-grey. Condition: average.

3.16.64 Context 2505/E/4. Rim and shoulder (13 g) from a globular vessel V6. Rim is rounded and everted with fingernail decoration. Smoothed surfaces. Fabric FA2. Colour: ext. reddish-brown: core grey: int. brown. Condition: average.

3.16.65 Context 2505/E/4. Neck and shoulder (6 g). Fabric FA2. Colour: ext. yellowish-brown: core and int. grey. Condition: worn.
3.16.66 Context 2505/E/4. Rounded shoulder (22 g). Fabric FA2. Colour: ext. yellowish-brown: core and int. grey. Condition: average.
3.16.67 Context 2505/E/4. Rounded shoulder (25 g) with fingertip impressions. Wiped outer surface. Fabric FQ3. Colour: ext. reddish-brown: core and int. dark grey. Condition: average.

Figure 3.17.1–15: context groups 2604–5, 2703 and 2705

3.17.1 Context 2604/1. Slightly in-turned rim R10, V2 (5 g). Fabric F2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition: worn.
3.17.2 Context 2604/1. Out-turned squared rim R4 (2 g). Fabric FA2. Colour: grey throughout. Condition: average.
3.17.3 Context 2605/1. Neck (14 g) with fingertip decoration. Fabric F2. Colour: ext. reddish-brown: core grey: int. reddish-brown. Condition: average.
3.17.4 Context 2605/2. Simple upright and in-turned rim (2 g). Fabric Q1. Colour: ext. black: core grey: int. black. Condition: average.
3.17.5 Context 2605/2. Simple base B2 (22 g). Fabric FQ3. Colour: ext. reddish-brown throughout. Condition: worn.
3.17.6 Context 2605/3. Simple pointed everted rim R8, V5 (11 g) from a slack-shouldered vessel. Fabric F1. Colour: dark grey throughout. Condition: worn.
3.17.7 Context 2605/3. Simple rounded everted rim R8 (10 g). Fabric F2. Colour: grey throughout. Condition: worn.
3.17.8 Context 2605/3. Neck (6 g) from an angular possibly carinated and tripartite vessel V10. Fabric Q2. Colour: grey throughout. Condition: worn.
3.17.9 Context 2705/3. In-turned rim (6 g) decorated with impressed finger dimples. Fabric F2. Colour: grey throughout. Condition: worn.
3.17.10 Context 2705/1. Refitting rim R8 and shoulder (15 g) possibly from a small cup or bowl V5. Fabric F2. Colour: dark grey throughout. Condition: average.
3.17.11 Context 2705/2. Rim R8, V3 and shoulder from a slack-shouldered vessel (21 g). Fabric F2. Colour: ext. greyish-brown: core grey: int. greyish-brown. Condition: average-worn.
3.17.12 Context 2705/3. Rounded everted rim R8 (22 g). Fabric Q2. Colour: reddish-brown throughout. Condition: worn.
3.17.13 Context 2705/4. Expanded rim R12, V8 and shoulder from an angular jar (36 g). Fabric F2. Colour: dark grey throughout. Condition: average.
3.17.14 Context 2705/4 and 2605/3. Two shoulder sherds probably from the same vessel (17 g). Fabric F2. Colour: dark grey throughout. Condition: average.
3.17.15 Context 2705/4. Shoulder (19 g). Smoothed surfaces. Fabric F2. Colour: ext. yellowish-brown: core and int. dark grey. Condition: worn.

IRON AGE AND ROMAN POTTERY

by Paul Booth

Only 11 sherds (38 g) of Iron Age and Roman pottery were recovered. A single context (1703) contained five sherds (17 g) in a variety of fabrics, tempered principally with sand, flint, shell and uncertain white inclusions (two examples). There were no diagnostic features among this group and they cannot be dated more closely than to the Iron Age. The remaining sherds, all Roman, were in the following ware groups (defined by the OAU pottery recording system, further details of which may be found in the site archive):

E20 'Belgic type' ware, principally fine sand inclusions: 1 sherd.
R10 General fine reduced coarsewares: 2 sherds.
R30 General medium sandy reduced wares: 3 sherds.

Again there were no diagnostic pieces. While fabrics such as R30 have a wide date range it is possible that all this material was of 1st–2nd-century date, with a 1st-century date being certain for fabric E20. The very small average size of both Iron Age and Roman sherds suggests a high degree of redeposition and probably does not indicate domestic activity at the site.

POST-ROMAN POTTERY

by Lucy Whittingham

A small quantity of later pottery was recovered. This material is summarised here, but further details may be found in the site archive; the methodology employed is described in Chapter 5. Four undiagnostic, small hand-built sherds are of indeterminate date. One sherd with quartz, organic and calcareous temper is possibly early/middle Saxon, but the three vesiculated sherds with possible fibrous gypsum/calcite inclusions are of unknown date or provenance. One small copper-glazed sherd of Brill/Boarstall (OXAM) pottery was recovered from context 1703.

FIRED CLAY

by Alistair Barclay

Introduction and methods

A total of 72 pieces (397 g) of fired clay were recovered from the excavations. A spindlewhorl fragment and some structural clay are the only diagnostic pieces, while most of the assemblage comprises amorphous fragments.

The material was quantified by number of fragments and weight (Table 3.19). The assemblage is divided into broad fabric types. Although there is evidence for metalworking from the site no crucible or mould fragments were found among the assemblage.

Table 3.19 Summary of all fired clay (number of fragments, weight)

Trench	Context	Fabric	Object	Daub	Amorphous
I	103/1 2–3 m	1			2, 10 g
	103/2 0–1 m	2			1, 7 g
	103/3 0–1 m	1			4, 12 g
	103/4	2			1, 9 g
II	203 1.5–2 m	1			1, 4 g
	203/3 2–3 m	2		2, 2 g	
	203/4	1			2, 2 g
III	303/2	3			1, 10 g
XVII	1703 0–1 m	4		20, 103 g	
	1703 2–3 m	4			3, 25 g
	1703 4–5 m	2			3, 5 g
XVIII	1803/1 1–2 m	4			4, 27 g
	1803 4–5 m	4			6, 17 g
	1803 8–9 m	4			1, 20 g
XXIV	2402	5			1, 1 g
	2402 153/495	5			1, 1 g
	2402 153/499	5			4, 5 g
	2403 153/495	2			1, 3 g
	2403 153/499	2			1, 3 g
	2403/2 153/505	2			1, 1 g
	2411/A 153/495	3			1, 3 g
	2414 149/507	3		2, 46 g	
	2414 153/505	3			1, 11 g
XXV	2505/B/2	1			1, 5 g
	2505/C/1	1		1, 45 g	
	2505/C?3	3			1, 2 g
	2505/E/2	2			1, 2 g
	2505/E/4	6	1, 3 g		
XXVI	2605/1	1			2, 4 g
XXVII	2705/4	3			1, 9 g
Total			1, 3 g	25, 196 g	46, 198 g

Fabrics

1. Soft fabric with a silty texture with no inclusions.
2. Soft fabric with a sandy texture which is either fine or coarse.
3. Soft fabric with calcareous grit inclusions (gravel and fossil shell).
4. Soft fabric with calcareous grit and sand inclusions.
5. Soft fabric with very sparse fine (<1 mm) flint.
6. Hard fabric with moderate medium (<3 mm) angular flint inclusions = pottery fabric F2.

Six different fabrics have been identified. Most of these can be described as unmodified clay, and with the exception of fabric 6 none had added inclusions. Fabrics 1–4 had been used as structural daub, while fabric 6, which equates to pottery fabric F2, was used to make the spindlewhorl.

Objects

The only recognisable object is a small fragment from a spindlewhorl of bipartite form (not illustrated). This was manufactured from the pottery fabric F2. The fragment is of similar form to examples published by Thomas *et al*. (1986) from the site that were also manufactured from flint-tempered fabrics.

Structural clay

A total of 26 (196 g) fragments of structural clay were recovered. Small quantities of this material came from trenches II, XVII, XXIV and XXV (see Fig. 2.10, Table 3.19). All the structural clay had been fired usually to a reddish-brown colour, although some was yellowish-brown. A number of pieces had single flat surfaces and two fragments had wattle impressions (contexts 1703 0–1 m and 203/3 2–3 m). This type of structural clay probably comes from oven structures rather than the walls of buildings. None of this material was recovered from *in situ* structures.

Amorphous fragments

The majority of the fired clay consisted of amorphous fragments (46, 198g). This material was mostly oxidised reddish-brown and was found in many of the excavation trenches (see Fig. 2.10, Table 3.19).

Discussion

Both amorphous and structural fired clay was found in many of the excavated trenches, although never in large quantities and the only significant deposit was the structural clay from trench XVII. Most of the fired clay was recovered as relatively small amorphous fragments which seldom weighed more than 20 g. Figure 2.10j illustrates that although the distribution covers much of the island the relative density was very low. The location of the spindlewhorl fragment from trench XXV is of interest, as a total of four others – recovered either from excavation (two from 1959, one from 1951) or the collapsed riverbank (one example) – have been found in approximately the same area of the eyot (Thomas *et al*. 1986, 191).

The range of fired clay from the 1985 and 1991 excavations is typical for a late Bronze Age site in the Upper Thames Valley. Both metalworking debris (crucibles and moulds) and loomweights are notably absent from this assemblage and to date have not been found at the site (cf. Thomas *et al*. 1986). Thomas *et al*. publish a range of spindlewhorls including one decorated example and a piece of moulded clay that is likely to derive from a structure such as an oven (1986, 191 and fig. 5.6–10), and this evidence complements the small assemblage under discussion here. In summary, the fired clay assemblage from the site indicates the use of clay ovens, although none of this material has ever been found *in situ*. The five spindlewhorls provide evidence for the production of textiles.

Chapter 4: Whitecross Farm: Environmental Evidence

ANIMAL BONE

by Adrienne Powell and Kate M Clark

Introduction

This report considers the animal bone recovered from the late Bronze Age contexts at Whitecross Farm. The small amount of bone from the earlier ditch and the later alluvium and ploughsoil has been excluded from the present analysis, although the assessment records and report on this small group may be found in the archive. Two pieces of worked bone were identified among the animal bone assemblage (see Powell and Clark, Chapter 3).

The assemblage was entirely hand-retrieved and totalled 1806 fragments, of which only 520 (29%) were identified to species (Table 4.1). Given the diverse natures of the source deposits, ranging from waterlogged palaeochannel fills to surface occupation spreads, differential survival is likely to have caused some spatial variation in the observed proportions of species and the degree of surface alterations to bones. Therefore these levels of the assemblage have been looked at separately. Most of the bone came from the wet midden and the occupation spread in the eyot; 'Other' includes bone from the postholes and the palisade trench. The incidence of gnawed, butchered and burnt bone was low overall (Table 4.2). However, when the levels are considered separately there is a marked tendency for the frequency of observed gnaw and butchery marks to decrease with increasing proximity to the surface and dryness of the deposit. This seems to have affected knife-cut marks to a greater degree than the heavier chop marks as their finer nature makes them more vulnerable to destruction. In addition to canid gnawing, the gnawed bone includes eight examples of rodent gnawing. The frequency of burning contrasts with the pattern for gnawed and butchered bone in that it increases between the wet midden and occupation levels, although the incidence is always low. The bone from the wet midden was often very darkly stained, which may have reduced the observed incidence of burning in this material.

Main species

Cattle, sheep/goat and pig comprised 93% of the total identified fraction of the assemblage.

Table 4.1 Number of identified specimens (NISP) from late Bronze Age features

Taxon	*Area*										*Total*	
	Palaeochannel		*Wet midden*		*Dry midden*		*Occupation*		*Other*			
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Horse	-	-	-	-	1	3	1	0.4	-	-	2	0.4
Cattle	7	11	25	16	4	12	69	27	1	100	106	21
Sheep	7	11	11	7	1	3	14	5	-	-	33	6
Goat	2	3	3	2	1	3	1	0.4	-	-	7	1
Sheep/goat	22	34	51	32	10	30	81	31	-	-	164	32
Pig	20	31	60	38	13	39	78	30	-	-	171	33
Dog	1	2	1	1	-	-	1	0.4	-	-	3	1
Cervus elaphus	5	8	8	5	3	9	12	5	-	-	28	5
Capreolus capreolus	-	-	1	1	-	-	0	-	-	-	1	0.2
Vulpes vulpes	-	-	0	-	-	-	1	0.4	-	-	1	0.2
Felis silvestris	1	2	0	-	-	-	0	-	-	-	1	0.2
cf. *Anser anser*	-	-	0	-	-	-	1	-	-	-	1	-
Small duck	-	-	2	-	-	-	0	-	-	-	2	-
Bird nfi.	-	-	1	-	-	-	0	-	-	-	1	-
Sheep-sized mammal	36	-	105	-	34	-	204	-	-	-	379	-
Cattle-sized mammal	13	-	45	-	17	-	136	-	4	-	215	-
Unidentified	29	-	148	-	46	-	466	-	2	-	691	-
Total	143	-	461	-	130	-	1065	-	7	-	1806	-
% identified	45	-	35	-	25	-	24	-	-	-	29	-

nfi. = not further identifiable

Table 4.2 Incidence of gnawed, butchered and burnt bone in different areas (%)

Area	Gnawed	Chopped	Cut	Butchered	Worked	Burnt	Total (n)
Palaeochannel	18.2	2.1	6.3	8.4	-	1.4	143
Wet midden	11.1	2.0	9.3	11.3	0.7	2.8	461
Dry midden	9.2	1.5	3.8	5.4	-	0.8	130
Occupation	3.2	0.1	1.1	1.2	0.1	4.4	1065
Other	14.3	-	-	-	-	14.3	7
All	6.9	0.8	3.8	4.7	0.1	3.5	1806

Sheep/goat bones were the most numerous in all levels, although this decreased from the channel fills to the occupation spread. In less than a quarter of the material could the bones of sheep and goat be distinguished, using the criteria of Boessneck (1969) and Payne (1985). Most of these were sheep, with only a small number, mainly post-cranial bones, identified as goat. Bones from cattle are least frequent of the main species, but increased in frequency as sheep/goat decreased. This directional change in frequency is probably related to changing preservation, as discussed above, with the more robust cattle bones favoured in more adverse conditions. Pig is the second most frequently represented species in all levels, and although there is some variation in the frequency of pig bone, unlike the variation in cattle and sheep/goat it is not markedly directional (Figs 4.1–3).

Minimum number of elements (MNE) were calculated for these three species following the zone

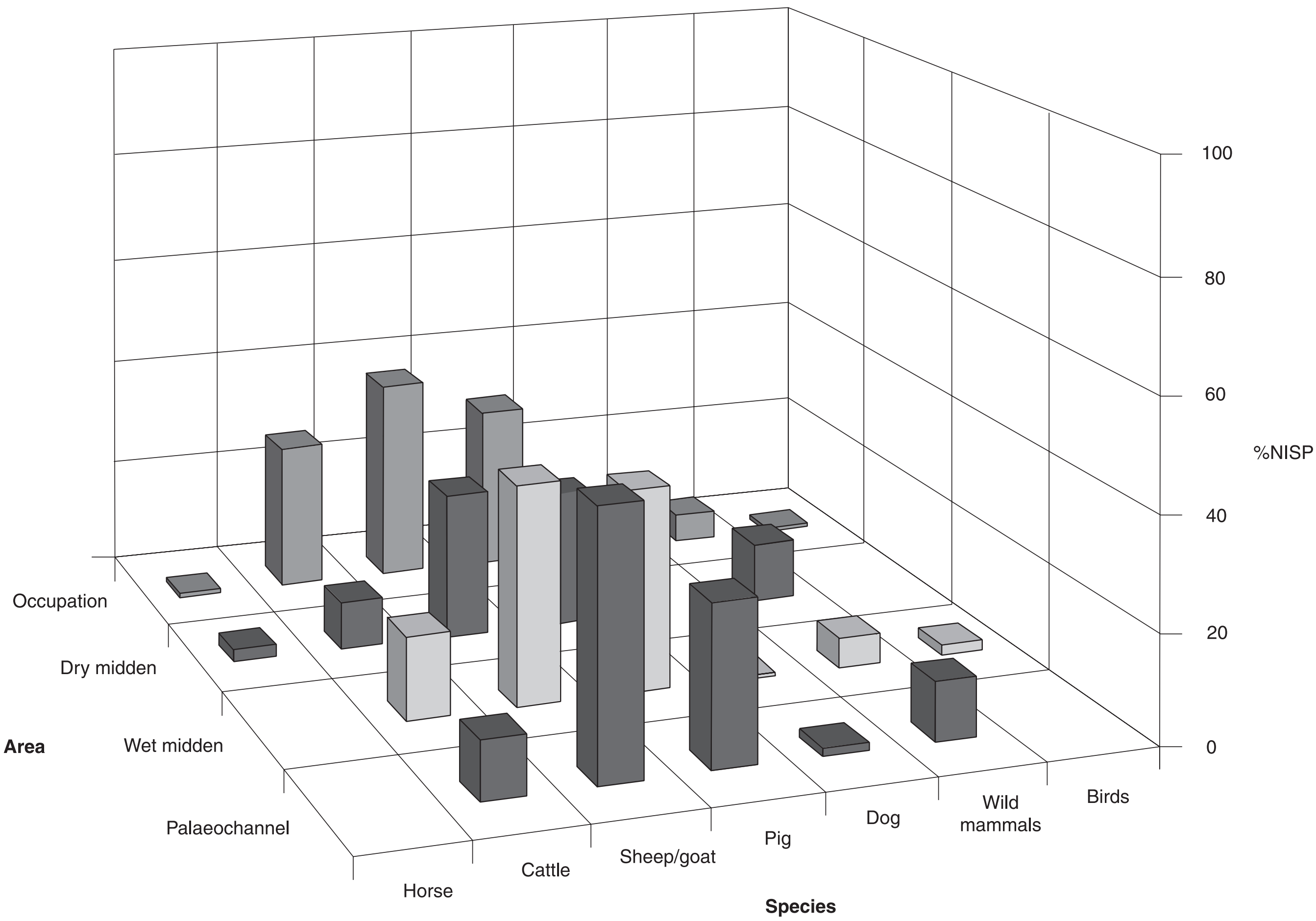


Figure 4.1 Distribution of species across all trenches at Whitecross Farm – %NISP

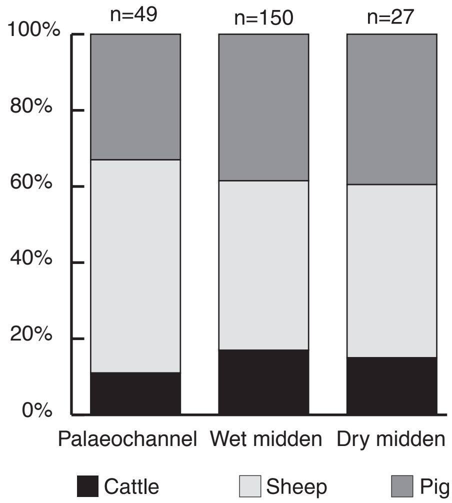


Figure 4.2 Relative proportions of cattle, sheep and pig – trench XXIV

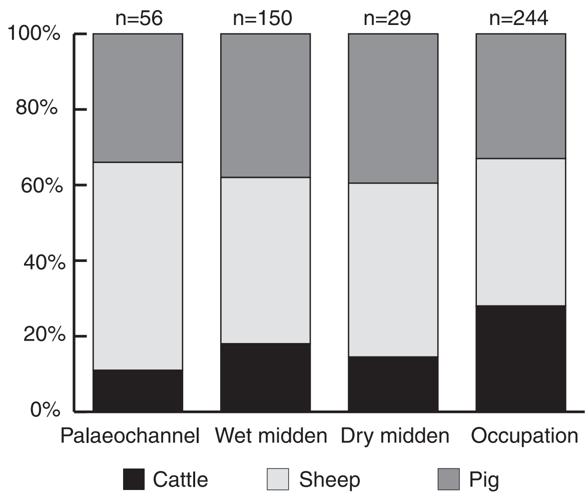


Figure 4.3 Relative proportions of cattle, sheep and pig – all trenches

method described by Serjeantson (1991), with loose maxillary teeth incorporated in the calculations for skulls where two or more teeth were demonstrably part of the same tooth row. The MNE figures for the assemblage as a whole, as well as the minimum number of individuals (MNI) derived from these, are given in Table 4.3. It may be seen that the rank order of the main species does not alter with the different methods of quantification, although the MNI figures increase the proportion of sheep/goat at the expense of cattle. The frequency of the mandible, since it is a robust element with a generally high rate of survival, has been used by Legge (1992) and Locker (2000) as another method of comparing relative proportions of species. From the

Table 4.3 Minimum number of elements (MNE)

Element	*Species* *Cattle*	*Sheep*	*Pig*	*Total*
Horn Core	-	1	-	1
Skull	2	2	3	7
Mandible	8	15	11	34
Atlas	-	1	1	2
Axis	1	1	1	3
Scapular	3	13	10	26
Humerus	5	6	13	24
Radius	3	24	5	32
Ulna	1	2	4	7
Pelvis	3	10	6	19
Sacrum	1	-	2	3
Femur	7	8	9	24
Tibia	5	18	8	31
Fibula	-	-	3	3
Patella	-	-	1	1
Astragalus	4	3	2	9
Calcaneus	2	-	5	7
Tarsals	2	-	1	3
Carpals	1	1	-	2
Metacarpal	1	17	3	21
Metatarsal	4	15	4	23
Lateral metapodial	-	-	6	6
Phalanx I	6	6	4	16
Phalanx II	2	-	2	4
Phalanx III	2	-	1	3
Total	63	143	105	311
% main domestics	20	46	34	
MNI	4	14	8	26
% MNI	15	54	31	

figures in Table 4.3 this gives 24%, 44% and 32% respectively for cattle, sheep/goat and pig, confirming the presence of an unusually high amount of pig in this assemblage.

Differential preservation between levels is also likely to have affected body part frequencies. However, when each level was examined separately, sample sizes were small, particularly for cattle, so those results are not presented here. The presentation of cattle, sheep/goat and pig body parts suggests that whole carcasses were present on site originally.

Tooth eruption and wear have been recorded after Grant (1982), and Table 4.4 shows the results for cattle, sheep/goat and pig allocated to age groups after O'Connor (1988). Although the data are sparse, the presence of an elderly cattle M3 contrasts with the data for sheep/goat and pig, which are dominated by young and subadult examples. Figure 4.4 shows the sheep/goat jaws and teeth aged according to Payne (1973): 50% of the material came from animals slaughtered before the end of their first year, and 75% came from animals dead by the end of their second year. The epiphyseal fusion data (Table 4.5a–c) are consistent with the dental data, at least for sheep/goat and

Table 4.4 Tooth eruption and wear age groups

Age	*Species* *Cattle*	*Sheep/goat*	*Pig*	*Total*
Neonate	-	-	-	0
Juvenile	2	2	2	6
Immature	1	6	1	8
Subadult	-	4	4	8
Adult	2	4	1	7
Elderly	1	-	-	1
Total	6	16	8	30

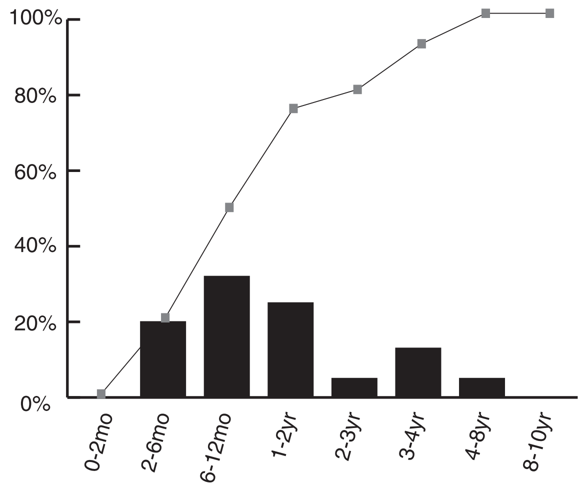


Figure 4.4 Sheep/goat mortality

pig, in suggesting that few animals survived beyond two years.

Sheep/goat were sexed on their pelves (Grigson 1982): 4 were female and 3 were male. Pigs were sexed on their canines (Schmid 1972) of which 7 examples occurred in this assemblage: 4 female and 3 male. The cattle bones yielded no sexable material.

Measurements were taken following Driesch (1976) and Payne and Bull (1988), and are listed in Appendix 3. Measurements on cattle bones are few: a right scapula with a GLP (greatest length of glenoid process) of 53.8 mm is within the range of cattle from Runnymede (Done 1980). Measurements on a distal humerus and three astragali are all within the range of the Potterne cattle (Locker 2000), although the humerus is relatively large. Sheep/goat withers heights were calculated on a sheep radius and a goat metacarpal using the factors of Teichert (Driesch and Boessneck 1974). The former gave a height of 0.591 m, within the range of both Runnymede and Potterne; the latter gave a height of 0.669 m, taller than any of the sheep from these sites. Other sheep/goat measurements from Whitecross Farm tend to be larger than the Runnymede animals, for example the proximal

Table 4.5a Cattle epiphyseal fusion

Age at fusion	*Element*	*Fused*	*Unfused*	*Juvenile*	*Total*
7–10 months	Scapula	2	-	-	2
"	Pelvis	1	-	-	1
12–15 months	Radius, p	1	1	-	2
15–18 months	Phalanx II	2	-	-	2
15–20 months	Humerus, d	2	-	-	2
20–24 months	Phalanx I	5	1	-	6
24–30 months	Tibia, d	3	-	-	3
"	Metapodial, d	-	2	1	3
36 months	Femur, p	-	2	2	4
42 months	Femur, d	-	1	2	3
42–48 months	Humerus, p	1	-	-	1
"	Radius, d	-	1	-	1
	Total	17	8	5	30

Table 4.5b Sheep/goat epiphyseal fusion

Age at fusion	*Element*	*Fused*	*Unfused*	*Juvenile*	*Total*
3–4 months	Humerus, d	2	-	1	3
"	Radius, p	8	5	-	13
5 months	Scapula	5	3	-	8
	Pelvis	11	-	-	11
7–10 months	Phalanx I	5	-	-	5
15–20 months	Tibia, d	2	7	1	10
20–24 months	Metapodial, d	5	8	1	14
36 months	Femur, p	-	3	-	3
42 months	Humerus, p	1	1	-	2
"	Radius, d	2	8	1	11
"	Femur, d	1	3	1	5
"	Tibia, p	-	3	2	5
	Total	42	41	7	90

Table 4.5c Pig epiphyseal fusion

Age at fusion	*Element*	*Fused*	*Unfused*	*Juvenile*	*Neonatal*	*Total*
12 months	Scapula	3	2	-	-	5
"	Humerus, d	6	3	-	-	9
"	Radius, p	3	1	-	-	4
"	Pelvis	4	-	-	-	4
"	Phalanx II	2	-	-	-	2
24 months	Phalanx I	1	4	-	-	5
"	Tibia, d	-	3	-	1	4
"	Metapodial, d	3	6	-	-	9
24–30 months	Calcaneus	-	4	-	-	4
36–42 months	Femur, p	-	4	2	-	6
"	Ulna, p	-	2	-	-	2
42 months	Humerus, p	-	3	-	-	3
"	Radius, d	-	1	-	-	1
"	Femur, d	-	3	2	-	5
"	Tibia, p	1	2	1	1	5
	Total	23	38	5	2	68

breadth (Bp) of the radius has a range of 24.3–28.8 mm, compared with 20–26 mm and a mean of 23 mm at Runnymede (Done 1980). However, when these figures are compared with the data in the animal Bone Metrical Archive (Centre for Human Ecology 1995) they both fall within the measurement range of 23.8–30.0 mm for the Bronze Age. Most of the measurements on pig bones are comparable with those of domestic animals from Runnymede and Potterne, but three bones are large enough to suggest the presence of wild boar (*Sus scrofa*). One is a large, but broken and unmeasurable, lower male canine; another is a similarly unmeasurable scapula; the third is a fused proximal tibia that has a proximal breadth of 60.8 mm. The same measurement in a modern female wild boar in the reference collection at the Department of Archaeology, University of Southampton, is 51.9 mm, or 85% of the bone from Whitecross Farm. Archaeological comparisons are rare since fused proximal tibiae rarely occur: the largest out of eight Bp measurements from the Neolithic domestic pigs at Durrington Walls is 52 mm (Harcourt 1971), while the ranges for domestic and wild pigs at the Iron Age German site of the Heuneberg are 41.5–49.5 mm and 52.5–70.5 mm, respectively (Willburger 1983). Thus, although male domestic pigs and female wild boar can overlap in size (Payne and Bull 1988), the tibia from Whitecross Farm is well outside the zone of overlap.

Dog

A femur recovered from the wet midden (2414) provided sufficient measurements to suggest that the animal was of similar height and build to a large modern labrador (length 177.3 mm, depth caput 19.19 mm, shaft diameter 14.5 mm, distal breadth 35.4 mm), with the estimated height at the shoulder being 0.544 m. From the organic deposit (2405) in the palaeochannel came a pelvic fragment, and again the breadth of the acetabulum suggests a dog of similar build although clearly the height of the animal cannot be predicted.

Other species

Of the other domestic species, horse is represented by only two bones: a left incisor (1803) and a right upper molar (2409).

In addition to the evidence for wild boar discussed above, at least six other species of wild animals are present, with red deer (*Cervus elaphus*) the most commonly occurring (contexts 1803, 2405, 2409, 2414, 2428, 2505 and 2605). Most of the red deer bones are from the post-cranial skeleton and include most of the longbones with the exception of the femur and metacarpal, as well as a pelvis (female) (2414) and three phalanges (2414 and 2505). A fragmentary, partial skull, consisting of left frontal, parietal, left and right petrous, occipital region and jugular process, came from the occupation spread. An atlas from the same context may articulate. Other cranial material consists of a fragment of mandible, one lower and two upper loose molars, a left zygomatic, a right temporal and six antlers. Most of these last are beam or tine fragments; however, two are shed antlers (2405) retaining the burr and one had the bes and tres tines, indicating an animal with a probable crown of ten points (Schmid 1972). Roe deer (*Capreolus capreolus*) is represented only by the shaft of a femur (2414). Wild carnivores present are fox (*Vulpes vulpes*) (2505), a single lower premolar, and wild cat (*Felis silvestris*) (2405), an unfused scapular indicating an animal less than 251 days old (after Curgy, in Amorosi 1989).

Four avian longbones were present (1807, 2414), of which three are identifiable: the distal shaft of a goose humerus, probably greylag goose (*Anser anser*), and a left humerus and ulna (GL=71.4 mm) of a duck or ducks smaller than a mallard (*Anas platyrhynchos*), about the size of a wigeon (*Anas penelope*).

Pathology

There were only two instances of pathological bone in the assemblage. A partially erupted pig M3 shows pitting in the enamel of the anterior cusps, which is unlikely to be the result of erosion since neither the other teeth in the row, nor the bone of the mandible itself, are affected. It is probably a hypoplastic condition, with unknown cause. The only other instance of pathology is a red deer first phalanx with two cavities on the medial side of the proximal metaphysis, which appear to be bone cysts.

Carcass utilisation

As mentioned above, butchery marks were observed on a few of the bones, amounting to 4.7% of the assemblage, including unidentified material (see Table 4.2), and were mainly in the form of knife cuts. Some evidence of skinning is present: in a pig mandible cut on the ventral surface of the symphysis, and a cattle metacarpal and sheep metatarsal with transverse cuts on the shafts. The remainder indicate both carcass dismemberment (including removal of the tongue in sheep and pig) and filleting. A right sheep/goat parietal with a longitudinal chop in the sagittal plane suggests splitting of the skull to extract the brain.

Axial splitting of vertebrae, suggesting division of carcasses into sides, was present at both Potterne (Locker 2000) and Runnymede (Done 1980), and was the most frequent sign of butchery at the latter. Evidence for this is less common at Whitecross Farm: out of 11 vertebrae with butchery evidence, a cattle axis and a lumbar vertebra from a sheep-sized mammal have been chopped axially, and a cattle-sized lumbar fragment has been chopped through lengthwise just off the sagittal plane. This bone and one other cattle-sized vertebra also show longitudinal chop marks on the internal surface of the neural arch, probably resulting from chops through the vertebral body. Vertical chop marks on the internal surface of a cattle-sized cervical vertebra fragment suggest that the spine was also chopped between the vertebrae into segments, either after or instead of splitting. Although axial splitting of vertebrae was practised at Whitecross Farm, it was not the sole technique used and the evidence is too sparse to indicate how prevalent it was on the whole. Whether it does represent division of carcasses into halves or only smaller-scale chopping of the spine into small joints or pot-sized portions is unclear.

Discussion

Earlier work at this site produced a small assemblage very similar to the one analysed here, although with a more restricted range of species (Wilson 1986). The Whitecross Farm assemblages show features in common with that from the similarly situated site of Runnymede (Done 1980; Serjeantson 1996). Both sites have unusually large proportions of pig, although at Runnymede the relative proportions of cattle, sheep/goat and pig vary according to which quantification method is used. Legge (1992) has shown that if the counts are based on identified mandibles, then different seasons of excavation at Runnymede give similar proportions: 27–28%, 45% and 27–29% respectively for cattle, sheep/goat and pig. These proportions are very similar to those at Whitecross Farm, although here pig is slightly better represented at the expense of cattle. The assemblage from Potterne also has similar proportions of the three main domestic species, if the large and small ungulate categories, which Locker (2000) includes with cattle and sheep, are excluded.

The high proportion of animals less than two years old in the pig and sheep/goat material is also seen at both Runnymede (Done 1980; Serjeantson 1996) and Whitecross Farm. This is a typical age profile for pigs since they do not yield any secondary products and it is most profitable in terms of meat yield for energy input to slaughter them before they are fully mature. The age profile for sheep/goat suggests that wool production did not play an important role in the economy of the inhabitants; however, the large numbers of sheep/goat bones suggest otherwise. It is possible that older, wool-producing animals, once they had outlived their usefulness, were generally not killed and eaten on the site. At Potterne, in contrast, both species have a greater number of older animals (Locker 2000).

The apparent similarity of the economy at Runnymede and Whitecross Farm may relate to their local environments. Pollen and plant macrofossil evidence from both sites suggests that in the late Bronze Age there were large cleared areas, with some secondary woodland (see Robinson below; Serjeantson 1996), and, as Serjeantson has argued, plants of the river edge such as waterlilies would also have been an important contribution to the diet of pigs. Done (1980) and Grigson (1986) have also suggested that high numbers of pig can indicate permanent settlement with a low element of pastoralism in the economy since pigs are difficult to herd. In addition, the presence of some woodland and scrub will have provided suitable habitats for the red deer, roe deer, wild boar and wild cat, and explain the presence of so many wild species in this small assemblage.

MACROSCOPIC PLANT AND INVERTEBRATE REMAINS

by Mark Robinson

Introduction

Extensive sampling was undertaken and the samples were analysed by the Environmental Archaeology Unit at the University Museum, Oxford. In addition subsamples of the waterlogged samples were analysed for pollen by F M Chambers (see below) and wood recovered by hand excavation was identified by R Gale and analysed by M Taylor (see below). Almost all the sediments on the site were sufficiently calcareous for the survival of mollusc shells. The bottom of the palaeochannel extended below the permanent water table resulting in the preservation of macroscopic plant and insect remains. In addition, high concentrations of charcoal were observed in some of the palaeochannel sediments.

Sampling strategy and the samples

A column of samples had already been analysed for molluscs through the island and the overlying sediments, including the late Bronze Age occupation deposit where it had been exposed by erosion in the bank of the Thames (Thomas *et al.* 1986). It was decided that the main effort would be concentrated on the sediments in the palaeochannel.

A column of waterlogged samples (column 1, samples 3 to 1) was analysed from the edge of the palaeochannel where it contained midden and possible destruction debris, in order to gain information on conditions and activities on the island (see Fig. 2.3). A waterlogged spot sample (sample 21) was also analysed from the edge of the palaeochannel further downstream. In order to provide a more regional environmental picture, a second column of waterlogged samples (column 4, samples 32 to 27) was analysed from the centre of the palaeochannel (see Fig. 2.3). This column was extended upwards through the inorganic sediments of the palaeochannel (column 4, samples 26 to 1) in order trace its later environmental sequence. Samples of inorganic sediments were also taken for molluscs from the pre-Bronze Age

Table 4.6 Sample details

Column	Sample	Context	Sample category	Description
1	1	2405	w	Black organic loam with some charred woody debris. Top sample in column
1	2	2405	w	Black highly organic silt with much shell and woody debris
1	3	2405	w	Black gravelly organic loam with some wood debris. Bottom sample in column
4	1	2402	m	Grey/buff clay. Top sample in column
4	2	2402	m	Grey/buff clay
4	3	2402	m	Grey/buff clay
4	4	2402	m	Grey/buff clay
4	5	2402	m	Grey clay
4	6	2402	m	Pale grey mottled silty clay with a little fine sand
4	7	2402	m	Pale grey mottled silty clay with a little fine sand
4	8	2402	m	Pale grey mottled silty clay with a little fine sand
4	9	2402	m	Pale grey mottled silty clay with a little fine sand
4	10	2402	m	Pale grey mottled silty clay with a little fine sand
4	11	2402	m	Pale grey mottled silty clay with a little fine sand
4	12	2402	m	Pale grey silty clay with a little fine sand
4	13	2402	m	Pale grey silty clay with a little fine sand
4	14	2402	m	Pale grey silty clay with a little fine sand
4	15	2402	m	Pale grey silty clay with a little fine sand
4	16	2402	m	Pale grey silty clay with a little fine sand
4	17	2404	m	Pale grey silty clay with a little fine sand
4	18	2404	m	Pale grey silty clay with a little fine sand
4	19	2404	m	Pale grey silty clay with a little fine sand
4	20	2404	m	Pale grey silty clay with a little fine sand
4	21	2404	m	Pale grey silty clay with a little fine sand
4	22	2404	m	Pale grey silty clay with a little fine sand
4	23	2404	m	Pale grey silty clay with a little fine sand
4	24	2404	m	Grey silty clay with a little fine sand
4	25	2404	m	Grey silty clay with a little fine sand
4	26	2404	m	Grey silty clay with a little fine sand
4	27	2404	w	Dark grey organic calcareous silt
4	28	2404	w	Dark grey organic calcareous silt
4	29	2405	w	Dark grey organic calcareous silt with many small shell fragments
4	30	2405	w	Black organic shelly sand
4	31	2405	w	Brown organic shelly silt with much woody debris
4	32	2405	w	Black organic sandy gravel. Bottom sample in column
-	5	2405	c	
-	6	gravel bar	m	Mottled pale grey/buff very sandy loam
-	7	gravel bar	m	Mottled pale grey/buff sandy gravel
-	8	2413/3	m	Grey sandy clay with some gravel and much iron panning
-	9	2413/4	m	Mottled grey fine sandy clay loam
-	10	2403/2	m	Grey/buff clay loam
-	11	2405/4	m	Dark grey clay loam
-	21	-	w	Black shelly organic
-	51	2405	c	
-	52	2505	c	
-	60	60	w	Brown peat with many fine roots
-	92	2505/2	c	
-	93	2505/3	c	
-	94	2505/4	c	
-	95	2505/3	c	

c = sample analysed for charred plant remains
m = sample analysed for molluscs
w = sample analysed for waterlogged macroscopic plant and insect remains in addition to charred plant remains and molluscs

sediments of the island (samples 6 and 7), a ditch on the island (samples 8 and 9) and the late Bronze Age occupation deposit (samples 10 and 11: see Fig. 2.3). Samples were floated for charred plant remains to obtain crop and charcoal evidence from the possible burnt destruction debris in the palaeochannel (samples 5 and 51) and also the occupation deposit on the island (samples 52, 92 to 95). Finally, a small sample of peat was analysed from a later deposit of fen peat (sample 60) which post-dated the other organic sediments in the palaeochannel, to obtain further information on the site after its abandonment. Sample details are given in Table 4.6.

Methods and results

Waterlogged samples (w in Table 4.6) were analysed for the full range of macroscopic plant and invertebrate remains: waterlogged seeds, wood, other waterlogged plant remains, charcoal, other charred plant remains, Coleoptera, other insect remains and Mollusca. Samples for charred plant remains (c) and molluscs (m) were just analysed for those categories.

The part of each sample which was to be analysed for macroscopic plant remains was weighed out and washed over on to a 0.2 mm aperture sieve in order to extract the organic fraction. This was graded through a stack of sieves and sorted in water with the aid of a binocular microscope at x12 magnification. Seeds and other potentially identifiable plant remains (both waterlogged and charred), along with insect fragments, were picked out. A subsample of the organic flot and a similar fraction of the inorganic residue were sorted down to 0.5 mm for the molluscs. An additional subsample from some of the samples was processed for insect remains alone. It was weighed out, washed over on to a 0.2 mm sieve, drained and subjected to paraffin flotation. The flot was washed in detergent then sorted as before. Both waterlogged plant and insect remains were stored in alcohol prior to identification whereas charred plant remains and mollusc shells were dried.

The molluscan samples were weighed, sieved down to 0.5 mm, dried and then sorted at x12 magnification. The samples for charred plant remains only were measured out and processed in a bulk flotation machine on to a 0.5 mm mesh. The flots were likewise dried and sorted at x12 magnification.

The weight or volume of each sample processed for each category of evidence is given at the start of each table of results (Tables 4.7–16). Specimens were identified with reference to the collections in the University Museum, Oxford at magnifications of up to x100 and the results have been given in Tables 4.7–16. The tables either record the minimum number of individuals represented by the fragments identified from a sample or show presence/absence. Nomenclature follows Clapham *et al.* (1987) for plants. The Royal Entomological Society's revised check lists of British insects (Kloet and Hincks 1964; 1977; 1978) have been used for the nomenclature of the entomological results. molluscan nomenclature follows Kerney (1976) for freshwater molluscs and Waldén (1976) for land snails.

Noteworthy species records

Papaver somniferum L. opium poppy

Waterlogged seeds of *P. somniferum* L. were found in column 4 samples 31 and 30, column 1 samples 3, 2 and 1 and sample 21. A total of 203 seeds were identified from sample 2 of column 1. A single charred seed of *P. somniferum* was identified from column 4 sample 31. They were easily separated from other species of *Papaver*, which were also present, by their size and their coarse reticulate surface cell pattern. This annual is generally regarded as an introduced weed (Clapham *et al.* 1987, 59), but the possibility that it was cultivated in Britain during the Bronze Age is also raised.

Drypta dentata (Ros.)

The front half of a left elytron of *D. dentata* was identified from column 1 sample 2. It could be recognised by its rounded shoulder, distinctively punctate surface and its iridescent green colour. It is now a rare beetle restricted in Britain to a few localities on the south coast (Lindroth 1974, 133) and this find probably represents the first archaeological record.

Aphodius varians Duft.

Part of a right elytron of *A. varians* was identified from column 4 sample 28. It was not possible to determine which colour variant it was from. This species of beetle has not been captured in Britain for over 150 years (Allen 1967, 222–3) although it is still widely distributed in France (Paulian 1959, 171). It has been identified from several other British prehistoric sites.

Analysis of the data

Coleoptera

The results for the Coleoptera from columns 1 and 4 are displayed in Figure 4.5; species groups are expressed as percentages of the minimum number of individuals of terrestrial Coleoptera. Aquatic Coleoptera have been excluded from the totals because the assemblages accumulated underwater and it enables some of the difference due to the environment of the deposit itself to be eliminated. The species groups used follow Robinson (1991, 278–81) and the members of each species group are

Table 4.7 Waterlogged seeds

		Number of seeds									
		Column 4						*Column 1*			
	Sample (all 1.0 kg)	*32*	*31*	*30*	*29*	*28*	*27*	*3*	*2*	*1*	*21*
RANUNCULACEAE											
Ranunculus cf. acris L.	meadow buttercup	1	-	1	2	3	-	-	1	1	-
R. cf. repens L.	creeping buttercup	10	17	16	16	14	1	3	12	15	8
R. cf. bulbosus L.	bulbous buttercup	1	2	-	1	1	-	1	1	-	-
R. flammula L.	lesser spearwort	-	-	-	1	-	-	-	-	-	-
R. cf. lingua L.	greater spearwort	-	-	2	1	-	-	-	-	-	-
R. sceleratus L.	celery-leaved spearwort	-	1	-	1	1	-	-	-	-	-
Ranunculus S. Batrachium sp.	water crowfoot	41	31	61	62	79	-	33	13	2	-
Thalictrum flavum L.	meadow rue	-	1	1	1	-	-	-	1	-	-
CERATOPHYLLACEAE											
Ceratophyllum submersum L.	hornwort	-	-	-	1	-	-	-	-	-	-
NYMPHAEACEAE											
Nymphaea alba L.	white water lily	1	-	-	1	1	-	-	-	-	-
Nuphar lutea (L.) Sm.	yellow water lily	-	2	2	1	3	1	1	1	-	-
PAPAVERACEAE											
Papaver rhoeas tp.	field poppy	-	5	-	-	-	-	-	52	-	7
P. argemone L.	long prickly headed poppy	1	2	-	-	-	-	-	8	1	1
P. somniferum L.	opium poppy	-	4	2	-	-	-	6	203	3	11
FUMARIACEAE											
Fumaria sp.	fumitory	-	1	-	1	-	-	-	-	-	1
CRUCIFERAE											
Brassica rapa L. ssp. *sylvestris* (L.) Jan.	wild turnip	3	2	1	1	-	-	1	3	-	-
Thlaspi arvense L.	field penny-cress	1	-	-	-	-	-	1	-	1	1
Capsella bursa-pastoris (L.) Med.	shepherd's purse	-	-	-	-	-	-	1	1	-	1
Barbarea vulgaris R. Br.	yellow rocket	1	1	-	1	-	-	1	2	1	-
Rorippa cf. amphibia (L.) Bes.	great yellow cress	6	4	2	-	9	-	41	11	-	16
Nasturtium microphyllum (Boen.) Reich.	watercress	-	-	-	-	-	-	-	-	-	1
Cruciferae indet.		-	-	1	-	-	-	-	-	-	-
VIOLACEAE											
Viola S. Viola sp.	violet	-	1	2	-	-	-	-	-	-	-
V. S. Melanium sp.	pansy	-	2	1	1	-	-	-	1	-	1
HYPERICACEAE											
Hypericum sp.	St John's wort	20	21	-	20	30	1	-	-	10	31
CARYOPHYLLACEAE											
Silene dioica (L.) Clairv.	red campion	-	2	1	-	-	-	-	-	-	-
S. cf. latifolia Poir.	white campion	-	-	-	-	-	-	-	-	-	1
Lychnis flos-cuculi L.	ragged robin	1	2	2	10	4	-	-	1	-	2
Cerastium cf. *fontanum* Baum.	mouse-ear chickweed	3	1	-	-	-	-	2	2	-	2
Myosoton aquaticum (L.) Moen.	water chickweed	7	36	7	5	9	1	5	20	22	42
Stellaria media gp	chickweed	3	10	4	6	1	-	2	19	6	121
S. cf. *neglecta* Weihe	greater chickweed	-	3	2	-	-	-	-	1	1	1
S. cf. *palustris* Retz.	marsh stitchwort	2	3	-	-	-	-	1	3	-	-
S. graminea L.	stitchwort	3	3	-	1	1	-	5	2	1	10
Moehringia trinervia (L.) Clairv.	three-nerved sandwort	-	-	1	1	-	-	-	1	-	-
Arenaria sp.	sandwort	31	20	-	-	10	-	-	12	-	12

Table 4.7 Waterlogged seeds (continued)

		Number of seeds									
		Column 4						*Column 1*			
	Sample (all 1.0 kg)	*32*	*31*	*30*	*29*	*28*	*27*	*3*	*2*	*1*	*21*
PORTULACACEAE											
Montia fontana L. ssp. chondrosperma (Fenz.) Walt.	blinks	-	2	-	-	-	-	-	-	-	-
CHENOPODIACEAE											
Chenopodium polyspermum L.	allseed	4	3	-	2	1	-	1	-	3	7
C. album L.	fat hen	12	15	16	8	1	-	46	182	18	80
C. ficifolium Sm.	fig-leaved goosefoot	-	-	-	-	-	-	-	-	-	4
C. cf. *rubrum* L.	red goosefoot	-	-	-	-	-	-	-	-	-	1
Atriplex sp.	orache	10	18	7	3	3	-	3	8	1	87
MALVACEAE											
Malva sylvestris L.	common mallow	-	-	-	-	-	-	-	-	-	1
LINACEAE											
Linum usitatissimum L.	flax	3	2	-	-	-	-	1	1	-	-
L. catharticum L.	fairy flax	4	3	11	8	2	-	2	3	-	4
ACERACEAE											
Acer campestre L.	field maple	-	-	2	1	-	-	-	-	-	-
RHAMNACEAE											
Rhamnus catharticus L.	purging buckthorn	-	1	-	-	-	-	-	1	-	-
ROSACEAE											
Filipendula ulmaria L.	meadowsweet	-	3	-	1	-	-	-	6	-	1
Rubus fruticosus agg.	blackberry	-	1	6	1	-	-	-	7	1	1
Potentilla anserina L.	silverweed	-	1	-	3	1	-	-	1	1	-
P. cf. *erecta* (L.) Räush.	tormentil	-	-	2	-	-	-	-	1	-	-
P. reptans L.	creeping cinquefoil	5	2	17	7	2	-	1	1	3	1
Aphanes arvensis L.	parsley piert	1	2	1	2	1	-	2	1	1	-
A. microcarpa (B. & R.) Roth.	parsley piert	1	1	1	1	-	-	1	2	1	2
Sanguisorba minor Scop.	salad burnet	1	1	4	-	-	-	-	1	-	2
Rosa sp.	rose	-	-	-	-	-	-	-	-	-	1
Crataegus cf. *monogyna* Jac.	hawthorn	5	9	4	4	1	-	6	10	-	-
Prunus spinosa L.	sloe	-	4	1	-	-	-	4	8	-	-
Prunus S. *Prunus* sp.	sloe or plum	-	1	-	-	-	-	-	-	-	-
LYTHRACEAE											
Lythrum salicaria L.	purple loosestrife	1	-	60	50	82	40	10	20	-	80
ONAGRACEAE											
Epilobium sp.	willowherb	5	2	2	1	-	-	-	-	-	2
HALORIGIDACEAE											
Myriophyllum sp.	water milfoil	3	-	3	1	-	-	-	-	-	-
HIPPURIDAE											
Hippuris vulgaris L.	mare's tail	1	-	-	2	-	-	-	-	-	1
CALLITRICHACEAE											
Callitriche sp.	starwort	-	-	-	1	-	-	-	-	-	-
CORNACEAE											
Cornus sanguinea L.	dogwood	-	-	3	-	1	-	-	2	-	-
UMBELLIFERAE											
Berula erecta (Huds.) Cov.	water parsnip	-	1	-	1	-	-	-	1	-	5
Oenanthe aquatica gp	water dropwort	2	4	9	5	7	5	13	18	4	4
Aethusa cynapium L.	fool's parsley	-	-	-	-	-	-	-	2	3	-
Conium maculatum L.	hemlock	-	-	-	-	-	-	-	1	1	-
Apium nodiflorum (L.) Lag.	fool's watercress	3	1	4	-	3	-	2	-	2	4
Torilis sp.	hedge parsley	-	-	-	-	1	-	-	-	-	2
Daucus carota L.	wild carrot	-	-	-	-	-	-	-	-	-	2

Table 4.7 *Waterlogged seeds (continued)*

		Number of seeds									
		Column 4						*Column 1*			
	Sample (all 1.0 kg)	*32*	*31*	*30*	*29*	*28*	*27*	*3*	*2*	*1*	*21*
EUPHORBIACEAE											
Mercurialis perennis L.	dog's mercury	-	-	-	-	-	-	-	1	-	-
POLYGONACEAE											
Polygonum aviculare agg.	knotgrass	3	3	4	3	2	-	1	4	-	8
P. persicaria L.	red shank	6	22	1	1	1	-	6	22	12	18
P. lapathifolium L.	pale persicaria	-	1	1	-	-	-	-	12	-	4
P. hydropiper L.	water pepper	5	4	3	-	-	-	2	4	-	-
Fallopia convolvulus (L.) Löv.	black bindweed	-	-	-	-	-	-	3	4	-	1
Rumex acetosella agg.	sheep's sorrel	-	2	-	-	-	-	3	2	3	5
R. hydrolapathum Huds.	great water dock	-	-	-	-	-	-	-	-	-	1
R. conglomeratus Mur.	sharp dock	8	14	32	15	12	-	32	28	-	20
Rumex spp.	dock	9	8	34	13	5	-	38	17	1	21
URTICACEAE											
Urtica urens L.	small nettle	-	1	-	-	-	-	-	-	1	2
U. dioica L.	stinging nettle	32	97	33	29	28	3	15	78	522	156
BETULACEAE											
Alnus glutinosa (L.) Gaert.	alder	4	6	5	9	10	1	-	4	-	-
CORYLACEAE											
Corylus avellana L.	hazel	-	1	1	-	1	-	1	1	1	-
FAGACEAE											
Quercus robur L. or *petraea* (Mat.) Lieb.	oak	-	-	-	-	-	-	-	-	1	-
PRIMULACEAE											
Lysimachia vulgaris L.	yellow loosestrife	-	-	1	-	-	-	-	-	-	-
MENYANTHACEAE											
Menyanthes trifoliata L.	bogbean	-	-	-	-	1	-	-	-	-	-
BORAGINACEAE											
Myosotis sp.	forget-me-not	-	2	2	1	4	-	1	2	-	5
SOLANACEAE											
Hyoscyamus niger L.	henbane	-	-	1	-	-	-	-	-	-	5
Solanum dulcamara L.	woody nightshade	1	2	3	-	1	1	-	-	2	2
S. nigrum L.	black nightshade	3	-	-	-	-	-	1	-	-	1
SCROPHULARIACEAE											
Linaria vulgaris Mill.	common toadflax	-	1	-	-	-	-	-	-	-	-
Scrophularia sp.	figwort	3	-	-	-	-	-	1	1	-	2
Veronica Sect. *Beccabunga* sp.	water speedwell	20	10	30	70	10	-	80	-	10	190
Odontites verna (Bell.) Dum.	red bartsia	-	-	-	-	-	-	-	1	-	-
VERBENACEAE											
Verbena officinalis L.	vervain	-	-	1	-	-	-	-	-	-	1
LABIATAE											
Mentha cf. *aquatica* L.	water mint	14	39	69	29	41	96	10	21	36	43
Lycopus europaeus L.	gipsy wort	2	4	3	3	6	-	3	8	64	3
Prunella vulgaris L.	selfheal	4	-	1	2	1	-	3	1	-	1
Stachys palustris L.	marsh woundwort	-	1	1	1	-	-	1	1	-	2
Ballota nigra L.	black horehound	-	-	-	-	-	-	-	1	-	1
Lamium sp.	dead-nettle	-	-	-	-	1	-	-	-	-	1
Galeopsis tetrahit agg.	hemp-nettle	-	1	1	-	-	-	1	1	1	2
Glechoma hederacea L.	ground ivy	-	1	2	2	2	-	-	3	1	-
Ajuga reptans L.	bugle	-	-	6	-	-	-	-	-	-	-
PLANTAGINACEAE											
Plantago major L.	great plantain	6	2	13	4	3	-	3	1	-	2

Table 4.7 Waterlogged seeds (continued)

		Number of seeds									
		Column 4						*Column 1*			
	Sample (all 1.0 kg)	*32*	*31*	*30*	*29*	*28*	*27*	*3*	*2*	*1*	*21*
RUBIACEAE											
Galium aparine L.	goosegrass	3	3	1	-	-	-	-	2	-	-
Galium sp.	bedstraw	9	22	1	-	1	-	3	7	1	1
CAPRIFOLIACEAE											
Sambucus nigra L.	elder	8	3	17	7	3	-	2	5	2	1
VALERIANACEAE											
Valerianella carinata Lois.	corn salad	-	-	1	-	-	-	-	2	-	-
V. dentata (L.) Pol.	corn salad	-	1	-	-	-	-	-	5	2	2
Valeriana sp.	valerian	-	1	-	-	1	-	-	1	-	1
COMPOSITAE											
Bidens cernua L.	bur-marigold	-	-	-	1	-	-	-	-	-	3
Eupatorium cannabinum L.	hemp agrimony	1	-	-	-	-	-	-	-	-	-
Senecio cf. *aquaticus* Hill	marsh ragwort	-	-	-	1	1	-	-	-	-	-
Leucanthemum vulgare Lam.	ox-eye daisy	2	1	1	-	-	-	-	-	-	-
Carduus sp.	thistle	1	5	5	1	2	-	-	2	-	8
cf. *Cirsium* sp.	thistle	1	2	1	-	2	-	1	-	1	-
Lapsana communis L.	nipplewort	-	4	-	-	-	-	-	1	-	2
Leontodon sp.	hawkbit	1	1	-	-	-	-	-	1	-	-
Sonchus oleraceus L.	sowthistle	-	-	-	-	-	-	-	1	-	-
S. asper (L.) Hill	sowthistle	-	4	1	2	1	1	3	-	1	2
ALISMATACEAE											
Alisma sp.	water plantain	7	8	66	30	32	14	11	41	1	55
Sagittaria sagittifolia L.	arrowhead	-	2	-	1	3	-	1	2	-	-
POTAMOGETONACEAE											
Potamogeton sp.	pondweed	18	3	12	6	6	1	1	2	1	-
ZANNICHELLIACEAE											
Zannichellia palustris L.		88	4	-	1	2	2	3	4	1	2
JUNCACEAE											
Juncus effusus gp	tussock rush	30	111	-	10	30	60	90	60	40	80
J. bufonius gp	toad rush	31	10	10	50	60	30	20	-	-	20
J. articulatus gp	rush	50	-	20	40	40	10	30	-	10	40
Juncus spp.	rush	10	-	10	30	20	20	-	-	40	20
IRIDACEAE											
Iris pseudacorus L.	yellow flag	-	-	-	-	2	2	-	1	-	2
LEMNACEAE											
Lemna sp.	duckweed	-	-	-	-	-	-	-	1	-	-
TYPHACEAE											
Typha sp.	reedmace	-	-	-	-	-	-	-	10	-	10
CYPERACEAE											
Eleocharis palustris (L.) R. & S. or *uniglumis* (Lin.) Sch.	spike rush	4	3	5	4	7	5	2	2	4	1
Scirpus sylvaticus L.	wood clubrush	-	-	-	-	10	-	-	-	-	-
Schoenoplectus lacustris (L.) Pal.	bulrush	114	112	217	122	14	2	38	43	13	25
Carex spp.	sedge	5	14	24	8	8	1	9	13	6	9
GRAMINEAE											
Glyceria sp.	reed-grass	-	-	1	1	4	-	-	-	-	2
Bromus S. *Eubromus* sp.	brome grass	13	17	-	-	-	-	-	-	-	-
Triticum dicoccum Shubl. or *spelta* L.	emmer or spelt wheat	-	-	-	-	-	-	2	-	-	-
Triticum sp.	wheat	-	-	-	-	-	-	-	1	-	-
Gramineae indet.	grass	2	4	1	1	13	1	-	1	-	3
Total		715	811	904	735	663	299	617	1074	881	1348

Table 4.8 Other waterlogged plant remains (excluding wood)

	Sample (all 1.0 kg)		Column 4: 32	31	30	29	28	27	Column 1: 3	2	1	21
			Number of items or presence									
Chara sp.	- oospore		2115	240	52	1351	30	60	90	21	10	200
Bryophyta indet.	- stem with leaves	moss	+	+	+	+	+	-	+	+	+	+
Pteridium aquilinum (L.) Kuhn	- frond fragment	bracken	3	3	-	-	-	-	8	5	-	2
Linum usitatissimum L.	- capsule	flax	1	1	-	-	-	-	-	5	-	1
Trifolium sp.	- flower	clover	1	-	-	-	-	-	-	-	-	-
Rubus sp.	- prickle	blackberry	-	-	-	-	-	-	1	-	-	-
Rosa sp.	- prickle	rose	-	-	-	-	-	-	-	1	-	-
Malus sp.	- endocarp fragment	apple	-	1	-	-	-	-	-	-	-	-
Prunus / Crataegus tp.	- thorn	sloe or hawthorn	3	9	2	-	-	-	17	6	-	1
Rumex sp.	- stem with peduncles	dock	-	-	1	-	-	-	-	2	-	-
Alnus glutinosa (L.) Gaert.	- female catkin	alder	-	-	4	2	-	-	-	4	-	-
A. glutinosa (L.) Gaert.	- female catkin scale	alder	-	3	-	-	-	-	-	-	-	-
A. glutinosa (L.) Gaert.	- bud scale	alder	-	2	-	-	1	-	1	-	-	3
A. glutinosa (L.) Gaert.	- mite gall	alder	-	-	-	-	2	-	-	-	-	-
Quercus sp.	- bud scale	oak	-	-	-	5	-	-	-	-	-	-
Triticum dicoccum Shubl.	- glume	emmer wheat	-	1	-	-	-	-	-	-	-	-
T. spelta L.	- glume	spelt wheat	-	-	-	-	-	-	1	2	-	2
T. dicoccum Shubl. or *spelta* L.	- glume	emmer or spelt wheat	1	1	-	-	-	-	-	5	-	-
Bud scale indet.			4	5	11	-	2	-	4	3	1	-
Leaf abscission pad			-	1	1	1	-	-	2	2	-	1
Deciduous leaf fragment			-	-	1	1	-	-	2	-	-	-

Table 4.9 Waterlogged wood

Sample (all 1.0 kg)		Column 4: 31	30	29	Column 1: 3	2	1	21
		Presence						
Rhamnus catharticus L.	purging buckthorn	-	-	-	+	-	-	-
Prunus sp.	sloe etc.	+	-	-	+	-	-	-
Pomoideae indet.	hawthorn, apple etc.	-	-	-	+	+	-	-
Alnus glutinosa (L.) Gaert.	alder	+	-	-	+	+	-	-
Corylus avellana L.	hazel	+	-	-	+	-	+	-
Quercus sp.	oak	+	+	+	+	+	+	+

Table 4.10 Charred plant remains (excluding charcoal)

								Number of items						
		Column 4		*Column 1*										
	Sample	*31*	*30*	*3*	*2*	*1*	*21*	*5*	*51*	*94*	*93*	*95*	*92*	*52*
	Sample weight (kg)	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*							
	or volume (litres)							*2.0*	*2.0*	*8.0*	*8.0*	*8.0*	*8.0*	*8.0*
Cereal grain														
Triticum dicoccum Shubl.	emmer wheat	-	-	-	-	2	-	5	-	-	-	-	-	-
T. spelta L.	spelt wheat	3	-	-	-	-	-	3	-	1	-	-	-	1
T. dicoccum Shubl. or *spelta* L.	emmer or spelt wheat	2	1	-	2	5	-	8	1	-	-	2	2	
Triticum sp. - short free-threshing grain	rivet or bread wheat	-	-	-	-	-	-	-	-	1	-	-	-	-
Triticum sp.	wheat	-	-	-	2	3	2	10	2	1	-	2	2	-
Hordeum vulgare L. - hulled lateral grain	six-row hulled barley	-	-	-	1	2	-	1	-	-	-	-	-	-
H. vulgare L. - lateral grain	six-row barley	-	-	-	1	-	-	1	-	-	-	1	-	1
Hordeum sp. - hulled median grain	hulled barley	-	-	-	1	3	-	2	1	-	-	-	-	1
Hordeum sp. - median grain	barley	-	-	-	-	-	-	1	1	-	-	-	-	-
Hordeum sp. - hulled grain	hulled barley	1	-	-	-	6	-	10	1	-	-	-	1	1
Hordeum sp.	barley	1	-	-	2	2	-	22	2	-	-	-	1	-
cereal indet.		1	1	1	4	10	2	56	9	3	2	10	8	3
Total cereal grain		8	2	1	13	33	4	119	17	6	2	15	14	7
Cereal chaff														
Triticum dicoccum Shubl. - glume base	emmer wheat	1	-	-	-	2	2	13	1	2	-	1	-	-
T. spelta L. - glume base	spelt wheat	11	1	-	6	17	-	29	9	-	-	-	-	-
T. dicoccum Shubl. or *spelta* L. - glume base	emmer or spelt wheat	9	3	-	1	21	13	35	8	-	-	-	-	-
Triticum sp. - awn fragment	wheat	4	-	-	5	-	-	1	5	-	-	-	-	-
Hordeum sp. - rachis	six-row barley	-	-	-	-	-	-	1	-	-	-	-	-	-
Hordeum sp.- rachis	barley	1	-	-	-	6	-	4	-	-	-	-	-	-
Secale or *Hordeum* sp. - rachis	rye or barley	-	-	-	-	-	-	2	-	-	-	-	-	-
Total chaff excluding awn fragments		22	4	0	7	46	15	84	18	2	0	1	0	0
Other food plant seeds / nuts														
Linum usitatissimum L.	flax	-	1	-	-	-	-	-	2	-	-	-	-	-
Corylus avellana L.	hazel	-	-	-	-	-	-	-	-	-	-	-	-	1
Weed seeds														
Ranunculus cf. *repens* L.	creeping buttercup	-	-	-	-	1	-	2	-	-	-	-	-	-
Papaver somniferum L.	opium poppy	1	-	-	-	-	-	-	-	-	-	-	-	-
Thlaspi arvense L.	field pennycress	-	-	-	-	-	-	1	-	-	-	-	-	-
Silene sp.	campion	-	-	-	-	-	-	1	-	-	-	-	-	-
Cerastium cf. *fontanum* Baum.	mouse-ear chickweed	1	-	-	-	-	-	-	-	-	-	-	-	-
Stellaria media gp	chickweed	-	-	-	-	-	-	2	-	-	-	-	-	-
S. graminea L.	stitchwort	-	-	-	-	-	-	4	1	-	-	-	-	-

Table 4.10 (continued) Charred plant remains (excluding charcoal)

		Number of items												
		Column 4		*Column 1*										
	Sample	*31*	*30*	*3*	*2*	*1*	*21*	*5*	*51*	*94*	*93*	*95*	*92*	*52*
	Sample weight (kg)	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*							
	or volume (litres)							*2.0*	*2.0*	*8.0*	*8.0*	*8.0*	*8.0*	*8.0*
Chenopodium polyspermum L.	allseed	-	-	-	-	-	-	3	-	-	-	-	-	-
C. album L.	fat hen	-	-	-	1	2	-	21	2	1	-	-	-	3
Atriplex sp.	orache	-	-	-	-	-	-	2	-	-	-	-	-	-
Chenopodiaceae indet.		-	-	-	-	-	-	4	-	-	-	-	-	-
Linum catharticum L.	fairy flax	-	-	-	-	-	-	1	-	-	-	-	-	-
Vicia or *Lathyrus* sp.	vetch or tare	1	-	-	-	-	-	-	1	-	-	-	-	-
cf. *Medicago lupulina* L.	black medick	-	-	-	-	-	-	1	-	-	-	-	-	-
cf. *Trifolium* sp.	clover	-	-	-	-	3	-	13	-	-	-	-	-	-
Potentilla reptans L.	creeping cinquefoil	-	-	-	-	-	-	1	-	-	-	-	-	-
Crataegus cf. *monogyna* Jac.	hawthorn	-	-	-	-	1	-	-	-	-	-	-	-	-
Prunus spinosa L.	sloe	-	-	-	-	-	-	1	-	-	-	-	-	-
Polygonum aviculare agg.	knotgrass	-	-	-	-	-	-	1	-	-	-	-	-	-
Rumex acetosella agg.	sheep's sorrel	-	-	-	-	1	-	1	-	-	-	-	-	-
Odontites verna (Bell.) Dum.	red bartsia	1	-	-	-	-	-	-	-	-	-	-	-	-
Lycopus europaeus L.	gipsywort	-	-	-	-	1	-	-	-	-	-	-	-	-
Prunella vulgaris L.	selfheal	-	-	-	-	-	-	3	-	-	-	-	-	-
Plantago media L. or *lanceolata* L.	plantain	-	-	-	-	-	-	2	1	-	-	-	-	-
Valerianella dentata (L.) Pol.	corn salad	-	-	-	-	-	-	2	-	-	-	-	-	-
Sonchus asper (L.) Hill	sowthistle	1	-	-	-	-	-	-	-	-	-	-	-	-
Schoenoplectus lacustris (L.) Pal.	bulrush	-	-	-	-	-	-	1	-	-	-	-	-	-
Carex spp.	sedge	-	-	-	-	1	-	5	-	-	-	-	-	-
Bromus S. *Eubromus* sp.	brome grass	12	2	-	5	5	3	2	21	-	-	-	-	1
Gramineae indet.	grass	2	-	-	-	-	-	12	-	-	-	-	-	-
weed seeds indet.		5	-	-	1	2	2	26	7	-	-	-	-	-
Total weed seeds		24	2	0	7	17	5	112	35	1	0	0	0	4
Concentration of remains/litre or /kg (excluding awns)		54.0	9.0	1.0	27.0	96.0	24.0	157.5	35.0	1.1	0.3	2.0	1.8	1.5

Table 4.11 Charcoal

		Presence							
		Column 4			*Column 1*				
	Sample	*31*	*30*	*29*	*2*	*1*	*21*	*5*	*51*
	Sample weight (kg)	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*		
	or volume (litres)							*2.0*	*2.0*
Pomoideae indet.	hawthorn, apple etc.	-	-	-	+	-	++	-	-
Corylus avellana L.	hazel	+++	++	-	+	+++	-	++++	++++
Quercus sp.	oak	-	-	+	-	-	-	-	+
Fraxinus excelsior L.	ash	-	-	+	-	+	+	-	-

+ present, ++ some, +++ much, ++++ very much

Table 4.12 Coleoptera

	Minimum no. of individuals										*Species group*
	Column 4						*Column 1*				
Sample	*32*	*31*	*30*	*29*	*28*	*27*	*3*	*2*	*1*	*21*	
Sample weight (kg)	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*4.0*	*10.0*	*6.0*	*4.0*	
CARABIDAE											
Nebria brevicollis (F.)	-	-	-	-	-	1	-	1	-	-	
Dyschirius globosus (Hbst.)	-	1	-	-	1	-	-	-	-	-	
Clivina collaris (Hbst.) or *fossor* (L.)	1	-	-	-	-	-	1	1	1	-	
Patrobus atrorufus (Ström)	-	-	-	-	-	-	-	2	-	-	
Trechus obtusus Er. or *quadristriatus* (Schr.)	-	-	1	-	-	-	-	-	-	-	
T. secalis (Pk.)	-	-	-	-	-	-	-	1	-	-	
Bembidion lampros (Hbst.)	-	1	-	-	-	-	-	-	-	-	
B. tetracolum Say	-	-	-	-	-	-	2	1	1	-	
B. gilvipes Sturm	1	-	1	1	1	-	1	5	4	1	
B. assimile Gyl.	-	-	-	-	-	-	2	1	2	-	
B. biguttatum (F.)	-	-	-	-	-	-	1	2	1	-	
B. guttula (F.)	-	-	-	-	-	-	-	5	3	1	
Pterostichus cupreus (L.)	1	-	-	-	1	-	-	-	-	-	
P. gracilis (Dej.)	-	-	-	-	-	-	1	1	-	1	
P. melanarius (Ill.)	-	-	-	1	1	-	-	1	1	-	
P. cf. *minor* (Gyl.)	-	-	-	-	-	-	-	-	2	-	
P. nigrita (Pk.)	-	-	1	-	-	-	-	2	-	1	
P. strenuus (Pz.)	-	-	-	-	-	-	1	4	2	-	
P. vernalis (Pz.)	-	-	-	-	-	-	-	1	-	-	
P. cupreus (L.) or *versicolor* (Sturm)	-	-	1	-	-	-	-	1	-	-	
Calathus fuscipes (Gz.)	1	-	-	-	1	-	-	1	-	-	
Synuchus nivalis (Pz.)	-	1	1	-	-	-	-	-	-	-	
Agonum fuliginosum (Pz.)	-	-	-	-	-	-	1	2	-	-	
A. gracile Sturm	-	1	-	-	-	-	-	1	-	1	
A. marginatum (L.)	-	-	-	-	-	-	-	1	-	-	
A. muelleri (Hbst.)	-	-	-	-	-	-	1	1	-	-	
A. piceum (L.)	1	-	-	-	-	-	-	-	-	-	
Amara sp.	-	-	1	-	1	-	1	1	-	1	
Harpalus S. *Ophonus* sp.	-	-	-	-	-	-	-	1	-	-	
H. affinis (Schr.)	-	-	-	-	-	-	-	1	-	-	
H. rubripes (Duft.)	1	-	-	-	-	-	-	-	-	-	
Bradycellus sp.	-	1	-	-	-	-	-	-	-	-	
Badister bipustulatus (F.)	-	-	-	-	-	-	-	1	1	-	
Dromius linearis (Ol.)	-	-	-	-	-	-	-	1	-	-	
Drypta dentata (Ros.)	-	-	-	-	-	-	-	1	-	-	
HALIPLIDAE											
Haliplus sp.	-	-	-	-	-	-	-	1	-	-	1
DYTISCIDAE											
Hygrotus versicolor (Schal.)	-	-	-	-	-	-	-	1	-	-	1
Hydroporus sp.	-	-	-	-	-	-	-	1	-	-	1
Potamonectes depressus (F.)	-	-	-	-	-	-	-	1	-	-	1
Agabus bipustulatus (L.)	-	-	-	-	-	-	-	1	-	-	1
Agabus sp. (not *bipustulatus*)	-	-	-	1	-	-	1	-	1	-	1
Rhantus sp.	1	-	-	-	-	-	-	-	-	-	1
Colymbetes fuscus (L.)	-	-	-	-	-	-	1	1	-	-	1
GYRINIDAE											
Gyrinus sp.	-	-	-	-	1	-	1	1	-	-	1
Orectochilus villosus (Müll.)	-	-	-	1	1	-	1	1	-	-	1

Table 4.12 Coleoptera (continued)

	Minimum no. of individuals										*Species group*
	Column 4						*Column 1*				
Sample	*32*	*31*	*30*	*29*	*28*	*27*	*3*	*2*	*1*	*21*	
Sample weight (kg)	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*4.0*	*10.0*	*6.0*	*4.0*	
HYDROPHILIDAE											
Helophorus aquaticus (L.)	-	-	-	-	-	-	-	2	-	-	1
H. grandis Ill.	-	-	-	-	-	-	-	1	1	-	1
H. aquaticus (L.) or *grandis* Ill.	-	1	-	-	-	-	1	-	-	1	1
Helophorus spp. (*brevipalpis* size)	-	-	1	-	-	-	1	15	1	2	1
Coelostoma orbiculare (F.)	-	-	1	-	1	-	-	-	-	-	1
Sphaeridium bipustulatum F.	-	-	-	-	-	-	-	-	-	1	
Cercyon analis (Pk.)	-	1	-	-	-	-	1	22	9	-	7
C. atricapillus (Marsh.)	-	-	-	-	-	-	-	-	-	1	7
C. haemorrhoidalis (F.)	1	3	-	1	1	-	2	10	2	-	7
C. pygmaeus (Ill.)	-	-	-	-	-	-	-	-	1	-	7
C. cf. *sternalis* Sharp.	-	-	-	-	1	-	-	-	2	-	7
C. cf. tristis (Ill.)	-	-	-	1	-	-	-	1	-	-	7
C. unipunctatus (L.)	-	-	-	-	-	-	-	2	-	-	7
Cercyon sp.	-	-		-	-	-	1	-	-	1	7
Megasternum obscurum (Marsh.)	3	3	1	2	1	1	1	17	11	2	7
Cryptopleurum minutum (F.)	-	-	-	-	-	-	-	1	1	1	7
Hydrobius fuscipes (L.)	-	-	1	-	-	-	-	1	-	2	1
Anacaena bipustulata (Marsh.) or *limbata* (F.)	-	1	-	-	-	1	-	2	1	1	1
Laccobius sp.	-	-	1	-	-	-	-	1	-	-	1
Chaetarthria seminulum (Hbst.)	1	-	-	-	-	-	-	-	-	1	1
HISTERIDAE											
Hister bissexstriatus F.	-	-	-	-	-	-	-	2	-	-	
Histerinae indet.	-	-	-	-	-	-	-	1	-	-	
HYDRAENIDAE											
Ochthebius bicolon Germ.	-	-	-	-	-	-	-	3	-	-	1
O. cf. *bicolon* Germ.	-	-	-	-	-	-	2	16	2	1	1
O. minimus (F.)	-	-	1	-	-	-	1	12	-	2	1
O. cf. *minimus* (F.)	1	-	-	-	1	-	3	53	2	2	1
Hydraena pulchella Germ.	-	-	-	-	-	-	2	4	-	-	1
H. riparia Kug.	-	-	-	-	-	-	2	16	2	1	1
H. testacea Curt.	-	-	-	-	-	-	-	2	-	-	1
Hydraena sp.	1	1	-	-	-	-	-	-	-	-	1
Limnebius papposus Muls.	-	-	1	-	-	-	-	1	-	-	1
PTILIIDAE											
Ptenidium sp.	-	-	-	-	-	-	-	-	1	-	
Ptiliidae indet. (not *Ptenidium*)	-	1	-	2	2	-	-	1	2	-	
LEIODIDAE											
Choleva or *Catops* sp.	-	1	-	-	1	-	-	-	1	-	
SILPHIDAE											
Aclypea opaca (L.)	-	1	-	-	-	-	1	-	-	-	
Silpha atrata L.	-	-	1	-	-	-	1	1	1	-	
S. tristis Ill.	-	-	1	-	-	-	-	-	-	-	
SCYDMAENIDAE											
Scydmaenidae indet.	-	-	-	-	-	-	-	1	-	-	

Table 4.12 Coleoptera (continued)

	Minimum no. of individuals										*Species group*
	Column 4						*Column 1*				
Sample	*32*	*31*	*30*	*29*	*28*	*27*	*3*	*2*	*1*	*21*	
Sample weight (kg)	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*4.0*	*10.0*	*6.0*	*4.0*	
STAPHYLINIDAE											
Micropeplus porcatus (Pk.)	-	-	-	-	-	-	-	1	-	-	
Metopsia retusa (Step.)	-	-	-	-	-	-	-	1	-	-	
Anthobium sp.	-	-	-	-	-	-	-	1	-	-	
Olophrum cf. *fuscum* (Grav.)	-	-	-	-	-	-	1	4	1	-	
O. cf. *piceum* (Gyl.)	1	3	-	-	-	-	-	-	2	-	
Acidota cruentata Man.	-	-	-	-	-	-	-	1	-	-	
Lesteva longoelytrata (Gz.)	1	2	-	-	-	-	-	-	-	-	
Bledius sp.	-	-	-	1	-	-	-	1	-	-	
Carpelimus bilineatus Step.	-	-	-	-	-	-	1	5	27	1	
C. cf. *corticinus* (Grav.)	-	-	-	-	-	-	-	1	4	1	
C. rivularis (Mots.)	-	-	-	-	-	-	-	3	1	-	
Platystethus arenarius (Fouc.)	-	2	-	-	-	-	-	1	1	-	7
P. cornutus gp	-	-	-	-	-	-	-	1	1	-	
Anotylus nitidulus (Grav.)	-	-	2	-	-	-	-	5	3	-	
A. rugosus (F.)	1	2	1	1	-	-	3	9	5	-	7
A. sculpturatus gp	-	1	-	-	-	-	-	1	-	-	7
Oxytelus sculptus Grav.	-	-	-	-	-	-	2	11	29	-	
Stenus bimaculatus Gyl.	-	-	-	-	-	-	1	-	-	-	
Stenus sp.	1	2	2	1	-	-	-	-	-	-	
Paederus littoralis Grav.	-	-	-	-	-	-	-	3	-	-	
Lathrobium longulum Grav.	-	-	-	-	-	-	-	-	1	-	
Lathrobium sp. (not *longulum*)	2	-	1	-	1	1	-	5	2	1	
Rugilus orbiculatus (Pk.)	-	-	-	-	-	-	-	-	-	1	
Othius laeviusculus Step.	-	-	-	-	-	-	1	-	-	-	
Leptacinus batychrus (Gyl.)	-	-	-	-	-	-	-	-	-	1	
L. pusillus (Step.)	-	-	-	-	-	-	-	-	1	-	
Gyrohypnus fracticornis (Müll.) or *punctulatus* (Pk.)	1	1	-	-	-	-	-	3	6	1	
Xantholinus linearis (Ol.)	-	-	-	-	2	-	-	2	-	-	
X. linearis (Ol.) or *longiventris* Heer	1	1	-	1	-	-	-	3	-	-	
Erichsonius cinerascens (Grav.)	-	-	-	-	-	-	-	2	-	-	
Philonthus spp.	1	3	2	-	-	-	1	4	4	1	
Creophilus maxillosus (L.)	-	-	-	-	-	-	-	1	-	-	
Mycetoporus sp.	1	-	-	-	-	-	-	-	-	-	
Tachyporus sp.	-	-	1	1	2	-	1	-	2	-	
Tachinus sp.	2	1	-	1	1	1	1	2	2	-	
Aleocharinae indet.	-	2	1	1	3	-	4	12	6	1	
PSELAPHIDAE											
Pselaphidae indet.	-	-	-	-	-	-	1	1	1	-	
GEOTRUPIDAE											
Geotrupes sp.	1	1	1	1	1	-	-	1	1	1	2
SCARABAEIDAE											
Colobopterus erraticus (L.)	-	-	-	-	-	-	2	1	-	-	2
Aphodius ater (Deg.)	-	-	-	-	-	-	1	1	-	-	2
A. contaminatus (Hbst.)	-	-	-	-	1	-	-	-	-	-	2
A. cf. *foetens* (F.)	-	-	-	-	-	-	-	1	-	-	2
A. granarius (L.)	-	-	-	-	-	-	2	-	1	-	2
A. luridus (F.)	1	1	-	-	-	-	-	1	-	-	2
A. pusillus (Hbst.)	1	-	-	1	1	-	1	5	-	-	2

Table 4.12 Coleoptera (continued)

	Minimum no. of individuals										Species group
	Column 4						Column 1				
Sample	*32*	*31*	*30*	*29*	*28*	*27*	*3*	*2*	*1*	*21*	
Sample weight (kg)	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*4.0*	*10.0*	*6.0*	*4.0*	
A. rufipes (L.)	-	-	-	1	-	-	-	-	-	-	2
A. cf. *sphacelatus* (Pz.)	2	2	2	2	3	-	1	5	5	2	2
A. varians Duft.	-	-	-	-	1	-	-	-	-	-	2
Aphodius spp.	2	3	2	-	-	1	2	6	2	-	2
Onthophagus ovatus (L.)	2	1	1	3	-	-	-	2	2	-	2
Onthophagus sp. (not *ovatus*)	1	-	1	-	1	-	-	1	1	-	2
Amphimallon solstitialis (L.)	1	-	-	-	-	-	-	-	-	-	
Phyllopertha horticola (L.)	2	1	2	2	2	-	1	2	1	1	11
Cetonia aurata (L.)	-	-	-	-	-	-	-	1	-	1	
SCIRTIDAE											
cf. *Cyphon* sp.	-	-	-	-	-	-	-	2	-	-	
BYRRHIDAE											
Byrrhus sp.	-	-	-	1	-	-	-	-	-	-	
HETEROCERIDAE											
Heterocerus sp.	1	-	-	-	-	-	-	-	-	-	
DRYOPIDAE											
Helichus substriatus (Müll.)	-	-	-	1	-	-	1	-	-	-	1
Dryops sp.	-	-	2	1	1	-	-	2	1	-	1
ELMIDAE											
Elmis aenea (Müll.)	-	-	-	-	-	-	-	2	-	-	1
Esolus parallelepipedus (Müll.)	-	1	-	1	-	-	3	4	1	1	1
Limnius volckmari (Pz.)	-	1	-	-	-	-	2	2	1	-	1
Macronychus quadrituberculatus Müll.	-	-	-	-	-	-	-	1	-	-	1
Normandia nitens (Müll.)	2	-	-	-	-	-	2	1	1	1	1
Oulimnius sp.	2	1	3	-	4	-	12	31	9	2	1
Stenelmis canaliculata (Gyl.)	-	-	1	1	-	-	1	4	3	-	1
ELATERIDAE											
Agrypnus murinus (L.)	1	1	1	-	1	-	2	1	1	-	11
Athous hirtus (Hbst.)	1	-	-	-	-	-	-	1	-	-	11
Agriotes obscurus (L.)	-	-	1	-	-	-	-	-	-	-	11
A. sputator (L.)	-	-	-	-	-	-	-	1	-	-	11
Agriotes sp.	1	-	-	-	-	-	1	-	-	-	11
Synaptus filiformis (F.)	-	-	-	-	-	-	1	-	-	-	
CANTHARIDES											
Cantharis sp.	1	-	-	-	-	-	-	1	-	-	
ANOBIIDAE											
Grynobius planus (F.)	1	-	-	-	-	-	-	1	1	-	4
Anobium punctatum (F.)	-	-	-	-	-	-	1	-	-	-	10
NITIDULIDAE											
Brachypterus urticae (F.)	-	-	-	1	-	-	-	1	-	-	
Brachypterolus pulicarius (L.)	1	-	-	-	-	-	-	1	-	-	
Pria dulcamara (Scop.)	-	-	-	-	-	-	-	1	-	-	
Meligethes sp.	-	-	-	-	-	-	-	1	-	-	

Table 4.12 Coleoptera (continued)

	Minimum no. of individuals										*Species group*
	Column 4						*Column 1*				
Sample	*32*	*31*	*30*	*29*	*28*	*27*	*3*	*2*	*1*	*21*	
Sample weight (kg)	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*4.0*	*10.0*	*6.0*	*4.0*	
RHIZOPHAGIDAE											
Monotoma sp.	-	-	-	-	-	-	-	1	2	-	
CRYPTOPHAGIDAE											
Cryptophagidae indet. (not *Atomaria*)	-	-	-	-	-	-	1	3	1	-	
Atomaria sp.	-	-	-	-	1	-	1	2	3	-	
CORYLOPHIDAE											
Corylophus cassidoides (Marsh.)	-	-	-	-	1	-	-	2	1	1	
Orthoperus sp.	-	1	-	-	-	-	-	1	-	-	
COCCINELLIDAE											
Anisosticta novemdecimpunctata (L.)	-	-	-	-	-	-	-	-	1	-	
Tytthaspsis sedecimpunctata (L.)	-	-	-	-	-	1	-	-	-	-	
LATHRIDIIDAE											
Lathridius minutus gp	-	-	-	-	-	-	-	2	7	-	8
Enicmus transversus (Ol.)	-	-	-	-	-	-	-	1	-	-	8
Corticaria punctulata Marsh.	-	-	-	-	-	-	2	1	-	-	8
Corticariinae indet.	-	-	-	1	-	-	1	7	2	1	8
CISIDAE											
Cis sp.	-	-	-	-	-	-	-	1	-	-	4
TENEBRIONIDAE											
Opatrum sabulosum (L.)	-	-	-	-	1	-	-	-	-	-	
ANTHICIDAE											
Anthicus formicarius (Gz.)	-	-	-	-	-	-	-	3	-	-	
BRUCHIDAE											
Bruchus or *Bruchidius* sp.	-	-	-	-	-	-	-	1	-	-	
CHRYSOMELIDAE											
Macroplea appendiculata (Pz.)	-	-	-	-	-	-	-	1	-	-	5
Donacia cinerea Hbst.	-	1	-	-	-	-	1	-	-	-	5
D. clavipes F.	-	-	-	1	-	-	-	1	1	-	5
D. dentata Hoppe	-	-	-	-	-	-	-	-	-	1	5
D. impressa Pk.	-	1	1	1	2	-	2	5	2	2	5
D. versicolorea (Brahm)	-	-	-	1	-	-	-	-	-	-	5
D. vulgaris Zsch.	-	-	-	-	-	-	-	1	-	-	5
Plateumaris affinis (Kunze)	-	-	-	-	-	-	1	1	1	-	5
Donacia or *Plateumaris* sp.	1	1	1	-	-	1	-	-	-	1	5
Chrysolina cf. *graminis* (L.)	-	-	-	-	-	-	-	1	-	-	
C. polita (L.)	-	-	-	-	-	-	-	1	-	1	
Gastrophysa polygoni (L.)	-	-	-	-	-	1	-	-	-	-	
G. viridula (Deg.)	-	-	-	-	-	-	-	1	-	-	
Phaedon sp. (not *tumidulus*)	-	-	-	-	-	-	1	1	-	-	
Prasocuris phellandrii (L.)	-	-	-	-	-	-	1	-	-	-	5
Galerucella calmariensis (L.)	-	-	-	-	-	-	-	1	-	-	5
Phyllotreta atra (F.)	-	-	-	-	-	-	-	1	-	-	
P. ochripes (Curt.)	-	-	-	-	-	-	-	1	-	-	
P. nemorum (L.) or *undulata* Kuts.	-	-	-	-	-	-	-	1	-	-	
P. vittula Redt.	1	-	-	1	1	-	1	1	-	-	
Aphthona nonstriata (Gz.)	-	1	-	-	-	-	-	5	1	1	5

Table 4.12 Coleoptera (continued)

	Minimum no. of individuals										*Species group*
	Column 4						*Column 1*				
Sample	*32*	*31*	*30*	*29*	*28*	*27*	*3*	*2*	*1*	*21*	
Sample weight (kg)	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*4.0*	*10.0*	*6.0*	*4.0*	
Longitarsus spp.	2	1	-	2	1	-	-	8	-	-	
Altica sp.	1	-	-	-	-	-	2	2	-	-	
Crepidodera ferruginea (Scop.)	1	-	1	-	-	-	-	-	-	-	
Chalcoides sp.	-	-	-	-	-	-	-	-	1	-	4
Chaetocnema concinna (Marsh.)	1	1	1	-	-	-	2	4	1	-	
Chaetocnema sp. (not concinna)	-	-	1	1	-	-	-	3	-	-	
Psylliodes sp.	-	-	-	-	1	-	-	1	-	-	
APIONIDAE											
Apion aeneum (F.)	-	-	-	-	-	-	1	-	-	1	
Apion spp.	2	2	3	2	1	-	4	8	4	-	3
CURCULIONIDAE											
Otiorhynchus ligustici (L.)	-	-	-	-	-	-	1	-	-	1	
O. ovatus (L.)	-	-	-	-	-	-	-	-	-	1	
Phyllobius roboretanus Gred. or *viridiaeris* (Laich.)	-	-	-	-	-	-	1	-	-	1	
Phyllobius sp.	1	-	-	-	-	-	-	1	-	1	
Polydrusus sp.	-	-	-	-	-	-	-	1	1	-	4
Barypeithes araneiformis (Schr.)	1	-	-	-	-	-	-	1	-	-	
Sciaphilus asperatus (Bons.)	-	-	-	1	-	-	-	1	-	-	
Barynotus obscurus (F.)	-	-	2	-	1	-	-	-	1	1	
Sitona cf. *hispidulus* (F.)	1	-	-	-	-	-	-	1	-	-	3
Sitona sp.	1	-	-	1	1	-	-	-	1	-	3
Hypera punctata (F.)	-	-	1	1	1	-	1	1	-	-	
Hypera sp. (not *punctata*)	-	-	-	1	-	-	-	-	-	-	
Alophus triguttatus (F.)	1	-	-	-	1	1	-	1	1	1	
Tanysphyrus lemnae (Pk.)	-	-	-	-	-	-	1	-	-	-	5
Acalles turbatus Boh.	-	1	-	-	-	-	1	-	-	-	4
Bagous sp.	-	1	-	-	-	-	2	16	3	-	5
Notaris acridulus (L.)	-	-	-	-	1	-	-	1	1	-	5
N. bimaculatus (F.) or *scirpi* (F.)	-	-	-	-	-	-	-	-	1	-	5
Grypus equiseti (F.)	-	-	-	1	-	-	-	-	-	-	5
Cidnorhinus quadrimaculatus (L.)	-	-	-	-	-	-	-	-	1	-	
Ceuthorhynchidius troglodytes (F.)	-	1	-	1	-	-	-	-	-	-	
Ceutorhynchus cf. *angulosus* Boh.	-	-	-	-	-	-	-	1	-	-	
Ceuthorhynchinae indet.	-	-	1	-	-	-	5	1	4	-	
Anthonomus brunnipennis (Curt.)	-	-	-	-	-	-	-	1	-	-	
A. cf. *pedicularius* (L.)	-	-	-	-	-	-	-	1	-	-	4
A. cf. *rubi* (Hbst.)	-	-	-	-	-	1	-	-	-	-	
Curculio cf. *nucum* L.	-	-	-	-	-	-	-	1	-	-	4
Tychius sp.	-	-	-	1	1	-	1	2	1	-	
Miccotrogus picirostris (F.)	-	-	-	-	-	-	-	1	-	-	
Mecinus pyraster (Hbst.)	-	-	1	1	1	-	-	-	1	1	
Gymnetron labile (Hbst.)	-	1	-	-	-	-	1	1	1	-	
G. pascuorum (Gyl.)	1	-	-	-	-	-	-	1	-	-	
G. rostellum (Hbst.)	-	-	-	-	-	-	-	1	-	-	
G. veronicae (Germ.)	-	-	-	-	-	-	-	1	1	-	5
SCOLYTIDAE											
Scolytus intricatus (Ratz.)	-	-	-	-	1	-	-	-	-	-	4
Leperisinus varius (F.)	-	-	-	-	-	-	-	1	-	-	4
Total	65	64	55	51	59	10	123	517	235	58	

For Key to species groups see *Figure 4.5*

Table 4.13 Other insects

		Minimum no. of individuals or presence									
		Column 4						*Column 1*			
Sample		*32*	*31*	*30*	*29*	*28*	*27*	*3*	*2*	*1*	*21*
Sample weight (kg)		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*4.0*	*10.0*	*6.0*	*4.0*
DERMAPTERA											
Labia minor (L.)		-	-	-	-		-	-	-	1	-
Forficula auricularia L.		-	-	-	-	-	-	-	1	-	-
HEMIPTERA											
Pentatoma rufipes (L.)		-	-	1	-	-	-	-	-	-	-
Heterogaster urticae (F.)		-	-	-	-	-	-	-	-	1	-
Drymus sylvaticus (F.)		-	-	-	-	-	-	-	1	-	-
Tingidae indet.		-	-	-	-	-	-	-	1	-	-
Anthocorinae indet.		-	-	-	-	-	-	-	1	-	-
Saldula S. *Saldula* sp.		-	-	-	-	1	-	1	2	-	-
Gerris sp.		-	-	-	-	-	-	1	5	-	-
Heteroptera indet.		-	-	1	-	-	-	-	-	1	-
Aphrodes bicinctus (Schr.)		1	-	2	-	1	-	3	1	1	-
A. flavostriatus (Don.)		-	1	-	-	-	-	-	1	1	-
Aphrodes sp.		-	-	1	2	-	-	-	1	-	-
Aphidoidea indet.		-	-	-	-	-	-	-	-	-	1
Homoptera indet.		-	-	-	-	-	1	-	-	-	-
TRICHOPTERA											
Ithytrichia lamellaris Eat. or *clavata* Mort	- larval case	31	46	78	144	203	15	30	109	10	48
Orthotrichia sp.	- larval case	14	3	8	17	35	-	-	4	3	10
Trichoptera indet.	- larva	5	3	3	2	-	-	16	5	1	-
Trichoptera indet.	- larval case	118	13	3	23	6	-	4	4	3	5
HYMENOPTERA											
Tetramorium caespitum (L.)	- female	-	-	-	-	-	-	-	1	-	-
Lasius flavus gp	- worker	1	-	2	1	-	-	1	-	-	-
L. niger gp	- worker	-	-	-	-	-	-	-	2	-	1
Hymenoptera indet.		1	1	-	-	-	-	9	11	4	3
DIPTERA											
Chironomidae indet.	- larva	-	+	+	+	+	-	+	+	+	+
Dilophus febrilis (L.) or *femoratus* Meig.	- adult	-	-	-	-	-	-	-	3	-	-
Musca cf. *domestica* (L.)	- puparium	-	-	-	-	-	-	1	1	1	1
Diptera indet.	- puparium	2	7	2	1	4	-	4	6	3	3
Diptera indet.	- adult	-	-	-	1	1	1	4	19	2	1

Table 4.14 Mollusca (column 4)

	Minimum no. of individuals Column 4																*Habitat*
Sample (all 0.5 kg)	*32*	*31*	*30*	*29*	*28*	*27*	*26*	*25*	*24*	*23*	*22*	*21*	*20*	*19*	*18*	*17*	
GASTROPODA																	
Theodoxus fluviatilis (L.)	10	10	39	4	-	-	1	1	5	8	13	7	8	6	3	-	a
Valvata cristata Müll.	13	9	31	35	2	2	1	3	4	12	7	4	7	2	-	1	a
V. piscinalis (Müll.)	42	28	144	61	15	1	-	1	11	35	36	23	27	4	2	1	a
Bithynia tentaculata (L.)	41	24	112	17	1	2	1	1	12	16	15	10	9	2	1	2	a
B. leachii (Shep.)	14	11	65	2	2	-	-	1	2	8	10	11	7	2	-	-	a
Bithynia spp.	54	29	180	166	7	1	1	4	17	36	33	28	11	4	4	2	a
Carychium sp.	2	-	6	2	1	5	-	-	-	-	1	1	-	-	-	-	t
Physa fontinalis (L.)	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	a
Lymnaea truncatula (Müll.)	2	1	8	10	2	8	3	2	6	15	5	6	3	3	2	2	am
L. stagnalis (L.)	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	a
L. auricularia (L.)	-	1	7	-	-	-	-	-	-	1	-	1	-	-	-	-	a
L. peregra (Müll.)	2	1	5	4	-	-	1	1	2	1	1	-	-	1	-	-	a
Lymnaea sp.	-	-	4	1	-	-	1	1	2	-	1	-	-	-	-	-	a
Planorbis planorbis (L.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
P. carinatus (Müll.)	2	-	3	2	-	-	-	1	1	-	-	-	-	-	-	-	a
Anisus leucostoma (Mill.)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	am
Bathyomphalus contortus (L.)	4	1	11	3	-	-	-	1	3	4	1	1	1	1	-	-	a
Gyraulus acronicus (Fér.)	1	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	a
G. albus (Müll.)	12	5	37	9	3	2	1	3	9	30	27	22	12	5	5	1	a
Armiger crista L.	3	6	23	19	2	3	-	3	7	17	19	14	9	3	2	-	a
Hippeutis complanatus (L.)	-	-	1	-	-	-	-	-	-	1	1	-	-	-	-	-	a
Ancylus fluviatilis Müll.	4	1	5	7	1	3	-	-	3	5	5	3	7	1	2	1	a
Acroloxus lacustris (L.)	-	1	-	-	-	1	-	-	-	1	-	-	-	-	-	-	a
Succinea or *Oxyloma* sp.	6	1	7	2	-	5	4	2	2	5	1	3	3	2	1	5	t
Cochlicopa sp.	2	-	1	1	-	-	-	-	-	-	-	1	1	1	-	1	t
Vertigo pusilla Müll.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	t
V. pygmaea (Drap.)	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	t
Pupilla muscorum (L.)	1	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	d
Vallonia costata (Müll.)	-	-	1	-	1	-	-	-	1	-	-	-	-	-	-	-	d
V. pulchella (Müll.)	1	1	2	-	-	-	1	-	2	3	2	5	12	13	6	23	t
V. excentrica Sterki	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	d
Vallonia sp.	4	4	8	6	4	1	1	2	-	3	6	16	24	15	16	23	t
Punctum pygmaeum (Drap.)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	t
Discus rotundatus (Müll.)	2	4	1	-	-	-	-	-	-	-	-	-	1	-	-	-	t
Vitrea sp.	-	-	1	-	1	-	-	-	-	1	-	-	-	-	-	-	t
Nesovitrea hammonis (Ström)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	t
Aegopinella nitidula (Drap.)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	t
Zonitoides nitidus (Müll.)	-	-	1	-	1	-	2	-	-	-	-	-	-	-	-	-	t
Limax or *Deroceras* sp.	-	-	-	-	-	-	1	-	-	1	1	-	3	1	1	3	t
Clausilia bidentata (Ström)	-	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	t
Helicella itala (L.)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	d
Trichia plebeia (Drap.) or *hispida* (L.)	3	4	6	4	2	3	1	6	1	2	2	1	8	2	1	5	t
Cepaea sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	t
BIVALVIA																	
Unionidae gen. et sp. indet.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	a
Sphaerium corneum (L.)	3	1	2	1	-	-	-	-	-	-	2	-	-	-	-	-	a
Sphaerium sp.	1	-	3	2	1	-	1	1	1	1	2	1	2	1	-	-	a
Pisidium amnicum (Müll.)	1	1	3	1	-	-	-	-	1	2	3	1	1	-	-	-	a
Pisidium spp.	15	9	73	79	13	12	4	10	27	30	23	24	11	6	5	3	a
Total	247	154	799	441	59	49	25	45	119	239	217	185	169	76	52	73	

d = dry ground, t = other terrestrial, am = amphibious, a = aquatic

Table 4.14 Mollusca (column 4) (continued)

	Minimum no. of individuals Column 4																*Habitat*
Sample (all 0.5 kg)	*16*	*15*	*14*	*13*	*12*	*11*	*10*	*9*	*8*	*7*	*6*	*5*	*4*	*3*	*2*	*1*	
GASTROPODA																	
Theodoxus fluviatilis (L.)	1	3	-	-	2	1	3	1	-	-	1	-	-	-	-	-	a
Valvata cristata Müll.	3	-	2	-	2	2	2	-	-	-	-	-	-	-	-	-	a
V. piscinalis (Müll.)	2	2	3	1	4	10	8	6	2	-	-	-	1	-	2	-	a
Bithynia tentaculata (L.)	-	1	1	-	-	1	2	1	-	-	-	-	-	-	-	-	a
B. leachii (Shep.)	1	1	-	-	1	-	1	2	-	-	-	-	-	-	-	-	a
Bithynia spp.	9	8	2	2	5	8	10	9	5	2	1	1	2	-	1	1	a
Carychium sp.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	t
Physa fontinalis (L.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
Lymnaea truncatula (Müll.)	3	1	2	2	-	-	1	-	1	1	1	-	1	2	7	8	am
L. stagnalis (L.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
L. auricularia (L.)	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	a
L. peregra (Müll.)	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	a
Lymnaea sp.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
Planorbis planorbis (L.)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	a
P. carinatus (Müll.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
Anisus leucostoma (Mill.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	am
Bathyomphalus contortus (L.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
Gyraulus acronicus (Fér.)	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	a
G. albus (Müll.)	4	3	3	2	4	5	9	-	1	1	-	-	-	-	-	-	a
Armiger crista L.	1	1	-	1	13	1	3	3	-	-	-	-	-	-	-	-	a
Hippeutis complanatus (L.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
Ancylus fluviatilis Müll.	3	3	1	-	5	-	2	1	-	-	-	-	-	-	-	-	a
Acroloxus lacustris (L.)	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	a
Succinea or *Oxyloma* sp.	1	4	5	1	-	-	2	-	-	1	-	-	-	2	2	12	t
Cochlicopa sp.	2	1	3	7	1	2	3	6	2	1	2	1	2	-	2	-	t
Vertigo pusilla Müll.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	t
V. pygmaea (Drap.)	-	-	-	-	-	-	-	-	1	-	-	2	1	-	-	-	t
Pupilla muscorum (L.)	-	-	1	2	-	-	1	1	3	8	6	2	-	-	-	-	d
Vallonia costata (Müll.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	d
V. pulchella (Müll.)	28	6	11	14	5	13	16	30	25	21	28	33	28	7	5	7	t
V. excentrica Sterki	-	-	-	-	1	-	-	-	-	2	-	1	-	-	1	-	d
Vallonia sp.	20	16	33	34	9	17	25	26	27	24	18	26	47	9	16	14	t
Punctum pygmaeum (Drap.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	t
Discus rotundatus (Müll.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	t
Vitrea sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	t
Nesovitrea hammonis (Ström)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	t
Aegopinella nitidula (Drap.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	t
Zonitoides nitidus (Müll.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	t
Limax or *Deroceras* sp.	-	1	2	-	1	-	1	-	-	-	1	2	-	2	2	1	t
Clausilia bidentata (Ström)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	t
Helicella itala (L.)	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	d
Trichia plebeia (Drap.) or *hispida* (L.)	4	7	10	2	9	5	13	22	21	37	39	51	40	19	30	49	t
Cepaea sp.	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	t
BIVALVIA																	
Unionidae gen. et sp. indet.	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	a
Sphaerium corneum (L.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
Sphaerium sp.	-	-	1	1	3	1	1	1	-	-	-	-	-	-	-	-	a
Pisidium amnicum (Müll.)	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	a
Pisidium spp.	11	8	7	4	10	14	16	10	4	-	-	1	-	-	1	1	a
Total	96	68	89	74	78	81	121	121	92	99	97	120	122	41	71	94	

d = dry ground, t = other terrestrial, am = amphibious, a = aquatic

Table 4.15 Mollusca (other samples)

	Minimum no. of individuals										*Habitat*
	Column 1										
Sample (all 0.5 kg)	*3*	*2*	*1*	*21*	*7*	*6*	*9*	*8*	*11*	*10*	
GASTROPODA											
Theodoxus fluviatilis (L.)	-	3	2	-	2	2	-	2	-	-	a
Valvata cristata Müll.	7	23	-	17	22	32	6	4	-	2	a
V. piscinalis (Müll.)	5	31	7	46	95	86	11	13	-	-	a
Bithynia tentaculata (L.)	14	24	1	11	90	112	4	1	4	-	a
B. leachii (Shep.)	7	5	2	9	83	109	3	-	-	1	a
Bithynia spp.	24	109	3	26	59	179	5	10	7	2	a
Carychium sp.	7	4	1	2	1	3	3	1	-	-	t
Lymnaea truncatula (Müll.)	2	2	1	5	3	3	16	1	-	-	am
L. stagnalis (L.)	-	1	-	-	1	-	-	-	-	-	a
L. auricularia (L.)	-	2	-	1	10	8	-	-	-	-	a
L. peregra (Müll.)	3	1	-	2	3	2	-	-	-		a
Lymnaea spp.	1	1	1	1	1	3	-	-	-		a
Planorbis planorbis (L.)	-	-	-	-	-	-	1	-	-	-	a
P. carinatus (Müll.)	1	1	-	5	-	-	-	-	-	1	a
Anisus leucostoma (Mill.)	1	-	-	-	-	-	-	-	-	-	am
A. vortex (L.)	-	-	-	-	-	-	-	-	1	-	a
Bathyomphalus contortus (L.)	7	4	1	2	5	29	-	-	-	-	a
Gyraulus acronicus (Fér.)	-	-	-	-	2	-	-	-	-	-	a
G. albus (Müll.)	6	4	-	2	39	54	2	2	-	1	a
Armiger crista L.	6	9	-	5	28	33	4	8	-	-	a
Hippeutis complanatus (L.)	-	-	-	1	-	1	-	-	-	-	a
Ancylus fluviatilis Müll.	2	3	-	2	3	26	3	5	-	1	a
Acroloxus lacustris (L.)	2	-	-	-	-	1	-	-	-	-	a
Succinea or *Oxyloma* sp.	1	1	-	1	1	-	3	-	-	2	t
Cochlicopa sp.	2	4	-	-	2	1	7	8	-	3	t
Vertigo pygmaea (Drap.)	1	2	-	-	-	-	7	4	3	-	t
Vertigo sp.	1	-	-	-	-	-	-	-	-	-	t
Pupilla muscorum (L.)	1	4	-	-	-	-	2	-	6	3	d
Vallonia costata (Müll.)	-	1	-	-	1	-	12	7	1	-	d
V. pulchella (Müll.)	1	4	1	-	1	5	31	7	9	6	t
V. excentrica Sterki	1	3	1	-	1	-	-	-	5	2	d
Vallonia sp.	5	15	1	4	3	13	30	24	19	23	t
Punctum pygmaeum (Drap.)	1	-	-	-	-	-	-	-	-	-	t
Discus rotundatus (Müll.)	-	2	-	1	-	1	-	-	-	-	t
Vitrea sp.	1	1	-	-	-	-	-	-	-	-	t
Nesovitrea hammonis (Ström)	-	-	-	-	1	-	1	-	-	-	t
Aegopinella nitidula (Drap.)	-	2	-	-	-	-	1	-	-	-	t
Oxychilus cellarius (Müll.)	-	1	-	-	-	-	-	-	-	-	t
Zonitoides nitidus (Müll.)	1	1	-	1	-	-	-	-	1	-	t
Limax or *Deroceras* sp.	-	1	-	-	-	-	1	2	-	2	t
Cochlodina laminata (Mont.)	-	-	-	-	1	-	-	-	-	-	t
Clausilia bidentata (Ström)	-	-	-	-	-	1	-	-	-	-	t
Helicella itala (L.)	-	-	-	-	-	-	-	-	1	-	d
Trichia plebeia (Drap.) or *hispida* (L.)	8	10	1	1	2	9	40	11	11	39	t
Arianta arbustorum (L.)	-	-	-	-	-	-	-	-	-	-	t
Cepaea sp.	-	-	-	-	-	-	-	-	-	-	t
Arianta arbustorum (L.) or *Cepaea* sp.	1	-	-	-	-	-	-	-	-	-	t
BIVALVIA											
Unio sp.	-	-	-	-	-	-	-	-	-	-	a
Anodonta or *Pseudanodonta* sp.	-	-	-	-	-	-	-	-	-	-	a
Unionidae gen. et sp. indet.	-	-	-	-	-	-	-	-	-	1	a
Sphaerium corneum (L.)	2	1	-	-	-	-	-	-	-	-	a
Sphaerium sp.	-	3	-	1	1	1	-	-	-	-	a
Pisidium amnicum (Müll.)	1	2	2	4	1	1	1	-	-	-	a
Pisidium spp.	10	20	2	14	26	61	3	6	2	1	a
Total	133	305	27	164	488	776	197	116	70	90	

d = dry ground, t = other terrestrial, am = amphibious, a = aquatic

Table 4.16 Waterlogged seeds from sample 60

	Sample (0.25 kg)	Number of seeds 60
Epilobium sp.	willowherb	10
Berula erecta (Huds.) Cov.	water parsnip	3
Pedicularis palustris L.	red rattle	1
Lycopus europaeus L.	gipsywort	1
Galium sp.	bedstraw	2
Carex spp.	sedge	6

indicated in Table 4.12. Not all the Coleoptera have been classified into categories. It was necessary to combine the results from column 4 samples 32 to 31 and column 4 samples 30 to 28 to give large enough totals of terrestrial Coleoptera.

Mollusca

The molluscan results from column 4 are displayed in Figure 4.6 according to habitat groups as indicated in Tables 4.14–15. They follow the groups used in Thomas *et al*. (1986, 179–81) with the addition of an amphibious group of *Lymnaea truncatula* and *Anisus leucostoma*. These two species were almost entirely absent from the original sequence and had been included in the aquatic group.

The taphonomy of the macroscopic plant and invertebrate remains

The waterlogged samples

The waterlogged sediments at the bottom of column 4 (samples 32 to 27), column 1 (samples 3 to 1) and sample 21 (trench XXIV contexts 2404/5–2405) all accumulated underwater in a palaeochannel of the

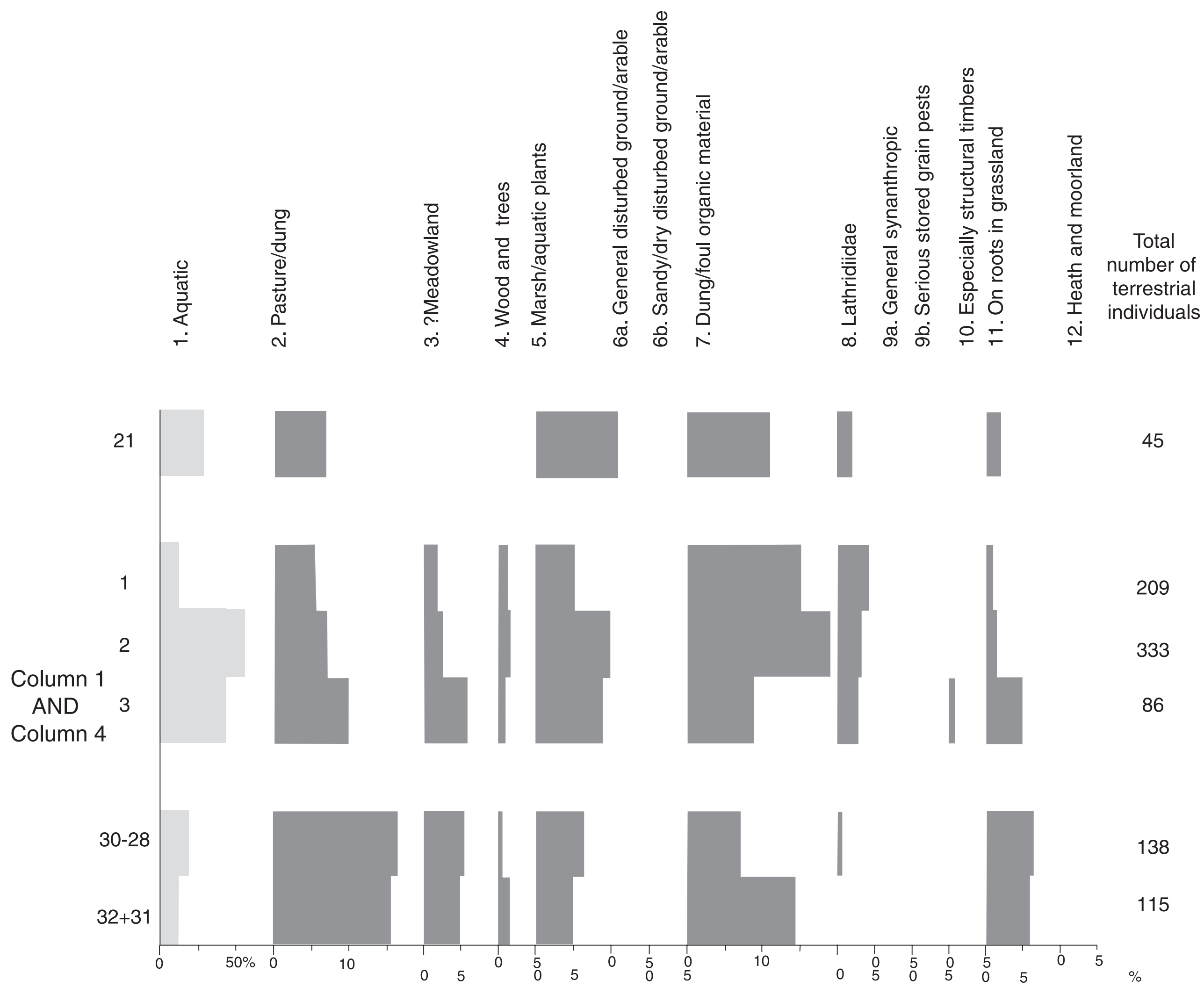


Figure 4.5 Species groups of Coleoptera from Whitecross Farm

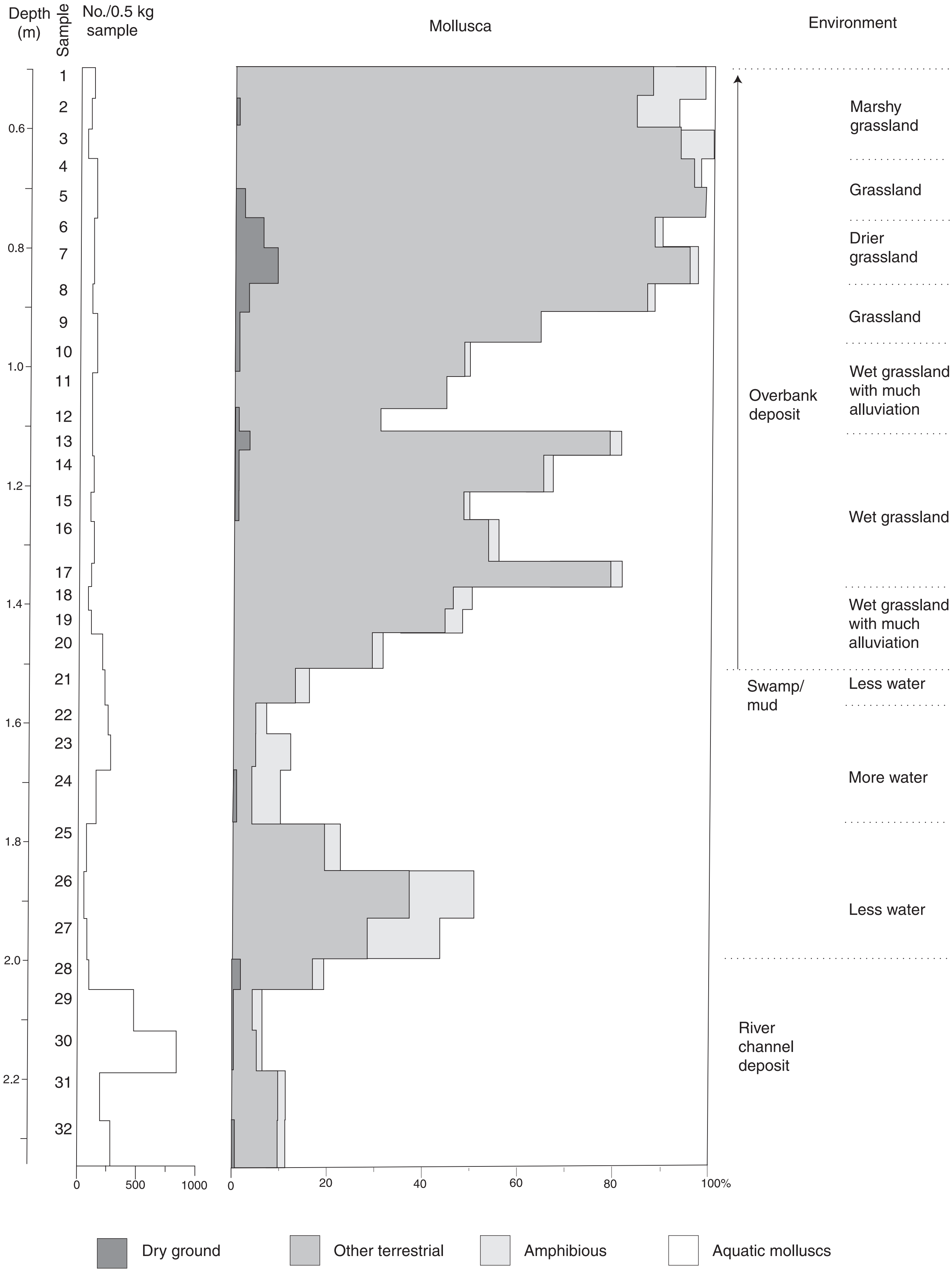


Figure 4.6 Molluscan sample column from trench XXIV and summary of results

Thames which at least seasonally carried a significant flow of water. Seeds of aquatic plants, fragments of aquatic insects and shells of aquatic molluscs occurred in all these samples. Although almost all of them could have come from organisms that lived in the channel at the place of deposition, presumably the majority had been carried some distance by the river before incorporation into the sediments.

The non-aquatic component of the samples included items which had entered the river through various natural agencies from the surrounding landscape, for example insects which flew into the water and seeds which had been carried by the wind etc., as well as material which had been dumped in the channel by humans. The former category was a major part of all the samples. Dumped material was certainly present in column 4 samples 32–30, throughout column 1 and in sample 21. A little wood charcoal was also present in column 4 sample 29.

The terrestrial remains which entered the river through natural agencies would have been derived from a strip of land extending upstream on either side of the river. The samples of column 1 from the banks of the island would have had a higher proportion of remains from the island itself than column 4, which was further away from the bank. The same considerations made for the plant and invertebrate remains from the palaeochannel sediments at Runnymede (Evans 1991, 365) are probably also applicable to Whitecross Farm, Wallingford. They were that shells of land snails, seeds, remains of terrestrial insects and pollen had been derived from progressively larger catchments. Of the order of 50% of the terrestrial remains which reached the site at Runnymede by natural processes were seen as having had their origin in a zone extending, for some considerable distance in some instances, either side of the river and upstream (Table 4.17).

The dumped material included the remains of crops, which had been brought to the site for processing or consumption, wood brought for structural purposes and bracken. Some of this material was burnt before dumping while other material was left as accumulations of decaying plant debris before dumping, thereby gaining a decomposer fauna of insects.

Table 4.17 Runnymede Bridge: catchment areas for different types of environmental data

	Distance either side of the river	*Distance upstream*
Molluscs	2 m	0.2 km
Waterlogged seeds	10 m	0.5 km
Insects	50 m	0.5 km
Pollen	100 m	2 km

Sample 60 (context 60) was from a localised area of fen peat that had formed in the top of the palaeochannel beyond the main area of excavation after substantial sedimentation had already occurred in the channel. The organic material in it was dominated by remains of the fen vegetation itself.

The preservation of remains in most of the waterlogged samples was good for calcareous sediments, which was probably a reflection of rapid sedimentation and permanent waterlogging. Although some of the mollusc shells were fragile, there was not a high ratio of *Bithynia* opercula to shells, which occurs with severe leaching. Some organic remains that might have been expected to survive in column 4 sample 27 and sample 60 had, however, been lost. The absence of mollusc shells from sample 60 was also probably due to preservational conditions.

The non-waterlogged molluscan samples

The sediments of the upper part of column 4 (samples 26 to 1, context 2405/4), samples 11 and 10 (context 2403/1) all accumulated on swamp or floodplain surfaces which were experiencing alluviation from the Thames. These samples contained shells of flowing-water molluscs which had certainly been deposited with the alluvial sediment, shells of other aquatic molluscs which could either have been transported by the river or have been living *in situ* during episodes of submergence, and shells of terrestrial snails which mostly represented the *in situ* fauna when the surface was above water.

Samples 6 and 7 (see Fig. 2.3) were from the channel sediments which comprise the island itself. They were mostly aquatic species from the river with only a few terrestrial individuals which had fallen or been washed in. Samples 8 and 9 (context 2413) were from a ditch which cut the island (see Fig. 2.3). In addition to molluscs from the three categories described for the upper part of column 4, there also appeared to have been significant numbers of shells reworked from the sediments of the island.

The preservation of shells in these samples was mostly good other than that many shells of aquatic species had been fragmented.

The samples for charred plant remains from non-waterlogged sediments

Samples 5, 51, 52 and 92–5 were all from sediments which had accumulated at or just above the water level around the bank of the island. The charred plant remains in them represented material which had been brought to the island and then burnt. Subsequently the burnt debris was dumped at the edge of the channels. It is likely that chaff and small weed seeds were more vulnerable to complete combustion than the cereal grain and wood. This bias seems to have been exaggerated in all except samples 5 and 51 by the effects of repeated wetting and drying causing degradation. Samples 5 and 51 were from wetter deposits and the charred remains from them showed the same good preservation as those from the waterlogged samples.

The origin of the island

The mid-channel bar

When the initial work was undertaken on the alluvial sequence in the modern Thames bank at Wallingford (Thomas *et al.* 1986, 178–84), it was not realised that the site had been an island in the River Thames. It was assumed that the coarse basal sediments of the exposure were channel deposits of a side bar forming by lateral accretion. The current excavation showed these sediments to have been a mid-channel bar, with a palaeochannel to the west in addition to the modern navigation channel to the east (see Fig. 2.1). The bar sediments were sampled again in the cut-back section of feature 2413, a ditch in the centre of the island (see Fig. 2.3). Sample 7 was similar to the lowest sediments of the original column at 1.47–1.58 m, while sample 6 was perhaps the equivalent of 1.23–1.33 m in the original column. The sediments again showed fining upwards from sandy gravel to a sandy loam. The molluscan assemblages from them were likewise dominated by flowing-water aquatic species, particularly *Valvata piscinalis*, *Bithynia tentaculata*, *B. leachii* and *Gyraulus albus*. The last two species seem more characteristic of channel-bed deposits than overbank alluvial sediments, although they were by no means absent from the overbank sediments on the site. The occurrence of open-country species of terrestrial molluscs such as *Vallonia* sp. in combination with the woodland mollusc *Discus rotundatus* would suggest that the mid-channel bar was Neolithic or more recent in origin. *D. rotundatus* was absent from Britain in the very early Flandrian, when open habitats were still widespread, and during the mid Flandrian the catchment was largely wooded. The formation of the mid-channel bar would have occurred during a period of peak discharge by the river. High-energy events which caused major changes to the channel pattern of the Upper Thames seem to have been relatively rare during the Flandrian, when the usual regime of the river was one of low-energy channel silting and simplification (Robinson and Lambrick 1984).

Subsequently the bar received fine overbank alluviation of clay loam which raised the level of the island by about 0.25 m and upon which a soil developed (Thomas *et al.* 1986, 178–84). The duration of flood episodes then decreased allowing dry-ground open-country species of mollusc to become established. They comprised around 23% of the total shells from the late Bronze Age soil.

The early ditch

A ditch (feature 2413) which cut the sediments of the island was found beneath the late Bronze Age soil (see Fig. 2.3). The majority of the molluscs from it (samples 9 and 8) were terrestrial species, with about 6% of them being dry-ground open-country species, particularly *Vallonia costata*. While the proportion of dry-ground molluscs was not as high as from the late Bronze Age soil, this was probably the results of many of the shells being derived from the alluvial sediments cut by the ditch. These results suggested that relatively dry open conditions prevailed on the island before the late Bronze Age occupation.

The extent of the island in the late Bronze Age

The western edge of the island was defined by the palaeochannel with the late Bronze Age revetment trench along its bank. Recent erosion of the modern riverbank had truncated the eastern side of the island, but in one place where the erosion was less severe, an apparent soil horizon could be detected within the alluvial sediments sloping at about 30° down towards the river (see Fig. 2.2). Molluscan analysis of this soil (sample 11) showed that dry-ground open-country terrestrial species, particularly *Pupilla muscorum* and *Vallonia excentrica*, comprised 16% of the shells, with other terrestrial species making up a further 53% of the total. The only part of the original sequence investigated in the modern Thames bank to have such a high proportion of terrestrial snails (apart from the modern topsoil) was the late Bronze Age soil. It seems reasonable to assume that this horizon represented the eastern bank of the island. This would make the island about 18 m wide at its greatest extent. Trial trenching showed the island to have been about 170 m in length. Such dimensions are not atypical for the eyots of the River Thames.

The late Bronze Age aquatic and waterside environment

The fauna and flora of the palaeochannel

The aquatic insects and molluscs from the waterlogged late Bronze Age sediments of column 4 (samples 32 to 28), column 1 (samples 3 to 1) and sample 21 comprised a rich fauna of a well-oxygenated mesotrophic lowland river in all its aspects. These ranged from lengths with rapidly flowing water over a strong bed, and from areas of open water in the centre of the channel, through to densely vegetated marginal reedswamp. Around 90% of the shells were from aquatic molluscs. About a third of the Coleoptera (beetles) were water beetles, and the great majority of the other insect remains were the aquatic larvae of Trichoptera (caddis flies).

The molluscan assemblages comprised typical clean-water riverine faunas, with many specimens of *Theodoxus fluviatilis*, *Valvata piscinalis*, *Bithynia tentaculata*, *B. leachii* and *Gyraulus albus*. Species that can live in stagnant water were present, as is usual with flowing-water faunas, but there were not the large numbers of those Lymnaeidae and Planorbidae which would have flourished if the palaeochannel had been cut off from the river each summer. Variation within the habitats of the river was, for example, shown by the occurrence of both *Sphaerium corneum*, a bivalve which lives in a silt bed below clean water, and *Ancylus fluviatilis*, a freshwater limpet that lives attached to stones in quick-moving water where the turbulence of the current is sufficient to keep the stones clean (Boycott 1936, 141–2). Many of the gastropods from these samples cling to aquatic plants but *Armiger crista* is particularly well known from this habitat.

The aquatic molluscs were all species which can still be found in the modern channel of the Thames. The aquatic Coleoptera, in contrast, included some species from the family Elmidae which are now of very restricted distribution in the Thames or are entirely absent from the drainage basin. They require very clean well-oxygenated running water. They are well adapted to a strong current of the water, clinging to stones, submerged wood and aquatic plants. The smaller species such as *Esolus parallelepipedus* and *Oulimnius* sp. are now confined to weir outflows and the faster-flowing tributaries of the Thames. The two large species *Macronychus quadrituberculatus* and *Stenelmis canaliculata* are so fastidious in their need for large bodies of clean water that they can now only be found in Britain in the upper reaches of a few rivers and a single northern lake. Other water beetles from the site that no longer occur in the Thames include *Helichus substriatus*. All these species have been recorded from palaeochannel sediments of Neolithic date upstream at Buscot Lock (Robinson and Wilson 1987, 31) and downstream in Neolithic and Bronze Age sediments of the Middle Thames at Runnymede Bridge (Robinson 1991, 316–17) and Dorney (Robinson in prep. a). As was argued for Runnymede, such a fauna probably occurred throughout much of the length of the Thames while it remained in an unpolluted unmanaged state and its water only carried a low silt level.

The remaining aquatic Coleoptera mostly comprised a balanced riverine fauna of Dytiscidae, Gyrinidae, Hydrophilidae and Hydraenidae. Only sample 2 of the bankside samples of column 1 gave evidence for slower-moving shallower water than the samples from column 1 which was more distant from the bank. Sample 2 of column 1 had a higher proportion of Hydraenidae, particularly *Ochthebius minimus* than the other samples. *O. minimus* is a beetle which most usually occurs in stagnant water and marshes although it does occur in running water (Balfour-Browne 1958, 160). It is possible that it was associated with the refuse which had been dumped into the channel. The flowing-water caddis larva *Ithytrichia* sp., however, greatly outnumbered the stagnant- or slowly flowing-water caddis larva *Orthotrichia* sp., as it did in all the waterlogged samples.

Around 8.5% of the non-aquatic Coleoptera were species which feed on marsh and aquatic plants. Some of the more host-specific species included are summarised in Table 4.18.

Seeds of all these plants except *P. australis* were identified from the samples. The full range of seeds suggested a rich aquatic flora. The submerged flora included *Ranunculus* S. *Batrachium* sp. (water crowfoot), *Myriophyllum* sp. (water milfoil) and *Zannichellia palustris* (horned pondweed) along with the alga *Chara* sp. (stonewort). Both white and yellow water lilies (*Nymphaea alba* and *Nuphar lutea*) were members of the floating-leaved community along with *Potamogeton* spp. (pondweed). There was also a slight presence of *Lemna* sp. (duckweed). The occurrence of *N. alba* and *Lemna* sp. could imply lengths of the river or at least sheltered bays which experienced little current during the summer.

On the basis both of seed numbers and the evidence of the phytophagous Coleoptera, *Schoenoplectus lacustris* (bulrush) was the dominant plant of the reedswamp which fringed the river along with *Alisma* sp. (water plantain) and *Mentha* cf. *aquatica* (water mint) in shallow water alongside the bank. Among the *S. lacustris* probably grew *Veronica* Sect. *Beccabunga* sp. (water speedwell) and *Oenanthe aquatica* gp (water dropwort) with occasional clumps of *Rumex hydrolapathum* (great water dock) and *Iris pseudacorus* (yellow flag).

There were some chronological changes in the aquatic flora as shown by the seeds, for example a very substantial decline in *Zannichellia palustris* in column 4 above sample 32, but the reasons are unknown. There was a lower proportion of seeds of

Table 4.18 Non-aquatic host-specific Coleoptera

Macroplea appendiculata **on:**	*Potamogeton* (pondweed) and *Myriophyllum* (water milfoil) spp.
Donacia clavipes	*Phragmites australis* (common reed)
D. dentata	*Sagittaria sagittifolia* (arrowhead) and *Alisma* sp. (water plantain)
D. impressa	*Schoenoplectus lacustris* (bulrush)
D. versicolorea	*Potamogeton* spp. (pondweed)
Plateumaris affinis	*Carex spp.* (sedge)
Prasocuris phellandrii	aquatic Umbelliferae (water dropwort etc.)
Aphthona nonstriata	*Iris pseudacorus* (yellow flag)
Tanysphyrus lemnae	*Lemna* spp. (duckweed)

Schoenoplectus lacustris from column 1 than from column 4. It is possible that the tall reedswamp community was absent from the bank of the island in the vicinity of the timber structure.

The plant and insect evidence suggested a relatively abrupt transition from aquatic to terrestrial habitats without any extensive marsh in between. The Coleoptera included various Carabidae which are favoured by bankside habitats such as *Bembidion gilvipes*, *B. assimile* and *Agonum marginatum*. One of those beetles, *Drypta dentata*, is now only known in Britain from a few coastal localities but it occurs inland, for example on swampy banks and under *Phragmites* (reed) debris in central Europe (Koch 1989, 106; Lindroth 1974, 133). *Myosoton aquaticum* (water chickweed) seeds suggested this plant grew on areas of freshly exposed sediment. *Brassica rapa* ssp. *sylvestris* (wild turnip) probably colonised drier areas of eroding riverbank. There were seeds from a wide range of plants from the more permanent bankside vegetation and these have been summarised in Table 4.19.

The phytophagous beetle *Grypus equiseti* adds *Equisetum* sp. (horsetail) to the list. *Verbena officinalis* is of interest because archaeological records from prehistoric sites such as Runnymede (Greig 1991, 236) are beginning to suggest that riverbanks were formerly an important habitat for this plant. One of the samples from column 1 (sample 1) contained very high numbers of seeds of *U. dioica* and doubtless the activity on the island had favoured the colonisation of its bank by nettles.

The occurrence of a few seeds and driftwood fragments of *Alnus glutinosa* (alder) in most of the samples would suggest that this tree grew along the riverbank. However, given the prolific seed production of alder and the abundance with which its seeds occur in riverine sediments formed against a background of alder woodland, these results would be consistent with a few isolated trees surviving on the bank rather than the dense alder woodland of earlier periods. Some of the other remains of woody plants, for example small-diameter branch-wood of *Prunus* sp. (sloe etc.) and Pomoideae (hawthorn tp.) plus *Prunus/Crataegus* tp. thorns, were also probably from bankside vegetation. Some of the non-structural cut wood could have been derived from chopping back such scrub.

Coleoptera that feed on a wide range of foul organic material (species group 7) were present in all the waterlogged samples. These beetles, particularly from the genera *Cercyon*, *Megasternum* and *Anotylus*, mostly comprised between 7 and 15% of the terrestrial Coleoptera in the samples or groups of samples (see Table 4.12). This is the range of values that might be expected independently of human activity, from naturally occurring accumulations of decaying plant debris along the edge of the river (Robinson 1991, 280). Samples 2 and 1, however, both had values above 15% for species group 7. They also contained high numbers of another beetle, *Oxytelus sculptus*, which tends to be favoured by manure heaps (eg Kenward and Hall 1997, 669). Puparia of *Musca domestica* (housefly) were present. An indication that some of this refuse had been dumped on the riverbank and had begun to develop its own insect fauna as it became submerged was given by numerous examples of *Carpelimus bilineatus*, which occurs in very wet decaying organic material especially on bankside mud.

Sedimentation in the palaeochannel and the late Bronze Age hydrology

By analogy with the results emerging from a palaeochannel at Yarnton, Oxfordshire (Robinson in prep. b), the Wallingford palaeochannel need not necessarily have been continuously active since the creation of the island, but the biological evidence noted above shows it certainly to have been active during the late Bronze Age. The earliest sediments in the palaeochannel (column 4 sample 32 and column 1 sample 3) both contained flax and cereal remains which suggested that they post-dated the foundation of the settlement on the island. It is very likely that the construction of the timber waterfront structures initiated sedimentation, which continued under flowing channel conditions throughout the period of late Bronze Age activity on the site.

The preservation of the joint (notched end) at the top of one of the large oak uprights of the possible jetty for a horizontal timber (possibly facilitated by a slight post-Bronze Age rise in the permanent water table) would suggest a summer depth of water in the channel of no more than 0.25 m. It was difficult to establish whether the island suffered flooding during the period of its occupation (Thomas *et al.* 1986, 182–3). The dry-ground species of mollusc from the Bronze Age soil horizon on the island (0.75–0.86 m and sample 10) including *Pupilla muscorum*, *Vallonia costata*, *V. excentrica* and *Helicella itala* would not be able to tolerate long periods of submergence. However, the topography of the island was such that flood waters would drain immediately once the river level fell. It was noted

Table 4.19 Plants indicative of more permanent bankside vegetation

Thalictrum flavum (meadow rue)	*Solanum dulcamara* (woody nightshade)
Lychnis flos-cuculi (ragged robin)	*Verbena officinalis* (vervain)
Filipendula ulmaria (meadowsweet)	*Lycopus europaeus* (gipsy wort)
Urtica dioica (stinging nettle)	*Galium* sp. (bedstraw)

that there was some similarity between the faunas of the Bronze Age soil and the modern gravel surface adjacent to the riverbank, which occasionally experiences brief flooding. Alternatively, flooding could have ceased entirely during the period of occupation, the shells of aquatic molluscs in the soil being the result of Bronze Age reworking of earlier sediments.

The wider late Bronze Age terrestrial environment

Woodland and scrub

Wood- and tree-dependent beetles comprised 2% of the terrestrial Coleoptera from the waterlogged late Bronze Age sediments of column 4 (samples 32 to 28), column 1 (samples 3 to 1) and sample 21. This would suggest that the landscape of the catchment was largely open although there would have been some scrub, hedges or limited areas of woodland. In this aspect the insect results were very similar to those from the late Bronze Age phase at Runnymede. Some of the more host-specific species are summarised in Table 4.20.

The occurrence of remains of *Alnus glutinosa* (alder) has already been mentioned. Other trees and shrubs represented by seeds and in some cases also by wood are summarised in Table 4.21.

There were also a few seeds of woodland herbs including *Silene dioica* (red campion), *Moehringia trinervia* (three-nerved sandwort) and *Mercurialis perennis* (dog's mercury). Many of the terrestrial insects can occur in woodland but few are indicative of it. The pentatomid bug *Pentatoma rufipes* shows an association with trees, especially oak. However, the woodland carabid *Patrobus atrorufus* was perhaps living in cleared habitats as occurred at Runnymede during the late Bronze Age (Robinson 1991, 322).

While the insects and plants certainly did not include a full woodland fauna and flora, it is possible that some were relicts which had survived clearance of more extensive woodland. *M. perennis* tends to be regarded as an old woodland plant (Pollard 1973) and *Acer campestre* is not an early colonist of scrub (Jones 1944–5, 241–3). Any woodland that remained had perhaps been substantially modified by management. Some of the oak piles of the possible jetty were 30–35 years old at felling and had an average annual ring width of 2.8 mm (see Taylor *et al*., below). This would suggest rapid growth under well-illuminated conditions as occurs when trees regenerate after felling and grazing animals are excluded. Cut hazel rods from the palaeochannel (see Taylor *et al*., below) had perhaps been derived from coppice woodland. The woodland from which these structural timbers were obtained need not have been within the catchment of the remains, which reached the site through natural agencies, but there was also insect evidence for oak and hazel.

In addition, the remains suggested the occurrence of mixed thorn scrub. This could have been around the edge of any surviving areas of woodland, in the form of hedges, on undergrazed pasture and, as had already been suggested, in places along the riverbank. Species such as *Rhamnus catharticus* are able to withstand grazing pressure better than woodland trees and shrubs but are light-demanding so become shaded out if the scrub develops into woodland.

Grassland and the open landscape

The late Bronze Age landscape which comprised the catchment for the macroscopic plant and invertebrate remains was largely open. Chafer and elaterid beetles of species group 11, which have larvae that feed on roots in grassland, made up over 6% of the terrestrial Coleoptera from column 4. This would suggest a substantial presence of permanent grassland (Robinson 1991, 281). The most numerous of these was *Phyllopertha horticola*, but *Agrypnus murinus* was also well represented, which would suggest well-aerated rather than gleyed soil. This is in agreement with the evidence for a relatively sharp transition from riverine to terrestrial habitats along the riverbank.

Table 4.20 Wood- and tree-dependent host-specific Coleoptera

Anthonomus cf. pedicularius **on:**	*Crataegus* sp. (hawthorn) leaves
Curculio cf. *nucum*	*Corylus avellana* (hazel) nuts
Scolytus intricatus	mainly *Quercus* sp. (oak) under bark
Leperisinus varius	mainly *Fraxinus excelsior* (ash) under bark

Table 4.21 Summary of trees and shrubs represented by seeds or wood

Cornus sanguinea (dogwood)	*Rhamnus catharticus* (purging buckthorn)
Corylus avellana (hazel)	*Crataegus* cf. *monogyna* (hawthorn)
Quercus sp. (oak)	*Prunus spinosa* (sloe)
Acer campestre (field maple)	*Sambucus nigra* (elder)

Scarabaeoid dung beetles of species group 2, which feed on the droppings of larger herbivores under pastureland conditions, comprised over 16% of the terrestrial Coleoptera from column 4. This is sufficient to imply that much of this grassland was being grazed by domestic animals (Robinson 1991, 271). The most numerous species were *Aphodius* cf. *sphacelatus* followed by *Onthophagus ovatus*. There was, however, a single example of *A. varians*, a dung beetle now extinct in Britain. *A. varians* was also identified from the late Bronze Age deposits at Runnymede and has been recorded from a few other prehistoric sites (Robinson 1991, 323; unpubl. info.).

Clover- and vetch-feeding weevils of the genera *Apion* and *Sitona* (species group 3) comprised 6% of the terrestrial Coleoptera. This value is rather high for pastureland (Robinson 1991, 280) and was possibly a reflection of the vegetation being ungrazed on the steeper parts of the riverbank. Both the phytophagous Coleoptera and the seeds suggested the grassland to have been very herb-rich. There were several species of weevil associated with grassland herbs whose seeds rarely survive in waterlogged deposits including *Ceuthorhynchidius troglodytes*, *Mecinus pyraster*, *Gymnetron labile* and *G. pascuorum,* which feed on *Plantago lanceolata* (ribwort plantain), and in one instance *P. media* (hoary plantain) as well.

Seeds of potential grassland plants are summarised in Table 4.22. Taken together, they would make up a community of relatively well-drained circumneutral to calcareous soil. *Sanguisorba minor*, the most calcicolous of these plants, was present in three of the five late Bronze Age samples from column 4. It is now best known in the Upper Thames Valley from chalk and limestone soils but is also present in some of the few fields of unimproved pasture that survive on the First Gravel Terrace of the Thames. *Rumex conglomeratus*, which was well represented in all these samples, tends to be favoured by grazing but is also a woodland-edge and hedgerow plant. The occurrence of seeds of *Leucanthemum vulgare* in three of the samples emphasises the insect evidence that some of the grassland was only lightly grazed. It is a plant which is most typical of hay meadows. However, a full hay-meadow flora was absent.

A large proportion of the remaining terrestrial insects were species common to grassland habitats. The bugs *Aphrodes* sp. including *A. bicinctus* feed on grasses. The small chrysomelid beetles *Longitarsus* spp. include many species which feed on grassland herbs. Carabid beetles such as *Calathus fuscipes* and some of the staphylinid beetles such as *Xantholinus linearis* or *longiventris* readily occur in grassland. The terrestrial molluscs from the waterlogged samples of column 4 were mostly open-country species which would be appropriate to grassland.

Arable and disturbed grassland

Insects are not very reliable for the detection of arable land within the catchment. However, the carabid beetles of species groups 6a and 6b, which tend to be favoured by arable and other disturbed-ground habitats, were entirely absent from column 4. Some of the phytophagous Coleoptera can feed on arable weeds, for example *Chaetocnema concinna* on *Polygonum aviculare* (knotgrass), but none is exclusive to arable weeds. Weevils of the subfamily Ceuthorhynchinae which tend to feed on cruciferous weeds were rare. The waterlogged seeds from column 4 included some from plants that can grow as arable weeds, but they could also have been derived from the settlement and naturally occurring bankside habitats.

Both the charred and the waterlogged plants included arable crop remains that had been brought to the site. The charred seeds were probably mostly from weeds which had been growing among the crops. The most numerous of these were the seeds of the annual weeds *Chenopodium album* (fat hen) and *Bromus* S. *Eubromus* sp. (brome grass). The former is a nitrophilous weed; the latter is a subgenus of large seeded grasses, one species of which, *B. secalinus* (chess), was once a common arable weed because it was difficult to clean its seeds from seedcorn. The charred weed seeds do not give sufficient evidence of soil type to enable the location of the arable fields to be determined, but they would be appropriate to the circumneutral soils of the gravel terraces of the Upper Thames. The occurrence of a significant number of seeds of grassland plants in sample 5 – including *Linum catharticum* (fairy flax), cf. *Trifolium* sp. (clover), *Prunella vulgaris* (selfheal) and *Plantago media* or *lanceolata* – might suggest that arable agriculture was impinging on grassland.

Waterlogged seeds of plants of various wayside and ruderal habitats such as *Rumex* spp. (dock) and *Urtica dioica* (stinging nettle) were present in column 4 along with annual weeds of more frequently disturbed ground such as *Stellaria media* gp (chickweed), *Chenopodium album* (fat hen) and

Table 4.22 Seeds of potential grassland plants

Ranunculus cf. *acris* (meadow buttercup)	*Potentilla reptans* (creeping cinquefoil)
R. cf. *repens* (creeping buttercup)	*Sanguisorba minor* (salad burnet)
R. cf. *bulbosus* (bulbous buttercup)	*Rumex conglomeratus* (sharp dock)
Stellaria graminea (stitchwort)	*Leucanthemum vulgare* (ox-eye daisy)
Linum catharticum (fairy flax)	*Leontodon* sp. (hawkbit)

Atriplex sp. (orache). They probably had their origin in the bankside habitats already mentioned, at the edge of scrub and from the settlement itself.

Other aspects of the landscape

The only other major aspect of the late Bronze Age landscape for which there was evidence was bracken-covered light acidic soil, as indicated by the frond fragments of *Pteridium aquilinum* (bracken) which had been imported to the settlement. The lack of a significant presence of other species characteristic of acid ground would suggest that the source of the bracken was beyond the catchment of the remains that did not experience human transport.

Conditions and activities on the island in the late Bronze Age

The vegetation of the island

The molluscan evidence from the late Bronze Age occupation horizon suggests that the island supported dry short-turfed grassland with bare patches created by trampling (Thomas *et al.* 1986, 182). Those Coleoptera that have larvae that feed on the roots of grassland plants (species group 11) and the scarabaeoid dung beetles of pastureland (species group 2) were less than half as abundant from the waterlogged samples from the edge of the island (column 1 samples 3 to 2, sample 21) as from column 4 (see Fig. 4.5). This tends to suggest that the grazed grassland was mostly an aspect of the surrounding landscape rather than of the island itself.

The waterlogged samples from the edge of the island, however, had a higher proportion of seeds from plants of disturbed and waste ground than the samples from column 4. They presumably reflected the weeds growing on the less heavily trampled parts of the island. Seeds of the nitrophile *Chenopodium album* (fat hen) were particularly abundant although seeds of two other plants of middens, *Hyoscyamus niger* (henbane) and *Solanum nigrum* (black nightshade), were not nearly so numerous. Other seeds of annual weeds included *Stellaria media* gp (chickweed), *Polygonum persicaria* (red shank) and *P. lapathifolium* (pale persicaria). Taken together the seeds suggest a community of the Polygono-Chenopodietalia, an order of weeds of root crops, spring-sown cereals and nitrogen-rich disturbed ground that occur around settlements (Silverside 1977, 240–1).

On the parts of the island that experienced less disturbance, the vegetation probably graded into a community dominated by *Urtica dioica* (stinging nettle) and other tall-growing coarse herbs. Interestingly, there were also a couple of early records of *Conium maculatum* (hemlock), which does not become widespread in the region until the Roman period. Phytophagous insects of such vegetation from column 1 and sample 21 are summarised in Table 4.23.

Seeds of *Alnus glutinosa* (alder) were almost absent from the samples from the edge of the island. There were, however, remains of *Rubus fruticosus* agg. (blackberry), *Crataegus* cf. *monogyna* (hawthorn) and *Prunus spinosa* (sloe), so it is possible there was some thorny scrub on the island and around its edge.

Decaying organic material and buildings

As has already been noted, the insect evidence suggested that foul organic refuse had been dumped on the riverbank of the island. This could have included manure, debris from animal byres and crop-processing waste. Beetles from the family Lathridiidae such as *Lathridius minutus* gp and *Corticaria punctulata* (species group 8) were better represented in the samples from the edge of the island than from column 4. These beetles are mould-feeders which are favoured by old damp hay, thatch and stable litter.

The insects gave plenty of evidence for accumulations of organic debris as commonly occur around settlements, but they gave no evidence for the presence of buildings. General synanthropic beetles – which tend to live in indoor habitats (species group 9a), such as members of the Ptinidae – were entirely absent. There was only a single specimen of *Anobium punctatum* (woodworm beetle). This beetle, which is the most important member of species group 10, proliferates in structural timber. It seems likely that the organic refuse did not have its origin inside buildings, and any houses on the island were situated some little distance beyond the excavated area, perhaps on the northern part.

Crops and crop-processing

Several of the waterlogged samples contained a few glumes of hulled wheat including both *Triticum dicoccum* (emmer wheat) and *T. spelta* (spelt wheat). Much higher concentrations of charred cereal

Table 4.23 Phytophagous insects of perennial waste ground vegetation from column 1 and sample 21

Pria dulcamara **on:**	*Solanum dulcamara* (woody nightshade)
Apion aeneum	*Malvaceae* (mallows)
Brachypterus urticae	*Urtica dioica* (stinging nettle)
Cidnorhinus quadrimaculatus	*Urtica dioica* (stinging nettle)
Heterogaster urticae	*Urtica dioica* (stinging nettle)

remains were found in one of the waterlogged samples from the edge of the island (column 1 sample 1), and an associated deposit of charcoal on the bank of the palaeochannel (sample 5). Although the charcoal deposit appeared to represent burnt structural timber, the charred cereal remains from both samples had the character of crop-processing debris rather than a stored crop. There was slightly less chaff than grain and a similar quantity of weed seeds to chaff. Barley, including hulled *Hordeum vulgare* (hulled six-row barley), outnumbered wheat among the identified grain from these samples. In contrast, glumes of emmer and spelt wheat greatly outnumbered rachis internodes of barley. Excluding species unlikely to have grown as arable weeds, for example *Prunus spinosa* (sloe), the charred weed seeds ranged in size from not much smaller than small cereal grains (*Bromus* S. *Eubromus* sp.) to very small (cf. *Trifolium* sp.).

If the ratios between grain, chaff and weed seeds had not been seriously distorted by differential combustion (and preservation was good), the charred crop-processing remains could be classed as 'tail grain', the by-product from the final sieving of a de-husked crop after the majority of the chaff has been removed by winnowing. Such material would probably be fed to domestic animals rather than deliberately burnt as waste. However, it could have been among the structural timbers when they were burnt. It is also possible that much chaff had been lost though differential combustion and that the remains represented de-husking waste.

Even allowing that a single six-row barley rachis can support three grains whereas a pair of emmer or spelt glumes only encloses two or three grains, barley chaff was still under-represented in comparison with wheat chaff. This was perhaps because the wheat had been stored within its glumes in spikelet form whereas the barley ears had been broken up and some of the rachis lost. It is uncertain whether the wheat and barley had been processed separately or mixed. Some late Bronze Age bread found at Lavendon, Buckinghamshire contained both wheat and barley grain (Robinson unpubl. info.).

The other charred assemblages were smaller and tended to contain the same range of remains. Sample 30 of column 4 and sample 41, however, also contained seeds of *Linum usitatissimum* (flax), a crop which is rarely found charred because, unlike cereals, fire was not part of its processing. Some of the samples from columns 1 and 4 contained waterlogged seeds and capsule fragments of flax. It is likely that flax was being rippled (threshed) on the site to extract its edible, oily seeds. It is also possible that flax was being retted in the palaeochannel to extract its fibres, although the concentration of remains was insufficient to confirm this activity.

Emmer wheat, spelt wheat, six-row hulled barley and flax are all well known as late Bronze Age crops, while the status of another plant from the site, *Papaver somniferum* (opium poppy), is much less certain. A single charred seed of *P. somniferum* was identified from column 4 sample 31, and waterlogged seeds of *P. somniferum* were present in most of the waterlogged samples. Column 1 sample 2, however, contained 203 seeds of it. Seeds of *P. somniferum* have already been recorded from a Bronze Age context in Britain at the Wilsford Shaft, Wiltshire (Robinson 1989, 83) and they form a common minor component of Iron Age assemblages of charred arable weeds from sites on the Hampshire Chalk (G Campbell pers. comm.).

P. somniferum now has the status in Britain of a semi-tolerated garden plant and a weed of waste places, especially refuse tips. The frequent occurrence of double-flowered varieties and a range of flower colours shows that most of these populations had their origins as escapes from cultivation of ornamental garden flowers. In central Europe it is also a member of arable weed communities, while in various parts of the world it is cultivated as an oil crop for its edible seeds and as a medicinal/drug plant.

A check on the subsample analysed for insects from column 1 sample 2 also revealed many seeds of *P. somniferum* so the result seems unlikely to have arisen through the chance inclusion of a single poppy capsule in the subsample analysed for macroscopic plant remains. The sample contained few waterlogged cereal remains in relation to poppy seeds so it is unlikely that the seeds represented cereal cleaning waste. It is possible that a stand of opium poppy grew on the island close to the deposit, either cultivated or wild. Poppy seed imported to the site could have been accidentally spilt or discarded among refuse into the channel. Finds of *P. somniferum* have been made from some Neolithic and Bronze Age sites in Germany, Switzerland and the Netherlands in contexts which suggested it was being cultivated (Renfrew 1973, 161–2; Waterbolk and van Zeist 1966, 575–6), and there seems no reason why it should not also have been cultivated in late Bronze Age Britain. Whatever the explanation for the Wallingford opium poppy, the occurrence of seeds of at least two other species of poppy in the sample, *Papaver rhoeas* tp. (field poppy) and *P. argemone* (long prickly headed poppy), in higher concentrations than in any of the other samples, was probably related.

No remains of other cultivated plants were found. A single charred hazelnut fragment provided the only evidence for collected wild food plant resources. Charred seeds of *Crataegus* cf. *monogyna* (hawthorn) and *Prunus spinosa* (sloe) were more likely to have been imported on branches used for fuel than collected for consumption. The discovery of a waterlogged endocarp (core) fragment of *Malus* sp. (apple) from the palaeochannel merely shows that this fruit was available in the locality.

Other imported plant remains

Wood was imported to the site for structural purposes and as fuel. Almost all the structural wood was *Quercus* sp. (oak) and *Corylus avellana* (hazel) which contrasted with the wider range of species among the waterlogged 'driftwood' (see Taylor *et al*., below). Relatively small quantities of Pomoideae indet. (hawthorn, apple etc.), *C. avellana* and *Fraxinus excelsior* (ash) charcoal from column 1 sample 2 and sample 21 probably represented wood burnt as fuel. The much larger quantities of *C. avellana* charcoal from column 1 sample 1, sample 5 and sample 51, however, were probably destruction debris. About half of all the hazel rods were charred (see Taylor *et al*., below).

About half the waterlogged samples contained frond fragments of *Pteridium aquilinum* (bracken), which was perhaps brought for use as animal bedding.

The post-abandonment environmental sequence

The silting of the palaeochannel and floodplain alluviation

The organic remains in column 4 sample 27 probably accumulated after the abandonment of the settlement on the island. Crop remains and charcoal were absent. The invertebrate remains suggest that the channel remained at least seasonally active, while the macroscopic plant remains suggest a landscape that was perhaps more open than earlier. The rise in the proportion of the amphibious mollusc *Lymnaea truncatula* from 2% to 11% of the total molluscs (see Fig. 4.6), however, probably reflected the increasing areas of seasonally exposed mud as the channel silted. These conditions of swamp and mud seem to have persisted until column 4 sample 20 when the proportion of terrestrial molluscs rose from 13% to 28% of the total. Thereafter the regime was one of overbank alluviation on a grassy floodplain.

The assemblages from column 4 sample 20 up to sample 4 comprised aquatic species from the river plus an open-country fauna of land snails, particularly *Vallonia pulchella*, *Trichia hispida* gp and, in some instances, *Cochlicopa* sp. There were few shells of amphibious species. They probably correspond to Evans *et al.* (1992, 69) taxocene 1 with the addition of allochthonous aquatic species. Evans interprets it as a taxocene of relatively dry meadow or pasture with occasional winter flooding. The assemblages did not contain the higher proportion of amphibious species Succineidae and *Carychium* sp. which occur in the alluvial floodmeadow faunas of the Upper Thames Valley (Robinson 1988). This was probably a reflection of the site being better drained and flood waters not standing so long as on some of the broad expanses of Thames floodplain.

An increase in the percentage of aquatic molluscs in column 4 between sample 12 and sample 9 was perhaps due to an increase in the rate of alluviation. It possibly corresponded to the period of rapid alluviation in the riverbank section between 0.64 m and 0.44 m (Thomas *et al.* 1986, 183). In samples 7 and 6 of column 4 there was a significant presence of dry-ground snails, particularly *Pupilla muscorum*. This level in column 4 corresponded to a horizon of disturbance of the Bronze Age occupation layer on the former island. It is suggested that this represented an episode of cultivation on the island and although the molluscan assemblages of these two samples were not characteristic of cultivation, it is possible that this occurred on the island itself during a dry phase. It could have been Roman or later in date.

An increase in amphibious species such as *Lymnaea truncatula* in the top three samples of column 4, reaching 9% in sample 1, suggests conditions became wetter. A rise in *Succinea* or *Oxyloma* sp. might suggest that the vegetation also became taller.

Fen vegetation in the top of the palaeochannel

The fen peat which had formed in the top of the palaeochannel beyond the main area of excavation (sample 60) contained relatively few seeds. They were all from species likely to have been growing in the localised fen itself including *Epilobium* sp. (willowherb), *Berula erecta* (water parsnip), *Pedicularis palustris* (red rattle) and *Carex* spp. (sedge).

The wider implications of the results

The environmental remains from the late Bronze Age site at Wallingford are remarkably similar to the late Bronze Age waterfront site at Runnymede Bridge, in the Middle Thames (Needham 1991), and it is the obvious site with which comparisons can be made. Both sites were settlements situated on what were islands in the River Thames and were the foci of high-status activity which resulted in the deposition of metalwork. Substantial timber structures were found in waterlogged palaeochannel sediments along one side of the islands, and midden material had been dumped in the palaeochannels. However, there was little evidence from insects for the proximity of buildings. Not least, very detailed studies have been made of the environmental archaeology of both sites, using a wide range of lines of evidence.

The environmental archaeology of the Upper Thames gravels during the late Bronze Age was reviewed briefly in the light of the results from excavations at Eight Acre Field, Radley (Robinson 1995, 49) and also as part of the project on the neighbouring site of Barrow Hills, Radley (Robinson 1999). An earlier review covered the Middle as well as the Upper Thames (Robinson 1992a, 54–5). The picture that emerged from several sites was of an open landscape of lightly grazed grassland, that is grassland not so heavily grazed as completely to prevent the flowering of taller grassland herbs and a local presence of mixed thorn scrub. Wallingford and Runnymede both fall into this pattern. Woodland was not entirely absent and the pollen from Wallingford (see Chambers and Botterill, below) might suggest a somewhat greater background presence of trees than on some of the gravel terrace sites. Likewise, the occurrence of seeds of some woodland herbs at Wallingford was possibly a reflection of large-scale clearance being more recent or the presence of more woodland around the edge of the catchment than on some of the other sites. The products of arable agriculture were found on most of the Thames Valley sites that were considered, although at Wallingford and Runnymede the cultivated fields were perhaps on higher ground at some distance from the settlements.

Both the Wallingford and Runnymede sites had areas of nutrient-rich disturbed ground which supported such weeds as *Chenopodium album* (fat hen) and *Urtica dioica* (stinging nettle) as might be expected for settlements of this date. In addition, seeds of *Conium maculatum* (hemlock) were present. It is a weed of riverbanks and damp waste ground, especially where refuse has been dumped. *C. maculatum* was a common weed on Roman sites in the Thames Valley (Robinson 1980, 93) but, with the exception of Wallingford and Runnymede, has not been found on earlier sites in the region. Trade along the River Thames would have provided a means by which this plant could spread into the region, perhaps from a Bronze Age introduction to the British Isles. These riverbank settlements were evidently suitable habitats where it could flourish. However, not until the Roman period did conditions enable a general colonisation of settlements. Various lines of evidence suggest that the intensity of activity on settlements was greater in the Roman period than in later prehistory (Robinson and Wilson 1987, 54) and it might be that these high-status late Bronze Age sites showed more similarity to settlements of a later period.

Although both Runnymede and Wallingford had waterlogged midden deposits which contained numerous remains of insects that feed on foul organic material, few woodworm beetles (*Anobium punctatum*) or other synanthropic insects of indoor habitats were found on either site. This fauna was certainly present in Britain before the late Bronze Age (Robinson 1992b). Such a result was somewhat surprising but was presumably because the middens largely comprised dung and crop-processing waste rather than debris from inside houses.

Wallingford joins Runnymede in a select group of late Bronze Age sites in southern Britain where both emmer (*Triticum dicoccum*) and spelt (*T. spelta*) wheat were being used. They date back to about 3000 BP and were mostly of high status (Greig 1991, 259). Spelt wheat was also identified from a late Bronze Age waterhole at Eight Acre Field, Radley, but further late Bronze Age sites in the Upper and Middle Thames Valley have so far only yielded emmer wheat (Robinson 1995, 48–50). Evidence is now emerging for a presence of spelt wheat in Britain during the middle Bronze Age with possible records from Godmanchester, Cambridgeshire (P Murphy pers. comm.) and Yarnton, Oxfordshire (Robinson in prep. b). By the early Iron Age, spelt became the main wheat cultivated over much of Britain and in the Upper Thames Valley; emmer wheat was reduced to only a trace in charred cereal assemblages as, for example, at the Ashville Trading Estate, Abingdon, Oxfordshire (Jones 1978, 94, 108).

The other certain crops from Wallingford – six-row hulled barley (*Hordeum vulgare*) and flax (*Linum usitatissimum*) – have a record of cultivation in Britain that goes back to the Neolithic and continues up to the present day. They were again found from the late Bronze Age phase at Runnymede (Greig 1991, 259). The discovery of a large quantity of seeds of opium poppy (*Papaver somniferum*) serves to illustrate the difficulty of determining whether a plant which certainly grew as a weed in prehistoric Britain was also a cultivated crop. Given the evidence for its cultivation in continental Europe, there seems no reason why it should not also have been cultivated in Britain.

The importation of fronds of bracken (*Pteridium aquilinum*) from an area of light acidic soil some distance from the site, perhaps for animal bedding, was a forerunner of a trend that became widespread on sites in the Upper Thames Valley during the Iron Age (Allen and Robinson 1993, 117). Bracken was likewise found in the midden at Runnymede (Robinson 1991, 325). It shows that the settlements were not dependent just upon their immediate environs for their subsistence activities.

Overall, the results from Wallingford present a picture of the landscape of the Upper Thames Valley during the agricultural intensification of the late Bronze Age. Clearance had been sufficiently extensive that structural timbers were being obtained from managed or at least secondary woodland. The floodplain was being used for pasture, and arable land was perhaps situated on the gravel terraces. The woodland relicts among the waterlogged seeds, and the seeds of grassland plants among the charred arable crop remains, emphasise that this change was ongoing. The silting of the palaeochannel and sedimentation over the island were reflections of the longer-term hydrological consequences as the agricultural intensification in the Upper Thames Basin continued into the Iron Age and Roman periods, consequences considered in more detail elsewhere (Robinson 1992c). At the more local level, the results here complement the other archaeological evidence for site conditions and activities on a rather unusual high-status site and have brought out further similarities with the only close parallel at Runnymede Bridge.

POLLEN ANALYSIS

by Frank Chambers and E W Botterill

Introduction

Ten samples from the excavations were submitted to the Environmental Research Unit, University of Keele for pollen analysis. The samples (subsamples of those taken for other environmental analyses, see Robinson above) derived from an alluvium-filled channel containing piles of a late Bronze Age waterfront structure. Samples 1–3 were from a sequence through the late Bronze Age sediments in trench XXIV, containing timber debris and charcoal (context 2405). Six of the other samples derived from a column sample (column 4), also taken from the palaeochannel fill in trench XXIV. These samples, 4.27–4.32, were taken at 0.1 m intervals from the portion of this column sample which cut through the organic layer 2405 and the base of the immediately overlying alluvial layer (2404, see Fig. 2.3). Sample 21 was taken separately from an organic deposit at the base of the channel further downstream, but still containing archaeological debris.

Laboratory methods

Samples were prepared for pollen analysis after the method of Barber (1976), employing hydrofluoric acid digestion, and using silicone oil as mounting medium. Pollen counts were then conducted, using a total land pollen (TLP) sum, excluding spores. Trees and major shrubs comprise arboreal pollen (AP); other pollen types comprise the non-arboreal pollen (NAP).

Results and discussion

Pollen was found in all samples, but the abundance and state of preservation varied considerably. Pollen was very sparse, or sparse in some, and in rather poor condition generally, with the exception of sample 21, in which the condition was excellent. The results are listed in Table 4.24, in which an attempt has been made to separate the non-arboreal pollen taxa into broad ecological groups. These should not be seen as definitive, as there is inevitable overlap between them, and some taxa could be placed in several of the groups.

The relatively low AP/NAP ratios in all the samples confirm an open local environment. Sample 21 had significantly lower arboreal pollen percentages (9.2%) than all the others; while sample 4.29, close to the middle of the vertical sequence of six samples, had the highest (33.8%). Of the arboreal taxa, *Quercus* (oak), *Alnus* (alder) and *Corylus* (hazel) were the principal types. The presence of *Fraxinus* (ash) and of *Sambucus* (elder) in some samples is suggestive of secondary woodland.

Gramineae (grass) pollen dominate all the pollen spectra, which together with the number of other taxa is suggestive of pastoralism (Dimbleby 1985), but could also be indicative of non-agricultural disturbed ground, or indeed of arable agriculture (Behre 1986).

Cereal-type pollen was recorded from all samples, although owing to difficulties of identification, *Glyceria* (an aquatic grass with a similar pollen size) may be included in these. The sample with the largest percentage of cereal-type pollen (sample 21) also included one grain of *Centaurea cyanus* (cornflower) – a notable arable weed (Behre 1986).

The proximity of the sampling sites to open water is testified by pollen records of a number of aquatic fringe and open-water taxa, including *Potamogeton* (pondweed) and *Nymphaea* (white water lily), and by the presence of pollen from certain marsh or wetland taxa (see Table 4.24).

WATERLOGGED WOOD

by Maisie Taylor, Rowena Gale and George Lambrick

Introduction

The catalogue of waterlogged wood presented below was compiled from the site records, report and draft descriptive/analytical catalogue created by George Lambrick during and soon after excavation. Rowena Gale undertook all species identifications. This earlier work was very thorough and of great value in the consideration of more detailed analysis of the woodworking. Some of George Lambrick's and Rowena Gale's comments have been incorporated into the text, and this has been acknowledged as far as possible. Some of the material was still available for examination when this more detailed phase of the analysis began, and some had been conserved. The quality of the conservation was extremely high and it was possible to add more data, including some information on surface detail, to the catalogue after further consideration of the surviving material.

Wood

Ninety-eight pieces of wood were recorded in detail in the field. They included *in situ* verticals and a variety of horizontal wood. Most of the wood was worked (51 pieces) and much was charred (46 pieces). Some were both worked and charred and in these cases the charring sometimes 'blurred' the woodworking detail. A high proportion of the material was retained and was therefore available for later examination. Thirteen pieces were conserved by freeze-drying.

Dimensions

Where the dimensions of some pieces examined in storage were different from those recorded in the

Table 4.24 Pollen spectra in samples analysed

Sample no.	*1*	*2*	*3*	*4.27*	*4.28*	*4.29*	*4.30*	*4.31*	*4.32*	*21*
Arboreal pollen										
Betula	-	-	0.2	0.4	0.4	0.2	0.4	1.0	0.3	0.2
Pinus	1.1	1.4	0.2	2.0	0.4	1.2	1.2	0.8	0.6	0.2
Ulmus	-	0.3	0.7	-	-	0.6	-	0.8	0.6	0.2
Quercus	4.4	8.5	7.0	6.0	9.1	11.8	5.0	3.3	5.2	2.0
Alnus	1.1	5.4	5.4	6.5	4.6	8.0	3.6	4.1	6.6	2.2
Tilia	-	-	-	0.8	0.4	0.2	0.9	-	0.9	-
Fraxinus	-	1.4	0.2	0.4	2.0	2.0	1.4	1.7	1.1	1.0
Ilex	-	-	-	-	-	0.2	-	-	-	-
Hedera	-	-	-	-	-	-	-	-	0.3	-
Fagus	-	-	-	-	-	0.2	-	-	-	-
Corylus	6.7	3.1	6.3	6.5	4.0	8.4	5.9	4.6	4.9	3.0
Salix	-	0.3	1.2	-	0.8	0.8	1.4	-	1.1	0.2
Sambucus	-	0.3	-	-	-	0.2	-	0.4	-	-
Rhamnus	-	-	-	-	-	-	-	-	-	0.2
Herbs										
(a) Woodland and woodland fringe										
(Polypodium)	-	-	0.2	0.4	-	0.2	-	-	0.3	-
(Filicales)	1.1	1.0	0.2	3.6	0.8	1.0	0.9	-	2.0	0.2
(Pteridium)	-	2.4	0.7	0.4	0.8	1.0	0.9	0.4	1.7	0.4
Solanum dulcamara	-	0.3	0.2	-	-	-	-	-	-	-
Umbelliferae	1.1	2.4	2.6	0.8	1.2	0.8	1.4	0.4	0.9	1.4
Liliaceae	-	-	0.2	-	0.4	0.6	-	0.4	-	-
Centaura cf. *nigra*	-	-	-	-	-	0.4	-	-	0.3	-
Stellaria	-	-	-	-	-	-	0.9	-	-	-
(b) Ruderal and grassland										
Caryophyllaceae	2.2	1.7	0.7	1.2	0.4	1.2	0.9	-	-	1.4
Labiatae	2.2	-	0.7	2.0	0.4	0.2	0.4	-	0.9	0.2
Artemisia	-	-	-	-	0.4	-	0.4	0.4	-	0.4
Compositae Tub.	-	1.4	0.2	0.8	0.4	0.8	0.9	1.2	0.9	1.4
Compositae Lig.	5.5	2.0	1.6	2.4	2.5	1.2	1.8	1.6	1.1	1.8
Chenopodiaceae	-	0.7	0.2	0.8	0.4	0.4	-	-	0.6	2.4
Rumex	-	1.0	1.2	0.4	0.8	0.4	0.4	1.2	0.3	0.6
Plantago lanc.	3.3	2.4	3.5	0.8	5.0	4.0	5.0	8.3	4.9	6.4
Papilionaceae	3.3	3.1	0.5	0.8	1.2	1.4	2.3	5.4	0.9	4.4
Gramineae	51.0	45.6	53.9	43.1	50.6	44.8	48.4	52.7	48.6	48.4
Poterium	-	1.0	0.7	-	-	-	-	-	-	1.4
Potentilla-type	2.2	0.7	-	-	0.4	0.2	-	-	0.6	0.8
Malvaceae	-	-	0.2	-	-	-	-	-	-	-
Campanulaceae	-	-	-	-		-	-	-	-	0.2
(c) Arable										
Cereal-type	4.4	1.4	1.4	2.0	0.8	2.0	4.5	2.9	4.0	7.8
Cannabiaceae	1.1	1.0	0.7	0.8	-	-	-	-	-	-
Centaurea cyanus	-	-	-	-	-	-	-	-	-	0.2
Cruciferae	-	2.0	0.7	1.2	-	-	-	-	0.9	-
Anagallis	-	-	0.2	-	-	-	-	-	-	-
(d) Marsh, fen and heath										
Ranunulaceae	4.4	2.0	3.1	1.2	4.1	2.6	2.7	4.1	0.6	3.0
(Lycopodium)	-	-	0.2	-	-	-	-	-	-	-
Mentha-type	-	-	0.2	-	-	0.2	-	0.4	-	0.4
Thalictrum	-	-	-	-	-	0.2	-	-	-	-
Succisa	-	0.3	-	-	-	-	0.4	-	-	-

Table 4.24 Pollen spectra in samples analysed (continued)

Sample no.	*1*	*2*	*3*	*4.27*	*4.28*	*4.29*	*4.30*	*4.31*	*4.32*	*21*
Filipendula	-	2.0	-	0.4	0.4	1.0	5.0	1.2	1.1	1.0
Cyperaceae	4.4	5.4	5.6	14.5	5.8	1.2	3.2	0.8	10.9	6.0
Ericaceae	1.1	-	0.5	-	0.8	0.2	-	0.4	-	-
Vaccinium	-	-	-	0.4	-	-	-	-	-	-
(e) Aquatic fringe and open water										
Typha-type	-	0.7	0.2	1.2	1.7	1.8	-	-	-	0.4
Sparganium-type	-	0.7	0.9	1.2	0.4	0.8	0.4	0.8	-	0.6
Potamogeton	-	0.3	-	0.8	-	-	0.4	0.4	-	-
Nymphaea	-	-	-	0.4	-	-	0.4	-	-	0.8
Summary										
Arboreal pollen (%)	13.3	20.7	21.2	22.6	21.7	33.8	19.8	16.7	21.6	9.2
Total land pollen (TLP)	90	294	426	248	241	500	221	241	348	500

Note: Taxa in parentheses are excluded from the total land pollen (TLP) sum

field, it was assumed that the field measurements were more accurate. Even slight drying out in storage can distort certain measurements, such as diameters, disproportionately. The lengths of some pieces were not recorded in the field, although they are evident from the plans.

Species identified

Species identification indicated that there were six species or groups of species.

Quercus sp. – oak

Thirty-four pieces were identified as oak. Of these, 27 were either timber, for example Wood 58 (Fig. 4.7.4) and Wood 49 (Fig. 4.8.6), or debris from timberworking, for example Wood 54 (Fig. 4.7.1), 28 (Fig. 4.7.2), 31 (Fig. 4.7.3), 10 (Fig. 4.8.7), 17 (Fig. 4.8.5), 81 (Fig. 4.8.8), 64 (Fig. 4.9.10) and 75 (Fig. 4.9.11). Another four were roundwood, for example Wood 96 (Fig. 4.9.9), but were large structural verticals. Eighteen pieces of timber and debris were charred, together with two pieces of smaller roundwood. One piece showed clear evidence for coppicing: Wood 93 (Fig. 4.11.16). All the oak was worked.

Corylus avellana – hazel

Twenty-eight pieces were identified as hazel, all of which were roundwood, many of which were trimmed (eg Fig. 4.10.12–13). Twenty-one pieces were charred, and on some occasions the charred ends may also have been trimmed. There were few definite signs of coppicing although many pieces had straight and, sometimes, quite long stems. Wood 57 also had a slight curve at the base of the stem.

Pomoideae – *apple, hawthorn etc.*

Sixteen pieces were identified as Pomoideae; of these, seven were trimmed in some way and two were charred. Some showed signs of being taken from a coppice (eg Fig. 4.11.15) or hedge (eg Wood 26). The different genera are impossible to separate microscopically, which leaves us with the likelihood that this wood comes from wild apple or pear, hawthorn or service.

Prunus **sp.** – *sloe, cherry etc.*

Five pieces were identified as *Prunus*. Because there are many difficulties in separating the different types of *Prunus*, this was not attempted. The wood is most likely to come from wild cherry or blackthorn. Wood 4 is roundwood, and was recorded in the field as trimmed, Wood 20 and 85 were also roundwood, while Wood 89 (Fig. 4.10.14) was a fork, trimmed at one end but still with side shoots.

Alnus glutinosa – alder

Two pieces were identified as alder. Wood 22 is a large woodchip, while Wood 86 was recorded in the field as a 'split log'.

Fraxinus excelsior – ash

One piece was identified as ash.

Roundwood

Sixty pieces of roundwood were retrieved from the excavation; much of it was trimmed, some of it was charred, and some of it was trimmed and charred which made analysis of the woodworking difficult. The diameters of the roundwood ranged from 5 mm on a twig of Pomoideae (Wood 79) upwards. The

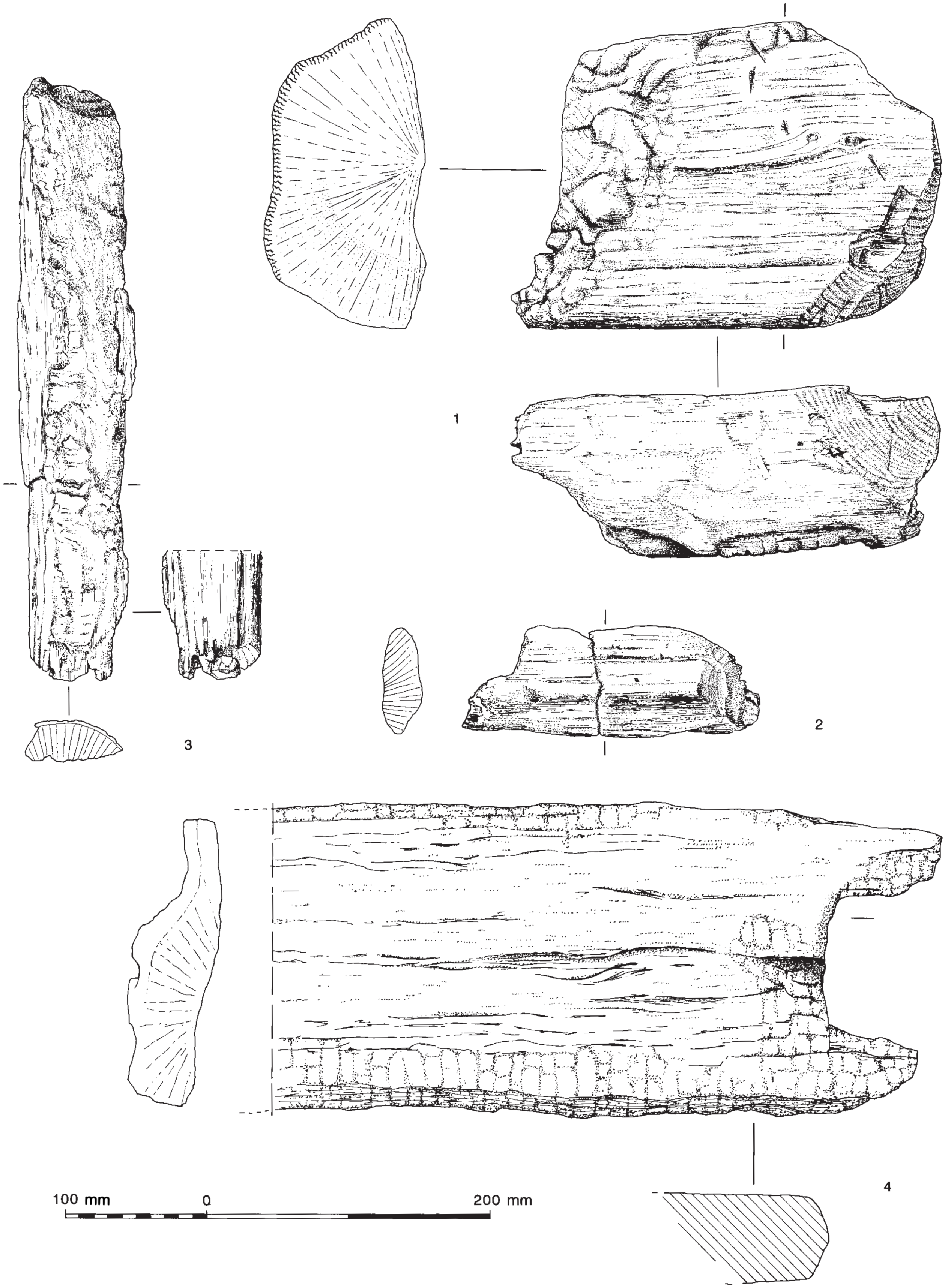


Figure 4.7 Worked oak (catalogue nos 54, 28, 31 and 58)

Figure 4.8 Worked oak (catalogue nos 17, 49, 10 and 81)

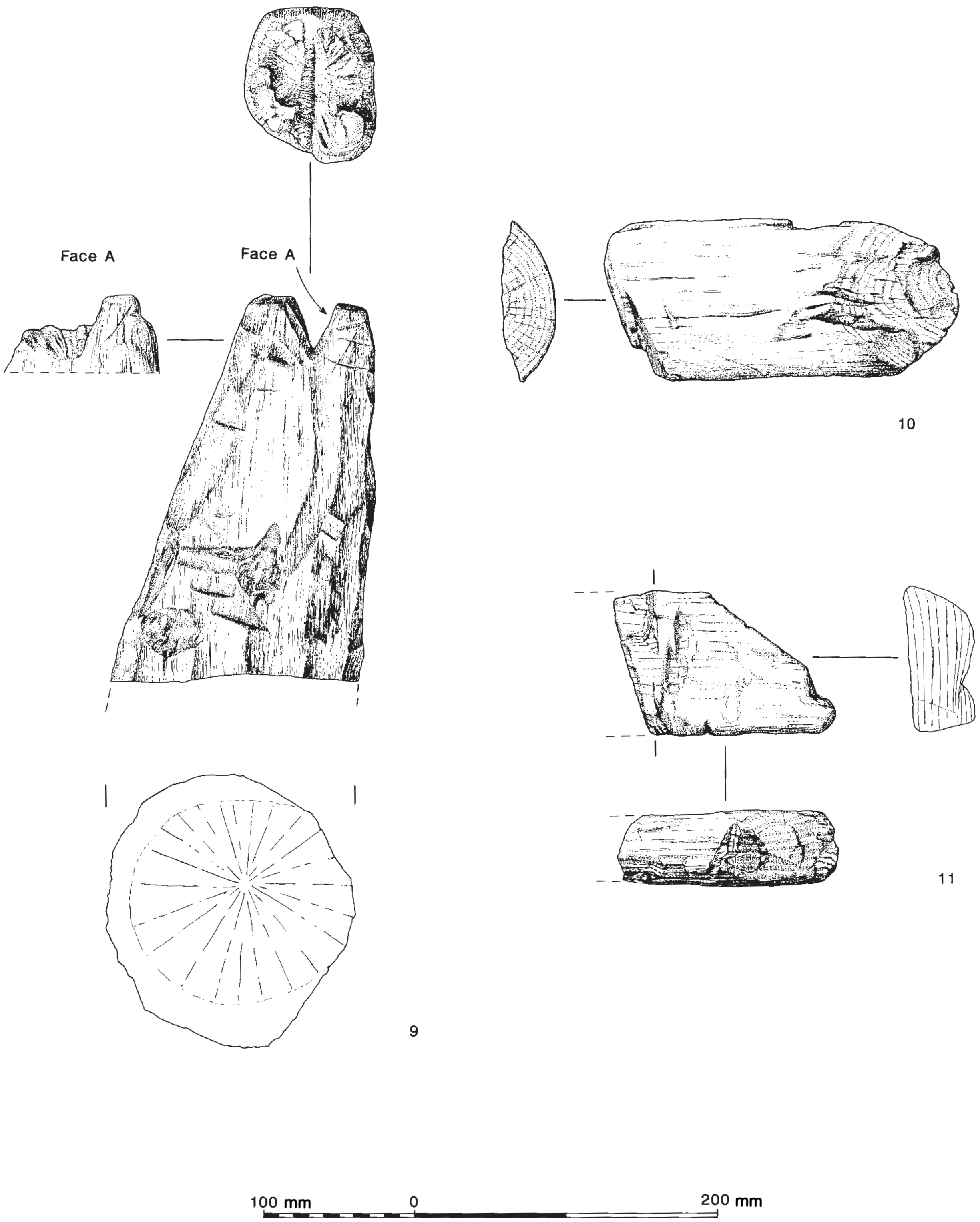


Figure 4.9 Worked oak (catalogue nos 96, 64 and 75)

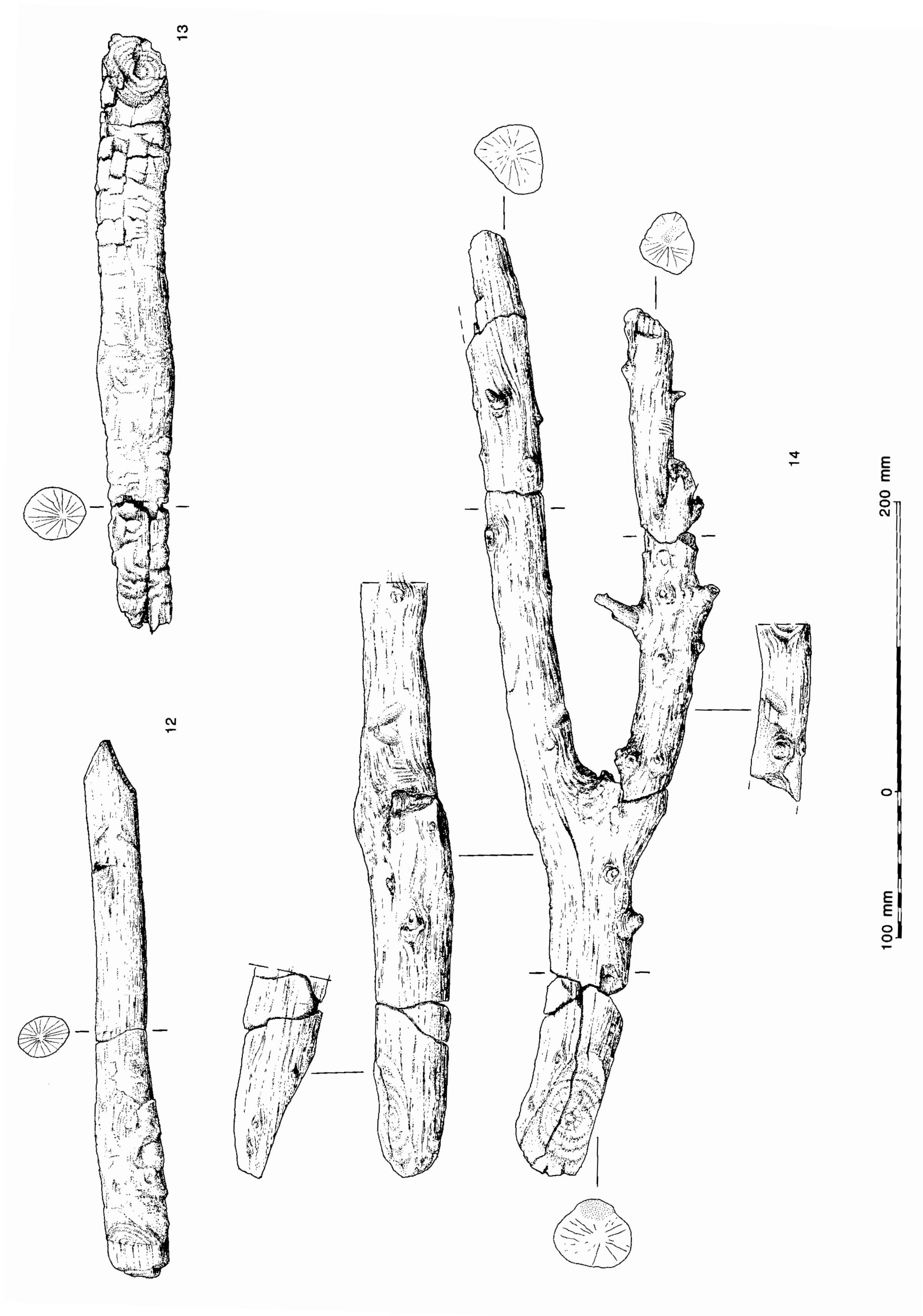


Figure 4.10 Worked wood (catalogue nos 40, 91 and 89)

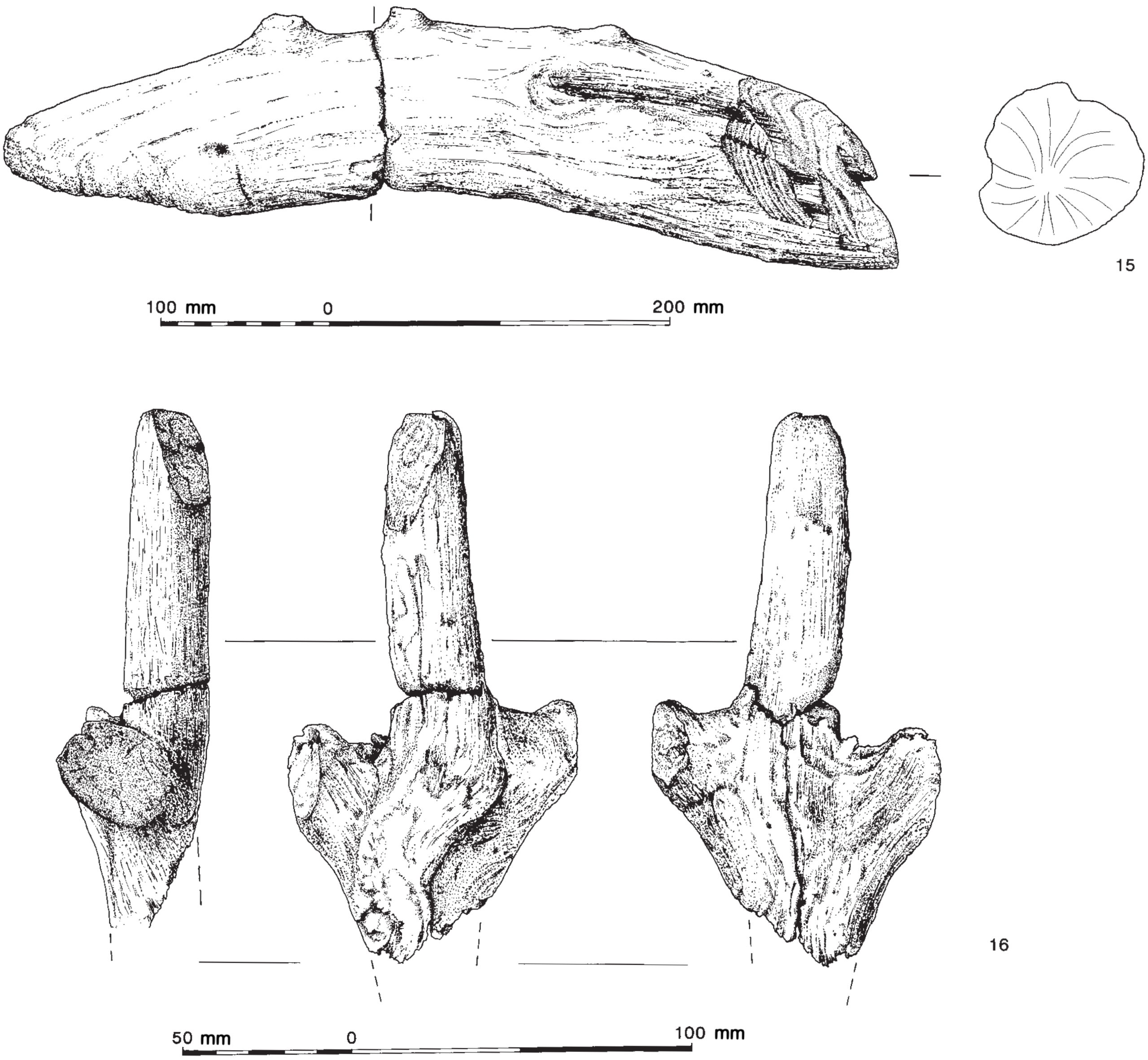


Figure 4.11 Worked wood (catalogue nos 1 and 93)

biggest tree used on the site was a 400 mm diameter oak tree from which a radial plank had been split (Wood 75, Fig. 4.9.11).

Woodworking

Given the relatively small size of the assemblage, a high proportion of the wood from the site was worked (over 50%). There is virtually no small woodworking debris, but a wide variety of woodworking techniques are evident. The woodworking debris that is present is derived from timber-working, and some of it may actually be the remains of badly burnt timbers. There is also virtually nothing to suggest that the wood is an accumulation of 'natural' wood, which has simply fallen off trees. Most of the roundwood is trimmed and much of the rest is either charred or in poor condition so that simple trimmed ends might not have been evident. There is one 'twig' (Wood 79), with a diameter of only 5 mm, but the remainder of the roundwood has a diameter of more than 10 mm (Fig. 4.12).

Hewing

Hewing is not very well recorded from assemblages of prehistoric woodworking. Hewing is a technique of creating a flat surface with an axe or adze. Until saws were invented, splitting or hewing could most

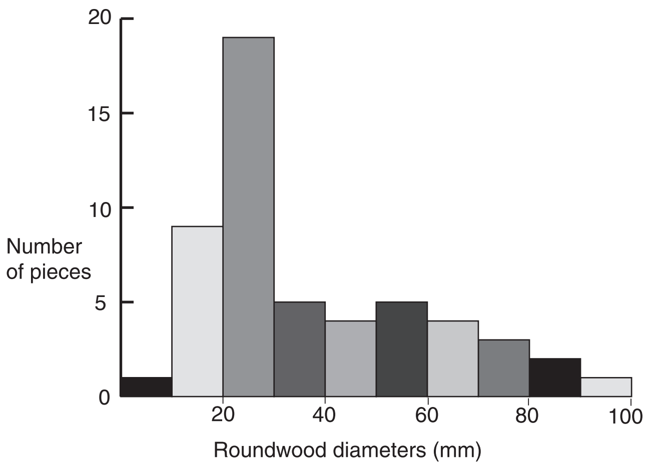


Figure 4.12 Roundwood diameters from wood deposit

efficiently create flat surfaces. Sometimes when the working went wrong, or perhaps wood was not of a high enough quality, split surfaces would have to be hewn to some extent to finish them. The evidence for hewing may be very slight, or even lost through careful finishing or subsequent wear. Sometimes it may be deduced that the most likely technique of shaping is hewing. Wood 17 (Fig. 4.8.5) was originally a half split and then hewn flat. It is very unlikely that such a shape could have been formed by splitting again across the grain. Wood 97 and 95 have both had some of their sapwood hewn off, a common practice at all periods, as sapwood rots faster than heartwood.

Trimming

Trimming is a very common form of woodworking, from trimming up roundwood, to squaring up the ends of timber. Roundwood has to be trimmed to remove the felling faces or the less useful curved ends where wood is coppiced. Wood 1 (Fig. 4.11.15) is trimmed from two directions which are possibly the felling faces of the small trunk. Wood 93 (Fig. 4.11.16), which is clearly part of a coppice stool, has been trimmed. There are a number of pieces of roundwood which have been trimmed at one or both ends: Wood 91 (Fig. 4.10.13), 88, 87, 60, 57, 48, 26, 19 and 2 were all trimmed at one end. Wood 40 (Fig. 4.10.12) is trimmed at both ends. Some pieces might have been trimmed at both ends originally, but several pieces are trimmed one end and charred the other. The burning would have destroyed any traces of trimming that might originally have been there (eg Wood 91, Fig. 4.10.13). Wood 89 (Fig. 4.10.14) is a forked piece which has been trimmed. Natural forks may be trimmed up, taking advantage of the shape, to make a tool, but this fork has only been rough trimmed and is more likely to be derived from a hedge.

Wood 28 (Fig. 4.7.2) is a small piece of timber debris, or an offcut, which has been roughly trimmed at one end. Wood 77 is another offcut with one end trimmed to be slightly concave. Wood 75 (Fig. 4.9.11) is a radially split piece, trimmed square; one end is trimmed from one direction. Wood 64 (Fig. 4.9.10) is split tangentially from a piece of roundwood and trimmed up at one end. Wood 44 is a strange tangential woodchip or piece of debris which was probably generated during the removal of a knot hole from a timber. Wood 54 (Fig. 4.7.1) is a half split piece which may have been trimmed at one end from two directions, or it may be that the piece still retains traces of its original felling faces.

Splitting

It is not common to find complete structural timbers from prehistoric sites, but interesting glimpses can be gained from the offcuts or timber debris that occur more frequently. The way that the timber was reduced from the round can often be deduced from quite small fragments, and that in turn can often give an impression of the size of trees available for working. There are, for example, ten pieces of tangentially split wood, all of which are fragments or offcuts. Splitting is a very efficient way of reducing roundwood to planks, boards and beams. Not all woods split easily or cleanly; the best is oak which can be halved and quartered and then split down into increasingly thinner, radial, wedge-shaped planks. Large oaks can be split across the grain, tangentially, to produce useful timber. It is sometimes possible to split other species of trees but none as efficiently as oak. It is not surprising to find, therefore, that all the split wood is oak. Although some of the pieces are quite small pieces of timber debris and offcuts, and some others are badly charred, it is possible to deduce how the wood was split, and sometimes the diameter of the original tree.

Wood 81 (Fig. 4.8.8) is radially split from quite a small trunk. Wood 75 (Fig. 4.9.11), on the other hand, is split from quite a large trunk. It is not possible to calculate how large, but the medullary rays in this piece are virtually parallel, which suggests a substantial trunk. There are plenty of examples of the simplest split of all, the half split trunk, including Wood 32, 49 (Fig. 4.8.6), 54 (Fig. 4.7.1), 59, 61, 62 and 69. Half split roundwood was a common choice for structural beams, with the split face providing the flat horizontal surface. Several fragments of half split, jointed beams survive, although all the joints are either broken or burnt. Wood 27 and 58 (Fig. 4.7.4) both have damaged open joints, of which Wood 58 (Fig. 4.7.4) is the best preserved. This piece is deeply charred and it is very likely that the joint was originally a complete mortice. This is a common joint in half split timbers at Flag Fen (Taylor 2001). Wood 64 (Fig. 4.9.10) is an unusual tangential split because it is taken from quite a small trunk. It is possible that it is a failed half split, where the split has wandered away from the centre of the stem. Wood 31 (Fig. 4.7.3) is possibly similar. This can happen quite easily, especially on fairly small roundwood. Wood 77 is difficult to interpret because it has been deeply charred subsequent to the splitting. Similarly, Wood 73 may have been trimmed up square after splitting tangentially, but it has been heavily charred and so the trimming is difficult to separate from the other shaping. Wood 52 and 42 are also tangentially split, but charred. Wood 28 (Fig. 4.7.2) is tangentially split but too small to draw many conclusions.

Joints

Mortices seem to be very common joints in the later Bronze Age (Taylor 1992, 490) and there are fragments of two here: Wood 17 (Fig. 4.8.5) and 58 (Fig. 4.7.4). The charring is again a problem here. Pieces such as Wood 10 (Fig. 4.8.7) are probably notched but subsequent charring makes it difficult to be quite sure of the shape and function of the 'notch'.

Woodchips

Where wood has been worked, whether split or trimmed, hewn or joints cut, there will be quantities of woodchips. Here, however, there are only three possible examples from the site: two of oak (Wood 30 and 70), and one, of alder, which was recorded in the field but not retained (Wood 22). With only three woodchips from the site, it is quite clear that no serious woodworking was actually being carried out in the immediate vicinity.

Verticals

The verticals were not excavated, but some were sampled and were quite large (170–200 mm) roundwood. It was noted in the field on Wood 95 that some of the sapwood had been trimmed off and this may, in fact, have been the start of the trimming of the vertical to a point to ease insertion. One of the verticals (Wood 96, Fig. 4.9.9) had been shaped and notched in the top. It is very hard to interpret this notch, particularly as it has subsequently deteriorated and is no longer as clear as it is shown to be in the drawing and site photographs.

Charring

Just over half the wood from the site was charred, but within certain classes of wood charring is more or less common. This becomes apparent if the distribution of charred wood (see Fig. 2.7) is compared with the distribution of species (see Fig. 2.8) and the distribution of worked wood (see Fig. 2.9). There are also problems which occur occasionally when attempting to distinguish trimming from burning, and particularly when attempting to distinguish the details of trimming where the wood has been subsequently charred. Charring of the surface of a piece of wood may obscure detail, especially with a technique such as hewing, which only leaves subtle traces. It would be impossible to tell, for example, whether a piece such as Wood 58 (Fig. 4.7.4) was hewn down from the half split, or whether it had been used as a straight half split timber which subsequently charred along its length, subtly altering the shape in section.

Tool marks

Although several pieces had clear marks made by axes trimming up ends etc. (Wood 64, Fig. 4.9.10; Wood 2), only three produced clear profiles of actual tools (Wood 1, 75 and 81, Fig. 4.13). The work on tool marks at Flag Fen, Peterborough (Taylor 2001) and later examples at the Oakbank Crannog, Loch Tay (Sands 1997) have led to an easy way of recording actual profiles as a curvature index of the width of the cutting edge (blade): depth of cutting edge (blade) (in mm). Recorded in this way, the trimmed end of Wood 1 (Fig. 4.11.15) was cut with an axe 40:3. Two other complete profiles were measured on marks trimming up split roundwood. Wood 81 (Fig. 4.8.8) was trimmed up with an axe 36:3. The marks on Wood 75 (Fig. 4.9.11) were made by an axe 30:7 (Fig. 4.13).

Coppicing and hedging

Coppicing and hedging both involve heavy cutting back of certain species of woody plants. The regrowth of coppice tends to have characteristic

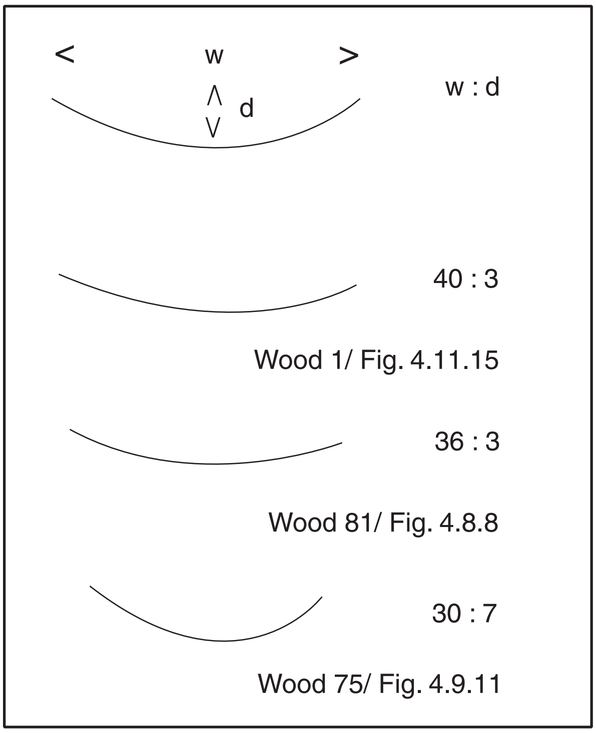


Figure 4.13 Toolmarks observed on wood

shapes: curved stems with heels and long straight stems. There also tends to be a characteristic ring pattern in coppice that grows on for several years: fast-grown rings for a few years, then very slow growth. Characteristic shapes in hedging are less clear, but where hedges have been laid, to make them stock-proof, certain characteristic shapes of regrowth or growing can occur (Taylor 1996, 107). In particular, cuts and right-angled bends in stems are unlikely to be caused by anything else.

Wood 93 (Fig. 4.11.16), which is oak, is the clearest evidence for coppicing. It is part of a coppice stool with three stems. Wood 57, which is hazel, has a long straight stem and slight curve. Both oak and hazel were commonly coppiced in the past to produce raw materials for charcoal-making, fencing and building purposes. Some of the pieces of Pomoideae are also curved. Wood 1 (Fig. 4.11.15) and Wood 5 have curved stems. Wood 2 also has a long straight stem and Wood 6 was recorded in the field as 'bent'. Only one piece shows the characteristic right-angled shape discussed above and that is Wood 26.

The *Prunus* sp. that was found was all roundwood and although it could not be identified more closely, some of it appeared to be blackthorn. Either cherry or blackthorn could have been incorporated into a hedge.

Discussion

A good deal of the comparative material for this discussion section will necessarily be drawn from Flag Fen where extensive research into the wood there has recently been carried out (Taylor 2001). One of the problems for the excavators at Flag Fen is that comparative material is so rare that it is difficult to know whether the assemblage of wooden artefacts and woodworking found at Flag Fen is 'normal'.

Species selection is very important for all aspects of woodworking. It is not surprising to find that all the oak shows signs of having been worked. Oak, especially with hazel, is the classic structural combination: oak timbers with hazel wattle infill. The Pomoideae and *Prunus* are much less likely to have been selected for building work, although both woods have their uses, such as carving. Alder can be an important timber tree and its roundwood may be used in place of hazel in areas where it is too wet for hazel to flourish. Ash is a good second-grade tree which often turns up in structures. Pomoideae and *Prunus* are most likely to occur as hedging plants.

If the distribution of driftwood/worked wood (see Fig. 2.9) is compared with the distribution of species (see Fig. 2.8), then virtually all the Pomoideae and *Prunus* were considered in the field to be driftwood, suggesting that the hedge (or hedges) was somewhere in the area, and that debris from hedges found its way into the water.

Previous work on the diameter measurements of roundwood used in wattle structures has shown that there are, not surprisingly, strong patterns in the types and sizes of roundwood used for this kind of construction (Taylor 1988; 1998). Over half the roundwood diameters here fall between 11 mm and 30 mm diameter. Other than one small twig with a diameter of 5 mm, all the remainder is larger roundwood, up to and over a diameter of 60 mm. The pattern is very like that of a wattle hurdle, although heavier. Work is currently underway at Flag Fen on the excavation and analysis of a wattle wall which may be a revetment, and although this work is still at an early stage, initial impressions are that the wattle of this revetment may be rather heavier than that of other recorded hurdles. Work is also ongoing on coppice products from the site at Yarnton.

Of the timber and timber debris, 70% was charred. Over 80% of the hazel roundwood was charred, but only a small proportion of the Pomoideae roundwood was charred and none of the *Prunus.*

Although there are not enough complete profiles for any detailed work on the tools, the axe marks here fall within the range of profiles recorded from other Bronze Age sites. The average blade width at Wallingford is 35.77 mm, while at Flag Fen it is 38.06 mm, but this is still within the range of widths for socketed axes and some palstaves (Taylor 2001). It seems that tool marks on wood tend to be narrower than the tools which originally produced them, and this may be a factor here. This problem is discussed in detail in Taylor (ibid.). Using the width and depth of the impression of the blade edge to produce a curvature index (%) has been a very productive way of analysing tool marks at Flag Fen, where the most commonly used tool turned out to be the socketed axe. Even with such a small number of impressions the range of curvature on the wood from Wallingford is very limited: Wood 1: 1.78; Wood 81: 1.44; Wood 81: 0.18 (see Fig. 4.13). This gives an average of 1.13, which is in the lower end of the range for socketed axes. The work undertaken so far suggests that flat and flanged axes and palstaves all have much higher indices for their lower limit. In other words they are more curved. The date from the wood (1000–800 cal BC) would fit with the use of socketed axes.

With evidence for hewing, splitting and trimming from the site, there is a fair range of woodworking techniques from such a relatively small assemblage. Also, a good deal of the woodworking detail is distorted and obscured because of the level of charring. It is possible that there may have been other joints than the two mortices (Wood 17 – Fig. 4.8.5 and Wood 58 – Fig. 4.7.4), which did not survive the burning. Hewing and trimming of wood produces large quantities of woodchips and as these are absent from the site then it can be said with some confidence that there is no evidence that any extensive woodworking was being carried out on site.

There is much to suggest that a great deal of the material here is derived from a burnt-down structure. There is a lack of any obvious horizontal member or timber *in situ*, but the high proportion of timber and hazel of an appropriate size for wattling is interesting, and it seems to be mostly this material that is charred. Mark Robinson (see above) found no beetles that might be associated with structural buildings, so his suggestion that the building burned down (or was demolished) elsewhere and then dumped here seems very likely. It is also supported by the fact that there were quantities of burnt hazel among the charred plant remains from the site.

Catalogue of wood *(Figs 4.7–11)*

1. Fig. 4.11.15. Roundwood (Pomoideae – apple, hawthorn etc.). Possible felled trunk or stem, trimmed one end/two directions, tool marks on the felling facet with tool mark 40:3 (Fig. 4.13). Slight curve may indicate coppicing. Conserved by freeze-drying. L: 530 mm; Dia.: 100 mm.
2. Roundwood (Pomoideae – apple, hawthorn etc.) Trimmed one end/one direction, long straight stem (possibly coppiced). Conserved by freeze-drying. L: 1160 mm; Dia.: 92/58 mm.
3. Timber debris (Pomoideae – apple, hawthorn etc.), half split. Disintegrated on lifting.
4. Roundwood (*Prunus* sp. – sloe, cherry etc.). Recorded as trimmed in the field. L: 780 mm (field measurement); Dia.: 80 mm.
5. Roundwood (Pomoideae – apple, hawthorn etc.). Trimmed one end/all directions, curved stem possibly indicates coppicing or hedging. L: 480 mm; Dia.: 80 mm (field measurements).
6. Roundwood (Pomoideae – apple, hawthorn etc.). Recorded as bent and trimmed in the field. L: 250 mm; Dia.: 35 mm.
7. Discarded in the field.
8. Roundwood (*Corylus avellana* – hazel), charred. Dia.: 25 mm.
9. Roundwood (*Corylus avellana* – hazel), almost totally charred. Dia.: 20 mm.
10. Fig. 4.8.7. Timber debris (*Quercus* sp. – oak), heavily charred. Radially split and trimmed flat, with V-shaped notch in one end. L: 215 mm; W: 73 mm; Th.: 52 mm.
11. Roundwood (Pomoideae – apple, hawthorn etc.), charred. Dia.: 70 mm.
12. Roundwood (*Corylus avellana* – hazel), charred. L: 460 mm; Dia.: 15 mm.
13. No ID, ?sample lost or not taken, partially charred. Roundwood, possibly trimmed. L: 210 mm; Dia.: 27 mm.
14. Roundwood (*Corylus avellana* – hazel), almost totally charred. Dia.: 30 mm.
15. Roundwood (*Corylus avellana* – hazel). Dia.: 20 mm.
16. ?Roundwood. L: 32 mm; Dia.: 20 mm. No further details available.
17. Fig. 4.8.5. Timber debris (*Quercus* sp. – oak), partially charred. Half split and hewn tangentially. L: 250 mm; W: 10 mm; Th.: 44 mm.
18. Roundwood (*Corylus avellana* – hazel), partially charred. Possibly trimmed. L: 240 mm; Dia.: 25 mm.
19. Roundwood (*Corylus avellana* – hazel), almost totally charred. Trimmed one end/to a point. Dia.: 30 mm.
20. Roundwood (*Prunus* sp. – sloe, cherry etc.). Dia.: 60 mm.
21. Roundwood (poss. Pomoideae – apple, hawthorn etc.), partially charred. Dia.: 30 mm.
22. Debris (*Alnus glutinosa* – alder). L: 160 mm; W: 90 mm.
23. Roundwood (Pomoideae – apple, hawthorn etc.). L: 240 mm; Dia.: 25 mm.
24. Timber debris (*Quercus* sp. – oak), charred almost all over. Half split. L: 570 mm; W: 70 mm; Th.: 60 mm.
25. Roundwood (unidentifiable), ?totally charred. 'Cut' marks observed in the field. L: 100 mm; Dia.: 30 mm.
26. Roundwood (Pomoideae – apple, hawthorn etc.). Right-angled bend and curve, trimmed at one end. Dia.: 70 mm.
27. Timber debris (*Quercus* sp. – oak). Half split with open joint. L: 200 mm; W: 90 mm; Th.: 40 mm.
28. Fig. 4.7.2. Timber debris (*Quercus* sp. – oak). Tangential split, trimmed one end/one direction. Conserved by freeze-drying. L: 80 mm; W: 30 mm.
29. Roundwood (*Prunus* sp. – sloe, cherry etc.). Dimensions not recorded.
30. Timber debris (*Quercus* sp. – oak). Tangential split. L: 50 mm; W: 30 mm; Th.: 35 mm.
31. Fig. 4.7.3. Timber debris (*Quercus* sp. – oak). Tangential split (slab). L: 420 mm; W: 80 mm; Th.: 20 mm.
32. Timber debris (*Quercus* sp. – oak), partially charred. Half split. L: 120 mm; W: 60 mm; Th.: 30 mm.
33. Roundwood (*Corylus avellana* – hazel), one end charred lightly. Dia.: 20 mm.
34. Roundwood (*Coryus avellana* – hazel), partially charred. L: 235 mm; Dia.: 20 mm.
35. ?Debris. L: 16 mm (max.); W: 8 mm. No further details available.
36. Roundwood (*Corylus avellana* – hazel), partially charred. L: 340 mm; Dia.: 25 mm.
37. Timber debris (*Quercus* sp. – oak), almost totally charred. L: 200 mm; W: 90 mm.
38. Roundwood (Pomoideae – apple, hawthorn etc.). L: 160 mm; Dia.: 20 mm.
39. Roundwood (*Corylus avellana* – hazel), partially charred. L: 180 mm; Dia.: 30 mm. UB-3138 2776±40 BP.
40. Fig. 4.10.12. Roundwood (*Corylus avellana* – hazel). Trimmed one end/one direction (with a flattish blade), one end/ two directions and side branches. L: 330 mm; Dia.: 50 mm.
41. Roundwood. L: 380 mm Dia.: 20 mm. No further details available.
42. Timber debris (*Quercus* sp. – oak), heavily charred. Tangentially split. L: 180 mm; W: 90 mm; Th.: 30 mm.
43. Roundwood (Pomoideae – apple, hawthorn etc.). Trimmed one end/one direction. Dia.: 45 mm.
44. Debris (*Quercus* sp. – oak). Tangential trimming of knot hole. Conserved by freeze-drying. L: 60 mm; W: 30 mm; Th.: 56 mm.
45. Roundwood (*Corylus avellana* – hazel). L: 340 mm; Dia.: 20 mm.
46. Roundwood (*Corylus avellana* – hazel). Dia.: 30 mm.
47. Roundwood (*Corylus avellana* – hazel), partially charred. Dia.: 40 mm.

48. Roundwood (*Corylus avellana* – hazel), charred one end. Trimmed one end/two directions. L: 900 mm; Dia.: 25 mm.
49. Fig. 4.8.6. Timber (*Quercus* sp. – oak), charred heavily on one side. Half split. L: incomplete; W: 170 mm; Th.: 120 mm.
50. Roundwood (*Corylus avellana* – hazel), charred one end. Possibly trimmed to a point, but charred. Dia.: 24 mm.
51. Roundwood (*Corylus avellana* – hazel), charred one end. Trimmed or charred to a point. Conserved by freeze-drying. L: 1100 mm; Dia.: 35 mm.
52. Timber debris (*Quercus* sp. – oak), charred heavily on one side. Tangentially split. L: 225 mm; W: 150 mm; Th.: 70 mm.
53. Discarded in the field.
54. Fig. 4.7.1. Timber debris (*Quercus* sp. – oak), charred on outside and ends quite deeply. Half split and trimmed one end (possibly felling facets). L: 300 mm; W: 220 mm; Th.: 120 mm; orig. Dia.: 220 mm.
55. Roundwood (*Quercus* sp. – oak), heavily charred. L: 240 mm; Dia.: (distorted) 60/50 mm.
56. Discarded in the field.
57. Roundwood (*Corylus avellana* – hazel), charred almost all over. Straight stem and possible curve of coppice heel. Trimmed one end/one direction. Conserved by freeze-drying. L: 740 mm; Dia.: 60 mm.
58. Fig. 4.7.4. Timber (*Quercus* sp. – oak), partially charred on one side and end. Half split with open joint. L: 740 mm; W: 220 mm; Th.: 60 mm. UB-3139 2713±35 BP.
59. Timber debris (*Quercus* sp. – oak), charred almost all over. Half split. Conserved by freeze-drying. L: 220 mm; W: 70 mm; Th.: 60 mm.
60. Roundwood (*Corylus avellana* – hazel), charred lightly all over. Possibly trimmed one end/one direction. Dia.: 30 mm.
61. Timber debris (*Quercus* sp. – oak), heavily charred. Half split. L: 185 mm; W: 105 mm (max.) 70 mm (min.); Th.: 55 mm.
62. Timber debris (*Quercus* sp. – oak), heavily charred. Half split. L: 130 mm; W: 80 mm; Th.: 50 mm.
63. Roundwood (*Corylus avellana* – hazel), partially charred. L: 250 mm; Dia.: 20 mm.
64. Fig. 4.9.10. Timber debris (*Quercus* sp. – oak). Tangentially split and trimmed one end, one direction. Conserved by freeze-drying. L: 160 mm; W: 110 mm; Th.: 30 mm.
65. Timber (*Quercus* sp. – oak), partially charred. Recorded as a 'plank' in the field. L: 400 mm; W: 80 mm; Th.: 20 mm.
66. Roundwood (*Quercus* sp. – oak), heavily charred. Split log. L: 530 mm; W: 110/70 mm.
67. Roundwood, partially charred. Dia.: 25/15 mm.
68. Roundwood (*Corylus avellana* – hazel). Dia.: 20 mm.
69. Timber debris (*Quercus* sp. – oak), heavily charred. Half split. W: 150 mm; Th.: 50 mm.
70. Debris (*Quercus* sp. – oak), charred on one side. Radial woodchip. L: 127 mm; W: 60 mm; Th.: 20 mm.
71. Timber (not sampled for ID), charred over whole surface. Described in the field as a 'plank'. L: 1050 mm; W: 180 mm.
72. Roundwood (Pomoideae – apple, hawthorn etc.). L: 1140 mm; Dia.: 90/70 mm.
73. Timber (*Quercus* sp. – oak), charred heavily all over. Tangentially split, possibly trimmed square. L: 1050 mm; W: 60 mm; Th.: 35 mm.
74. Roundwood (Pomoideae – apple, hawthorn etc.). Dia.: 70 mm.
75. Fig. 4.9.11. Timber debris (*Quercus* sp. – oak). Radial split, trimmed one end/one direction, with tool mark 30:7 (Fig. 4.13). Conserved by freeze-drying. Orig. Dia.: 400 mm.
76. Roundwood (*Corylus avellana* – hazel), partially charred. Dia.: 25 mm.
77. Timber debris (*Quercus* sp. – oak), charred on one side. Tangentially split, and trimmed one end/concave. Conserved by freeze-drying. L: 180 mm; W: 80 mm; Th.: 35 mm.
78. Roundwood (*Corylus avellana* – hazel), partially charred. Dia.: 60/50 mm.
79. Roundwood twig (Pomoideae – apple, hawthorn etc.). L: 90 mm; Dia.: 5 mm.
80. Roundwood (*Corylus avellana* – hazel). L: 570 mm; Dia.: 20–25 mm.
81. Fig. 4.8.8. Timber debris (*Quercus* sp. – oak). Split and trimmed both ends and side branches – one end/flat, one end/two directions, with tool mark 36:3 (Fig. 4.13). L: 250 mm; orig. Dia.: 100 mm.
82. Discarded in the field.
83. Roundwood (Pomoideae – apple, hawthorn etc.). Dia.: 60 mm.
84. Timber debris (*Quercus* sp.– oak). Recorded in the field as 'radial split'. L: 240 mm; W: 50 mm; Th.: 15 mm.
85. Roundwood (*Prunus* sp. – sloe, cherry etc.). Dia.: 40 mm.
86. Timber debris (*Alnus glutinosa* – alder). Recorded in the field as 'split log'. W: 90 mm; Th.: 40 mm.
87. Roundwood (*Corylus avellana* – hazel), partially charred. Trimmed one end/one direction. Dia.: 20 mm.
88. Roundwood (Pomoideae – apple, hawthorn etc.). Trimmed one end/one direction. L: 500 mm; Dia.: 50/40 mm.
89. Fig. 4.10.14. Roundwood (*Prunus* sp. – sloe, cherry etc.). Natural fork, gnarled. Trimmed one end/one direction. Conserved by freeze-drying. Dia.: 50 mm.
90. Debris (*Fraxinus excelsior* – ash). L: 160 mm; W: 50–60 mm; Th.: 20–30 mm.
91. Fig. 4.10.13. Roundwood (*Corylus avellana* – hazel), almost totally charred. Trimmed one end/one direction. Conserved by freeze-drying. L: 410 mm; Dia.: 54 mm.
92. No details available.
93. Fig. 4.11.16. Roundwood debris (*Quercus* sp. – oak). Part of a coppice stool with three stems. Three stems trimmed one direction. Conserved by freeze-drying. Dia.: 25 mm.
94. Roundwood (*Corylus avellana* – hazel). L: 380 mm; Dia.: 30–40 mm.
95. Roundwood (*Quercus* sp. – oak). Some sapwood hewn off. Structural vertical. Dia.: 170 mm.
96. Fig. 4.9.9. Roundwood (*Quercus* sp. – oak). Structural vertical with notch or joint cut in top. Dia.: 170 mm.
97. Roundwood (*Quercus* sp. – oak). Some sapwood hewn off. Structural vertical. Dia.: 200 mm. UB-3141 2736±45 BP.
98. Roundwood (*Quercus* sp. – oak). Structural vertical. Dia.: 200 mm. UB-3140 2739±40 BP.

SHELL

by Greg Campbell

A very small number of shells (34 complete valves or hinged parts of valves of bivalves, and 38 fragments) were recovered by hand from 17 contexts during the course of excavation. One of the part valves is from a swan or duck mussel (*Anodonta* sp.), with the remaining 33 valves or part valves of painter's mussel (*Unio* sp.). The thickness of the unidentifiable fragments implies that the great majority of these are also *Unio*.

Both of these are mussels of lime-rich fresh water of medium to slow flow. While both mussels are edible, none of the intact valves refit, nor do any show evidence of opening breakage or of burning. This assemblage represents a population that would be washed up dead on the edges of a gravelly island in a reticulated river system, rather than food debris. The contexts in which the shells were recovered are almost all riverbanks around the edges of the eyot. The few fragments from the dry ditch 2413 probably eroded out of the gravel forming the eyot.

Chapter 5: Grim's Ditch

by Anne Marie Cromarty with Alistair Barclay and George Lambrick

INTRODUCTION

The Grim's Ditch linear earthwork runs for 7.5 km due east from the edge of the Thames at Mongewell to the crest of the Chiltern escarpment (Fig 5.1). Richard Bradley (1968) has reviewed the evidence relating to this monument. No full-scale archaeological investigation had ever been carried out, however, although a small area of the earthwork had been examined in 1974 (Hinchliffe 1975) (Fig. 5.2). The Wallingford Bypass was to cut across the earthwork (see Fig. 1.2), providing an opportunity to examine a large area in detail. The better-preserved eastern part of Grim's Ditch is a Scheduled Ancient Monument (SAM no. 32), but the western part where it was to be cut by the bypass is not, as this part of the monument had been modified by landscaping within Mongewell Park. The deserted medieval village of Mongewell was also known to lie somewhere in the vicinity, perhaps on the route of the bypass.

The ancient parish of Mongewell was one of a series of long, east–west, Chiltern-edge parishes in Oxfordshire, stretching from the Thames to the highest part of the Chiltern ridge, its northern boundary following Grim's Ditch for nearly 5 km. The topography of such medieval parishes, reflecting mid to late Saxon land use and estates, ranged from wood-pastures and scattered settlement on the Chilterns to fields and nucleated settlements located in a line along the east bank of the river at Goring, South Stoke, Little Stoke, North Stoke, Mongewell and Newnham Murren. Mongewell probably began to decline after the Black Death (1349), and by the time of the 1877 Ordnance Survey plan the village consisted of no more than the house, church, rectory, mill and farm. The extent and exact location of the village are unknown: no estate maps of Mongewell are known, and the OS plan shows parkland to the north and east of the house (Allison *et al.* 1966).

GEOLOGY, TOPOGRAPHY AND SOILS

The solid geology of this part of the bypass is Lower Chalk overlain by a drift deposit of Valley Gravel (Geological Survey map, 1948). This consists of orange and white patchy sandy loam with decayed chalk fragments and a high proportion of gravel, which formed at the base of slopes here beyond the Pleistocene ice limits. It formed a slight scarp about 30 m from the riverbank, rising steadily from around 45 m OD to just over 63 m OD where the bypass was to meet the Reading–Crowmarsh road. The excavated area lay at around 47 m OD where the line of the bypass crossed the bank of the Grim's Ditch earthwork.

All the soils in the excavated area were derived from these drift deposits, and consisted of sandy silty loams with variable amounts of chalk and flint inclusions. The topsoil (1), which covered the whole of the excavated area, was a loose dark brown fairly humus-rich sandy loam with occasional flecks of chalk.

ARCHAEOLOGICAL BACKGROUND

In 1974 the OAU had undertaken an earlier excavation in advance of the widening of the A4074 at SU 617 879 (Fig. 5.2), some 600 m to the east of the bypass line (Hinchliffe 1975). Iron Age pottery was recovered from the underlying old land surface and from the bank core (including two sherds identified as middle Iron Age). A pit containing middle Iron Age pottery was also found, although its stratigraphic relation to the earthwork could not be defined. The fragmentary remains of three unaccompanied inhumations were found in the core of the bank, and a fourth to the south on the lip of the ditch. A lateral quarry had subsequently damaged the south side of the bank. It remained unclear whether the Iron Age pottery was contemporary with the construction of the earthwork or was derived from earlier occupation, represented by the pit.

In 1970 possible Saxon inhumations accompanied by iron spearheads were found during ploughing in the general area of Grim's Ditch in field 6200 (information supplied by Wallingford Archaeological and Historical Society).

The area was thus of some archaeological interest, and an evaluation was undertaken in 1987 by the OAU on behalf of the Oxford County Council (see Fig. 5.2). An evaluation trench (MGD87) excavated across Grim's Ditch at SU 611 881 showed that at least five stratigraphic phases were represented: a prehistoric or Roman field boundary and associated ploughsoils underlying the earthwork; the ditch and denuded bank of Grim's Ditch itself, accompanied by further cultivation; medieval truncation of the earthwork, possibly relating to Mongewell deserted medieval village; cultivation on both sides of the earthwork, and 18th-century landscaping. Beaker, late Bronze Age/Iron Age and Roman pottery were recovered, although their chronological relation to the earthwork remained unclear.

In 1988 two further trenches were excavated along the line of the bypass at SU 609 881 between the Thames and Grim's Ditch (see Fig. 5.2;

Figure 5.1 Grim's Ditch earthwork

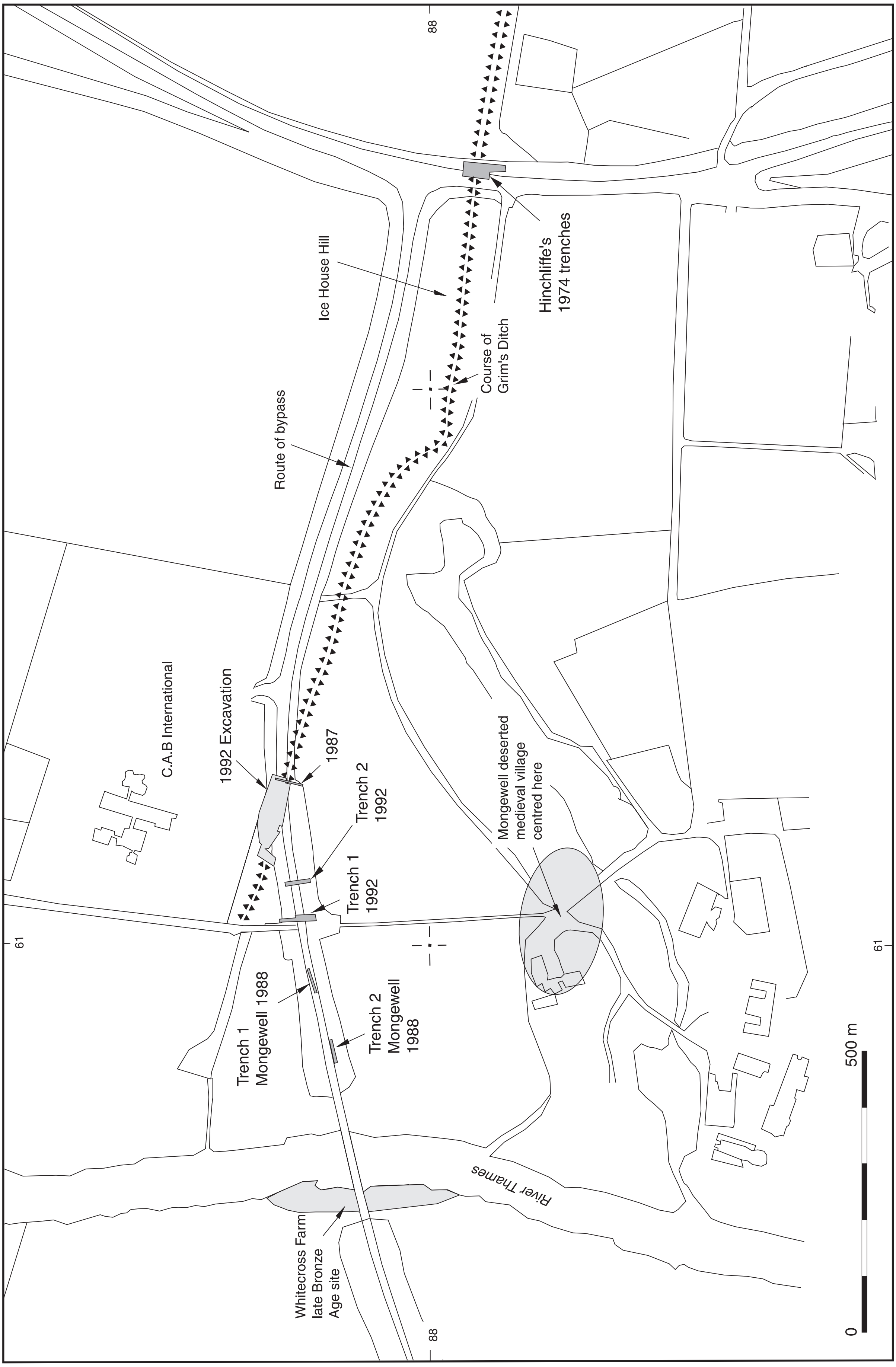


Figure 5.2 Trench location plan showing Hinchliffe's 1974 trenches and the relationship of the Grim's Ditch site to the late Bronze Age eyot at Whitecross Farm and Mongewell deserted medieval village

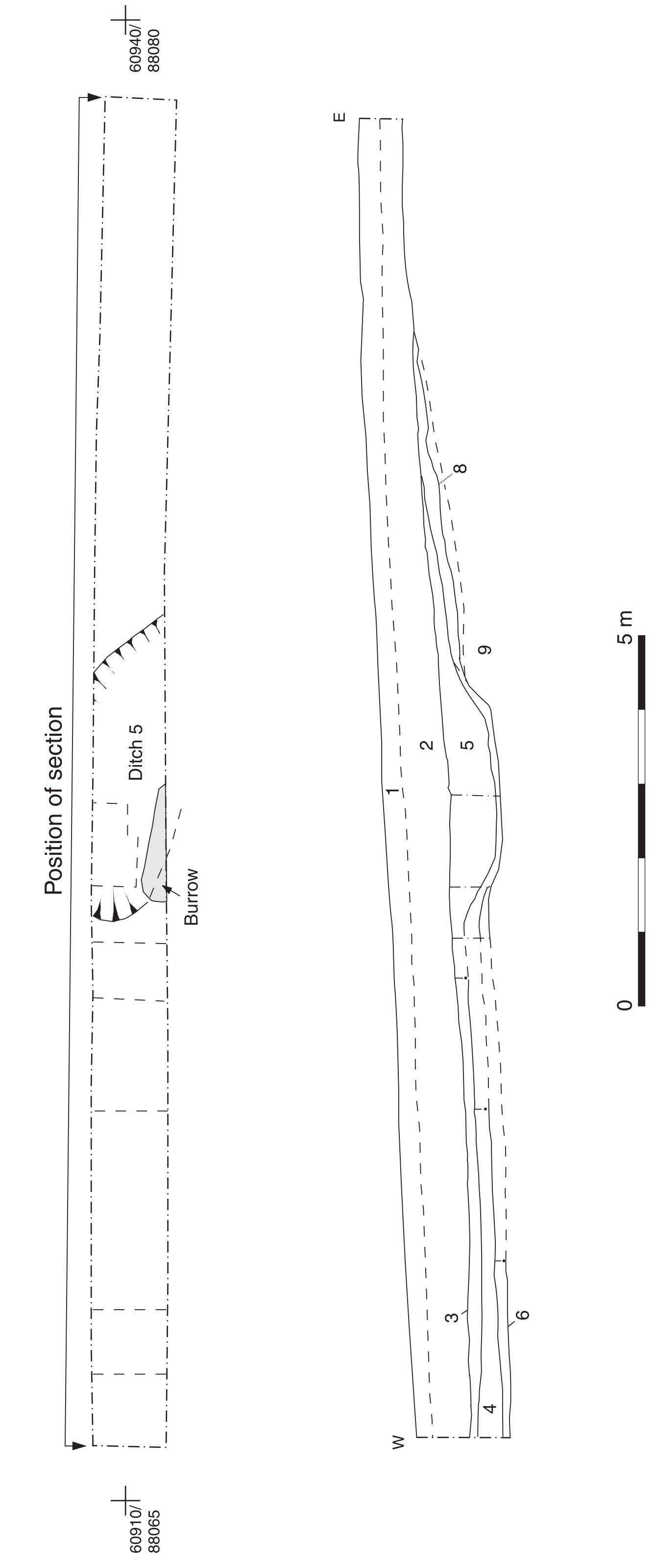


Figure 5.3 Plan and section of Mongewell 1988 trench 2

MONG88:1–2). The eastern trench (1) revealed up to 0.75 m of successive ploughsoils, overlying thin, sporadic patches of original soil cover. The western trench (2), closer to the edge of the terrace, revealed a build-up of ploughwash up to 0.85 m deep covering a silty loamy layer containing Neolithic material, as well as the possible terminal of a ditch (Fig. 5.3).

This evidence, together with other information, provided the basis for a scheme of mitigation by Oxford County Council Engineers in consultation with the OAU. This involved fully excavating a wide swathe across Grim's Ditch in 1992, in order to date the earthwork and the field system beneath it; to examine the pre-earthwork field system; to date basal sediments in the earthwork ditch and, if possible, obtain a sequence through it; to obtain ecofactual samples to elucidate the changing character of the environment of the sequence, and especially of the environmental context of Grim's Ditch; and to clarify the nature of the medieval settlement traces recorded during the evaluation. The academic objectives were to consider the sociopolitical context of Grim's Ditch in relation to its date; to consider the pre-earthwork field system in relation to other traces of pre-Saxon fields; and to consider the medieval settlement traces in relation to the existence and desertion of Mongewell deserted medieval village.

The work was funded by Oxfordshire County Council, supported by a 45% grant from English Heritage. The excavation of Grim's Ditch was not, however, completed within the time agreed because of the complexity of the pre-earthwork archaeology. Further work required to elucidate the cultivation traces associated with the earthwork was funded by Oxfordshire County Council. Two further evaluation trenches were excavated across the line of the bypass to the south of Grim's Ditch at SU 6102 8813 (trench 1) and 6106 8814 (trench 2) (see Fig. 5.2). In both there were two successive ploughsoils between topsoil and natural, echoing the build-up of ploughsoils found in the trenches to the west in 1988. An undated posthole was recorded beneath these at the south end of trench 1.

A length of Grim's Ditch centred at SU 611 881 was excavated (three areas: A–C, from east to west) immediately to the west of the 1987 evaluation trench (see Fig. 5.5, Pl. 5.1). Areas A and B cut across the bank, while a full section of the ditch was exposed in Area C.

EXCAVATION METHODS AND RECORDING

These three areas had a considerable number of standing trees, the stumps of which were left *in situ* during the excavation (Pl. 5.1). Baulks were initially left running north–south across the site, though

Plate 5.1 General view of the site during excavation (1992) after removal of the remnants of the Grim's Ditch earthwork bank, looking west from the eastern end of Area A

these were later removed. Most of the excavation was undertaken by hand with some deeper sections into the ditch excavated by machine. Extensive layers were initially preserved to recover artefact spreads, which were recorded in three dimensions.

The single context recording system was used, whereby a single number from a continuous series is given to each context. Contexts which were observed in more than one area were given separate numbers in each area and correlated later, with the exception of the topsoil and the immediately underlying soil. Plans were drawn at scales of 1:20 and 1:50 at different stages throughout the excavation, with certain features, such as the cultivation ridges and plough and ard marks, also being planned separately. Sections of individual features and the baulks were drawn at 1:20. Some of the major sections left in the final stages of excavation were cleaned back and redrawn, at which point some contexts were reinterpreted as in fact representing more than one event. New contexts were defined for each of these, and inevitably there is some uncertainty as to which of the new contexts the previously excavated finds belonged. Only artefacts which were securely related to particular contexts have been used in the phasing of the site. Areas of some layers were left unexcavated to allow weathering to reveal artefact scatters, and these were then excavated in spits. They were numbered by adding a suffix to the context number (eg 206/1) and finds were recorded by spit.

Soil samples were taken from contexts where high concentrations of charcoal or other charred material were encountered. A snail column was taken from the ditch section, and a sequence of soil samples was taken for soil micromorphology.

ARCHAEOLOGICAL DESCRIPTION

The development of the site has been divided into eight broad phases, one of which is divided into three subphases (Table 5.1). While in general the relative chronology of these phases is clear, the features grouped within them need not all be strictly contemporary. In many of the features datable artefacts were rare or absent. Many were also clearly residual, perhaps because of the numerous episodes of ploughing and other disturbances to which the site has been subject. It is therefore often difficult to assign absolute dates, even in terms of broad periods, to these phases.

Phase 0: earlier prehistoric activity

Sporadic finds clearly demonstrate activity in the excavated areas from the Mesolithic to the beginning of the Bronze Age. Many of these artefacts, however, were clearly in secondary contexts, and some can be dated only tentatively. Given these difficulties, and the small numbers of artefacts in most contexts, it is impossible to confidently assign any features to this broad phase.

Table 5.1 Grim's Ditch phasing

Phase	*Description*
0	Earlier prehistoric (Mesolithic–early Bronze Age) activity
1	a Bronze Age ard marks
	b Late Bronze Age–Iron Age tree clearance
	c Late Bronze Age–Iron Age settlement
2	Late Iron Age cultivation soil and ridges
3	Late Iron Age:
	a Construction of the earthwork
	b Initial silting of the ditch
4	Roman and post-Roman:
	a Post-bank ploughing
	b Cleaning/activity around the ditch
5	Medieval:
	a Building and pits
	b Ploughing
6	Medieval/post-medieval ploughing and ditches
7	18th-century landscaping

The only area in which artefacts from this phase are likely to have suffered from relatively little disturbance was in the 1988 trench 1 where ten sherds of decorated middle Neolithic Peterborough Ware (including Fig. 5.15.1–4), worked flint including a possible leaf-shaped arrowhead (Fig. 5.13.10), burnt flint and animal bone were found in a thin grey silty loam palaeosol overlying a preserved ground surface, itself covered by an alluvial layer.

Further artefacts of this and earlier date were mostly found in much later contexts. Mesolithic flint, for example, was found associated with later ard marks, cultivation soils and in the bank of Grim's Ditch. Further worn Neolithic sherds, including some similar in fabric to the Peterborough Ware, but also others that could be early Neolithic in date, were found in the bank (eg 15), in layers associated with the ploughing before (eg 202) and after (eg 203) the bank's construction, and in layers below the bank (eg 221).

Further Peterborough Ware sherds were also found in the end of a U-sectioned ditch in trench 2 (see Fig. 5.3). Given the clear evidence of residuality these sherds cannot be regarded as providing firm dating evidence for the feature. The ditch cut both the middle Neolithic palaeosol and the alluvium/colluvium (4) which covered it, and is thus clearly later than these layers. Rather than dating from the Neolithic, the ditch may instead have been related to the possibly late Bronze Age features described below (phase 1c).

Very small quantities of late Neolithic–early Bronze Age pottery, including a Beaker sherd, were also found within the bank and in one phase 1 layer (518) preceding it. The evidence for activity in this phase provided by these few sherds is supplemented by two radiocarbon dates: 2340–2040 cal BC and 2130–1880 cal BC (95% confidence OxA-7173–4; 3765±40 BP, 3600±35 BP). These two dates were obtained from samples of charred cereal, including emmer wheat, from the fill (133) of posthole 135 (Fig. 5.5). The two dates are significantly different at the 95% confidence level, suggesting that the dated material derives from two or more 'events', and is thus likely to be residual. For this reason, despite these dates, these postholes have been assigned to the late Bronze Age (phase 1c) and are discussed below with other similar features. The evidence for a late Bronze Age date, however, is itself not conclusive, and it remains possible that some or all of the postholes do date from the late Neolithic–early Bronze Age.

Phase 1: cultivation, clearance and settlement in the Bronze Age *(Figs 5.4–5)*

Phase 1 is divided into three subphases, representing phases of cultivation marked by ard marks, followed by tree clearance and then 'settlement'. Despite little dating evidence, the phase is broadly attributed to the Bronze Age, although its earliest subphase could have begun earlier, in the Neolithic.

Phase 1a: early cultivation

Small areas of grooves interpreted as ard marks were found in both Areas B and C (Fig. 5.5). In both areas the grooves were cut into brown sandy loams (355 and 223) which form, or derive from, disturbance of natural sediments. The grooves in both areas were aligned similarly: one series of parallel grooves ran NNW–SSE, roughly perpendicular to the second series. The grooves themselves were generally only 0.03 m wide (except in Area B where, perhaps because of better preservation, they were 0.06 m wide), no more than 5 mm deep, and were spaced 0.3–0.2 m apart. In section 1 (Fig. 5.9a), however, the grooves appeared deeper, from 20 mm to 50 mm, and were clearly V-shaped in section.

No artefacts were associated with these layers, but in Area B they were overlain by a layer (221) of compact mid brown sandy silt which contained worked and burnt flint, fired clay, burnt bone and several small abraded Neolithic or early Bronze Age sherds as well as two small and possibly intrusive sherds probably dating from the middle Iron Age.

Phase 1b: ?tree clearance

Numerous features interpreted as tree-throw holes or root disturbances were found in Areas A (83–6, 165, 170–2), B (222, 234–5, 245–6, 251–2, 259–60, 275–6, 279–86), especially its north-eastern part, and C (365–6). One of these features (222) contained much charcoal, suggesting deliberate clearance. Similar evidence did not, however, occur in other features. None contained artefacts, and, although they all lie stratigraphically between the earliest ploughsoils and the pre-bank cultivation soils, they need not all be contemporary. One at least (245–6) was cut by a posthole (241) assigned here to the late Bronze Age, hinting that the clearance may have predated the settlement in the late Bronze Age. Taken together these features suggest a phase of woodland regeneration between the earliest cultivation and the cultivation immediately preceding the construction of the bank.

Phase 1c: ?settlement

A scatter of 91 postholes, pits and scoops in Areas A and B has been assigned to this phase (see Fig. 5.4). Although a six-post structure has been recognised among these features, there is little other apparent order. The other features have been grouped into three more or less distinct clusters. There is again little clear dating evidence, and these features are attributed to the late Bronze Age largely on the basis of parallels for the six-post structure.

Structure A: the six-poster

Six postholes (Table 5.2, Fig. 5.6, Pl. 5.2) laid out in a rough square, 3.4 m across, in the west of Area B have been interpreted as the remains of a six-post structure (Structure A). All of these postholes were sealed by a phase 2 cultivation soil (206) and were cut into a phase 1a ploughsoil (221; see Fig. 5.9). One also cut tree-throw hole 245, assigned to phase 1b.

Cluster B

Feature Cluster B lies 12 m to the east of Structure A. All the features in this cluster were overlain by phase 4 layer 102, except posthole 158 which may have been cut into the lower part of this layer.

Within this cluster eight postholes may have formed an oval structure with a diameter 3.5 m x 2.5 m. Two further groups of postholes forming concentric arcs at its eastern end may represent repairs or rebuilding. The postholes were all roughly circular, 0.14–0.3 m in diameter and 0.05–0.12 m deep. They had shallow rounded profiles, with the exceptions of 427, which was very shallow, and 429 which was deeper and more U-shaped in profile. They were all filled with identical light grey-brown silt with frequent chalk inclusions, which was quite distinct from the fills of the tree-throw holes and other natural features in this area. Given that it is not significantly truncated, the absence of domestic features such as hearths, and the small size of the structure, suggest it was not a house. No patterns have been discerned in the surrounding postholes; some may have been related to the oval structure.

Cluster C

A third cluster of 11 postholes and shallower scoops (Cluster C) lay between Structure A and Cluster B. Some of the features (eg 251 and 259) may be tree-throw holes or derive from animal or root disturbance. No clear patterns were discerned within this cluster, but five small postholes (253, 255, 257, 261

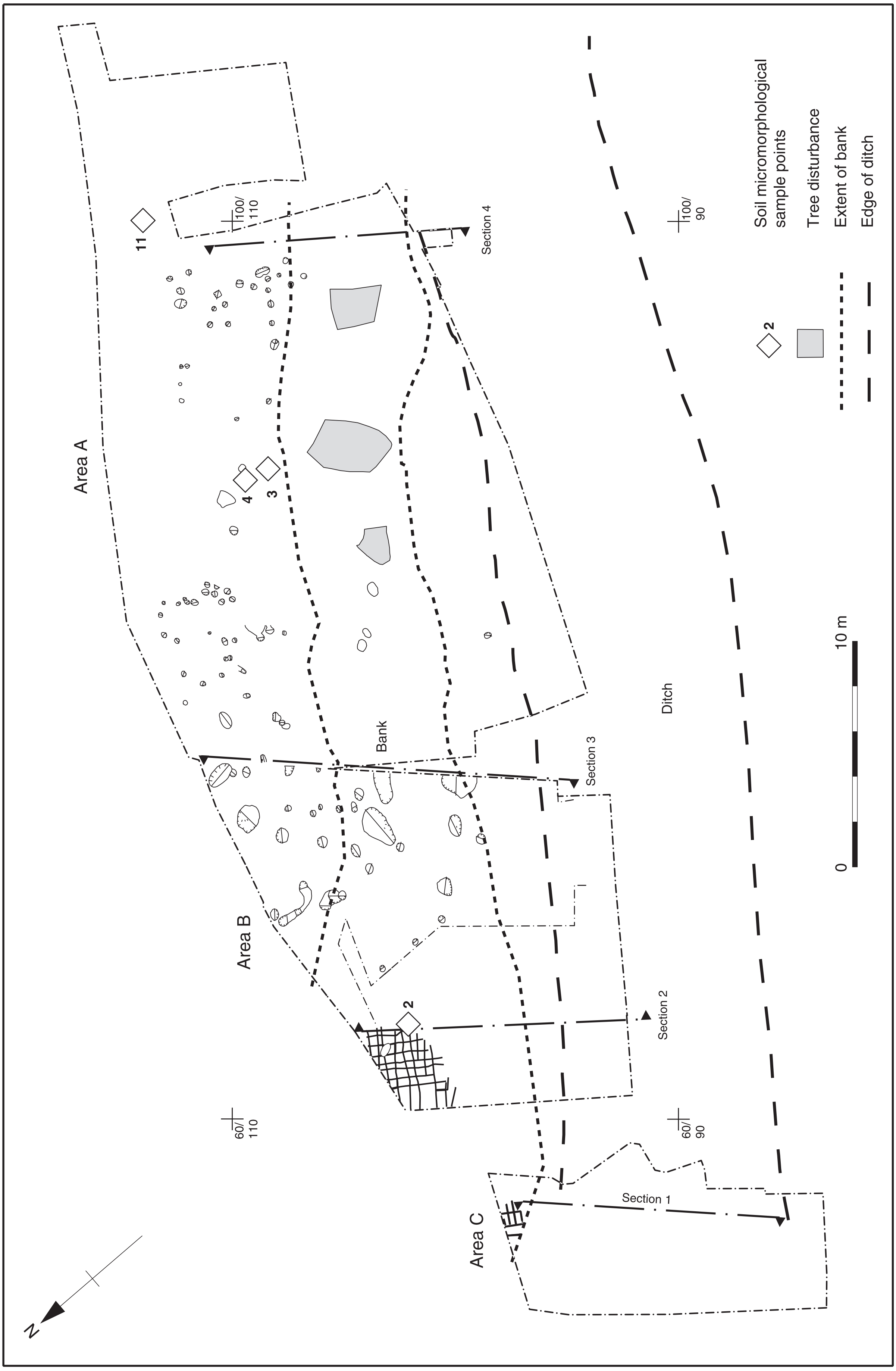


Figure 5.4 Phase 1: pre-bank arding, tree clearance and settlement with limits of later bank and ditch

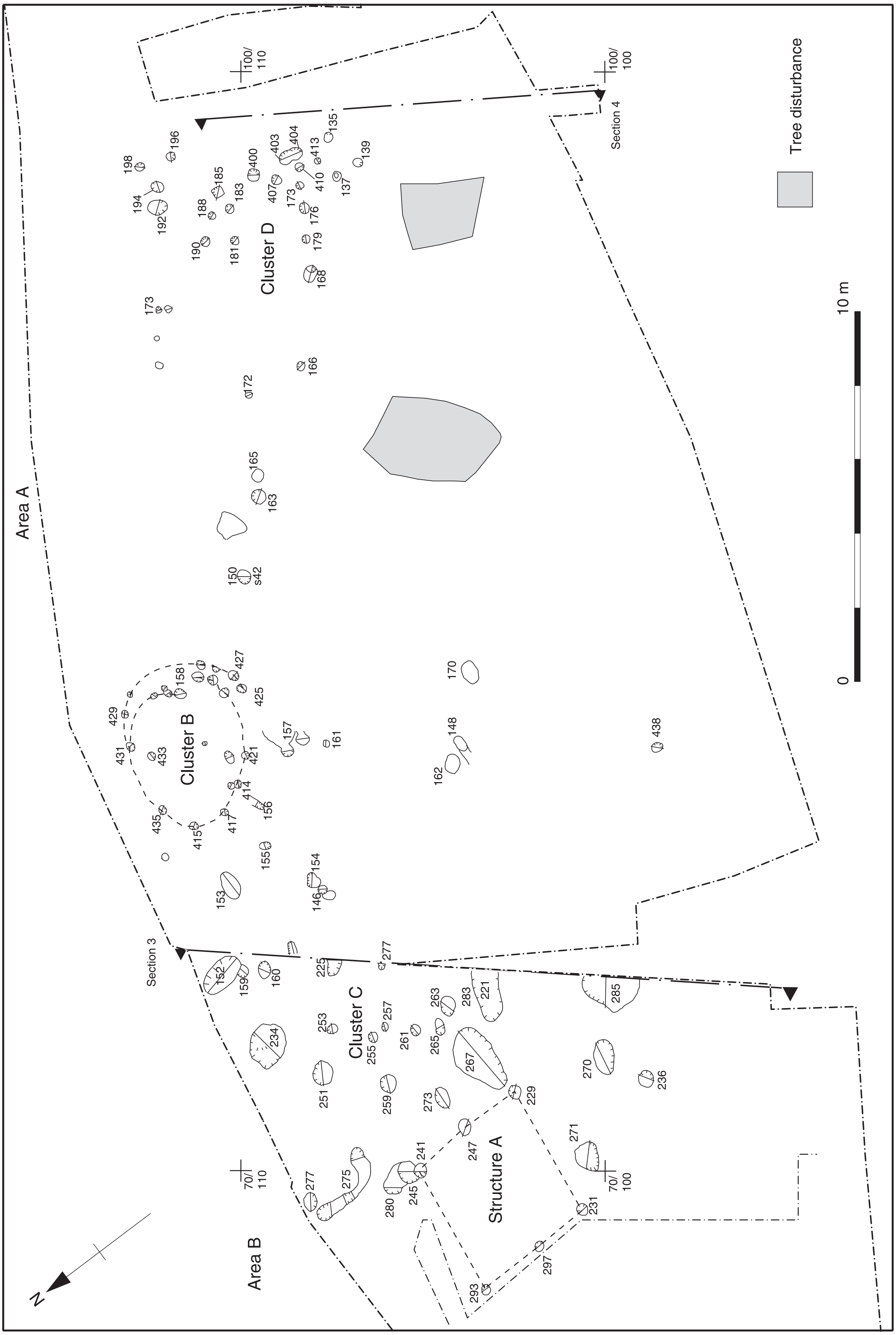


Figure 5.5 Detail of phase 1 settlement, showing Structure A, possible structure within Cluster B and Clusters C and D

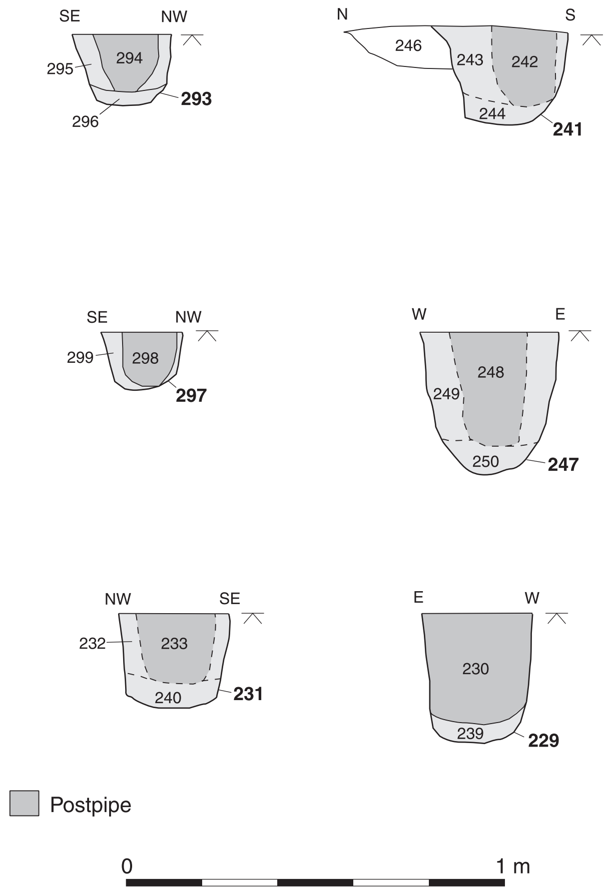


Figure 5.6 Sections of postholes forming Structure A

and 265) may have formed part of a fenceline. They were all roughly circular, measuring 0.2–0.35 m in diameter and 0.04–0.08 m in depth, and were filled with sandy silty loam. The other postholes in this cluster varied in form. Three (225, 263 and 273) were oval, *c* 0.42 m long by 0.34 m wide. Posthole 225 had a more U-shaped profile (0.23 m deep, filled with friable dark brown silty loam) than the others, while postholes 263 and 273 had shallower, more rounded profiles, 0.09 m and 0.08 m deep respectively, and were filled with similar grey-brown sandy silt.

Cluster D

The fourth cluster of features (Cluster D) consisted of 28 shallow scoops, pits and postholes at the south-east side of Area A. All were below cultivation soils (phase 2 103 to the west; phase 2 101 to the south; phase 4 102 to the north and east; Fig. 5.9b). Some of these features may derive from natural animal and root disturbance, but 20 made convincing postholes (in addition to those described below these were: 139, 163, 166, 168, 174, 198 and 410).

One group of postholes (179, 181, 183, 188, 190, 192, 194 and 196) were marked by their similarity in size and fill. They all measured *c* 0.2 m in diameter, and 0.04–0.11 m in depth (except 181: 0.16 m deep), and were filled with similar mid grey-orange-brown silt containing occasional chalk, which was markedly different from the dark red-brown silt (116) that formed the substrate and filled root holes in this part of the site.

A second group of postholes included several with definite postpipes (135, 137, 173, 176 and 185). The postholes were all circular, with diameters of around 0.2 m, except for 185 which was 0.17 m square. The postpipes were filled with dark grey or

Table 5.2 Structure A: details of postholes

Cut	*Shape in plan*	*Diameter (m)*	*Depth (m)*	*Level at base (m OD)*	*Profile*	*Fills*
297	Circular	0.22	0.15	46.925	U-shaped	299 friable red-brown silty sandy loam, post-packing 298 friable dark brown silty sandy loam with moderate charcoal inclusions, forming distinct postpipe, sample 13
293	Circular	0.24	0.18	46.94	U-shaped	296 primary fill of redeposited natural 295 dark red-brown silty sandy loam post-packing 294 postpipe with moderate charcoal, sample 14
229	Oval	0.28–0.35	0.35	46.875	U-shaped	239 primary fill, redeposited natural 230 silty loam with no discernible postpipe
231	Circular	0.31	0.24	46.86	U-shaped	240 primary fill, redeposited natural 232 post-packing 233 postpipe with moderate charcoal
241	Circular	0.34	0.21	46.945	U-shaped	244 primary fill, compact sandy silt loam with occasional chalk flecks 243 similar with more chalk 242 post-pipe, similar, sample 15
247	Circular	0.38	0.39	46.85	U-shaped	250 primary fill, redeposited natural 249 silty sandy loam with some chalk 248 postpipe, similar with some charcoal flecks, sample 16

Plate 5.2 Structure A, looking south-west, with phase 2 cultivation ridges sealed by paler Grim's Ditch bank material visible in the section behind

brown silt containing much charcoal, which was clearly distinct from the dark red-brown silts which formed the packing around the posts. The postpipe in 173 was circular and 0.11 m in diameter; that in 135 was 0.18 m square. It was from 135 that the sample of emmer wheat on which the late Neolithic–early Bronze Age radiocarbon dates – 2340–2040 cal BC and 2130–1880 cal BC – discussed above were obtained. The statistical discrepancy between these dates suggests that the material is residual, and does not provide a good date for the posthole which is here assigned to the late Bronze Age. Two further features contained less certain postpipes (400 and 410); although similar in some respects to the other postholes described here, they are also comparable to some of the shallow scoops (403–4 and 413).

Phase 2: late Iron Age cultivation *(Fig. 5.7)*

Two distinct cultivation soils overlay the settlement phase. The earliest of these (layers 47, 116, 103, 206(=?202) and 314) sealed the six-post structure and other features in the settlement phase, and were in turn sealed by the Grim's Ditch bank (see Fig. 5.9b: section 3). They consisted of either a compact dark red-brown silt with occasional lighter yellow-brown sand or a mid brown-grey sandy silt with chalk flecks. The small and abraded sherds they contained do not seem to date from any later that the end of the Iron Age or very early in the post-conquest phase.

A series of north–south orientated cultivation ridges (62–70, 73, 75–80, 82, 91–4, 210–12, 351–3 and 356) within these soils were preserved by Grim's Ditch bank (Fig. 5.7). The furrows have a U-shaped profile, generally 0.05–0.07 m in depth (but up to 0.2 m deep in Area C, Pl. 5.3). They vary from 0.4 m to 0.8 m wide and were placed at roughly 0.8 m intervals. These ridges presumably originally extended further north where they were destroyed by later ploughing.

At apparently the same stratigraphic level, an area of plough or ard marks was found immediately to the north-east of the ridges in a layer (101) very similar to 103, perhaps originally part of the same soil (Fig. 5.8, Pl. 5.4). These marks consisted of two series of parallel grooves. One set, 0.1–0.2 m apart and 0.05 m deep, ran east–west (110–15) perpendicular to, and cutting the other set, which lay 0.4–0.6 m apart, and were 0.02 m deep. All were filled with dark red-brown silt (96–100, 104 and 117–22). They may represent ploughing out of the cultivation ridges prior to the construction of Grim's Ditch bank. Although both ard marks and cultivation ridges appear to be buried beneath slippage of bank material (7–8), some of the ard marks contained chalk that is not derived from the underlying undis-

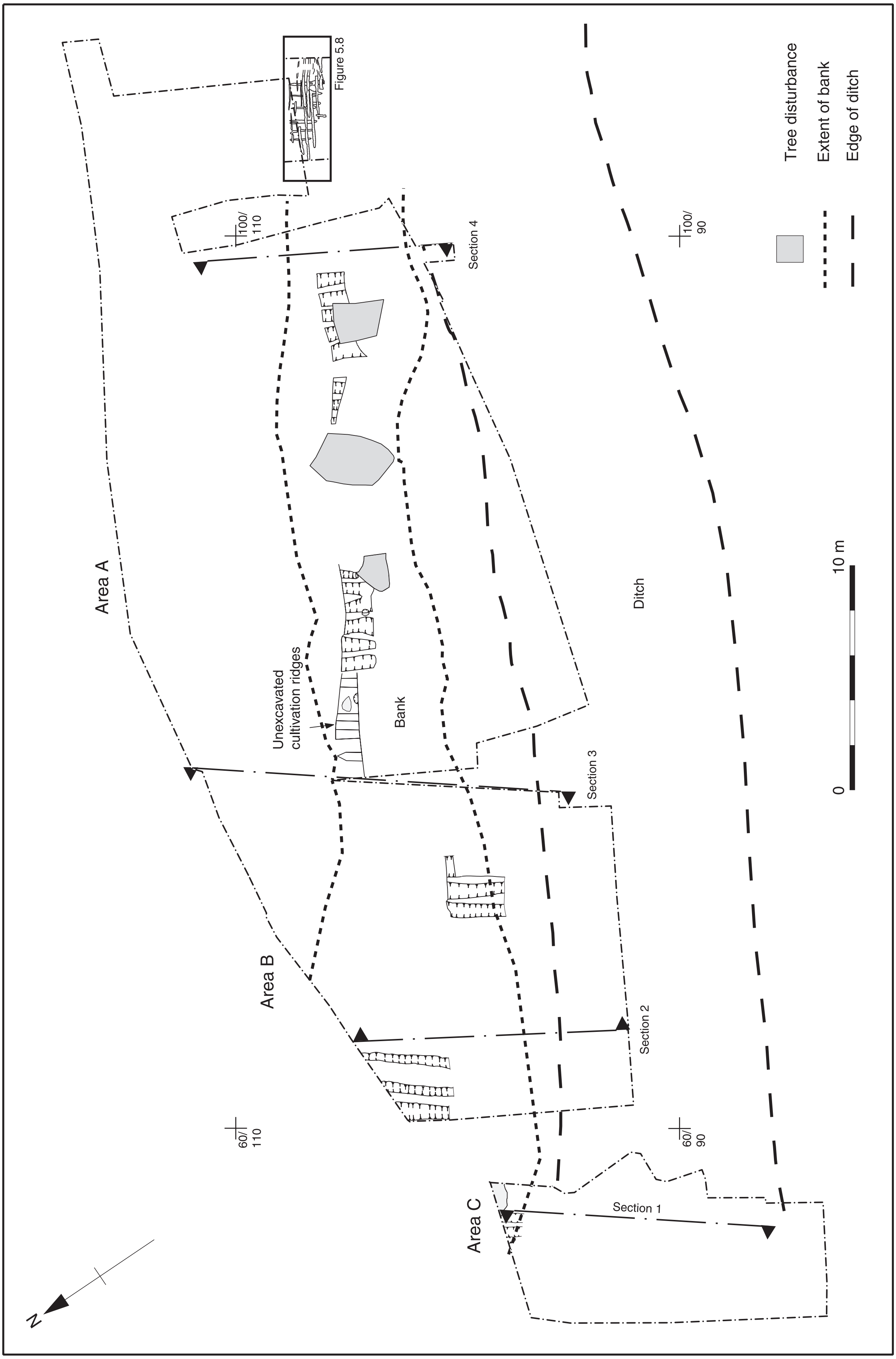


Figure 5.7 Areas of surviving phase 2 cultivation ridges with limits of later bank and ditch

turbed subsoil (116). Such material may derive from ploughing through the slumped bank material and would thus post-date the construction of Grim's Ditch bank.

Similar plough marks were observed at the bottom of layer 518 in the 1987 evaluation trench in the eastern part of the excavated area.

Although the plough/ard marks observed in 101 probably extended to the north of the slippage from the bank they were very difficult to trace there, probably because of later – possibly late Iron Age or Roman – disturbance beyond the protection of the bank. Similarly orientated ard marks probably related to those in Area A, running parallel to the north side of the bank, were, however, seen in the section through the bank at the eastern edge of Area B. They were again cut into the layer (206) which contained the cultivation ridges.

The few sherds found in these contexts were small and abraded. None of the four sherds from 103 date from later than the end of the Iron Age. Layer 101 contained one residual Neolithic or Bronze Age sherd, one intrusive medieval sherd, and two others which may be Roman. A Roman sherd was also found in the ard marks in this area. Layer 102 contained one late Neolithic or Bronze Age sherd and one Roman.

A further series of ard marks (437) forming a rectilinear pattern was found in the north corner of Area A (Pl. 5.5). One set, aligned NE–SW, were 0.24–0.74 m apart; the other, aligned NW–SE, were around 0.36 m apart. They were not excavated, but the difference in their alignment with respect to the other ard marks suggests they may belong to a separate, perhaps later, phase.

Phases 3–4: the Grim's Ditch earthwork *(Figs 5.9–10)*

Grim's Ditch itself consisted of a large ditch with a bank along its northern side (87 and 350). While its bank preserved the cultivation ridges described above, the ditch cut through the cultivation soils (103, 206 and 514).

The bank and berm

Little of the bank remains. In Area C it was just 1.5 m wide and 0.2 m high, clearly including only a fraction of the material originally removed from the ditch. A section cut in Area B (Fig. 5.9a, section 2) shows the bank to have originally been at least 6.8 m wide, and even here it has been truncated by later ploughing (291). The northern edge of these deposits is 9.2 m north of the edge of the ditch. Given the absence in the ditch fill of deposits slumping from the bank, it seems likely that the bank and ditch were separated by a berm, the width of which is unclear. The distance between the bank

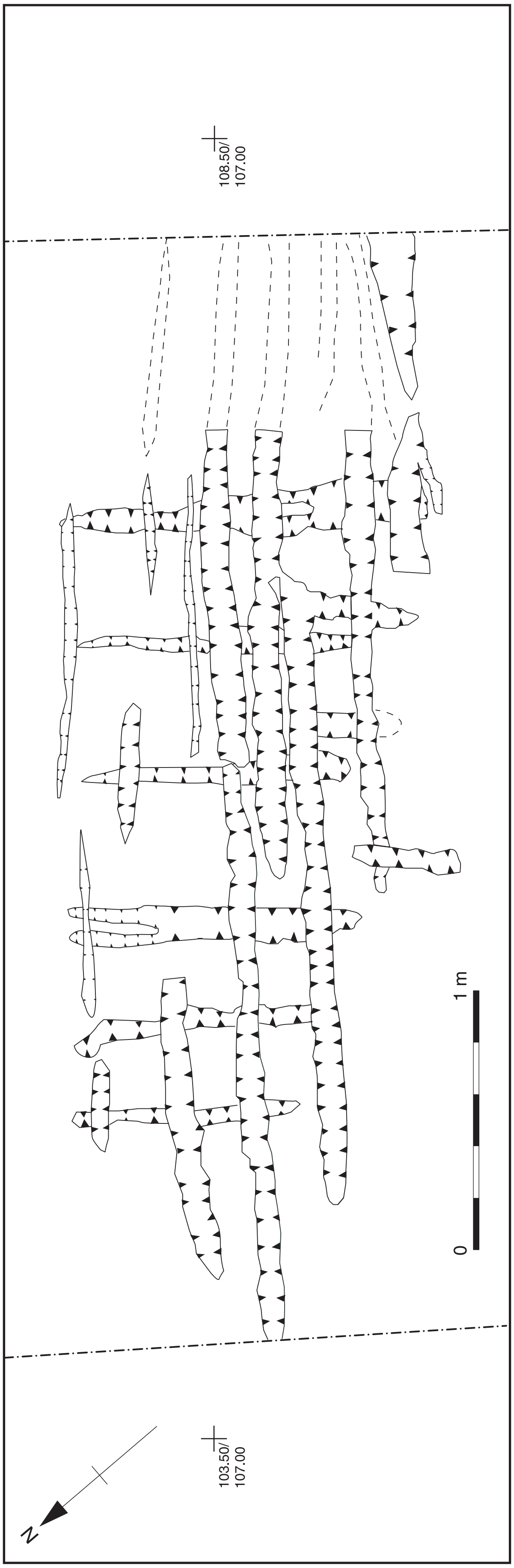


Figure 5.8 Phase 4 post-bank ploughing to east of Area A

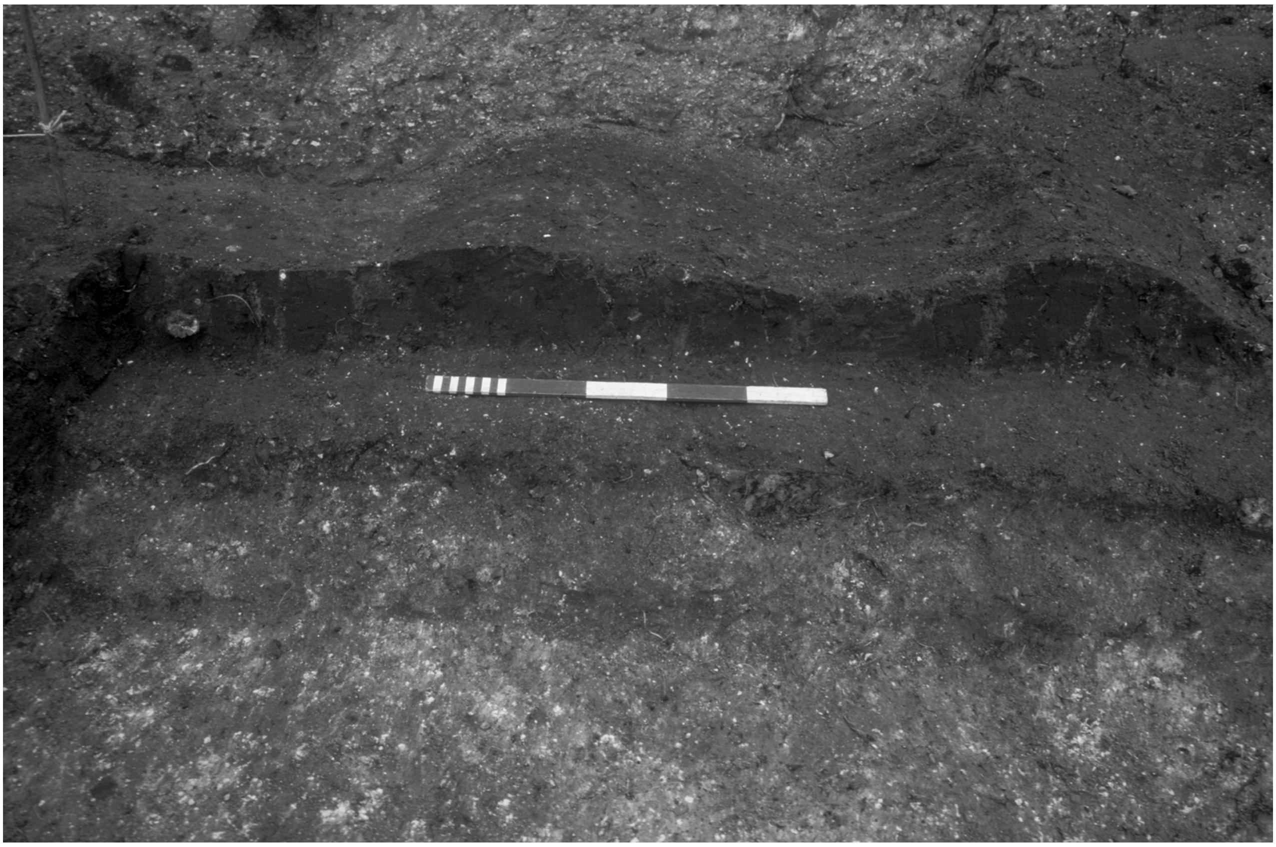


Plate 5.3 Phase 2 cultivation ridges preserved beneath the Grim's Ditch bank

deposits and the ditch varies between 2 m and 4 m. If the berm was 2 m wide, and was constructed from all the ditch material, the bank would have been around 7 m wide and about 2 m tall.

The bank was constructed of chalk and soil which were not deposited in a structured way. The chalky layers (14, 95, 292=287=203) within the bank made the ridged cultivation below highly visible; the brown silty layers (11, 354, 288 and 289) were similar to both earlier and later ploughsoils.

In Area A the bank was composed of several layers (Fig. 5.9b). A soft dark brown sandy silt with some gravel (15), which may be redeposited ploughsoil or just underlying cultivation soil, lay directly above the cultivation ridges. Above this lay friable pale yellow sand with much gravel (11=522), then a mid grey-brown sandy silty clay (11) containing limestone and gravel, both probably deriving from the cutting of the ditch. To the north further deposits of compact pale yellow sand containing limestone and gravel (7 and 8=520) may derive from the initial slippage of the bank. This suggestion is supported by the discovery of a single medieval sherd, as well as middle Iron Age and 1st-century AD sherds, within them, which provide important dating evidence for the earthwork.

Further west the bank material differs. In Area B it consisted of mid dark brown silty sandy loam with horizontal lenses of chalk and yellow silt (287=288; see Fig. 5.9b, section 3). In Area C it consisted of a friable light yellow-brown gravelly sand containing chalk and flint, which was overlain by a darker fine sandy silt containing some chalk.

A stakehole (515; see Fig. 5.9b, section 4) cut into the cultivation soils on the edge of the ditch, and possibly cut by the ditch, may, however, have formed part of a revetment. Hinchliffe (1975, 134) suggested that the bank must have been retained in some way, but no further evidence of such a structure was found. Three postholes (58, 60 and 90), which cut the cultivation soil (15) and were overlain, and, in the case of 90, filled by slippage from the bank (8), were found on the northern side of the bank, and hence could not have prevented slippage into the ditch.

The ditch

The ditch was sectioned in Area C (Figs 5.9a, section 1, 5.10, Pl. 5.6) where it was 10 m wide and 2.8 m deep. It had a gradual break of slope at the top, 45° sides, and an uneven rounded base. The ditch seems to have become narrower and deeper to the east, away from its western end towards the river. In the 1987 evaluation trench, 45 m to the east of Area C, it appeared to be about 7–8 m wide, and augering to a depth of 3 m did not reach its bottom. Some 575 m further east (see Fig. 5.1), the 1974

Plate 5.4 Phase 4 post-bank ploughing looking east

excavations found it to be 5–6 m wide and 3 m deep (Hinchliffe 1975).

The fills of the ditch have been divided into three phases (see Fig. 5.9a, section 1). The lowest of the primary fills (321, 324 and 325) were grey-orange sandy silts, mottled with iron staining, containing some chalk, which probably derive from slumping rather than deliberate infilling. Some animal bone was found in 325. Above these was a layer of blue-grey silty clay (328) which contained one worked flint, further animal bone and a fragment of Roman tile. Although Robinson suggests that the ditch never held permanent water (see below), this layer may have formed in the bottom of the ditch while it was still in use and contained water. This layer was overlain by an orange-brown sandy silt (327), and, above that, by a mottled orange and brown silty clay, both probably slippage from the side of the ditch. Although the section appears to show a recut between these two and the earlier layers, the fact that parts of the same dog skull and jaw were found in both 325 and 328 suggests that this is an illusion deriving from the reconstruction of the section from either side of a step which was left for safety reasons. The dog bones, perhaps derived from a deliberate burial, were radiocarbon-dated to cal AD 140–390 (95% confidence OxA-7175; 1755±35 BP), which together with the Roman tile provides a secure Roman date for this phase of

Plate 5.5 East section of Area A showing where post-bank ploughing has cut down through the Grim's Ditch bank mixing the light chalk rich layer into the dark soil rich layers

filling (see also Powell and Clark, below).

The secondary fills were light grey-brown and orange-brown sandy silts or silty clays which contained occasional flint or chalk stained with iron. The fills near the bank (320, 316 and 304) probably derive from further slippage from the bank. Although the stratigraphy here gives the impression of a recut, the relationships visible in the section do not seem to have been fully resolved in the field, and a recut is unlikely. The main fills probably derive from ploughed bank material. A single sherd of possibly 11th–15th-century date in layer 304 provides the only direct dating evidence.

The tertiary fills, deep to mid brown silts (88–9, 292, 305–7 and 309), are probably of the same origin as the secondary fills. A single flake of samian was found in layer 307.

Phases 5–7: medieval and later activity *(Fig. 5.11)*

Early pits and ditches

Two ditches (9=46=208 and 207=50) were found running along the line of Grim's Ditch bank. The earlier of these (9=46=208) varied along its length. In Area B it had a U-shaped profile at least 1 m wide and 0.7 m deep. It became shallower and wider

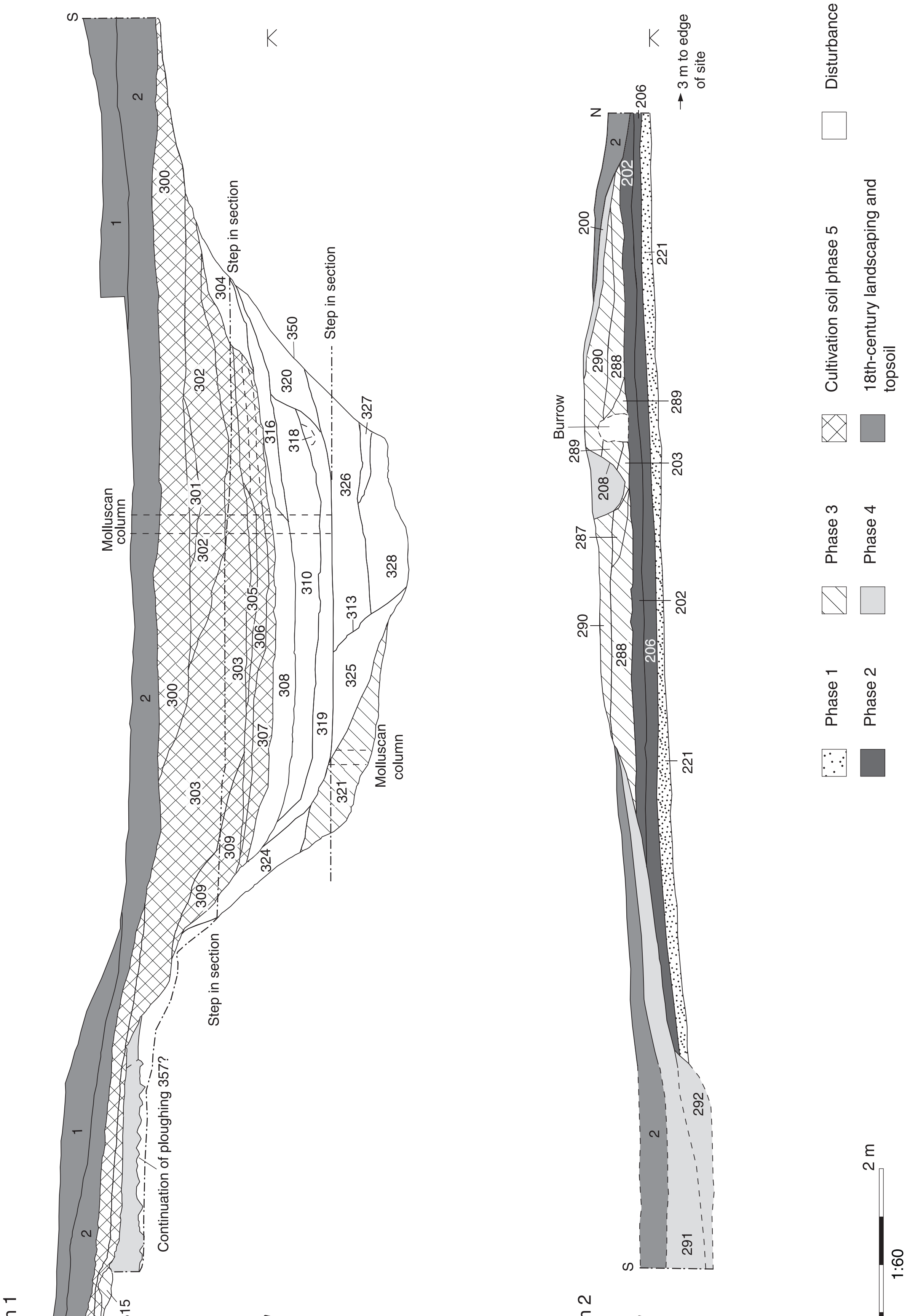


Figure 5.9a Sections 1–2 through the Grim's Ditch earthwork

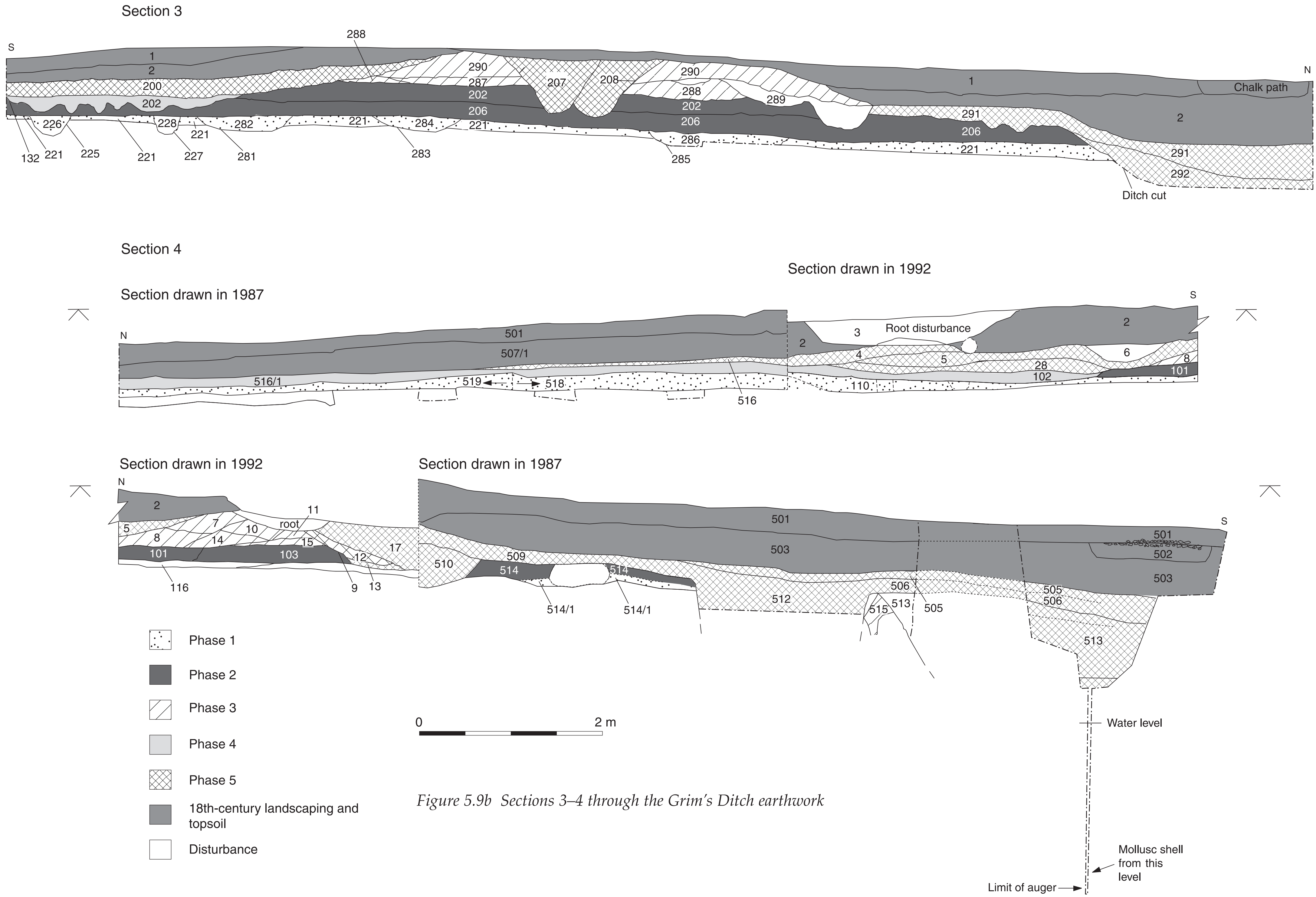


Figure 5.9b Sections 3–4 through the Grim's Ditch earthwork

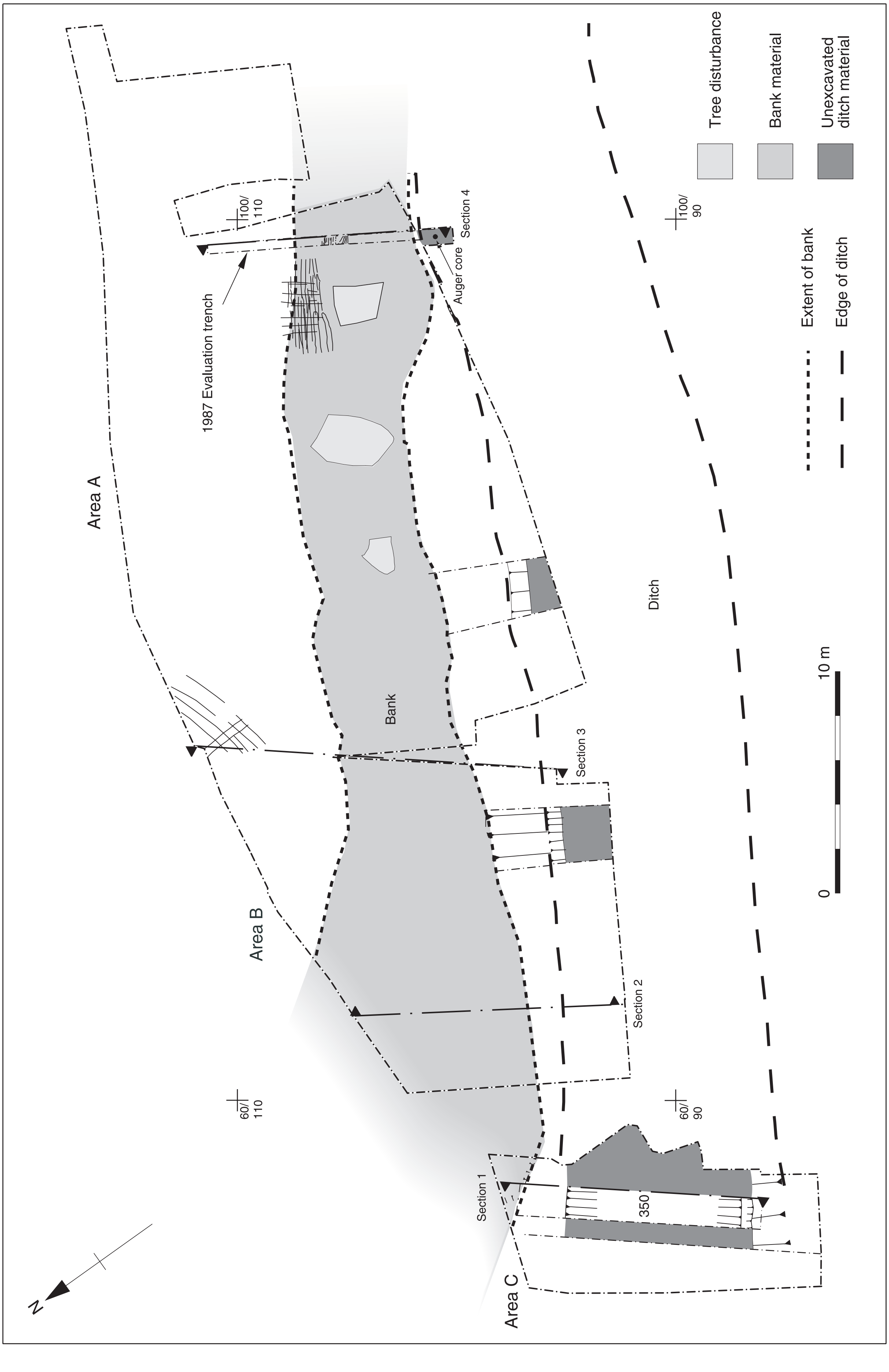


Figure 5.10 Phases 3–4: Grim's Ditch earthwork and immediate post-bank ploughing

Plate 5.6 The Grim's Ditch section in Area C, almost completely excavated with snail sample column removed, looking north-east towards Areas B and A respectively

towards the east, measuring 0.45 m deep and 1.4 m wide in Area A. It was filled with a yellow or grey-brown sandy clay (12–13, 45 and 209). The second ditch (207=50) had a very similar profile, and although it clearly cut ditch 9=46=208, the two merged in the west of Area B, where a second cut could not be recognised (Fig. 5.11). The later ditch was filled with a mid brown sandy silty loam (201=15=51) which contained residual worked flint, and pottery of 11th- to 15th-century date, suggesting, given their similar alignment and form, that both ditches were medieval.

Towards the eastern edge of Area A, ditch 9=46=208 was cut by a pit (44), 1.8–2 m wide and 0.38 m deep, filled by a soft mid yellow-brown sand. This pit was, in turn, cut by a rectangular pit (48) of similar dimensions, but only 0.2 m deep, with concave sides and a flat base. It was filled by friable dark grey-brown sandy silt (35) which contained one piece of flint and an animal bone.

The stone building

Pit 48 lay within the remains of a stone building (Fig. 5.12, Pl. 5.7). The walls of this structure were set within a curved foundation trench, 4 m long, 0.3 m wide and 0.1 m deep, with steeply sloping sides and a flat base. Although the walls (19 and 20) may well have been built at one time, since they (and the foundation trench) were cut by a pit (34), they were given two context numbers. The walls were built of rough courses of roughly squared blocks of chalk and occasionally flint, measuring up to 0.12 m x 0.20 m x 0.05 m. No mortar was used; a pale brown chalk and clay mix was the only material found between the blocks. A posthole (37) cut into wall 20 may indicate that a wooden superstructure rose above the stone foundations.

Although it could be an unrelated ditch, the cut (21) along the western side of the structure may be a robber trench related to the removal of a western wall. It was, however, overlain by the partial remains of a later and less substantial wall (25 and 27), which was perhaps an attempt to rebuild the western wall.

A series of layers interpreted as make-up layers and floors were found within the building. The earliest of these (23), a make-up layer, overlay the fill (35) of pit 48, and consisted of compact mid brown clay silt containing stones, gravel chalk flecks and charcoal. It contained 11th- to 13th-century pottery. It was covered by a very compacted layer of sand, gravel and chalk (22) which may be a floor or a make-up for layer 18. Layer 18 was a flat surface composed of a single layer of flints within a clay silt matrix which had been burnt uniformly along its length (see Pl. 5.7). It was originally suggested that it may have been a hearth for a bread

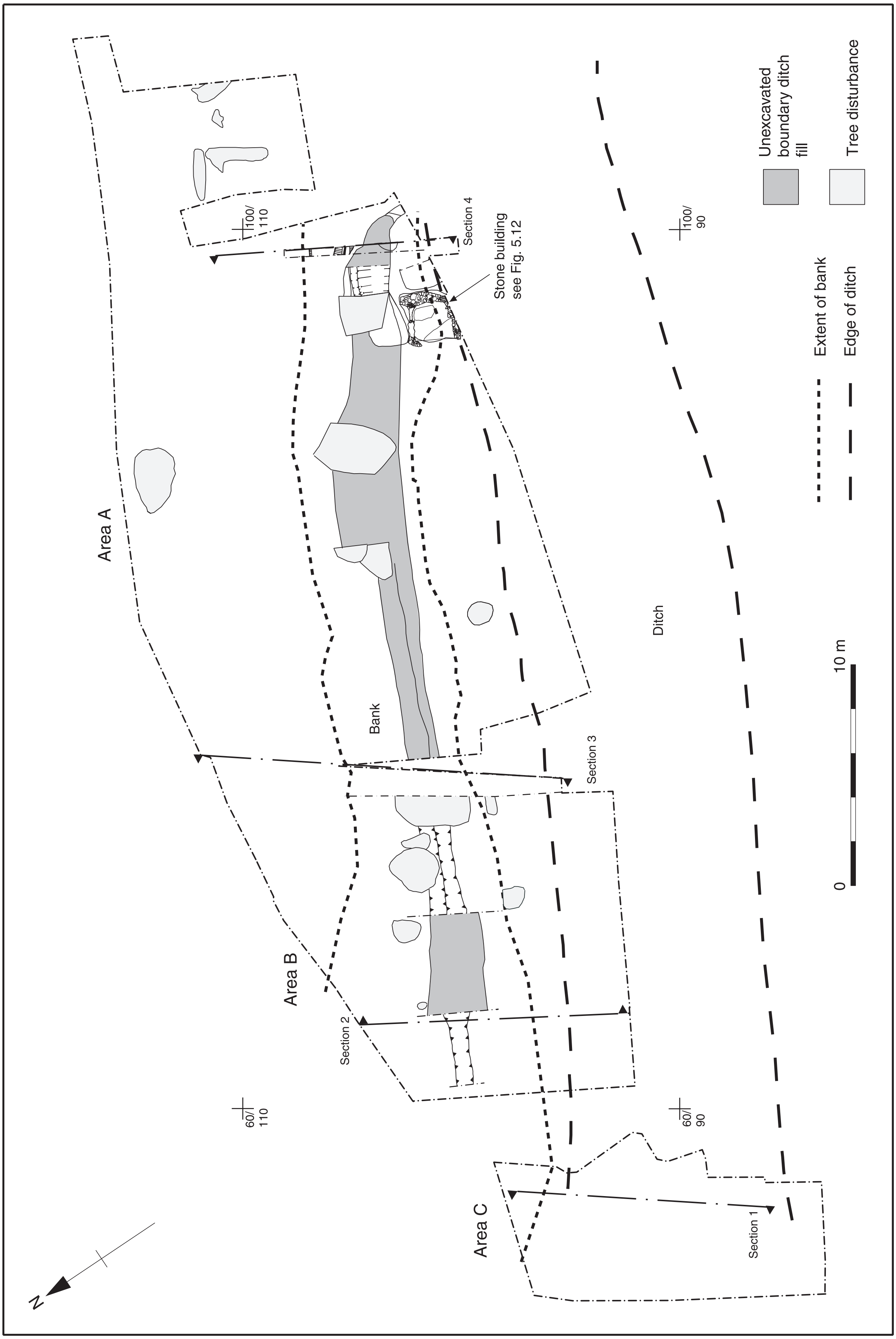


Figure 5.11 Phases 5-7: medieval and post-medieval features with the extent of the earlier bank and ditch

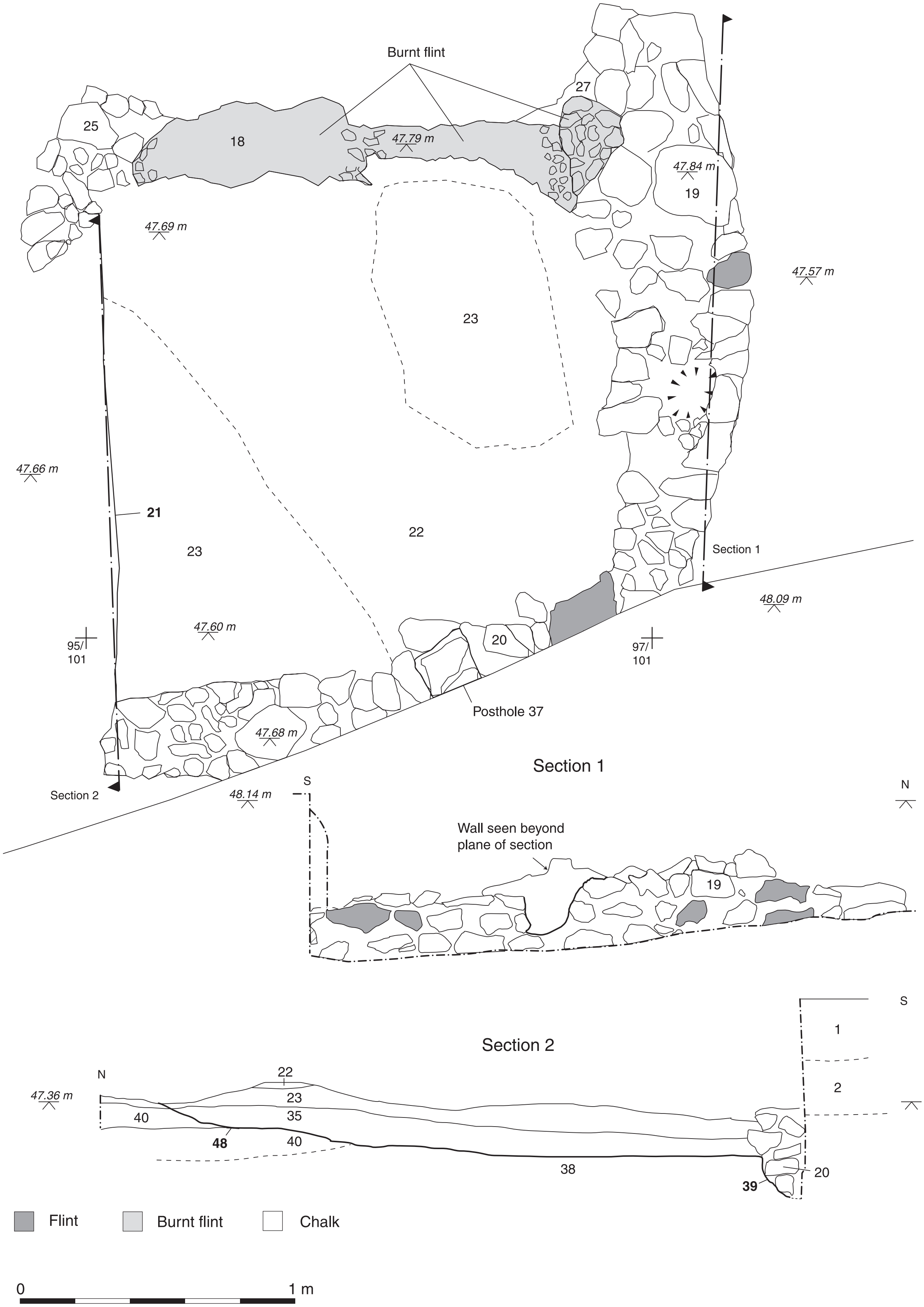


Figure 5.12 Plan and sections of the medieval stone building, possibly a brewhouse or oven structure

oven contained within the walls. On the grounds that it was too extensive to be a domestic hearth, this interpretation, and the idea of an oven, were later rejected, and the surface interpreted simply as a floor. It is also possible, however, that the structure was a brewhouse or a communal oven on the edge of the village.

Other pits and ditches

Immediately to the east of the structure a short sequence of features was found. The earliest was a curvilinear ditch (45), 0.8 m wide and 0.5 m deep, filled with two layers (31 and 41) of grey-brown sandy loam. This ditch was cut by two pits: pit 34, which may have been associated with the building, and a bell-shaped pit (29), 1 m wide and 0.6 m deep, the base and one side of which were reddened by perhaps *in situ* burning. It was filled with grey-brown silty loam (30) which contained several pieces of burnt flint, a possible flint scraper and several sherds of 11th- to 15th-century pottery. Pit 29 was cut by what may have been a flat-based ditch (43), 0.3 m wide and 0.4 m deep, which ran for 4.5 m into the eastern section, and was filled with brown-grey silty loam (42).

A further group of features was found 12 m to the west. The earliest was a flat-based pit or ditch (55), 0.7 m wide and 0.34 m deep, cut into cultivation soil 15 and filled with an orange-brown sandy silt (56). This feature was cut by the later of two parallel boundary ditches (50=207). Both of these ditches were cut by an ovoid round-based pit (53), 1.32–3.0 m wide and 0.45 m deep, filled with brown-grey sandy silt which contained a single piece of burnt flint. A further ovoid pit (71), 2.1 m wide, was observed at 92/105, but was not excavated.

Ploughing out of the bank

To the north of the bank in Area A, ploughsoil 102 was overlain by two medieval and post-medieval ploughsoils: 28 – a dark brown silty loam – and 5=4 – a yellow-brown clay and sand loam – both of which may have been formed by ploughing out of the bank. These layers contained a large number of finds: animal bone, flint flakes and prehistoric, Roman, medieval and post-medieval pottery (see Tables 5.8, 5.12).

Similarly in Area B the top of the bank was disturbed by ploughing (204=290, a brown silty sandy loam), and was overlain by a possible ploughsoil (200, a yellow-brown sandy silt loam, which may be the same as layer 5 in Area A). These layers also contained an assortment of finds including flint flakes and 11th- to early 15th-century pottery (see Table 5.12).

In Area C the top of the bank was also found to have been disturbed by ploughing. The bank deposits were overlain by two ploughsoils (323 and 322), both silty sandy loams, and although they

Plate 5.7 The medieval stone structure, looking east, with burnt flint layer 18 to the left and wall 20 to the right

contained few datable artefacts besides two sherds of middle 11th- to early 15th-century pottery in 322, the fact that they overlay deposit 303 in the ditch, suggests that they are post-medieval in date.

These ploughsoils were overlain by a layer of friable dark brown loam (2) which covered much of the site on both sides of the bank, and formed a slight bank running east–west alongside Grim's Ditch, but not necessarily on the line of the original bank. As well as pieces of flint, iron slag and animal bone, this soil contained pottery ranging in date from the 11th to the 18th century, and may have been associated with the 18th-century landscaping of the site. This landscaping included the planting of an avenue of beech trees and the construction of a chalk pathway roughly along the line of Grim's Ditch.

The final filling of the ditch

The final filling of the ditch occurred during this broad period as several soils were ploughed down from the bank and into the shallow hollow (*c* 0.95 m deep) that remained. The first of these fills (303) was a brown silty loam which contained a few flint flakes, some burnt flint and pottery, including one sherd of 11th- to 15th-century date (Fig. 5.9a, section 1). It can be correlated with ploughsoil 291, a brown silty sandy loam in Area B, which extends from the base of the bank down into the ditch. The bottom of 291 undulated, possibly representing ploughmarks cut east–west across the cultivation ridges in the underlying layer 206. Ploughsoil 291 was overlain in Area C by a shallower deposit of slightly darker but otherwise similar loam (302), which probably also derived from ploughing through the bank. It contained medieval pottery, including one late 11th- to 13th-century sherd, and a copper-alloy ring probably of late Saxon to Norman date. It was overlain firstly by a distinct layer of sandy loam (301) which contained no finds, and then by ploughsoil 300 which contained two early 11th- to late 14th-century sherds. Similarly in Area A, where a machine section was cut into the ditch deposits, an orange-brown sandy silt layer (88) and a grey-brown sandy silt layer (89), probably both derived from the bank, were seen in section. No finds were recovered from either deposit.

ARTEFACTUAL EVIDENCE

Worked flint *(Figs 5.13–14)*
by Philippa Bradley

Introduction

A total of 596 pieces of worked flint and 106 pieces of burnt unworked flint and stone was recovered (Tables 5.3–6, Figs 5.13–14). The flint is not a homogeneous group: it includes diagnostic Mesolithic pieces (eg Fig. 5.13.1–5), several pieces assigned to the Neolithic (eg Fig. 5.13.10) and the Neolithic/early Bronze Age (eg Fig. 5.14.21) on technological grounds, and a number of retouched pieces and debitage likely to be later Bronze Age in date (eg Fig. 5.14.18–19, 22–3).

Raw materials

The majority of the flint is mid to dark brown in colour with a white, buff or brown, occasionally chalky, cortex. Their condition is quite varied. Some are very worn with an abraded and stained cortex; others are much fresher. Internally the condition of the flint also varies; many pieces have cherty or crystalline inclusions, which sometimes affected the knapping quality of the raw material. Cortication was generally light but occasionally pieces exhibited medium to heavy clouding or mottling. Some of this material may have been found in the locality, but better-quality flint occurs in the river gravels around Dorchester-on-Thames (Gibbard 1985) and some may have come from either the Chilterns or the Berkshire Downs.

Description

The few diagnostic pieces indicate Mesolithic activity, and technological aspects of the material have therefore been used to provide additional, albeit less precise and reliable, dating information. Although mostly undistinguished, a controlled knapping strategy typical of the Mesolithic and Neolithic is revealed in much of the material. The large number of crudely worked tested nodules and core fragments, however, may be of later date. One or two of the retouched pieces may also belong to this expedient knapping technology (eg Fig. 5.14.18–19, 22–3).

Both earlier and later Mesolithic activity seems to be represented by a small group of retouched forms and debitage. Both of the microliths (Fig. 5.13.1–2) are edge-blunted points. The smaller example with additional retouch (Fig. 5.13.2) would be consistent with a later Mesolithic date. The larger, more robust form (Fig. 5.13.1) is probably earlier in date. Blades, bladelets, blade-like flakes, a burin (Fig. 5.13.3) and three truncated blades (eg Fig. 5.13.4) were also recovered. Some of the small neatly retouched scrapers and serrated and retouched flakes (eg Figs 5.13.12, 5.14.15) may also be of Mesolithic date, although they are relatively undiagnostic and could be later. A number of soft-hammer-struck flakes, some with abraded platform edges and prepared butts, and the core rejuvenation flakes (eg Fig. 5.13.9) may also be contemporary. This material is fairly widely distributed across the site, coming from the cultivation soils and the ard marks, later ploughsoils and topsoil. Away from the main site, towards the river, a probable unfinished microburin (Fig. 5.13.5) was recovered.

The possible leaf-shaped arrowhead is a rather dubious example (Fig. 5.13.10). The retouch is largely confined to the edges of the object and it has

Table 5.3 Summary of flint assemblage

	Flakes	*Blades, blade-like flakes etc.	Chips	Irregular waste	Cores, core fragments	Retouched forms	Total	Burnt unworked flint
Excavation	410	28	14	7	33	45	537	93
Evaluation	48*	1	1	1	3	5	59	13
Total	458	29	15	8	36	50	596	106

* including six face/edge rejuvenation flakes and one core tablet

Table 5.4 Core typology

	Single platform	Multiplatform	Discoidal	Tested nodules	Core fragments	Total
Excavation	1	5	1	17	9	33
Evaluation	-	-	-	3	2	5
Total	1	5	1	20	11	38

Table 5.5 Retouched forms

	Points	Scrapers	Serrated and retouched flakes	Backed knives	Notches	Misc. retouch	Total
Excavation	5 (2 microliths, 2 piercers, 1 burin)	12 (5 end, 1 side, 2 end and side, 1 disc, 3 other)	15 (7 serrated, 8 retouched)	1	2	10	45
Evaluation	1 (possible leaf arrowhead or point)	-	-	1	-	3	5
Total	6	12	15	2	2	13	50

Table 5.6 Summary of flint from context groups 40, 47 and 50

Context group	Flakes	Blades, blade-like	Chips	Irregular waste flakes etc.	Cores, core fragments	Retouched forms	Total	Burnt unworked flint
Ard marks (40)	26	4	5	-	-	2 (1 microlith, 1 serrated flake)	37	5
Cultivation soils (47)	126	9	3	1	8 (1 single platform, 1 multiplatform, 1 discoidal, 1 tested nodule, 4 fragments)	18 (5 scrapers, 2 notches, 4 serrated flakes, 3 retouched flakes, 1 burin, 3 misc. retouch)	165	31
Bank of Grim's Ditch (50)	53	3	1	2	3 (1 multiplatform core, 2 core fragments)	7 (2 serrated flakes, 2 retouchedflakes, 1 piercer, 1 end scraper, 1 other scraper)	69	6
Total	205	16	9	3	11	27	271	42

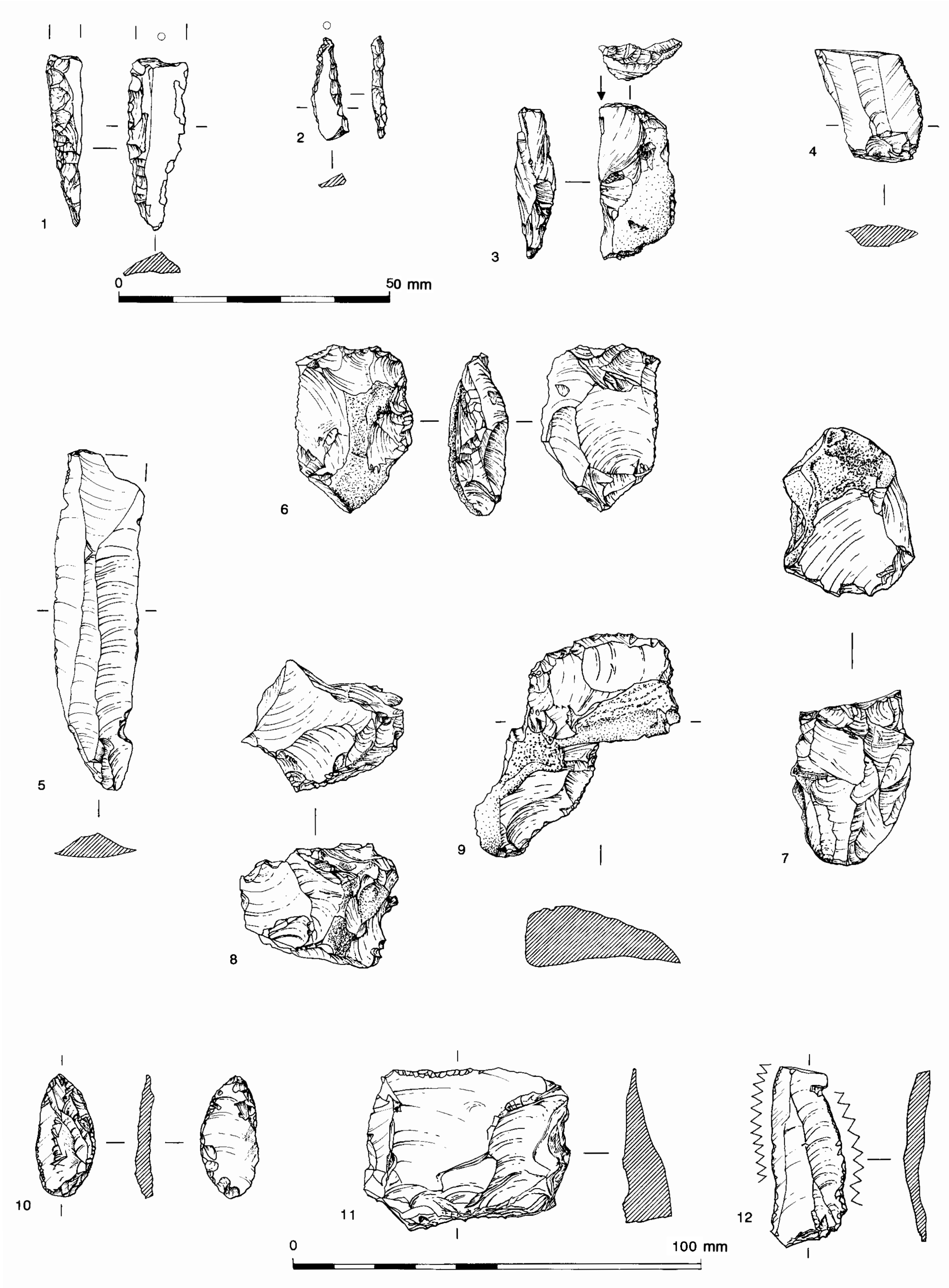


Figure 5.13 Worked flint (details in catalogue)

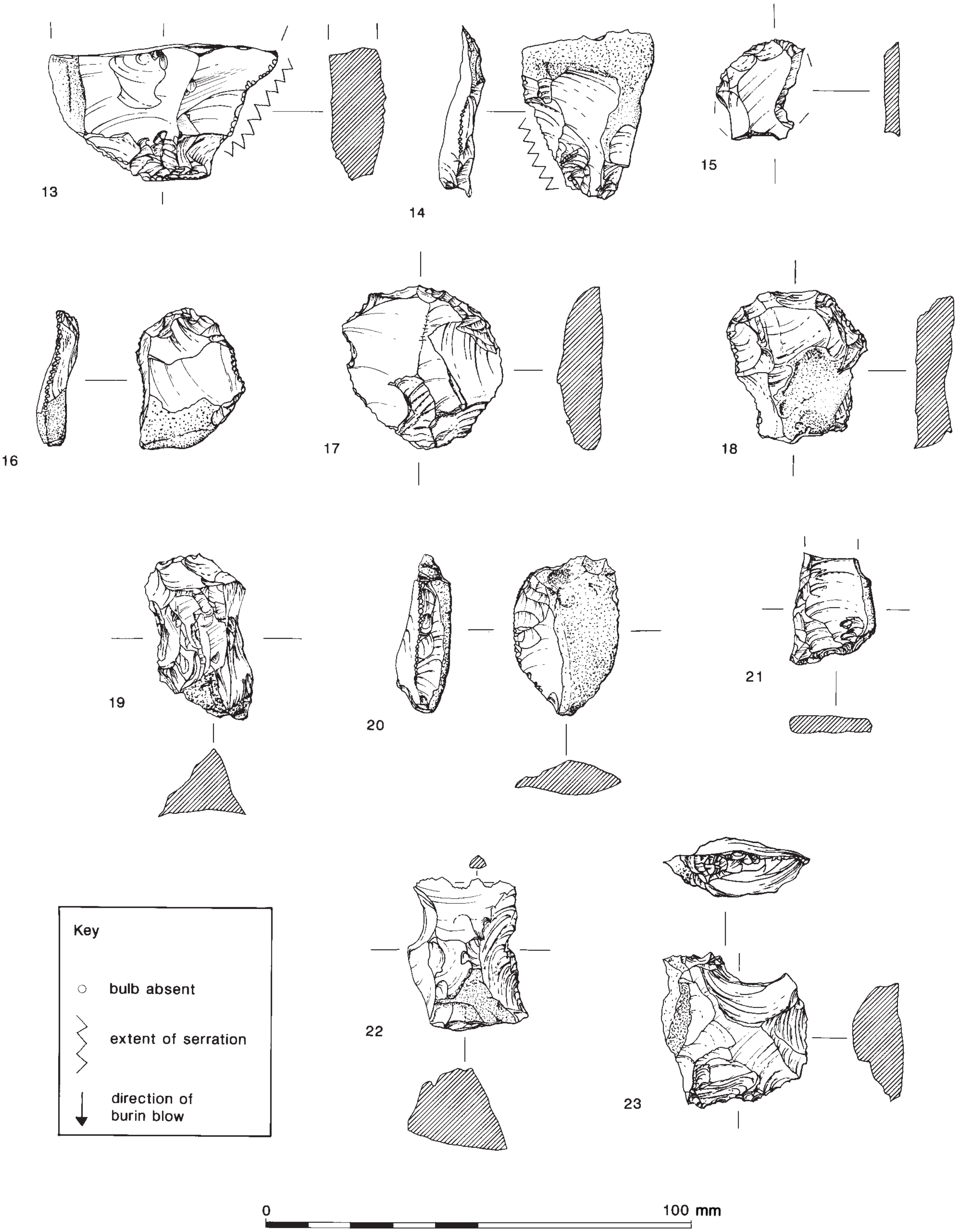


Figure 5.14 Worked flint (details in catalogue)

a rather asymmetrical outline. It may have been used as a piercer although it does not have a very robust point. A Neolithic date would, however, seem likely. Some of the scrapers and the knives (eg Fig. 5.14.17, 20–1) may be of Neolithic/early Bronze Age date. Apart from the discoidal example (Fig. 5.13.6), the cores recovered were not used to produce specific types of removal (eg Fig. 5.13.7–8), and little evidence for core preparation was recorded, which would again be consistent with a Neolithic or Bronze Age date. Some retouched forms such as the notches, a piercer and a couple of scrapers (eg Fig. 5.14.18–19, 22–3), including one on a piece of irregular waste, are probably of later Bronze Age date, and can be compared with material from Whitecross Farm (see Brown and Bradley, Chapter 3).

The only context groups which produced any quantity of flint were the ard marks (42 pieces), the cultivation soils (196 pieces) and the bank of Grim's Ditch (75 pieces); each context group is summarised in Table 5.6.

Discussion

The dating of this collection of flint has been largely based on technological aspects of the material since so few diagnostic retouched forms were recovered. There is, however, diagnostic Mesolithic material, including an unfinished microburin (Fig. 5.13.5) indicating microlith manufacture. Neolithic and Neolithic to early Bronze Age activity is indicated by a range of neatly retouched pieces including scrapers, serrated and retouched flakes and knives. A possible leaf-shaped arrowhead was also recovered. A discoidal core is the only diagnostic piece of debitage recovered. Healy has shown (1985, 192–3) that keeled and discoidal cores are more common during the later Neolithic and are often associated with Grooved Ware. They have also been linked to production of blanks for transverse arrowheads (Green 1980, 38). The retouched forms present are typical of Neolithic and early Bronze Age domestic assemblages, and a range of tasks seems to have been carried out on site including plant processing, knapping and hide preparation.

Neolithic and Bronze Age flintwork has been recovered from numerous sites in the immediate area (Oxfordshire SMR nos 2198, 15523, 15494) and to the south of the Grim's Ditch excavations (eg Oxfordshire SMR nos 15463, 15465, 15462, 15464), as well as in excavations and surface collections at North Stoke (Case 1982a, 72, fig. 39; Holgate 1988a, 236; Ford 1987) and South Stoke (Holgate 1988a, 249; in general see Case and Whittle 1982 and Holgate 1988a). A flake and a serrated flake accompanied a middle Neolithic burial within a ring ditch at Newnham Murren just 2 km to the north-west (Moorey 1982, 58, fig. 31). Further south, excavations at Gatehampton Farm, Goring produced Neolithic and Bronze Age flint including evidence for laurel leaf manufacture (Brown 1995, 82). Several later Neolithic pits have been found in the area which have produced flint associated with Peterborough Ware pottery (Bradley in prep. b) and Grooved Ware pottery (Holgate 1988a, 268). Further upstream from Wallingford large Neolithic and Bronze Age flint assemblages have been recovered from a series of funerary and other monuments and pit groups in the Dorchester–Drayton/Abingdon–Radley monument complexes (see eg Bradley 1999a; Holgate *et al*. 2003).

At least two scrapers and a piercer, together with many of the tested nodules, some of the core fragments and undoubtedly some of the undistinguished flakes, belong to the mid to late Bronze Age. This material is very similar to that from the later Bronze Age sites at Whitecross Farm (see Brown and Bradley, Chapter 3) and Bradford's Brook (see Bradley, Chapter 6). Fieldwalking around Winterbrook identified a scatter of later Bronze Age flintwork (Bevan 1998).

Catalogue of worked flint (Figs 5.13–14)

1. Context 203, SF 395. Broken microlith, edge-blunted type on a proximal truncation, some later damage to right-hand side. Heavily corticated.
2. Context 221/2, SF 823. Microlith, small edge-blunted form with additional retouch along right-hand side. Probably later Mesolithic. Lightly corticated.
3. Context 206/3, SF 754. Burin, prepared platform. Lightly corticated.
4. Context 8, SF 658. Truncated blade. Lightly corticated.
5. F5. MONG881. Notched blade with ?used edges. Probably an unfinished microburin. Lightly corticated.
6. Context 15, SF 529. Discoidal core. 13 g. Lightly corticated.
7. Context 203, SF 604. Multiplatform flake core. 43 g. Medium to heavy cortication with some areas of later damage.
8. U/S, SF 688. Multiplatform flake core. Uncorticated, some incipient cones of percussion.
9. Context 8, SF 704. Core rejuvenation flake (face/edge). Lightly corticated.
10. L3 (1–3 m), SF 1. MONG881. Point (dubious leaf-shaped arrowhead). Minimally retouched. Lightly corticated.
11. L3 (1–3m) MONG881. Retouched flake, on a core rejuvenation flake (face/edge). Distal end of flake neatly but minimally retouched. Heavily corticated.
12. Context 15, SF 552. Serrated flake, on truncated blade-like flake. Both edges have been serrated and are very worn, *c* 11 serrations per 10 mm. Lightly corticated.
13. Context 202, SF 647. Serrated flake, on broken thick irregular-shaped blank. Right-hand side serrated, *c* 9 serrations per 10 mm. Medium to heavy cortication.
14. Context 305, SF 226. Serrated flake. Left-hand side serrated, *c* 6 serrations per 10 mm. Lightly corticated.
15. Context 206/3, SF 762. Broken end and side scraper, on thin blank. Neatly retouched with small

patch of cortex surviving. Scraping angle 55–70°. Lightly corticated. Probably Mesolithic or Neolithic in date.

16. Context 15, SF 563. End scraper, minimally retouched on thin blank. Scraping angle 55–65°. Lightly corticated. Probably Mesolithic or Neolithic in date.
17. Context 202, SF 284. End scraper, neatly retouched on a thin, non-cortical blank. Scraping angle 65–75°. Lightly corticated and some glossing. Possibly Neolithic.
18. Context 203, SF 393. End scraper, on thick, partly cortical blank. Scraping angle 65–80°. Lightly corticated. ?Later Bronze Age date.
19. Context 203, SF 438. Scraper on a chunk of irregular waste. Scraping angle 75–80°. Lightly corticated. ?Later Bronze Age date.
20. Context 8, SF 662. Backed knife, left-hand side minimally retouched with invasive removals, cortical backing right-hand side. Lightly corticated.
21. U/S, SF 687. Miscellaneous retouch, distal break. Steeply retouched left-hand side, ?knife fragment. Uncorticated.
22. Context 28, SF 316. Piercer, roughly formed on a thick blank. Medium cortication. ?Later Bronze Age date.
23. Context 202, SF 655. Notch, a semicircular notch formed at the distal end of a flake. Uncorticated. ?Later Bronze Age date.

Worked and burnt stone

by Alistair Barclay and Fiona Roe

A single fragment of worked stone (1987 evaluation trench MGD87 SF 1) of very fine-grained calcareous limestone, measuring 105 mm x 80 mm and weighing 518 g, was recovered from layer 503. It is possibly from a door or window and could be of medieval date (J Blair pers. comm.).

Burnt pebbles including some fragments, mostly quartzite but including some sandstone, were recovered from contexts mostly post-dating the earthwork (2, 8 and 52) with the notable exception of 328, near the bottom of the primary fills of the ditch. All have signs of alteration by heat, some with either angular fractured and/or reddened surfaces. These stones could originally have been used in cooking-related activities, as potboilers or hearthstones, or may derive from non-domestic activities, such as tree clearance or the burning of vegetation.

Earlier prehistoric pottery

by Alistair Barclay

Introduction and methods

A total of 68 sherds (238 g) of earlier prehistoric pottery, including a small number of Peterborough Ware sherds, some indeterminate Neolithic and earlier Bronze Age sherds, and some later Bronze Age sherds was found. The assemblage recovered from beneath the Grim's Ditch earthwork is characterised by mostly small abraded featureless body sherds, while the sherds recovered from the Mongewell riverside site are notably larger and less abraded.

The pottery was characterised by fabric, form, surface treatment, decoration and colour. Where present, visible residues were recorded. The sherds were analysed using a binocular microscope (x20) and were divided into fabric groups by principal inclusion type. In the absence of featured sherds, dates have been assigned through fabric analysis. OAU standard codes are used to denote inclusion types: A = sand, F = flint, G = grog, Q = quartzite, R = rock fragments, S = shell, V = voids (mostly leached calcareous inclusions). Size range for inclusions: 1= <1 mm fine; 2 = 1–3 mm fine–medium; 3 = medium–coarse up to and over 3 mm. Frequency range for inclusions: rare = <3%; sparse = <7%; moderate = 10%; common = 15%; abundant = >20%.

Peterborough Ware *(Fig. 5.15)*

Ten sherds (46 g) of middle Neolithic Peterborough Ware pottery were recovered from a preserved land surface near the edge of the present River Thames in the 1988 trench 1 (MONG881) at Mongewell (Table 5.7). Three fabrics were identified.

Flint-tempered

FA2 Hard fabric with moderate angular flint (up to 3 mm) and sparse quartz sand.

FA3 As above, but with larger flint and either very fine or fine–medium quartz and to a lesser extent glauconitic sand.

Quartzite-tempered

Q3 Hard fabric with coarse angular quartzite (up to 7 mm). Clay matrix also contains rare fine quartz sand and very fine mica.

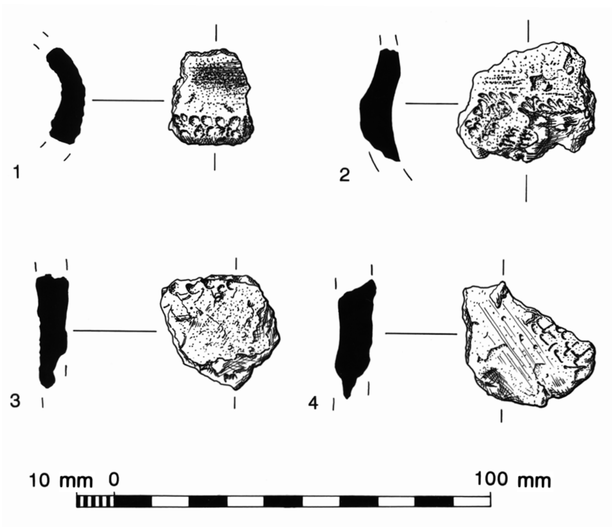


Figure 5.15 Middle Neolithic Peterborough Ware (details in catalogue)

Table 5.7 Quantification by context and fabric of the Peterborough Ware from the Mongewell 1988 evaluation trench (MONG881)

Context	*FA2*	*FA3*	*Q3*	*Total*
Layer 3, 1–3 m	2, 4 g	4, 25 g	1, 11 g	7, 40 g
Layer 3–4 m		3, 6 g		3, 6 g
Total	2, 4 g	7, 31 g	1, 11 g	10, 46 g

The use of either flint or quartzite to temper pottery of this date is common within the Upper Thames Valley. Flint temper was first used in earlier Neolithic Bowl pottery, whereas the use of quartzite seems to coincide with the appearance of Peterborough Ware, and particularly Ebbsfleet Ware.

The featured sherds (Fig. 5.15.1–4) represent at least three vessels. Nos 1 and 3 are very similar in fabric and appearance and probably derive from the same shouldered bowl, although they do not refit. Both are decorated with impressions made with the articular surface of a small bone and both are broken at the shoulder. No. 2 is from a similar type of vessel and is decorated with short whipped-cord maggot impressions. No. 4, from the body of a vessel, has been decorated with fingernail impressions which perhaps formed a lattice motif. This sherd has a bevelled edge that could have formed part of a rim, but is more likely to be the surface of a coil break. The angular rather than ledge-like shoulders, the relatively thin walls and the minimal use of whipped-cord or bone-impressed decoration suggest affinities with the Ebbsfleet substyle of Peterborough Ware.

Discussion

The small number of Ebbsfleet Ware sherds from the palaeosol in trench 1 could form part of a more extensive artefact scatter. Similar Peterborough Ware associated artefact scatters have been found at a number of sites in the Upper Thames Valley, such as Drayton and Yarnton (Barclay *et al*. 2003; Hey in prep.). Some of the sherds from beneath the Grim's Ditch earthwork could be of a similar date, although this is tentative as it is based solely on fabric analysis (see below).

Ebbsfleet Ware has been recovered from a number of sites along this part of the Thames. A small number of sherds were recovered from excavations at Gatehampton Farm, Goring less than 10 km downriver (Cleal 1995), while further upriver this type of pottery has been recovered from both the Drayton and Dorchester-on-Thames cursus complexes (Barclay *et al*. 2003; Whittle *et al*. 1992). A number of Mortlake Ware bowls have been recovered from the adjacent stretch of the River Thames, and an assemblage of Fengate Ware has been recovered from Wallingford (Barclay in prep.).

Catalogue of Peterborough Ware (Fig. 5.15)

5.15.1 Layer 3, 3–4 m. Neck sherd probably from the same vessel as no. 4. Fabric FA3. Colour: black throughout. Condition: average.

5.15.2 Layer 3, 1–3 m. Shoulder sherd with impressed whipped-cord maggot decoration. Fabric FA3. Colour: ext. reddish-brown: core black: int. brown. Condition: average.

5.15.3 Layer 3, 1–3 m. Shoulder sherd with impressed bone decoration. Fabric FA3. Colour: black throughout. Condition: average.

5.15.4 Layer 3, 1–3 m. Body sherd with fingernail decoration. Fabric Q3. Colour: ext. brownish-grey: core grey: int. dark grey. Condition: average.

The remainder of the assemblage

With the exception of the Peterborough Ware, the remainder of the assemblage (61 sherds, 211 g) is characterised by mostly small and abraded body sherds (Table 5.8). The only decorated sherds were recovered from the 1987 evaluation trench (MGD87). In the absence of either decorated or featured sherds, dates have been suggested on the basis of fabric analysis. The history of the site could largely account for the relatively poor condition of this assemblage. It perhaps accumulated on an open land surface over a prolonged period of time and then underwent several episodes of post-depositional disturbance some of which involved cultivation prior to the construction of the Grim's Ditch earthwork. Eighteen fabrics were identified.

Neolithic flint-tempered

F1–3/N Generally hard fabrics with generally ill-sorted sparse flint inclusions.

FA1–3/N As above, with the addition of quartz sand.

FAG/3 Hard fabric with moderate fine to coarse flint, sparse quartz sand and rare angular grog.

FQG2/N Hard fabric with sparse medium angular flint, rare medium quartzite and sparse fine–medium grog.

A total of 44 sherds are in principally flint-tempered fabrics that could be of Neolithic date. Perhaps significantly quartzite-tempered fabrics are absent (see Barclay, Chapter 3), supporting the suggestion that most of this material is Neolithic rather than later Bronze Age. All are plain body sherds, mostly in a worn condition. One small and

Table 5.8 Quantification by context and fabric (sherd number, weight) of the total prehistoric assemblage recovered from the Grim's Ditch earthwork

Context	*F1–3/N*	*FA1–3/N*	*FAG3/N*	*FQG2/N*	*AGQ2/LNEBA*	*GAF2/LNEBA*	*AG2/EBA*	*AQ1/LBA*	*F2/LBA*	*FGA1/LBA*	*SA2/EIA*	*AF1/-*	*ARF2/-*	*F1/-*	*Total*
US	1, 4 g									1, 7 g	1, 5 g				3, 16 g
5	1, 4 g							1, 2 g							2, 6 g
8		1, 2 g													1, 2 g
10	1, 5 g	2, 4 g													3, 9 g
15	4, 19 g	3, 14 g							1, 5 g						8, 38 g
23		1, 1 g													1, 1 g
28	5, 17 g								2, 10 g			1, 1 g			8, 28 g
101													1, 7 g	1, 1 g	2, 8 g
102														1, 3 g	1, 3 g
202	1, 5 g	4, 10 g	1, 6 g												6, 21 g
203	1, 2 g	7, 17 g		1, 4 g	1, 3 g		1, 4 g								11, 30 g
206/3	1, 5 g	1, 1 g													2, 6 g
221/1		3, 5 g													3, 5 g
221/2	2, 2 g	1, 1 g													3, 3 g
310									1, 6 g						1, 6 g
314		1, 2 g													1, 2 g
321		1, 5 g													1, 5 g
518						1, 3 g									1, 3 g
Total	17, 63 g	25, 62 g	1, 6 g	1, 4 g	1, 3 g	1, 3 g	1, 4 g	1, 2 g	4, 21 g	1, 7 g	1, 5 g	1, 1 g	1, 7 g	2, 4 g	58, 192 g

worn sherd in fabric FA2 from the post-bank ploughing 518 has what could be a single whipped-cord maggot impression. The combination of fabric and decoration suggests affinities with Peterborough Ware. This material was recovered from a wide range of contexts (see Table 5.8) with concentrations in layers 15, 202 and 203. Given that they are all tempered with flint they could be of either early or middle Neolithic date, and belong to either the Plain Bowl or Peterborough Ware ceramic tradition. Some, however, are in fabrics similar to the Peterborough Ware from the 1988 Mongewell evaluation trench.

Late Neolithic–early Bronze Age (including Beaker)

AGQ2/LNEBA Hard fabric with sparse quartz and glauconitic sand, rare grog and rare quartzite.

GAF2/LNEBA Soft fabric with moderate grog, sparse quartz and glauconitic sand and rare angular flint.

Two sherds are thought to be of late Neolithic–early Bronze Age date of which one is certainly Beaker. The Beaker sherd from context 518 has two closely spaced rows of comb impressions, and is manufactured from a principally grog-tempered fabric that also contains sand and some flint. It is relatively thin walled (*c* 4 mm) and has a well-fired reddish-brown outer surface. It derives from a fine Beaker probably of Case's 'early' or 'middle' styles which he now refers to as styles 1 and 2 (1993, 243 and table 1). A single plain body sherd, manufactured from a sand-, grog- and quartzite-tempered fabric, is also thought to be of this date.

Early Bronze Age

AG2/EBA Soft fabric with sparse quartz and glauconitic sand and rare angular grog.

A single body sherd tempered with sand and grog and recovered from layer 203 is probably of this date.

Late Bronze Age

AQ1/LBA Hard fabric with quartz sand and quartzite.

F2/LBA Hard fabric with medium flint.

FGA1/LBA Hard fabric with flint, grog and sand.

Six body sherds recovered from layers 5, 15, 28 and 310 are thought to be late Bronze Age.

Early Iron Age

SA2/EIA	Soft fabric with moderate medium shell platelets and sparse quartz sand.

A single unstratified sherd in a principally shell-tempered fabric is thought to be of this date. The use of shell would favour an early Iron Age date.

Indeterminate prehistoric

AF1/-	Hard fabric with quartz sand and fine flint.
ARF2/-	Soft fabric with quartz sand, coarse angular argillaceous rock fragments and rare flint.
F1/-	Hard fabric with fine flint.

Four sherds from contexts 28, 101 and 102 are of indeterminate character mainly because they are so small and abraded. One sherd in an unusual fabric that contains angular argillaceous rock fragments is of uncertain prehistoric date because of its unusual fabric but could be of late Bronze Age or Iron Age date.

The fabrics are predominantly flint-tempered. Flint tempering can occur in either the Neolithic or the later Bronze Age. It can be difficult to differentiate fabrics of these two periods, although as a general rule Neolithic flint temper tends to be quite angular, whereas later Bronze Age flint temper has a blocky appearance having been calcined prior to crushing for use as temper. The inclusions in Neolithic fabrics can also be less well sorted and of a sparser nature. The degree of firing and colour may also provide an indication of date. Collectively these criteria can be used to provide tentative dates.

Discussion

All this pottery predates the construction of the Grim's Ditch earthwork. Only 16 sherds, however, were recovered from features and deposits that were stratigraphically earlier than the earthwork, while a further 11 sherds came from the bank make-up (203). Most of this material is probably of Neolithic date, although a few late Bronze Age sherds are also present. Significantly very little early Iron Age pottery was present, although some middle Iron Age pottery was noted. None of the pottery discussed here can be used with certainty to provide dates for either the posthole structures (phase 1c) or the early episodes of cultivation (phase 1a). The arding and the posthole structures probably post-date the Neolithic and early Bronze Age pottery, while the form of the six-post structure suggests a tenuous link with the few later Bronze Age sherds.

Iron Age and Roman pottery

by Paul Booth

Introduction and methods

Some 104 sherds (581 g) of Iron Age and Roman pottery were recovered, most of middle and late Iron Age date, with the principal Roman pieces occurring in late or poorly stratified contexts. Five sherds (8 g) came from the 1987 evaluation trench, and the remainder from the 1992 excavation. The pottery was generally very fragmented and in many cases surfaces were, at best, only moderately well preserved. Diagnostic features of form and decoration were therefore scarce. Confident identification and attribution to period was therefore often difficult. For most sherds the only identifiable attribute was fabric. Owing to the small sherd size it was usually difficult to determine if vessels were hand-made or wheel-thrown, thus rendering more problematic the task of distinguishing between middle Iron Age pottery (hand-made) and late Iron Age (often wheel-thrown). Such a distinction has been attempted, but an above-average margin of error has to be allowed for. Nevertheless, although processed without initial reference to stratigraphic data, the pottery data fitted well with the interpretation of the site.

The material was recorded using the established OAU system for Iron Age and Roman pottery. Sherds were examined by context and recorded by fabric, with details of form and decoration noted where these were present. Quantification was by sherd count and weight, with quantification of vessels by rim count and estimated vessel equivalents (EVEs).

Fabrics and wares

These were identified using a dual system of nomenclature, in which fabric descriptions, characterised in terms of their two principal inclusion types (identified by letters) and a numeric indicator of fineness (on a scale of 1 = very fine, to 5 = very coarse) were distinct from ware codes, which characterise sherds in more general terms, often in relation to known centres of production. The former codes were used for material thought to be of middle Iron Age date, and in some cases for later pottery, although this was always defined by ware codes. Owing to the small size of the assemblage some closely related fabrics were grouped together (Table 5.9). The inclusion type codes employed were: A = quartz sand, F = flint, I = iron oxides, M = mica, N = no inclusion type visible, P = clay pellets, V = organic, W = uncertain white inclusions, Z = indeterminate voids.

Table 5.9 Middle Iron Age fabric groups

Fabric code	*Number of sherds*	*Weight (g)*
AF3	4	23
AI2/3	3	6
AM2/3	3	10
AN2/3	12	35
AV2/3	6	9
AW3	3	25
AZ3	4	31
PI3	1	5
WV3	1	1

Table 5.10 Ware groups for late Iron Age and Romano-British pottery

Ware group	*Number of sherds*	*Weight (g)*
S20. South Gaulish samian ware	2	2
F50. General red-brown colour-coated fabrics	1	2
W20. General coarse sand-tempered white ware	1	3
E. General 'Belgic type' ware, subgroup uncertain	1	1
E20. 'Belgic type' ware, principally fine sand inclusions	7	12
E30. 'Belgic type' ware, principally common coarse sand inclusions	20	77
E60. 'Belgic type' ware, principally flint inclusions	2	15
E80. 'Belgic type' ware, principally grog inclusions	19	132
O10. General fine oxidised ware, probably Oxfordshire products	1	1
R10. General fine reduced coarse wares	1	2
R20. General coarse sandy reduced wares	2	27
R30. General medium sandy reduced wares	4	113
R90. Very coarse (usually grog-) tempered reduced wares	2	28
R95. Probable Savernake ware	3	16
C10. General shell-tempered fabrics	1	5

The assemblage of 37 sherds assigned to the middle Iron Age, with an average weight of 3.9 g, was dominated by sand-tempered fabrics which had a wide variety of secondary inclusion types, though sand tempering alone (AN2/3) was the most common fabric type. There were no rim forms or other featured or decorated sherds. The assumption that this material belongs to the middle Iron Age is based on the nature of the fabrics, which are typical of the middle Iron Age in the region, allied to the presence of a few sherds which were sufficiently large for their method of manufacture and other general characteristics to be clear.

The group of 67 sherds dated to the late Iron Age and Roman period (Table 5.10), with an average weight of 6.5 g (boosted by two large sherds of fabric R30 from unstratified and recent plough-layer contexts), consisted principally of E wares ('Belgic type' wares, in the sense of Thompson 1982, 4–5). These were supplemented by smaller quantities of Roman fabrics, the majority of which are consistent with a date in the 1st century AD, though one or two sherds must have been later. With the exceptions of samian and Savernake wares all the material is likely to have been produced fairly locally. The later Roman greywares (most of the R30 sherds), for example, are consistent with production in the Oxford industry. A single sherd of fabric F50, too poorly preserved to allow confident attribution to a known source, is, however, reminiscent of the 2nd-century AD fineware products of the kiln site at Lower Farm, Nuneham Courtenay, and might therefore be of fabric F59 (Booth *et al*. 1993, 140).

Forms

Only ten vessels were represented by rim sherds. These were a possible butt beaker in fabric W20, two uncertain jar/bowl forms in fabric E20, a jar and an unidentifiable form in E30, uncertain jar/bowl forms in E60 and E80, a jar and a large curving-sided bowl in R30 and a small bead-rimmed jar in fabric C10. Most of the rims were small so they could only be attributed to very broad classes. Consequently the vessel forms do not provide chronological definition of the assemblage as a whole. Nonetheless, they appear consistent with the ware groups in which they occur.

Chronology

The pottery is particularly important for establishing the chronology of the Grim's Ditch sequence. The principal issue relates to the dating of the E wares. Harding's chronology, which pushed the introduction of this pottery back into the 1st century BC (1972, 129), is not supported by the results of recent work (eg Abingdon Vineyard, Yarnton: Booth in prep. b and c; Gravelly Guy, Stanton Harcourt: Green *et al*. 2004; and Hatford: Booth 2000). The current view tends to see the appearance of these fabrics within the 1st century AD (cf. Booth 1996, 81–2), although this position is not yet conclusively established. Sites in the south-east of the county might have been exposed to the Belgic tradition earlier than some of those in the Upper Thames Valley, but it seems unlikely that there would have been a significant time lag in the introduction of these wares across different parts of the region. In broad terms, therefore, the likely date range for these wares at Wallingford lies in the early to middle part of the 1st century AD. Their survival after the Roman conquest is certain and on some sites they may have been in common use up to the beginning of the Flavian period. In the context of the present site, more precise dating of these fabrics, if possible, must rely on their associations.

Phasing

Two sherds, both probably of middle Iron Age date, were associated with the phase 1a layer 221, but these were very small (1 and 2 g) and could easily have been intrusive. Phase 2 contexts (96, 101, 103, 202, 206, 206/3), predating Grim's Ditch, contained 14 sherds (62 g), of which eight were probably middle Iron Age and the remainder were E wares (E20, E30 (2) and E80 (3)), including a large sherd in fabric E80 from context 202. Phase 3 contexts (8, 10 and 15), associated with the bank and ditch itself, produced 26 sherds (178 g). Eleven (75 g) were assigned to the middle Iron Age; the remainder were E wares (E20 (2), E30 (6), E60 (1) and E80 (5)) with a single sherd of fabric R90, which is closely related to E80 and almost certainly of the same date. The slightly above average weight of these sherds (6.8 g) is notable, implying that once incorporated into the bank they may have been better protected against degenerative processes. A single very tiny flake of South Gaulish samian ware came from the tertiary fill (307) of the ditch.

The pottery from phase 4 post-bank ploughing contexts (102, 200, 203, 204, 303 and 516–18) was more varied than that from phase 3, comprising 26 sherds (125 g) of which 11 were in middle Iron Age fabrics, 10 were in E wares and the others in related early Roman fabrics, one each of W20, R20, R95 and C10, all consistent with a 1st-century date, and a single fragment of F50, for which a 2nd-century date is most likely. The W20 sherd was a small rim, perhaps from a butt beaker, and the sherd in C10 was also a rim, from a small bead-rimmed jar. Fabric R20 is particularly characteristic of the mid to late 1st century in the region, being common at sites such as the Vineyard, Abingdon, and may be seen as closely allied to E30 (Booth in prep. b). Fabric R95, Savernake ware, is commonly associated with Belgic-type wares in the Upper Thames, for example at Hatford (Booth 2000) and Linch Hill Corner, Stanton Harcourt (eg Grimes 1943–4, 53–5, nos 4 and 6). These are both sites in which Savernake ware appears alongside the earliest Belgic wares, a situation also noted by Trow at Bagendon and Salmonsbury (Trow 1988, 76). Whether or not one accepts a pre-conquest date for the inception of Savernake ware, this fabric is unlikely to have appeared much before the conquest, and it is this association which has tended to support a later dating for Belgic-type wares within the region generally.

The later phase groups at Grim's Ditch do not require extensive comment. The bulk of the later Roman material comes from post-Roman contexts, though late Iron Age material continues to occur even at this late date.

Conclusions about the chronology of the site based on such a small assemblage must be treated with caution, but on present evidence the pre-bank and bank deposits consistently contained middle and late Iron Age pottery, probably reflecting settlement of this date in the immediate vicinity of the earthwork. This situation exactly parallels that seen at the north Oxfordshire Grim's Ditch, where 'Belgic type' pottery has been found sealed by and incorporated within the banks near Ditchley (Harden 1937, 80), near North Lodge, Blenheim Park (ibid., 82–3) and at Callow Hill (Thomas 1957, 32–4). At the present site, early Roman material occurred in small quantities but not before phase 4, which is associated with the partial denudation of the bank. On this basis the bank appears to have been constructed in the 1st century AD. While the ceramic material is perfectly consistent with a date in the late Iron Age and while this may seem most likely on other criteria, it cannot be taken to prove this conclusively.

Medieval pottery

by Lucy Whittingham

Introduction and methods

A small assemblage of medieval pottery was recovered: 63 sherds (*c* 0.9 kg) from the 1987 evaluation and 172 sherds (*c* 1.7 kg) from the 1992 excavation (Tables 5.11–12).

The assemblages were recorded by sherd count, weight, presence of diagnostic sherds and further attributes such as glaze colour and decorative motifs.

Table 5.11 Summary of medieval fabric types from Grim's Ditch evaluation (MGD87) by context

Context	*Fabric*	*No. of sherds*	*Weight (g)*	*Date*
501	OXAQ?	7	58	L12–E15C
	CAMLEY	4	26	13–15C
	WA38	2	10	E/M11–M13C
501/2	ABA	1	2	M11–L14C
503	OXAQ	2	6	L12–E15C
	OXAW?	1	4	13–15C
	OXAG	1	18	M11–L14C
	ABA	3	20	M11–L14C
505	CAMLEY	6	42	13–15C
	OXAW	1	4	13–15C
	ABA	5	198	M11–L14C
506	CAMLEY	3	20	13–15C
	OXAG	4	14	M11–L14C
507	CIST	1	4	16C
	S/N	1	2	10–11C
	OXAQ	1	4	L12–E15C
	OXAM	1	2	13–15C
	CAMLEY	1	8	13–15C
508	ABA	2	6	M11–L14C
509	ST NEOTS	2	14	L9–L11C
	ABA	6	364	M11–L14C
	CAMLEY	2	2	13–15C
	WA38?	1	10	E/M11–M13C
	OXAQ	1	4	L12–E15C
512	OXAQ	1	4	L12–E15C
	ABA	2	24	M11–L14C
517	CAMLEY	1	2	13–15C
Total		63	872	

Table 5.12 Summary of medieval fabric types from Grim's Ditch excavation (MGD92) by context

Context	Fabric	No. of sherds	Weight (g)	Date
1	CAMLEY	3	45	13–15C
	OXAQ	1	4	L12–E15C
	ABA	2	19	M11–L14C
	OXAG	5	21	M11–L14C
	WA38	2	4	E/M11–M13C
	PMFR	5	97	17–19C
	ENGS	22	242	18–20C
2	CBW	11	210	M14–E16C
	WA38	11	148	E/M11–M13C
	ABA	34	292	M11–L14C
	OXAG	5	39	M11–L14C
	CAMLEY	6	30	13–15C
	OXAG	2	12	L12–E15C
	OXBF	4	24	M11–E13C
	OXAM	1	2	13–15C
	OXAW	4	52	13–15C
	PMFR	1	2	17–19C
	SWSG	1	4	18C
	?ID	3	16	
5	CAMLEY	1	1	13–15C
8	ABA	2	6	M11–L14C
23	ABA	1	48	M11–L14C
	OXAG	1	6	M11–L14C
	CAMLEY	1	2	13–15C
	WA38	1	2	E/M11–M13C
24	CAMLEY	1	8	13–15C
	WA38?	1	8	E/M11–M13C
28	WA38	2	82	E/M11–M13C
	CAMLEY	1	8	13–15C
30	OXBF	1	4	M11–E13C
	WA38	4	48	E/M11–M13C
	CAMLEY	2	16	13–15C
	OXAQ	1	6	L12–E15C
35	OXAQ	1	16	L12–E15C
142	CAMLEY	1	12	13–15C
	OXAQ	1	2	L12–E15C
200	OXAQ	1	18	L12–E15C
	WA38	1	7	E/M11–M13C
201	WA38	2	8	E/M11–M13C
	CAMLEY	1	2	13–15C
	ABA	3	15	M11–L14C
	OXAG	1	4	12C
	LCOAR	1	2	
204	OXAG	2	14	M11–L14C
	WA38	1	6	E/M11–M13C
	CAMLEY	1	8	13–15C
300	ABA	2	18	M11–L14C
	WA38	1	8	E/M11–M13C
302	?	1	18	
	OXBF	1	4	M11–E13C
	OXAQ?	1	6	L12–E15C
303	OXBF	1	12	M11–E13C
	OXAW	1	2	13–15C
304	WA38?	1	2	E/M11–M13C
322	CAMLEY	1	2	13–15C
	OXBF	2	16	M11–E13C
Total		172	1710	

Fabric types were identified macroscopically with the use of x20 binocular magnification, and where possible classified with reference to the OAU fabric type series (Haldon and Mellor 1977; Mellor 1994). The difficulty of classifying quartz-tempered fabrics is particularly acute in this assemblage of small abraded sherds. The average sherd weight is 11 g.

Grim's Ditch evaluation (MGD87)

The 63 sherds found in the evaluation range in date from late Saxon through to early post-medieval (see Table 5.11). The earliest sherds are two base sherds of late 9th- to late 11th-century St Neot's Type Ware and Saxo-Norman ware tempered with grog, oolitic limestone and shell. The majority of sherds (84%) are medieval quartz-tempered wares: mid 11th- to mid/late 14th-century Abingdon Ware (ABA and OXAG), late 12th- to early 15th-century East Wiltshire Ware (OXAQ) and a 13th- to 15th-century Camley Gardens-type coarseware (Pike 1965). They include an Abingdon Ware thumbed cooking-pot rim (cf. Mellor 1994, fig. 26, no. 2) and a thickened East Wiltshire Ware cooking-pot rim (cf. ibid., fig. 41, no. 4). The remaining six sherds are in early/mid 11th- to mid 13th-century Wallingford Ware and 13th- to 15th-century Brill/Boarstall fabrics OXAW and glazed OXAM.

These wares all occurred in the later ploughsoils in phase 2 through to topsoil in phase 5. Contexts 517 and 508 in phase 2, and 512, 506=509 and 505 in phase 3 contained various associations of the mid 11th- to early 15th-century wares. All the contexts in phase 3 contained sherds from the same vessel showing some degree of distance in stratigraphy. Context 509 also contained the residual sherds of St Neot's Type Ware. The presence of 16th-century Cistercian Ware in context 507, phase 4, marks the start of early post-medieval activity on the site. Topsoil contexts 503, 502 and 501 contained small assemblages of mid 11th- to 15th-century wares which must be residual.

Grim's Ditch excavation (MGD92)

Of the 172 sherds from the 1992 excavation most were poorly stratified: 123 were residual in topsoil context 1 and in the fill of a natural hollow in context 2 (see Table 5.12). The remaining assemblages are small collections of one to eight abraded sherds associated with the stone building and medieval ploughsoil, but were also intrusive in earlier settlement levels.

Six quartz-tempered fabrics, ranging in date from the mid 11th- to late 15th/early 16th centuries, account for 70% of this assemblage. The most common of these wares (33%) are the two Abingdon Ware fabrics ABA and OXAG, of 11th- to mid/late 14th-century date. Cooking vessels including bowls and jars are represented by sooted base sherds, white-slipped sherds, two bowl rims (cf. Mellor 1994, fig. 25, no. 7) and two everted jar rims. Pitchers are represented by a number of slip-decorated and glazed sherds including a sherd with a graffito pattern of circles within panels. The local early/mid 11th- to mid 13th-century Wallingford Ware (WA38) is also quite common (16%). The majority of the sherds are from pitchers, some glazed with slip decoration and one with a large strap handle with slashed decoration. Cooking vessels are represented by two thickened rims (cf. ibid., fig. 16, nos 2–3 and 9–10). The third most common component (11%) is a 13th- to 15th-century Camley Gardens-type coarseware. Cooking vessels are represented by one simple everted jar rim, one thickened rim and sooted sherds. One sherd is decorated with an applied thumbed cordon. Pitchers are represented by lead glazed sherds, some decorated with bands of incised lines. The smallest components of this assemblage (5% each) are mid 11th- to early 13th-century South West Oxfordshire Ware (OXBF) and late 12th- to early 15th-century East Wiltshire Ware (OXAQ), represented by sooted base sherds from cooking vessels.

There are also occasional sherds of a mid 14th- to early 16th-century Surrey/Hampshire Coarse Border Ware jug, a 12th-century Coarse London-type Ware (LCOAR) jug with a white slip and copper-glazed surface and 13th- to 15th-century Brill/Boarstall fabrics OXAW and OXAM.

Post-medieval wares, including English Stoneware bottles, fine Red Earthenware and Staffordshire Salt Glazed Stoneware were also found in the topsoil.

Contexts

The mid 11th- to late 14th-century sherd of pottery in context 8 corroborates the interpretation of this feature as slippage of the bank material, which cannot therefore predate the construction of Grim's Ditch bank.

Two fills (contexts 35 and 23) within pit 48 contained a variety of wares which could date between the mid 11th and late 14th/early 15th centuries. A similar assemblage was recovered from the fill of pit 29.

The ploughsoils in Areas A–C (5, 28, 200, 204 and 322) produced similar small assemblages of early 11th- to mid 13th-century and 13th- to 15th-century pottery.

Layers 303, 302 and 300 in Area C are the final fills within the ditch. All of these layers contained 13th- to 15th-century pottery and earlier mid 11th- to early 13th-century wares similar to the ploughsoils in Areas A and B.

The largest collection of medieval and post-medieval pottery came from layer 2, and probably relates to the 18th-century landscaping of the site. The majority of the pottery in this context must be residual, ranging in date from mid 11th through to the 19th century.

Discussion

This assemblage contains a range of fabric types typical of the area (Mellor 1994). The occurrence of St Neot's Type Ware is of interest as an indicator of late Saxon activity in the area and has been noted previously as a common ware in Wallingford (ibid.). The wide variety of domestic wares found in such a small assemblage and the longevity of the quartz-tempered traditions (from the mid 11th to the late 15th century) is probably indicative of the proximity of the site to the Mongewell deserted medieval village. Trading links occurred both to the east and west of Wallingford, with an abundance of Abingdon Ware, East Wiltshire Ware and Camley Gardens-type coarsewares. The coarse Border Ware jug also shows contact with the Surrey/Hampshire industries, which is not unusual for the Thames Valley region.

Tile

by Kate Atherton

A single piece of Roman tile, a fragment of an imbrex, was found in context 328 within the lower fill of Grim's Ditch. The projected height of the top of the curve is *c* 135 mm. The soft and soapy fabric, with a hackley fracture, and moderately spaced mica, quartz and grog inclusions and occasional iron flecks, cannot be related to any particular production site. There were also small quantities of medieval and post-medieval tile. Details can be found in the site archive.

Miscellaneous finds

A single fragment of brick, a single piece of fired clay, a late Saxon or Norman copper-alloy finger ring, some ferrous metalwork and some slag were also recovered, mostly from the upper fill of Grim's Ditch.

ENVIRONMENTAL EVIDENCE

Animal bone

by Adrienne Powell and Kate M Clark

Small quantities of animal bone were recovered from the 1987 and 1988 evaluations (MGD87 and MONG881), and the main excavation undertaken in 1992 (MGD92; Tables 5.13–14). Those from the 1992 excavation and the riverside site (MONG881) are described briefly here; those from the lower fills of Grim's Ditch, which have significance for the dating of the earthwork, are described in more detail. Further details of all the assemblages may be found in the site archive.

Mongewell 1988 site (MONG881)

Context layer 3, 1–3 m contained 19 tooth fragments which when rejoined revealed 4 large bovine maxillary molars: 2 right and 2 left. Measurement of crown-base circumference (following Davis 1989) on one of these, a first or second molar, gave a dimension of 106 mm, outside the range of the cattle teeth from Irthlingborough (ibid.), but comparable with the aurochs (*Bos primigenius*) from the same assemblage. The other three teeth were similar in size. Context layer 3, 3-4 m, contained 19 fragments of large ungulate bone and teeth. The bone included fragments of tarsal, metapodial and phalanx, but these were too small and weathered to assign to species.

Grim's Ditch

Only 38 fragments came from the fills of Grim's Ditch (Table 5.13). There was little difference between the fills, except the presence in the upper fills of the humerus of a red deer (*Cervus elaphus*), and several dog cranial and maxillary fragments in the lower fills (see also section on the Grim's Ditch earthwork, above).

The metrical and morphological characteristics of the dog remains suggest that the right mandible from context 328 is from the same animal as the left mandible and cranial material from 325 (see Fig. 5.9a). The dimensions of each of six pairs of standard measurements (von den Driesch 1976) are remarkably similar (Table 5.14). The measurements of the individual premolars are extremely close and the arrangement of the teeth in these mandibles (reflecting the degree of crowding and overlap) is symmetrical. The degree of tooth wear on both mandibles is also the same, and the area of symphysis in the left mandible matches exactly in size and sculpture the opposing portion of the right mandible. Context 325 also contained the right incisive of a dog skull retaining the canine and two incisors. Wear on this upper canine and that on the canine in the right mandible from context 328 is compatible with these teeth having been in alignment with each other. Context 325 also produced a fragment of right maxilla and another of right zygomatic.

Morphologically the length of the jaw of this dog would have been equal to or greater than a modern greyhound, but with the robusticity and depth of a Rottweiler or English bull terrier. A date of cal AD 140–390 (OxA-7175; 1755±35 BP) was obtained on the dog bones.

Table 5.13 Number of identified specimens (NISP) from Grim's Ditch

Taxon	*Date*		*Total*
	Iron Age/Roman	*Medieval*	
Horse	1	1	2
Cattle	5	6	11
Sheep/goat	1	1	2
Dog	5	-	5
Cervus elaphus (red deer)	-	1	1
Sheep-sized mammal	-	3	3
Cattle-sized mammal	-	3	3
Unidentified	3	8	11
Total	15	23	38

Charred plant remains and molluscs

by Mark Robinson

Introduction

Samples from 13 archaeological features mostly sealed beneath the bank were floated on to a 0.5 mm mesh to recover charred plant remains. A sequence of 19 samples was also taken from the fill of Grim's Ditch for molluscan analysis.

Charred plant remains

The flots were scanned under a binocular microscope. Charred remains proved extremely sparse, although several of the samples were found to contain very small quantities of *Quercus* (oak) and *Alnus/Corylus* (alder/hazel) charcoal. Cereal remains were only observed in two samples, one of which (MGD92 18), radiocarbon-dated to the late Neolithic–early Bronze Age, from a pre-bank posthole, was analysed in detail (Table 5.15).

Table 5.14 Dog mandibular measurements from Grim's Ditch

Measurement	*R (context 328) mm*	*L (context 325) mm*
Condyle process to aboral border of canine	147.7	
Indent between condyle process and angular process to aboral border of canine	134.8	
Aboral border M3 to aboral border of canine	98.4	
Length M3 to P1	78.9	
Length M3 to P2	73.2	
Length molar row	38.4	
Length P1 to P4	42.1	42
Length P2 to P4	36.6	35.8
Length carnassial alveolus	22.6	22.7
Thickness of jaw below M1	12.7	12.8
Height of mandible behind M1	29.5	29.5
Height of mandible between P2 and P3	21.1	20.4

Table 5.15 Charred plant remains: context 133, sample 18

		No. of items
Triticum dicoccum Shubl.	emmer wheat	3
T. dicoccum Shubl. or *spelt* L.	emmer or spelt wheat	3
Triticum sp.	wheat	5
Hordeum vulgare L. - hulled lateral grain	six-row hulled barley	1
Cereal indet.		24

Table 5.16 Terrestrial molluscs from the ditch

Cochlicopa sp.
Vertigo pygmaea
Pupilla muscorum
Vallonia costata
V. excentrica
Nesovitrea hammonis
Limax or *Deroceras* sp.
Helicella itala
Trichia hispida gp
Cepaea sp.

Table 5.17 Contexts sampled for soil micromorphological analysis

Profile number and location	*Context*
MGD 2: Area B 64.50/102.85	204 – Medieval ploughsoil 203 – Bank material 206 – Pre-bank cultivation soil
MGD 3: Area A 99/108.95	28 – Post-medieval ploughing and ditches 74 – Pre-bank ploughing
MGD 4: Area A 98.65/109.70	Contexts as MGD 3
MGD 11: Area A 100/114.5	8 – Bank and ditch 14 – Bank and ditch 74 – Pre-bank ploughing

The cereal grains from the sample were mostly badly preserved and chaff was absent, but the majority of them could have been wheat. Alongside a single grain of *Hordeum vulgare* (six-row hulled barley), the only wheat variety to be identified with certainty was *Triticum dicoccum* (emmer wheat) which is appropriate given the late Neolithic–early Bronze Age date. The late Bronze Age waterfront site (see Robinson, Chapter 4) was transitional from emmer to spelt wheat.

Mollusca

Subsamples of the order of 100 g were taken from selected samples, sieved over a 0.5 mm mesh, dried and scanned for shells under a binocular microscope. It was decided that they did not merit detailed analysis but the assessment results were useful. The samples from the very bottom of the ditch were gleyed but ancient organic material was absent. The Mollusca from the samples included the stagnant-water aquatic and amphibious species *Lymnaea truncatula, L. palustris* and *Anisus leucostoma*, suggesting that the ditch initially held temporary puddles of water. Otherwise the shells from these and the remainder of the samples comprised an assemblage suggestive of dry open conditions (Table 5.16), reflecting the open, agricultural landscape from which the colluvial sediments filling the ditch derived. A similar dry open-ground fauna was identified from the lower sediments of Grim's Ditch where it was sectioned on the line of the A4074 (1974 trenches: see Fig. 5.2; Robinson 1975).

Soil micromorphology

by Helen Lewis and Charles A I French

Four soil profiles were taken for micromorphological assessment with the purpose of examining the relationship between the various cultivation horizons and the earthwork deposits. The samples (see Fig. 5.4, Table 5.17) were taken from the medieval ploughsoil overlying the bank deposits (MGD 2), post-medieval ploughing overlying pre-

Table 5.19 Summary of micromorphological descriptions

Fabric	*Structure*	*Porosity*	*Mineral components*	*Organic components*	*c:f ratio*
1 (204)	Degraded fine subangular blocky	20–30% channels, vughs	*Grains:* Mainly quartz mono-, some polycrystalline occasional feldspar (parallel, multiple twinned)	5–10%, amorphous, 'punctuations'	50:50
2 ?(203)	Pellicular grain + intergrain microaggregates	30–40%irregular		10%, as in fabric 1	60:40 to 50:50
3 (28)	Subangular and irregular blocky	20%channels, vughs		5–10%, as in fabric 1	40:60
4 (74)	Moderately to strongly developed angular to subangular blocky	10–20% channels, vughs	*Rock fragments:* Limestone (chalk), occasional sandstone, subangular chert	5–10%, as in fabric 1	40:60
5 (8)	Pellicular grain + intergrain microaggregates	30–40% irregular	*Calcium carbonate:* Microsparite + micrite crystals (and needles)	<10% 'punctuations'	60:40 to 70:30
6 ?(14)	Subangular to angular blocky	30% as in 3–4		10%, as in fabric 1	40:60 to 50:50

Table 5.18 Summary of profiles as seen in thin-section

HORIZON	PROFILE (Fabric/Context) MGD 2	MGD 3	MGD 4	MGD 11
Post-medieval soil		Fabric 3 (28)	Fabric 3 (28)	
Medieval soil	Fabric 1 (204)	↑	↑	
Soil/bank interface	Fabrics 1 and 2			
Bank – redeposited subsoil material	Fabric 2 (203)	Strongly mixed with	Some mixing with	Fabric 5 (8)
Bank material or ?bank/soil interface		↓	↓	Fabric 6 + fabrics 4, 5 (and 3?) ?(14)
Pre-bank soil		Fabric 4 (74)	Fabric 4 (74)	Fabric 4 (74)

bank ploughing (MGD 3 and 4) and from deposits in the bank and ditch and the soil buried below the bank (MGD 11). These profiles also form part of a research project on the identification of ancient tillage from soil features (Lewis 1998).

Although the samples had been in storage for two years before assessment, they seemed intact and undisturbed, but had considerable iron precipitation at their edges, resulting from long storage in metal containers. The resin-impregnated blocks were cut so that this would not interfere with interpretation. The samples were processed using the methodology of Murphy (1986), and described following Bullock *et al*. (1985) and Fitzpatrick (1993). The detailed thin-section descriptions can be found in the archive. The results are summarised in Tables 5.18–19. Only the main conclusions are summarised here.

The horizons present in most of the samples are internally quite homogeneous and, as such, fabrics tend to correspond with contexts/layers as described in the field, with a few exceptions: context 206 cannot be identified in the MGD 2 thin-section, and there is also some difficulty in deciding whether or not all three of the contexts in MGD 11 are present as described in the field. Finally, MGD 3 is so mixed that it is impossible to see two distinct horizons in the thin-section, although two fabrics are present.

The results of micromorphological analysis support, for the most part, the field interpretation of the profiles. The pre-bank soil represents an A horizon with shrink-swell clays. Some disturbance appears to have occurred before later bank construction and historic ploughing. This could be related to prehistoric ploughing (identified by ard marks seen in the field). In thin-section possible tillage indicators include non-laminated dusty clay coatings in pores and in the groundmass, along with the reorganisation of layers, such that (redeposited) subsoil aggregates have been pulled up into the topsoil, and layers were mixed. It is, however, uncertain whether these features relate mainly to pre-bank tilling and historic ploughing or more to bank construction itself.

The overlying earthwork is composed of a mixture of redeposited soil and subsoil. The latter consists of chalk fragments and aggregated loess-like material (silt and very fine quartz sand). The bank material seems to have been relatively uncompacted to begin with, but subsequent cementation has led to the creation of very solid horizons. In general, little can be said about construction from the small amount of material examined. The calcium carbonate (mostly micrite) cementation seen appears to relate to efflorescence, indicating relatively quick drying of deposits rich in dissolved salts. This cementation seems to have occurred

Texture	*Roundmass*	*Pedofeatures*	*Interpretation*
Sandy loam	Stipple-speckled	Dusty clay, silt infillings, rolled aggregates	Old alluvial A, degraded, disturbed
Loamy sand to sandy loam	Crystallitic	Excremental calcitic nodules	Bank material, highly oxidised
Sandy (clay) loam	Crystallitic	Sesquioxides, shell, rest as in fabrics 1 and 2	Lower A and/or A1, possible ploughsoil
Sandy (clay) loam	Stipple-speckled	As in fabric 3, but greater sesquioxide impregnation and no shell	Old alluvial A, possible ploughsoil
Loamy sand/sandy oam	Crystallitic	Shell, sesquioxides, subsoil aggregates	Bank material, highly oxidised
Sandy (clay) loam	Stipple-speckled	Sesquioxides, aggregates of other fabrics	Alluvial A, disturbed by plough?/bank

mainly after bank construction, and may be related to the disturbance inherent in the building of the earthwork and to later oxidation.

A topsoil horizon subsequently developed. The genesis of such a horizon would indicate stabilisation of the bank. This layer has a degraded structure and other features suggesting strong disturbance, possibly relating to its origin (if it were redeposited), but certainly compounded by the ploughing seen in the field (dating to the medieval and post-medieval periods). It is possible that the soil horizon overlying the bank may actually represent part of the construction itself, but this is unclear at present.

Microscopic features possibly related to tillage in the later ploughsoils include dusty clay as coatings and in the groundmass, and movement of relatively large fragments of lower material into the topsoil (204), and strong mixing of contexts (28 and 74) in MGD 3 and 4.

As at Fengate (Lewis 1998), despite macroscopic evidence for tilling (ard marks), the thin-section evidence is ambiguous regarding arable land use, although some horizon mixing and possible features were seen. Again it seems that any extant evidence relating to tilling may be explained by other factors (bank and ditch construction, for example).

DISCUSSION

by Alistair Barclay, Anne Marie Cromarty and George Lambrick

Earlier prehistoric activity

The earlier prehistoric evidence from the excavations indicates that this area was used episodically from at least the earlier Mesolithic until the Bronze Age. The earthwork and alluvium have preserved the more fragile component (ie earlier prehistoric pottery) that does not normally survive. Similar artefact scatters, perhaps indicating low-level/small-scale occupation, have been found at Drayton and Yarnton (Barclay *et al*. 2003; Hey in prep.). Within the context of the Upper Thames Valley, it is not unusual for artefact scatters to be of a mixed date. At Drayton and Yarnton, scatters were found in riverine locations like that at Grim's Ditch. The Neolithic evidence suggests domestic activity that would be broadly contemporary with the ritual and ceremonial use of the Benson cursus monument complex just 3 km to the north-east (see Fig. 1.2), and with the deposition of arguably votive deposits in an adjacent reach of the Thames (Holgate 1988a, 283, 304). The extent of the artefact scatter, shown by these excavations to stretch from fairly close to the river some 300 m upslope to the Grim's Ditch site, may well indicate that the area was cleared for cultivation during the Neolithic. The idea that fairly extensive tracts were cleared in this area during the early prehistoric period is further supported by the cursus at Benson (Leeds 1934; Riley 1944; Benson and Miles 1974), the construction of which would have entailed fairly substantial clearing.

The earliest cultivation

The earliest episode of cultivation consisted of continuous grooves cut into the disturbed natural (see Fig. 5.4). These marks were shallow and probably fairly severely truncated, but the remaining profiles were found to be symmetrical. They probably derive from cultivation using an ard with an upright share, possibly an arrow-shaped one, rather than a share that could be tilted to turn the soil a little (Fowler 1971) since there was no evidence that the soil had been turned. A tilted share would have produced an asymmetrical furrow. The truncation of the marks means, however, that these suggestions can only be tentative.

These marks, aligned perpendicular to one another, were obviously created in at least two stages, though it was not clear how many seasons of cultivation this represented. Where ard marks intercut three possible explanations can be given: that the area was cultivated in one direction in one year and across it in the next; that the area was ploughed in one direction during the spring and across in the autumn; or that the cross-ploughing occurred during the same episode of cultivation to produce a finer tilth in which the nutrients are more thoroughly mixed. Experimental ploughing has shown that deeply ploughing the same furrows twice, then between them and across them breaks up the soil completely (Fowler 1971). It is unknown whether the recorded furrows were ploughed in more than one direction, but as there was no significant difference in the recorded fills it is possible that they represent a single season's work.

The date of this cultivation is difficult to determine as the chronological currency of such ard marks stretches from the 3rd millennium BC into the Roman period. Many can only be dated approximately by stratigraphic relationship (eg Palmer 1980; Everton and Fowler 1978).

On the basis of the artefactual evidence from the overlying cultivation soil in Area B, the cultivation soil that seals the early ard marks could be of either Neolithic or earlier Bronze Age date. The stratigraphic relationship of this cultivation to the tree-throw holes and postholes assigned to phases 1b and 1c is also uncertain, but some of these features at least seem to cut this layer. The ard marks do show, however, that the area experienced at least one episode of cultivation deep enough to disturb the natural subsoil during the earlier prehistoric period, possibly associated with deliberate tree clearance.

Ard cultivation is labour intensive and the overlying cultivation soil suggests that cultivation occurred over a long period. This indicates an at least seasonally settled population at levels sufficient to sustain ard cultivation, and a more than purely pastoral economy.

The Grim's Ditch site would have been a very fertile one then as now, even allowing for the prevailing climatic conditions at the time, which are known to have begun to deteriorate from the warmer, more continental conditions of the sub-Boreal period, to become much cooler and wetter. It was only in the full sub-Atlantic period that any significant difference would have been felt in the climate at Grim's Ditch. The next phase of cultivation at the site (phase 2) may be a reflection of this.

Tree clearance

The earliest phase of cultivation was followed by a period of tree clearance (phase 1b) indicated by the tree-throw and root holes which cut the cultivation soil. There is nothing to date these features directly, but there must have been a fairly long period of woodland regeneration after the earliest cultivation, suggesting that the clearance may have occurred during the late Bronze Age.

Late Bronze Age activity

The phase of activity attributed to the late Bronze Age is perhaps unusual in being characterised on the one hand by quite dense clusters of postholes, perhaps indicating prolonged use of the site and several episodes of construction, but, on the other hand, by a dearth of contemporary settlement evidence. Elsewhere in the Upper Thames, although pits containing domestic material are often encountered (eg Yarnton; Hey in prep.), it is not unusual for later Bronze Age settlements to produce little occupation debris. Structures such as small round or oval post-built houses tend, however, to be more clearly defined on other sites (eg Yarnton; ibid.). The only clearly definable structure at Grim's Ditch is a six-poster, which may have been a granary. Similar structures have been recognised on late Bronze Age sites such as Reading Business Park (Moore and Jennings 1992, 27) and Rams Hill (Bradley and Ellison 1975, 55). The structure at Grim's Ditch is also thought to be of late Bronze Age date, although elsewhere post-built granaries were built until at least the start of the middle Iron Age (Allen *et al*. 1984, 100). Analysis of the pottery showed that a few late Bronze Age sherds were present, perhaps reflecting some settlement activity in the vicinity.

The absence of domestic debris is relevant to the site's interpretation, and may indicate only episodic, perhaps seasonal, occupation of the site or that this area was peripheral to the main focus of settlement. The posthole clusters do not, of course, have to be linked to domestic dwellings: they may have formed animal pens, fences or other structures associated with stock control.

The number of middle to late Iron Age sherds was considered sufficient to suggest settlement of this date in the immediate vicinity, though none of the features could be dated to this period. Any such settlement may be related to the next phase of activity on the site.

Late Iron Age cultivation

This phase consisted of the creation of cultivation ridges that immediately predate the construction of the earthwork and are only preserved in a fairly narrow strip under the bank (see Fig. 5.7). The dating of these features is difficult as dating cultivation soils always is. Any finds within them are likely to be residual, and could have been reworked over a considerable period before the soil passed out of use and was preserved. The layer in which the ridges were found is stratigraphically later than the posthole with material of early Bronze Age date and immediately underlies the Grim's Ditch earthwork bank. This is not dated precisely but the first fills of the ditch are of Roman date providing a *terminus ante quem* for the ridges and suggesting a late Iron Age or early Roman date. The pottery from within the cultivation soil supports such a date: although very small and abraded, none appeared to post-date the conquest. Such a date also fits well with the chronology of this type of cultivation as defined by Topping (1989a), who suggests that it is associated with periods of poorer climatic conditions such as prevailed at this time.

These ridges can be interpreted in various ways, but the closest parallel is with those known as 'cord-rig' from numerous sites in northern England and southern Scotland (Topping 1989a). These ridges are very narrow, with generally no more than 1.4 m between the centres of the furrows. Topping gives a catalogue of prehistoric sites associated with cord-rig. Though thought to have been restricted to the higher ground in the northern and western parts of the British Isles, the ridges at Grim's Ditch fall well within the range of dimensions of cord-rig as described by Topping. Further sites in southern England are now also coming to light to add support to this. Ridges observed in a small-scale excavation at Chisenbury Warren (Entwistle *et al.* 1994) may be of this type, and two small 'garden plots' at Weston Wood, Albury (Russell 1989), dated only by their proximity to a Bronze Age structure, provide another parallel.

The method used to create the cultivation ridges at Grim's Ditch is uncertain. The Chisenbury Warren examples were found to be somewhat irregular, the profile of some parts being V-shaped, while in others it was much more rounded. This contrasts with the Grim's Ditch examples which are generally U-shaped in profile and are relatively uniform across the area. The Chisenbury Warren ridges are thought to have been dug with a spade as tool marks were observed. Topping considers it unlikely that this was the usual method of creating these ridges as it would have been very inefficient to create the areas of cord-rig known from the north of the country in this way even if the ground was already broken up by a plough (1989a). Spade-dug areas are, however, known from prehistoric sites. A series of 150 individual regularly spaced spade marks were observed over most of a small 5 m x 9 m trench at Hengistbury Head, Dorset, for example (Chadburn and Gardiner 1985; Chadburn 1987). Late Iron Age sherds (*c* 100–50 BC) were recovered from the primary fill of the ditch cutting this layer (ibid.). In

Shetland, before mechanisation, teams of five or six diggers working together, each with the traditional Shetland spade, which were roughly the same width as the cuts observed at Hengistbury Head, used to cultivate the small field of the typical croft, but this was very time consuming and labour intensive.

Topping suggests that cord-rig is more likely to have been created with an ard, or even a plough with a mouldboard (although these have not been found in prehistoric contexts). No tool marks were observed at Grim's Ditch, and the regularity of the ridges, and the reasonably extensive area that the cord-rig seems likely to have covered, make the use of some sort of ard or plough seem possible. The whole length of the ridges was not, however, preserved, and it is not known if they had the subtle S-bend plan produced when a plough and team are turned at each end of a furrow, as is reported in at least one case cited by Topping (1989a, 166).

The Chisenbury Warren ridges are thought to have been the product of several phases of digging, and it is possible that the Grim's Ditch cord-rig resulted from more than one phase of arding. It was hoped that micromorphological analysis of the soil from these ridges and the immediately overlying bank material could provide information on the character of cultivation during this episode. However, only one undisturbed sample of this material was analysed. This suggested that the soil is a natural topsoil with a degree of disturbance. Though the compaction of the underlying soil which would be expected under a plough zone was absent, the inclusions within the mixed horizon between the pre-bank layer and the initial bank material may be the result of ploughing. It is possible that the ridges were created by only one phase of ploughing. This could explain the lack of a recognisable zone of compaction in the underlying soil, though the use of a spade to create the ridges cannot be ruled out.

Although they are recorded as surviving along a 50 m strip, it is possible that this is only the fragmentary remains of a more substantial area. This may have significance in terms of the socio-economic organisation of the site. Topping (1989b) suggests that in Northumbria enclosed stone-built settlements and forts are more regularly associated with fields and field systems under cord-rig, while timber-built and unenclosed stone-built settlements are more frequently associated with only small patches and plots of cord-rig. He suggests that this is due to a greater reliance on cereal cultivation in the overall economy of the former group, to which the Grim's Ditch site may belong on the basis of a relatively large area of cord-rig cultivation. No settlement is known in the immediate vicinity of the site, though Iron Age activity is known in the wider area. Relatively little archaeological excavation has been carried out in the vicinity of the site, however, so it is difficult to say if Topping's Northumbrian model can be applied to this area.

This episode of cord-rig cultivation was followed by another episode of arding, again aligned north–south and east–west, cut down through the primary slippage of the Grim's Ditch bank into the earlier cultivation soils (see Fig. 5.8, Pl. 5.4). A further separate episode of cross-ploughing, aligned differently, but also thought to date from the same general period, was found further west along the bank. Much of what has been said of the earlier phase of arding holds true for this period also. The marks appear to have been symmetrical and hence cut with the share held upright. Within the first group of ard marks the east–west aligned set was cut by the north–south one, but both appear to have been part of the same episode of cultivation since there was no significant difference in the fills of the two sets. Some of these ard marks were found to be filled by material derived from the reworking of the earlier cultivation soils, which contained nothing that could be dated to later than the Roman period. As the second group of ard marks were not excavated they are more difficult to date, but they may date from the same broad period as the other ard marks.

The cross-ploughing may have been an attempt to smooth out the remains of the earlier cord-rigs, or may have been aimed at producing a finer tilth as the inclusion of bank material into the cultivation soil incorporated a fairly high proportion of chalk gravel and flecks. They may also represent a deliberate attempt to plough out the bank, again possibly in the Roman period (Fowler 1983, 113–17). Cross-ploughing may be the most effective way of flattening irregularities in the land surface with an ard. Ploughing with a modern plough with a mouldboard physically moves the earth significantly forward as it turns the sod. Plough with mouldboards, however, were only introduced in the late Saxon period (Fowler 1981, 27). Lateral movement of the soil does not occur with the use of an ard, but cross-ploughing diagonally across the irregularity may comb the soil from the mound downslope sufficiently to reduce the gradient. The use of the ard as an engineering tool during this period is known from other sites. Uniaxial ploughing parallel to the Winchester–Silchester Roman road, for example, was used to create a terrace in advance of construction of the road (Fasham and Hanworth 1978, 175) and there are other examples of cross-ploughing to flatten earthworks (eg Roman ploughing of a long barrow at Redlands Farm, Northamptonshire; Bradley in prep. a).

The fact that such a difficult area was being cultivated suggests that the land was being fairly intensively cultivated during the Romano-British period, and that arable cultivation was relatively significant to the economy. No evidence for a contemporary settlement was found on the site, but Roman activity is known from the vicinity, particularly slightly upriver at Newnham Murren where finds and cropmarks may represent settlement (PRN 7692).

South Oxfordshire Grim's Ditch earthwork

Chronology

Unfortunately, the excavation could not date the construction of the Grim's Ditch earthwork much more accurately than had been done by earlier excavations (Hinchliffe 1975). Then, the earthwork was dated to the Iron Age by pottery from within the bank and by its association with a nearby pit. Analysis of the pottery found within the cultivation soil preserved immediately beneath the bank and of finds from the first fills of the ditch during the present excavation showed that the latest sherds beneath the bank were of late Iron Age 'Belgic type'. Early Roman material only began to appear in the phase associated with the partial denudation of the bank and after the initial silting of the ditch.

A late Iron Age to early Roman date for the construction of the earthwork accords well with that for similar earthworks such as the north Oxfordshire Grim's Ditch (Copeland 1988), the Big Enclosure at Cassington Mill (Case 1982b), the late Iron Age oppida at Abingdon (Allen 1991; 1993) and Dyke Hills, Dorchester (Harding 1972, 54), all of which may be related in some way to the present site and to the late Iron Age sociopolitical landscape.

The earthwork in its wider context

It is first worth comparing this earthwork with the north Oxfordshire Grim's Ditch (see Fig. 7.3a). Pottery from the north Oxfordshire Grim's Ditch suggests it was probably also constructed in the late Iron Age and fell into disuse in the early Roman period. It consists of a series of earthworks, generally of dump or mound type, separated from a ditch by a berm and possibly a 'palisade trench', running between the valleys of the Glyme, Evenlode and Windrush to form a large enclosure. There are gaps in this earthwork which may or may not be intentional, just as there are gaps at the present site (Bradley 1968).

The north Oxfordshire example differs from the southern one in that it apparently encloses an area with the bank on the inner side of the ditch as would be expected if it had a defensive function. The Big Enclosure at Cassington also encloses a fairly substantial area. Although no physical remains of a bank survived there, the excavator suggested that one was probably present on the inner side of the ditch (Case 1982b), perhaps again indicating that they may have been defensive structures built in the face of a perceived threat.

If the Mongewell Grim's Ditch originally stretched as far as Henley-on-Thames (see Fig. 1.1), as has been suggested (Bradley 1968, 2), then it may also have formed a defensible enclosure with the loop of the River Thames to the south. Similar enclosures, albeit on much smaller scales, are known further up the Thames at Dyke Hills (see Fig. 1.2) and Abingdon. At Dyke Hills a substantial ditch flanked by large banks runs between the Thames and the Thame to form an enclosure around a substantial settlement or oppidum. Defensive ditches between the Rivers Thames and Ock at Abingdon also formed a similar defensive enclosure around the oppidum there. The main ditch at Abingdon has been excavated and found to be 12.5 m wide and 2.7 m deep, comparable to the dimensions of the Mongewell Grim's Ditch described above. The Abingdon ditch has also been dated to the late Iron Age–early Roman period and continued in use until the late 1st–early 2nd century AD (Allen 1991; 1993).

However, there are significant differences between these sites and the Mongewell Grim's Ditch which suggest that other parallels may be more appropriate. On the basis of his survey of the surviving earthworks, Bradley (1968) dismisses the suggestion that the Mongewell Grim's Ditch ever stretched as far as Henley-on-Thames. The fact that the bank lies to the north of the ditch, outside the supposed enclosed area, makes it even less likely to have formed an enclosure. The earthwork seems to have been purely rectilinear.

The earthwork has also been compared to other earthworks also known as Grim's Ditch in the Chilterns (see Bradley 1968). These are not as closely dated, but are thought to be approximately contemporary. The Chiltern ditches are rectilinear in plan, and it has been argued that they enclosed areas of clay soils. This, however, is not true of the south Oxfordshire example, which cuts across the geology. The Chiltern earthworks are generally aligned to contours, as are the north Oxfordshire examples, again contrasting markedly with the south Oxfordshire Grim's Ditch which runs across the contours.

A closer parallel can be found in Aves Ditch to the west of Middleton Stoney in north Oxfordshire (Sauer 1999). This earthwork is purely linear with no indication that it ever formed an enclosure. Indeed, it is so straight that, in the belief that it was a Roman road which formed a junction with Akeman Street just to the west of the River Cherwell, a Roman date was assumed (Rahtz and Rowley 1984). Limited and unpublished excavations at the southern end in 1937 revealed a single large ditch and bank, and recent excavations of a section towards the northern end by the Oxford University Archaeological Society showed that it could not have been a road, but consisted of a large ditch with a bank to the east. These excavations also found Iron Age pottery within the bank suggesting that the feature was earlier than the late Roman date that had been assumed. It has clear parallels with the south Oxfordshire Grim's Ditch in nature and date, and perhaps therefore also in function.

The south Oxfordshire Grim's Ditch must have formed a substantial obstacle to movement along the eastern side of the Thames Valley, and may have been built specifically for the purpose of impeding or controlling this movement. The late Iron Age was a period of marked economic, social and political change. By this period, the increasing standardisation of some artefact types, such as pottery and brooches, perhaps indicates greater social articulation between different areas. This coincides with signs of economic growth in southern and eastern England, marked, for example, by the introduction of the potter's wheel. It may also have been marked by increasing political and economic rivalry between the so-called Iron Age tribes. And there may, therefore, have been a greater need than before to define territories overtly.

The construction of substantial earthworks at this time may have been a response to complex political pressures rather than merely hostile immigration. Bradley (1968) suggests that the Chiltern Ditches are likely to have been built to demarcate boundaries between different groups and/or were land-use practices. Copeland (1988, 287–8) suggests that both the north Oxfordshire Grim's Ditch and Cassington Big Enclosure are an expression of centralised control of territories rather than simply defensive structures, and indeed that the former enclosure may never have been completely defensive. Its main function was to express territorial control. This seems a likely interpretation of the south Oxfordshire Ditch also. The area around Wallingford with its commanding position in the middle of the Thames Valley between the two complementary resource zones of the Upper and Lower Valley would have been desirable territory, and the construction of such a substantial physical barrier would have not only marked a boundary, and controlled movement, but also expressed control over it.

It is difficult to determine who was responsible for the construction of this earthwork. Some central, possibly tribal, power, or at least a noble individual or family, seems likely to have been responsible for instigating construction on such a large scale. To what tribe this power or noble would have belonged is open to speculation. The different tribes residing in southern England at the time are known from Roman historical accounts, but the exact areas they occupied are less easily defined. Some attempts at relating the named tribes to the known archaeology have been made using numismatic evidence.

For a fairly short period from *c* 30 BC to AD 43 (or at the latest a couple of decades after this date) several of these tribes minted their own coins. Some issues have a geographically defined distribution. As there was little movement of coins between these areas, and coinage is likely to be sensitive to politico-economic realities (Sellwood 1984), careful use of coin distributions can give a general indication of tribal territories.

A gross plot of coins of the Catuvellauni (Cunobelin gold, silver and bronze coins), Dobunni, Durotriges and Atrebates (see Fig.7.3b) can thus be used to suggest the territories of these four major tribes. There is an area to the south of Oxford and the west of Wallingford where coins of three of these tribes have been found in almost equal abundance. It is not clear which if any of these tribes controlled this area. A separate tribe, which did not mint its own coins, may have controlled it – a sub-Dobunni tribe has been suggested – but it may be that this area was disputed and allegiances varied through time. The gross coin evidence cannot reveal such subtle changes. It is likely that the area was one of some rivalry between tribes for control. On the opposite side of the river the picture is clearer.

The Mongewell Grim's Ditch may have formed a boundary between the Catuvellauni to the north and the Atrebates to the south. This is uncertain as major rivers such as the Thames apparently form boundaries in other places, with a little overlap in the coin distributions along the boundaries of each territory as might be expected. There are various mechanisms by which coins from one tribe could come into the territory of another. Even where the coinage was not recognised some may have been exchanged for goods or taken for bullion. The Atrebatic coins found between the river and Grim's Ditch could derive from such trade, rather than being an indication that the Atrebatic territory extended to the north of the river at this point. Hodder and Orton's (1976) quantitative analysis also suggests that the territory of the Atrebates extended north of the river at this point. The boundary suggested by their analysis is geometric, but does give some support to the hypothesis that Grim's Ditch formed a boundary between the two tribes.

Since the bank is on the northern side of the ditch it might be suggested that the earthwork was built by the Catuvellauni to halt any further encroachment north along the eastern side of the Thames by the Atrebates. A similar suggestion could be made for the construction of Aves Ditch, which may have formed the western boundary of the Catuvellauni territory. The Cherwell had been assumed to form this boundary but Aves Ditch is close enough to the river not to show up in gross artefact distributions (Sauer 1999, 268).

The ploughing of the bank and the subsequent infill of the ditch suggest that the earthwork fell out of use during, or perhaps towards the end of, the Roman period, as is the case with the north Oxfordshire and Cassington sites. Copeland (1988) suggests this was a result of the old tribal territories becoming obsolete after the Claudian invasion.

The earthwork after the Roman period

Little is known of the political significance of the Grim's Ditch earthwork after the Roman period, although part of its course became the parish boundary. Ploughing out of the bank continued until the 18th-century landscaping of the site, but the earthwork still functioned as a boundary, and remains largely visible today.

Chapter 6: A Multi-period Settlement at Bradford's Brook, Cholsey

by Angela Boyle and Anne Marie Cromarty

INTRODUCTION

Nine evaluation trenches excavated in 1992 in the field between Bradford's Brook, Cholsey (at SU 598 885) and a former branch line of the Great Western Railway (at SU 598 885), along the line of the bypass to the south and west of Wallingford (see Fig. 1.2), revealed a late Bronze Age, Romano-British and Saxon settlement (Fig. 6.1). These results prompted further limited excavation in some areas, which was supplemented by records from a watching brief maintained during the construction of the bypass, and by the results of fieldwalking.

BACKGROUND

With the exception of a lower lying area of alluvium beside Bradford's Brook to the north (see Fig. 6.1), the proposed 30–40 m wide road corridor lay on valley gravels. Within the area of the gravels it crossed a 4 m high ridge which corresponds to a change in sedimentology: north of the ridge the archaeology was sealed by colluvium or relic ploughsoil; to the south by modern ploughsoil alone. The field was under arable cultivation.

No cropmarks were known in the area prior to the evaluation, although a subsequent Royal Commission survey revealed some cropmarks in the field (RCHME 1993; see Fig. 6.1). A few sherds of early Roman and Iron Age date had been found during fieldwalking in 1985–6 to the south of Bradford's Brook around SU 595 885 (see Fig. 1.2 and Chapter 1).

EXCAVATION METHODS AND RECORDING

The evaluation trenches were machine excavated using a toothless bucket down to the archaeological horizon or the underlying natural. Trenches 7 and 8 were 20 m long; the others 30 m. All features were excavated, either by hand or, due to time restrictions, in the case of deep features, by machine, to obtain details of stratigraphy, preservation, dating and finds density. Features in the evaluation trenches were designated by a trench number followed by a feature number taken from a continuous sequence. A letter was assigned to each section in cases where more than one section was cut through a feature. A further number taken from a continuous sequence was assigned to the features' fills (eg 1/2/A/1 for trench 1, feature 2, section A, fill 1).

Since the area to the north of the ridge was stripped only as far as the colluvium during the watching brief no further features were revealed in this area. Numerous features were, however, revealed to the south. Each of these features was assigned a number from a continuous sequence; a further number from a second continuous sequence being assigned to each fill.

ARCHAEOLOGICAL DESCRIPTION

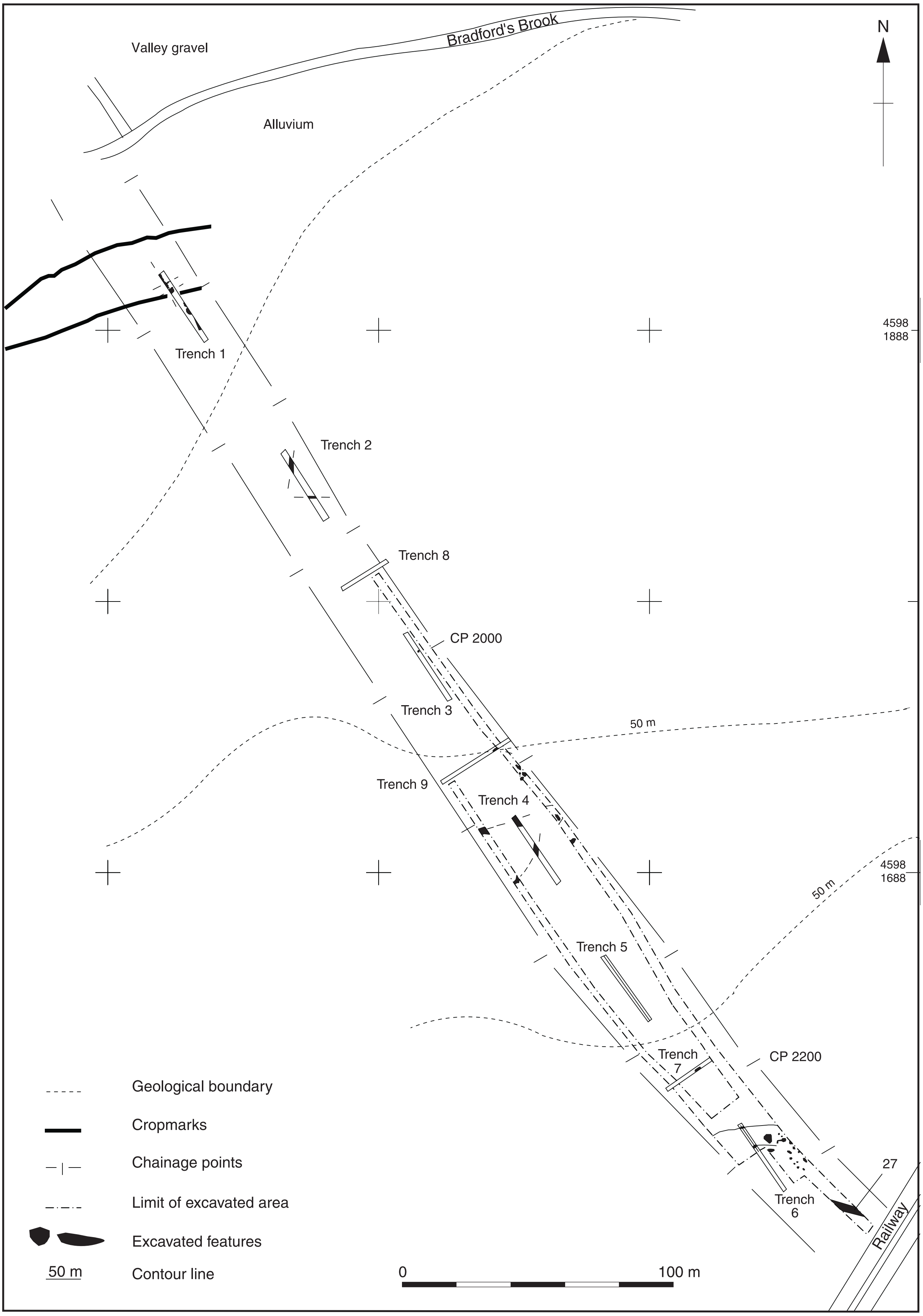
General stratigraphy and early deposits

In all the trenches the uppermost layer was a modern ploughsoil (1–9/1), and in all but trench 1 the natural was a grey chalk and gravel mix. Corresponding to the change in underlying geology, the natural in trench 1 differed, consisting of orange sand and gravel (1/5). The natural was overlain in this trench alone firstly by a dirty gravel layer 0.05 m thick (1/4) which contained some flint flakes and waste that cannot be precisely dated, and then by the remains of what may have been an old ground surface (1/8), preserved in a natural hollow. A flint scraper, possibly Neolithic in date was found in this layer (1/8). Although this deposit may well predate the late Bronze Age, possibly contemporary flintwork was found also in the layer above (1/3), and the precise date of the ground surface is uncertain.

A brown or grey alluvial clay overlay the natural in trenches 1, 8 and 9, and a layer of mid brown or grey clay or clay loam, perhaps a relic ploughsoil, was noted in some trenches (2–4 and possibly 1).

The later Bronze Age

Various features indicate activity in the later Bronze Age: a waterhole, dating from the end of the middle Bronze Age; ditches, some of which perhaps formed part of a system of land divisions; numerous postholes, some suggesting the existence of a structure; and pits. These features are concentrated at the northern and southern ends of the site. The apparently featureless gap between them may reflect only the fact that shallow features on this higher ground are likely to have been destroyed by later ploughing. Finds of pottery of this period in layer 48, near the middle of the site, hint at activity within this otherwise blank area.


Valley gravel
Bradford's Brook
Alluvium
N
Trench 1
4598
1888
Trench 2
Trench 8
CP 2000
Trench 3
50 m
Trench 9
Trench 4
4598
1688
50 m
Trench 5
Trench 7
CP 2200
27
Trench 6
Railway
Geological boundary
Cropmarks
Chainage points
Limit of excavated area
Excavated features
50 m
Contour line
0
100 m

The waterhole

An oval pit (1/7; Fig. 6.2), 3.4 m wide and 1.7 m deep, has been interpreted as a waterhole. Its sides were generally near-vertical, except to the south-east, where, perhaps to provide access, the side was shallower and stepped. Since it extended beyond the trench only part of the feature was hand-excavated. A slot was cut by machine to reveal its complete profile (Fig. 6.3, section 1). The primary fill (1/7/A/5), a waterlogged blue-grey silty clay, contained middle–late Bronze Age pottery, a cylindrical loomweight of middle–late Bronze Age type, and seven fragments of wood 0.5 m long. Radiocarbon dates on two pieces of this wood (see Table A1.1) again suggest a middle–late Bronze Age date: 1740–1410 cal BC and 1440–1120 cal BC (95% confidence GU-5713; 3260±70 BP; GU-5714; 3050±60 BP).

The primary fill was overlain by a mid buff sandy clay also containing wood (1/7/A/4), and above that by a buff-brown sandy silt (1/7/A3) which contained a probable Neolithic flint flake (probably residual) and a cattle skull. The skull lay towards the top of this layer, face up, suggesting that it was deliberately placed. A radiocarbon date, 110 cal BC–cal AD 230 (95% confidence GU-5712; 1950±70 BP), dates the skull to the late Iron Age–early Roman period.

The final fill (1/7/A/2) was a dark grey clay. It lay immediately below a mid dark brown clay layer (1/7/A/1) which, although it appeared to cut the possible relic ploughsoil (1/3), is probably part of the same layer.

A ?field system

Two ditches in trench 1 (1/9 and 1/11) may have been related, perhaps forming part of a field system (see Fig. 6.2). Ditch 1/9 may be part of the feature identified as a cropmark by RCHME (1993; see Fig. 6.1). The area around this trench was, however, stripped down to the possible relic ploughsoil or alluvial layer (1/2) only, so the continuations of these ditches were not observed. They appear nonetheless to run roughly perpendicularly, 1/9 ENE and 1/11 NNW. Although the full width of ditch 1/11 could not be determined, both appear to have been large: ditch 1/9 being 0.8 m deep and 2 m wide, and ditch 1/11 0.75 m deep and over 0.75 m wide. They were similar in section (see Fig. 6.3, section 2). Ditch 1/9 had somewhat irregular sides which sloped from 20° to 70°, becoming steeper towards the slightly concave base. The sides of 1/11 sloped at around 30° near the top, becoming almost vertical towards its flat base. They also had similar grey or brown clay fills either mixed with, or containing lenses of, red-brown sand.

As well as residual Neolithic or early Bronze Age flint, the finds in ditch 1/11 consisted of one sherd of late Bronze Age pottery in its middle fill (1/11/2), and a larger group of late or middle–late Bronze Age pottery in the final fill (1/11/1). A single sherd possibly of middle Iron Age date was also found in this layer; it may be intrusive from layer 1/3 above. A single sherd of middle–late Bronze Age pottery in the final fill (1/9/A/1) was the only artefact in ditch 1/9.

The stratigraphic relationship between these two ditches was unclear, but although 1/9 may have cut 1/11, the ceramic finds and other similarities suggest that the two ditches were of very similar date, if not precisely contemporary.

A third ditch (2/4) with a similar profile was located in trench 2 (see Fig. 6.2). Its sides sloped irregularly to an almost flat base. It was filled with light grey-brown compact sandy silty loams which could be divided into three distinct layers (2/41–3). The difference between these fills and those in ditches 1/9 and 1/11 is probably due to the differences in the underlying natural geology. Although it contained no artefacts, and is aligned roughly north–south in contrast to ditches 1/9 and 1/11, the similarity in size and profile suggests that all three ditches may be of similar date.

Smaller ditches and gullies

The large ditch 1/11 was cut by a smaller ditch (1/10), 0.65 m wide and 0.3 m deep; it ran parallel to ditch 1/9, which was 3 m to the south (see Fig. 6.2). The ditch 1/10 was filled with a grey-brown slightly sandy clay with occasional flecks of red-brown sand, within which two small sherds from a late Bronze Age fingernail-decorated jar were found (Fig. 6.7.3). These could be residual, and the date of the ditch is, therefore, uncertain. It was, however, sealed by the poorly dated layer 1/3.

A gully (1/6), 0.55 m wide and 0.13 m deep, with a rounded profile, also sealed by layer 1/3, was found in trench 1. It had the same alignment as ditch 1/11, but since its light grey-brown slightly sandy clay fill contained no artefacts, it is undated. It may be a late feature, perhaps cutting the waterhole (1/7); the stratigraphic relationship between the two could not, however, be fully examined.

A similar gully (2/5), 0.9 m wide by 0.2 m deep, again with a rounded profile, was found in trench 2. Late Bronze Age–Iron Age pottery was found in its light grey-brown very sandy clay fill. It was, however, aligned east–west, in contrast to all the other linear features.

At the southern end of the site two parallel gullies (6/5=52 and 6/4=24) also aligned east–west were found in the extended area of excavation around trench 6 (Fig. 6.4). Gully 6/5=52 was 0.5 m wide, had a gentle rounded profile 0.15 m deep, and was filled by a light grey clay with 20% chalk (6/5/1 and 52/1) which contained one sherd of late

Figure 6.1 (opposite) Trench location plan showing evaluation trenches and stripped areas

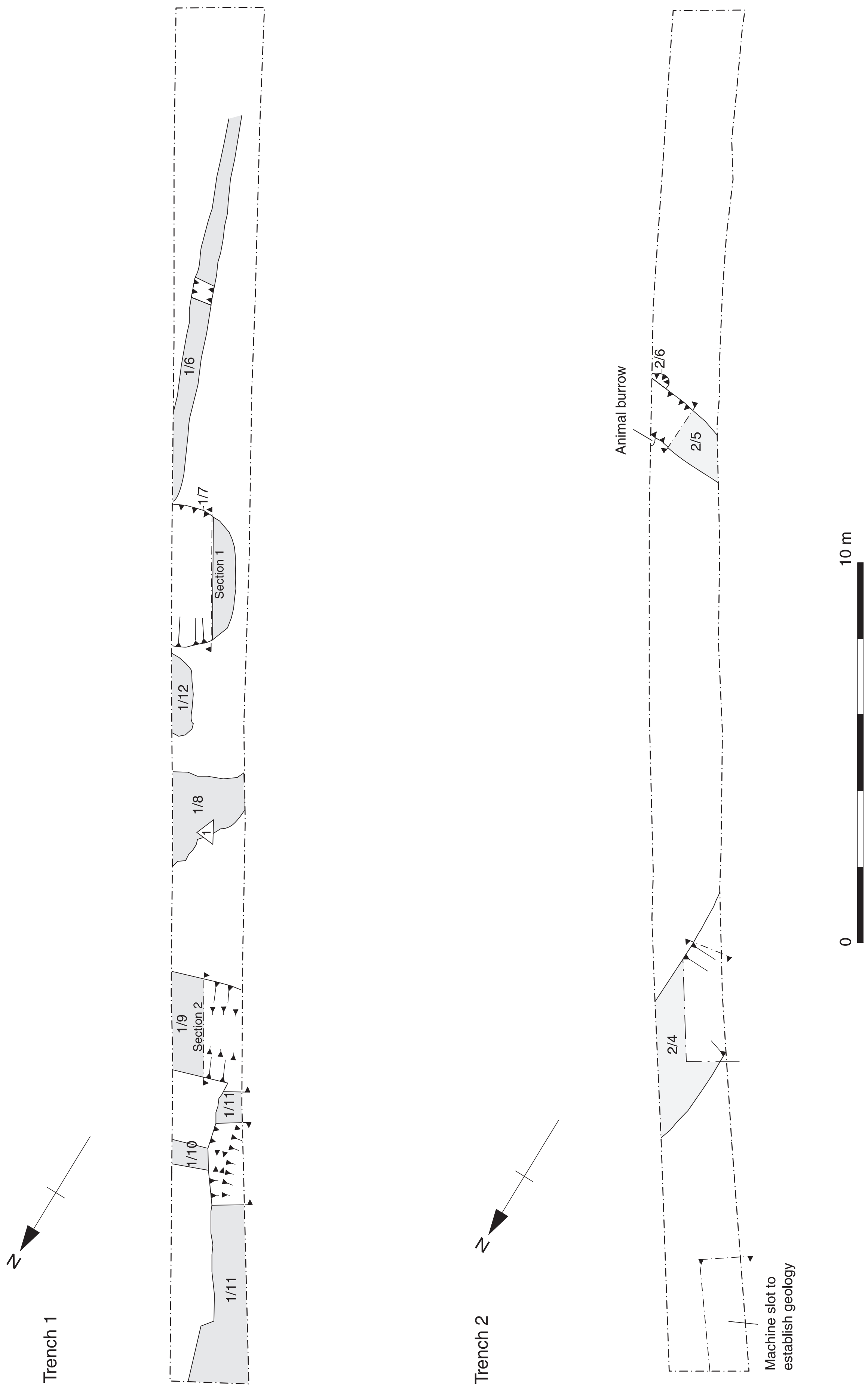


Figure 6.2 Plans of trenches 1 and 2 showing features and dug sections

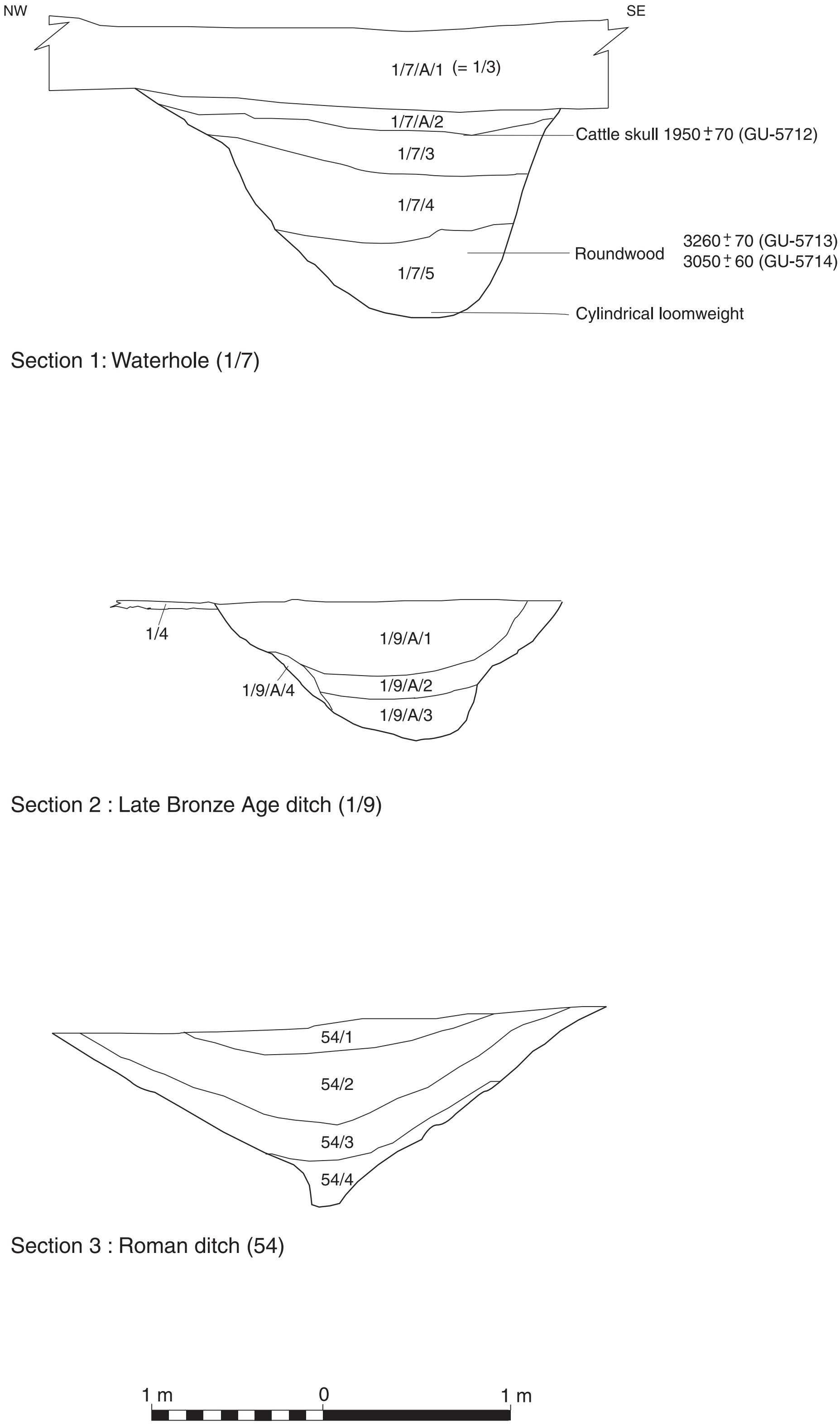


Figure 6.3 Sections: 1: Waterhole 1/7, 2: late Bronze Age ditch 1/9, 3: Roman ditch 54

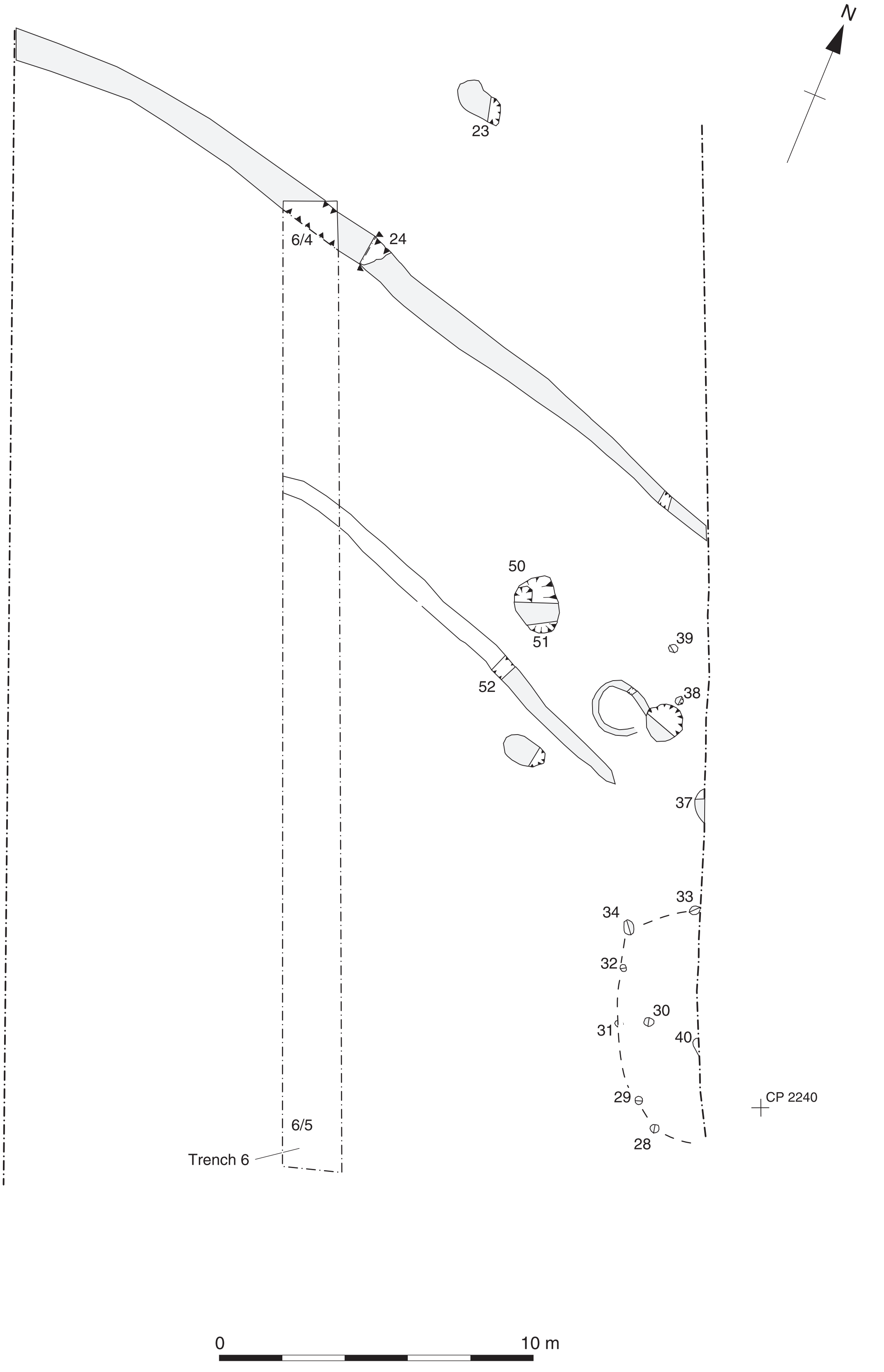


Figure 6.4 Composite plan of area around trench 6 showing possible roundhouse structure, associated pit and parallel gullies

Bronze Age pottery. Gully 6/4=24 was 0.7–0.9 m wide, had a U-shaped profile, 0.15–0.22 m deep and was filled with a mid brown clay loam containing some chalk (6/4/1 and 24/1). Although it contained no finds its common alignment with 6/5 suggests contemporaneity.

Pits

Between gullies 6/4=24 and 6/5=52, a roughly oval pit, 1.75 m x 1.3 m wide, with a rounded profile 0.28 m deep, was located. Two fills (upper 50/2 and lower 50/1) were identified in the west section and one (51/1) in the east. All were brown silty clays varying slightly in colour and in the proportion of chalk and charcoal. They contained 16 sherds of late Bronze Age pottery from a fingertip-decorated jar (Fig. 6.7.5; contexts 50 and 51) as well as cattle, sheep-sized mammal and other unidentified animal bone and charcoal.

Within trench 1, feature 1/12, another possible pit (see Fig. 6.2), 1.7 m wide, is also tentatively dated to this phase. It was only partially within the area investigated and was not excavated. A piece of burnt flint was recovered from the top fill.

A post-built structure

Part of a possible circular post-built structure, interpreted as a house, and defined by a semicircle of six postholes (28–9 and 31–4) with a maximum visible diameter of 7.25 m, was located within an area of small, discrete features in the area immediately east of trench 6 (see Fig. 6.4). The other half of this structure lay beyond the limits of the excavation. No finds were recovered from the postholes which varied in profile and contained no evidence of post-packing. Posthole 34 was markedly larger than the others (Table 6.1). Two further postholes (30 and 40) were located within this structure and may be related. A pair of small circular postholes (38 and 39), 0.23–0.24 m wide, were located near the eastern edge of the road corridor to the north-west of the post-built structure.

Iron Age

No features could be specifically attributed to the Iron Age, but occasional Iron Age sherds scattered through the fills of later features and layer 1/3 in trench 1 (interpreted as relic ploughsoil) indicate activity in the vicinity during this period. Layer 1/3 contained late Bronze Age, probable early–middle Iron Age, and middle Iron Age pottery. As well as overlying all the later Bronze Age features in trench 1, it also covered the final fills of the waterhole (1/7) from which the cattle skull, dated to the late Iron Age to early Roman period, was recovered, and hence is likely to be late Iron Age or later in date. How much later cannot be determined: the date of alluviation in this area is not known, but a phase of alluviation is known to have occurred in the later Roman period at Yarnton, further up the Thames Valley.

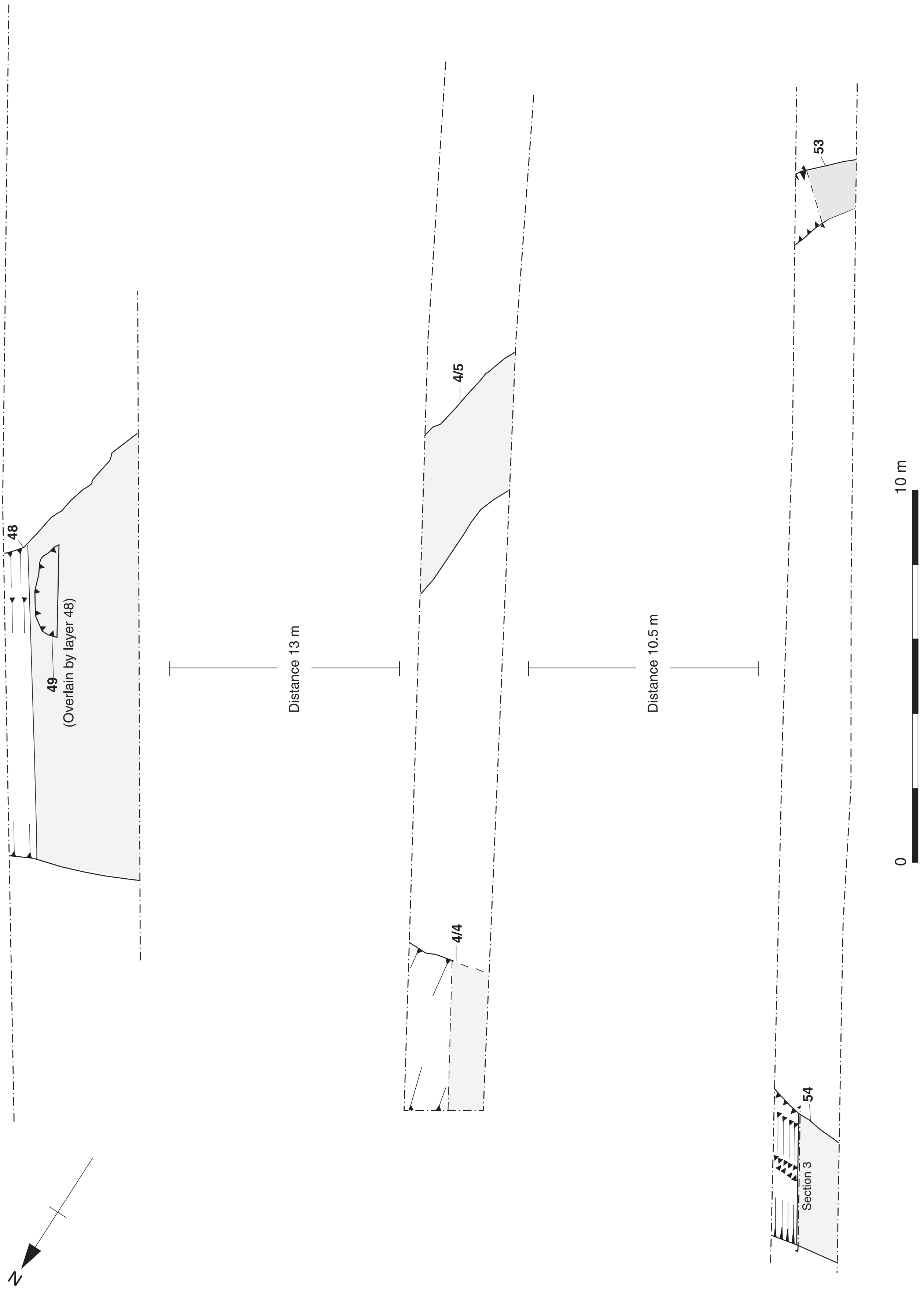
Roman

Two large ditches, dated to the Romano-British period, were identified on the top of the ridge towards the south of the site (Fig. 6.5). They contained pottery in sufficient quantities to suggest a significant level of activity around the 3rd century AD in the vicinity of the site, although there were also some residual earlier sherds and some later pot in the upper fills.

Ditch 4/5 (?same as ditch 53 identified in watching brief) was aligned NNE–SSW; it was not fully excavated but 53 had a V-shaped profile. The ditch was filled with three layers of brown silty clays. Four sherds (including one very small late Bronze Age sherd) and two flints were recovered from 53. The upper fill of ditch 4/5, however, contained a substantial quantity of Roman pottery dated to the later 3rd–4th centuries AD, one small

Table 6.1 Detail of excavated postholes (contexts 28–34)

Posthole no.	Shape	Width (m)	Depth (m)	Profile	Fill context	Colour	Composition	Inclusions
28	Circular	0.22	0.09	Rounded	28/1	Light–mid grey-brown	Silty clay	35–40% chalk; charcoal flecks
29	Roughly circular	0.26	0.06	Irregular	29/1	Mid dark brown	Silty clay	Occasional chalk & charcoal
31	Roughly circular	0.22	0.2	U-shaped	31/2 (lower)	Light grey-brown	Clay silt	Large quantity chalk
					31/1 (upper)	Mid grey-brown	Silty clay	15–20% chalk; frequent charcoal
32	Oval	0.2	0.1	Irregular U-shape	32/1	Light–mid grey-brown	Silty clay	25–30% chalk; frequent charcoal
33	Oval	0.3	0.24	U-shaped	33/1	Light grey-brown	Silty clay	5% chalk; some charcoal
34	Oval	0.48	0.2	Rounded	34/1		Clay silt	Large quantity chalk


48
49
(Overlain by layer 48)
Distance 13 m
4/5
4/4
Distance 10.5 m
53
54
Section 3
10 m
0
N

piece of possible Roman tile and two complete iron nails, possibly also Roman.

Ditch 4/4 (?same as ditch 54 identified in watching brief), a large ditch 3 m wide, was aligned east–west along the crest of the hill in the middle of the site. Ditch 4/4 was not fully excavated, but ditch 54 had a V-shaped profile (see Fig. 6.3, section 3). It was filled with brown silty clays and produced fired clay, charcoal, an iron object and animal bones (including horse and pig). Roman pottery, mostly late 3rd century or later in date (but including some earlier) came from the final fill (54/1). Ditch 4/4 was excavated to a depth of 0.75 m within which three fills of grey or grey-brown clays were recorded. A sherd of probably residual later Bronze Age/Iron Age pottery, Roman pottery of 2nd- and 3rd- to 4th-century date, a little early Anglo-Saxon pottery and two fragments of Roman tile came from the fills. Around 30 pieces of animal bone, including cattle, sheep and fox, were also recovered.

Saxon

No features could be dated specifically to the Saxon period, but the Anglo-Saxon pottery in the top fill of ditch 4/4 and the possible Saxon glass bead recovered from fieldwalking (see below) suggest activity in the area early within the period, possibly early in the 6th century.

Undated features

A number of features could not be dated due to a lack of finds or any relationship to other datable features. They include ditches and gullies (25, 26, 27, 42, possible gullies 35, 2/6 and 9/4), pits (36, 37 and 49), postholes (summarised in Table 6.2) and tree-throw holes (7/3, 23, 41, 44–7).

ARTEFACTUAL EVIDENCE

Glass bead

by Angela Boyle

A single glass bead was recovered during fieldwalking at chainage 440/10.

Catalogue

Glass bead

Short-cylinder, straight-sided, opaque monochrome, pale-green colour. The bead is now squashed and distorted so measurements are approximate. Ht: 4.5 mm; W: 10.7 mm; W (of perforation) 0.5 mm. Anglo-Saxon date.

Comparable examples are known from a number of Anglo-Saxon cemetery sites in the Upper Thames Valley including Standlake Down (Dickinson 1973) and Butler's Field, Lechlade (Boyle *et al*. 1998). Dickinson describes them as instantly recognisable as 7th-century (1973, 252) although examples do occur in later 6th-century contexts (Evison 1987).

Worked flint *(Fig. 6.6)*

by Philippa Bradley

Introduction

A small assemblage of 41 pieces of worked flint and four pieces of burnt unworked flint was found (Table 6.3). Dark brown, grey and orange flint with a white, sometimes chalky, cortex, which would have been available locally in superficial deposits, was used throughout. Flint of suitable flaking quality occurs in the gravel deposits around Dorchester-on-Thames (Gibbard 1986, 142). The only core recovered (context 48) was made on a nodule of bluish-grey, slightly granular flint with cherty inclusions and a worn cortex.

Description

Some preparation and trimming flakes were recovered indicating that primary reduction was occurring on site. Around 35% of the material was broken, perhaps reflecting its recovery from ploughsoils and later features. Only five struck pieces, including two scrapers (Fig. 6.6.1–2), were burnt.

Hard-hammer-struck flakes with prominent bulbs of percussion dominate the assemblage. Little evidence for platform preparation was noted, and hinge fractures, incipient cones of percussion and other accidents of debitage were frequent,

Table 6.2 Detail of other postholes

Posthole no.	*Shape*	*Width (m)*	*Depth (m)*	*Profile*	*Fill context*	*Colour*	*Composition*	*Inclusions*
3/4	Oval	0.45 x 0.4	0.16	Irregular U-shaped	3/4/1	Dark grey-brown	Clay	10% chalk gravel
9/3	Circular	0.26	0.04	-	9/3/1	Mid dark grey-brown	Clay loam	-
43	Oval	0.5	0.08	Rounded	43/1	Mid brown	Silty clay	5% chalk

Figure 6.5 (opposite) Composite plan of area around trench 4 showing Roman ditches 54=4/4 and 53=4/5

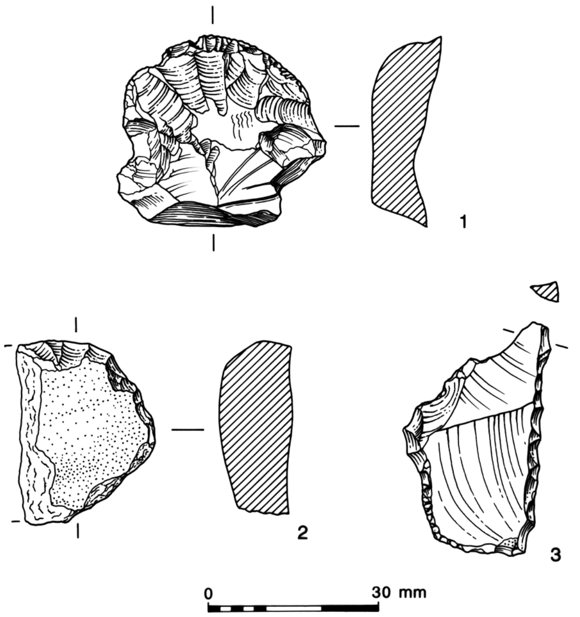


Figure 6.6 Worked flint (details in catalogue)

indicating a general loss of control during knapping (cf. Brown 1992, 92). These technological traits would indicate a mid–late Bronze Age date from this material. The retouched forms are not particularly diagnostic and include scrapers, a piercer and a possible core tool (see Table 6.3). Apart from the end and side scraper (Fig. 6.6.1) the scrapers are minimally retouched. The miscellaneous scraper (Fig. 6.6.2) may be of mid–late Bronze Age date. The piercer (Fig. 6.6.3) from the same context is quite neatly retouched, and this piece and the end and side scraper may be Neolithic or early Bronze Age in date.

A minority of pieces – including two blade-like flakes (contexts 1/2 and 45/2), a blade struck from an opposed platform core (context 1/3) and a flake (context 1/7/A) – were soft-hammer struck, had linear or punctiform butts, and previous parallel blade scars on their dorsal faces, technological characteristics most prevalent during the Mesolithic and earlier Neolithic. Although the neatly retouched scraper and piercer (Fig. 6.6.1, 3) suggest that the blade-like material is Neolithic, there are too few pieces to assign any particular date.

Catalogue of worked flint (Fig. 6.6)

1. Context 1/8, SF 1. End and side scraper, burnt. Some more recent damage around the scraping edge. Scraping angle 55–75°.
2. Context 1/11/A/1. Scraper, broken and burnt. Quite crudely retouched. Scraping angle 75–90°.
3. Context 1/11/A/1. Piercer, neatly retouched with a worn point. Lightly corticated.

Prehistoric pottery

by Alistair Barclay

Introduction

A small quantity (46 sherds, 472 g) of later prehistoric pottery (Table 6.4, Fig. 6.7), most of either late Bronze Age or middle Iron Age date, was found. The methodology employed in their analysis is the same as that outlined for Whitecross Farm (see Barclay, Chapter 3).

Fabrics

Eight fabrics were identified. (Fabric codes: A = sand, C = calcareous, F = flint, P = pellet (Fe = ferruginous), Q = quartzite, S = shell.)

Sand-tempered

A1 Hard fabric with moderate coarse white quartz sand.

Table 6.3 Flint summary composition

Context group	*Flakes, blades etc.*	*Chips*	*Irregular waste*	*Cores/frags*	*Retouched forms*	*Burnt unworked*	*Total*
1 Modern ploughsoils	2	-	-	-	1 (?core tool)	-	3
2 Relic ploughsoils	9	-	-	1 (multiplatform)	-	1	11
4 Waterhole/well	1	-	-	-	-	-	1
6 Linear features LBA/LIA	4	-	3	-	3 (1 end scraper, 1 misc. scraper: Fig. 6.6.2, 1 piercer: Fig. 6.6.3)	2	12
7 Linear features RB	3	-	1	-	2 (1 end scraper, 1 side scraper)	-	6
10 Pits LBA	-	1	-	-	-	1	2
13 Tree-throw holes	1	-	-	-	-	-	1
Other (1/4, 1/8)	7	-	1	-	1 (end and side scraper: Fig. 6.6.1)	-	9
Total	27	1	5	1	7	4	45

AP(Fe)1 As above, but with the addition of reddish-brown ferruginous pellets and voids from burnt-out organic matter.
AP(Fe)C2 As above, but with the addition of rare large subrounded limestone.

Flint-tempered

F2 Hard fabric with <25% medium (1–3 mm) calcined flint.
F3 Hard fabric with <20% coarse calcined flint.
FA2 As F2, but with only 10% flint and <15% coarse quartz sand.

Quartzite-tempered

QA2 Hard fabric with <7% medium angular quartzite and <20% coarse quartz sand.

Shell-tempered

SA2 Hard fabric with <15% shell platelets (<3 mm) and <15% coarse quartz sand.

The sand-tempered and shell-tempered fabrics are likely to be of Iron Age date, while the flint-tempered and quartzite-tempered fabrics are thought to be of late Bronze Age date. Similar fabrics occur among the larger assemblage recovered from Whitecross Farm.

Forms and decoration

The assemblage includes featured sherds from six vessels. A simple rim (Fig. 6.7.2) in fabric AP(Fe)1 is probably of middle Iron Age date (cf. Harding 1972, 99–101 and pls 60–2); the remainder are probably late Bronze Age. They include part of a bipartite shouldered jar (Fig. 6.7.5) with fingertip impressions on the rim and shoulder, decorated body and shoulder sherds probably from jars (Fig. 6.7.1, 3), a further plain shoulder (Fig. 6.7.4) and a base sherd (not illustrated). The late Bronze Age forms can all be paralleled among the larger late Bronze Age assemblage from Whitecross Farm.

The only decoration is impressed fingertipping on three of the late Bronze Age vessels. Such decoration is common on later late Bronze Age assemblages and indicates a probable date range between 900–750 cal BC.

Catalogue of prehistoric pottery *(Fig. 6.7.1–5)*

6.7.1 Context 1/3. LBA. Fingertip-decorated body sherd. Fabric FA2. Colour: ext. reddish-brown: core grey: int. grey. Condition average-worn.
6.7.2 Context 1/3. MIA. Simple rim probably from a barrel-shaped vessel. Fabric AP(Fe)1. Colour: ext. reddish-brown: core grey: int. reddish-brown. Condition average-worn.
6.7.3 Context 1/10. LBA. Shoulder sherd decorated with fingernail impressions. Fabric QA2. Colour: ext. yellowish-brown: core grey: int. yellowish-brown. Condition average-worn.
6.7.4 Context 1/11/A/1. LBA. Plain shoulder with very worn outer surface. Colour: ext. greyish-brown: core grey: int. grey. Condition worn.
6.7.5 Contexts 50–1. LBA. Decorated jar fragments. Bipartite with fingertipping along the outer edge of the rim and on the shoulder. Fabric FA2. Colour: ext. yellowish-brown: core grey: int. grey. Condition worn.

Discussion

The late Bronze Age pottery, characterised by a relatively small number of fingertip-decorated vessels, bipartite forms and the use of flint- or quartzite-tempered fabrics, is associated with some

Table 6.4 Prehistoric pottery: a breakdown of fabrics by context (quantification by sherd number and weight)

Context	Sand-tempered fabrics			Quartzite-tempered fabrics	Flint-tempered fabrics			Shell-tempered fabrics	Total
	A1	AP1	APC2	QA2	F2	F3	FA2	SA2	
US 26	1, 7 g								1, 7 g
1/3	1, 2 g	2, 33 g		1, 1 g			1, 4 g	1, 13 g	6, 53 g
1/7/A/5						1, 15 g			1, 15 g
1/9/A/A/1					1, 12 g				1, 12 g
1/10				1, 3 g			1, 1 g		2, 4 g
1/11/A/1	1, 8 g			2, 32 g	1, 5 g	1, 20 g			5, 65 g
1/11/A/2							1, 10 g		1, 10 g
4/4							1, 8 g		1, 8 g
48	2, 12 g		7, 13 g				1, 6 g		10, 31 g
50							11, 178 g		11, 178 g
51							5, 80 g		5, 80 g
52							1, 8 g		1, 8 g
53				1, 1 g					1, 1 g
Total	5, 29 g	2, 33 g	7, 13 g	5, 37 g	2, 17 g	2, 35 g	22, 295 g	1, 13 g	46, 472 g

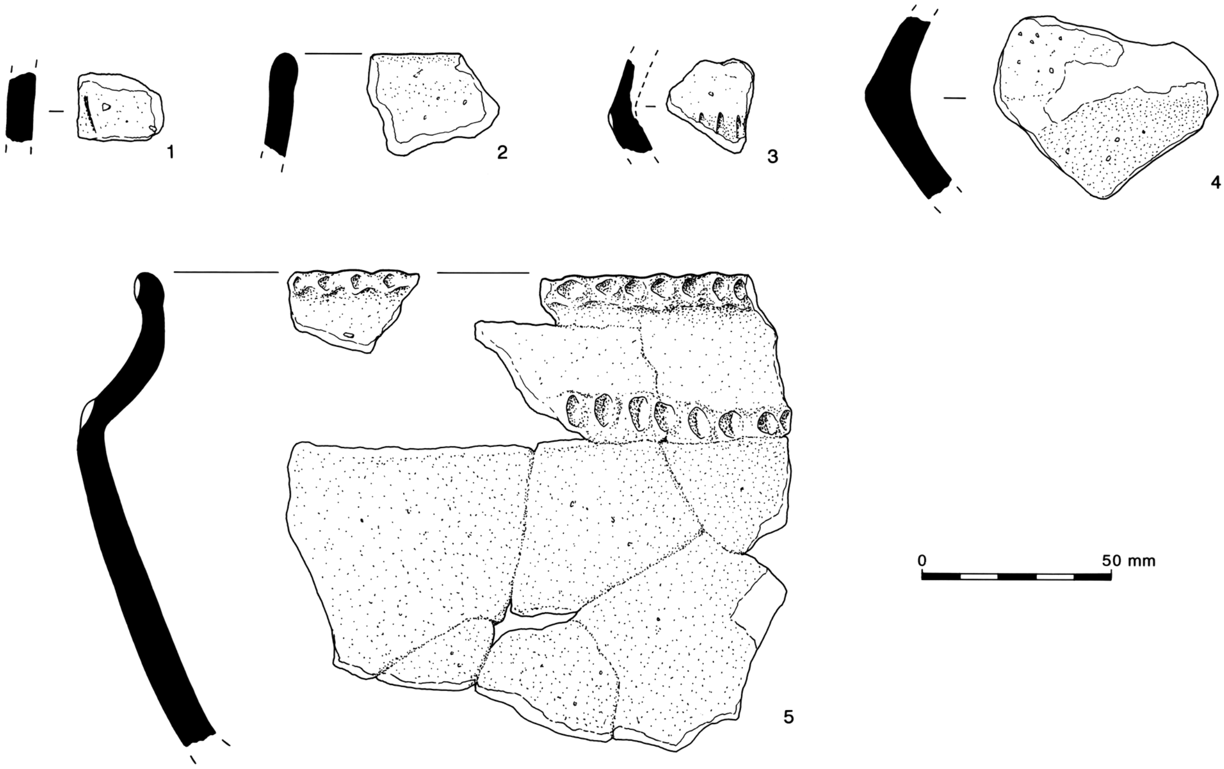


Figure 6.7 Prehistoric pottery (details in catalogue)

of the settlement features including the waterhole (1/7/A/5), a pit (fills 50–1) and some of the linear ditches (1/9, 1/10 and 1/11; see Table 6.4), although a small number of sherds were recovered as residual material in Roman features (contexts 4/4 and 53) as well as from layers interpreted as ploughsoils (1/3 and 48). Identical material occurs among the larger assemblage excavated at Whitecross Farm, and the two sites are therefore probably broadly contemporary (*c* 9th–7th century cal BC).

The Iron Age pottery was recovered from ploughsoils (1/3 and 48) and from the upper fill of the possibly late Bronze Age ditch 1/11. This material is thought to be of mostly middle Iron Age date, although at least one sherd in a shell-tempered fabric is more likely to be early Iron Age.

Late Iron Age and Roman pottery

by Paul Booth

Introduction

The small assemblage of Iron Age and Roman pottery consisted of two sherds (6 g) of probable middle Iron Age date and 92 sherds (2033 g) of late Iron Age and Roman pottery (Table 6.5). It was generally in good condition and the Roman sherds were quite large. The pottery was analysed and recorded using methods similar to those outlined above (see Booth, Chapter 5), except that, since EVEs are unreliable with such small assemblages, rim count was used to quantify vessel types. Here the late Iron Age material is subsumed with the Roman, and percentages are of the combined sherd total for these periods, excluding the middle Iron Age material.

Fabrics and wares

Both middle Iron Age sherds had sand-tempered fabrics, one with additional ferruginous inclusions. The remaining pottery was divided initially into major ware groups, defined on the basis of significant common characteristics (Booth *et al.* 1993, 135–6). Sherds were then assigned either to the principal subdivisions of the ware groups or to individual fabrics/wares (see Table 6.5). Common fabric names are given where appropriate.

The fabrics are all standard for the region and most (including all the O and R wares) probably originated in, or were consistent with, the Oxford industry. The source of the E ware sherds is unknown, but is likely to have been relatively local. The only significant extraregional imports were the various samian ware fabrics and black-burnished ware. The shell-tempered sherds (C11) may have derived from the production centre at Harrold in Bedfordshire (Brown 1994).

Discussion of proportions of the various ware groups is of limited value with such a small assemblage, but a few general points can be made. The representation of E wares is high enough to hint at significant late Iron Age/early Roman activity.

Reduced wares totalled *c* 50% of all sherds, a proportion more in keeping with later Roman assemblages in the region than early ones. The 'fine and specialist wares' (S, F, M, W and Q fabrics) together totalled 17% of sherds.

Forms

Sixteen vessels were represented by rim sherds. The major vessel classes present were jars (7), bowls (2) and dishes (3), with single examples of jar/bowl, cup, bowl/dish and mortarium forms. The correlation of vessel form with fabric is shown in Table 6.6, in which specific vessel form numbers (eg from the typology of Young 1977) are given where possible.

Context and chronology

Apart from a single small unstratified sherd all the Roman pottery derived from two ditch features, 4/5 (?53) and 4/4 (=54). Although the latter also contained Saxon pottery, it was almost certainly Roman in origin. The secondary fill (54/3) contained five Roman sherds perhaps datable as early as the late 1st–early 2nd century AD, but later fills were of late 3rd-century date or later, despite

Table 6.5 Late Iron Age and Roman wares from Bradford's Brook

Ware	*No. of sherds*	*Weight (g)*
S20. South Gaulish samian ware	1	18
S30. Central Gaulish samian ware	1	44
S40. ?East Gaulish samian ware	1	6
F51. Oxford colour-coated ware	6	84
F53. ?New Forest colour-coated ware (Fulford (1975, 24–5) fabric 1a)	1	2
M22. Oxford white ware mortarium	1	305
W20. ?Oxford sandy white fabrics	3	15
Q21. Oxford oxidised white-slipped fabric	1	2
E30. Coarse sand-tempered 'Belgic type' fabrics	7	52
E80. Grog-tempered 'Belgic type' fabrics	1	4
O10. Fine sandy oxidised 'coarse' wares	9	292
O20. Sandy oxidised coarsewares	1	4
O80. Very coarse (usually grog-) tempered oxidised fabrics	5	201
R10. Fine sandy reduced 'coarse' wares	26	409
R20. Sandy reduced coarsewares	8	256
R30. Medium sandy reduced coarsewares	8	85
R90. Very coarse (usually grog-) tempered reduced fabrics	3	126
B11. Black-burnished ware (Dorset BB1)	6	111
C11. Shell-tempered fabrics	3	17
Total	92	2033

Table 6.6 Roman pottery: correlation of vessel form and fabric (quantification by rim count)

Form	*Fabric*										
	S30	*F51*	*M22*	*O10*	*O20*	*R10*	*R30*	*R90*	*B11*	*C11*	*Total*
Medium-mouthed jar						3					3
Angled everted-rim jar					1						1
'Cooking pot type' jar									1	1	2
Storage jar								1			1
Jar/bowl (indeterminate)							1				1
Cup (Young 1977, R62)						1					1
Straight-sided bowl (Young 1977, O31)				1							1
Rounded bowl (Drag 31)	1										1
Straight-sided bowl/dish									1		1
Straight-sided dish							1		1		2
Curving-sided dish (Young 1977, C47)		1									1
Mortarium (Young 1977, M11)			1								1
Total	1	1	1	1	1	4	2	1	3	1	16

which this feature contained *inter alia* all the sherds in fabric E30, certainly assignable to the 1st century AD. The fill of ditch 4/5, which produced the bulk of the pottery (55% of sherds, 77% of weight), was also datable to the later 3rd–4th centuries.

Residual material (apart from the E30 sherds already mentioned) was present in both features. This is clearer from the vessel forms than from the fabrics, most of which were long-lived. At least five of the vessels represented by rims are assignable to the 2nd to mid 3rd centuries: those in fabrics S30, M22, O20, R10 (type R62) and B11 (the indeterminate bowl/dish, which has a rim of 2nd-century type), although of these the Central Gaulish Drag 31 could easily have been in use in the later 3rd century. The overall balance of the fabrics and forms, however, suggests a later Roman emphasis. The representation of reduced wares at about 50% of the assemblage is, as already indicated, likely to indicate a 3rd- to 4th-century date. Comparative data come for example from Wally Corner, Berinsfield, where in a site with more definitely established 2nd-century occupation (as well as later activity) reduced wares totalled *c* 70% of the assemblage (Booth 1995, 18), and an almost exactly similar figure is seen in a predominantly 2nd-century group from Drayton (Booth 2003). Equally the representation of fine and specialist wares, at *c* 17% of the sherd total, is consistent with a late Roman pattern but not an early Roman one; in the latter the great majority of rural sites in the region have less than 5% fine and specialist wares (Booth in prep. a). The number of jars, again at no more than 50% of the total vessels (including the uncertain jar/bowl type in this total), is also indicative of a later Roman date, jars being much better represented in 1st- to 2nd-century assemblages.

Catalogue of Roman pottery *(Fig.6.8 – all from context 4/5)*

6.8.1 Fabric F51. Oxford colour-coated ware bowl of Young (1977) type C47.
6.8.2 Fabric M22. Oxford white ware mortarium of Young (1977) type M11.
6.8.3 Fabric O10. Fine oxidised ware flanged bowl, cf. Young (1977) type O31.
6.8.4 Fabric R10. Fine reduced ware medium-necked jar.
6.8.5 Fabric R10. Fine reduced ware small medium-necked jar.
6.8.6 Fabric R10. Fine reduced ware carinated bowl of Young (1977) type R62.
6.8.7 Fabric B11. Black-burnished ware 'cooking-pot type' jar.
6.8.8 Fabric B11. Black-burnished ware incipient bead and flanged bowl.

Discussion

Despite its occurrence in two features essentially of late Roman date, the pottery indicates activity on or near the site from at least as early as the middle of the 1st century AD and perhaps continuously thereafter. Present evidence suggests an increase in activity in the later 3rd–4th centuries, however. The character of the material, consisting generally of quite large, unabraded sherds (even discounting the single very large mortarium sherd the average sherd weight was 19 g), indicates derivation from a closely adjacent settlement. The spectrum of fabrics and forms present suggests that this settlement utilised standard sources of material for the region at this time, but drew mostly on the local major (Oxford) industry. There were no exotica. The representation of fine and specialist wares is entirely consistent with the regional late Roman pattern for rural sites of relatively low status (Booth in prep. a).

Medieval pottery

by Lucy Whittingham

Three features on the site produced Saxon and medieval sherds: ditches 4/4, 53 and 54 all produced the same early Saxon fabric types, listed below. Ditches 4/4 and 53 also produced later medieval pottery. The methodology used is described in Chapter 5.

Fabrics

Saxon fabric 1

Moderately tempered with abundant quartz <0.1 mm, moderate subangular quartz 0.2–0.5 mm, occasional large iron oxide pellets 2–3 mm, sparse fine mica.

Saxon fabric 2

Coarse, tempered with abundant fine quartz <0.1 mm, moderate subrounded quartz 0.2–0.5 mm, occasional large rounded quartz 1–2 mm, occasional large subangular white quartz 3.0 mm, moderate red iron oxide 0.2–0.3 mm, no visible mica.

Saxon fabric 3

Coarse, with abundant subangular quartz 0.2–0.5 mm, occasional polycrystalline quartz 0.3 mm, occasional clay/grog pellets. No visible mica.

Saxon fabric 4

Fine quartz-tempered fabric with abundant quartz <0.1 mm, sparse/moderate subrounded quartz 0.3–0.4 mm, occasional rounded quartz 0.5 mm, moderate red iron oxide 0.2–0.3 mm, sparse mica, some fine organic/grass temper.

Discussion

The four quartz-tempered fabrics found at Bradford's Brook fit into the general tradition of 5th- or 6th-century Saxon pottery. Similar wares have been described in south Oxfordshire and close to the Thames (eg at Benson, Dorchester and North Stoke;

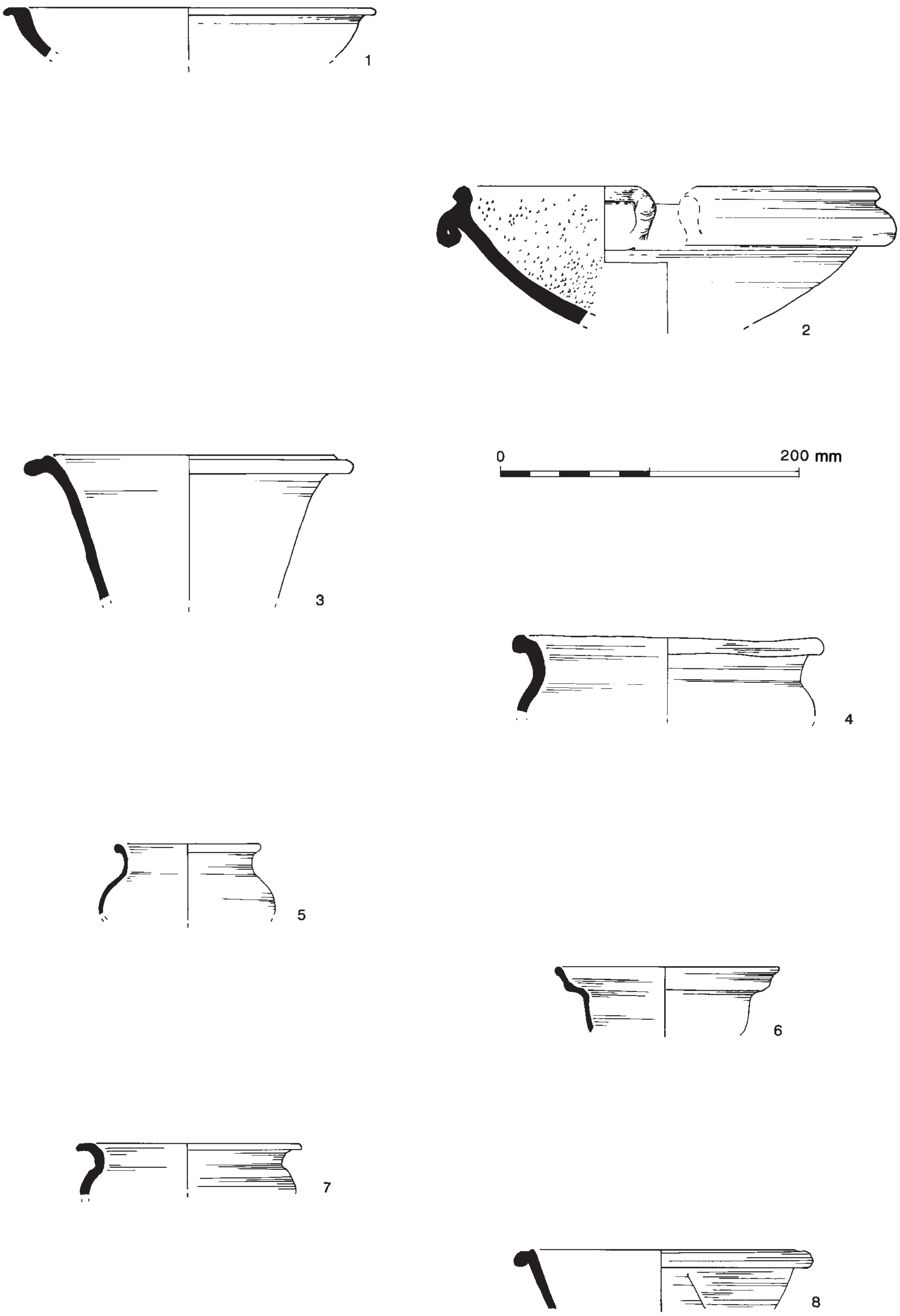


Figure 6.8 Roman pottery (details in catalogue)

Mellor 1994). It is not clear whether there is a well-defined transition between early Saxon quartz-tempered wares and later chaff- or shell-tempered wares in Oxfordshire (ibid.). At one time these wares were thought to characterise different periods; they have, however, been found in association in Oxford (ibid.) and at Dorney (Whittingham 2002).

Fired clay

by Alistair Barclay

A complete cylindrical loomweight (SF 2, Fig. 6.9) was recovered from the primary fill (1/7/A/5) of the waterhole. It weighs approximately 505 g and was made from ill-prepared clay containing abundant probable clay pellets (rather than grog; mostly 1–3 mm but some between 10–15 mm), organic matter (some of which survives as charred stems) and rare natural flint gravel. It has a maximum length of 82 mm and a diameter of 80–90 mm. The firing colour has been altered to a light, almost whitish, grey colour, probably through being deposited in the anaerobic waterlogged environment of the waterhole.

Cylindrical loomweights have a mid–late Bronze Age date range and are commonly found on settlements (cf. Adkins and Needham 1985). The rarity of this type in the Upper Thames partly reflects a lack of settlement evidence, although examples have been found at late Bronze Age settlements such as Yarnton and Eynsham (Barclay and Edwards in prep. b; Barclay 2001).

Tile

by Kate Atherton and Nick Mitchell

Two fragments of Roman tile, weighing 48 g and 21 g, were found in Roman ditch 4/4. The fabric of both is moderately hard and sandy with occasional inclusions of mica, quartz and grog, suggesting a Roman date and that both may derive from the same tile. Three fragments of medieval or post-medieval roof-tile in two fabrics, but with no distinguishing features, were also found.

Nails

by Leigh Allen

Two complete iron nails with flanged heads and square-sectioned shanks (74 mm and 65 mm long), recovered from the Roman ditch 4/5, may be of Roman date.

ENVIRONMENTAL EVIDENCE

Animal bone

by Adrienne Powell

Of the 103 fragments of animal bone, most of which derive from the late Bronze Age pits (50–1) and ditch 1/11 (Table 6.7), only 15 were identified to species. Sheep/goat and fox (*Vulpes vulpes*) were present only in the Roman ditch (4/4=54). A sheep/goat mandible had tooth wear indicating an age of two to three years (Payne 1973). The fragmentary cattle skull of late Iron Age or Roman date (radiocarbon sample GU-5712) in the top of the middle Bronze Age waterhole (1/7) belonged to a horned adult. The maximum basal diameter of the horncore was 60.4 mm, within the range of cattle at Potterne (Locker 2000).

Macroscopic plant and invertebrate remains

by Mark Robinson

Introduction

A single waterlogged sample (sample 4) from the dark grey highly organic clay loam that formed the

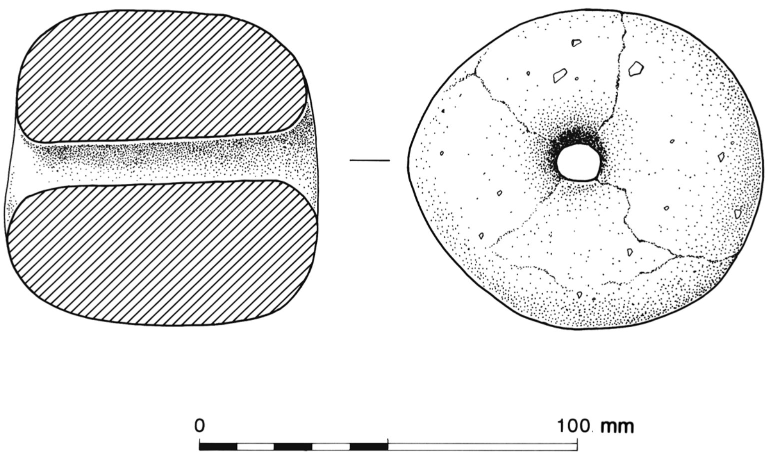


Figure 6.9 Mid–late Bronze Age cylindrical loomweight

Table 6.7 Animal bone: number of identified specimens (NISP)

Species	*MBA waterhole (1/7)*	*LBA pits (50–1)*	*LBA linear (1/11)*	*Romano-British linear (4/4=54)*	*Total*
Horse	0	0	1	1	2
Cattle	1	1	1	2	5
Sheep/goat	0	0	0	5	5
Pig	0	1	0	1	2
Vulpes vulpes (fox)	0	0	0	1	1
Sheep-sized mammal	0	3	0	3	6
Cattle-sized mammal	2	1	1	10	14
Unidentified	0	33	10	25	68
Total	3	39	13	48	103
% identified	33	5	15	21	15

primary fill (1/7/A/5) of the waterhole was analysed (Tables 6.8–14, Fig. 6.10) using the methods outlined above for Whitecross Farm (see Robinson, Chapter 4).

The origin of the assemblage

Remains of aquatic plants, insects and molluscs were absent apart from a single example of the amphibious beetle *Dryops* sp. This suggested that the waterhole had the character of a well rather than a pond with its own autochthonous fauna and flora. The majority of the plant and invertebrate remains probably entered the deposit through natural agencies from the surrounding landscape, although crop-processing remains, both waterlogged and charred, may have been deliberately dumped.

General landscape conditions

The insects suggest an open landscape, giving evidence of grassland and disturbed-ground habitats. Species associated with trees and shrubs were absent. The waterlogged macroscopic plant remains – which, apart from those imported by humans, would have tended to have had a more local origin than the insects – were mostly from plants of disturbed and waste-ground habitats. There were some remains of shrubs but insufficient to suggest the general development of scrub. There was some evidence from the insects for the proximity of a settlement, and the macroscopic plant remains were most probably from the vegetation growing in or around the settlement.

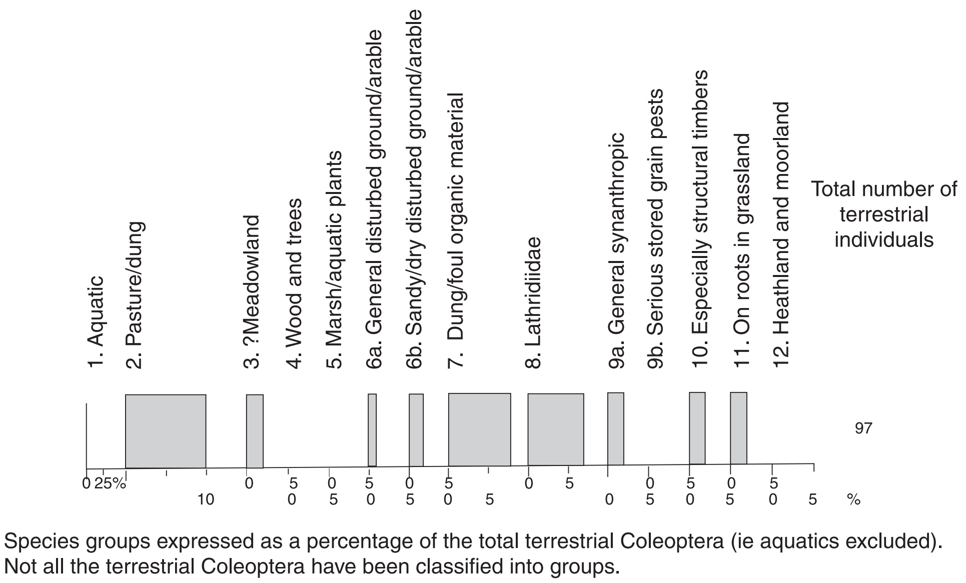


Figure 6.10 Species groups of Coleoptera from the waterhole at Bradford's Brook

Table 6.8 Waterlogged seeds

Sample 4
Sample weight 1 kg

		No. of seeds
RANUNCULACEAE		
Ranunculus cf. *acris* L.	meadow buttercup	2
R. cf. *repens* L.	creeping buttercup	6
R. cf. *bulbosus* L.	bulbous buttercup	1
R. parviflorus L.	small-flowered buttercup	7
PAPAVERACEAE		
Papaver rhoeas tp.	field poppy	64
P. argemone L.	long prickly headed poppy	25
P. somniferum L.	opium poppy	24
Chelidonium majus L.	greater celandine	8
CRUCIFERAE		
Capsella bursa-pastoris (L.) Med.	shepherd's purse	4
Sisymbrium officinale (L.) Scop.	hedge mustard	8
CARYOPHYLLACEAE		
Cerastium cf. *fontanum* Baum.	mouse-ear chickweed	5
Stellaria media gp	chickweed	102
S. graminea L.	stitchwort	1
Minuartia sp.	sandwort	2
Arenaria sp.	sandwort	13
Spergula arvensis L.	corn spurrey	2
Scleranthus annuus L.	annual knawel	1
CHENOPODIACEAE		
Chenopodium album L.	fat hen	65
Atriplex sp.	orache	124
LINACEAE		
Linum catharticum L.	fairy flax	3
ROSACEAE		
Rubus fruticosus agg.	blackberry	2
Potentilla cf. *erecta* (L.) Räush.	tormentil	1
P. reptans L.	creeping cinquefoil	34
Aphanes arvensis L.	parsley piert	14
A. microcarpa (B. & R.) Roth.	parsley piert	3
ONAGRACEAE		
Epilobium sp.	willowherb	2
UMBELLIFERAE		
Chaerophyllum temulentum L.	rough chervil	56
Anthriscus sylvestris (L.) Hof.	cow parsley	1
Aethusa cynapium L.	fool's parsley	6
Torilis sp.	hedge parsley	1
POLYGONACEAE		
Polygonum aviculare agg.	knotgrass	116
Fallopia convolvulus (L.) Löv.	black bindweed	2
Rumex acetosella agg.	sheep's sorrel	12
Rumex spp.	dock	32
URTICACEAE		
Urtica urens L.	small nettle	1
U. dioica L.	stinging nettle	520

Table 6.8 (continued) Waterlogged seeds

Sample 4
Sample weight 1 kg

		No. of seeds
BETULACEAE		
Alnus glutinosa (L.) Gaert.	alder	1
PRIMULACEAE		
Anagallis sp.	pimpernel	2
SOLANACEAE		
Hyoscyamus niger L.	henbane	1
Solanum dulcamara L.	woody nightshade	1
LABIATAE		
Mentha cf. *aquatica* L.	water mint	1
Prunella vulgaris L.	selfheal	4
Galeopsis tetrahit agg.	hemp-nettle	1
Glechoma hederacea L.	ground ivy	3
PLANTAGINACEAE		
Plantago major L.	great plantain	5
RUBIACEAE		
Galium aparine L.	goosegrass	4
CAPRIFOLIACEAE		
Sambucus nigra L.	elder	48
VALERIANACEAE		
Valerianella dentata (L.) Pol.	corn salad	2
COMPOSITAE		
Tripleurospermum inodorum (L.) Schultz	scentless mayweed	1
Leucanthemum vulgare Lam.	ox-eye daisy	1
Arctium sp.	burdock	1
Carduus sp.	thistle	23
cf. *Cirsium* sp.	thistle	7
Lapsana communis L.	nipplewort	5
Sonchus oleraceus L.	sowthistle	12
JUNCACEAE		
Juncus effusus gp	tussock rush	23
J. bufonius gp	toad rush	3
J. articulatus gp	rush	2
CYPERACEAE		
Eleocharis palustris (L.) R. & S. or *uniglumis* (Lin.) Sch.	spike rush	1
Carex spp.	sedge	3
GRAMINEAE		
Bromus S. *Eubromus* sp.		
brome grass	1	
Gramineae indet.	grass	15
indet.		1
Total		1442

Table 6.9 Other waterlogged plant remains

	Sample 4 *Sample weight 1 kg*		*No. of items or presence*
Bryophyta indet.	- stem with leaves	moss	+
Pteridium aquilinum (L.) Kuhn	- frond fragment	bracken	1
Papaver hybridum L.	- capsule lid	round prickly headed poppy	1
Rubus sp.	- prickle	blackberry	12
Rosa sp.	- prickle	rose	1
Pomoideae indet.	- wood	hawthorn, apple etc.	+
Prunus / Crataegus tp.	- thorn	sloe or hawthorn	2
Salix sp.	- bud scale	willow	1
Triticum dicoccum Shubl.	- glume	emmer wheat	7
T. cf. *spelta* L.	- glume	spelt wheat	1
T. cf. *dicoccum* Shubl. or *spelta* L.	- glume	emmer or spelt wheat	29
*Hord*eum sp.	- rachis	barley	3
Secale or *Hordeum* sp.	- rachis	rye or barley	2
Bud scale indet.			1
Deciduous leaf fragment			+

Table 6.10 Charred plant remains (excluding charcoal)

		Sample 4 *Sample weight 1 kg*	*No. of items*
Cereal grain			
Triticum dicoccum Shubl. or *spelta* L.		emmer or spelt wheat	1
Hordeum sp. sprouted	- hulled median grain	hulled barley	1
Hordeum sp.		barley	1
cereal indet.			1
Cereal chaff			
Triticum dicoccum Shubl.	- glume base	emmer wheat	4
T. dicoccum Shubl. or *spelta* L.	- glume base	emmer or spelt wheat	6
Hordeum sp.	- rachis	barley	3
Secale or *Hordeum* sp.	- rachis	rye or barley	1
Weed seeds			
Vicia or *Lathyrus* sp.		vetch or tare	3
cf. *Trifolium* sp.		clover	1
Rumex sp.		dock	1
Galium aparine L.		goosegrass	1
Total items			24

Table 6.11 Charcoal

	Sample 4 *Sample weight 1 kg*	*Presence*
Pomoideae indet.	hawthorn, apple etc.	+
Quercus sp.	oak	+

+ present

Table 6.12 Coleoptera

Sample 4 *Sample weight 4 kg*	*Minimum no of individuals*	*Species group*
CARABIDAE		
Trechus obtusus Er. or *quadristriatus* (Schr.)	2	
Bembidion obtusum Serv.	1	
Bembidion sp.	1	
Pterostichus melanarius (Ill.)	2	
P. cupreus (L.) or *versicolor* (Sturm)	1	
Amara apricaria (Pk.)	1	6b
A. aulica (Pz.)	2	
A. bifrons (Gyl.)	1	6b
Amara sp.	1	
Harpalus rufipes (Deg.)	1	6a
Harpalus S. *Ophonus* sp.	1	
Brachinus crepitans (L.)	1	
HYDROPHILIDAE		
Sphaeridium lunatum F. or *scarabaeoides* (L.)	1	
Cercyon analis (Pk.)	1	7
C. pygmaeus (Ill.)	1	7
Megasternum obscurum (Marsh.)	3	7
Cryptopleurum minutum (F.)	1	7
HISTERIDAE		
Acritus nigricornis (Hof.)	1	
Histerinae indet.	1	
STAPHYLINIDAE		
Xylodromus concinnus (Marsh.)	1	
Carpelimus bilineatus Step.	1	
Platystethus cornutus gp	4	
Anotylus nitidulus (Grav.)	1	
A. rugosus (F.)	1	7
A. sculpturatus gp	1	7
Stenus sp.	3	
Sunius sp.	1	
Othius laeviusculus Step.	1	
Xantholinus glabratus (Grav.)	1	
X. longiventris Heer	1	
X. linearis (Ol.) or *longiventris* Heer	2	
Philonthus spp.	2	
Tachyporus sp.	1	
Tachinus sp.	2	
Aleocharinae indet.	2	
GEOTRUPIDAE		
Geotrupes sp.	1	2
SCARABAEIDAE		
Colobopterus fossor (L.)	1	2
Aphodius foetidus (Hbst.)	1	2
A. granarius (L.)	2	2
A. pusillus (Hbst.)	1	2
A. cf. *sphacelatus* (Pz.)	2	2
Aphodius spp.	1	2
Oxyomus sylvestris (Scop.)	2	
Onthophagus sp. (not *ovatus*)	1	2
Phyllopertha horticola (L.)	1	11

Table 6.12 (continued) Coleoptera

Sample 4 *Sample weight 4 kg*	*Minimum no of individuals*	*Species group*
SCIRTIDAE		
cf. *Cyphon* sp.	1	
DRYOPIDAE		
Dryops sp.	1	1
ELATERIDAE		
Athous hirtus (Hbst.)	1	11
ANOBIIDAE		
Stegobium paniceum (L.)	1	9a
Anobium punctatum (F.)	2	10
PTINIDAE		
Ptinus fur (L.)	1	9a
NITIDULIDAE		
Brachypterus urticae (F.)	1	
RHIZOPHAGIDAE		
Monotoma sp.	1	
CRYPTOPHAGIDAE		
Atomaria sp.	1	
LATHRIDIIDAE		
Stephostethus angusticollis (Gyl.)	1	8
Lathridius minutus gp	1	8
Enicmus transversus (Ol.)	1	8
Corticariinae indet.	4	8
CHRYSOMELIDAE		
Gastrophysa polygoni (L.)	1	
Galeruca tanaceti (L.)	1	
Phyllotreta atra (F.)	1	
P. vittula Redt.	1	
Longitarsus spp.	3	
Chaetocnema concinna (Marsh.)	3	
Psylliodes sp.	1	
APIONIDAE		
Apion urticarium (Hbst.)	1	
Apion spp.	1	3
CURCULIONIDAE		
Sitona sp.	1	3
Liparus coronatus (Gz.)	1	
Cidnorhinus quadrimaculatus (L.)	2	
Ceuthorhynchinae indet.	1	
Gymnetron labile (Hbst.)	1	
Total	98	

For Key to species groups see Figure 6.10

Table 6.13 Other insects

		Minimum no. of individuals or presence
Sample 4 sample weight 4 kg		
DERMAPTERA		
Forficula auricularia L.		1
HEMIPTERA		
Heterogaster urticae (F.)		1
Scolopostethus sp.		1
Anthocorinae indet.		1
Aphrodes bicinctus (Schr.)		1
A. fuscofasciatus (Gz.)		2
Aphidoidea indet.		1
Homoptera indet.		1
HYMENOPTERA		
Stenamma sp.	- worker	6
Hymenoptera indet.		6
DIPTERA		
Chironomidae indet.	- larva	+
Diptera indet.	- puparium	2
Diptera indet.	- adult	2

Table 6.14 Mollusca

Sample 4 sample weight 1 kg	Minimum no. of individuals
Carychium sp.	2
Cochlicopa sp.	1
Vallonia costata (Müll.)	7
V. excentrica Sterki	2
Vallonia sp.	4
Discus rotundatus (Müll.)	1
Vitrea sp.	3
Oxychilus cellarius (Müll.)	1
Trichia hispida gp	2
Cepaea sp.	1

Grassland

Chafers and elaterid beetles of species group 11, which have larvae that feed on roots in grassland, made up 2% of the Coleoptera from the waterhole (see Fig. 6.10). Some grassland weevils were also present including *Gymnetron labile*, which feeds on *Plantago lanceolata* (ribwort plantain). Seeds of potential grassland plants were few but included *Ranunculus* cf. *repens* (creeping buttercup), *R.* cf. *bulbosus* (bulbous buttercup), *Potentilla* cf. *erecta* (tormentil), *P. reptans* (creeping cinquefoil), *Rumex acetosella* agg. (sheep's sorrel) and *Prunella vulgaris* (selfheal).

Some of the seeds were of plants which are favoured by noncalcareous soils including *P.* cf. *erecta* and *R. acetosella* agg. A frond fragment of *Pteridium aquilinum* (bracken) was also found, although this could have been from material imported to the site for use as animal bedding. A full acid ground flora was absent, so the soil conditions were probably circumneutral to slightly acidic. Scarabaeoid dung beetles of species group 2, which feed on the dung of herbivores on pasture, comprised 10% of the terrestrial Coleoptera. They included *Aphodius granarius* and *A.* cf. *sphacelatus*. These results suggest the occurrence of pastureland supporting domestic animals in the catchment, although the grassland species were not so abundant as to exclude the possibility that there was also a major presence of arable.

Arable and crop plants

The cereal remains show that the products of arable agriculture were being brought to the site for processing. Coleoptera do not give such reliable evidence for the proximity of arable as they do for the occurrence of grassland. However, there was a significant presence of Carabidae, which tend to be associated with disturbed ground and arable, such as *Amara apricaria* and *A. bifrons*, species which are never very abundant in insect assemblages. It is entirely plausible that there were arable fields in the vicinity of the site. Two cereals were identified: *Triticum dicoccum* (emmer wheat) and *Hordeum* sp. – hulled (hulled barley). Unfortunately there were too few charred weed seeds to gain an indication of the type of soil being cultivated. In addition to waterlogged cereal chaff, there were also 24 waterlogged seeds of *Papaver somniferum* (opium poppy). They were outnumbered by seeds of two other species of poppy, *P. argemone* (long prickly headed poppy) and *P. rhoeas* tp. (field poppy). On the basis of a single capsule lid, it is possible that the latter were from *P. hybridum* (round prickly headed poppy). A somewhat similar discovery, although with a higher concentration of *P. somniferum* seeds, was made from the late Bronze Age eyot at Whitecross Farm, and the possibility that they were from a cultivated crop is discussed in that report (see Robinson, Chapter 4).

Many of the waterlogged seeds were from annual weeds of disturbed ground. The more numerous included *Stellaria media* gp (chickweed), *Chenopodium album* (fat hen), *Atriplex* sp. (orache) and *Polygonum aviculare* agg. (knotgrass). These species readily grow as arable weeds although it is more likely that most were from plants growing on neglected ground in the vicinity of the waterhole. Other potential arable weed seeds included species characteristic of light circumneutral to acidic soils, although none was abundant: *Spergula arvensis* (corn spurrey), *Scleranthus annuus* (annual knawel), *Aphanes microcarpa* (parsley piert) and *Rumex acetosella* agg. (sheep's sorrel).

Conditions and activities around the waterhole

The Coleoptera from the waterhole included some species highly suggestive of settlement on the site. *Anobium punctatum* (woodworm beetle), which usually infests structural timbers, made up 2% of the total (species group 10). General synanthropic beetles (species group 9a) also formed 2% of the total. They comprised *Stegobium paniceum*, a minor grain pest that also attacks a wide range of other stored products, and *Ptinus fur*, an omnivorous beetle which flourishes indoors although it does also occur in birds' nests.

The most numerous waterlogged seeds from the waterhole were from *Urtica dioica* (stinging nettle). There was also a range of nettle-feeding insects: *Brachypterus urticae, Apion urticarium, Cidnorhinus quadrimaculatus* and *Heterogaster urticae.*

Seeds of *Sambucus nigra* (elder) were also well represented. Nutrient-rich waste or neglected ground was probably a feature of the settlement. Scrub species such as *Rubus fruticosus* agg. (blackberry) were becoming established. Other members of this community included *Chelidonium majus* (greater celandine) and *Chaerophyllum temulentum* (rough chervil). Areas of more frequent disturbance had probably been colonised by the annual weeds listed above.

The only activity for which there was evidence was crop-processing. The cereal remains were mostly debris from the de-husking of *Triticum dicoccum* (emmer wheat).

Discussion

The waterhole dates from the end of the middle Bronze Age, just predating the eyot at Whitecross Farm. A possible reflection of this was the occurrence of both emmer and spelt wheat at the eyot, whereas only emmer wheat was found at Bradford's Brook. The results indicate an open agricultural landscape with evidence for both arable and the grazing of domestic animals. They largely fall into the pattern shown by late Bronze Age sites in the region including the eyot (see Robinson, Chapter 4) although there was less thorn scrub than at Eight Acre Field, Radley (Robinson 1995, 49). The environmental evidence from Bradford's Brook perhaps enables the origin of the organised agricultural landscape of the region to be taken back to the end of the middle Bronze Age.

Waterlogged wood

by Maisie Taylor

Seven pieces of wood were recovered from the waterhole (1/7/A/5).

Catalogue of wood (not illus.)

1. Roundwood (*Sambucus* sp. – elder). Trimmed one end/one direction. L: 470 mm; Dia.: 118 mm. Very fibrous. GU-5714; 3050±60 BP.

2–5. Roundwood – four pieces (Pomoideae). One piece possibly trimmed. Dia.: 70–95 mm. GU-5713; 3260±70 BP.

6. Timber, half split. L: 288 mm; W: 150 mm; Th.: 110 mm.

7. Timber (*Fraxinus excelsior* – ash), half split. L: 512 mm; W: 182 mm; Th.: 79 mm.

With such a small wood assemblage it is difficult to draw any meaningful conclusions. Although Robinson's study (above) of the macroscopic plant remains suggests that trees and shrubs were largely absent from the surrounding landscape, all the wood could have originated in hedges or from regenerated woods or scrub on cleared land. There is evidence for Pomoideae and elder seeds from the waterhole, supporting the idea that the wood originated in the immediate area. The elder trunk is quite large, at 118 mm, but elder grows very quickly, and the fact that the trunk is trimmed hints at continuing clearance of agricultural land. The ash wood is more likely to have been brought in, but, as it is not particularly large, it may have originated in regenerated wood or coppice.

All the wood from the waterhole would have been available locally and, although it could have been used for fences or hurdles, it could also be debris from scrub clearance or hedge cutting. None of the wood is of high quality, and none is large enough or of good enough quality to have derived from buildings. It is most likely, therefore, that the wood just happened to be lying around when the waterhole went out of use and was filled in.

DISCUSSION

Earlier prehistoric activity

The only indication of Neolithic activity in the vicinity is worked flint within some of the fills; no features can be dated to this phase.

The later Bronze Age

Later Bronze Age features make up the main component of the archaeology. They consist of a series of ditches, perhaps forming part of a system of land divisions; several shallower gullies, perhaps either smaller divisions within the larger system of boundaries or slightly later features; a group of postholes, possibly forming a roundhouse; and a possible waterhole.

The waterhole

Features similar to the waterhole, with its stepped side, have been found at other sites within the Thames Valley such as Eight Acre Field, Radley (Mudd 1995), Mount Farm, Dorchester-on-Thames (Barclay and Lambrick 1995) and Yarnton floodplain (Hey in prep.). The Bradford's Brook example was cut below the water table, as is shown by the waterlogged remains in its primary fill, and seems, on the basis of the biological evidence, to have functioned as a well. It seems to have been located near a settlement, in a landscape of grassland with some disturbed ground, possibly arable fields. Its stepped side would have allowed access from the south-east. The limited extent of excavation did not reveal the nature and location of this settlement, but it may have been located to the south-east, possibly on the edge of the gravel terrace. The waterhole could have been for domestic use or have been used to water cattle, as was suggested for the examples at Eight Acre Field (Mudd 1995, 58). Cattle bones dominate the animal bone assemblage at Bradford's Brook as they did at Eight Acre Field, although the assemblage at Bradford's Brook is too small to allow definite conclusions. A cattle-based pastoral economy seems, however, very plausible on the basis of the biological data and the ditched field system, with this waterhole at the junction of the field boundaries.

The middle Bronze Age date for the primary use of the waterhole, established by both radiocarbon determinations and the loomweight, compares well with the radiocarbon date of 1680–1420 cal BC obtained on a piece of wood from a similar waterhole at Eight Acre Field (Mudd 1995, 55), and is only slightly earlier than the dates of 1500–900 cal BC and 1290–820 cal BC obtained on waterlogged material from the substantial waterhole at Mount Farm (Barclay and Lambrick 1995). A second waterhole at Eight Acre Field was, however, somewhat later, dating to 1020–800 cal BC (Mudd 1995, 55).

How long the waterhole at Bradford's Brook remained open after the middle Bronze Age is unclear. If the cattle skull in the upper fill is regarded as being related to its closure, the period would be substantial. An inverted cattle skull placed on top of a small tripartite bowl in the secondary fill of the later of the two waterholes at Eight Acre Field (feature 156, Mudd 1995) may have been associated with a closure ritual. The early Iron Age date of the bowl suggests that the feature at Eight Acre Field was open for only a few hundred years. No bowl or other offering was found with the Bradford's Brook skull, however, and the very much later radiocarbon date of the skull – implying that the feature was open for at least a millennium – suggests that the skull relates to chance reuse of an already long-abandoned, and largely filled, feature. The deposition of the skull may relate more closely to the ritual depositions in waterholes, wells and shafts cited by Webster (1997), which could occur as reuse of a feature after it had dried up or been fouled. Few of these are considered to be much earlier than the Roman conquest.

?A field system

The late Bronze Age gullies and ditches at Bradford's Brook also have parallels at Eight Acre Field where there were hints of middle–late Bronze Age landscape organisation (Mudd 1995, 62). It is clear from other sites in this area of the Thames Valley – such as Mount Farm, Dorchester-on-Thames (Barclay and Lambrick 1995) and Wallingford Road, Didcot (Ruben and Ford 1992) – that field systems begin to appear in the middle Bronze Age (Barclay *et al.* 1996). It is possible that the ditches at Bradford's Brook were contemporary with the waterhole, but remained open into the later Bronze Age. Given the limited extent of excavation, the interpretation of the ditches at Bradford's Brook as a field system can, however, only be tentative.

The post-built structure

The post-built structure is within the size range of, and the postholes are no less uniform than, those in the late Bronze Age settlement at Reading Business Park (Moore and Jennings 1992), The Bradford's Brook example appears to be a very close match for some of the larger and later late Bronze Age structures at Yarnton, where the later posthole groups that form such structures are usually irregular circles, often with one flat side, in contrast to the more regular earlier examples (C Bell pers. comm; Hey in prep.).

At Yarnton the middle and late Bronze Age post-built structures often lie only 30–40 m away from their accompanying waterholes, much closer than the 400 m that separate the Bradford's Brook structure and waterhole. The confines of the road corridor did not allow a large enough area to be excavated to reveal the whole structure at Bradford's Brook, far less any surrounding contemporary features, so it is impossible to take this comparison very far. It nonetheless seems unlikely that these two features were contemporary. On the basis of the pottery found within the probably associated pit 50–1, and as the comparison with the structures at Yarnton suggests, the post-built structure is likely to be late Bronze Age.

Iron Age activity

Although the Iron Age pottery clearly indicates activity in this period, very little can be said about it. It is possible that the waterhole went out of use during the early Iron Age as part of a change in the whole system of land use. Nothing was found during these excavations to indicate that the field boundaries established during the Bronze Age were maintained during this period. Activity could have been centred slightly to the east where abundant Iron Age pottery, animal bones and possible hearths were recorded when a new gas main was constructed in 1948 (Collins 1948–9, 65; although it is possible that this pottery is of late Bronze Age date, see Barclay, Chapter 3). A probable middle Iron Age rectangular enclosure was partially excavated by Moorey (1982) 0.5 km to the east (at SU 603 888).

Roman and later activity

Similarly, little can be said of later periods. The Roman ditches indicate that there was Romano-British activity in the surrounding area as is also suggested by various Roman finds recorded on the county SMR. Given the limited extent of excavation, the quantities of finds suggest that this activity was quite nearby. It could have been focused along the line of the Roman Dorchester–Silchester road which may pass around a kilometre to the west. The ditches were probably part of a system of land division, the nature of which cannot be determined. The major ditch (4/4=54) followed the crest of the ridge, perhaps indicating that it formed a division between separate units on either side of this hill, one to the north-west around Bradford's Brook, and the other to the south-east closer to the River Thames. This large ditch seems to have existed as a depression into the 6th century when it was finally completely silted up.

No more can be said of the Anglo-Saxon period other than that the pottery and glass bead indicate some activity in the vicinity early in the period.

Chapter 7:
Synthesis: The Wider Regional and National Context

by Alistair Barclay, Anne Marie Cromarty, George Lambrick and Mark Robinson

THE EARLIER PREHISTORIC LANDSCAPE

The evidence for earlier prehistoric activity along the route of the bypass is in general ephemeral and in certain cases ambiguous. However, near the point where the bypass crosses the river a number of important Neolithic artefacts have been recovered, including Mortlake-style Peterborough Ware bowls and at least one stone axe (see Chapters 1 and 2). These finds are likely to represent intentional deposits that were placed in the river or at its edge (Holgate 1988a, 88). The line of the bypass also runs between two important monument complexes that are approximately 5 km apart, both of which are located on the east side of the river (see Fig. 1.2): to the north is the cursus monument complex at Benson and to the south is the North Stoke bank barrow/cursus with its associated barrow cemetery (Barclay *et al*. 2003). Other smaller groups or isolated monuments are also known to exist. The cropmark of a middle Neolithic oval barrow is located just to the north of Grim's Ditch (see Fig. 1.2) and a ring ditch of similar date was excavated at Newnham Murren (Moorey 1982).

From the old land surface beneath Grim's Ditch, pottery and flintwork indicate the ephemeral traces of early Neolithic occupation (see Barclay and Bradley, Chapter 5). This material might indicate the presence of more substantial settlement nearby or could simply represent the ephemeral traces of occupation that have been protected by the later earthwork. Similar more substantial scatters have been found elsewhere in the Upper Thames and the location of settlement near the river's edge is not unusual for this region (Holgate 1988a, fig. 6.9). It is possible that the Peterborough Ware, flintwork and animal bone found in one of the evaluation trenches at the west end of Grim's Ditch could represent only a small part of a more substantial spread. This area was sealed by early alluvium and appears to represent a sealed ground surface.

The field survey undertaken along the route of the bypass produced only a small number of flints (see Cromarty and Capel-Davies, Chapter 1) and therefore no evidence for substantial scatters, although the collected flintwork did appear to cluster in two areas, one near Brightwell and the other at Bradford's Brook. The flintwork was of mixed date but included some diagnostic forms such as a small number of scrapers, piercers and a leaf-shaped arrowhead.

Some late Neolithic/early Bronze Age activity is indicated by a Beaker sherd, some flintwork and the radiocarbon dates of 2340–2040 cal BC and 2130–1880 cal BC (95% confidence; OxA-7173–4) on charred cereal grain remains from a posthole beneath the Grim's Ditch bank. It is possible that the charred material, which included emmer, was residual within this feature. But nonetheless it still provides indirect evidence for cultivation at this time (see Chapter 5). It is possible that some of the ard marks found sealed below the earthwork are also of Bronze Age date. There is little contemporary activity from the immediate area other than stray finds. Just to the south, Beaker burials and pits have been found at North Stoke, while within the region there is a growing body of evidence for domestic sites. Most are represented by pit deposits and small-scale surface scatters (Barclay *et al*. 1996, 9).

THE PLACE OF WALLINGFORD WITHIN ITS WIDER CONTEXT

It is now almost 20 years since Barrett and Bradley reviewed the evidence for the later Bronze Age of the Upper Thames region (Barrett and Bradley 1980a) and since their review many new sites have been discovered and some old sites have been reassessed (Barclay and Cromarty in prep.; Miles 1997). This section will attempt to place the later Bronze Age settlements at Whitecross Farm and Bradford's Brook within their wider regional and national context.

It is now acknowledged that the middle Bronze Age (1600–1150 cal BC) represents a period of dramatic social change in which the landscape was transformed by the sudden appearance of field systems, farmstead enclosures and new types of settlement (Barclay *et al*. 1996, 13; Miles 1997). The economy appears to have been one of mixed farming, with a strong emphasis on pastoralism especially cattle rearing (Lambrick 1992, 88). Certainly the appearance of field systems, enclosures and waterholes all point towards intensification of this aspect. The introduction of spelt wheat at this time can be seen as an innovation. Although these developments may well represent intensification, in this region the scale of this change may be less pronounced than elsewhere (eg the Lower Kennet Valley, the Fen edge and Dartmoor).

It is during the middle Bronze Age in the Upper Thames region that coaxial field systems and farmstead enclosures appear for the first time (Lambrick 1992, 86–8 and fig. 29), a pattern that can be traced across much of lowland England. Many of the ritual landscapes that were defined by groups of Neolithic and early Bronze Age monuments had been abandoned by this stage. In the Upper Thames there is some evidence for the reuse of barrows for secondary burial in both the mid and late Bronze Age. However, new monument building is rare, although a small number of cremation enclosures and post circles could belong to this phase. There are also traces of occupation at a number of Neolithic enclosures that range from scatters of material to actual settlement.

In 1972 in a book titled *The Iron Age in the Upper Thames Basin* Harding was only able to mention a handful of late Bronze Age sites, none of which was substantial. The site at Whitecross Farm, Wallingford – despite its finds of Bronze Age metalwork and pottery that was assumed at the time to be Iron Age – received little comment. The next review of the evidence came with Barrett's seminal paper on 'The pottery of the later Bronze Age in lowland England' (1980) and with Barrett and Bradley's paper discussing 'The later Bronze Age in the Thames Valley' (1980b). At the same time work by Hinchliffe and Thomas at Appleford (1980) and by Hingley at Wittenham Clumps (1979–80) was also identifying late Bronze Age sites. Aspects of the settlement at Whitecross Farm were reviewed in the 1980s (Barrett 1980; Thomas *et al*. 1986), while Thomas also published an article on Bronze Age metalwork from the Thames at Wallingford (1984).

Prior to the 1990s many of the accounts of prehistory such as Harding (1972) had been based on evidence (cropmark survey, field survey and excavation) that was recovered from the Second Gravel Terrace. Settlement patterns built around this evidence therefore had an inherent bias, as it is now realised that much of the earlier prehistoric settlement is concentrated on the lower lying First Gravel Terrace.

Since 1980 many new later Bronze Age sites have been discovered (Miles 1997) and this number is likely to increase as gravel extraction moves on to the lower lying areas of First Gravel Terrace. Ongoing large-scale excavations at Yarnton, Oxfordshire and Shorncote, Gloucestershire are revealing two, somewhat similar, landscapes characterised by open settlements, waterholes, pits and occasional fencelines (Gill Hey pers. comm.; Hearne and Heaton 1994). The sites at Yarnton are generally small-scale and dispersed over an area of First and Second Gravel Terrace that extends for almost 1 km adjacent to the modern course of the River Thames. Further to the west of Yarnton other contemporary sites have been found at Mead Lane, Eynsham and beneath the remains of the Saxon minster at Eynsham (Barclay *et al.* 2001; Miles 1997, 10). A series of excavations around Lechlade are revealing traces of a probable late Bronze Age field system and other ephemeral traces of settlement and burial (Jennings 1998; Allen *et al*. 1993).

In the Upper Thames region most evidence for middle Bronze Age settlement has been found on the gravel terraces, in particular the lower lying First Gravel Terrace. These settlements and their associated field systems and enclosures are generally small-scale in comparison to other areas of the Thames Valley such as the Lower Kennet Valley and the Middle Thames Valley (Yates 1997). Middle Bronze Age settlement is characterised by waterholes, open settlement, occasional enclosures and field systems. Other elements in the cultural landscape include burnt mounds and spreads. The settlement distribution for the Oxford region of the Upper Thames is illustrated in Figure 7.1. This reveals that many of the so-called field systems occur to the south of Abingdon, while finds of metalwork are more widespread, but that the two distributions, especially hoards, appear to be complementary.

For this area, Corporation Farm, just to the south of Abingdon, remains the only convincing and substantial example of an enclosed farmstead (Shand *et al*. 2003). The site developed next to a small barrow cemetery and this position could have been intentional. The site, with its complex of enclosures, associated Deverel-Rimbury pottery, evidence for textile production and with a series of ritual burials and deposits involving human and animal remains, has similarities with sites found elsewhere in lowland England (Brück 1995; Barrett and Bradley 1980a). So far the only other site in this region of a similar character is the settlement that was excavated at Eight Acre Field, Radley, 10 km to the north-west (Mudd 1995). Also of this date are a number of field systems most of which are located in an area extending from Abingdon down to Wallingford. Their distribution has been mapped by Yates (1999) and it seems likely that further examples will be discovered.

The most extensive field system is the one recorded at Dorchester-on-Thames, which consists of a network of coaxially arranged single, double and triple ditches (Bradley and Chambers 1988; Whittle *et al*. 1992). One of the ditches produced approximately half of a middle Bronze Age Bucket Urn (Whittle *et al*. 1992, 160). These ditches are arranged with their main axis NW–SE and with paired ditches running NE–SW. The ditches cut the earlier cursus in at least four places along its entire length. The system can be traced as cropmarks to the north of the cursus, while at Mount Farm 1.5 km away similar ditches have been found (Barclay *et al*. 1996, 13 and fig. 4). It is argued that the double ditches did not necessarily act as droveways but rather contained central banks, while the general shallowness of the ditches could indicate that fences or hedges were placed on the banks if they were to act as any form of stock control or barrier.

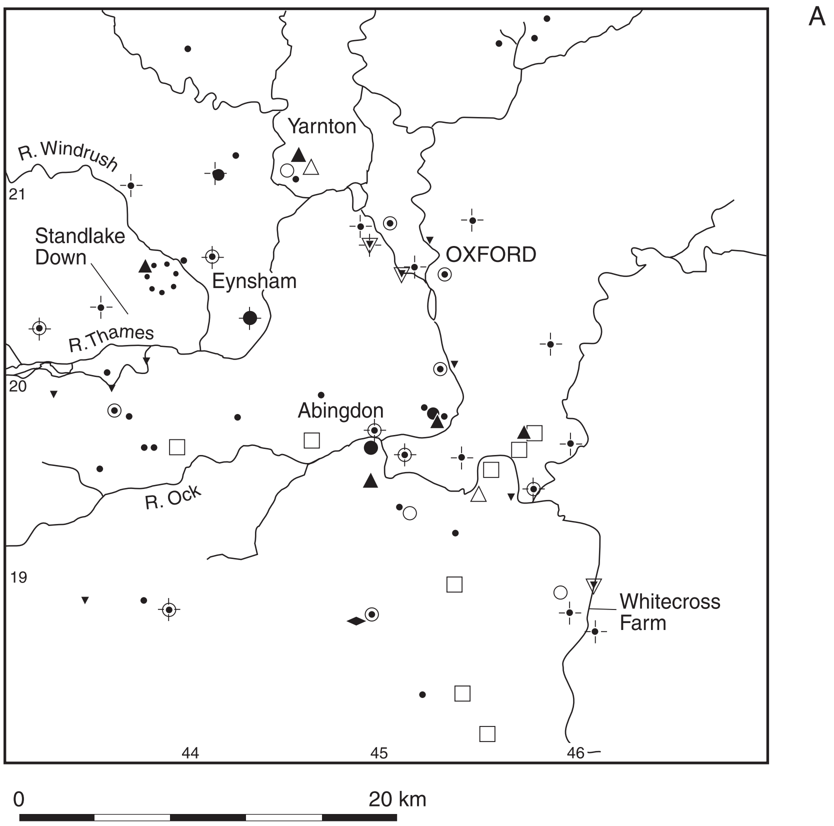
As at Corporation Farm the ditches at Mount Farm were aligned on an earlier barrow and they were possibly associated with a waterhole and burnt spread. At Dorchester-on-Thames the main axis of the field system appeared to share the same orientation as a massive henge monument (Bradley and Chambers 1988, fig. 3). It is not possible to say whether the field systems recorded at Mount Farm and at the site of the Dorchester cursus were physically linked as much of the area in between has been extracted for gravel, although this seems very likely (Benson and Miles 1974, fig. 18). It is possible that the ditches recorded at Bradford's Brook belonged to a similar type of field system, although the evidence for their dating to this period is slight and tenuous (see Chapter 6). Another feature at Bradford's Brook was the waterhole 1/7, and this may have related to the same broad phase of later Bronze Age settlement. While the ditches cut the higher ground, this feature was found on low-lying ground not far from the present course of Bradford's Brook (see Figs 6.1–3). Deposits from the base of the waterhole are associated with two radiocarbon dates (GU-5713–14: see Chapter 6; Table A1.1) that indicate a middle or transitional mid–late Bronze Age date. Robinson's report on the insects (see Chapter 6) suggests that the waterhole was located within an open landscape perhaps made up of grassland and some disturbed ground and indicating that both arable and the grazing of animals was taking place. He also concluded that settlement could have been located nearby. Similar results were obtained from a waterhole of similar date at Eight Acre Field, Radley (Parker 1995, 52). However, the results from Bradford's Brook confirm the existence of an organised agricultural landscape by the end of the middle Bronze Age.

Much of the evidence recovered from the albeit limited and confined excavations at Bradford's Brook indicates that further and perhaps more substantial traces of later Bronze Age occupation are likely to exist in this area.

One other interesting feature of this waterhole was the recovery of intentional deposits, which have been discussed in Chapter 6; their wider context is discussed here. These deposits can range in date from late Bronze Age through to Roman and can involve a variety of materials. The Bradford's Brook waterhole contained two such deposits: a complete loomweight from the base and a cattle skull from the top. The radiocarbon dating indicates that the waterhole was dug in the mid–late Bronze Age and if the two dates are taken at face value then it was in existence before the settlement on the eyot at Whitecross Farm. There is little evidence to suggest when the waterhole went out of use and this may well have been gradual. The small size of the complete cylindrical loomweight makes it perhaps more likely to date to the early part of the late Bronze Age (see Barclay, Chapter 6). Items of weaving equipment are sometimes found at the bottoms of later Bronze Age waterholes, often only single items rather than a range of related objects. Other finds from waterholes in the Upper Thames Valley include quernstones, pots and human remains. Often occurring in isolation these items could have been deliberately deposited in a similar way to those single objects that were sometimes placed on the bases of Iron Age pits. This practice falls within the category of votive deposition in watery places that has been illustrated and described by authors such as Bradley (1990). Other more complex deposits sometimes occur and these can be associated with the blocking or decommissioning of these features. At Eight Acre Field, Radley, one of a pair of waterholes had a deposit of animal bone and pottery placed within it, while at Yarnton a waterhole was packed with worked timber and animal bone (Mudd 1995, 58; Gill Hey pers. comm.). Such deposits are more than just rubbish. The one at Eight Acre Field, Radley had clearly been structured. At Yarnton the worked timber included a broken wooden bowl and underneath this was the skull of a fox.

The blocking of these features could have signified more than just the deliberate closure of a waterhole. Some clearly went out of use during the late Bronze Age and early Iron Age, at a time of social change during a period of general settlement abandonment and shift on to the higher Second Gravel Terrace. The waterhole at Bradford's Brook appears to have been abandoned, but not blocked. That the position of this feature somehow remained in folk memory, or that the feature was recognised, possibly marked in some way and reappropriated, can be suggested by the placing of a cattle skull into what had become by the end of the Iron Age little more than a silted-up hollow. This practice of placed deposits belongs to a wider pattern of ritual or structured deposition that can be recognised at settlement sites and at natural places. One type of material that is seldom found in waterholes is metalwork, despite its abundant recovery from rivers and other wet places.

The suggestion that the enclosed landscape at Bradford's Brook is linked with the settlement on the eyot at Whitecross Farm is strengthened by the finding of late Bronze Age pottery from a pit (see Chapter 6). While the organised landscape at Bradford's Brook appears to have had its origins in the middle Bronze Age, the occupation on the eyot seems to have begun perhaps no earlier than the 10th century BC. There is little evidence for middle Bronze Age Deverel-Rimbury associated activity from around the site, other than metalwork recovered from the river (Northover, Chapter 3; Thomas 1984). The nearest settlement activity to here comes from Didcot (Ruben and Ford 1992) some 7 km to the west and from ongoing excavations at Appleford Sidings in approximately the same area (Paul Booth pers. comm.). At both sites Deverel-Rimbury pottery was associated with linear ditches that could indicate coaxial field systems and/or enclosure ditches. In general there would appear to be a concentration of domestic sites in the Abingdon/Dorchester area, although at present it is unclear whether this pattern is simply a reflection of where mineral extraction and development have taken place.



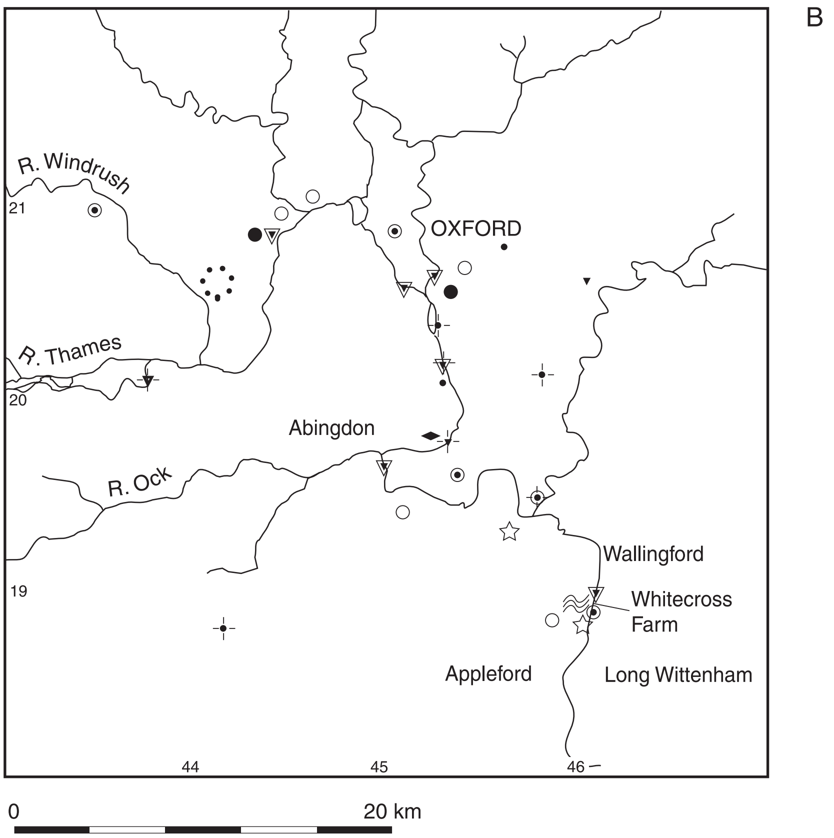


Figure 7.1 Metalwork, settlement and funerary distributions – a: middle Bronze Age, b: late Bronze Age

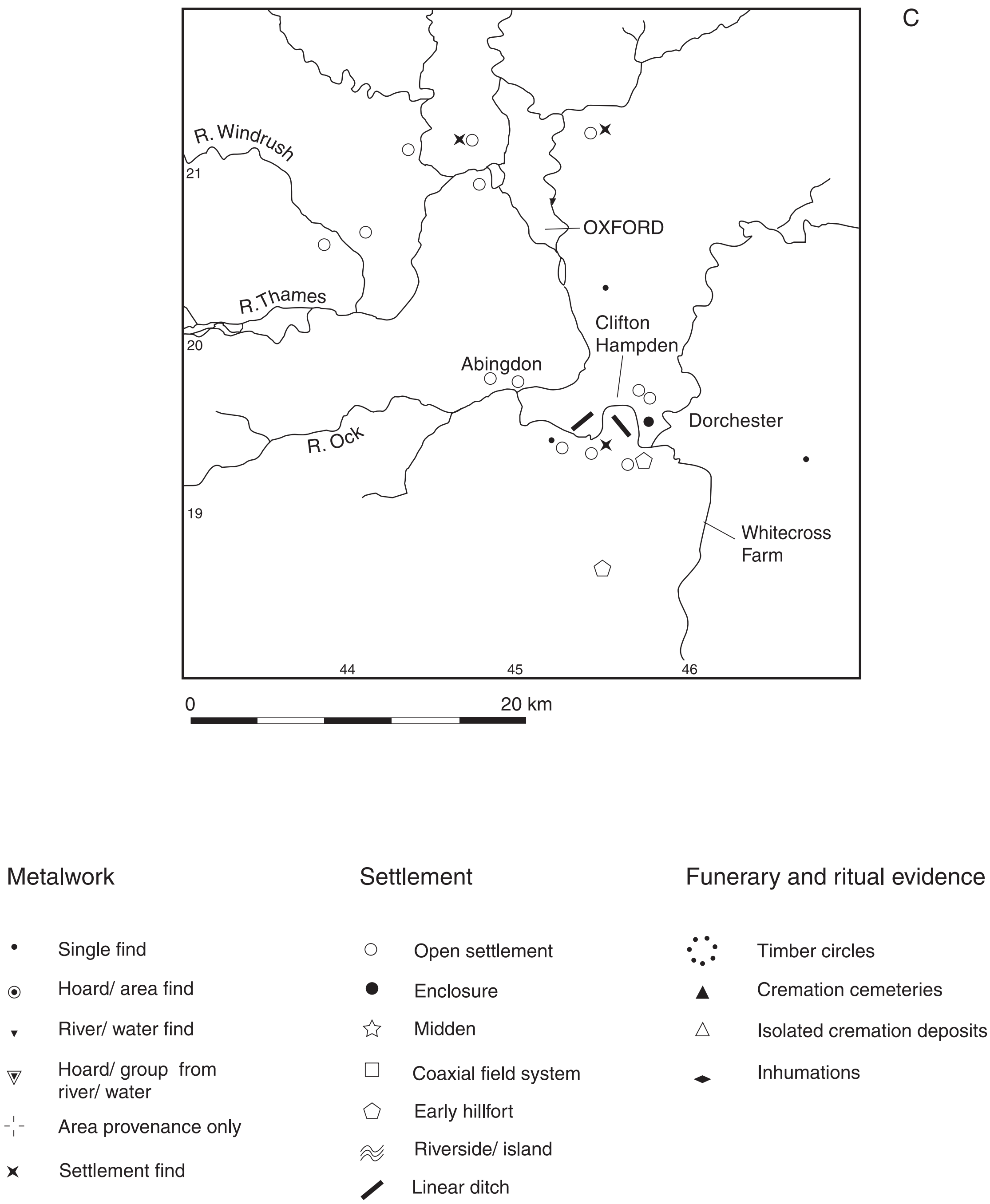


Figure 7.1 (continued) Metalwork, settlement and funerary distributions – c: late Bronze Age/early Iron Age?

As well as settlement activity within the region there is also a growing body of evidence for later Bronze Age funerary and ritual (see Fig. 7.1a–c). Within the barrow cemetery at Standlake Down it is possible to reinterpret one of the ring ditches as a possible later Bronze Age ceremonial monument (Catling 1982). Site 20 was a ring ditch or barrow that was surrounded by a probable post circle. It is possible that the post ring and ditch are not contemporary, but that the ring was added at a later date, perhaps during the middle Bronze Age. Pottery was recovered from the ditch that was originally reported as Iron Age but is in fact middle Bronze Age (ibid., fig. 58.24–6). The same barrow cemetery also contained a massive Deverel-Rimbury cremation cemetery (Akerman and Stone 1857; Riley 1946–7). At Gravelly Guy, Stanton Harcourt another post or pit circle of pre-Iron Age date was discovered underneath an early Iron Age settlement (Barclay 1995, 88; Lambrick and Allen 2004). The post ring is of pre-Iron Age date and its entrance appears to align on what was perhaps the largest of the early Bronze Age barrow mounds (George Lambrick pers. comm.). Again it seems likely that the site is of later Bronze Age date. Secondary middle Bronze Age cremation deposits were found at a number of barrows, while part of a Bucket Urn was deposited in the silted ditch of the Devil's Quoits henge (Barclay 1995). A further possible site has also been identified near the cemetery at Barrow Hills, Radley (info. RCHME).

Apart from Standlake the evidence for middle Bronze Age cremation cemeteries tends to be small-scale and often secondary within pre-existing barrows. At Barrow Hills, Radley secondary cremation deposits were added to barrows near the periphery of the barrow cemetery (Barclay and Halpin 1999). Barrow Hills provides a good example of how the landscape was divided up during the middle Bronze Age. The barrow cemetery was constructed along the edge of the higher Second Gravel Terrace, while to the south on the lower lying First Gravel Terrace could be found the later Bronze Age settlement at Eight Acre Field (Mudd 1995). This settlement had its beginnings in the middle Bronze Age and appears to have gone out of use by the start of the Iron Age. The deposits found in the waterhole that included early Iron Age pottery perhaps signify deliberate decommissioning of the waterhole and settlement. In comparison, secondary cremation deposits, inhumations and at least one animal burial were added to the early Bronze Age barrows. Other finds of Deverel-Rimbury and post-Deverel-Rimbury pottery were found at some of the barrow ditches and from at least one pit (Barclay and Halpin 1999).

Around Eynsham and Yarnton middle Bronze Age settlement is represented mostly by small-scale open settlement (see Fig. 7.1a). At Yarnton settlement is characterised by pit deposits, roundhouses and related structures, burnt spreads and waterholes. The late Bronze Age settlement follows a similar pattern with slight evidence for settlement shift. However, large-scale nucleated and/or defended settlements, such as ring works, are notably absent. Excavation has indicated that most of the settlement at Yarnton was located on the First Gravel Terrace. There is the suggestion that a Neolithic long enclosure was reused for settlement during the late Bronze Age, although the activity is again small-scale (Gill Hey pers. comm.).

The evidence for the mid–late Bronze Age transition (*c* 1200–1100 BC) and for the start of the late Bronze Age is elusive within the Upper Thames region (Fig. 7.2), a situation that is perhaps common across many areas of lowland England (see Barrett 1980). So far only a few sites can be demonstrated as belonging to this phase. A number of sites have been identified in the Eynsham/Yarnton area. At Eynsham Abbey a probable ?Neolithic enclosure was reused for settlement during the start of the late Bronze Age, while at Mead Lane, Eynsham a possible open settlement of this date is known to exist (Barclay *et al.* 2001.; unpubl. info.). The traces of mid–late Bronze Age settlement at Mead Lane, Eynsham (Miles 1997) consisted of mostly unenclosed features and at least one burnt mound or spread.

At Yarnton elements of the later Bronze Age landscape that belong to this phase include at least one house structure and a number of pits (Gill Hey pers. comm.). Away from the gravels the only other site that developed during this phase is the enclosure at Rams Hill (see Fig. 1.1; Needham and Ambers 1994). On and around the gravel terraces most late Bronze Age settlement belongs to the early 1st millennium BC (see Fig. 7.2).

Settlement during this later phase of the late Bronze Age takes a variety of forms. The Whitecross Farm eyot settlement is characterised by a midden and a midden-like occupation spread. It was suggested in Chapter 2 that middens were placed near the edge of the eyot and that occupation debris was allowed to accumulate across the southern half of the island. The northern area could have been kept clean and this area could have been reserved for human habitation. The reconstruction of the site (see front cover) is just one interpretation of how such a settlement might have appeared. However, excavation on three separate occasions has failed to produce any convincing evidence for post-built structures apart from a few isolated postholes. Despite this, there is plenty of indirect evidence. While it is not improbable that rubbish was brought to the eyot either along the river or from the surrounding area, this does seem somewhat unlikely. The charred timbers and probable wattle, possible hearthstones and refired pottery from basal silts in the channel could have come from a demolished building. Robinson notes in Chapter 4 that some of the beetles found in samples taken from the edge of the eyot favour certain types of decaying organic matter and therefore could be taken as indicators for the former presence of manure, material from byres and crop-processing waste. Interestingly the insect remains provide evidence only for the type of refuse that accumulates around settlements rather than any actual evidence for buildings. Again the hypothesis can be made that the buildings were located in the northern part of the island where less excavation has taken place.

The character of the settlement on the eyot has been described in detail in Chapter 2, while parallels for this type of site can be found elsewhere along the River Thames at Runnymede and perhaps also at Bray.

The activities that took place on the eyot have been described in Chapter 2. There is by the nature of the site more evidence for consumption than production. What evidence there is for artefact production all derives from secondary contexts of deposition with no evidence for *in situ* working.

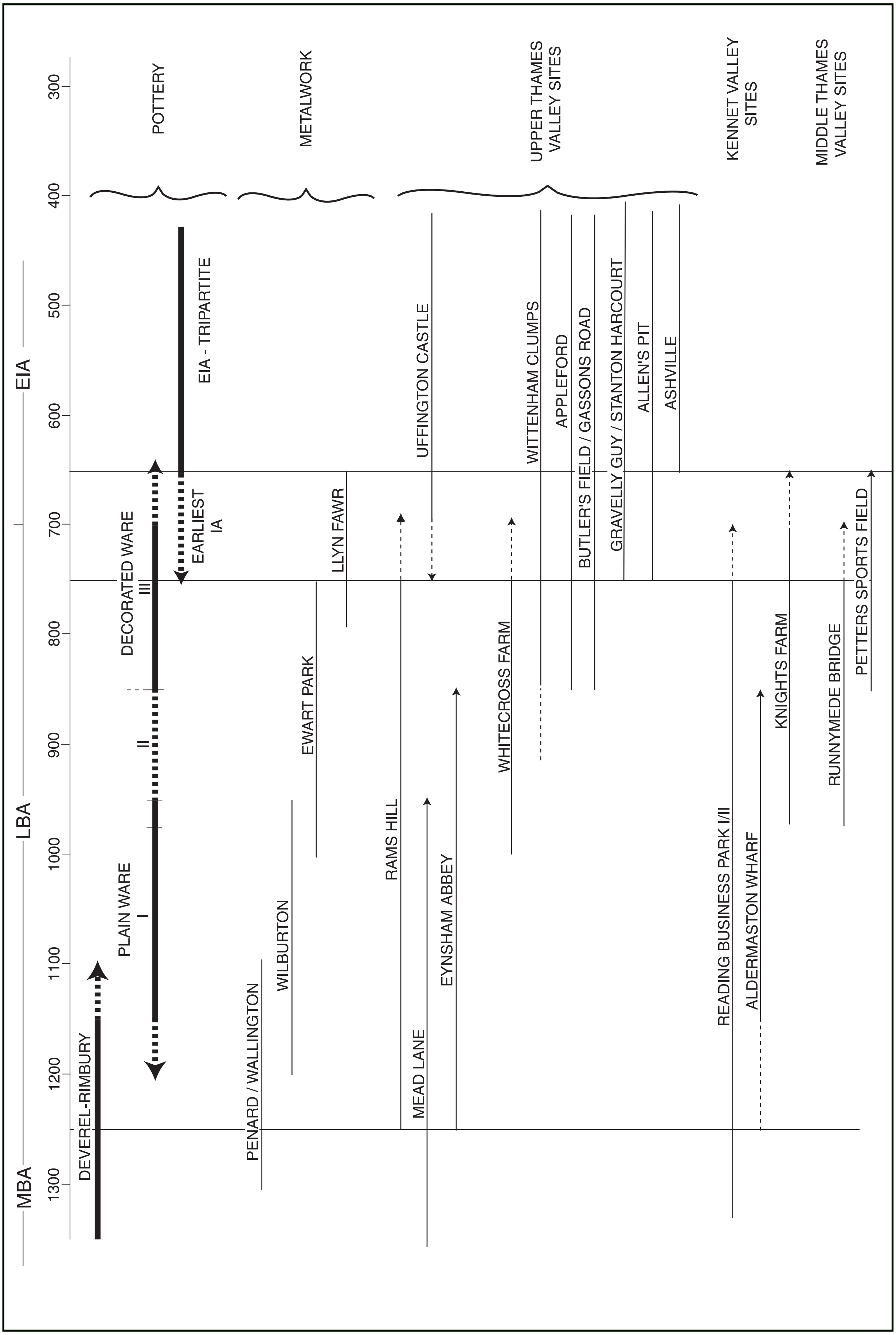


Figure 7.2 The development and sequence of pottery styles, metalwork and selected settlements in the Upper and Middle Thames Valley and the Lower Kennet Valley

Some of the metalworking debris included fragments of sheet and wire as well as an ingot fragment that might indicate at least the melting of bronze. The recovery of broken bronzes (eg sickles) also indicates the curation of scrap metal on the island. The presence of refired or overfired sherds, vein quartz and quartzite pebbles could all indicate pottery production, although the evidence is slight. No *in situ* flint knapping was recorded, although the waste from flintworking was present. Brown and Bradley (see Chapter 3) note that much of the waste material came from the southern part of the island. Apart from the production of the actual flint tools on the island, Brown and Bradley's use-wear data also provide an insight into other production activities in which flint tools were used. Although this type of analysis cannot be used to specifically identify what material was being worked, it is possible to make the suggestion as to what type of activity is represented and some of these tools could have been used for leatherworking and for woodworking.

Although waterlogged wood was preserved at the site, there was little evidence that extensive woodworking had taken place, although it must be remembered that proportionally very little of the channel deposits where such information could be recovered were excavated. Wood was certainly used on the site for making a variety of structures, and the evidence points to some degree of woodland management.

The recovery of a small number of spindlewhorl fragments from the earlier as well as the OAU excavations provides only slight evidence for textile production. The absence of loomweight fragments could be taken to indicate that the production of textiles was perhaps not a significant activity, a point that is also supported from the analysis of the animal bone (see Powell and Clark, Chapter 4). Powell and Clark note the similarities in the proportion of the three main domestic species (cattle, pig, sheep/goat) between Whitecross Farm, Runnymede and Potterne. They note that the high proportion of pig and juvenile sheep indicates meat consumption and that this could be a reflection of the site's suggested high status. For the region the proportion of pig and the age profile of sheep found at Whitecross Farm are significantly different to what is then found on Iron Age sites. The wider implications of the environmental analysis are discussed in detail by Robinson who notes the strong similarity between Wallingford and Runnymede (see Chapter 4).

The appearance of midden sites as a phenomenon of the late Bronze Age has been discussed by a number of people (Brück 1995; Needham and Sørensen 1988; McOrmish 1996). In north Wessex and the Thames Valley a number of midden sites have been identified and all appear to belong to the early 1st millennium BC. Apart from Whitecross Farm only one other site has been identified in the Upper Thames region, the Castle Hill hillfort at Wittenham Clumps (see Fig. 1.1; Hingley 1979–80). The contrast between these two localities is significant. The Whitecross Farm midden was placed on an island or eyot within the Thames, while the midden at Wittenham Clumps was placed on one side of a prominent hill that is a distinct landmark. At the latter site the origin of the midden could have predated the construction of an early Iron Age hillfort, although in a secondary phase it appears to have been contemporary. Wittenham Clumps has a number of parallels in Wessex, while Whitecross Farm has close affinities with the riverside sites at Runnymede and probably Bray (Needham 1991; Wymer 1960).

Hingley has compared the position of the midden at Wittenham Clumps in relation to the hillfort enclosure with other sites in southern Britain and noted the preference for a westerly or south-westerly slope (1979–80, 54 and fig. 17). The same point is made by McOrmish who also notes the occurrence of middens within enclosures (1996, 74). At Wittenham Clumps the midden is thought to have a linear spread of approximately 300 m. Other sites in north Wiltshire, such as East Chisenbury and Potterne, could have been on a similar scale. Many of the Wessex sites appear to belong to – or have their greater phase of development during – the late Bronze Age/Iron Age transition or earliest Iron Age, although some such as Potterne appear to have earlier beginnings (McOrmish 1996; Lawson 1994, 43). Within the Upper Thames region and just 3 km west of Castle Hill is the enigmatic site of Wigbalds Farm, Long Wittenham which is located on gravel terrace (Savory 1937). This site consisted of a large shallow rectangular pit some 6 m x 5 m that had been filled with occupation debris. Associated with this pit was an occupation layer that could be traced for *c* 8 m. Finds included pots that appeared to be broken *in situ* and animal bone, while small finds included an axe-pendant, a fragment of a bronze fitting, a crucible and a spindlewhorl. The pottery is similar to the earliest Iron Age assemblage from Castle Hill (ibid., fig. 2).

Both sites fitted into a pattern of generally small-scale open settlement. At present more is known about the variety of settlement than the overall organisation. Late Bronze Age landscapes or concentrations of sites have been found in a number of areas. For instance there are a number of sites along the gravel terraces between Wallingford and Abingdon, although most are small-scale (see Fig. 7.1b). Further upriver there is another concentration of sites in the Eynsham/Yarnton area. In the Oxford region finds of contemporary metalwork have a very similar distribution to that of settlement.

Between Abingdon and Wallingford many of the traces of late Bronze Age settlement are small-scale and some sites are represented by no more than isolated findspots or features or groups of features such as the pits at Appleford (Hinchliffe and Thomas 1980, 35). In this area the organised field systems and enclosures could all belong to the middle Bronze Age with the possible exception of Eight Acre Field, Radley (Mudd 1995), although even here the date of the site is ambiguous because it contained very little artefactual evidence, and its layout, which has more than one phase, could have evolved over the later Bronze Age.

The eyot settlement at Whitecross Farm appears to have gone out of use before the start of the Iron Age. There is little evidence for settlement continuity at this time and so far most of the evidence that has been recovered points to settlement shift, with many of the early Iron Age settlements being located on the Second Gravel Terrace. This is clearly seen at Yarnton and could explain a simple reason why so little later Bronze Age settlement has been recorded at other sites on the Second Gravel Terrace. Many of the early Iron Age settlements – such as Ashville, Abingdon – appear to have their origins perhaps at a time after sites like the Whitecross Farm eyot had gone out of use (see Fig. 7.2). At other sites such as Yarnton it is possible to recognise the beginnings of settlement on the Second Gravel Terrace at a slightly earlier stage that might indicate some overlap with the final use of some late Bronze Age settlements, although it must be stated that this earliest Iron Age activity is perhaps on a much smaller scale. A similar early phase of activity may also be present in the Stanton Harcourt area (see Fig. 1.1) and again was represented only by a single pit group and redeposited finds of pottery (Lambrick and Allen 2004).

The distribution of Iron Age settlements with potentially early material is given in Figure 7.1c. At the same time new land divisions appeared. These took the form of massive linear earthworks that tend to cut off loops of the Thames. Two occur in the Oxford region at Clifton Hampden and Northfield Farm near Dorchester, while other examples have been found at Lechlade (see Fig. 1.1; Allen *et al*. 1993; Barclay *et al*. 2003; Jennings 1998, 33).

The early Iron Age is marked by a general, major shift in settlement location on to a higher gravel terrace that would perhaps be a better area for cultivation, and by the appearance of farming sites that are clearly organised around crop production and storage (Lambrick 1992, 88).

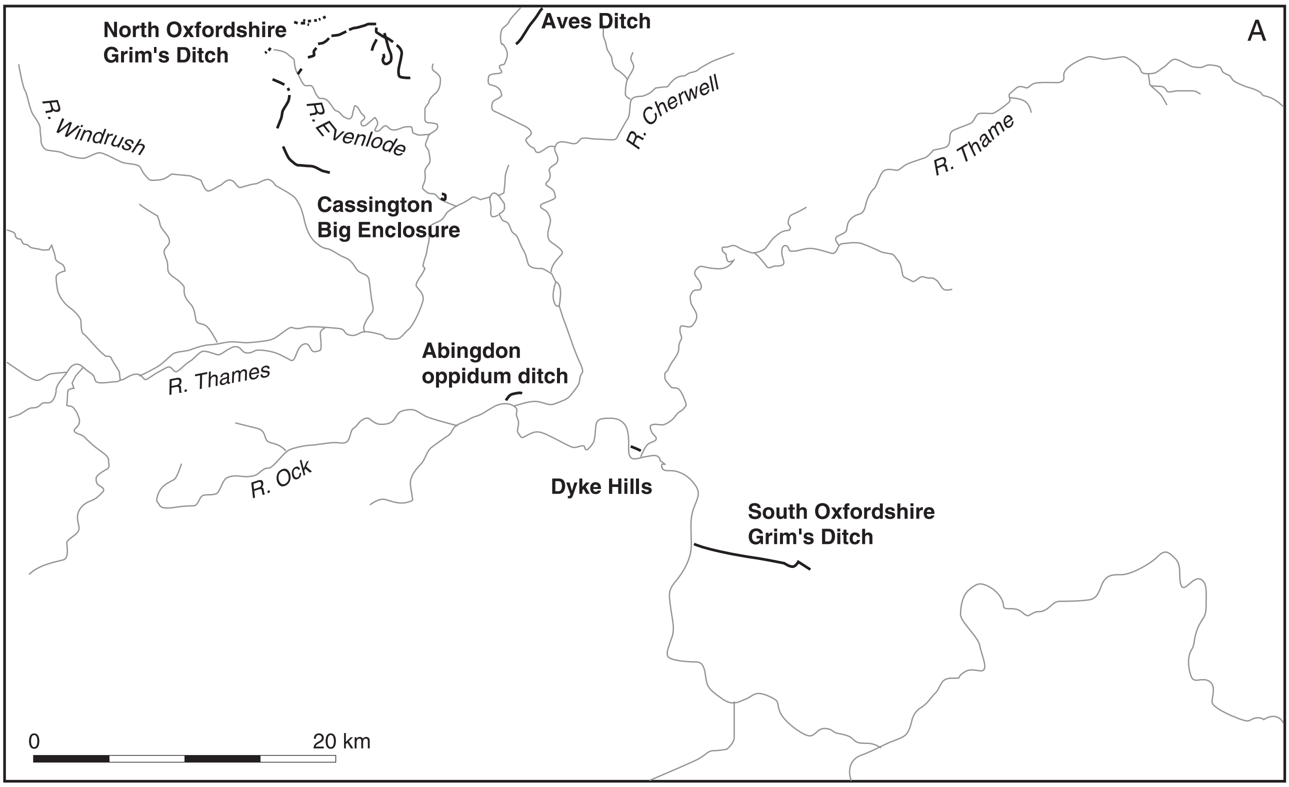
Along the route of the Wallingford Bypass there is little evidence for Iron Age activity before about the 1st century BC. Some of the pottery at Bradford's Brook could be of middle Iron Age date, but most of the associated features were found to be of a later date (see Chapter 6). To the north of Bradford's Brook are the excavated rectilinear enclosures at Newnham Murren that contained middle Iron Age pottery and animal bone (Moorey 1982, 59). Otherwise Iron Age settlement in the immediate area is on present evidence quite sparse with many of the known settlements occurring upriver.

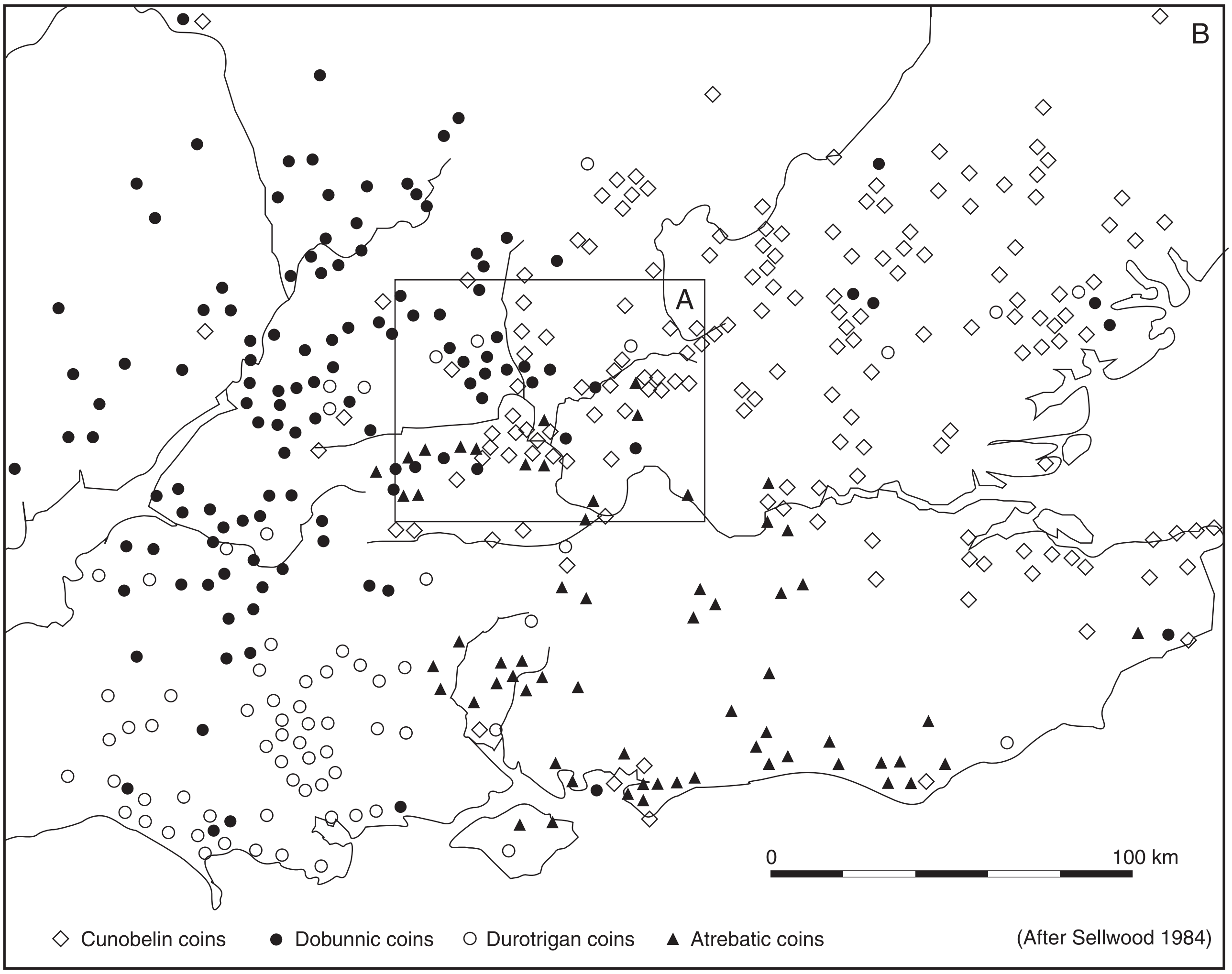
GRIM'S DITCH AND THE DEVELOPMENT OF THE HISTORIC LANDSCAPE

The late Iron Age landscape of the Upper Thames is one of change, and in the more eastern area around Abingdon and Dorchester it appears to have been more dramatic and rapid. From about 100 BC new settlements appear. There are major new settlements along the Thames, some of which – such as Abingdon and Dyke Hills – can be described as oppida, while other lesser sites are known, such as the Big Enclosure at Cassington (Fig. 7.3a; Case 1982b). The emergence of new settlement types and changes to the pre-existing settlement pattern reflect wider sociopolitical developments caused by the influence of the Roman Empire on much of south-east England. At this time the River Thames probably became both an important trade route to the south-east and a tribal boundary. The eastern part of the Upper Thames sat probably on the outer margin of this area. Sellwood has used the numismatic evidence to suggest boundaries between the tribal groups of the Dobunni, Atrebates and the Catuvellauni (1984). The interpretation of such data will always be problematic, but the complementary distribution of other lines of data do strengthen her hypothesis that these represent some form of ethnic groupings.

The coin distributions seem to respect the course of the River Thames, indicating that the river may well have functioned as a boundary (Fig. 7.3b). The symbolic and political importance of the Thames is well recognised (Bradley 1990), and this was certainly the case during the Iron Age (Fitzpatrick 1984). Fitzpatrick notes the recovery of ironwork and coins from the Thames; the explanation that at least some this is the product of votive deposition, perhaps linked to some form of public ceremony, seems plausible. The placing of new enclosed nucleated settlements of massive proportion – such as Dyke Hills and perhaps Abingdon – near the Thames support the river's role as an important economic link for the distribution of goods. Little is known of Dyke Hills, although a number of excavations have taken place at Abingdon. Dyke Hills is really only known as an earthwork and details of its interior have been revealed by aerial photography (Hingley and Miles 1984, fig. 4.9; Allen 1938, 170 and pl. XVIII).

It has been suggested that the settlement at Dyke Hills represents a tribal centre (Cunliffe 1991, 131 and fig. 7.2). Certainly the size and apparent complexity of the site indicate a massive nucleated settlement of 47 ha (Miles 1997, 16). The oppidum was placed so as to make use of a major bend in the River Thames and its confluence with the River Thame. Abingdon was similarly situated at a major bend in the river and at the confluence with the River Ock (ibid., fig. 3), while the much smaller Big Enclosure at Cassington was situated at the confluence with the River Evenlode (Case 1982b). Little is known of the site at Dyke Hills since only small-scale excavation has taken place, although the


A
North Oxfordshire
Grim's Ditch
Aves Ditch
R. Windrush
R. Evenlode
R. Cherwell
R. Thame
Cassington
Big Enclosure
Abingdon
oppidum ditch
R. Thames
R. Ock
Dyke Hills
South Oxfordshire
Grim's Ditch
0
20 km


B
A
0
100 km
Cunobelin coins
Dobunnic coins
Durotrigan coins
Atrebatic coins
(After Sellwood 1984)

cropmark evidence indicates that the interior contains quite dense settlement features. The smaller enclosure (only 8 ha) and possible oppidum at Abingdon have been revealed in a series of excavations undertaken by OAU (Allen 1997, 50 and figs 2–3). Like Dyke Hills it also seems to have contained dense areas of occupation. Study of the artefacts found at Abingdon indicates trade links with the south-east (Tim Allen pers. comm.).

The location of the south Oxfordshire Grim's Ditch earthwork also makes sense within this picture of political geography (see Fig. 7.3). The regional context and function of Grim's Ditch have been discussed in Chapter 5. As already mentioned, its purpose could have been to mark the edge of a territory or boundary between the Catuvellauni to the north and the Atrebates to the south. The suggestion that it was designed to cut off a significant loop of the River Thames between Wallingford and Henley-on-Thames (a distance of *c* 16 km; see Fig. 1.1) has yet to be established as its course can only be traced as far as Nettlebed, *c* 9 km east of Wallingford. Bradley was sceptical that it had continued as far as Henley-on-Thames (1968, 2–4), while the placing of the ditch to the south meant that it was designed to prevent movement from this direction. Its many similarities with Aves Ditch in north Oxfordshire have been discussed in Chapter 5; the two may have served the same basic function as tribal boundaries (see Sauer 1999, 268). Sauer has also suggested that the north Oxfordshire Grim's Ditch may have been created for this function and not, as previously thought, as a large oppidum (ibid., 269). He argues that in Oxfordshire the territory of the Catuvellauni was defined by Aves Ditch to the north and Grim's Ditch to the south. In between, the River Thames acted as a territorial marker as far as the Evenlode confluence. To the north of here the territory crossed the Cherwell and was defined by the north Oxfordshire Grim's Ditch. This particular interpretation would also fit with the general distribution of enclosed nucleated settlements. It would place both Cassington and Dyke Hills on the side of the Catuvellauni, while the 'oppidum' at Abingdon would occupy a similar position in an opposing territory perhaps controlled by the Dobunni.

Whatever the function of the south Oxfordshire Grim's Ditch, there is little evidence that it was ever slighted, but rather was abandoned and simply went out of use. The date of its construction is still ambiguous, although the results of the 1992 excavations indicate a date perhaps within the late Iron Age. Once created it is unclear on what scale the earthwork was maintained. There is evidence for recutting of at least sections of the ditch, and the recovery of early Roman pottery and the probable dog burial indicate subsequent activity into at least the late Roman period. If the accepted date for the earthwork construction is within the 1st century BC or sometime later, then initial use may have lasted no more than a few decades, although subsequent Roman activity indicates that some importance was still attached to the earthwork.

THE ROMAN LANDSCAPE

There is little evidence for Roman activity in the immediate area of Grim's Ditch or from the adjacent west side of the river. Roman pottery was found at all the excavated sites but only in relatively small quantities.

Of interest are the two animal bone deposits that hint at ritual activity and structured deposition. One is the probable dog burial of late Roman date from Grim's Ditch and the other is the late Iron Age/early Roman cattle skull from the silted-up Bronze Age waterhole at Bradford's Brook. Philpot has discussed the occurrence and relationship of animal burials with that of humans (1991). It is possible that the dog burial at Grim's Ditch was an isolated occurrence. Its position near the base of the ditch – which at this point was some 2.5 m in depth – rather than the bank could hint at some form of ritual offering and that the earthwork still held some significance as a boundary marker. The placing of the cattle skull in the much silted-up waterhole is intriguing. It seems unlikely that the feature retained any long-term meaning and the occurrence of place deposits in both the late Bronze Age and then the Roman period may be little more than coincidental. Votive deposition in wet places was a common practice in both periods but these acts are not necessarily linked by the same ritual traditions (see Webster 1997).

Most of the evidence from the area of the bypass relates to rural activity. The area to the immediate north of Grim's Ditch was being intensively cultivated during this period and it is possible that the area of the eyot was also ploughed at this time. There were also field ditches at Bradford's Brook associated with both early and late Roman pottery.

There is little evidence for substantial Roman settlement in the area around Wallingford. Numerous Roman finds have been found within the western part of the Saxon walled town and to the west of here (Airs *et al*. 1975, 155). The historian J K Hedges mentions some 1500 coins as coming either from Wallingford or from within a 6 mile (10 km) radius (Dewey and Dewey 1977). However, they note that the collection of coins was broken up upon the death of the owner, W R Davies. So far no structural evidence for Roman settlement has been found, and in general with the exception of the coins Roman evidence remains relatively slight. The

Figure 7.3 (opposite) a: Late Iron Age earthworks, b: Distribution of Cunobelin, Dobunnic, Durotrigan and Atrebatic coins (after Sellwood 1984) fact that the Roman road that ran between Dorchester and Silchester passes to one side of Wallingford might be an indicator that any settlement was minor, while Wallingford itself could have been a river crossing.

Near Wallingford minor settlements are known from an area to the north, and near North Stoke is the site of a probable villa (Young 1986, map 9). In general, Roman settlement appears to be concentrated in the areas of Dorchester and Abingdon some 7–15 km further north (ibid., 60 and map 9).

THE POST-ROMAN EARTHWORK

The present excavations found little evidence for either Saxon or medieval activity. Finds of pottery and a bead from Bradford's Brook indicate some Saxon activity in this area with possible reuse of the Roman ditched enclosures (see Chapters 1 and 6). No Saxon material was recovered from Grim's Ditch during the 1992 excavations, although small quantities of medieval and post-medieval pottery were recovered along with the foundations of a possible bread oven or brewhouse. Little evidence for the village of Mongewell was revealed in the excavations other than scattered finds in layers mostly interpreted as ploughsoils. The extent of the village is unknown and its exact location is uncertain (see Chapter 5). However, the parish boundary lay between Mongewell to the south and Newnham Murren to the north and followed the line of Grim's Ditch.

Appendices

APPENDIX 1: RADIOCARBON DATING

by Alex Bayliss, Alistair Barclay, Anne Marie Cromarty and George Lambrick

Introduction

Ten radiocarbon age determinations were obtained on samples from the archaeological investigations along the line of the Wallingford Bypass. Four were processed by the Queen's University of Belfast Radiocarbon Laboratory in 1989, three by the Oxford Radiocarbon Accelerator Unit in 1997, and three by the Scottish Universities Research and Reactor Centre at East Kilbride in 1998. All three laboratories maintain continual programmes of quality-assurance procedures, in addition to participation in international intercomparisons (Scott *et al.* 1990; Rozanski *et al.* 1992; Scott *et al.* in prep.). These tests indicate no laboratory offsets and demonstrate the validity of the precision quoted.

Samples processed in Oxford were measured using Accelerator Mass Spectrometry (AMS) and were prepared using the methods outlined in Hedges *et al.* (1989, 102) and Bronk Ramsey and Hedges (1997). Samples processed in Belfast and Glasgow were measured using liquid scintillation counting (Noakes *et al.* 1965). In Belfast they were processed according to methods outlined in McCormac *et al.* (1992) and references therein, and in Glasgow according to methods outlined in Stenhouse and Baxter (1983).

Results

The results are given in Table A1.1, and are quoted in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986). They are conventional radiocarbon ages (Stuiver and Polach 1977).

Calibration

The calibrations of these results, which relate the radiocarbon measurements directly to the calendrical time scale, are given in Table A1.1 and Figure A1.1. All have been calculated using the datasets published by Stuiver and Pearson (1986) and Pearson and Stuiver (1986) and the computer program OxCal (v2.18 and v3beta2) (Bronk Ramsey 1994; 1995). The calibrated date ranges cited in the text are those for 95% confidence. They have been calculated according to the maximum intercept method (Stuiver and Reimer 1986) and are quoted in the form recommended by Mook (1986), with the end points rounded outwards to ten years. Probability distributions have been calculated using the usual probability method (Stuiver and Reimer 1993).

Table A1.1 Radiocarbon age determinations

Laboratory number	*Sample reference*	*Material*	*Radiocarbon Age (BP)*	*δ13C (‰)*	*Calibrated date range (95% confidence)*
Whitecross Farm					
UB-3138	WBP1 (WS39)	*Corylus* sp., roundwood containing 9 rings	2776±40	-27.7±0.2	1030–830 cal BC
UB-3139	WBP2 (WS58)	*Quercus* sp., outer rings of plank	2713±35	-28.1±0.2	930–800 cal BC
UB-3140	WBP3 (WS98)	*Quercus* sp., sapwood of a pile containing *c* 35 rings	2739±40	-27.7±0.2	1000–810 cal BC
UB-3141	WBP4 (WS97)	*Quercus* sp., sapwood of a pile containing *c* 35 rings	2736±45	-26.6±0.2	1000–810 cal BC
Grim's Ditch					
OxA-7173	WPB2-133(I)	charred cereal grain, indet.	3765±40	-26.8	2340–2040 cal BC
OxA-7174	WPB2-133(II)	charred cereal grain, emmer	3600±35	-24.2	2130–1880 cal BC
OxA-7175	WBP1-325/328	animal bone, dog	1755±35	-20.3	cal AD 140–390
Bradford's Brook					
GU-5712	CHBB91-7/3	animal bone, cattle skull	1950±70	-27.6	110 cal BC–cal AD 230
GU-5713	CHBB91-7/5(I) (WS3)	Pomoideae, roundwood	3260±70	-26.2	1740–1410 cal BC
GU-5714	CHBB91-7/5(II) (WS2)	*Sambucus* sp., roundwood	3050±60	-25.3	1440–1120 cal BC

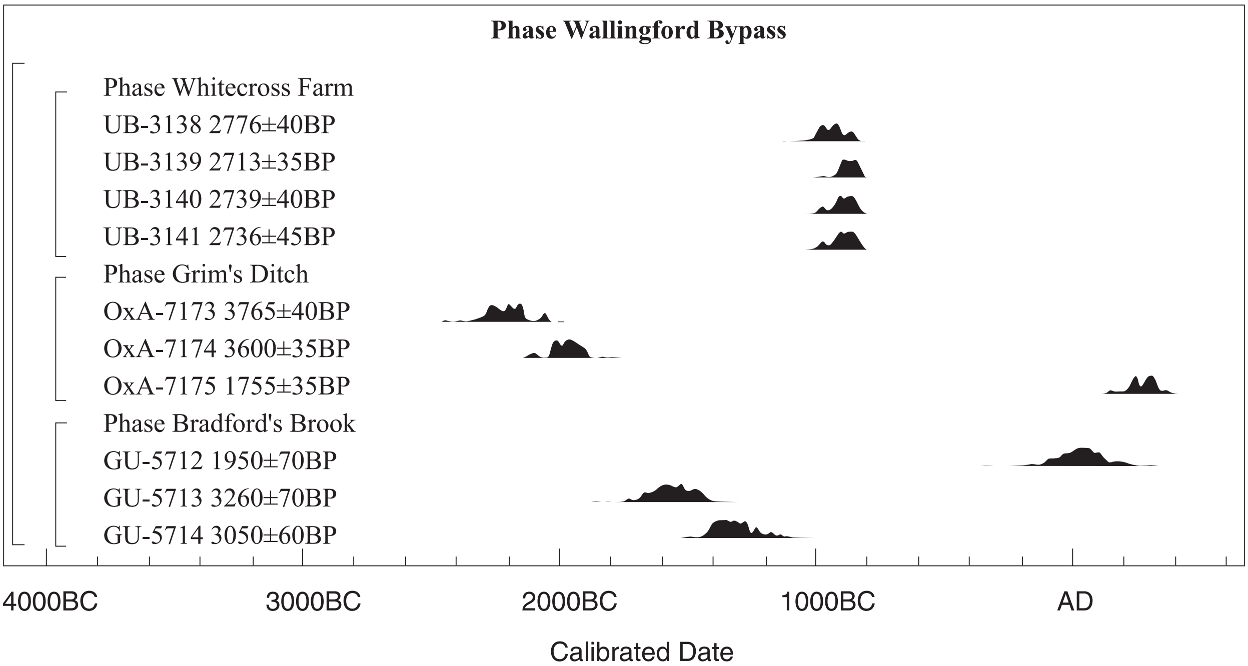


Figure A1.1 Radiocarbon age determinations from all sites on the Wallingford Bypass

Whitecross Farm

Aims

The four samples submitted were intended to address the following research questions:

1. To date the deposit of worked wood.
2. To date and provide a relative sequence for Structures A and B.
3. To provide a date for the first pre-midden phase of activity.

Analysis and interpretation

The four results are not statistically significantly different at 95% confidence (T′=1.4; T′ (5%)=7.8; *v*=3; Ward and Wilson 1978). This means that the period of activity represented by the wooden structures and the wood deposit was probably fairly short (see Fig. 2.5). UB-3141, from Structure A, is not significantly different in date from UB-3140, from Structure B, and so their relative chronology cannot be determined by radiocarbon analysis.

The wood deposits are securely late Bronze Age in date and provide a *terminus post quem* of *c* 1000 cal BC–800 cal BC for the midden deposits. If this midden is contemporary with the occupation layer found widely across the eyot which is associated with a Decorated Ware assemblage and Ewart Park metalwork (see Chapter 2), then this independent *terminus post quem* for these deposits fits well with the currently accepted chronologies for the late Bronze Age (Needham 1996).

Grim's Ditch

Aims

The three samples submitted for radiocarbon dating were intended to address the following research questions:

1. To date the settlement beneath the earthwork bank.
2. To date the construction and primary use of the earthwork.

Analysis and interpretation

The structures beneath the bank of Grim's Ditch are thought to be of late Bronze Age date because of the six-post structure (see Chapter 5, Fig. 5.5). The two radiocarbon results are not from this structure, but from a cluster of postholes (D) to the east in Area A. These two results are statistically significantly different at 95% confidence (T′=9.6; T′(5%)=3.8; *v*=1; Ward and Wilson 1978), and so are likely to represent residual material in a late Bronze Age posthole. Stratigraphically earlier activity consisted of ard marks and cultivation soils, and a scattering of late Neolithic/early Bronze Age ceramics and flintwork was recovered from later cultivation horizons. However, the possibility remains that this cluster of postholes is really of late Neolithic date.

The bank of Grim's Ditch sealed a cultivation horizon which contained late Iron Age pottery. This provides a more useful *terminus post quem* than the dates of the cereals. OxA-7175 provides a *terminus* *ante quem* for construction because the dog remains, although recovered disarticulated, were probably originally an articulated burial deposit which had been placed near the bottom of the ditch. Therefore, all that can be said about the chronology of Grim's Ditch is that it was originally constructed in the later Iron Age or Roman period, and was recut at some point after the dog burial.

Bradford's Brook

Aims

Three radiocarbon dates were obtained for the later Bronze Age waterhole at Bradford's Brook. The dates obtained were intended to address the following research questions:

1. To date the period of primary use.
2. To date secondary activity within the waterhole.

Analysis and interpretation

The two pieces of wood from the bottom of the waterhole gave radiocarbon results which are statistically significantly different at 95% confidence (T'=5.2; T'(5%)=3.8; v=1; Ward and Wilson 1978), although they are not different at 99% confidence. Since the feature was probably open for a number of years, this difference may not be archaeologically significant. The middle Bronze Age dating for the waterhole agrees well with the recovery of a complete cylindrical loomweight from its lowest fill (see Figs 6.3, section 1, 6.9). From these dates the environmental sequence from this deposit can be shown to be earlier than the environmental evidence from Whitecross Farm.

The cattle skull, GU-5712, is of late Iron Age or Roman date. This is considerably later than expected, and suggests that the waterhole remained as a depression in the ground for a considerable period. On archaeological grounds, a placed cattle skull is more likely to fall in the earlier part of the calibrated date range.

APPENDIX 2: LEAD ISOTOPE ANALYSIS OF THE STOP-RIDGE FLANGED AXE

by S Stos-Gale

Methods

About 10 mg of the sample from the axe (see Chapter 3 and Fig. 3.2.4) was dissolved in triple-distilled reagents in a Class 100 clean room and the lead extracted by anodic deposition. The lead isotope composition was measured at the Isotrace Laboratory, University of Oxford, using thermal ionisation mass spectrometry (TIMS) with an overall accuracy of better than 0.1% and within run standard error of better than 0.02%. The analytical procedure is described by Stos-Gale *et al*. (1995, 407–10).

Results

The results of the lead isotope analysis of this sample is listed in Table A2.1, together with data from later early Bronze Age and early middle Bronze Age artefacts from Britain analysed by Rohl (1995) which are closest in their lead isotope composition.

The two objects from the Burley, Hampshire hoard are early palstaves, that from Betws-yn-rhos an unusual thin-bladed axe associated with a stop-ridge axe, and that from Poslingford Hall is a flanged axe from an Arreton period hoard.

Table A2.1 Lead isotope analysis together with comparative data from Britain

Sample number	*Site*	*Pb208/206*	*Pb207/206*	*Pb206/204*
Ox155	Wallingford	2.08498	0.084968	18.419
1927.1-7.1c	Burley hoard	2.08651	0.084795	18.478
1927.1-7.2	Burley hoard	2.08675	0.084984	18.369
37.555	Betws-yn-rhos	2.08533	0.084958	18.403
1845.5-10.2	Poslingford Hall	2.08518	0.084898	18.410

Conclusions

The lead isotope composition of the sample from the stop-ridge axe from Wallingford is similar to four British artefacts from the end of the early Bronze Age and the beginning of the middle Bronze Age analysed by Rohl (1995, tables A25–6). The lead in the Wallingford axe has an isotopic composition identical to that of the late early Bronze Age flanged axe from the Poslingford Hall and the early middle Bronze Age thin-bladed axe from the Betws-yn-rhos hoard. The two items from the Burley hoard in Hampshire are also similar and it is possible to say that all five artefacts could have been made from copper from the same ore deposit – but the flanged and thin-bladed axe are a much better isotopic match with the Wallingford axe. It can also be said that the typological connections are closer as well.

APPENDIX 3: LIST OF ANIMAL BONE MEASUREMENTS FROM WHITECROSS FARM

by Adrienne Powell and Kate M Clark

The animal bone from the late Bronze Age contexts at Whitecross Farm is discussed in Chapter 4. See Table A3.1.

Table A3.1 Animal bone measurements from Whitecross Farm (mm)

Horse		L	B					
	P3/P4	28.10	25.50					
Cattle	Mandible	7	8	9	15a	15b		
		136.20	87.70	50.30	66.50	33.00		
	M_3	L	B					
		35.90	11.80					
		34.70	13.40					
		34.00	13.60					
	Scapula	GLP	LG	SLC				
		53.80	44.10	-				
		-	-	41.90				
	Humerus	Bd	BT	HT	HTC			
		85.50	79.60	49.90	36.00			
	Astragalus	GL1	GLm	Bd				
		-	55.50	-				
		61.40	57.50	-				
		57.80	51.30	36.70				
	Calcaneus	GL						
		54.50						
Sheep/goat	Mandible	7	8	9	15a			
		69.60	45.80	23.00	14.20			
		-	28.00	34.60	-			
	M_3	L	B					
		21.90	8.20					
		18.60	6.80					
		23.10	7.40					
		20.80	7.80					
	Scapula	GLP	BG	LG	SLC			
		-	-	-	15.20			
		30.70	20.70	24.20	-			
		29.90	19.10	-	17.40		(sheep)	
		28.50	19.70	22.80	15.00		(goat)	
	Humerus	Bd	BT	HT	HTC			
		28.40	25.80	16.70	12.10	(sheep)		
	Radius	GL	Bp	BFp	SD	Bd	BFd	
		-	27.10	26.00	-	-	-	(sheep)
		147.20	26.40	24.90	13.70	24.30	21.50	"
		-	25.40	23.80	-	-	-	"
		-	27.20	26.00	-	-	-	"
		-	24.30	20.30	-	-	-	"
		-	28.80	27.50	-	-	-	(goat)
		-	28.80	27.90	-	-	-	"
	Pelvis	LA	SBpu	SHpu				
		26.30	-	-				
		28.10	-	-				
		24.60	6.90	5.70		(sheep)		
	Tibia	Bd	Dd					
		23.10	17.30					
		23.10	18.30					
	Metacarpal	GL	Bp	Dp	SD	Bd		
		-	20.90	15.90	-	-		
		116.50	23.70	16.60	15.50	26.60		(goat)
	Astragalus	GL1	GLm	Bd				
		26.00	27.20	17.10				
		25.10	24.10	-				
		27.30	25.80	-				
Pig	M_3	L	B					
		-	16.20					
		-	15.70					
		27.70	13.90					

Table A3.1 (continued) Animal bone measurements from Whitecross Farm (mm)

	Scapula	GLP	BG	LG	SLC	
		-	-	-	26.70	
		29.20	22.00	25.40	18.20	
		30.80	22.40	-	-	
	Humerus	Bd	BT	HTC		
		38.50	33.00	18.90		
		38.20	32.40	18.30		
		39.40	33.00	19.40		
		-	-	20.70		
		-	-	18.30		
	Radius	Bp				
		25.90				
		29.10				
	Pelvis	LAR				
		32.10				
		33.30				
	Tibia	Bp				
		60.80				
	Metacarpal	GL	Bp	B	Bd	
		72.10	14.60	11.90	15.30	MC IV
	Metatarsal	GL	LeP	Bp	B	Bd
		83.40	82.10	13.90	11.70	15.20
		88.30	85.70	16.10	12.80	16.50
	Astragalus	GL1	GLm			
		41.50	37.50			
		39.90	37.10			
Red deer	Antler	41				
		213.00				
	Humerus	Bd	BT	HT	HTC	
		65.70	59.50	35.30	33.90	
		62.80	57.30	42.00	30.20	
	Pelvis	LA				
		55.60				
	Tibia	Bd	Dd			
		55.60	39.60			

Key

Teeth

B	Breadth
L	Length
Mandible	
7	Length mandibular cheektooth row
8	Length mandibular molar row
9	Length mandibular premolar row
15a	Height of mandible behind M_3
15b	Height of mandible in front of M_1
Other bone	
B	Breadth in middle of diaphysis
Bd	Breadth of distal end
BFd	Breadth of distal articular surface
BFp	Breadth of proximal articular surface
BG	Breadth of glenoid cavity
Bp	Greatest breadth of proximal end
BT	Breadth of trochlea
Dd	Depth of distal end
Dp	Proximal depth
GL	Greatest length
GLl	Greatest length lateral half of astragalus
GLm	Greatest length medial half of astragalus
GLP	Greatest length of glenoid process
HT	Height of trochlea
HTC	Minimum diameter of trochlea
LA	Length of acetabulum
LAR	Length of acetabulum on the rim
LeP	Length excepting plantar projection (pig)
LG	Length of glenoid cavity
SBpu	Smallest breadth pubis
SD	Smallest breadth of diaphysis
SHpu	Smallest height pubis
SLC	Smallest length of neck of scapula
Antler	
41	Greatest diameter of base

APPENDIX 4: LATE BRONZE AGE POTTERY: PETROGRAPHIC ANALYSIS *by Chris Doherty*

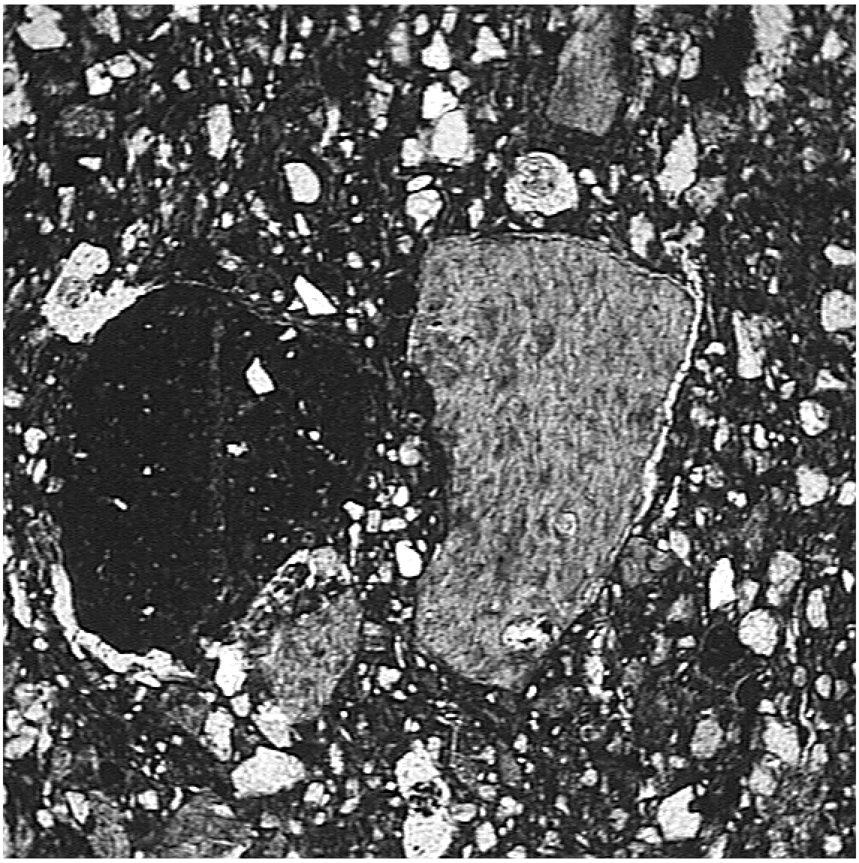


Plate A4.1 A flint-rich fabric with large (up to 2 mm diameter) angular flint grains in a sandy matrix that also contains flint. This range of grain sizes suggests a natural source for the larger flint grains, rather than added temper. Also present are occasional clay pellets (eg dark grain, centre), which lack coarse sand inclusions (TS2)

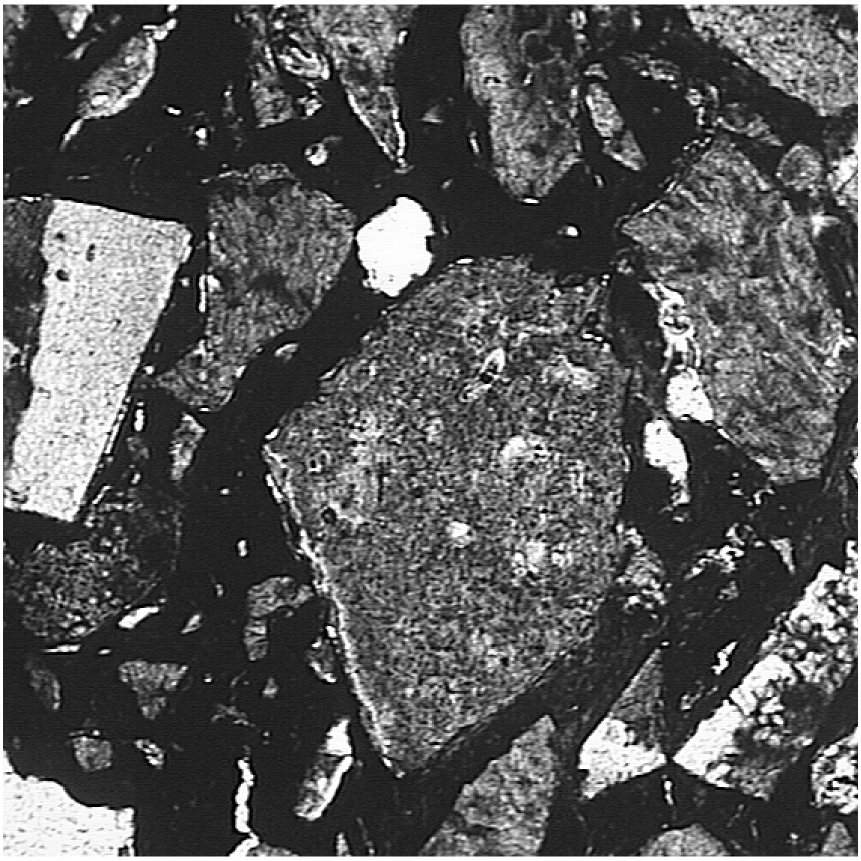


Plate A4.2 This fabric has an unusually high concentration of flint grains, estimated at 50–60% of the sherd. Notable also is the relatively narrow range of grain sizes. This is probably temper, in which case the finer flint has been winnowed out before addition to the body clay (TS3)

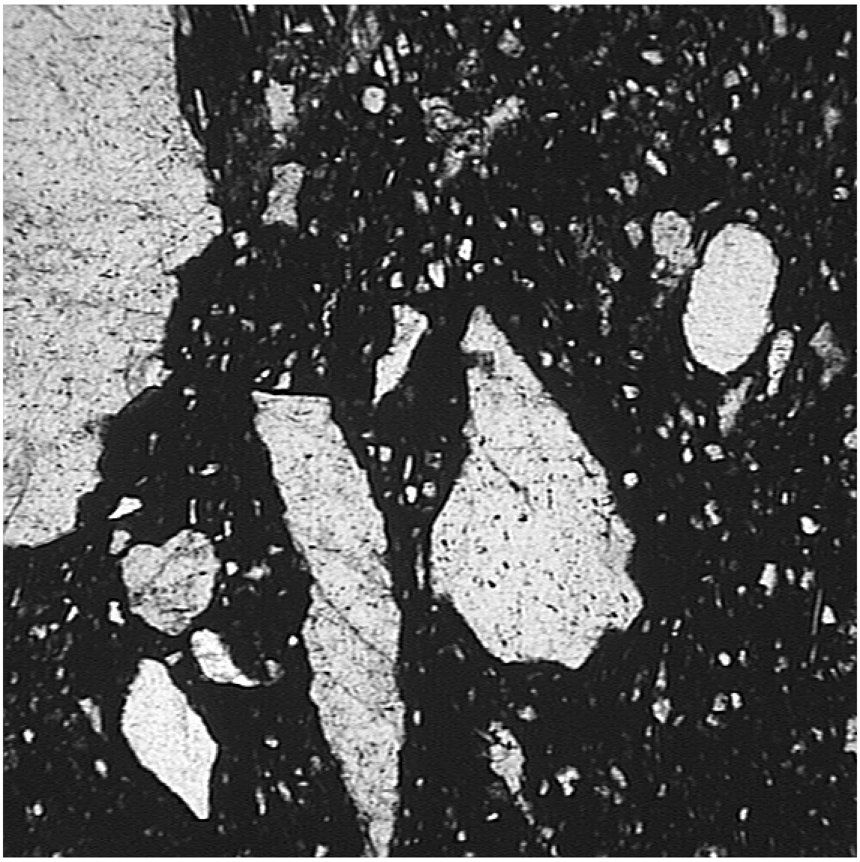


Plate A4.3 Angular quartzite temper in a very fine sandy clay. Interestingly this all appears to be monocrystalline quartz (or showing only moderate undulose extinction) whereas the quartzite pebbles of the Thames alluvium are typically a mix of monocrystalline and polycrystalline types. Unlike the polycrystalline quartzite, the monocrystalline variety is relatively easy to fragment (ie for temper) and may have been preferentially selected (TS4)

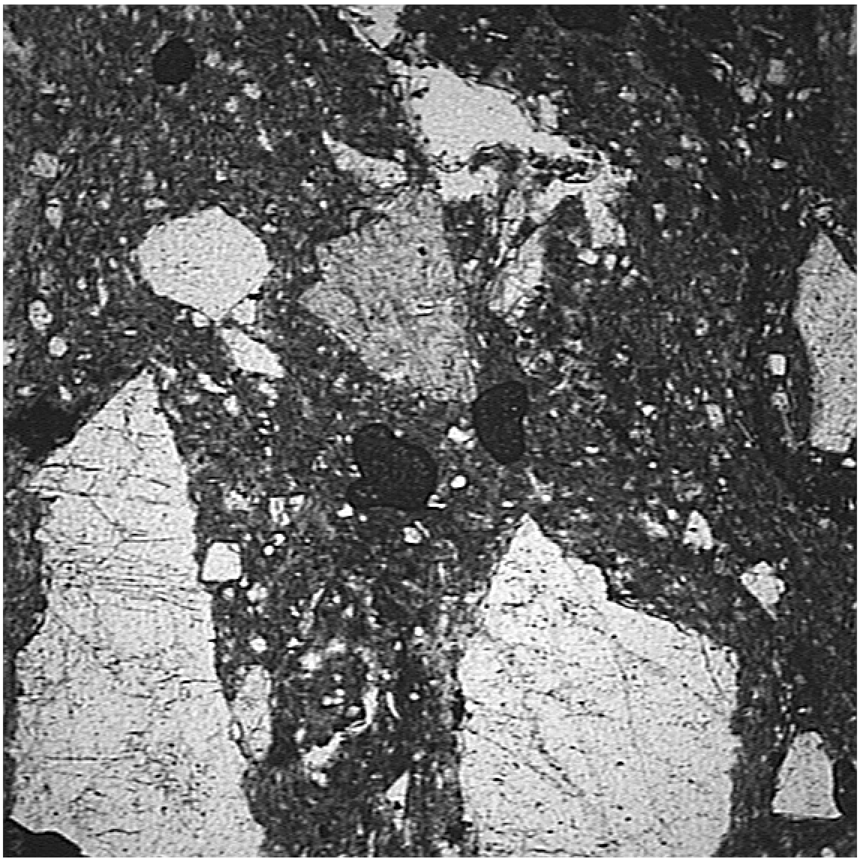


Plate A4.4 Quartzite temper (with lesser flint) in a very fine sandy body which contains small amounts of thin-walled shell and muscovite. Again this is almost entirely monocrystalline quartzite (TS5)

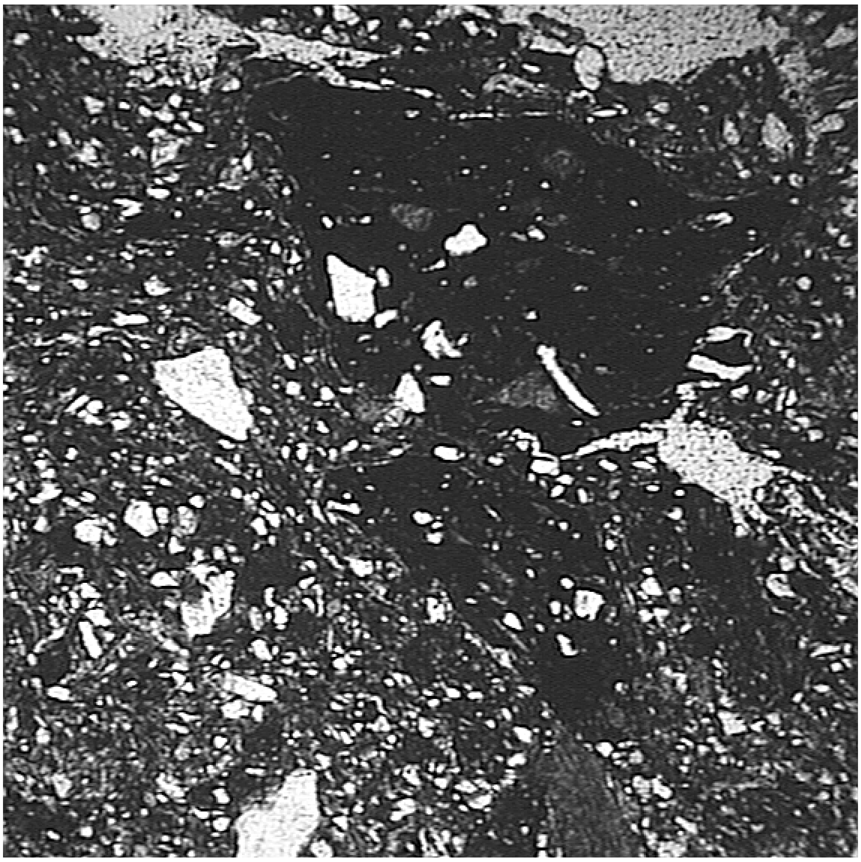


Plate A4.5 This fabric has a mixed temper comprising mainly grog (dark angular sandy grain) with lesser quartzite (monocrystalline), shell (fossil) and occasional flint. The fine sandy matrix is micaceous (TS8)

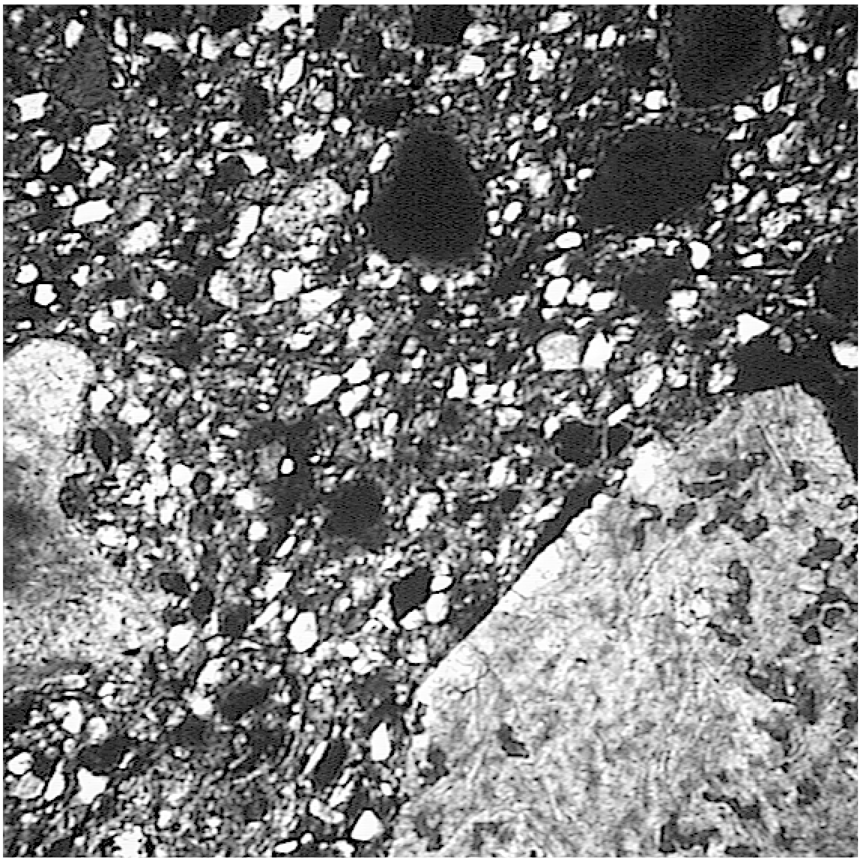


Plate A4.6 Photomicrograph showing coarse flint temper in a Greensand-derived clay. The latter has a very high concentration of angular quartz with muscovite mica and small rounded grains of glauconite (bottom right) (TS13)

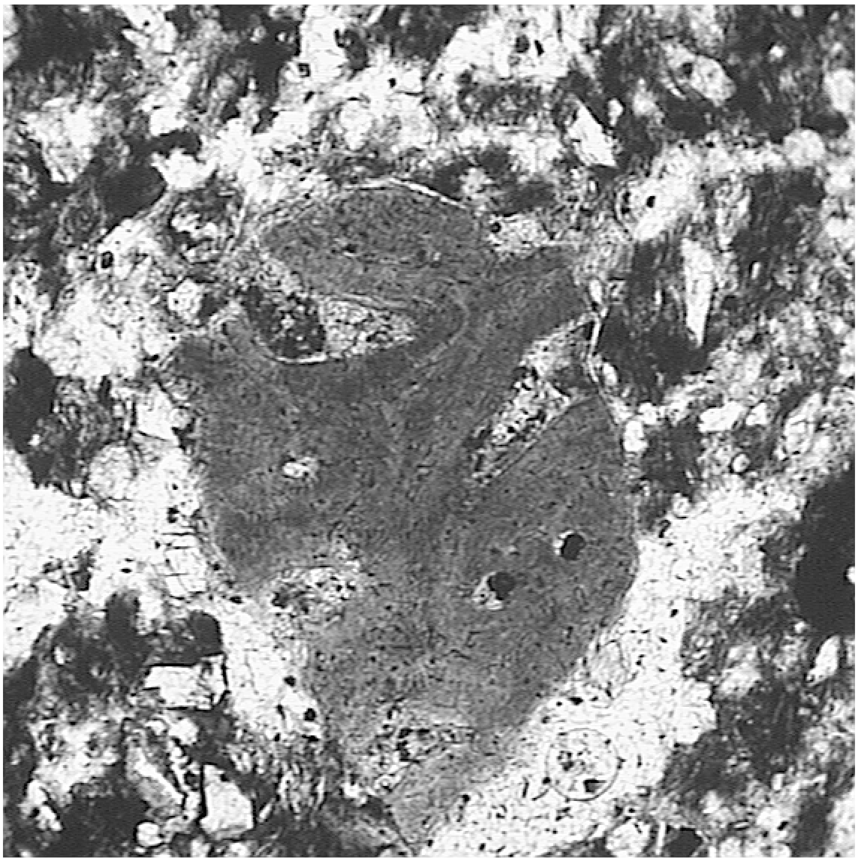


Plate A4.7 Photomicrograph showing bone inclusion in Greensand-derived clay. Probably incidental (TS15)

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BA	Bronze Age
IA	Iron Age
LBA	Late Bronze Age
LIA-R	Late Iron Age-Roman

Oxford Archaeology
Thames Valley Landscapes
Monograph 22

This report presents the results of three excavations (Grim's Ditch, Whitecross Farm and Bradford's Brook) along the route of the Wallingford Bypass. Investigations at Whitecross Farm revealed that an important late Bronze Age site was located on a former river eyot. The results of these and earlier limited excavations are presented. Bringing all this evidence together has allowed the site to be more fully characterised as a place of 'high' status habitation and ritual during the 10th to 8th centuries BC. The bank of the Grim's Ditch earthwork was found to have preserved evidence of earlier prehistoric settlement, and a sequence of cultivation, including ard marks and 'cord-rig'; the latter is rarely found in lowland Britain. The Grim's Ditch can now be precisely placed within a major phase of massive earthwork construction that happened during the late Iron Age and early Roman period as a response to major political reorganisation. At Bradford's Brook traces of multi-period settlement and land division were uncovered. All three sites are discussed within their local, regional and national contexts.

FRONT COVER: Artist's impression of the Bronze Age settlement at Whitecross Farm © River and Rowing Museum
BACK COVER: Metalwork recovered from the river at Wallingford

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