ETTON

Excavations at a Neolithic causewayed enclosure near Maxey Cambridgeshire, 1982–7

Francis Pryor

ENGLISH HERITAGE

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Dedication

For Maisie Taylor and Charles French

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with major contributions by
Miranda Armour-Chelu, Adrian Challands, Mark Edmonds, Charles French, Kasia Gdaniec, David Gurney, Ian Kinnes, H Robert Middleton, Sandra Nye, Mark Robinson, Rob Scaife, and Maisie Taylor

and other contributions by
Janet Ambers, C E Buck, Ros Cleal, Alan Dawn, C D Litton, and Christine Osborne

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List of contributors

Janet Ambers
Dept of Scientific Research
The British Museum
London WC1B 3DG

Dr Miranda Armour-Chelu
c/o The Natural History Museum
Cromwell Road
London SW7 5BD

Dr C E Buck
Dept of Mathematics
The University
Nottingham NG7 2RD

Adrian Challands
The Old Schoolhouse
Glinton Road
Helpston
Peterborough
Cambs PE6 7DG

Dr Ros Cleal
Alexander Keiller Museum
High Street
Avebury
Wilts SN8 1RF

Alan Dawn
26 Sutherland Way
Stamford
Lincs PE9 2TB

Dr Mark Edmonds
Dept of Archaeology and Prehistory
The University
Sheffield S10 2TN

Dr Charles French
Dept of Archaeology
University of Cambridge
Downing Street
Cambridge CB2 3DZ

Kasia Gdaniec
Cambridge Archaeology Unit
Dept of Archaeology
University of Cambridge
Downing Street
Cambridge CB2 3DZ

David Gurney
Norfolk Archaeological Unit
Union House
Gressenhall, nr Dereham
Norfolk NR20 4DR

Dr Ian Kinnes
Dept of Prehistoric and Romano-British Antiquities
The British Museum
London
WC1B 3DG

Dr C D Litton
Dept of Mathematics
The University
Nottingham NG7 2RD

H Robert Middleton
North West Wetlands Survey
Archaeology Unit
Physics Building
The University
Lancaster LA1 4YW

Dr Sandra Nye
Zetland House
Woodland
Co Durham DL13 5RH

Christine Osborne
27 Gurney Road
New Costessey
Norwich
Norfolk NR5 0HE

Dr Francis Pryor
Fenland Archaeological Trust
Flag Fen Excavations
Fourth Drove
Fengate
Peterborough
Cambs PE1 5UR

Dr Mark Robinson
University Museum
Parks Road
Oxford OX1 3PW

Dr Rob Scaife
Department of Geography
University of Southampton
Highfield
Southampton SO17 1BJ

Maisie Taylor
Fenland Archaeological Trust
Flag Fen Excavations
Fourth Drove
Fengate
Peterborough
Cambs
PE1 5UR

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Summary

The Etton causewayed enclosure is situated in the lower Welland valley in the parish of Maxey, Cambridgeshire. Following the excavations described in this report, the site was destroyed by gravel extraction, and today only a small part of the enclosure ditch survives beneath the bank of a modern river, the Maxey Cut.

The Neolithic course of the Welland was braided at the point where the river entered the Fenland basin. The landscape was flat, wet, low-lying, and subject to regular fluvial flooding, which laid down extensive areas of clay alluvium, mainly in the Iron Age and later times. The subsoil, into which archaeological features were cut, was Pleistocene river terrace gravel.

The site lies within the crook of a relict meander of one of the braided streams of the Welland system. In effect, the location is a very low-lying floodplain 'island' immediately south of the much larger and higher floodplain 'island' of Maxey. The ditch and interior of the enclosure were buried beneath alluvium, which has preserved a palaeosol and has protected the site from modern plough damage.

The Etton causewayed enclosure is small by British standards and was bounded by a single enclosure ditch, in the form of a 'squashed oval'. The excavations revealed approximately 80% of the interior and a slightly smaller proportion of the segmented ditch.

Radiocarbon samples indicated that the site was constructed and used in the first half of the fourth millennium cal BC; this would place it early in the succession of British causewayed enclosures. Most of the pottery from primary contexts (Phases 1A and 1B) belonged to a regional variant of the Hurst Fen tradition; there was also an unusually large assemblage of Fengate-style wares (Phase 1C) and notable collections of flintwork, 'imported' polished stone axes, and other stone objects. The western arc of the enclosure ditch produced some 5000 pieces of worked wood, most of which derived from coppice. Most of the features excavated were associated with the causewayed enclosure, but there was also a significant number of Late Neolithic (Phase 2) and earlier Bronze Age (Phase 3) features; some of these were probably connected with the single ditch of the Etton cursus, which traversed the causewayed enclosure diagonally.

The enclosure was entered by entrance causeways to the west, north, and east, but the southern perimeter could not be examined. The north entrance was marked by a substantial timber gateway. There were no substantial earthfast buildings within the Phase 1 enclosure. Instead, the predominant features were numerous, small, backfilled pits, which contained quantities of pottery, flint, and animal bone. These 'small filled pits' never cut one another, and it is probable that their precise locations were marked or mapped in some way. These pits were probably of ritual rather than domestic significance.

In Phase 1 the enclosure ditch and interior were set out and used in two distinct halves, separated by a north–south fence or ditch aligned on the main north entrance gateway. Many of the artefacts and ecofacts recovered had been positioned in the ground with some care. Deliberate smashing or breakage was common. Backfilling, sometimes with clean gravel, was also frequently observed within the ditch. Care had been taken to ensure that later ditch recuts did not penetrate earlier placed deposits. It was possible to define a gradually evolving tradition of carefully structured ritual deposits within the enclosure ditch recuts; distinctive objects, such as complete pots or skulls, were often placed close to causeways, within the butt ends of individual ditch segments.

It is suggested that the small filled pits of Phase 1 represented individual people and that the contents of the pit referred to a person's skills, achievements, or social position. The ditch segment (and the deposits within it) nearest to a particular 'small filled pit' would represent that individual's family or kin group. By the Late Neolithic (Phase 2), use of the ditch and of the interior was more sporadic, but ritual continued to dominate.

Résumé

L'enceinte à chaussée empierrée d'Etton se trouve dans la partie la plus basse de la vallée de la Welland sur la commune de Maxey, comté de Cambridgeshire. Après les fouilles décrites dans ce compte-rendu, le site fut détruit quand on entreprit d'en extraire du gravier et aujourd'hui ne demeure, sous la berge du nouveau cours d'eau, la Maxey, qu'une petite partie du fossé qui entourait l'enceinte.

Au néolithique la Welland se divisait en tresses à l'endroit où elle pénétrait dans le bassin de Fenland. La région était plate, marécageuse, basse et régulièrement sujette à des inondations fluviales qui y déposèrent de vastes étendues d'alluvions argileuses, principalement à l'âge du fer et dans les périodes qui suivirent. La couche inférieure, dans laquelle les témoignages archéologiques avaient été taillés, consistait en gravier typique des terrasses fluviales du pléistocène.

Le site se situe dans le creux d'un méandre abandonné de l'un des bras de la Welland. En fait l'endroit

est une "ile", en réalité une plaine inondable très basse située juste au sud de l' "ile" de Maxey, autre plaine inondable beaucoup plus grande et plus élevée. Des alluvions recouvraient le fossé et l'intérieur de l'enceinte, de ce fait le paléosol a été préservé et le site a été protégé des dégâts qu'auraient pu causer les labours de l'époque moderne.

L'enceinte à chaussée empierrée d'Etton est petite comparée aux autres sites de même type en Grande-Bretagne et elle est entourée d'un seul fossé en forme d'"oval écrasé". Les fouilles ont mis à jour environ 80% de l'intérieur et un pourcentage légèrement inférieur des différentes sections du fossé.

Des échantillons de radiocarbone montrent que le site fut construit et utilisé au cours de la première moitié du quatrième millénaire av. J-.C. en années calibrées, ce qui le placerait parmi les premiers dans la série des enclos britanniques à chaussée empierrée. La majeure partie de la poterie extraite des contextes primaires (Phases 1A et 1B) appartient à une variante régionale de la poterie traditionnelle de Hurst Fen; il y avait également une collection étonnement importante d'objets de style Fengate (Phase 1C) et de remarquables assortiments de silex, des haches importées en pierre polie et d'autres articles en pierre. L'arc ouest du fossé de l'enceinte a révélé plus de 5000 morceaux de bois ouvragé dont la plupart provenaient de taillis. La plupart des objets mis à jour avaient un rapport avec l'enceinte à chaussée, mais on a également retrouvé un nombre significatif d'articles datant du néolithique tardif (Phase 2) et du début de l'âge du bronze (Phase 3), certains d'entre eux avaient probablement un lien avec le fossé unique de l'ouvrage d'Etton, appelé cursus, qui traversait en diagonale l'enceinte à chaussée empierrée.

On pénétrait dans l'enceinte par des chaussées d'accès qui se trouvaient à l'ouest, au nord et à l'est, malheureusement il a été impossible d'étudier le périmètre sud. L'entrée nord était marquée par une imposante porte en bois. On n'a découvert aucun bâtiment substantiel au sol dans l'enceinte datant de la phase 1. Au contraire, les vestiges les plus importants consistaient en de nombreuses petites fosses comblées qui contenaient une abondance de poteries, silex et os d'animaux. Ces "petites fosses comblées" ne se chevauchaient jamais l'une l'autre et il est probable que leur position était indiquée avec précision ou cartographiée d'une manière ou d'une autre. Ces fosses avaient probablement une signification rituelle plutôt que domestique.

Au cours de la phase 1 le fossé et l'intérieur de l'enceinte furent divisés et utilisés en deux moitiés distinctes séparées par une palissade ou un fossé orienté dans le sens nord-sud et situé dans l'alignement de la porte principale de l'entrée nord. Beaucoup des trouvailles façonnées et naturelles qui ont été découvertes avaient été positionnées avec soin dans le sol. Dans de nombreux cas les objets avaient été fracassés ou brisés. On a également noté qu'on avait souvent comblé l'intérieur du fossé, quelquefois avec du gravier propre. On avait pris soin de s'assurer que si l'on devait recreuser le fossé plus tard, on ne dérangeait jamais les objets déjà déposés. On a pu identifier une tradition à évolution lente qui consistait en dépôts rituels soigneusement structurés à l'intérieur des différents stades de creusement du fossé de l'enceinte; des objets spécifiques tels que des pots entiers ou des crânes se trouvaient souvent placés à proximité des chaussées, dans les bouts des différentes sections du fossé.

On a émis l'hypothèse que les "petites fosses comblées" de la phase 1 représentaient des individus particuliers et que le contenu de la fosse était en rapport avec les talents, les accomplissements ou la position sociale de la personne concernée. La section du fossé (et les dépôts qu'elle contenait) la plus proche d'une "petite fosse comblée" particulière aurait représenté la famille ou la parenté de cet individu. Au néolithique tardif (phase 2) l'utilisation du fossé et de son intérieur devint plus sporadique mais son rôle rituel continua à être prédominant.

Traduction: Annie Pritchard

Zusammenfassung

Das Erdwerk (causewayed enclosure) von Etton befindet sich im unteren Wellandtal in der Gemeinde Maxey in Cambridgeshire. Nach Abschluß der Ausgrabungen, die in diesem Bericht dokumentiert werden, wurde die Fundstelle durch Kiesentnahme zerstört. Nur ein kleiner Teil des äußeren Grabens ist unter dem Damm des modernen Wasserlaufes Maxey Cut erhalten.

Im Neolithikum war der Verlauf des Wellands an der Stelle, wo der Fluß in das Fenlandbecken eintritt, stark verzweigt. Die Landschaft war flach, feucht, niedrigliegend und regelmässigen Flußüberschwemmungen unterworfen, die vor allem ab der Eisenzeit über weite Gebiete Ton ablagerten. Der Untergrund, in den archäologische Strukturen eingegraben waren, bestand aus dem Kies einer pleistozänen Flußterrasse.

Die Fundstelle liegt in der Biegung eines Altarms einer der verzweigten Ströme des Wellandsystems. Die Stelle ist in Wirklichkeit eine sehr niedrigliegende 'Insel' auf einer Schwemmebene unmittelbar südlich der wesentlich größeren und höhergelegenen Schwemmebenen-'Insel' von Maxey. Der Graben und das Innere des Erdwerks waren unter Ablagerungen begraben, die nicht nur einen Paläoboden konserviert haben, sondern die Stelle auch vor modernem Pflugschaden geschützt haben.

Gemessen an britischen Standards ist das Erdwerk von Etton klein. Es ist von einem einzigen äußeren Graben in der Form eines 'zusammengedrückten Ovals' umgeben. Die Ausgrabungen haben schätzungsweise 80% des Inneren und einen etwas kleineren Anteil des in Abschnitte unterteilten Grabens freigelegt.

Radiokarbonproben ergaben, daß die Anlage während der ersten Hälfte des vierten Jahrtausends BC (kal.) errichtet und benutzt wurde; in der Abfolge britischer Erdwerke (causewayed enclosures) liegt sie damit relativ früh. Die meiste Keramik aus Primärkontexten (Phasen 1A und 1B) gehört zu einer regionalen Variante der Hurst Fen-Tradition. Außerdem wurden eine ungewöhnlich große Anhäufung von Waren des Fengatestils (Phase 1C) sowie beachtliche Kollektionen von Feuersteinwerkzeugen, 'inportierten' geschliffenen Steinäxten, und anderen Gegenständen aus Stein gefunden. Der westliche Abschnitt des äußeren Grabens erbrachte um die 5000 Stücke von bearbeitetem Holz, bei dem sich in den meisten Fällen um Unterholzarten handelte. Die meisten der ausgegrabenen Befunde gehörten zu dem Erdwerk, doch gab es daneben auch eine beträchtliche Anzahl von Befunden aus dem Spätneolithikum (Phase 2) und der frühen Bronzezeit (Phase 3); einige davon standen wahrscheinlich mit dem einzelnen Graben des Etton Cursus in Verbindung, der das Erdwerk diagonal durchschneidet.

Das Erdwerk wurde betreten über Zugangsdämme im Westen, Norden und Osten; der südliche Bereich konnte nicht untersucht werden. Der nördliche Zugang war durch ein starkes Holztor hervorgehoben. Innerhalb des Erdwerkes der Phase 1 gab es keine substantiellen erdbeständigen Gebäude. Die stattdessen vorherrschenden Strukturen waren zahlreiche kleine, wieder zugefüllte Gruben, die eine Menge an Keramik, Feuerstein und Tierknochen enthielten. Diese 'kleinen gefüllten Gruben' überschnitten sich in keinem Fall, und es ist wahrscheinlich, daß ihre genaue Lage auf irgendeine Weise markiert oder kartiert war. Diese Gruben waren wahrscheinlich mehr von ritueller als von häuslicher Bedeutung.

In Phase 1 wurden der äußere Graben und das Innere in zwei deutlich getrennten Hälften benutzt, die von Norden nach Süden durch einen Zaun oder Graben, der auf das nördliche Hauptzugangstor ausgerichtet war, voneinander abgegrenzt waren. Viele der gefundenen Artefakte und Ökofakte waren mit einiger Sorgfalt im Boden plaziert worden. Bewußtes Zerschlagen oder Zerbrechen war häufig. Außerdem wurde oft ein Zufüllen des Grabens beobachtet, manchmal mit sauberem Kies. Es wurde sorgfältig vermieden, daß spätere Grabenaushübe in frühere Deponierungen eindrangen. In den neuausgehobenen Abschnitten des äußeren Grabens konnte eine sich allmählich entwickelnde Tradition sorgfältig strukturierter ritueller Deponierungen ausgemacht werden; besondere Gegenstände, wie etwa vollständige Töpfe oder Schädel, wurden oft nahe den Dämmen und innerhalb des dicken Endes einzelner Grabenabschnitte plaziert.

Es wird vorgeschlagen, daß die 'kleinen gefüllten Gruben' der Phase 1 einzelne Individuen repräsentierten und daß sich der Inhalt der jeweiligen Grube auf die Fähigkeiten, Leistungen und die soziale Stellung einer Person bezogen. Der Grabenabschnitt (und die Deponierungen darin), die am nähsten zu einer bestimmten 'kleinen gefüllten Grube' liegen, könnten die Familie oder Verwandtschaftsgruppe des betreffenden Individuums repräsentieren. Im Spätneolithikum (Phase 2) wurden der Graben und das Innere sporadischer genutzt, aber ein ritualer Charakter war nachwievor vorherrschend.

Übersetzung: Cornelius Holtorf

Conventions used in the section drawings

1 Introduction

This chapter is in four parts: the first is a discussion of the site and its setting in the natural landscape, continued in the second part, which discusses the relict channel. The third part is a brief review of archaeological research in the Welland valley before the recent Welland Valley Project (of which Etton is a part). This is followed by a short history of the Etton Project, including a description of methods of excavation and recording.

All radiocarbon dates mentioned in the text are cited as maximum intercept calibrated date ranges at two standard deviations and are calibrated using the data published by Pearson and Stuiver (1986), Pearson *et al* (1986), and others.

The site in its setting

The Etton causewayed enclosure was located in the Maxey gravel quarry, in the parish of Maxey, Cambridgeshire, at OS NGR TF 13830739. It was discovered from the air in 1976 and was excavated between 1982 and 1987. Apart from a small length of the enclosure ditch that lies beneath the bank of the Maxey Cut, almost the entire site was destroyed by gravel extraction in 1988. It consisted of a single segmented ditch that was laid out in a squashed or flattened oval plan, with the flattened side to the south (but hidden beneath Maxey Cut's northern bank). The long (east–west) axis of the oval measured approximately 187m (including the enclosure ditch); the north–south dimension was less straightforward to estimate, as part of the ditch was hidden, but it was in the region of 145–155m.

The causewayed enclosure at Etton and the other sites discussed in this report are located on the wide, low-lying plain that fringes the Fenland north of Peterborough (Fig 1). The subsoil consists of freely draining sands and gravels of the river Welland First and Second Terraces. Although within the parish of Maxey, it was decided to name the causewayed enclosure after the nearby village of Etton, in order to avoid confusion with the well-known prehistoric, Roman, and post-Roman sites that are found elsewhere in Maxey parish.

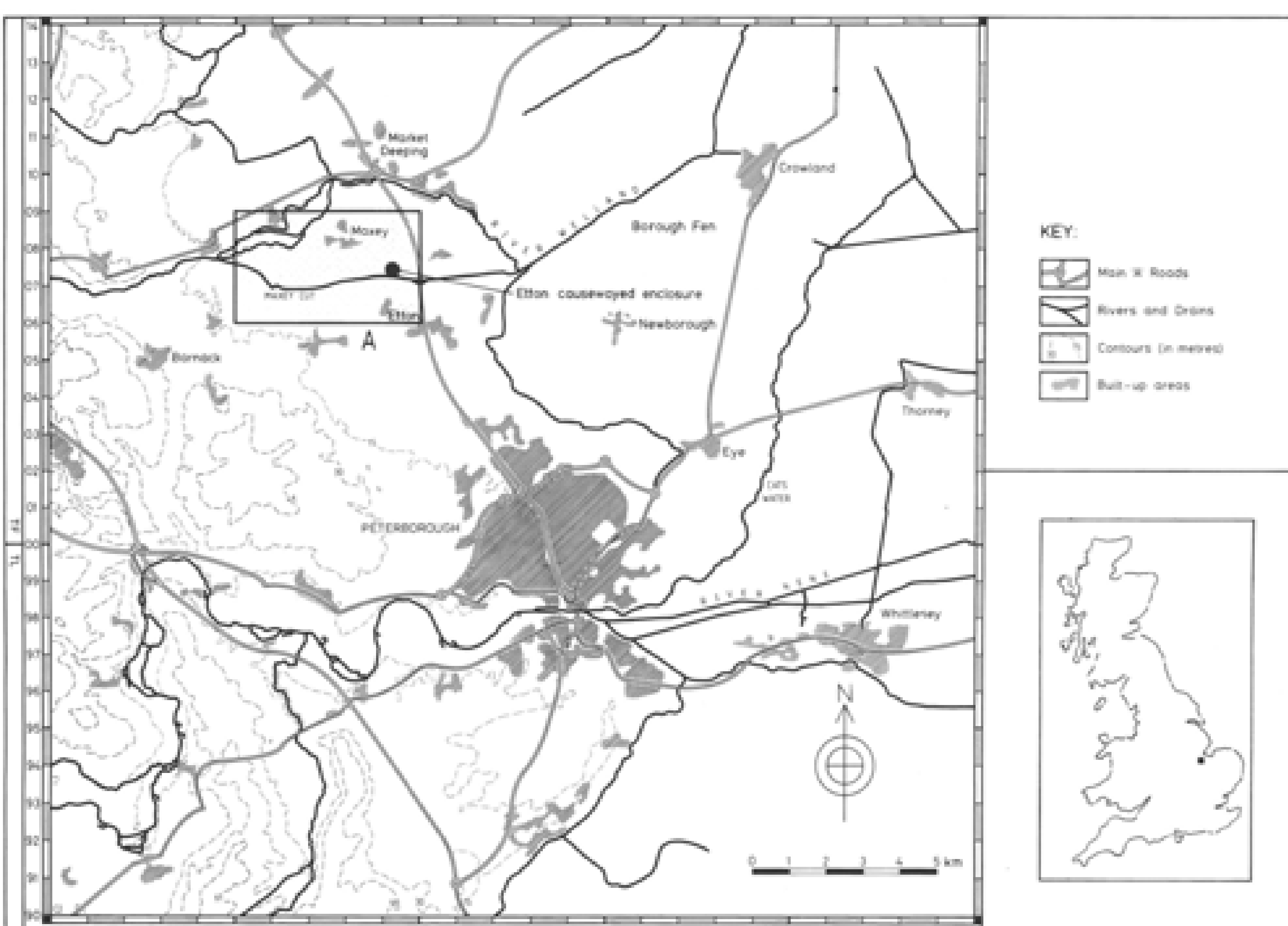


Fig 1 The location of Etton within the Welland valley

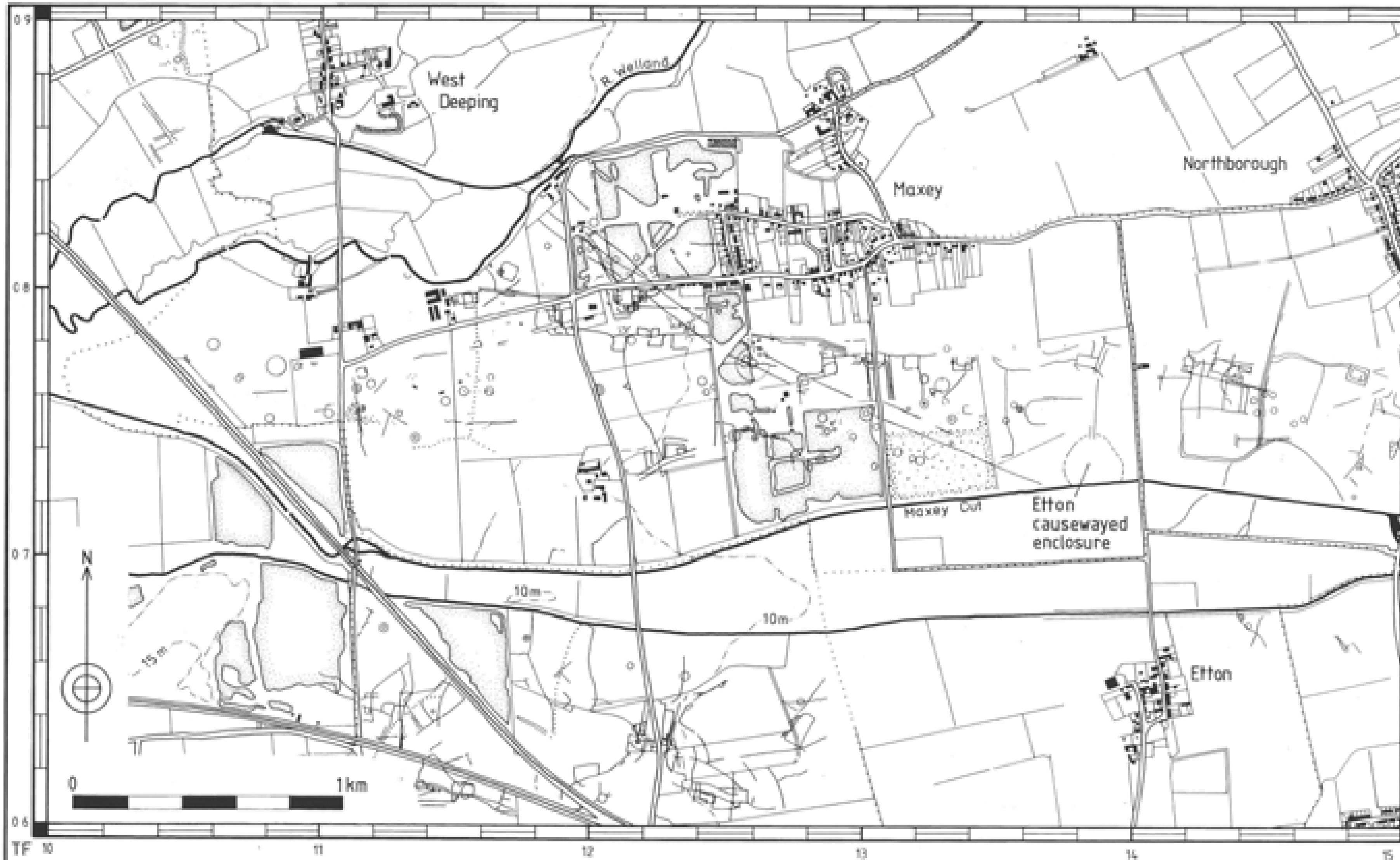


Fig 2 Map of the Etton/Maxey area showing cropmarks taken from aerial photographs. The stippled areas are quarries. Figure 1 shows the location of this area

Cropmarks

The cropmarks of the lower Welland valley are remarkable (Fig 2), but they are only a portion of what is probably a far more extensive ancient landscape, for large areas are hidden from the aerial camera by extensive spreads of alluvium (French 1990; French and Pryor 1992). It must always be borne in mind, therefore, that the ancient landscape presently under consideration is far from complete: it is entirely possible that sites similar to Etton may lie hidden beneath the alluvial clays that cover the countryside between, for example, Maxey and the fen edge to the east around Newborough. Indeed, it is possible that the ritual sites of the Maxey/Etton area might form part of a far larger 'ritual landscape', which might include the barrow fields of Borough Fen, Eye, and Eyebury (French and Pryor 1993, 61–8; Hall 1987, 21–5; Hall *et al* 1987, 176–7). Eyebury is a small suburb on the south-east side of Eye.

The causewayed enclosure was located within an extinct meander of one of the streams of the ancient, braided Welland system. These watercourses have histories that antedate the Neolithic. The Etton stream was still active while the site was in use. Today it is dry, but its approximate easterly direction of flow has been taken up by the Maxey Cut to the south, a major flood relief channel of the river Welland, constructed in the 1950s. In effect, the straight line of the Cut 'rationalises' a series of meandering stream courses. The principal cropmarks of Maxey 'island' north and west of the causewayed enclosure are shown in Figure 3. The causewayed enclosure is defined by a single interrupted ditch; to the west run the ditches of the Maxey cursus in a north-westerly direction towards the gravel upland of Maxey 'island' and the main Maxey henge complex. The archaeology of this area has been discussed recently and at length (Pryor and French 1985; Simpson *et al* 1993). The present report will focus upon the landscape downstream (south and east) of Maxey 'island', where there have been a number of important recent discoveries (Fig 4).

Close examination of aerial photographs revealed a very faint ditch on approximately the same alignment as the Maxey cursus, but parallel to it and several hundred metres to the east. This ditch ended within the Etton causewayed enclosure, where it was labelled feature 318. A parallel ditch was located to the east. Together, the two ditches are known as the Etton cursus (Fig 4), and they have been seen in section on the freshly machine-cleaned sides of the Maxey Cut; they have also been observed in plan some 400m south-east of the causewayed enclosure, during excavation ahead of the construction of the A15 Glinton bypass (French and Pryor forthcoming). The southerly course of both cursuses is hidden beneath alluvium south of the Maxey Cut.

Fig 3 Cropmarks in the Maxey area, north and west of the Etton causewayed enclosure; almost all the features shown here have been destroyed by gravel extraction (after Pryor and French 1985)

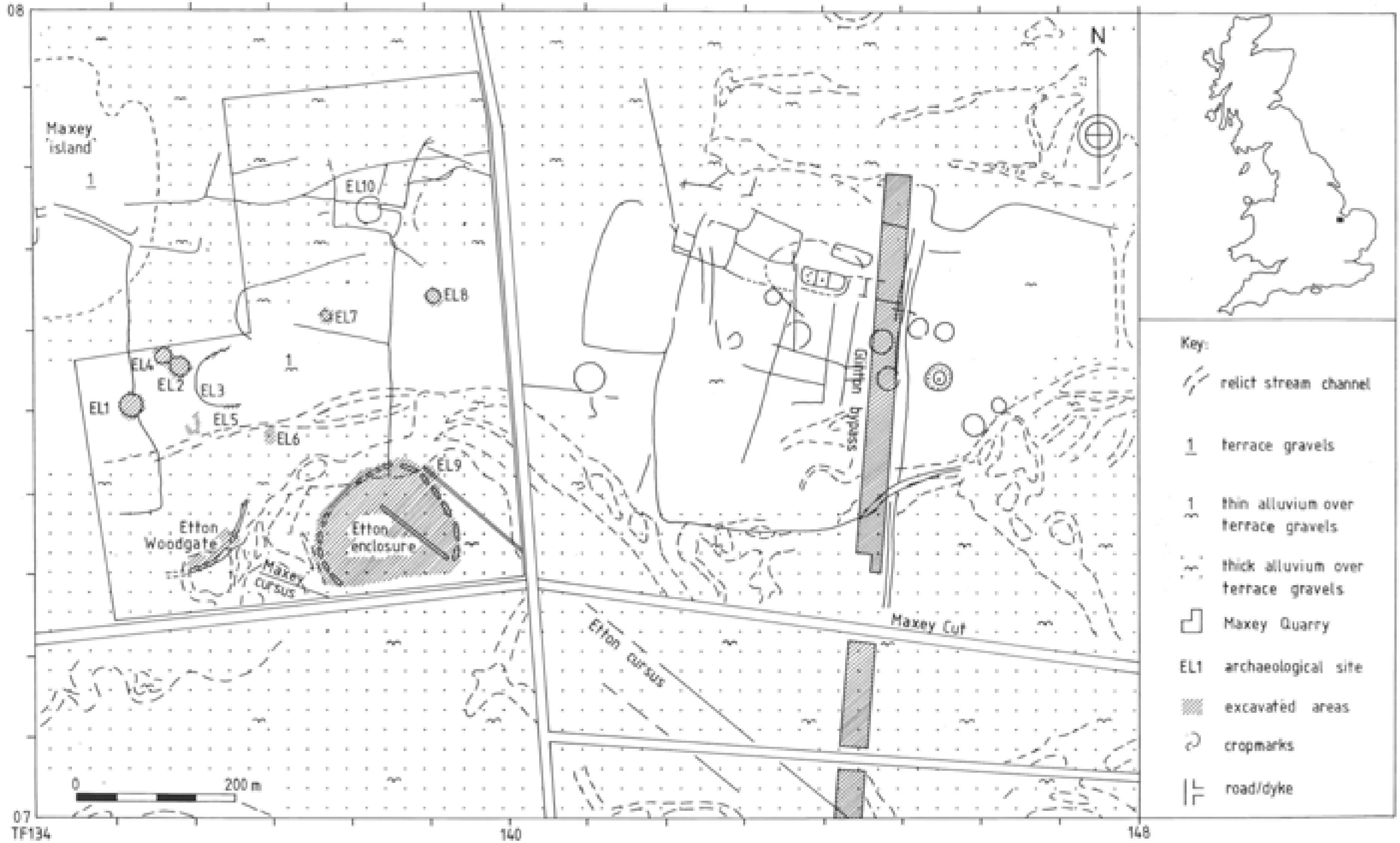


Fig 4 Cropmarks, relict stream channels, and drift geology north and east of the Etton causewayed enclosure. Principal sites of the Etton Landscape (EL) project are numbered

The relict stream channel passed the west and north sides of the causewayed enclosure and seems to have formed the focus for two sites of Neolithic date. One site was located some 500m to the north-east (on the northern side of the stream) and has revealed pottery of Grooved Ware style; the other site has been named Etton Woodgate and lay some 80m to the west of the enclosure, on the other side of the stream. It will be discussed more fully in Chapter 16; it was probably closely associated with the causewayed enclosure (Pryor *et al* 1985).

The complex of sites known as EL9 (EL: Etton Landscape) (Fig 4) lay close to the meander, on its southern side; these sites included the easterly ditch of the Etton cursus and a series of Late Bronze Age pits that contained finds suggestive of occupation debris. Further east, excavation associated with the A15 (Glinton) bypass, north of the Maxey Cut, revealed evidence for a possible Neolithic or earlier Bronze Age field system, perhaps similar to that at Fengate (Pryor 1980). It is significant that both the Late Bronze Age pits and the possible field ditches were located next to the stream channels.

Six ring-ditch sites were located north and west of the causewayed enclosure close to the stream (Fig 4), but on significantly higher ground. The most important of these, known as site EL2, was a complex multi-phased series of concentric ring ditches and pit circles reminiscent of Dorchester, Oxon (Atkinson *et al* 1954; French and Pryor 1992). Of the other ring ditches, one was most probably a simple Class I henge, and others may have been barrows. Another 11 ring ditches are (or were) located downstream of Etton, the farthest lying just 700m to the east-north-east. Etton Woodgate and the various sites and monuments excavated outside the causewayed enclosure since the publication of the report on the lower Welland valley (Pryor and French 1985) will be published together in a report devoted to the Etton Landscape project (French and Pryor forthcoming).

The relict palaeochannel systems in the vicinity of the causewayed enclosure

by Charles French

Sedimentological and micromorphological investigations and aerial mapping of the channel belt systems in the lower Welland valley, between Uffington in the west and the fen edge in the east, have identified two main relict channel belts (3 and 4) located in the vicinity of Maxey/Etton (Figs 4 and 5; French *et al* 1992). These stream channel systems are intimately associated with the prehistoric archaeological sites investigated over the past decade in Maxey quarry and along the course of the A15 Glinton bypass (Fig 4) (French and Pryor forthcoming; Pryor and French 1985).

Channel belt 3

The channel belt 3 system immediately to the north of the causewayed enclosure contains at least two palaeochannel systems that differ in age and morphology. The earliest channels comprise laterally mobile braided river channels of low sinuosity that are relatively wide (20m), but shallow (0.7m) (in Trenches 3 and 4). Organic material interbedded with fluvial gravelly sands in Trench 3 has produced radiocarbon dates of between 10,070 ± 190 BP (GU-5124) and 10,900 ± 200 BP (GU-5123), which indicate a Late Devensian age for this first channel system (French *et al* 1992).

This system is overlain and in some places truncated by a second, much later channel system (in Trenches 1–3). It is an anastomosed (that is, cross-connected with a 'ladder-like' pattern) system with relatively high channel sinuosity, as well as very wide (29–45m) and relatively deep (1.3m) channel dimensions. It is infilled with gravelly sands with interbedded organics and is overlain by silty clays. This system is known to have been active in later Neolithic times and has been dated in relation to archaeological sites at two separate loci: it coalesces with, and overlies, the Middle Neolithic causewayed enclosure ditch at Etton, and it overlies Late Neolithic (Grooved Ware) midden deposits found during the A15 Glinton bypass excavations; these midden deposits were dated between 3320–2890 cal BC and 2480–2140 cal BC (Q-3093, 3860 ± 50 BP; Q-3094, 4220 ± 50 BP; Q-3099, 4375 ± 65 BP; Q-3100, 4180 ± 75 BP) (Roy Switsur personal communication). The primary fill of the channel itself contained interbedded organic material that was dated to 2560–2200 cal BC (Q-3149, 3875 ± 50 BP) (French 1990; French *et al* 1992).

The location of the later Neolithic/earlier Bronze Age channel system 3 effectively places the causewayed enclosure within its floodplain, and more specifically within the northern apex of a major meander loop of the system. As the channel system to the south (channel belt 4) was inactive during this period, a large area of available floodplain land would have existed to the south-west, south, and south-east of the causewayed enclosure. The arrangement of channels goes some way towards explaining the position of the Etton cursus, which runs diagonally north-west–south-east across this area of land.

Channel belt 4

The second system (channel belt 4), situated some 100–150m to the south of channel belt 3, exhibits a complex sequence of meandering, anastomosing palaeochannels with indications of several phases of channel migration and avulsion (lateral change in a river's course) (Fig 5). A date of 6380–5980 cal BC (GU-5156, 7350 ± 90 BP) was obtained from organic material interbedded within the lower sand unit of the first channel in Trench 5 (Linick *et al* 1986; Pearson *et al* 1993).

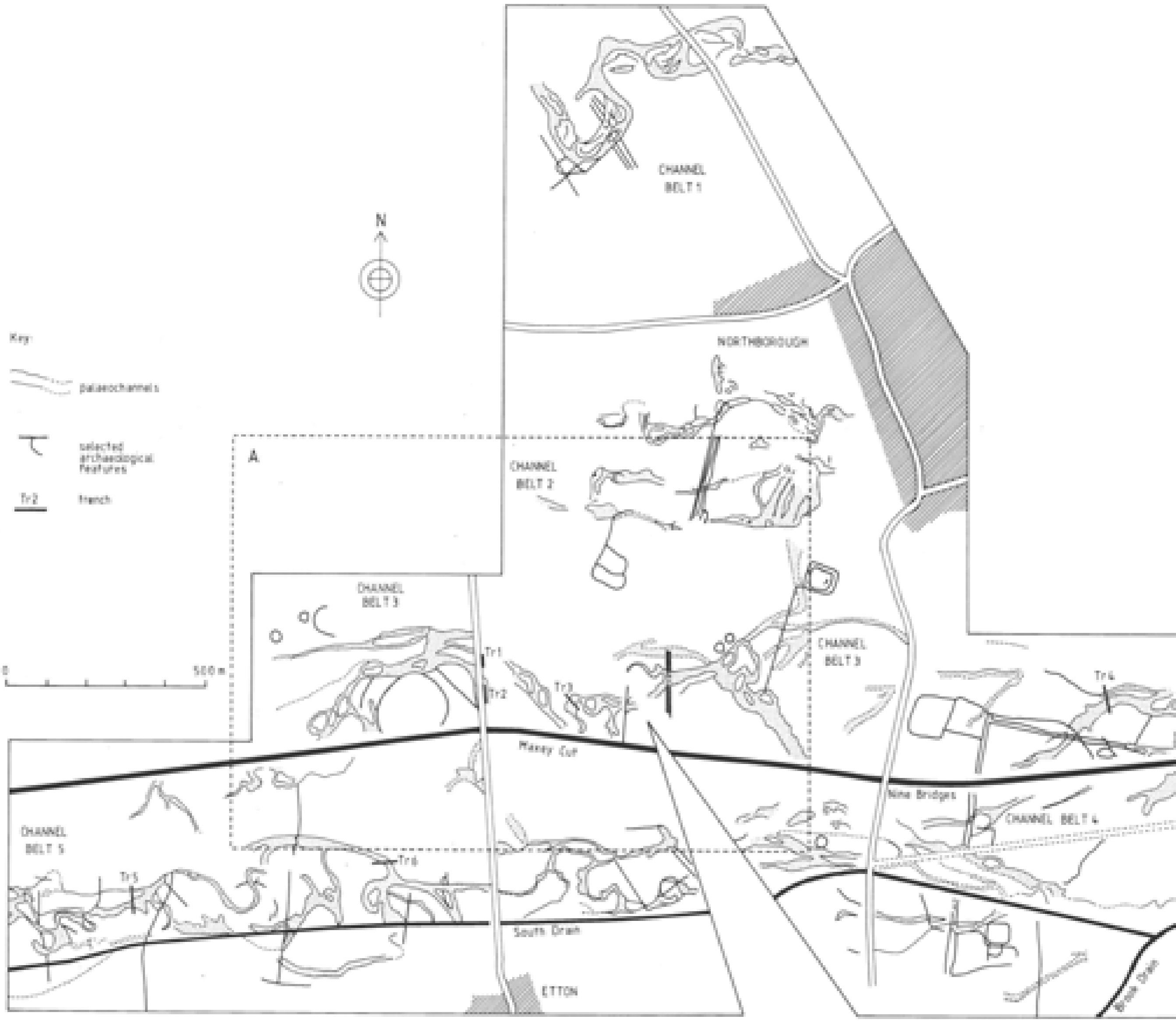


Fig 5 The channel belts between Maxey and Northborough, with the trial trenches and selected archaeological features indicated. The triangular white area in the south represents a gap in the aerial photographs. A = the area of Figure 4

The channels in Trenches 5 and 6 both exhibit gravelly sand fills overlain by structureless silts and clays. These indicate actively migrating meandering channels that were transporting relatively coarse bedload in Early Holocene times (French *et al* 1992).

Micromorphological analyses of material infilling the channels

Micromorphological examination of the infills of the channel belt systems has revealed the following:

1 The earliest, low sinuosity, braided channel system of the Late Devensian period that is evident in Trench 4 of channel belt 3 exhibits a variety of infilling processes and components: localised bank scour and colluviation, slowly moving water, and the intercalation of alluvial fines (silt and clay) under relatively quiet water conditions.

2 The Early Holocene, meandering, anastomosing channel system in belt 4 (Trenches 5 and 6) also exhibits a variety of infilling processes and components. The channel in Trench 6 exhibits a gradual infilling under relatively quiet water conditions, perhaps in a cut-off channel with a considerable alluvial component. On the other hand, the channel in Trench 5 exhibits completely different infilling characteristics: first, the transport and deposition of relatively coarse gravelly sand bedload, followed by dense calcitic sand formation. Although the exact reasons for this are unknown, it may represent the ponding up and rapid drying out of calcareous groundwater within an out-of-use, cut-off channel.

3 The high sinuosity, anastomosing, Neolithic-period channel system in belt 3 (Trenches 1–3) overlies, and in some places cuts, the previous Late Devensian system. It certainly bounded the northern

part of the causewayed enclosure and, in later Neolithic times, encroached on the enclosure ditch (resulting in the remodelling of segment 5 in Phase 1C). The channel contained fills that are indicative of a variety of infilling processes: some initial bank scour, then quiet water conditions and the aggradation of alluvial fine material, perhaps on a seasonal basis; some of this material could have derived from human activity immediately upstream.

4 Micromorphological examination of the associated buried soils situated adjacent to the relict stream channels indicates that they are in the main relatively poorly developed brown earth soils, which have been subject to much alluvial addition and fluctuating groundwater levels. In this, they bear remarkable similarities to buried soils analysed in a comparable floodplain position within the causewayed enclosure (French 1990). There is little doubt that the former active floodplain (already several millennia old by the Neolithic period) inhibited soil development and the formation of well-developed brown earths under contemporary deciduous woodland.

A brief history of research in the area

The light soils of the lower Welland valley are particularly well suited to the formation of clear cropmarks, which may be seen from the air in profusion (Figs 2–4). Accordingly, the region has been the subject of intensive archaeological attention since the Second World War. The principal campaigns of excavation, survey, and publication have been fully chronicled in the report on the lower Welland valley (Taylor 1985b).

The archaeological richness of the lower Welland valley was first brought to public attention by the Royal Commission on Historical Monuments (England) report, *A matter of time* (RCHM 1960); this important survey led directly to the Welland Valley Research Committee's programme of rescue excavation, ahead of gravel extraction. The following years saw a rapid increase in archaeological activity, much of which was focused on the Maxey area (such as Addyman and Fennell 1964; Simpson 1966; 1976; 1981). The remaining excavations of the Welland Valley Research Committee, together with an early Nene Valley Research Committee excavation at Fengate, have been published recently (Simpson *et al* 1993). After 1965, however, little concerted work took place, until late in 1979 when the DoE/English Heritage-sponsored Welland Valley Project was started. It is sad to note that the decade and a half of archaeological inactivity in the area coincided with the expansion of Greater Peterborough; its many roads and buildings were largely made from concrete whose aggregates derived from Welland gravels.

Members of the Fenland Project have excavated and surveyed prehistoric sites in the lower Welland valley of south Lincolnshire (French and Begg 1992; Lane 1992); recently the Cambridgeshire County Archaeological Unit investigated a prehistoric site at Barnack (Fig 1), close to that investigated by the author in the early 1970s (Pryor 1974b). This project had an unhappy history of poor mechanical equipment and over-digging; the report is also difficult to interpret (Reynolds 1992). The principal features investigated include probable Bronze Age ring ditches and a double-ditched 'hengiform' monument; two linear ditches respected the latter, and it was concluded that a very few scraps of weathered Romano-British and Iron Age pottery from the uppermost, tertiary, filling of these features could be used to date them. The stratigraphic evidence for a late date was not convincing, as the ploughsoil they cut through was not precisely dated. The 'hengiform' monument was respected by the linear ditches, and as the latter (so far as one can judge from the sections) originally did not possess a central mound, or substantial banks, it is probable that there was not a long interval between the linear ditches and the concentric ring ditches. Taken together the evidence suggests a remarkable and largely intact second millennium BC (and later) landscape.

The Etton excavation project 1981–7

The Etton causewayed enclosure was discovered by the Nene Valley Research Committee's aerial archaeologist, Dr Steve Upex, in the dry summer of 1976 (Fig 6). The single interrupted ditch was seen to lie somewhat off-centre within a meander of a relict course of the braided Welland system (channel belt 3, see above). The cropmarks were unusually indistinct owing to the thick cover of alluvium that was a feature of that particular part of the floodplain. Part of the western circuit of the ditch lay on land within the boundaries of Maxey gravel quarry.

In November 1981 Mr Bruce Sully of Tarmac Roadstone Ltd, operators of the Maxey Quarry, announced that he planned to expand the quarry up to its eastern boundary. The land had been granted planning permission for gravel extraction, so no further archaeological investigation was required by law, but despite this Mr Sully authorised a mechanical excavator and operator to be loaned to the archaeological team, then in the final stages of the last season of excavation at Maxey (Pryor and French 1985). It was decided that the causewayed enclosure ditch would be searched for and investigated.

Part of ditch segment 1 lay beneath a field boundary ditch, and its location was established by measurement from oblique aerial photographs. A small exploratory trench was opened mechanically using a 360° tracked excavator with a 1m-wide bucket, fitted with teeth that could not readily be removed (Fig 7). By good fortune the aerial photograph measurements were accurate, and the ditch was immediately encountered (Fig 8). The presence of teeth on the excavator's

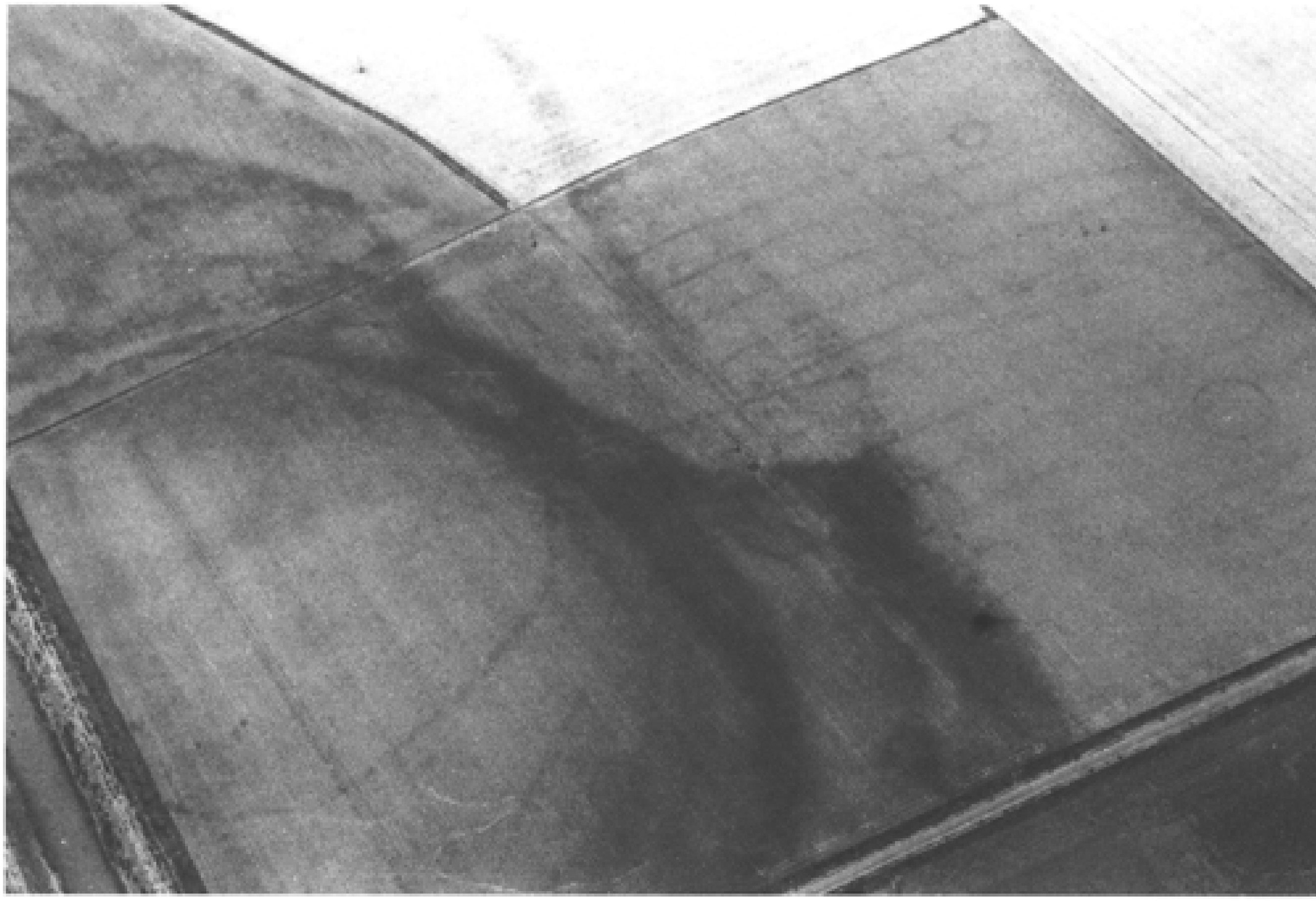


Fig 6 Aerial photograph of the causewayed enclosure as a cropmark, looking north-west, taken in the dry summer of 1976. Photograph by S J Upex, Nene Valley Research Committee

Fig 7 The exploratory excavation, November 1981. This photograph shows the depth of alluvium that had to be removed before the ditch deposits were encountered. The archaeologists shown (left to right) are Charles French, David Gurney, and David Crowther

bucket caused difficulties, so only the upper (secondary and tertiary) layers of ditch filling were removed in this way. The lower (secondary and primary) layers were excavated by hand. The trench was approximately 3m wide and was located directly south of what was later to be known as section 5 (in segment 1).

The lower layers soon gave evidence for waterlogging in the form of twigs, leaves, and pieces of wood. A few sherds of pottery were also found, with the thickened T-shaped rims that are characteristic of Mildenhall and other Middle Neolithic ceramic styles; with the potsherds were woodchips and animal bones. The site's importance was immediately apparent.

The initial, exploratory, trench was sealed with plastic sheeting and partially infilled by Christmas 1981. A brief report on the discovery was published shortly afterwards (Pryor and Kinnes 1982). The main quarry at that time was still some 400m to the west, and the groundwater table had yet to be lowered significantly. The wood was generally in good condition, but it was very soft, with a high water content, and there was little doubt that it would suffer rapidly when dewatering took place – in advance of the quarry's planned expansion eastwards. At the end of 1981 there were reasons to believe that this move would be within the next 18 months.

Excavation of the initial trench was informative, but it was immediately obvious that extensive trial trenching of deeply alluviated areas could do serious damage to very sensitive archaeological deposits, unless features could be seen in their setting. It was clearly essential that excavation of the threatened waterlogged lower ditch deposits should take place as soon as possible, but on a scale sufficiently large to reveal the contexts of

Fig 8 The ditch (segment 1) when first exposed in 1981. The ranging pole (with 0.5m divisions) is at the centre

deposition, both cultural and environmental. The British Museum provided a major grant at very short notice, and work began in the early spring of 1982. By great good fortune the first enclosure ditch segment to be investigated (segment 1) was also the best preserved and most deeply waterlogged, perhaps because of seepage from the adjacent drainage ditch. The excellent condition of the wood from this first season of excavation allowed us to make qualitative assessments of wood deterioration in later seasons of work. The 1982 season also saw the excavation of a deep 'control trench' to monitor groundwater levels and wood preservation in the ditch at a greater distance from the Maxey Cut; the 'control section' crossed the enclosure ditch at segment 4, between sections 98 and 99.

The British Museum-funded excavations of 1982 were concentrated in segment 1 of the enclosure ditch and a small area of land adjacent to it, on the interior. The following summer the funding was provided by the Department of the Environment (now English Heritage), and ditch segment 1 was completed; segment 2 was also excavated, together with a small part of segment 4 (between causeway D and section 41). The latter was excavated under difficult conditions in November and December.

The winter of 1983–4 saw the expansion of the quarry face up to the line of the 1982 'control trench'; unfortunately it was impossible to excavate the 6 or 7m of enclosure ditch between sections 98 (1982) and 41 (1983), which were lost to the quarry. The expanded quarry also necessitated extensive dewatering, whose effects were seriously detrimental to the buried ancient wood and other waterlogged deposits; they were also very rapid. A series of boreholes were sunk to monitor and quantify the dewatering; the results of this survey have been published elsewhere (French and Taylor 1985). The 1984 season began in ditch segment 4 (between section 50 and causeway E) and continued in segment 5, approximately as far east as section 90. Principal results of the first three full seasons of work were published in an interim report (Pryor *et al* 1985).

The season of 1985 witnessed the completion of ditch segment 5 and the stripping and excavation of approximately half of the interior (see Methods of excavation and recording, below). In 1986 the eastern half of the interior was stripped, and ditch segments 6–10 were excavated. The following and final year saw the excavation of segments 11–14, together with the balance of interior features exposed the previous season; we were also able to carry out a rapid salvage excavation on land previously buried beneath spoil heaps, parallel to, and immediately north of the Maxey Cut; this excavation had to be carried out at the 'ballast

Fig 9 General view of the 1982 excavations, showing enclosure ditch segment 1, looking south towards the bank of the Maxey Cut. The prominent sections in the centre are 13 (in front) and 10 (behind)

level', where only the deepest archaeological features could be expected to survive (Crowther 1985). The field phase of the project was completed in October 1987.

Methods of excavation and recording

Initially, the methods and tactics of excavation were almost entirely dictated by the pressing need to recover information from waterlogged deposits before they were destroyed by dewatering. Happily the project was not adversely affected by the availability of land, thanks to the generosity of the Whitton family of Glinton, who allowed us free access to their fields in advance of the quarry. The first three full seasons (1982–4) were largely spent in the enclosure ditch; only when dewatering was well advanced was it considered 'safe' to turn our attention to the interior. At this point, however, it is appropriate to record some observations on preservation (which will be considered in more detail by Maisie Taylor in Chapter 4).

The enclosure ditch deposits of the westerly arc (segments 1–5) were very different in nature from those to the east. The former included large amounts of wood, which were generally absent from the latter. It is the considered opinion of everyone involved with the excavation that this difference was not a result of post-depositional factors alone. While drying out does indeed rapidly destroy the structure of preserved wood, bark may survive for very much longer, and virtually no bark was recorded from segments 7–14. Recently decayed ancient wood will also leave voids with areas of soft, brown, 'peaty-like' organic material; again, none of these 'peaty-like' voids was observed in segments 7–14.

Furthermore, the large Late Neolithic (Phase 2) pits (features 1054 and 1060), located just 20m west of ditch segment 14, did produce bark and twigs in their primary levels. The aurochs skulls from the Phase 2 pit in ditch segment 12 lay upon a split oak plank (Fig 50). This wood was not as well preserved as that in primary levels of the western arc ditch, but it was nonetheless clearly identifiable. This evidence might possibly indicate that the absence of wood, twigs, and other soft organic material from the eastern arc of the enclosure ditch was a result of cultural selection in antiquity. On the other hand, there was no indication that the primary or secondary fillings of ditch segments in the eastern arc had been subject to more than the intermittent effects of groundwater rise and fall (Charles French personal communication). This would suggest that the two halves of the enclosure ditch were either dug at different times or were dug when the adjacent stream was no longer sufficiently active to spill across causeway G, into segments 7–14.

The most time-consuming parts of the excavation were the waterlogged layers of the western arc of the enclosure ditch. Details of these procedures are given by Maisie Taylor in her report on the wood (Chapter 4), but drying out was a serious problem, whether from above (sunlight and wind) or below (dewatering), and special measures were required to retain moisture. The principal record of these excavations is an archive of approximately 80 detailed plans of *et al* wood, with bone and artefacts, at a scale of 1:10. These are housed with the archive in The British Museum.

During the first three seasons of excavation (1982–4) the overlying topsoil and alluvium were removed by the back-actor of a wheeled JCB 3C 180° digger-loader, using a 1m-wide toothless bucket. This machine was kindly loaned to the project by the Maxey Quarry. Lower layers, from the buried soil surface down, were excavated by hand. The seasons of 1985 and 1986 saw the clearing of large areas of ditch and interior; this required two types of machine: a 360° tracked Hy-Mac 580C digger (fitted with a 2m-wide toothless bucket) and various bulldozers that were fitted with extra-wide, low ground pressure, tracks. The bulldozers removed the digger's spoil to an area that was then (erroneously) thought to be unthreatened by quarrying. The bulldozers only ran on unstripped ground, and having wide tracks, caused minimal compaction or track churn. The digger first removed topsoil and alluvium, to expose the (naturally truncated) buried palaeosol. This material was bulldozed clear.

After archaeological investigation (geophysical survey, gridded fieldwalking, and sample sieving), the buried soil was then removed by the digger; this material was 'double handled' by the digger to remove it clear of the excavation. The bulldozer was not allowed to run on the buried soil. The upper (tertiary and later secondary) layers of the ditch were bound by silty clay alluvium and were extremely stiff when wet – and hard when dry. Apart from bone, organic material was not present in these deposits, which for reasons of speed were excavated using spades and garden forks; these finds were recorded by depth and 1m grid square. Any unnecessary delay at this stage would inevitably lead to deterioration in the lower primary levels. Waterlogged lower secondary and primary layers were excavated by trowel and wooden spatula, and all finds were planned as outlined above and by Maisie Taylor below (Chapter 4). Features of the interior were excavated by trowel, and finds were planned *in situ*.

The interior of the enclosure presented practical problems of excavation, largely caused by the depth of alluvium covering the old land surface. The alluvium of the interior was removed by mechanical diggers in the manner just described; this exposed the old (truncated) land surface. A 10m grid was then laid out over this surface. As much time as possible was allowed for weathering (3–4 weeks), and a detailed surface collection was then made, with finds plotted to 1m grid squares. A check against the fieldwalking survey was provided by a series of dry-sieved samples, in which half-barrowfuls of palaeosol were passed through 5mm (¼-inch) dry shaker sieves; this survey took place on a 10m grid. The surface was also surveyed for magnetic susceptibility (1m grid) and soil phosphates (1m and susceptibility (1m grid) and soil phosphates (1m and 5m grids). After the various surveys had been completed, the soil was removed mechanically as before. Archaeological features such as pits and postholes could not be seen through the palaeosol, which therefore had to be removed before further excavation could take place. Non-linear features were excavated by hand trowelling (combined with dry sieving and wet sieving where necessary). Excavation procedures are further described in Chapters 2–4.

The grid

The site grid at Etton was a continuation of that used at Maxey, with approximately the same accuracy of ±1% (Pryor and French 1985, 24). Grid references are based on full Ordnance Survey ten-figure references. They are given in metres easting followed by northing, but for convenience and brevity the intial letters (TF) and the first (ie 10km) digits in each direction are omitted. Thus the site grid 38307390 would be the full Ordnance Survey equivalent of TF 1383007390.

Site records

Apart from the detailed finds plans of the enclosure ditch (see Chapter 4), the recording system and subsequent computer storage and analysis suite of programmes are the same as that employed in the Welland Valley Project (Booth 1985). The system is based upon features and layers. Context sheets were raised in the field and form the basis of the contextual archive. A new sheet was assigned for each layer of each feature. The distillation of the data was then transferred to computer files, using Ben Booth's Maxarc software, now modified to run on MS-DOS (Booth *et al* 1984). The Etton contextual data are stored on database files, labelled EFEAT, which are formatted in ASCII and are dBase compatible. Finds numbers were assigned in the field, and each find was plotted by feature, layer, and grid reference. Because of the large numbers of finds, they were grouped into six principal categories: Bone, Wood, Pot, Flint, and Other (often abbreviated to Ot). Each category of find has its own set of Maxarc data files, which may be consulted in the archive.

2 The excavation of the enclosure ditch

Introduction

This chapter is in six parts. The Introduction is followed by a general description of the enclosure ditch. Next is a detailed description of each ditch segment in the western arc arranged in numerical order, and then a detailed description of each ditch segment in the eastern arc, arranged in numerical order. This is followed by a description of the section drawings, and the chapter concludes with a discussion.

The single enclosure ditch consisted of 14 visible segments, which were numbered 1–14 clockwise from the south-west; the intervening causeways were labelled A–O, also clockwise from the south-west (Fig 10).

Ditch deposits

The primary Phase 1 infilling deposits of the enclosure ditch did not accumulate within the ditch by natural processes alone. In certain cases, primary deposits may have been affected post-depositionally by water action, but the majority, particularly on the eastern side of the enclosure, represent deliberate backfilling. In the western arc (segments 1–5), the ditch either remained open (segments 3–5), or was maintained clear by recutting (segments 1–2). Cultural material (mainly wood and bone) then accumulated or was placed in the muds of the ditch bottom.

In the eastern arc (segments 6–14), the usual pattern of backfilling began with the placing of arranged items (usually wood, bone, pottery, and flint) in the bottom of the ditch or the ditch recut. The nature and significance of the various structured arrangements of material will be discussed later, but it is sufficient to observe at this juncture that many of the arrangements were probably deliberate, and are believed to have been associated with ritual or symbolic acts (Richards and Thomas 1984). The structured deposits were often covered over with gravel, and in many cases the cut or recut was filled in – probably to the surface. In about half of the recuts of the eastern arc it was possible to discern stratigraphic evidence for backfilling (Charles French personal communication); in the remaining cases some form of covering is indicated by the fresh condition of the bone and pottery, and by the structured arrangement of the material in the ground. This is particularly true of the higher, Phase 1C, linear deposits, which show no obvious evidence for post-depositional disturbance by dogs or foxes, as one might otherwise expect. It has been necessary to briefly outline this process in order to understand the arrangement of this chapter.

The structured deposits of the enclosure ditch were complex, especially in the eastern arc, and it has not proved possible to describe each in sufficient detail in this report. A large number have therefore been illustrated in plan, and the finds are labelled in the captions. It should also be noted that there is every possibility that many of the more subtle structured depositions were not recognised by the excavators. The descriptions of the deposits within each ditch segment will draw attention to unusual features and will attempt to characterise material found in the various layers.

Segments and sections

We will see that the enclosure ditch can be divided readily into two approximately equal-sized arcs, separated by the widest causeway, F, to the north. The west–east division of the enclosure ditch is fundamental to the discussion that follows; the western arc consisted of ditch segments 1–5; the east was represented by segments 6–14. In the interests of brevity, as much information as possible has been presented in tables. The enclosure ditch was subdivided by transverse sections in order to plot more accurately the distribution of finds in the upper (non-primary) layers. The section faces were numbered individually; finds were therefore attributed to layers between two numbered sections – for example, between 13 and 14.

Not all sections were in the end used, but most are shown on Figure 11. A concordance list of ditch segments and section numbers is given in Table 3. Table 2 lists the illustrated ditch sections by segment. Table 4 summarises the phasing data in relation to the illustrated sections. Table 5 gives the lowest levels of the layers that represent the various phases within the ditch (this is important information on a site with a high groundwater table). Dimensions of each ditch segment are given in Table 1. The report must necessarily treat certain aspects of each ditch segment elsewhere (such as the wood – see Chapter 4).

Finds

Various categories of finds from within the primary (Phase 1) deposits of the western arc were plotted (for example, Figs 12, 140). An attempt was made to repeat the process for the eastern arc, but the sheer quantity of material (especially bone) made the task impossible. General patterns seem to be significant on the western side of the enclosure, whereas detailed patterns are more informative in the eastern arc.

General description

The causewayed enclosure was surrounded by a single segmented ditch, consisting of 14 visible segments. The segments have been numbered sequentially 1–14, working clockwise from the south-west; causeways

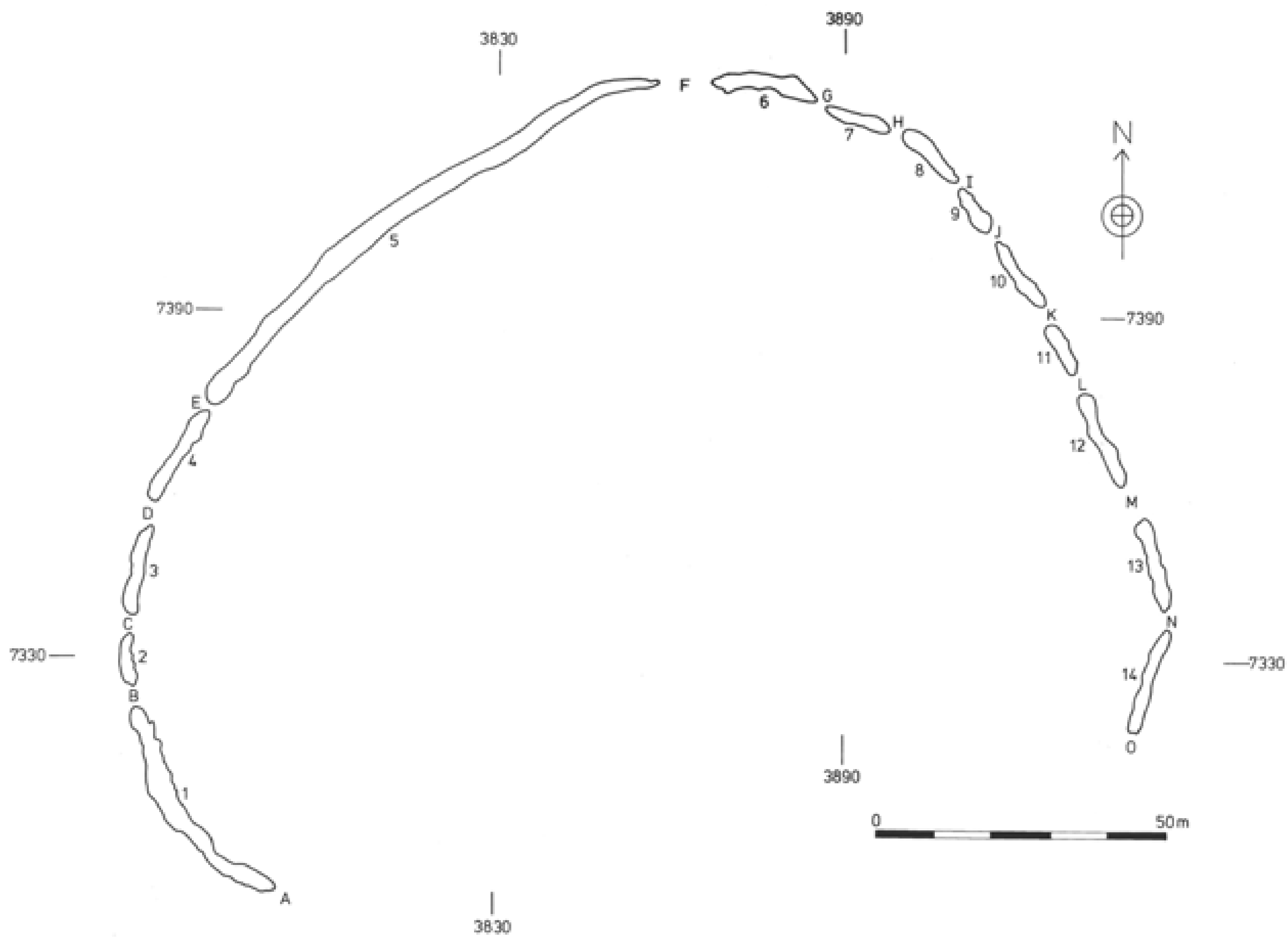


Fig 10 Plan of the causewayed enclosure showing the location of ditch segments and causeways

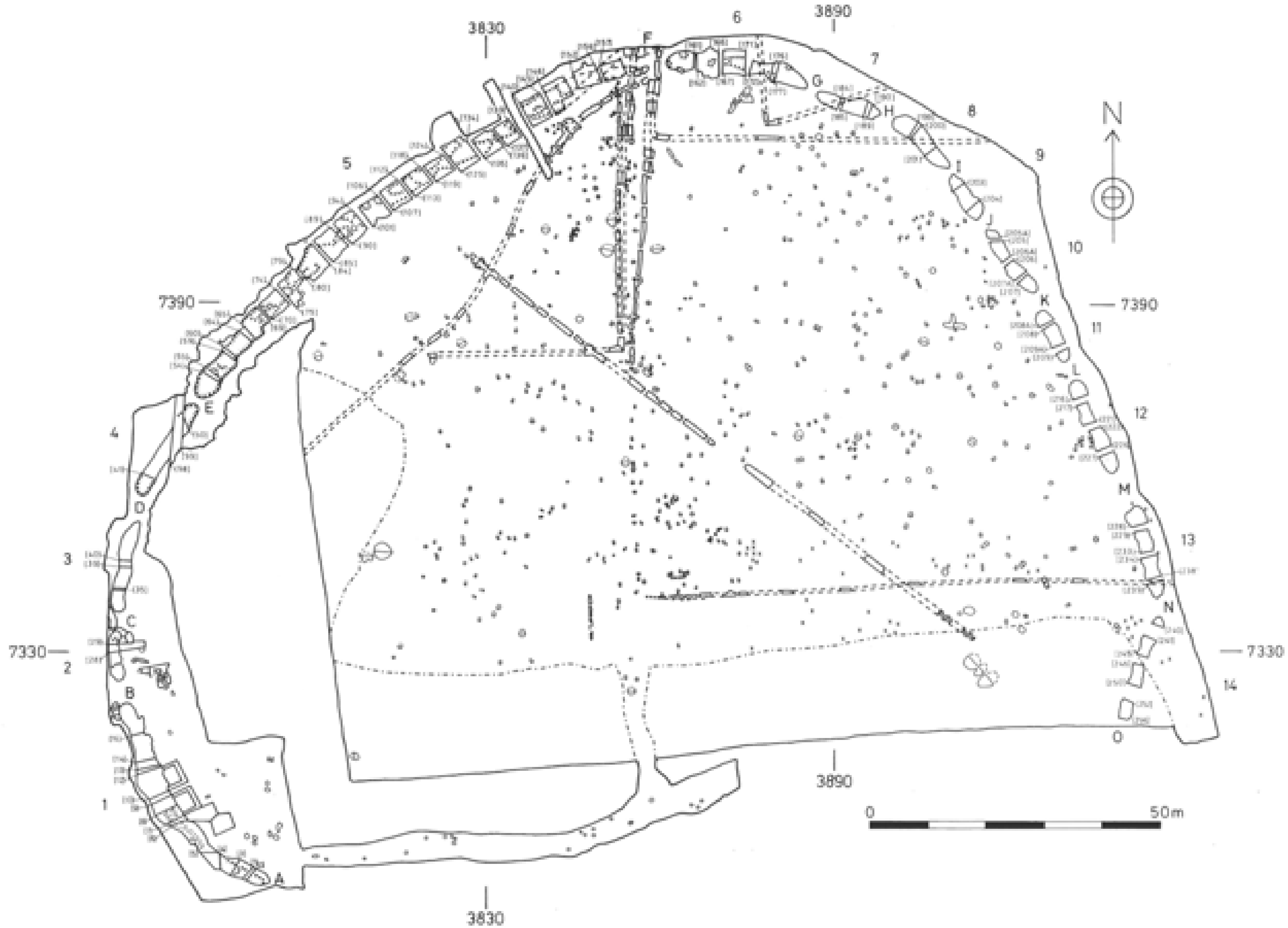


Fig 11 General plan of the excavations: the enclosure ditch segments are numbered 1–14 and the causeways A–O. The numbers of the major sections are in square brackets – for example, [10]. Section lines across interior features are also indicated. Site grid lines at 3830 and 3890 (eastings) and 7330 and 7390 (northings) are shown. The dot-and-dash line represents the boundary of the area of detailed recording. The dashed lines represent visible but unexcavated lengths of ditches

Table 1 Dimensions (in metres) of the enclosure ditch segments and causeways; the eastern and western arcs are separated by causeway F

western arc	*width*	*length*	*depth*
segment 1	3.00	42.00	0.90
segment 2	2.50	8.80	0.90
segment 3	2.30	16.20	0.75
segment 4	2.10	18.10	0.65
segment 5 (Phase 1A/1B)	4.00	81.00	0.75
total	–	166.10	–
average	2.78	33.22	0.79
causeway B	3.50		
causeway C	3.10		
causeway D	3.75		
causeway E	1.25		
total	11.60		
average	2.90		
causeway F			
Phase 1A/1B	25.50		
Phase 1C	10.00		
eastern arc	*width*	*length*	*depth*
segment 6	2.50	17.20	1.10
segment 7	2.10	11.50	0.90
segment 8	2.60	12.80	0.95
segment 9	2.75	8.80	1.00
segment 10	2.35	13.50	1.05
segment 11	2.50	9.80	0.85
segment 12	2.25	17.30	0.95
segment 13	2.50	16.50	1.00
segment 14	2.20	19.00	1.05
total	–	126.40	–
average	2.42	14.04	0.98
causeway G	1.90		
causeway H	2.30		
causeway I	1.00		
causeway J	2.10		
causeway K	3.10		
causeway L	3.40		
causeway M	6.60		
causeway N	3.00		
total	23.40		
average	2.92		
segments of both arcs			
total	–	292.50	–
average	2.55	20.89	0.91
causeways of both arcs			
total	35.00		
average	2.92		

between each segment were given letters in the same way (causeways A–O) (Fig 11). The southern quarter, or so, of the ditch is all that survives; it lies protected and hidden beneath the bank of the Maxey Cut (Fig 4). Observation of the south side of the bank during engineering work (which necessitated lowering the water level in the Cut) showed that the ditch did not extend south of the bank.

Dimensions

The plan of the ditch was very roughly circular to oval, with external diameters of about 187m (east–west) and 145 to 155m (north–south). By and large, the width of individual ditch segments was remarkably uniform, ranging between about 3 and 5m; the depth, too, was generally uniform and may have been limited by the high groundwater; the ditch was rarely dug deeper than about 1.25m below the base of the surface alluvium. The lengths of individual ditch segments, however, varied considerably, as did the width of the causeways – see Table 1 for dimensions.

Sections

The ditch was excavated in units of 4m length; these were first excavated in opposed quadrants (in segments 1–4), but this practice was dropped after the start of dewatering in the adjacent quarry, when speed became a prime consideration. From time-to-time, longitudinal sections were retained (for example, Fig 65), but these were generally found to be uninformative, and in those places where linear deposits ran down the centre of the ditch, they were a positive hindrance. Section lines are planned on Figure 11, and selected section drawings are given in Figures 59–75. A summary of illustrated sections within each segment is given in Table 2, while Table 3 is a concordance list of ditch segments and their sections.

Phasing

The criteria upon which the phasing of the ditch was based are discussed in Chapter 12. In general terms, there was good evidence for recutting in both western and eastern arcs, but by no means on the same scale or frequency as Briar Hill (Bamford 1985, 17–37). With the exception of the Phase 2 pits and some of the deeper Phase 1C recuts, it was rare for a recut to remove material that had been placed in the ditch (and covered) in an earlier period.

Stratigraphically the phasing appeared quite convincing, but in practice it was often difficult to be certain whether deposits of Phase 1C date in one segment were actually later than those of apparent Phase 1B date in a neighbouring segment. It was therefore decided to analyse the phasing stratigraphically as one exercise (Tables 4 and 5), and then to test the results against other aspects of the data. This comparison is considered in the Discussion at the end of this chapter.

The evidence for phasing was undoubtedly affected by the different sedimentary circumstances of the western and eastern arcs. In particular, the infilling of the eastern arc contained very much more sand and gravel (the result probably of backfilling); as a result, the three sub-phases of Phase 1 could be more readily discerned in this arc, whereas they could only be distinguished very tentatively in the western arc, and only

Table 2 Summary of illustrated sections of the enclosure ditch arranged by ditch segment

segment	section	figure
western arc		
1	1, 2	59
	5, 6	60
	7, 10	62
2	28, 29	63
3	31	63
	35, 39, 40	64
4	41	64
5	longitudinals	65
	54, 59, 64	66
	69, 79	67
	74, 84, 89, 94	68
	106, 118, 125	69
	139, 146	70
eastern arc		
6	161, 171, 176	71
7	184, 189	72
8	200	72
9	203, 204	73
10	206, 207	73
11	208A, 209	73
12	216, 221, 227	74
13	228, 234, 238	75
14	245, 250	75

Table 3 Sections through the enclosure ditch segments (for section lines see Fig 11)

segments	sections
western arc	
1	1–16
2	28–29
3	25–40
4	41–50, 98–99
5	54–157
eastern arc	
6	161–172
7	184–190
8	199–201
9	203–204
10	205–207
11	208–209
12	216–227
13	228–239
14	240–256

in segments 1 and 2 (where there was sufficient evidence for recutting). Possible reasons for the contrasting nature of the ditch sediments in the eastern and western arcs will be considered in the final section of this chapter.

Three principal, primary, phases could be distinguished, all of Middle Neolithic date (in ceramic terms they were characterised by pottery in the Mildenhall and Fengate styles). The first phase, 1A, saw the initial excavation of the ditch, probably of the entire circuit. In Phase 1B the segments of the Phase 1A ditch were recut, perhaps several times; these recuts were generally backfilled with soil and gravel and contained material (artefacts and ecofacts) that had been placed in the ground. There was no positive evidence that the entire circuit of the ditch was recut during the various episodes of Phase 1B; indeed, it could be argued that the recutting could represent a series of 'events' that may only have taken place in one or two ditch segments. We have already noted that the presence of causeways makes it very difficult both to prove or disprove such hypotheses. Certain indications, such as the sudden increase in magnetic enhancement between segments 9 and 10 (Fig 79), could have chronological significance, but they could equally be explained in other ways.

The final Phase 1C recut was somewhat narrower than the earlier recuts and also contained material placed in the ground; unlike earlier recuts, however, this material does not appear to have been deeply buried beneath clean sand or gravel. Phase 2 is best considered as an intermittent continuation of Phase 1C, but of Late Neolithic date – the deposits are characterised by Peterborough pottery. This phase consisted of a series of pits or scoops cut through the ditch from the upper layers. Most of these recuts were confined to the eastern arc; segment 1 is the principal exception in the western arc.

Peat channel

When the phasing of the ditch was first worked out, a peat-filled channel in segment 1 was considered to be man-made and contemporary with a very early phase of the enclosure ditch; indeed, pollen from this channel was included within the pollen diagram of the main interim report (Pryor *et al* 1985, fig 9). It was not until late in the post-excavation process that it was realised that the peat channel predated the enclosure ditch and was not man-made. This channel had been ascribed to Phase 1, and the main use of the site was therefore placed within Phases 2A–2C, with subsequent Phases 3–6. Latterly the phasing was revised, as it appears in this report, with the main use of the site within Phases 1A–1C (and subsequent Phases 2–5). Much of the archive (for example, finds bags, context sheets) still retains the earlier version of the site phasing.

Western and eastern arcs

During the excavation it was noticed that the nature of the ditch and the deposits within it changed markedly on either side of the northern causeway, F. We will discuss further aspects of this change in the Discussion,

Table 4 Securely dated layers of the ditch segments presented by phase and illustrated section number

western arc	layers
segment 1	
section 1	
pre-Neo peat	5
Phase 1A	6–8
Phase 1B	0, 1
Phase 1C	2, 3
section 5	
pre-Neo peat	5
Phase 1A	2, 3
section 6	
pre-Neo peat	4
Phase 1A	2, 3
section 7	
pre-Neo peat	6
Phase 1A	5
Phase 1B	3, 4
section 10	
pre-Neo peat	6, 7
Phase 1A	5
Phase 1B	3
segment 2	
section 28	
Phase 1A	3, 4
Phase 1B	5
Phase 1C	1, 2
section 29	
Phase 1A	4
Phase 1B	3
Phase 1C	1, 2
segment 3	
section 31	
Phase 1C	1
section 35	
Phase 1A	3
section 39	
Phase 1A	3, 4
section 40	
Phase 1A	3
segment 4	
section 41	
Phase 1A	3

western arc	layers
segment 5	
section 54	
Phase 1A	3
section 59	
Phase 1A	3
section 64	
Phase 1A	3
later events	stream channel overlaps segment 6
section 69	
Phase 1A	2, 3
later events	stream channel overlaps segment 6
section 74	
Phase 1A	2?
later events	stream channel overlaps segment 6
section 79	
Phase 1A	2
Phase 2	1?
later events	stream channel overlaps segment 6
section 84	
Phase 1A	2?
later events	stream channel overlaps segment 6
section 89	
Phase 1A	3
later events	stream channel overlaps segment 6
section 94	
Phase 1A	3
later events	stream channel overlaps segment 6
section 106	
Phase 1A	2
section 118	
pre-Neo stream channel	present
Phase 1A	3
section 125	
pre-Neo stream channel	present
Phase 1A	2
section 139	
pre-Neo stream channel	present
Phase 1A	2
section 146	
pre-Neo stream channel	present
Phase 1A	2

Table 4 ***continued***

eastern arc		alternative interpretation
segment 6		
section 161		
Phase 1C	2	
Phase 2	1	
section 171		
Phase 1A	3?	
section 176		
Phase 1C	?3	
Phase 2	6	
segment 7		
section 184		
Phase 1A	3	
section 189		
Phase 1A	7, 8, 10	
Phase 1B	6	
Phase 1C	3	
segment 8		
section 200		
Phase 1A	6	
Phase 1B	5	
Phase 1C	2	
segment 9		
section 203		
Phase 1A	4	4
Phase 1B	6	3, 5, 6
Phase 1C	3, 5	2
Phase 2	1	1
section 204		
Phase 1A	4	4
Phase 1B	5, 6	5, 6
Phase 1C	3	2
Phase 2	1	1
segment 10		
section 206		
Phase 1A	4, 7	
Phase 1B	5, 6	
Phase 1C	2, 3	
Phase 2	1	
section 207		
Phase 1A	6–8	
Phase 1B	2, 5	
Phase 1C	3	
Phase 2	1	

eastern arc		alternative interpretation
segment 11		
section 208A		
Phase 1A	6–8	
Phase 1B	5	
Phase 1C	3?	
Phase 2	1, 2	
section 209		
Phase 1A	6, 7	
Phase 1C	5	
Phase 2	1–4	
segment 12		
section 221		
Phase 1A	5–7	5–7
Phase 1B	4	
Phase 1C	3	3, 4
Phase 2	1, 2	1, 2
section 227		
Phase 1A	3, 6	3, 6
Phase 1B	5	
Phase 1C	4	4, 5
Phase 2	1, 2	1, 2
segment 13		
section 228		
Phase 1A	5, 7	
Phase 1B	4, 6	
Phase 1C	2, 3	
Phase 2	1	
section 234		
Phase 1A	8	
Phase 1B	3, 6, 7	
Phase 1C	5	
section 238		
Phase 1A	10, 11	
Phase 1B	4, 9	
Phase 1C	3	
segment 14		
sections 245 and 250		
Phase 1A	5, 6	
Phase 1B	3, 4	
Phase 1C	2	
Phase 2	1	

Table 5 Enclosure ditch lowest levels (Phases 1A–2 deposits), in metres above OD

western arc

	segment 1								*segment 2*		*segment 3*				*segment 4*		*segment 5*	
section	1	3	5	6	7	9	10	12	28	29	31	35	39	40	41	50	54	59
Phase 1A	6.00	6.08	6.38	6.02	6.24	6.38	6.30	*c*6.15	6.48	6.60	–	6.42	6.35	6.36	6.32	6.32	6.58	6.47
Phase 1B	6.25	6.42	–	–	6.46	6.40	6.44	6.32	6.74	6.66	–	–	*c*6.63	*c*6.42	–	6.63	6.80	–
Phase 1C	–	–	–	–	–	–	–	–	–	–	6.86	–	–	–	–	–	–	–

	segment 5															
section	64	69	74	79	84	89	94	106	112	118	125	131	139	140	146	156
Phase 1A	6.48	6.70	*c*6.67	6.38	*c*6.61	6.47	6.37	6.35	6.57	6.24	6.48	6.28	6.34	6.27	6.24	6.47
Phase 1B	–	–	–	*c*6.63	–	–	–	–	–	–	–	–	–	–	–	–

eastern arc

	segment 6						*segment 7*			*segment 8*		*segment 9*		*segment 10*			*segment 11*	
section	161	166	171	172	176	179	184	185	189	200	201	203	204	205	206	207	208A	209
Phase 1A	–	*c*6.64	*c*6.18	6.40	*c*6.02	6.52	6.38	6.34	6.34	6.33	6.28	6.38	6.25	6.37	6.27	6.25	6.22	6.35
Phase 1B	–	*c*6.70	–	–	–	–	6.43	6.39	6.51	6.43	6.24	6.56	6.30	6.40	6.49	6.33	6.25	6.67
Phase 1C	*c*6.56	*c*6.78	–	–	–	–	–	6.89	6.76	6.72	6.46	6.83	6.66	6.70	6.60	6.53	6.46	6.85
Phase 2	–	–	–	–	–	–	–	–	6.98	–	–	7.08	6.81	6.89	6.90	6.81	6.86	6.96

	segment 12					*segment 13*			*segment 14*	
section	209A	216	221	222	227	228	234	238	245	250
Phase 1A	6.59	6.30	6.31	6.25	6.21	6.45	6.30	6.11	6.06	6.40
Phase 1B	6.73	6.30	6.78	6.44	6.51	6.50	6.63	6.47	6.33	6.57
Phase 1C	6.73	6.76	6.89	6.64	6.71	6.79	6.88	6.59	6.78	6.78
Phase 2	7.18	6.88	7.03	6.92	7.05	7.00	–	6.76	6.91	6.91

below, and in Chapter 16, but for present purposes it is sufficient to note that the segments of the western arc were of more variable length and were generally wider (Table 1). They also contained an abundance of organic material that was largely absent in the segments of the eastern arc. Detailed descriptions (below) of individual ditch segments are therefore arranged in two groups: the western arc, followed by the eastern arc.

In the western arc of the ditch, material from the uppermost layers (1 and sometimes 2) appeared to have been washed in and was therefore probably residual; it contrasts markedly with that from the primary layers below (this is particularly true of the animal bone, discussed in Chapter 9). The greater thickness of secondary and tertiary deposits in the western arc reflects the fact that lower, primary, deposits were not so deeply or thoroughly backfilled; the ground was also subject to more frequent (and earlier) inundation.

Methods of excavation

The methods of any archaeological excavation must be directly dependent on the project's research goals. From the outset it was realised that the material preserved in the lower ditch deposits was in excellent condition, and it was of prime importance to map its distribution and occurrence. By and large, significant patterning within a distribution of finds can only be observed if a sufficiently large area is exposed at any one time. Our original intention, following the then current experience at Briar Hill, was to focus attention on the phasing and succession of the many enclosure ditch recuts that we confidently expected. In practice, we found that it was impossible to observe horizontal patterning within the numerous small opposed quadrants using the Briar Hill technique of excavation (Bamford 1985, 6). We also saw little sense in recording numerous recuts for their own sake, and we reasoned that patterns within the horizontal distribution of material might help to explain why the ditch had been recut so many times. Inevitably we would fail to identify a few recuts by abandoning the use of opposed quadrants, but in retrospect, the general integrity of the many structured deposits, particularly of the eastern arc, leads us to believe that few recuts of any significance did in fact elude us.

All Neolithic deposits (that is, Phases 1 and 2) were excavated using trowels or similar small hand tools. Wherever possible, detailed plans of finds distributions were prepared, at a scale of 1:10. These are stored in the site archive at The British Museum. Upper (secondary and tertiary) deposits were removed using garden forks and spades, and finds were bagged by 1m square, without the preparation of distribution plans. Ditch segment 14 was excavated under salvage conditions.

The western arc ditch segments

General description

The general plan of the site (Fig 11) shows that the ditch segments of the western arc (segments 1–5) were more varied in size and length than were those of the eastern arc (see also Table 1). They were laid out in a gently curving pattern, without any obvious straight section. Segments 1 and 5 were the two longest, and segment 2 was the shortest of the entire enclosure ditch (Fig 12).

Causeway F was the widest on the site in both Phases 1 and 2. It was probably the principal entrance to the enclosure. Causeway B was also slightly wider than average (Fig 13), and for reasons that will be discussed below (and in Chapter 3) was also considered to be an entranceway.

Phasing will be discussed more fully below, but there was evidence for a short length of possible blocking ditch in causeway C, which might tentatively be placed within Phase 1C. There was also evidence for an extension of the butt end in segment 1. Segment 5 was undoubtedly very wet in Phase 1C. Probably in this phase its butt end at causeway F was extended north-eastwards, to partially restrict that causeway. Apart from the extensions of segments 1 and 5, the use of the ditch segments was consistent throughout Phase 1, with each sub-phase respecting previous activity.

The survival of organic material

The segments of the western arc were generally more affected by water than those of the eastern arc. The upper ditch layers often contained a high proportion of silty clay alluvium that had to be removed rapidly, before it dried into a brick-like solid mass. During the removal of these upper layers all finds were kept and recorded, but no special efforts were made to finely subdivide the matrix; there can be no doubt that many bone and flint fragments were not recovered during this rapid excavation.

Large quantities of organic material were present in all the earlier deposits of ditch segments 1–5. As soon as the highest waterlogged and gravel-rich deposits were encountered, far more careful methods of excavation and recording were adopted. All waterlogged deposits were excavated under shelter (see Fig 17). Details of the excavation techniques employed on the waterlogged deposits are given in Chapter 4.

The waterlogged finds from segment 1 were recovered in the best condition, but this is probably due to the subsequent rapid drying out that took place after the turning on of large pumps in the neighbouring quarry in June 1983 (French and Taylor 1985, fig 4). The effects of drying were severe during the excavation of segment 5 in 1985. In this instance the very lowest levels, lying directly upon the freely draining natural gravel, were seriously affected by water loss, whereas material from within the higher ditch deposits was protected by thesilt-rich and clay-rich matrix of the ditch filling.

The earlier deposits of ditch segments 1 to 4 were laid down in waterlogged conditions, but they do not appear to have been post-depositionally affected by water action. The movement of water in these instances was probably up and down – reflecting the seasonal rise and fall of the groundwater table. In segment 5, on the other hand, there was evidence that the sides and bottom of the ditch had been disturbed by the growth of shrubs, with this ditch segment kept very wet by the ingress of water from the nearby stream channel. In segment 5 the ditch bottom was flat, but irregular, and if activities actually took place *in situ*, the ground conditions must have been wet and muddy. The south-westerly sections (as far as perhaps section 64) of segment 5 were more regular in profile and showed no obvious signs of disturbance; this area was probably not affected so severely by the flooding that took place in segment 5 towards causeway F. The sedimentary history of the deposits in segment 5 is discussed in Chapter 12.

Segment 1

Ditch segment 1 (Fig 14) was the first to be investigated. It was located in the initial exploratory trench of 1981 (Fig 8) immediately south of what was later to be called section 6. The butt end at causeway A was marked by a deposit of a complete Mildenhall bowl (M3) that had been placed upon a birch bark mat (Wood 184) on the bottom of the ditch. The mat, approximately 300mm square, was revealed when the vessel was block lifted prior to transport to The British Museum. The 'placed' deposit was at the centre of the ditch at the very butt end, at grid 37897290.

Five metres west of the butt end at causeway A was another earlier possible butt end, about 200mm deep. It was not 'matched' by another early butt end in segment 1 at causeway B. Any butt-end deposit would have been removed by the recutting of the ditch immediately prior to the deposition of the complete pot and birch bark mat. The dating of this possible very early phase of the ditch can only be guessed, but it does provide an indication of earlier activity on the site, all evidence of which has been removed by the cutting of the Phase 1A ditch.

The lowest levels probably dated to Phase 1A and did not appear to have been truncated or cut into by later recuts; they contained quantities of woodworking debris and an almost intact wooden axe haft (Wood 409). The haft lay a few millimetres off the ditch bottom, in layer 8, between sections 2 and 3; it had been abandoned after part of the axe socket had split off, presumably during use in the ditch.

A small pit, F40, was found at the outside edge of the ditch, just north of section 4 (Figs 14 and 15). It was steep sided, but did not appear to have been

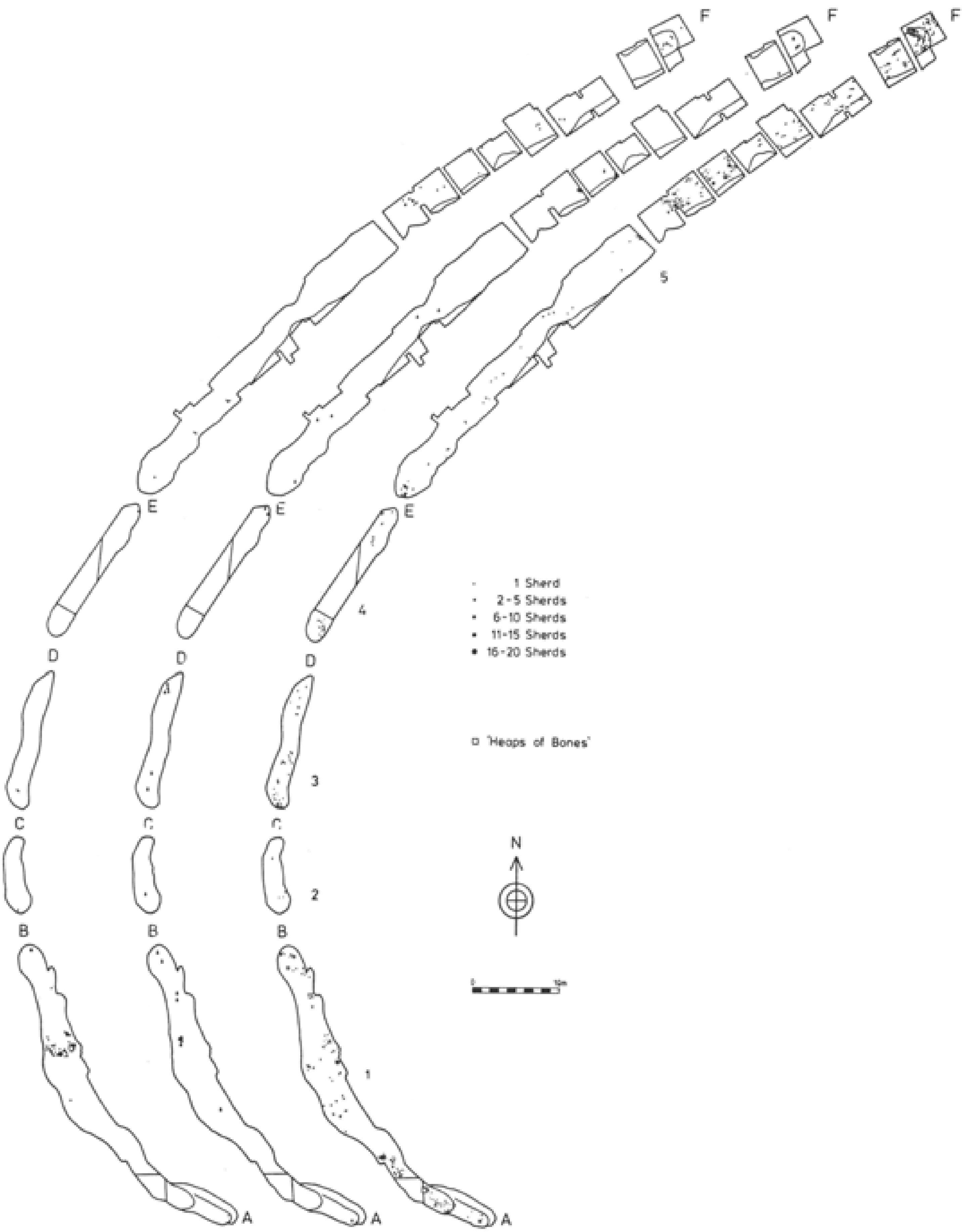


Fig 12 The enclosure ditch of the western arc, with ditch segments 1–5, causeways A–F, and the position of the sections. The three plans show the Phase 1 distribution of pottery, worked flint, and bone

Fig 13 Causeway B during excavation, November 1983, looking east towards the interior. The two 1m scales are in enclosure ditch segment 2, with section 28 at the extreme left; the excavated ditch (right) is segment 1

deliberately backfilled. Its lowest 3.10m, or so, was waterlogged and yielded quantities of twiggy material, leaves, and so on. This material concealed a complete cushion quern or pounder that had been placed centrally in the pit, face downwards (Fig 15); the leaves and twigs could have served as packing material. The pit had presumably been dug to receive the quern. This pit was similar to other 'small filled pits', except for its waterlogged location and the fact the filling did not contain any bone, flint, pottery, or charcoal.

Towards the centre of the segment, immediately south of section 6, was a peat-filled former stream channel (Fig 106). The channel extended for approximately 6.6m south of section 6 and could also be traced as far north as section 10. The peat channel more or less followed the curve of the ditch and seemed to be cut into the bottom of the Phase 1A ditch. The consensus of environmental opinion is that the channel substantially predated the enclosure and was not of human origin (Charles French, Mark Robinson, and Rob Scaife personal communication). The channel is further discussed in Chapter 11.

North of section 6 the ditch became slightly deeper and more waterlogged. Pottery, which had been absent in primary levels after the initial butt-end deposit, began to occur again. It should be noted that the half-dozen sherds recovered in the initial 1981 exploration (Pryor and Kinnes 1982, fig 2) do not appear on Figure 12. North of section 10 was a substantial scatter of often large sherds of Mildenhall pottery, associated with worked wood and animal bone (see Fig 128). The wood was spread across the ditch, whereas the large potsherds and animal bones were concentrated around the inner edge (Fig 128, foreground). In the field the deposit gave the impression that the bone and pottery had been thrown in from the interior, whereas the wood had been worked and discarded *in situ* in the ditch. The lowest ditch deposits containing wood north of section 10 also produced evidence for recutting, which was sometime quite clearly defined (see Fig 130).

North of section 14 the ditch and the waterlogged deposits became shallower. The butt end at causeway B contained much roundwood and was marked by a bundle of cattle ribs (Fig 16), which was placed on the ditch bottom in deposits that can probably be dated to Phase 1B. The area around the cattle ribs produced two or three dozen hazelnut shells, both broken and complete. It is possible that these nuts were the dispersed remains of another butt-end deposit; they would have been readily disturbed by rising water levels.

Fig 14 Enclosure ditch segment 1 looking south-east towards section 1. Causeway A is behind the baulk. In the foreground is pit F40

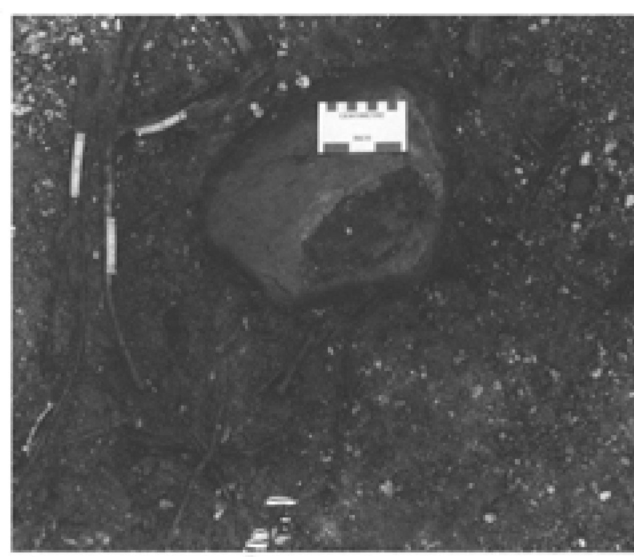


Fig 15 Pit F40 with an inverted cushion quern or pounder (Other 209) in waterlogged deposits

Segment 1 may have stayed open as a shallow ditch in Phase 2, but there were also indications of at least two smaller pits belonging to this phase, one in section 3 and one in section 8. These small pits contrast with the much larger Phase 2 pits of the eastern arc.

Illustrations and principal finds

Sections: Figures 8, 59, 60, 62.
Plans: Figure 159.
Photographs of in situ *deposits:* Figures 14–16, 126–132, 160.
Butt-end deposits: at causeway A – Mildenhall bowl (M3) on birch bark mat; partial sheep skeleton. At causeway B – bundle of cattle ribs (Fig 16); possible heap of hazelnuts (dispersed by water).
Other principal individual finds: axe haft (Wood 409). Stone axe fragments (Other 1, 2, 4–6, 26, 33). Bone – group of cattle ribs, in sections 5–6; neonatal cattle bones.

Segment 2

Ditch segment 2 was the smallest segment of the entire enclosure. Its lowest, waterlogged levels (layer 4) probably belonged to Phase 1A, but there is a possibility that the whole segment may date to Phase 1B or 1C, in which case it would have been used to block or to narrow a wide entrance causeway between segments 1 and 3. The southern half of the segment was deeper and wider than the northern half, with larger waterlogged deposits. The southern butt end revealed a length of vegetable-fibre twine in the higher waterlogged levels (Figs 133, 174); this was probably a butt-end structured deposit of Phase 1A; beneath it on the sandy gravel of the ditch bottom (and parallel to the inner edge of the ditch) was a large, partly folded, complete sheet of birch bark (Figs 172, 173).

Fig 16 Bundle of cattle rib bones in the butt end of enclosure ditch segment 1 close to causeway B

The central and northerly primary ditch deposits were poorly preserved, but small, plum-like fruit stones were much in evidence; they became particularly concentrated around the butt end at causeway C. These stones (probably the remains of the fruit of the sloe, *Prunus spinosa*) were probably dispersed by water action and may originally have formed a butt-end structured or heaped deposit.

One further possibility should be mentioned here. Segment 2 was very short. If it was removed from the plan, the resultant, much enlarged, causeway would provide a striking western approach to the monument (Fig 11). If this interpretation has any validity (and proof is impossible), then the origin of segment 2 might lie within Phases 1B or 1C.

Illustrations and principal finds

Section: Figure 63.
Plan: Figure 133.
Photograph of in situ *deposits:* Figure 13.
Butt-end deposits: at causeway B – vegetable-fibre twine (Figs 133, 174); complete sheet of birch bark (Figs 172, 173). At causeway C – possible heap of sloe stones (dispersed by water); possibly significant group of neonatal cattle bones.

Segment 3

In ditch segment 3, the lowest, waterlogged levels (layer 3) were probably of Phase 1A. The deposits were rich in woodworking debris and included a number of probable coppice stools, which were growing *in situ* on the ditch bottom. The wood was spread evenly across the ditch bottom, throughout its length (Fig 135), and there was no evidence for disturbance due to recutting in the lower levels; indeed, there was no evidence for recutting above layer 3, and consequently we must suppose that the ditch remained open for some time, perhaps throughout Phase 1.

There were two possible butt-end deposits. Unlike ditch segment 4, this segment was almost completely excavated, and the rarity of pottery in primary levels must be noted.

South of segment 3 was a linear ditch whose filling closely resembled that of the enclosure ditch. On stratigraphic grounds it was almost certainly broadly contemporary with the enclosure ditch. It is shown in Figures 63 (C, layers 1 and 2) and 106; a date within Phase 1C would seem probable.

Illustrations and principal finds

Sections: Figure 64.
Photographs of in situ *deposits:* Figures 134, 135.
Butt-end deposits: at causeway C – partial sheep skeleton; neonatal cattle bones. At causeway D – bone 'tally stick' (Fig 246).

Segment 4

This segment was the least fully excavated, as it was located at the extreme edge of the field that was then (1984) being operated by the quarry; the large baulk between sections 98 and 41 was occupied by a hedge. The ditch between sections 98 and 99 was excavated in 1982 as a 'control trench' to monitor waterlogging at the edge of the area that we were then permitted to excavate. Although slightly less than half the area of this segment was excavated, the evidence indicates a similar depositional environment to that of segment 3; there is no evidence for any Phase 1B or 1C recutting. The thickness and homogeneity of the waterlogged primary deposits suggest that the segment remained open and wet for a long time – indeed, perhaps throughout Phase 1. The primary deposits included much evidence for woodworking, quantities of animal bone (including a possible bone butt-end deposit at causeway D), and a very small amount of pottery.

Illustrations and principal finds

Section: Figure 64.
Photograph of in situ *deposits:* Figure 136.
Butt-end deposit: at causeway D – possible concentration of animal bone.

Fig 17 Segment 5 in the 1985 excavations with its undulating ditch bottom; beneath the A-frame shelters waterlogged deposits are being excavated. Left of the wheelbarrow is causeway E and in the foreground segment 4

Segment 5

Ditch segment 5 was the longest segment. It had been considerably disturbed by water action, but in other respects the stratigraphic succession closely followed that of segments 3 and 4. The lowest, waterlogged levels, usually layers 2 and/or 3 (Table 4), were generally homogeneous, but appeared during excavation to have been subject to more trample and other disturbance than was the case in segments 3 and 4. The ditch sides, too, were very uneven north-east of section 65, and the ditch bottom undulated, sometimes quite sharply (Fig 17); as it approached causeway F, the ditch became very shallow indeed (Fig 18).

Fig 18 Enclosure ditch segment 5, fully excavated, looking south-west towards causeway E. Segment 5 was long, shallow, and uneven in profile

Fig 19 Enclosure ditch segment 5 butt end, at causeway E, with a red deer antler crown or rake (B6103) at the centre. 1m scale

At section 139 the ditch and the stream channel were almost indistinguishable (Fig 70, A). The planned ditch edges in this area are, at best, estimates (Fig 88). Proof that the stream channel was active before the cutting of segment 5 is provided by laminated stream deposits below the ditch bottom, at section 112 (Fig 252). The Phase 1A/1B butt end between causeway F and section 146 was, however, deeper and better defined; it contained a large deposit of animal bone and wood (Fig 139).

The other butt end, at causeway E, contained much wood and another, clearly defined, concentration of animal bone. At the centre of this butt end was a red deer antler crown (Figs 19, 20); the primary deposits further along the ditch included antler-working debris, pottery, and bone (Figs 21, 22), and there was much

Fig 20 Red deer antler crown or rake (B6103) from segment 5 (see also Fig 19)

Fig 21 Deposit of pottery (Pot 1010), wood, and animal bone in enclosure ditch segment 5, layer 3, between sections 101 and 106

Fig 22 Pottery sherds (Pot 1010) in situ, *after removal of wood and bone. Scale in inches*

evidence for *in situ* woodworking along the entire length of the ditch (including what is arguably the only substantial piece of timber from the entire site, Wood 3950 – Fig 158).

The ditch had been extended some 15m eastwards at section 146 sometime after the original excavation of the Phase 1A butt end. However, all the layers above layer 2 at this point (Fig 70, B) were ostensibly composed of alluvial-derived silty clay, and it was extremely difficult to distinguish or define a reliable stratigraphic sequence. It can be said with confidence, however, that the shallow extension did indeed exist and that it did not cut into the earlier Phase 1A deposits. Its butt end, too, was quite clearly defined. On present evidence it seems highly improbable that it post-dates Phase 1, and a date in Phase 1C is indicated. We will see in Chapter 3 that there are other lines of evidence to support this tentative dating.

Illustrations and principal finds

Sections: Figures 65–70.
Photographs: in situ deposits – Figures 21, 22, 139, 141, 137, 138. Laminated stream bed deposits – Figure 252. Completed excavation – Figure 18.
Butt-end deposits: at causeway E – concentration of wood and animal bone; red deer antler crown (Figs 19, 20). At causeway F – concentration of animal bone and wood debris (Phase 1A/1B).
Other principal individual finds: wood (Wood 3950); stone axe fragments (Other 62, 64); worked antler from sections 125–130.

The eastern arc ditch segments

General description

The ditch segments of the eastern arc were of more even size than those of the western arc. The sides of the ditch were generally steeper, but this was probably a reflection of the wetter ground conditions that prevailed in the western arc. The segments of the western arc were also generally left open (not backfilled), and this allowed weathering processes to take place. The layout of the segments in the eastern arc was, however, instructive: segments 6 and 7 followed the curve established in the western arc. Segment 8 was marked by a distinct 'kink' (at sections 199–200) that broke this smooth curve and established a new, straight alignment which was then followed by segments 9–13. There was no physiographic reason (such as a stream) why these segments should have been laid out in this straight line, which was very apparent when viewed from the ground. The curve was resumed by segment 14.

Causeway M was twice as wide as any other causeway on the eastern arc. It will be suggested that this was an entranceway.

The survival of organic material

The primary deposits of the eastern arc contained very little organic material, apart from segment 6 (Fig 26) whose western reaches were undoubtedly affected by flooding from the nearby stream channel. The distribution of the wood in segment 6 does not end at a dried-out or rotted horizon. The actual pieces of wood never extended beyond their excavated eastern termination, which was marked by an extensive spread of broken Mildenhall pottery (see Fig 24). Thereafter segments 7–14 produced almost no wood or organic material. Enough did survive, however, to be quite certain that wood could have survived had it been present in antiquity; the probable plank beneath the aurochs skull in the Phase 2 pit in ditch segment 12 illustrates this well (Figs 49, 50). Elsewhere there were a few, but widely scattered, scraps of bark, nutshells, and so on.

The distinctive brown organic staining so characteristic of recently dried-out wood (which would certainly have been present had the wood dried out within the past two or three decades) was absent. It is possible that the ditch segments of the eastern arc were excavated, recut, and backfilled in the drier months of the year, and this might help to account for the fact that the infilling of the eastern segments appeared to have been subject to less waterlogging than those to the west. But such explanations are not sufficient to completely explain so marked a disparity (Charles French personal communication). It would appear that there was also an actual physical distinction between the wetness of ditch segments in the western and eastern arcs. Such a distinction must have been readily apparent in antiquity.

Segment 6

Ditch segment 6 (Fig 23) was well defined at causeway G, but almost impossible to distinguish at causeway F because of the presence of the stream channel that had affected the easterly lengths of ditch segment 5. The outer outline of the ditch, drawn on Figure 11 west of section 171, can be considered the absolute maximum size of the segment, and was probably much enlarged by water action. A more reasonable estimate of the original size of the ditch is shown in the various phase plans (for example, Fig 103). Section 161 (Fig 71) shows the minimal evidence for the 'greater' segment 6.

Section 171 (Fig 71) is quite unlike any other of the eastern arc and would be entirely typical of, for example, segments 3 and 4; there was no evidence for recutting, and the lowest primary layer 3 was waterlogged and possibly dated to Phase 1A. This part of segment 6 probably escaped recutting because of the nearby stream channel. Section 176 shows the Phase 2 pit F953 (Fig 71, B, layer 6) that almost completely cut out the Phase 1 deposits at this point (layer 3 is all that remained of the primary deposit); the pit filling included wooden skeuomorphs of Peterborough (?Mortlake) bowls (Figs 165–168) and sherds of Peterborough pottery. The pit did not extend beyond section 177. The presence of so large a pit may also help to explain the

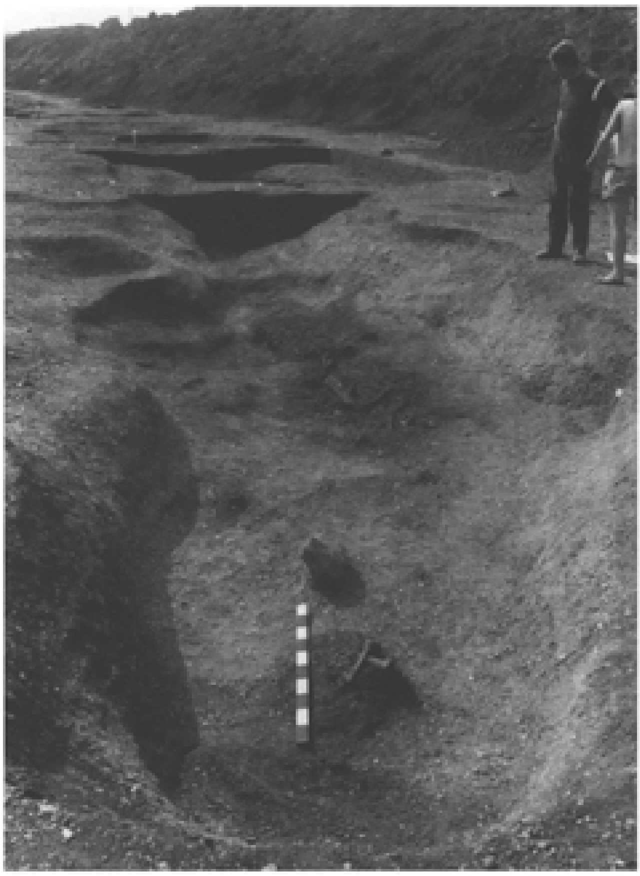


Fig 23 General view of enclosure ditch segment 6, with causeway G in the foreground (section 172 in background). Fragments of a human skull, a broken possible antler pick, and a cattle bone are visible next to the 1m scale. Note the organic layer halfway along the ditch (and see also Figs 26 and 27)

absence of a westerly butt-end deposit in segment 6 that would 'match' the deposit of animal bones east of section 146 in segment 5.

The relationship of the deposits east and west of section 176 was obscured by the pit F953. A complex structured deposit ran from causeway G to section 177 (Fig 23) and could possibly date to Phase 1B, although an attribution to Phase 1A would accord better with similar deposits elsewhere in the eastern arc (for example, Fig 30). The deposit in segment 6 was placed on the clean gravel of the ditch bottom and was arranged in a line along the central part of the ditch: at the extreme eastern butt end, and inclined towards the interior, was a deposit of 'pyre' material that included much charcoal and burnt bone (Fig 24, dashed line); within this material were larger bone fragments. At the centre of the ditch butt end was a human cranium placed rightside-up and 'facing' the causeway; with it were a red deer antler object (perhaps a 'baton') and the bones of other animals (Figs 24, E–H; 25). About 0.75m to the west was a large stone of 'calcrete' (a locally occurring gravel conglomerate) that had been set on edge; beneath it were sherds of a (?Mildenhall) vessel, and another sherd, possibly from the same vessel, lay to the west (Fig 24, r, s).

Some 0.4m north of this first alignment of finds was another possible parallel alignment marked by a group of potsherds and a group of bone (Fig 24, J, K). This alignment was continued to the west by a spread of wood, bone, and quantities of pottery from a single large broken Mildenhall vessel (Figs 24, 26); some of its rimsherds had been arranged in a 'nested' fashion (Fig 27). This main spread seemed to have a clearly defined butt end, marked by the broken Mildenhall vessel, and probably belonged within Phase 1C. The two outlying groups (J and K) may or may not be contemporary. To the north of the Phase 1C material, and cut into the ditch side, was a group of animal bone (Fig 24, P–Q, T–Z, a–c); it was not recognised until its relationship to other parts of the ditch had been removed, but it probably belonged within Phase 2.

Illustrations and principal finds

Section: Figure 71.
Plan: Figure 24.
Photographs of in situ *deposits:* Figures 26, 27.
Butt-end deposits: at causeway F – this area was disturbed by water action. At causeway G – complex linear deposit including a human cranium (Bone 9932) and a red deer antler 'baton' (Bone 9933) (Figs 23–25).
Other principal individual finds: wood – Peterborough bowl skeuomorphs, Phase 2 pit (Figs 165–168). Pottery – broken large Mildenhall vessel (Pot 2112, 2114). Stone – axe fragments (Other 68, 132, 148); 'calcrete' rock (Other 200).

Segment 7

The central and western thirds of ditch segment 7 were rapidly excavated to provide a stratigraphic 'control' against which the future strategy of excavation could be assessed. The eastern third, between section 189 and causeway H, was excavated more slowly.

No obviously arranged deposits were encountered in the rapid excavation between causeway G and section 184, until the very bottom (Fig 28). This deposit consisted of large sherds of pottery, a flat burnt stone, and two flints. Bone was also present, but was not planned *in situ*. The sherds (Mildenhall type) conjoined and probably formed part of a (?complete) vessel that had originally been placed at the butt end upon the flat stone in Phase 1A; the vessel was broken and disassociated from the stone – this disturbance may possibly have been caused by a subsequent recut that was not visible in section 184 at so low a level.

No structured deposits were observed between sections 185 and 189, although large quantities of bone and other material were recovered. Perhaps the most important finds of the 'rapid' excavation were not recognised immediately in the field. They are two pieces of fired clay, one with deep impressions and one a ball (Other 79 and 81). They have no obvious function and are best regarded as ritual objects. They are in

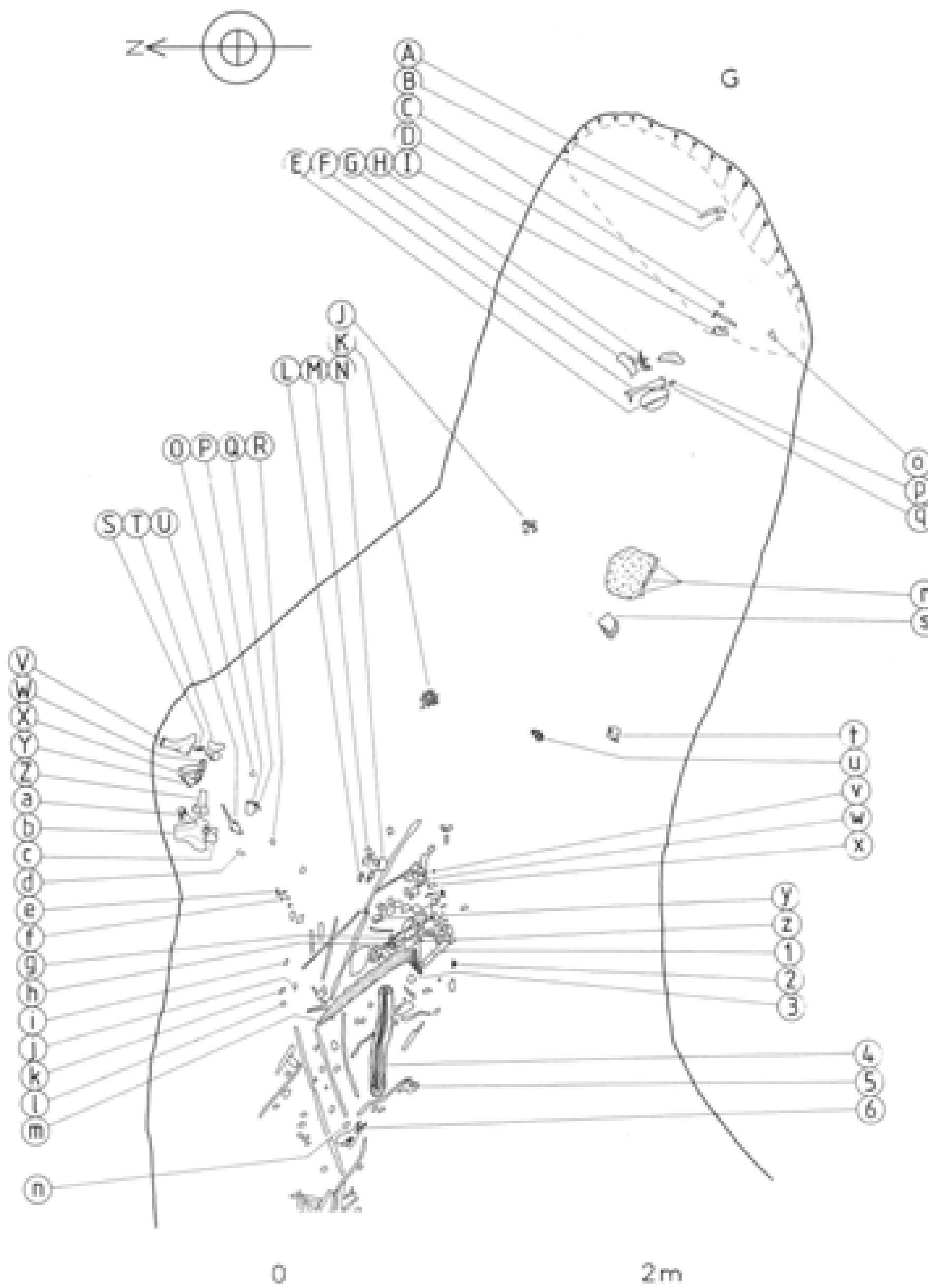


Fig 24 Distribution of finds at the bottom of ditch segment 6 in the Phase 1B recut. Causeway G is at the top. A deposit of 'pyre' material at the butt end is indicated by a dashed line

Finds are listed below: [for pot numbers see Appendix 3]
A Bone 9942; B Bone 9941; C Bone 9940; D Bone 9939; E Bone 9932 human cranium; F Bone 9933 red deer antler 'baton'; G Bone 9934; H Bone 9335; I Bone 9938; J Pot 2170 group of plain bodysherds; K Bone 9930; L Pot 2118 plain bodysherd; M Pot 2119 decorated rimsherd, Mildenhall; N Bone 9949; O Pot 2161 plain bodysherd; P Bone 9865; Q Bone 9866; R Pot 2169 plain bodysherd; S Flint 5591 blade, lightly burnt; T Bone 9864; U Bone 9861; V Bone 9858; W Bone 9867; X Bone 9863; Y Bone 9862; Z Bone 9855; a Bone 9819; b Bone 9859; c Bone 9860; d Pot 2160 plain bodysherd; e Bone 9871; f Pot 2135 plain bodysherd; g Pot 2116 plain rimsherd, Mildenhall; h Pot 2115 plain bodysherd; i Pot 2134 plain bodysherd; j Pot 2133 plain bodysherd; k Pot 2132 plain bodysherd; l Pot 2131 plain bodysherd; m Wood 4977 junction of two stems; partially half split; n Pot 2136 plain bodysherd; o Pot 2171 decorated bodysherd, Mildenhall; p Bone 9937; q Bone 9936; r Pot 2172 three plain bodysherds, lodged beneath 'calcrete' rock ; s Pot 2111 plain bodysherd; t Bone 9931; u Flint 5597 waste flake; v Bone 9950; w Pot 2117 plain bodysherd; x Pot 2120 plain bodysherd; y Pot 2114 plain rimsherd, Mildenhall (joins Pot 2112); z Pot 2113 plain bodysherd; 1 Pot 2112 plain rimsherds, Mildenhall; 'nested' arrangement; 2 Flint 5598 waste flake; 3 Pot (not numbered) plain bodysherd; 4 Wood 4965 roundwood (exfoliated); chopped both ends; 5 Bone 9947; 6 Bone 9948

Fig 25 *A human cranium, a broken antler baton, and a cattle bone, near the butt end of enclosure ditch segment 6, at causeway G*

Fig 26 *Wood, bone, and pottery in enclosure ditch segment 6 looking west (see also Fig 23). To the right of the 1m scale is a group of 'nested' potsherds (see Fig 27)*

Fig 27 *'Nested' Mildenhall potsherds (Pot 2112) within the organic deposit of enclosure ditch segment 6*

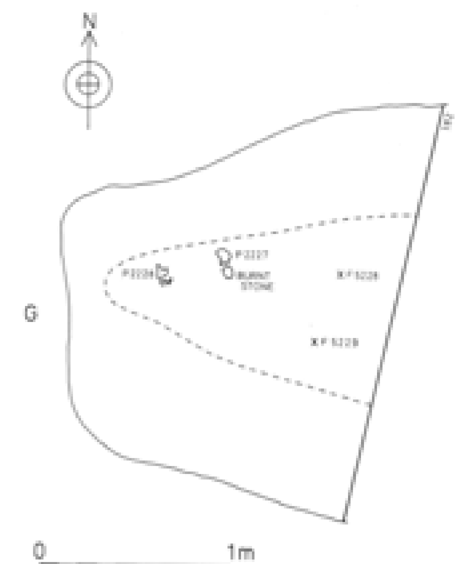


Fig 28 *Distribution of finds at the bottom (Phase 1B) of ditch segment 7 between causeway G and section 182 (this temporary section is not shown in Fig 11, but was located 2.5m west of section 184).*

Finds are listed from west to east: [for pot numbers see Appendix 3]
Pot 2228 large Mildenhall rim, decorated lugs; same vessel as Pot 2227; Pot 2227 large bodysherds (probably originally resting on the burnt stone); Flint 5229 pebble core (type B1); Flint 5228 irregular workshop waste (bashed pebble)

fired (but quite soft) clay and in very fresh condition; this would indicate that they derived from primary contexts (probably layer 3). Their depth (6.90m OD) would indicate Phase 1C contexts, but the recorded layer (2) is secondary.

The rapid excavation ceased when a sequence of complicated structured deposits was recognised between sections 189 and causeway H. Given the fragmentary evidence from the butt end at causeway G, it is possible that the sequence of structured deposits

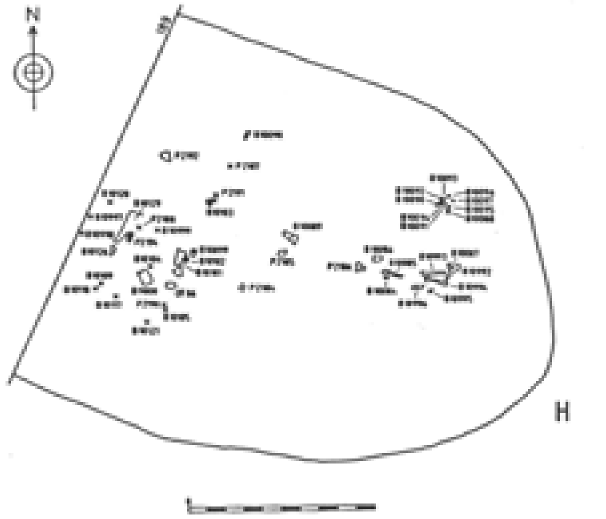


Fig 29 Distribution of finds in ditch segment 7 between section 189 and causeway H, 6.90–7.20m OD.

Pottery and other finds are listed from west to east: [for pot numbers see Appendix 3]
Pot 2194 plain bodysherd; Pot 2188 plain bodysherd; Pot 2192 plain rimsherd, Mildenhall; Pot 2190 plain bodysherd; Other 86 flaked implement (Group VI); Pot 2191 plain bodysherd; Pot 2187 plain bodysherd; Pot 2184 plain bodysherd; Pot 2185 plain bodysherd; Pot 2186 plain bodysherd; Bone finds are listed in numerical order: Bone 10084–10099, 10101–10105, 10109, 10117, 10118, 11120, 10121, 10126, 10129, 10992–11000

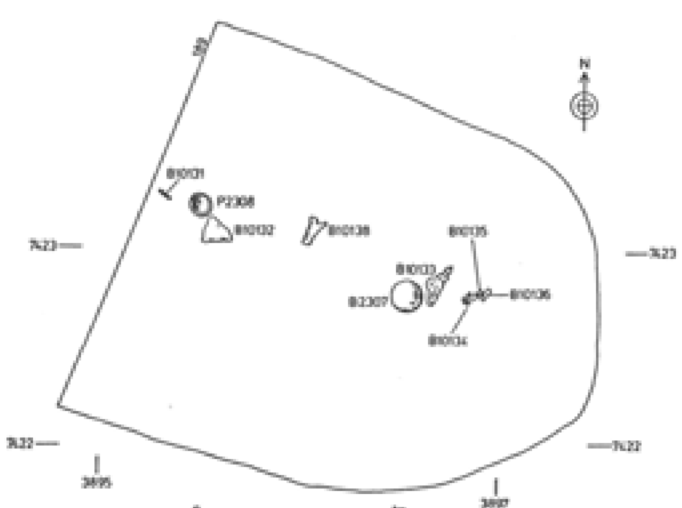


Fig 30 Distribution of finds in ditch segment 7 between section 189 and causeway H, 6.30–6.70m OD.

Finds are listed from west to east: [for pot numbers see Appendix 3]
Bone 10131; Pot 2308 (M78) complete, small plain bowl; flat base placed on ditch bottom; Bone 10132; Bone 10138 decorated antler comb; Pot 2307 (M79) complete decorated Mildenhall bowl, inverted on ditch bottom; Bone 10133 complete fox skull; Bone 10134–10136

Fig 31 Four arranged deposits within enclosure ditch segment 7 looking west to causeway G: fox mandible (B10133) in foreground, inverted bowl (P2307/M79), decorated antler comb (B10138) (beyond the 250mm scale), and a small bowl (P2308/M78)

observed north-west of causeway H did not stop at section 189, but originally extended along the entire ditch segment.

The highest structured deposits were in a rough linear pattern within the Phase 1C recut of layer 3 (Fig 29). This deposit consisted of quantities of animal bone, together with pottery and a polished axe fragment (and probably the ritual fired clay objects, to the west of section 189). There was no significant butt-end deposit. The Phase 1C recut had been placed to one side of an earlier linear structured deposit, which itself was arranged slightly to the north of centre. The earlier deposit was on the ditch bottom, within the gravelly layer 8 of Phase 1A. This deposit was remarkable (Figs 30, 31). At the centre of the butt end was a severed, inverted fox skull (Bone 10133; Fig 32); close by was an inverted Mildenhall bowl (M79). There was a gap of some 400mm before the next object – an antler comb (Bone 10138). Another similar gap separated the second complete vessel (a small plain bowl, M78) from the antler; this small bowl was accompanied by two animal bones.

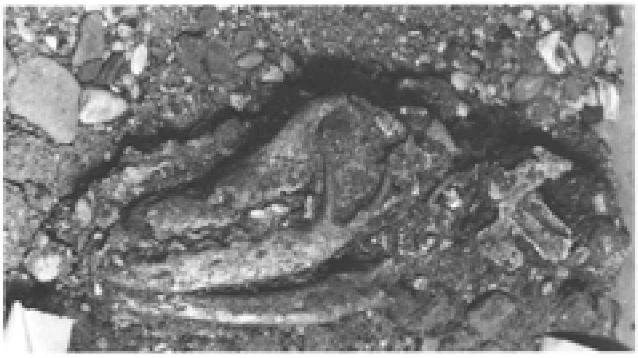


Fig 32 Fox mandible (B10133) from segment 7, in situ in a lifted soil block before excavation in the laboratory. Photograph courtesy of the Trustees of The British Museum

Illustrations and principal finds

Section: Figure 72.
Plans: Figures 28–30.
Photograph of in situ *deposits:* Figure 31.
Butt-end deposits: at causeway G – pottery on a stone (Pot 2227, Pot 2228), disturbed(?) by a later recut, possibly in Phase 1C (Fig 28). At causeway H – complex superimposed deposits; the lowest included a linear arrangement with two complete pots (M78, M79), an inverted fox skull (B10133), and an antler comb (B10138) (Fig 30); a higher linear deposit of pottery and bone (Fig 29).
Other principal individual finds: stone axe fragments (Other 82, 86). A 'fertility' group of fired clay objects (Fig 241). Six articulated cattle vertebrae, from sections 185–187.

Segment 8

The most significant deposit of ditch segment 8 was found within layer 2, the Phase 1C recut. Like other recuts of this phase, it was long and thin and contained an almost continuous linear spread of arranged finds. Elsewhere in the enclosure, Phase 1C linear deposits often did not terminate with special, or obvious, butt-end offerings (such as Fig 29); it is possible that by this period certain aspects of symbolic expression had become very subtle. The quality of the archaeological excavation should be able to match this subtlety.

The Phase 1C deposit was mostly concentrated towards the north-western end of the ditch segment, at causeway H (Figs 33, 34). At the very butt end of the linear spread, near causeway H, was a blade-like fragment of a polished stone axe (Other 88). Behind it, but at the centre of the ditch, was a round stone with a pecked hole – a pitted crinoid (Other 90); the round stone could have originally rested upon the flat surface of a small piece of limestone (Other 91). Figure 35 shows the relationship of the two stones as excavated. When rolled back, the round stone came to rest at the centre of the flat stone, with the pecked hole underneath. It is suggested that the pecked hole represented the *foramen magnum* of a skull and that the round stone symbolised a human head (Fig 240). The flat piece of limestone, when excavated, had a V-shaped underside, and it must have been set carefully into the ground in order to present a flat upper surface.

The rest of the linear deposit included animal bone, a large number of flints (some of which were clearly smashed), and a fragment of human skull (Bone 10351). Several broken conjoining pieces of Mildenhall pottery (including Pot 2536 and 2537, two deliberately positioned sherds reminiscent of segment 6) linked the spread to the 'back-marker', a broken piece of limestone (Other 92) decorated by pecking and possibly daubed with ochre. The entire spread of material occupied less than 1m. The linear spread continued along the rest of segment 8.

The lower levels (layers 3–5) of Phases 1A and 1B did not produce structured deposits that were straightforward to identify: a scatter of bones, a few potsherds, but nothing else.

Illustrations and principal finds

Sections: Figure 72.
Plan: Figure 33.
Photographs of in situ *deposits:* Figures 34, 35.
Butt-end deposits: at causeway H – a complex arrangement, with a pitted crinoid (Other 90) and an axe fragment (Other 88) – see Figure 33 (box). At causeway I was a slight concentration of animal bone (a possible butt-end deposit) (Fig 33).
Other principal individual finds: a possible bone tally stick, from sections 199–200; a human skull fragment (Bone 10351); broken Mildenhall pottery (Pot 2536, 2537); and a decorated limestone fragment (Other 92).

Segment 9

Ditch segment 9 was characterised by a complex succession of recuts and backfilling. Every effort was made to disentangle them, but we cannot be absolutely confident that we were entirely successful. The complexity is illustrated in the sections 203 and 204 (Fig 73, A and B). As would befit so complex a series of deposits, at least two interpretations of the phasing are possible (see Table 4). For ease of interpretation we will number the various episodes and will begin with the version of events that was suggested by the stratigraphic evidence. The alternative version is given at the conclusion of this section.

The lowest layer 4 represents backfilling after the initial Phase 1A cutting of the ditch (episode 1). Layers 5–6 were backfilled into a wide, Phase 1B, recut (episode 2); the final recut (Phase 1C) was represented by layers 3 (episode 3) and 2 (episode 4). Layer 2 appears to have been a 'sealing' deposit laid along the top of the Phase 1C backfill; it was probably laid down as a final act of the infilling event. The Phase 1C recut was not completely backfilled, and layer 1 accumulated during Phase 2 and later.

Episode 4: the late Phase 1C 'sealing' deposit layer 2 lay on top of the early Phase 1C backfill; it consisted of pottery, flint, and bone in a linear-heaped arrangement, without any other type of find or, indeed, any particularly large bone or potsherd (Figs 36–38). The gap near the line of section 204 may have been significant

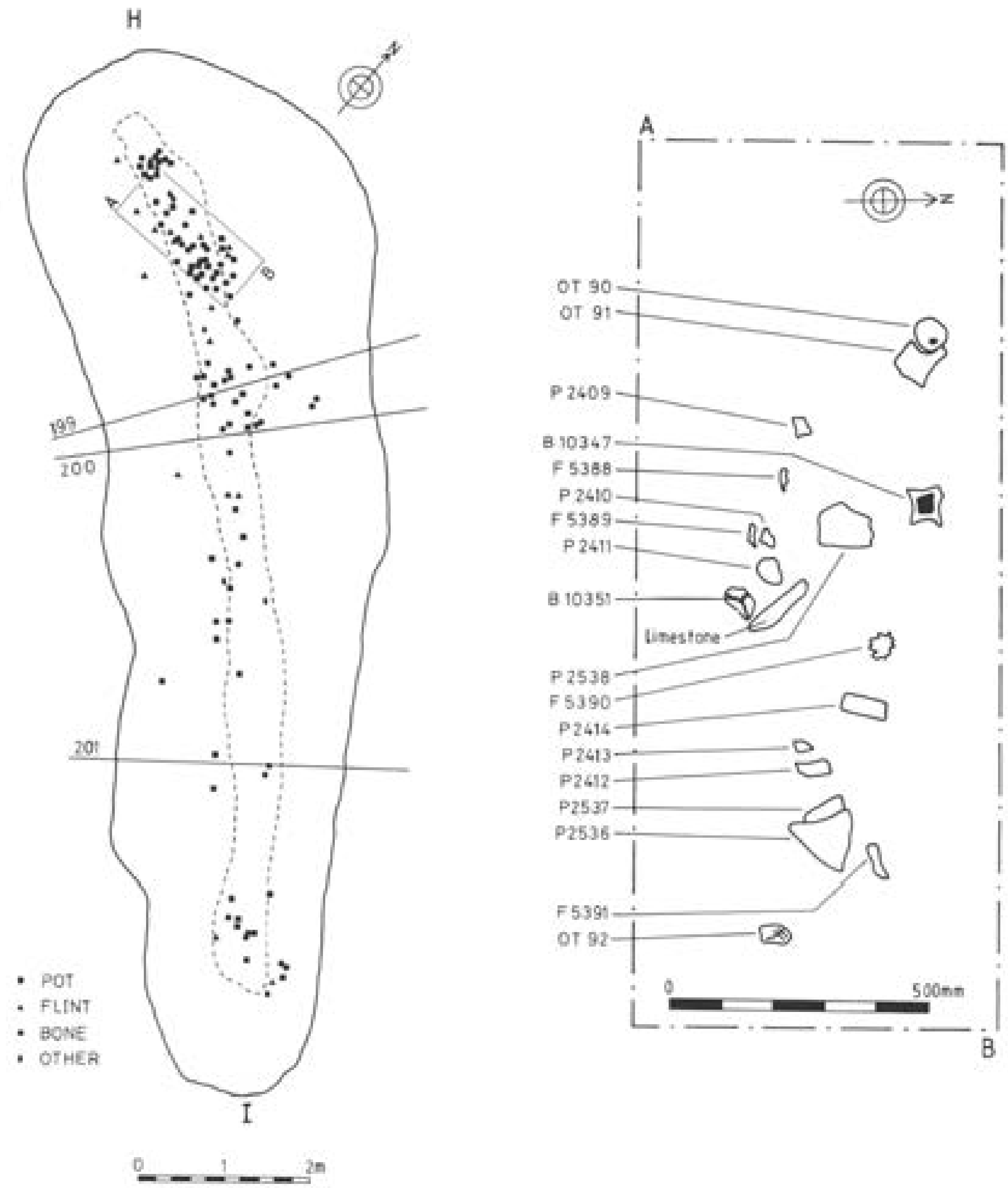


Fig 33 Plan of ditch segment 8, showing the distribution of finds between 6.6 and 6.8m OD. The Phase 1 recut is shown by the dashed line. The concentration of finds in the north-west is shown in more detail in (A), and the finds are listed from top to bottom: [for pot numbers see Appendix 3]

Other 90 round stone with pecked socket or hole (pitted crinoid); Other 91 flat limestone (unshaped); Pot 2409 plain bodysherd; Bone 10347; Flint 5388 waste flake; Pot 2410; Flint 5389 waste flake; Pot 2411 plain bodysherd; Bone 10351 fragment of human cranium, next to limestone piece; Pot 2538 plain bodysherd; Flint 5390 waste flake; Pot 2414 plain bodysherd; Pot 2413 plain bodysherd; Pot 2412 plain bodysherd; Pot 2537 plain bodysherd, Mildenhall; Pot 2536 plain bodysherd, Mildenhall; Flint 5391 serrated flake; Other 92 decorated (pecked) limestone with ochre

(Fig 36), but the deposits on either side were very similar. There were no clear butt-end deposits. In the field the deposit appeared very regular, well defined, but homogeneous and undistinctive.

Episode 3: the layer 3 linear structured deposits of early Phase 1C were very different from the 'sealing' deposit of layer 2. The recut was irregular in shape, with a central section that was narrower than the two butt ends (Fig 39). This shape was echoed by the placing of two broken quern fragments, which precisely divided the recut into three sections of equal size (Fig 39, P and T). The deposits themselves were linear, but not tightly confined, and consisted of a series of

Fig 34 Arranged deposits at the butt end of enclosure ditch segment 8, between section 199 and causeway H (right)

Fig 35 Part of the arranged deposit at the butt end of enclosure ditch segment 8 (shown in Fig 34), with pottery, bone, flint, stone, and a round stone (Other 90) with a pecked socket hole (pitted fossil echinoid)

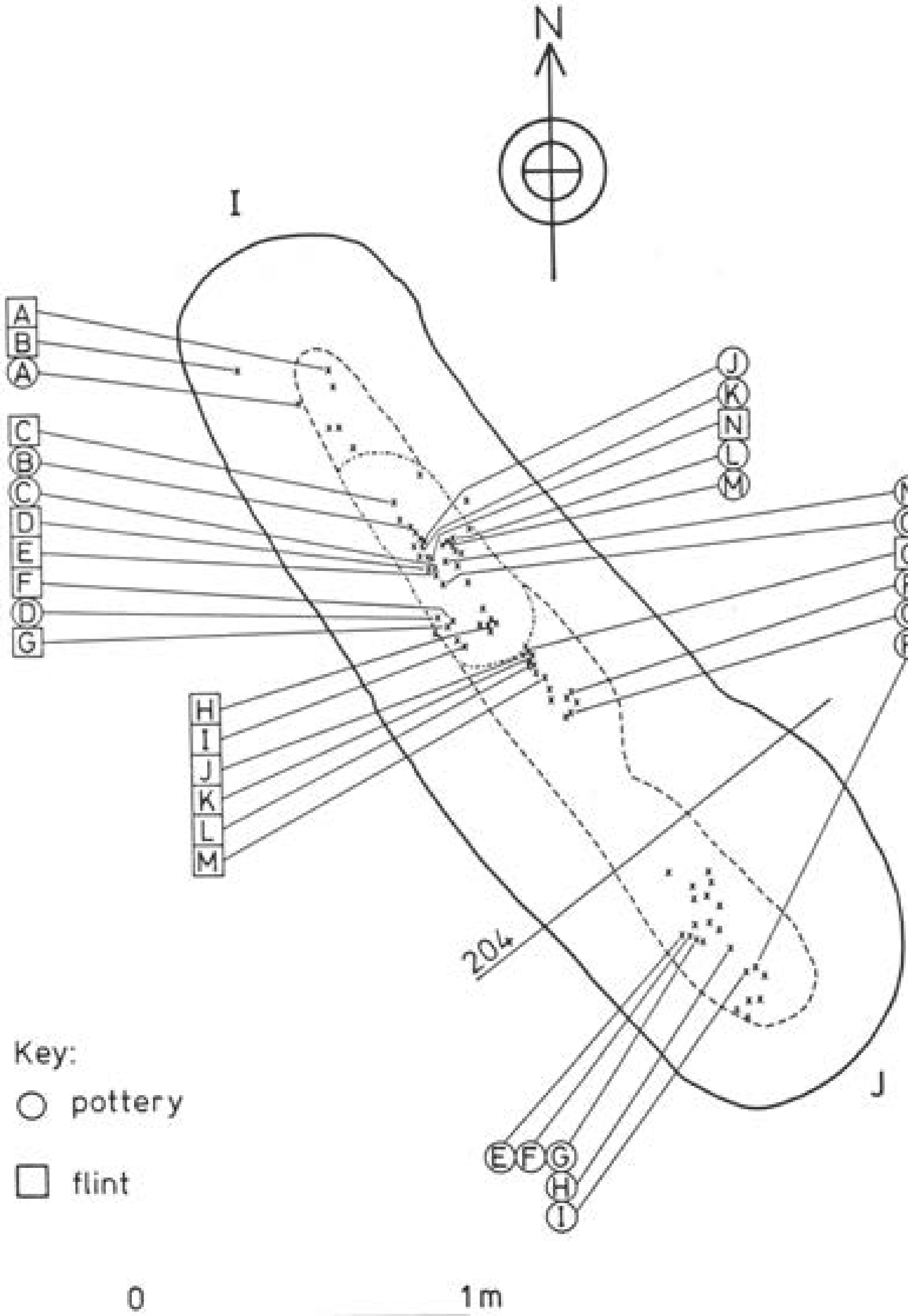


Fig 36 Distribution of findspots within enclosure ditch segment 9, layer 2, at approximately 7.10m OD. (Fig 38 shows the southerly concentration of finds in greater detail.) Unlabelled crosses are findspots of pottery, flint, and bone (too numerous to label) [for pot numbers see Appendix 3]

Circles (all plain bodysherds except Pot 2142): A Pot 2144; B Pot 2141; C Pot 2333; D Pot 2332; E Pot 2142 decorated bodysherd, Mildenhall; F Pot 2198; G Pot 2197; H Pot 2337; I Pot 2195; J Pot 2139; K Pot 2138; L Pot 2146; M Pot 2145; N Pot 2334; O Pot 2140; P Pot 2147; Q Pot 2148; R Pot 2196

Squares (waste flakes unless stated): A Flint 5352 serrated flake; B Flint 5365 unclassifiable; C Flint 5606; D Flint 5603 leaf arrowhead; E Flint 5604; F Flint 5607; G Flint 5602 serrated flake; H Flint 5364 irregular workshop waste; I Flint 5600; J Flint 5355; K Flint 5356; L Flint 5358 piercer; M Flint 5359 waste flake, burnt; N Flint 5605 utilised flake; O Flint 5357 core type A

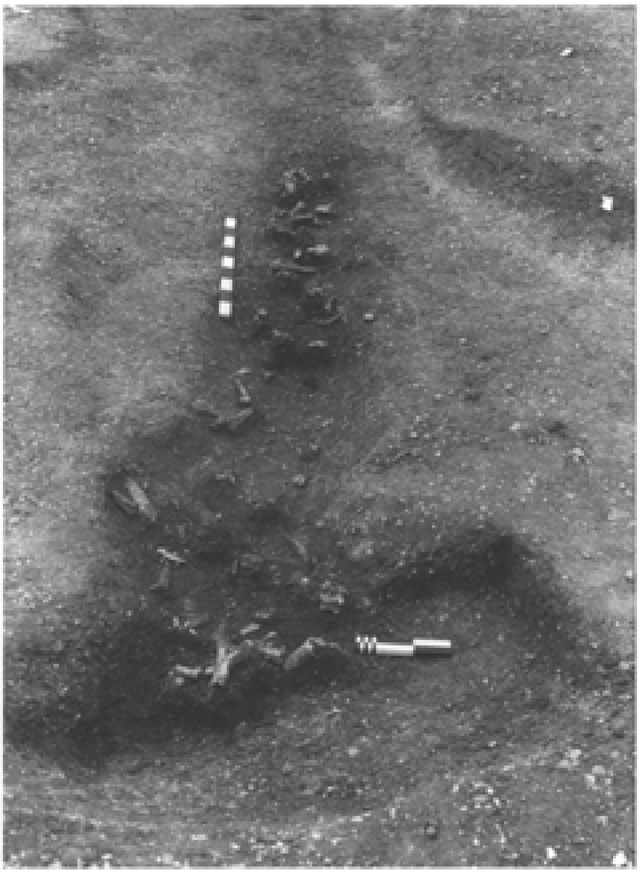


Fig 37 Linear deposit of mainly animal bone in enclosure ditch segment 9, layer 2, looking north-west from causeway J. 1m scale

discrete 'statements' (Fig 40), reminiscent of deposits in segments 6 and 7.

The enlarged southerly end of segment 9, at causeway J, contained quantities of pottery and animal bone; the central area, between the two quern fragments, contained large, isolated, animal bones. The area between the northerly quern fragment and causeway I revealed three small concentrations of animal bone, with a worked cattle scapula as a butt-end deposit (Fig 247). The northerly quern fragment had been placed in the ground on edge, with its grinding surface arranged vertically (Fig 41). A small round stone (Other 100) was also found in layer 3 during the lifting of the deposit (it is not planned in Fig 39); the stone would be unremarkable were it not for a pecked shallow depression that recalls the socket-like hole in the round stone (Other 90) from segment 8. The segment 9 stone was found at grid 39097411 at 6.8m OD (Fig 240); this grid reference covers the extreme north end of the ditch segment, immediately alongside causeway I. If so small an object can be considered a butt-end structured deposit, its location would certainly support the suggestion.

Episodes 1 and 2: these layers had undoubtedly been disturbed by the recutting associated with episode 3, particularly around the butt ends. However, enough survived for certain conclusions to be drawn. Layer 5 was an organic loam and represented a linear recut that had been backfilled with turf and topsoil; it contained very few finds and must be regarded as a structured deposit in its own right. The lowest layer (4) was very gravelly, and again it represented backfilling. Layer 5 generally cut out layer 4, which only survived in any thickness around the ditch edges; any structured deposits within it were most probably destroyed by the recut of layer 5.

The alternative and perhaps preferable explanation for the segment 9 deposits is as follows: the lowest, gravelly, level (episode 1) was of Phase 1A date and is entirely consistent with Phase 1A practice elsewhere. Episodes 2 (the topsoil/turf) and 3 (the structured deposit with querns) took place in Phase 1B; episode 4 (the linear 'sealing' deposit) took place in Phase 1C in a ditch that was open, if shallow. This explanation accords better with the nature of structured deposits elsewhere in Phase 1B; it also explains the presence of the linear turf/topsoil deposit and allows Phase 1C to be represented by a single, tightly linear deposit, as elsewhere.

Illustrations and principal finds

Sections: Figure 73.
Plans: Figures 36, 38, 39.
Photographs of in situ *deposits:* Figures 37, 40, 41.
Butt-end deposits: at causeway I – a worked cattle scapula (Bone 10825; Fig 247). At causeway J – a concentration of animal bone and pottery (Fig 37), including a decorated cattle innominate (Bone 10675, Fig 245).
Other principal individual finds: quern fragments (Other 98, 99); a small round stone (Other 100); a group of pig ribs, from sections 203–204.

Segment 10

The excavation of ditch segment 10 revealed that bones and artefacts could be found *in situ* in the highest levels of the enclosure ditch. Two examples of finds distribution plans made in the field show that there was a distinction between the smaller finds and homogeneous filling of the highest levels (Fig 42) and the more varied filling and larger finds of the level directly below (Fig 43). These changes took place within a few centimetres and were not caused by a stratigraphic disjunction.

The sequence of infilling and recutting in segment 10 (Fig 43) was perhaps the most difficult to excavate and interpret. The ditch was first excavated in four areas, separated by baulks at sections 205, 206, and 207. It proved very difficult, however, to match and marry up the various layers, even on either side of the same baulk; this accounts for the disparity in layer numbers between the two illustrated sections, 206 and 207 (Fig 73, C, D). In section 206 the lowest gravelly layers, 4 and 7, represented the backfill of Phase 1A. The Phase 1B recut comprised layers 5 and 6; layers 2 and 3 belonged to Phase 1C. The highest, tertiary,

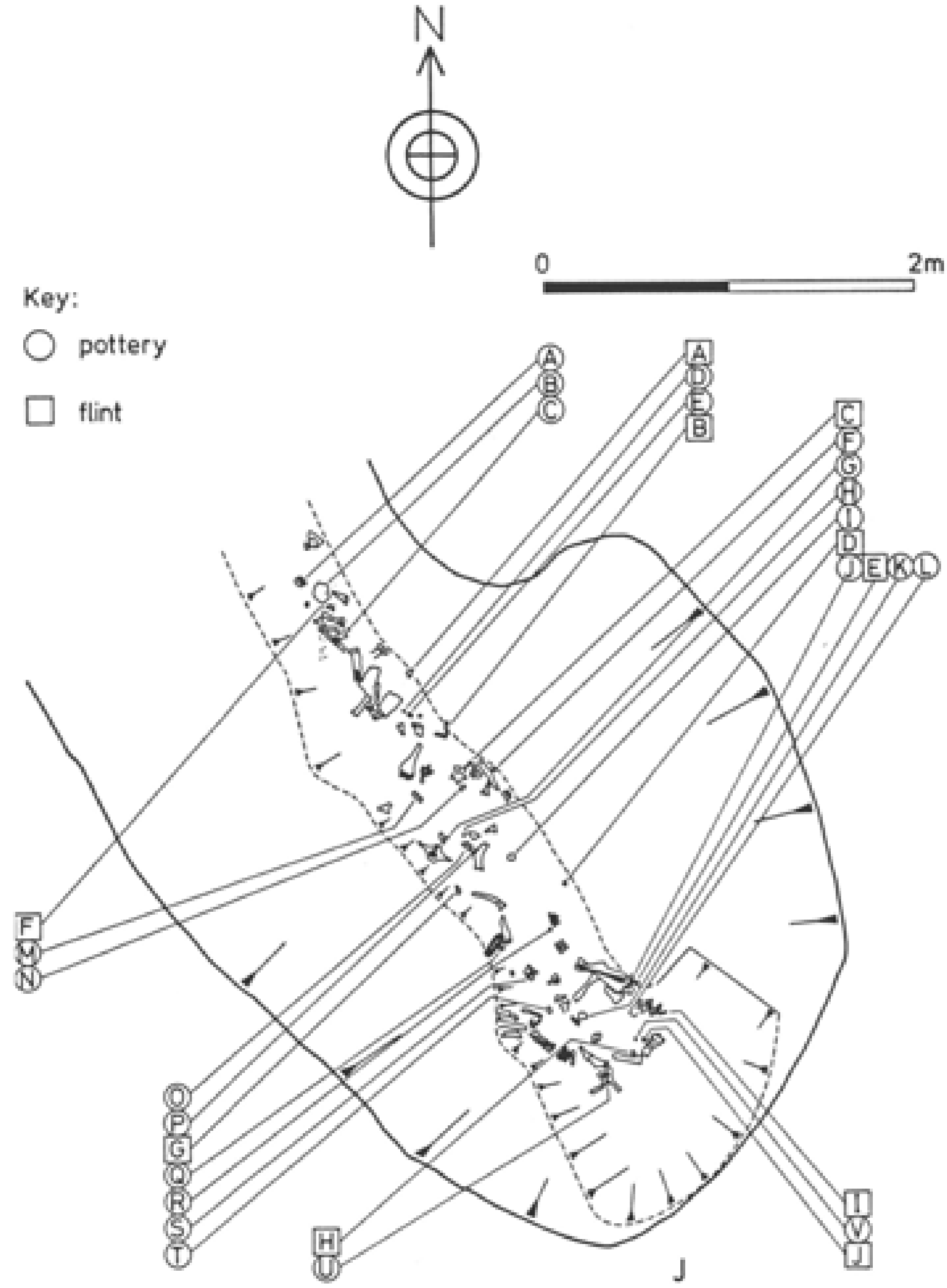


Fig 38 Distribution of finds within enclosure ditch segment 9, south-eastern portion, layer 2, at approximately 7.10m OD. This narrow concentration of bone, pottery, and flint follows the Phase 1C recut. Due to its quantity, bone is planned, but not labelled [for pot numbers see Appendix 3]

Circles (plain bodysherds unless stated): A Pot 2150; B Pot 2437; C Pot 2452; D Pot 2451; E Pot 2438; F Pot 4392 decorated rimsherd, Mildenhall; G Pot 2444; H Pot 2449; I Pot 2443 plain rimsherd, Mildenhall; J Pot 2447; K Pot 2195; L Pot 2196; M Pot 2441 decorated rimsherd, Mildenhall; N Pot 2440; O Pot 2442 plain rimsherd, Mildenhall; P Pot 2445; Q Pot 2149; R Pot 2448; S Pot 2197; T Pot 2198; U Pot 2446; V Pot 2450
Squares (waste flakes unless stated): A Flint 5360; B Flint 5361; C Flint 5368; D Flint 5369; E Flint 5367; F Flint 5370; G Flint 5362; H Flint 5363 unclassifiable; H Flint 5366 unclassifiable; J Flint 5364 irregular workshop waste

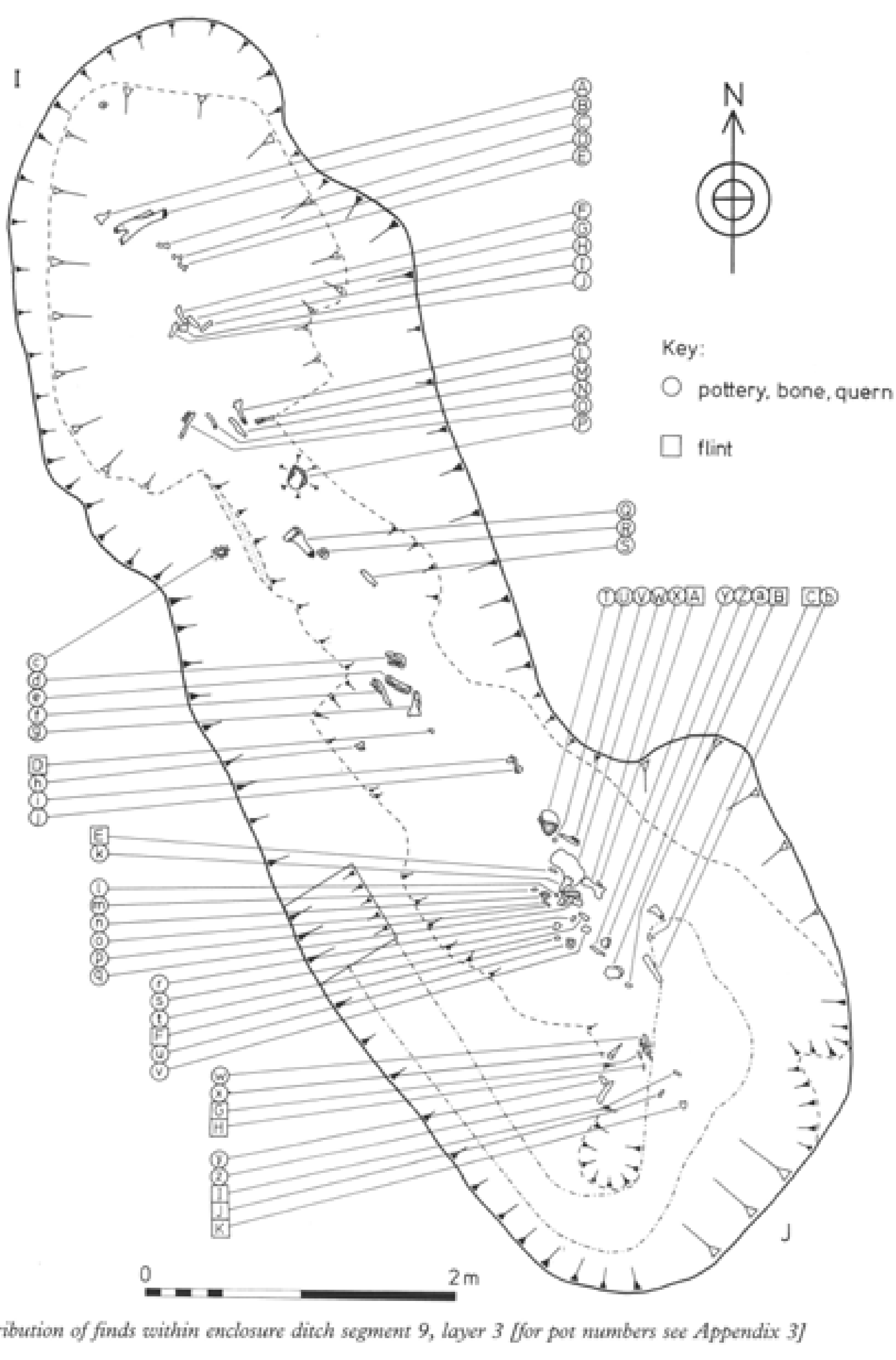


Fig 39 Distribution of finds within enclosure ditch segment 9, layer 3 [for pot numbers see Appendix 3]

Circles: A Pot 2643 plain bodysherd; B Bone 10825 cattle scapula; C Bone 10824; D Bone 10823; E Bone 10822; F Bone 10821; G Bone 10818; H Bone 10817; I Bone 10819; J Bone 10820; K Bone 10813; L Bone 10812; M Bone 10814; N Bone 10815; O Bone 10816; P Other 99 quern fragment, on edge; Q Bone 10810; R Bone 10743; S Bone 10742; T Other 98 quern fragment; U Bone 10733; V Bone 10677; W Pot 2642 plain bodysherd; X Bone 10675 decorated cattle innominate; Y Bone 10672; Z Pot 2632 plain rimsherd, Mildenhall; a Pot 2631 plain bodysherd; b Bone 10671; c Bone 10811; d Bone 10741; e Bone 10738; f Bone 10740; g Bone 10737; h Bone 10739; i Bone 10736; j Bone 10735; k Bone 10676; l Pot 2637 plain bodysherd; m Pot 2641 decorated rimsherd, Mildenhall; n Pot 2640 plain bodysherd; o Pot 2639 decorated rimsherd, Mildenhall; p Pot 2638 plain bodysherd; q Bone 10674; r Pot 2635 plain bodysherd; s Pot 2636 plain bodysherd; t Pot 2634 decorated rimsherd, Mildenhall; u Bone 10673; v Pot 2633 plain bodysherd; w Bone 10670; x Bone 10669; y Bone 10668; z Bone 10667

Fig 40 Arranged linear deposit in layer 3 of enclosure ditch segment 9, with causeway I in the foreground. For a plan of the deposit, see Figure 39

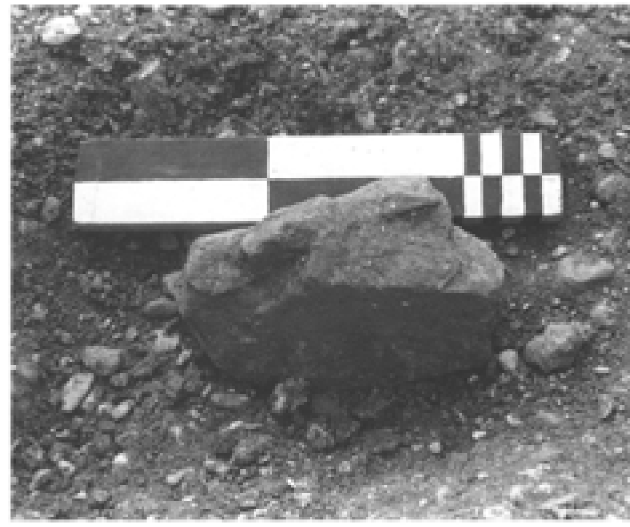


Fig 41 Quern fragment (Other 99) placed on edge in enclosure ditch segment 9, layer 3. Scale 0.25m

layer (1) represented natural accumulation, mainly during Phase 2, in the shallow, partially filled Phase 1C ditch. Section 207 showed a similar sequence, but the Phase 1A backfill (layers 6–8) was substantially thicker; layers 2 and 5 were the Phase 1B recut, and Phase 1C was represented by layer 3.

The excavation of segment 10 was, as we have noted, extremely difficult, and the three principal deposits have only been disentangled very provisionally. The process of separation was, however, made slightly simpler by the presence of a dark charcoal-rich deposit (feature 994) that had been deliberately incorporated as a lens into the Phase 1B deposit, layer 2. It was hard to be precise, but this deposit did not appear to have been cut into layer 2: the impression gained in the field was that layer 2 and feature 994 had been fashioned together in some way – this is admittedly an unlikely proposition, but that is how it seemed at the time. Feature 994 was filled with charcoal and burnt and unburnt bone and recalled the possible pyre deposit within segment 6. When first encountered, it appeared as a continuous dark stain along the interior edge of the Phase 1B recut (Fig 42); when excavated it was seen to consist of four small pits, or alternatively, four segments of ditch (Fig 44). Possible butt-end structured deposits could be seen in the two northerly miniature segments.

The highest, Phase 1C, structured deposits are shown in Figure 42. These included a complete cushion quern (Other 206), but in common with other deposits of this phase, there were no obvious butt-end offerings. Below and to one side of the 'pyre' material of feature 994 was another linear arrangement of arranged material, with a human skull fragment (Bone 10518) as a butt-end deposit by causeway K (Figs 43, 45). A large scatter of potsherds was noted in each distribution at the butt end by causeway J – and it is quite probable that we were unable to disentangle the two deposits at this point. A Phase 2 pit between causeway K and section 207 cut the Phase 1C filling of the ditch.

The lowest levels of the ditch produced few finds, and there was again some evidence for the backfilling of topsoil/turf in Phases 1A and 1B, as seen in segment 9. However, segment 10 did produce a quantity of animal bones. The numerous bones of Phase 1A included a partial pig skeleton (a possible butt-end deposit near causeway K); Phase 1B produced fewer bones than Phase 1A, but in places they were closely packed together (Fig 44). Phase 1C produced the largest collection of bone, including two cattle skulls.

Key to fig 39 (*cont.*)
Squares (waste flakes unless stated): A Flint 5900 waste flake, burnt; B Flint 5903 irregular workshop waste, burnt; C Flint 5898; D Flint 5902 utilised flake, damaged; E Flint 5901; F Flint 5899 unclassifiable, burnt; G Flint 5897; H Flint 5893; I Flint 5896; J Flint 5894; K Flint 5895

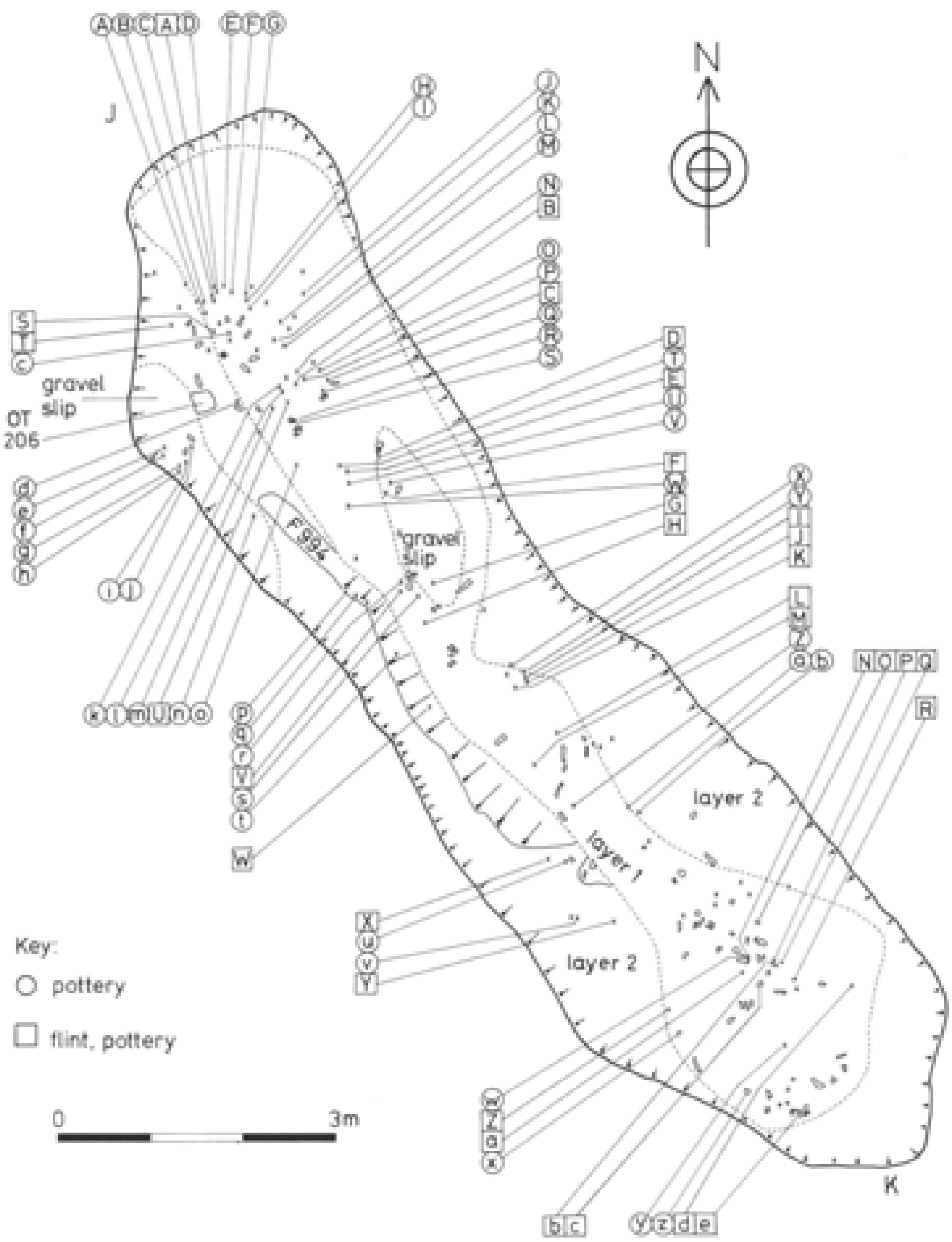


Fig 42 Distribution of finds within enclosure ditch segment 10, layers 1 and 2, Phase 1C, between approximately 6.90 and 7.10m OD, above those shown in Figure 43. Due to its quantity, bone is planned but not labelled; unlabelled crosses represent findspots of smaller bones, potsherds, and flint. The dashed lines represent layer boundaries [for pot numbers see Appendix 3]

Circles (plain bodysherds unless stated): A Pot 2389; B Pot 2385; C Pot 2384; D Pot 2387 plain rimsherd, Mildenhall; E Pot 2373; F Pot 2372; G Pot 2386 decorated bodysherd; H Pot 2374; I Pot 2375; J Pot 2390 decorated bodysherd, Peterborough; K Pot 2376; L Pot 2383; M Pot 2388; N Pot 2391 decorated bodysherd; O Pot 2395 decorated rimsherd, Peterborough; P Pot 2392 decorated rimsherd, Mildenhall; Q Pot 2396; R Pot 2794; S Pot 2795; T Pot 2659; U Pot 2658; V Pot 2660; W Pot 2661; X Pot 2748; Y Pot 2747 decorated bodysherd, Mildenhall; Z Pot 2589; a Pot 2603; b Pot 2602; c Pot 2392 decorated rimsherd, Mildenhall; d Pot 2801; e Pot 2401; f Pot 2397 plain rimsherd, Mildenhall; g Pot 2398; h Pot 2399; i Pot 2402; j Pot 2400 decorated bodysherd, Mildenhall; k Pot 2393; l Pot 2394; m Pot 2798; n Pot 2403; o Pot 2657; p Pot 2662; q Pot 2663; r Pot 2664; s Pot 2665; t Pot 2793 decorated bodysherd, Mildenhall; u Pot 2588 plain rimsherd, Mildenhall; v Pot 2377; w Pot 2381; x Pot 2380; y Pot 2371; z Pot 2379

Squares (waste flakes unless stated): A Flint 6008; B Flint 5651; C Flint 6003; D Flint 6006; E Flint 6004; F Flint 6005; G Flint 5653; H Flint 5892 serrated flake; I Pot 2746 decorated bodysherd, Peterborough; J Flint 6035; K Flint 6030; L Flint 5647; M Flint 5947; N Flint 5733; O Flint 5871 scraper, type A2; P Flint 5735; Q Flint 5736; R Flint 5737; S Flint 6007; T Flint 6009; U Pot 2799 plain bodysherd; V Flint 5652 utilised flake; W Flint 5654; X Flint 5872; Y Flint 5729; Z Flint 5730; a Flint 5731; b Flint 5734; c Flint 5732; d Flint 5738 serrated flake; e Pot 2378 plain bodysherd

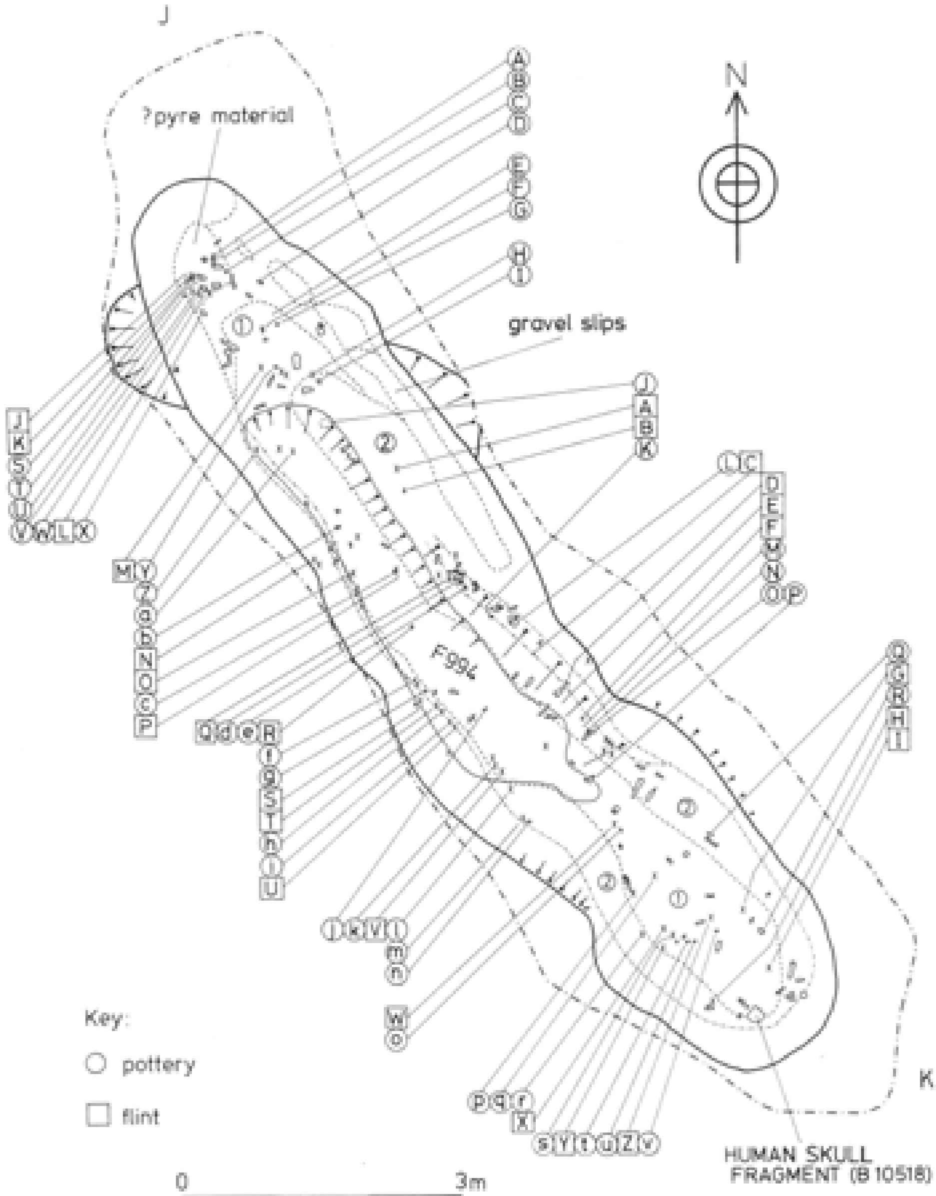


Fig 43 Distribution of finds within enclosure ditch segment 10, layers 1 and 2, between approximately 6.70 and 7.00m OD, below those shown in Figure 42. Due to its quantity, bone is planned, but not labelled. The outer dot-dash line is the edge of the weathered, battered profile (the outer edge of Fig 42); the solid outline is the steep edge of the ditch; other dashed lines indicate approximate layer boundaries [for pot numbers see Appendix 3]

Circles (plain bodysherds unless stated): A Pot 2596 decorated bodysherd, Mildenhall; B Pot 2597; C Pot 2598; D Pot 2599; E Pot 2898 decorated rimsherd, Mildenhall; F Pot 2720; G Pot 2699; H Pot 2836 decorated bodysherd, Mildenhall; I Pot 2721; J Pot 2843; K Pot 2969; L Pot 2965; M Pot 2968 decorated bodysherd, Mildenhall; N Pot 2928; O Pot 2976 decorated bodysherd, Mildenhall; P Pot 2927 decorated rimsherd, Mildenhall; Q Pot 2755; R Pot 2749 decorated rimsherd, Mildenhall; S Pot 2809 decorated rimsherd, Mildenhall; T Pot 2810 decorated bodysherd, Mildenhall; U Pot 2600; V Pot 2892 and 2893; W Pot 2601; X Pot 2719; Y Pot 2722 decorated bodysherd, Peterborough; Z Pot 2839; a Pot 2841; b Pot 2975; c Pot 2971 decorated rimsherd, Mildenhall; d Pot 2842; e Pot 2927 decorated rimsherd, Mildenhall; f Pot 2972; g Pot 2973; h Pot 2838; i Pot 2837 decorated bodysherd, Mildenhall; j Pot 2967; k Pot 2835; l Pot 2833 decorated rimsherd, Mildenhall; m Pot 2834 plain rimsherd, Mildenhall; n Pot 2700; o Pot 2587; p Pot 2585; q Pot 2586; r Pot 2753; s Pot 2754 decorated bodysherd, Fengate; t Pot 2750; u Pot 2751; v Pot 2752 decorated bodysherd

Squares (waste flakes unless stated): A Flint 6346; B Flint 6022; C Flint 6019; D Flint 6023 waste flake, burnt; E Flint 6018 core, type A2, burnt; F Flint 6077; G Flint 5942; H Flint 5944; I Flint 5943; J Flint 6070; K Flint 6071 waste flake, burnt; L Flint 6180 waste flake, burnt; M Flint 6185; N Flint 6187a; O Flint 6187b; P Flint 6187c; Q Flint 6345; R Flint 6021 irregular workshop waste; S Flint 6387; T Flint 6386; U Flint 2751; V Flint 6332; W Flint 5946; X Flint 5645; Y Flint 5646 core fragment; Z Flint 5945 core fragment

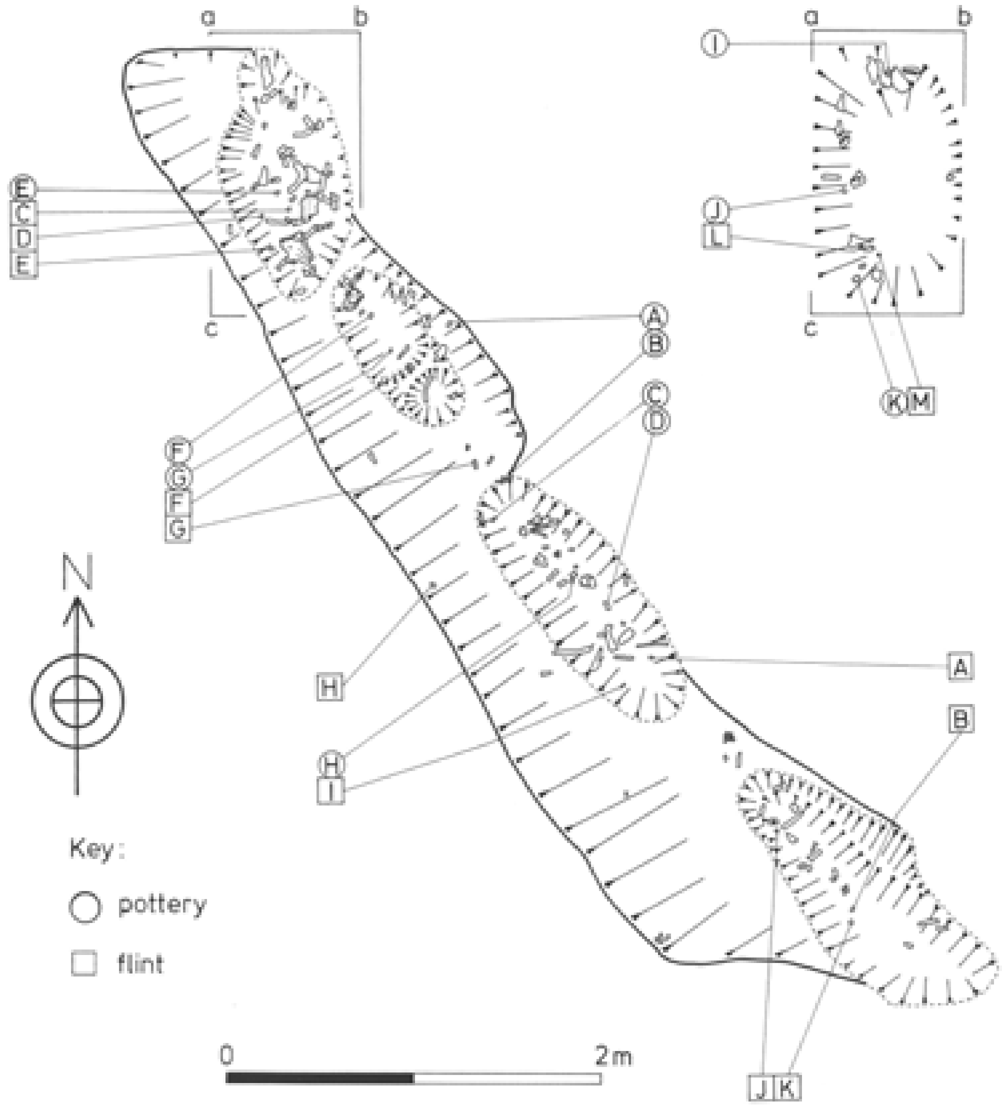


Fig 44 Distribution of finds in the four pits of F994, ditch segment 10, between 6.55 and 6.90m OD. The dashed lines represent the pits of F994, and the solid black line the outer edge of F994 'pyre' feature. Due to its quantity, bone is planned, but not labelled. The inset box was drawn at a higher level. For the position of F994 within segment 10, see Figure 43 [for pot numbers see Appendix 3]

Circles (plain bodysherds unless stated): A Pot 2922; B Pot 2923 decorated rimsherd, Mildenhall; C Pot 2924 plain rim, Mildenhall; D Pot 2925 decorated rimsherd, Peterborough; E Pot 2931; F Pot 2990; G Pot 2921 decorated bodysherd; H Pot 2926 decorated rimsherd, Mildenhall; I Pot 2840; J Pot 2978; K Pot 2979 decorated rimsherd, Mildenhall

Squares (waste flakes unless stated): A Flint 6015 unclassifiable, burnt; B Flint 5650 waste flake; C Flint 6021 irregular workshop waste; D Flint 6020 core, type A2; E Flint 5648 scraper, type A2; F Flint 5869; G Flint 6014 irregular workshop waste; H Flint 6016 waste flake, burnt; I Flint 5870; J Flint 5868; K Flint 5649 scraper, type A2; L Flint 6289 unclassifiable, damaged; M Flint 6290

Fig 45 Fragment of human skull (B10518) at the causeway K butt end of ditch segment 10 (layers 1 and 2). The eye orbits are 'looking' towards the north-east. Scale 0.25m

Illustrations and principal finds

Sections: Figure 109.
Plans: Figures 42–44 (feature 944).
Photographs of in situ *deposits:* Figure 45.
Butt-end deposits: at causeway J – a concentration of broken Mildenhall pottery (Fig 43); a roe deer antler and skull (Fig 248). At causeway K – a large fragment of human skull (Bone 10518; Fig 245); large quantity of animal bone.
Other principal individual finds: a complete quern (Other 206); cattle skulls and a partial pig skeleton from sections 206–207A.

Segment 11

Ditch segment 11 seemed to carry to 'extremes' the tendency noted in segments 9 and 10 for structured deposits to be concentrated within the upper layers. These upper layers were generally thin and often homogeneous, and distinction between different deposits was often very difficult. The gravel backfill of layers 6–8 was so clean that it was considered to be undisturbed natural gravel until, latterly, this was disproved. The best-preserved deposit of structured finds (Fig 46) can probably be dated to Phase 1C. It included large quantities of animal bone and lesser amounts of flint and pottery. Some of the animal bone had been gathered into small piles or heaps. There were two very distinct concentrations of charcoal-stained material, very similar to feature 994 of segment 10, but less sharply defined. Like feature 994, these deposits did not appear to have been cut into the layers in which they were found. Both areas of possible 'pyre' material were concentrated along the inner edge of the ditch. It should be noted that this was an area that gave very high magnetic susceptibility readings (Fig 79).

Below the uppermost deposit was another linear deposit that was composed largely of bone. It occurred at a depth of 6.60m, within layer 5 (Phase 1B). The higher deposit appeared to respect it, and there was no intercutting.

Illustrations and principal finds

Sections: Figure 73.
Plan: Figure 46.
Other finds: two possible pyre deposits.

Segment 12

It should be noted at this point that ditch segments 12–14 were excavated under considerable pressure: the gravel pit was encroaching, and both time and money were running out. Care was taken to excavate and record structured deposits thoroughly, but the large accumulations of backfilled sands and gravel of Phase 1A could not be trowelled through in their entirety. As the lowest (Phase 1A) levels of segments 9–11 had been generally free of finds, it was decided that more rapid techniques could be adopted, given the urgency of the situation.

The phasing of sections 221 and 227 (Fig 74) is given in Table 4, but section 216 is not included, as its interpretation is difficult: layer 6 is indoubtedly Phase 1A, and layers 3 and 7 might relate to Phase 1B; layer 4 is possibly Phase 1C, and layer 1 accumulated during Phase 2 and later. Sections 221 and 227 exhibited considerable accumulations of backfill.

The most remarkable feature of segment 12 was a large Phase 2 pit that cut through all Phase 1 deposits between sections 222 and 226 (Figs 47, 48); this pit contained much pottery and animal bone and two skulls of aurochs that rested upon the much-decayed remains of a wooden (probably oak) plank or box bottom (Figs 49, 50). The pit was located at the centre of the recut defined in section 227 by layers 4 and 5; it did not lie at the centre of the main Phase 1A ditch. The pit must have been dug shortly after the final recutting – and partial infilling – of the Phase 1C enclosure ditch.

Apart from the large pit and a possible butt-end deposit of a roe deer skull from Phase 1C near causeway M, the principal interest lay in a narrow recut that ran the entire length of the segment. The recut was packed with pottery and bone (Figs 51–53). Apart from a concentration of pottery (Fig 51, i–iv) on the south-east edge of the recut at causeway M, there were no obvious butt-end deposits. The precise date of this recut is hard to decide upon, but it has more in common with Phase 1C deposits elsewhere. It could be argued that the normal recutting in Phase 1B was, in fact, absent in this segment of ditch; it is nowhere else so narrow or shallow. The alternative interpretations are given in Table 4.

Illustrations and principal finds

Sections: Figure 74.
Plans: Figure 51.
Photographs: in situ deposits (Figs 52, 63). Phase 2 pit between sections 222 and 226 (Figs 47, 49, 50).
Butt-end deposits: at causeway M – a deposit of pottery at the end of a linear spread of antler and bone (Fig 52); a roe deer skull.
Other principal individual finds: two aurochs skulls on an oak plank in a Phase 2 pit (Figs 48–50).

Segment 13

Ditch segment 13 was also excavated under pressure. The lowest levels again consisted of mainly sterile, backfilled sands and gravel, but there were two linear spreads of bone, pottery, and flint: the highest was in layer 2 and ran the entire length of the ditch. It can probably be dated to Phase 1C and included a scatter of antler and bone close to causeway M (Figs 54, 55). A slightly wider linear structured deposit was below, in layer 4 – a context that can be dated to Phase 1B with some confidence (Figs 56, 57). This linear spread was densest near the two butt ends, where there were large quantities of broken pottery and animal bone. The butt-end deposits at causeway M were of particular

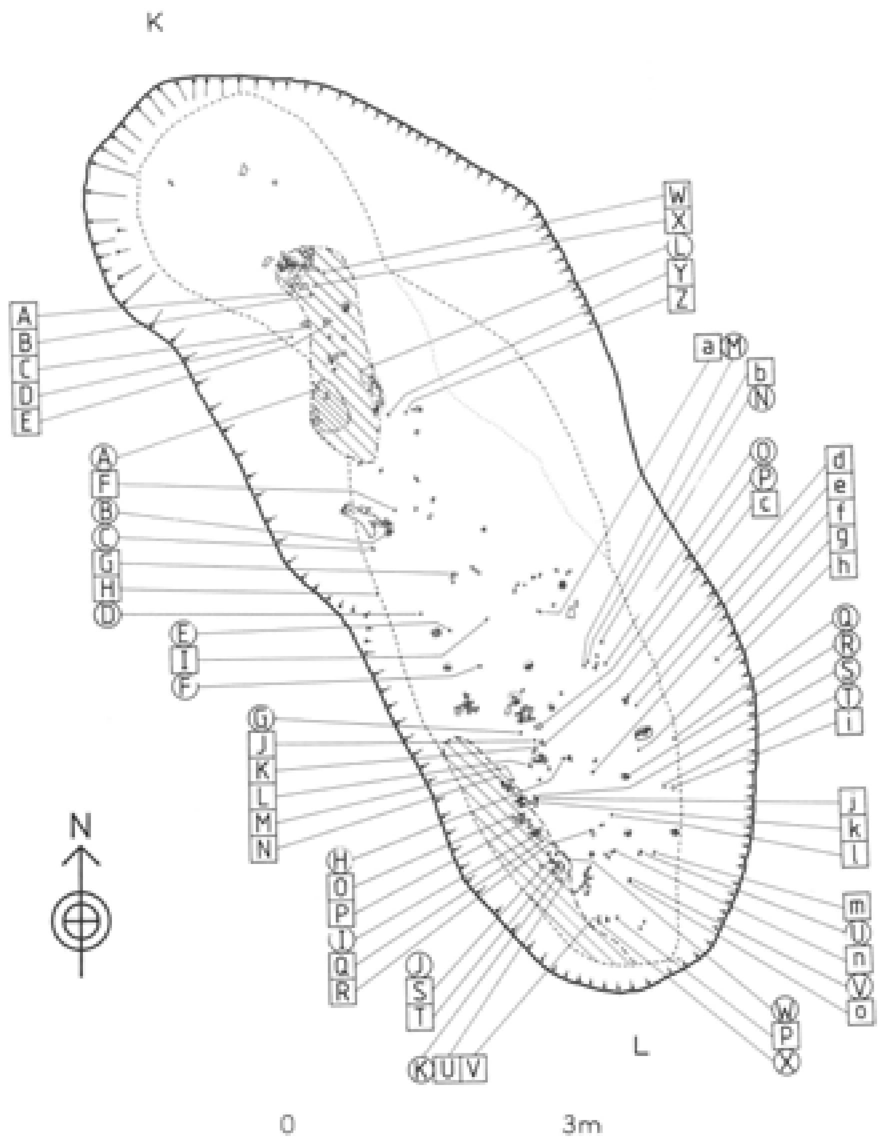


Fig 46 Distribution of finds within layers 2–5 of ditch segment 11, at 7.15m OD. Due to its quantity, bone is not labelled. Dashed lines indicate the edge of the filling, while the two hatched areas contained 'pyre-like' burnt material; close hatching indicates dense concentrations of charcoal [for pot numbers see Appendix 3]

Circles (plain bodysherds unless stated): A Pot 2713; B Pot 2716; C Pot 2715; D Pot 2718; E Pot 2712; F Pot 2876; G Pot 2884 decorated bodysherd; H Pot 2882 decorated bodysherd; I Pot 2887; J Pot 2886; K Pot 2881; L Pot 2714; M Pot 2873 decorated bodysherd; N Pot 2871; O Pot 2872; P Pot 2590; Q Pot 2874; R Pot 2883; S Pot 2889; T Pot 2875; U Pot 2878; V Pot 2877; W Pot 2880 decorated bodysherd; X Pot 2879

Squares (waste flakes unless stated): A Flint 6080 natural; B Flint 6082; C Flint 6085 waste flake, burnt; D Flint 6986 waste flake, burnt; E Flint 6084; F Flint 6090; G Flint 6094; H Flint 6092 denticulate, heavily burnt; I Flint 6093 serrated flake ; J Flint 6202; K Flint 6201; L Flint 6177; M Flint 6175; N Flint 6174; O Flint 6204; P Flint 6200 scraper, type D2, heavily burnt; Q Flint 6199 core, too damaged to classify; R Flint 6172; S Flint 6171 serrated flake; T Flint 6170 serrated flake; U Flint 6167 scraper, type A2; V Flint 6169 waste flake, burnt; W Flint 6081; X Flint 6083; Y Flint 6088; Z Flint 6087; a Flint 6095; b Flint 6162; c Flint 6203; d Flint 6168; e Flint 6161; f Flint 6173 natural; g Flint 5975; h Flint 6163 natural; i Flint 6207 core, type A2; j Flint 6178; k Flint 6176; l Flint 6166 serrated flake; m Flint 6164; n Flint 6165; o Flint 6167 scraper, type A2; p Flint 6168

Fig 47 Large Phase 2 pit cutting enclosure ditch segment 12, during the excavation of the aurochs skulls. Looking north-west towards causeway M

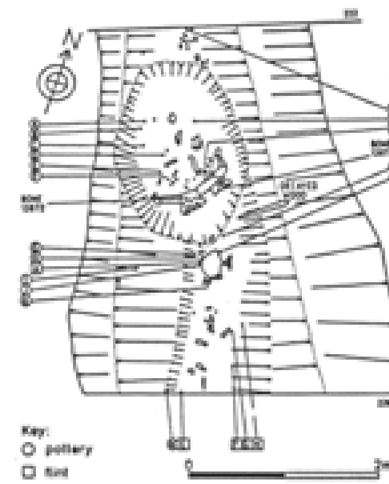


Fig 48 Distribution of finds around the pit containing aurochs skulls within enclosure ditch segment 12, between sections 222 and 226. Finds plotted within the ditch are in layer 6; the pit comprises layers 4 and 5. Due to the quantity of material, only the largest bones are labelled [for pot numbers see Appendix 3]

Circles (plain bodysherds unless stated): A Pot 3676; B Pot 3974; C Pot 3977; D Pot 3979; E Pot 3976; F Pot 3981; G Pot 3434; H Pot 3987 decorated rimsherd, Mildenhall; I Pot 3989; J Pot 3975 decorated rimsherd, Mildenhall; K Pot 3958; L Pot 3486; M Pot 3485; N Pot 3982

Squares (waste flakes unless stated): A Flint 7503; B Flint 7570; C Flint 7562; D Flint 7565; E Flint 7566 scraper, type A2; F Flint 7567 retouched flake; G Flint 7569 core, type A2; H Flint 7568

interest (Fig 56): at the very end of the ditch was a concentration of animal bones (mainly sheep), which included several articulated vertebrae. Beside them was a concentration of pottery that had clearly been tipped into the ditch from the enclosure, as the sherds extended some 150mm up the recut ditch; they derived from a single (?Mildenhall) vessel.

At the centre of the ditch segment, in the Phase 1B recut, was a broken quernstone upon which had been placed a topstone (Figs 57, 58).

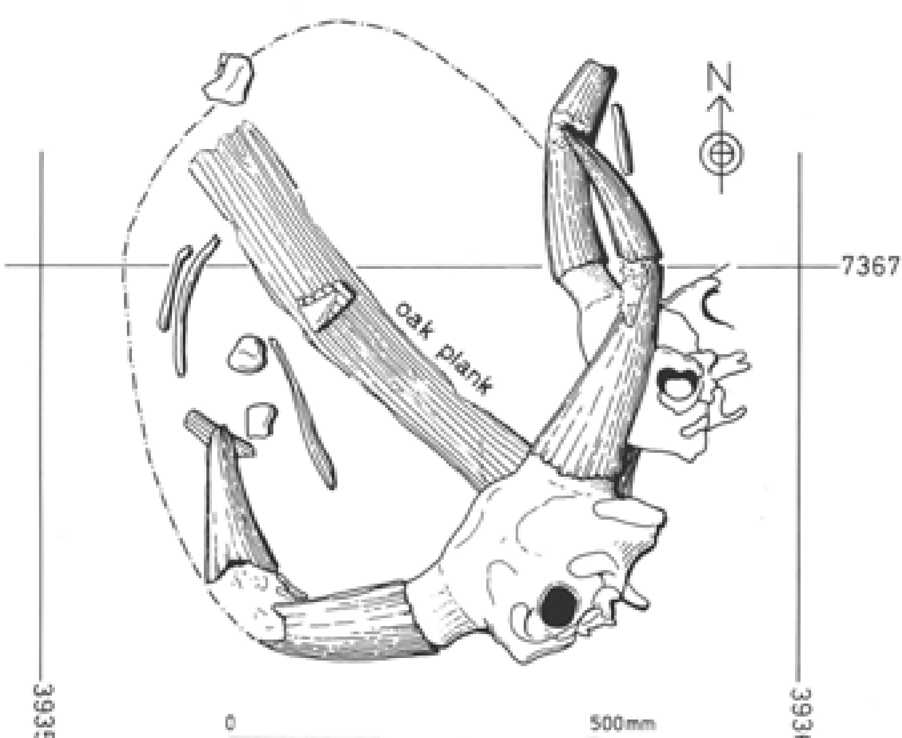


Fig 49 Plan of bones in the Phase 2 pit in ditch segment 12, showing the location of the much-decayed wooden plank below an aurochs skull. The dot-dash line is the edge of the pit

Fig 50 Aurochs bones in the Phase 2 pit in ditch segment 12; traces of a much-decayed plank or board are beneath the skull, running down the centre of the pit (see Fig 49)

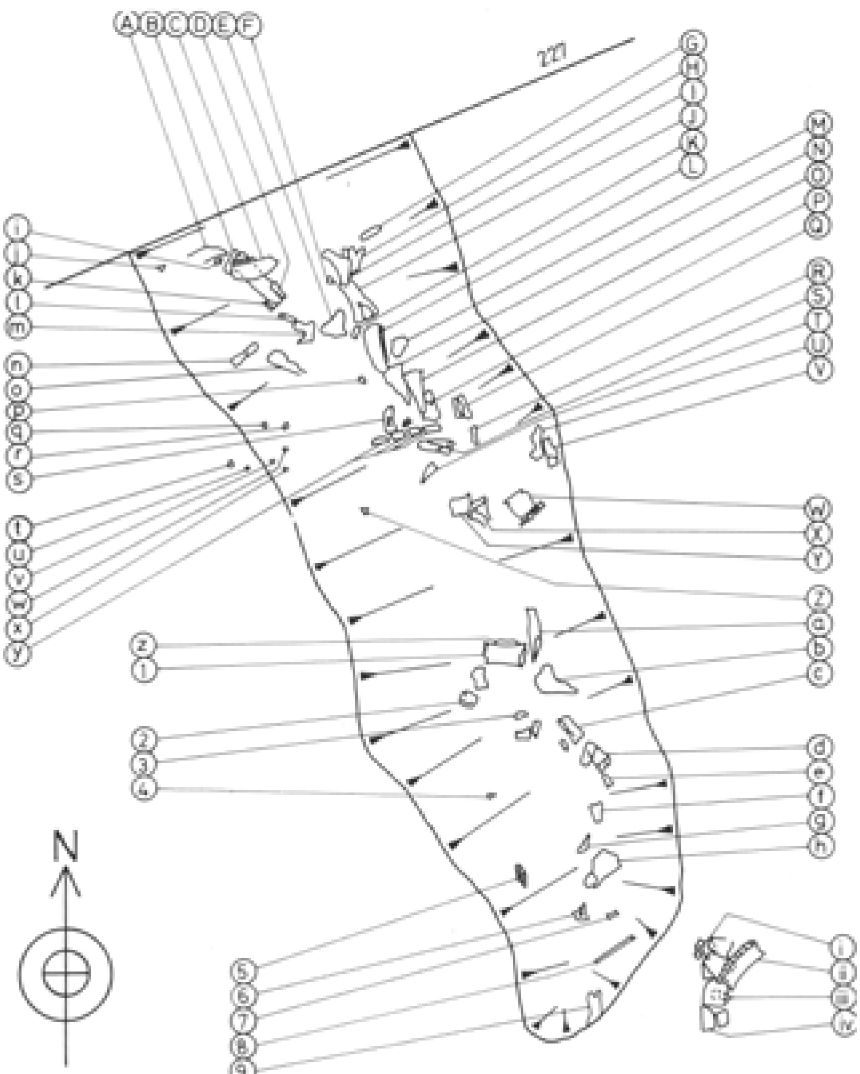


Fig 51 Distribution of finds within the narrow recut of enclosure ditch segment 12, between section 227 and causeway M, layer 5, at and below 7.10m OD. The pottery i–iv on the south-east edge of the recut may be the disturbed remains of an earlier (Phase 1A?) butt-end deposit [for pot numbers see Appendix 3]

A Bone 13667; B Bone 13436; C Bone 13668; D Bone 13669; E Bone 13440; F Pot 3964 plain bodysherd; G Bone 13670; H Bone 13674; I Bone 13673; J Bone 13675; K Pot 3965 plain bodysherd; L Bone 13676; M Pot 3967 plain bodysherd; N Bone 13677; O Bone 13678; P Bone 13414; Q Bone 13415; R Bone 13441; S Bone 13418; T Bone 13419; U Bone 13907; V Bone 13908; W Pot 4021 plain rimsherd, Mildenhall; X Bone 13421; Y Bone 13420; Z Flint 7532 waste flake; a Bone 13422; b Bone 13426; c Bone 13427; d Bone 13429; e Bone 13430; f Bone 13431; g Bone 13432; h Bone 13433; i Bone 13439; j Flint 7531 piercer; k Pot 3963 plain bodysherd; l Bone 13438; m Bone 13672; n Bone 13671; o Bone 13431; p Pot 3466 decorated bodysherd; q Bone 13914; r Bone 13915; s Bone 13416; t Pot 4037 plain bodysherd; u Bone 13919; v Bone 13917; w Bone 13916; x Bone 13918; y Bone 13417; z Bone 13425; 1 Bone 13424; 2 Bone 13423; 3 Bone 13428; 4 Flint 7533 waste flake; 5 Bone 13466; 6 Bone 13435; 7 Bone 13434; 8 Bone 13462; 9 Bone 13467; i Pot 4028 plain bodysherd; ii Pot 4027 decorated rimsherd, Mildenhall; iii Pot 4029 plain rimsherd, Mildenhall; iv Pot 4019 plain bodysherd

Fig 52 Deposit of antler and bone within the narrow recut of enclosure ditch segment 12, layer 4, looking north-west from causeway M to section 227. 1m scale

Fig 54 Bone and antler deposit in enclosure ditch segment 13, layer 2, Phase 2, between section 228 (in background) and causeway M. Scale 0.25m

Fig 53 Antler fragments and bone in enclosure ditch segment 12, layer 4. Scale 0.25m

Fig 55 Bone and antler deposit in layer 2, Phase 2, of ditch segment 13. Scale 0.25m

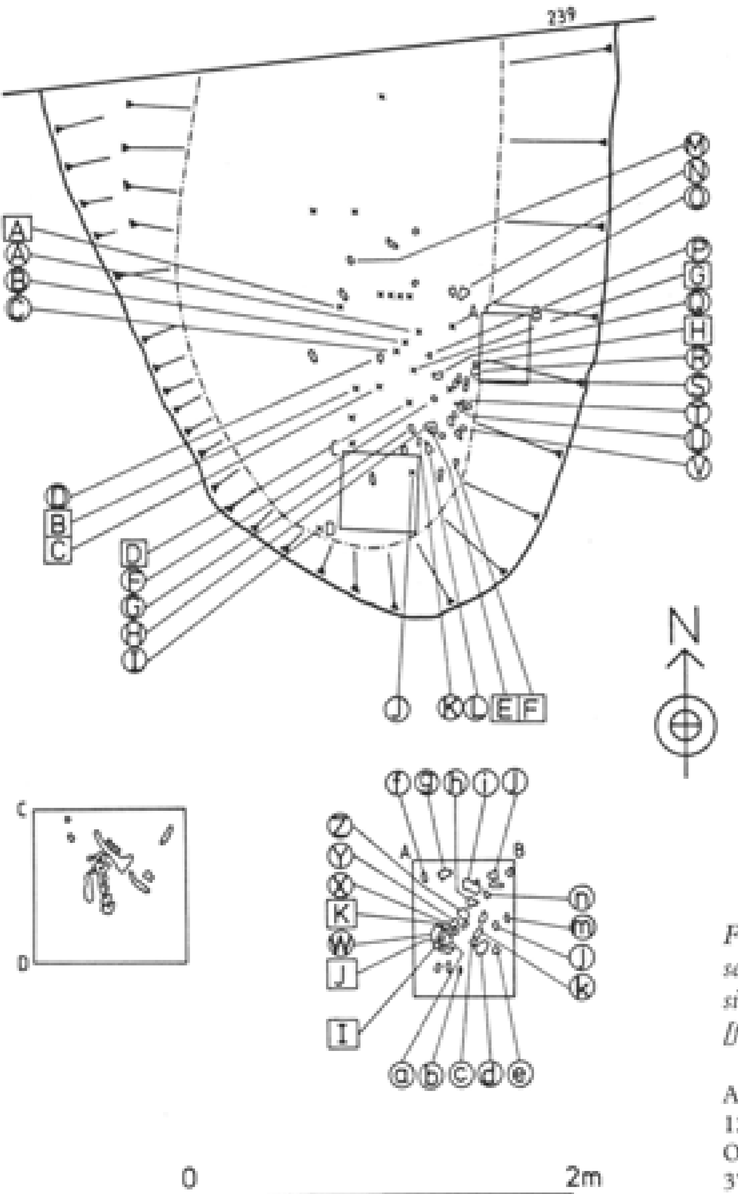


Fig 56 *Distribution of finds in ditch segment 13, layer 4, between causeway N and section 239. Due to the quantity found, bone is not labelled. The animal bones in the butt-end deposit (planned in box C–D) were a sheep/goat mandible (Bone 12420) and articulated vertebrae (Bone 12417). Pottery that had been tipped in from the exterior of the enclosure is planned in box A–B [for pot numbers see Appendix 3]*

Circles (all plain bodysherds): A Pot 3592; B Pot 3591; C Pot 3590; D Pot 3602; F Pot 3603; G Pot 3597; H Pot 3596; I Pot 3628; J Pot 3589; K Pot 3595; L Pot 3598; M Pot 3606; N Pot 3605; O Pot 3593; P Pot 3625; Q Pot 3604; R Pot 3607; S Pot 3601; T Pot 3594; U Pot 3600; V Pot 3599; W Pot 3621; X Pot 3626; Y Pot 3619; Z Pot 3620; a Pot 3622; b Pot 3623; c Pot 3613; d Pot 3617; e Pot 3615; f Pot 3614; g Pot 3613; h Pot 3616; i Pot 3611; j Pot 3612; k Pot 3618; l Pot 3609; m Pot 3608; n Pot 3624

Squares (waste flakes unless stated): A Flint 7277 scraper, type A2; B Flint 7278; C Flint 7273 scraper, type A2 ; D Flint 7280; E Flint 7274; F Flint 7275; G Flint 7279; H Flint 7276 irregular workshop waste; I Flint 7288; J Flint 7287 small flake fragment; K Flint 7289 natural

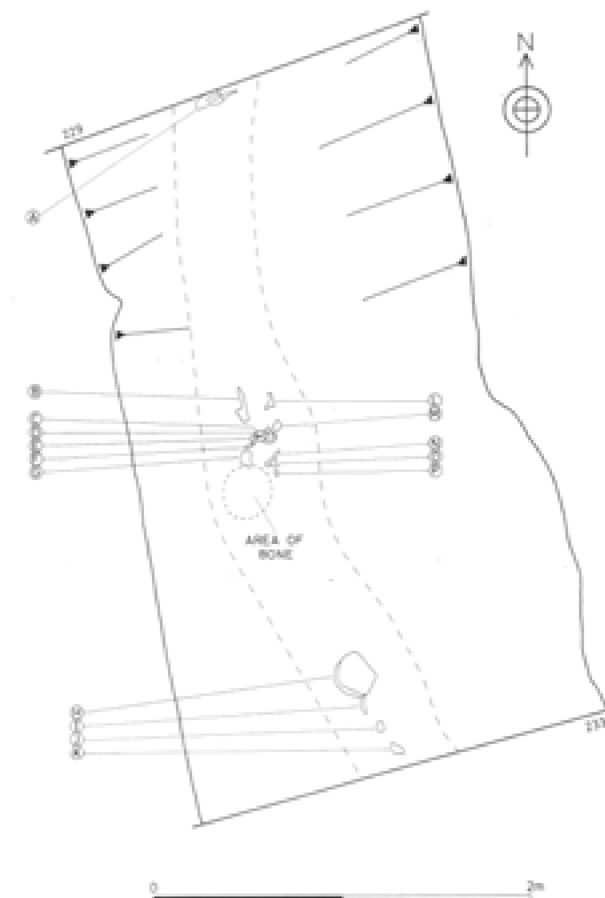


Fig 57 *Plan of finds in enclosure ditch segment 13, between sections 229 and 233, at the base of layer 4. It was not possible to complete this plan owing to the encroaching quarry: [for pot numbers see Appendix 3]*

A Bone 12793; B Bone 12795; C Bone 12801; D Bone 12804; E Bone 12802; F Bone 12803; G Bone 12796; H Other 152 saddle quern fragment; I Other 154 stone; J Pot 3734 plain bodysherd; K Bone 12805; L Bone 12794; M Bone 12799; N Bone 12797; O Bone 12798; P Pot 3796 plain bodysherd

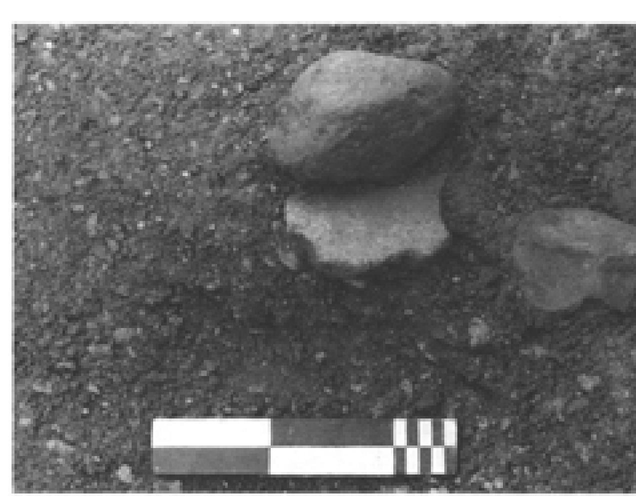


Fig 58 *Broken saddle quern (Other 152) beneath rubber (Other 166) in layer 4 of enclosure ditch segment 13. This deposit was almost exactly at the centre of the segment*

The latest features of the segment were two large Phase 2 pits; these contained quantities of animal bone, and a few flints and potsherds. The pits clearly cut through the narrow Phase 1C recut and are represented in section 234 by layer 5 and in section 238 by layer 3 (Fig 75, B, C).

Illustrations and principal finds

Sections: Figure 75.
Plans: Figures 56, 57.
Photographs of in situ *deposits:* Figures 54, 55, 58.
Butt-end deposits: at causeway M – a linear spread of bone, antler, and pottery (Phase 1C).
Other principal individual finds: a stone axe fragment (Other 151); quern fragments (Other 152, 167); a quern rubber (Other 166).

Segment 14

This last ditch segment was excavated under salvage conditions. South-west of section 245 the ditch was revealed at the ballast level. Linear spreads of bone were observed, probably of Phase 1B or 1C date, and much charcoal and/or 'pyre' material was in the infilling; unusually this was also observed in a lens within Phase 1A deposits. The lowest, Phase 1A, backfilled deposits were less thick than in previous segments, and there were indications that they were also less free of finds. The lowest layer of the Phase 1B recut was rich in charcoal, as was the Phase 1C recut (layer 2). The nature of the filling of this segment had clearly changed from what had gone before, but under the circumstances it was impossible to be more precise. An unusual (for Etton) butt-end deposit may be represented by a pronounced concentration of flint debitage between section 252 and causeway O.

Illustrations and principal finds

Sections: Figure 75.
Butt-end deposits: at causeway N – a linear spread of bone, antler, and pottery. At causeway O – a linear spread of bone, antler, and pottery; a possible concentration of flint by-products in possible Phase 1C contexts.

Description of illustrated sections

by Charles French

Introduction

The section drawings illustrate a representative selection of mainly transverse sections through the enclosure ditch. Sections from every ditch segment have been illustrated, and the section line locations are on Figure 11. However, the 'box' sections through buried soil on the interior side of segment 1, between transverse sections 6 and 13 (Fig 61) are best located in Figure 106; similarly, section 31 across a small ditch (possibly a southerly extension of segment 3) in causeway C is also located on Figure 106 – for convenience this small feature is treated as part of enclosure ditch segment 3.

Table 4 is a concordance of illustrated sections and ditch segments. The sections are arranged in numerical order, starting in segment 1, and working clockwise around the enclosure ditch. Soil colour descriptions are coded using the Munsell colour chart system (such as 10YR 3/3). Conventions used in the section drawings appear on p xxii. Ap, Bg, Bw/g, Bw, B/C, and C are soil horizons – see the descriptions for Figure 59, section 1 (below).

Figure 59

Section 1

This transverse section was across ditch segment 1; layers 1 and 2 of feature 26 are not described:

Ap: silty clay loam alluvial ploughsoil, with medium subangular blocky ped structure; 10YR 3/3.
Bg: silty clay loam to clay loam alluvium, with medium to strongly developed sub-angular blocky ped structure, gleyed B horizon; 10YR 3/2.
Bw/g: sandy/silt loam with few scattered gravel pebbles, gleyed and weathered, lower B horizon; 10YR 4/3.
B/C: loamy sand and gravel transition between weathered upper surface of subsoil and base of soil profile; 10YR 5/6.
C: sand/gravel terrace subsoil; 10YR 7/6.

Layer 0: sandy/silt loam with few scattered gravel pebbles (100–200mm); 10YR 4/2.
Layer 1: sandy loam with few scattered gravel pebbles (2–200mm); 10YR 5/6.
Layer 2: silt loam with even gravel mix (>50%) (2–200mm); 10YR 5/6.
Layer 3: similar to layer 2.
Layer 4: loamy sand with few scattered gravel pebbles; 10YR 5/6.
Layer 5: loamy sand with even gravel mix (>25%) and one sand lens; 10YR 5/6.
Layer 6: loamy sand with few scattered gravel pebbles; 10YR 4/6.
Layer 7: sandy loam with even gravel mix (2–200mm); 10YR 4/1–5/6.
Layer 8: sandy loam with even gravel mix (2–200mm), wood fragments, and amorphous organic matter; 10YR 2/1.

Section 3

This transverse section was across ditch segment 1:

Layer 0: sandy/silt loam with few scattered gravel pebbles; 10YR 4/2.
Layer 1: silt loam; 10YR 5/6.
Layer 2: silt loam with even gravel mix; 10YR 5/2.
Layer 3: silt loam with few scattered gravel pebbles; 10YR 5/2.
Layer 4: sandy loam with even gravel mix towards base of layer; 10YR 5/6.
Layer 5: sandy loam with few scattered gravel pebbles; 10YR 4/4.
Layer 6: loamy sand with even gravel mix; 10YR 4/6.
Layer 7: same as for layer 6.
Layer 8: sandy loam with even gravel mix, wood fragments, and amorphous organic matter; 10YR 2/1.

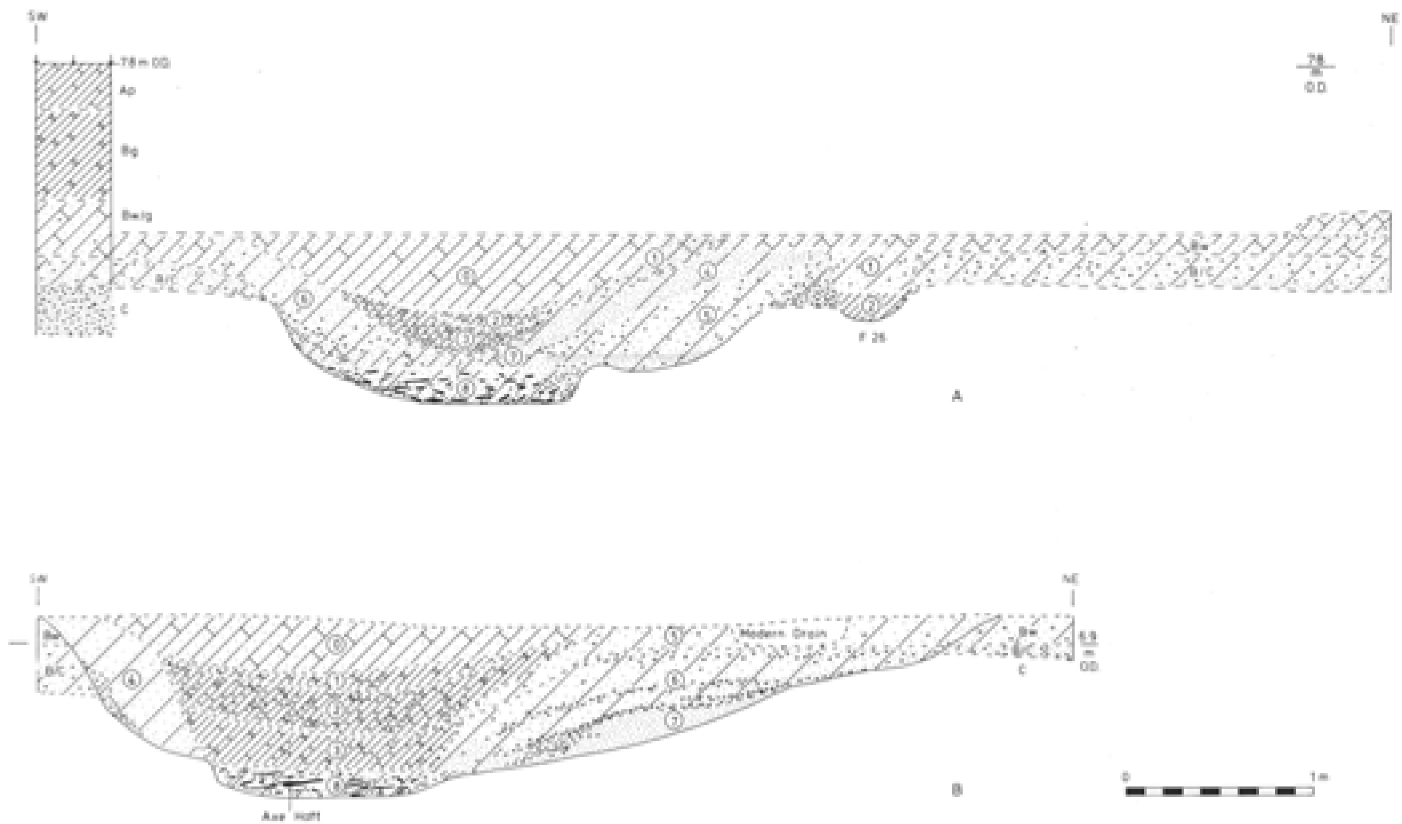


Fig 59 Enclosure ditch sections: section 1 (A) and section 2 (B) – the axe haft is projected

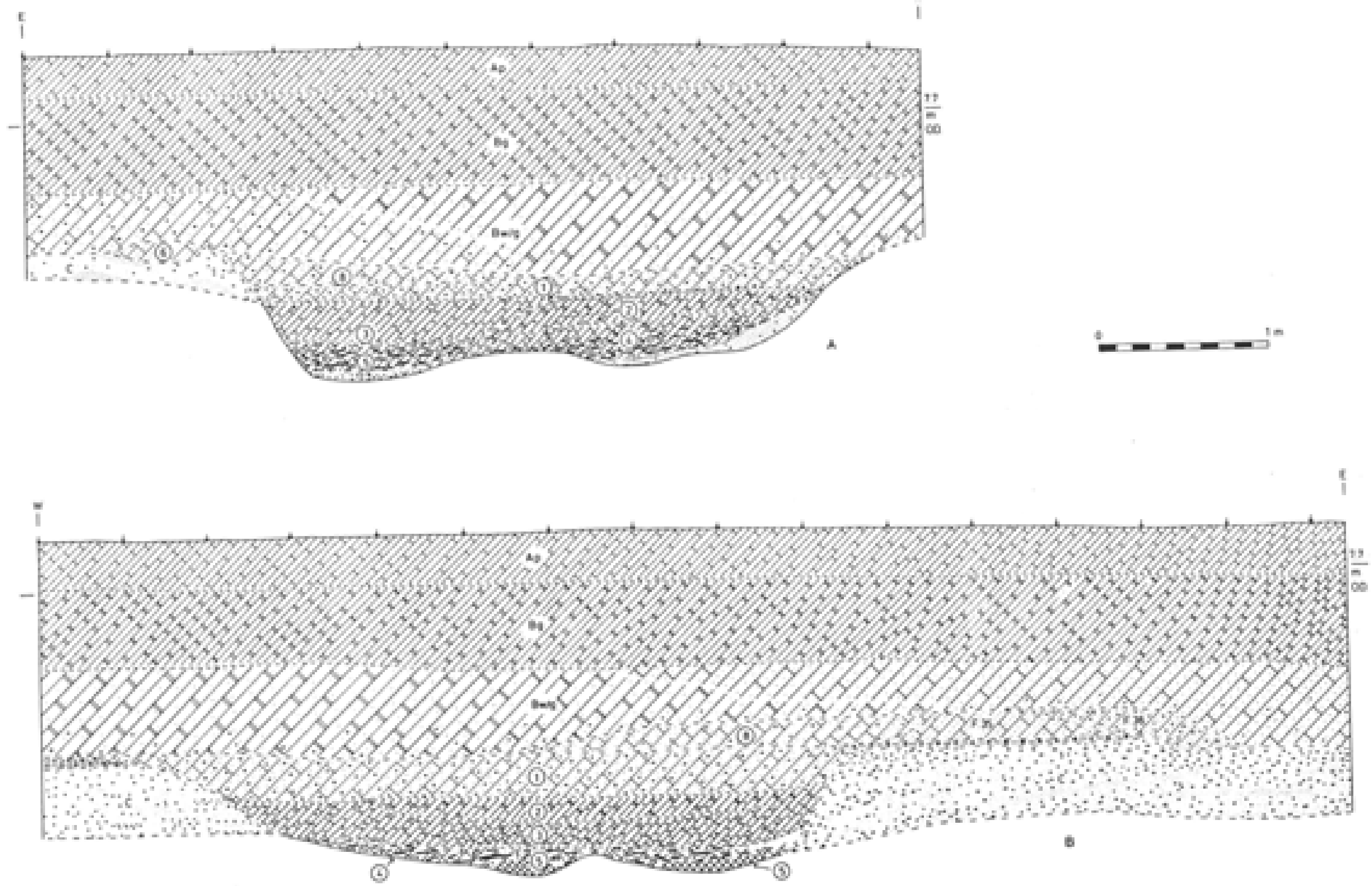


Fig 60 Enclosure ditch sections: section 5 (A) and section 6 (B). These were drawn in 1982, and ploughsoil is present

Figure 60

Section 5

This transverse section was across ditch segment 1:

Layer 1: sandy loam to loam with even gravel mix (<40%); 10YR 4/2–5YR 4/4.
Layer 2: silty clay loam with few scattered gravel pebbles; 10YR 5/6; two lenses of iron pan (2.5YR 4/6).
Layer 3: silt loam with scattered gravel pebbles; 10YR 5/6.
Layer 4: silt loam with even gravel mix, abundant wood fragments, and amorphous organic matter, 10YR 4/1–5/6.
Layer 5: same as layer 4.
Layer 6: sandy loam; 10YR 4/3.
Layer 8: sandy loam to loam with even gravel mix (<30%); 10YR 4/2–5YR 4/4.

Section 6

This transverse section was across ditch segment 1:

Layer 1: sandy loam to loam with even gravel mix (<40%); 10YR 4/2–5YR 4/4.
Layer 2: silty clay loam with few scattered gravel pebbles; 10YR 5/6.
Layer 3: silt loam with even gravel mix (>40%), 10YR 5/6–5/3.
Layer 4: sandy/silt loam with few scattered gravel pebbles, abundant wood fragments, and amorphous organic matter; 10YR 4/1–5/6.
Layer 5: detrital peat; 10YR 2/1.
Layer 8: sandy loam with few scattered gravel pebbles; 10YR 5/6–4/2.
F35: loam; 5YR 3/4.
F36: sandy loam with even gravel mix (>50%); 10YR 6/6.

Figure 61

These sections are included here as they were of buried soil of the interior adjacent to ditch segment 1 – see Figure 106 for section locations.

Section 1 (interior)

This section adjoined section 7 of ditch segment 1:

F32 (layer 1): silt loam; 10YR 3/2–2.5YR 4/8.
F35 (layer 1): silty clay loam; 10YR 3/4.
F36 (layer 1): loamy sand with few scattered gravel pebbles; 10YR 5/8.

Section 2 (interior)

This section extended the alignment of section 8 of ditch segment 1:

F32 (layer 1): silt loam; 10YR 3/2–2.5 YR 4/8.
F35 (layer 1): silty clay loam; 10YR 3/4.
F36 (layer 1): loamy sand with few scattered gravel pebbles; 10YR 5/8.
F37 (layer 1): silt loam; 10YR 4/4.
Layer 8: see F36.

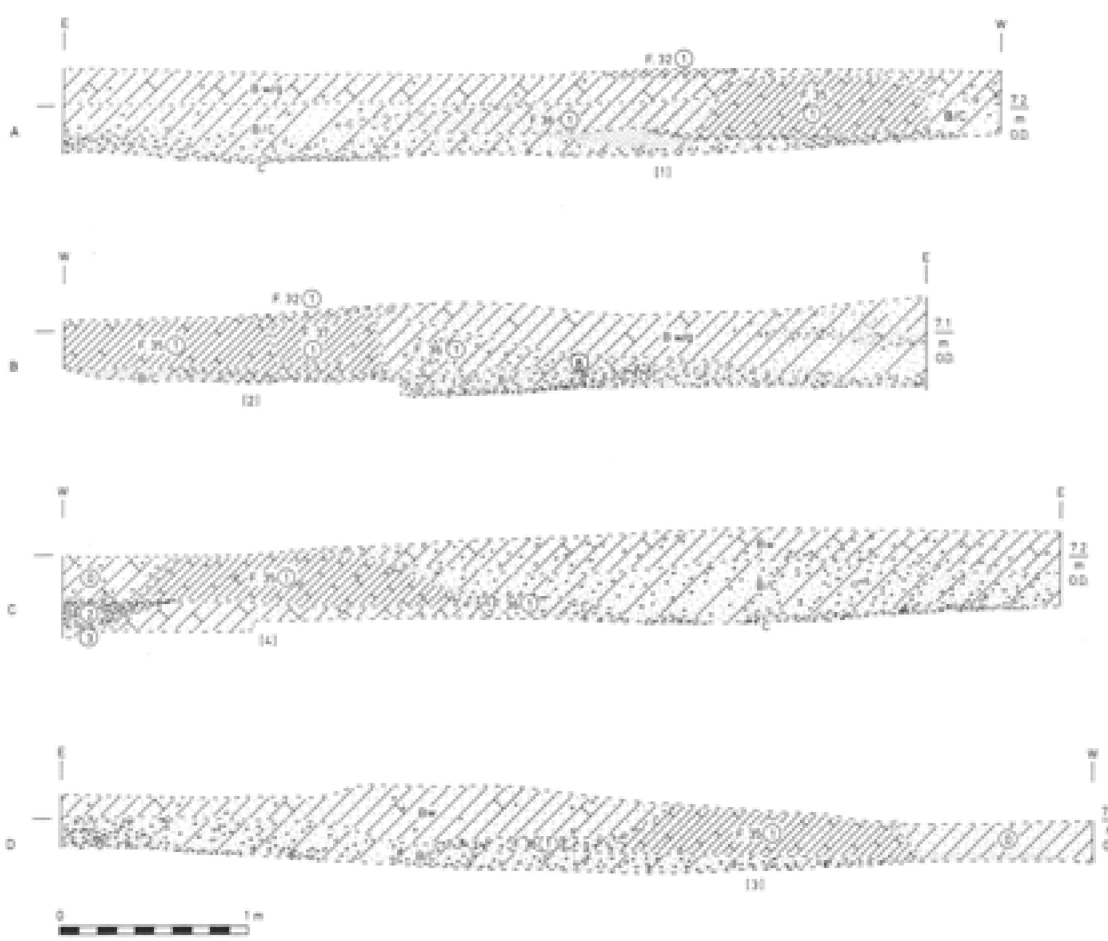


Fig 61 Sections through buried soils of the interior, immediately adjacent to the enclosure ditch: sections 1 (A), 2 (B), 4 (C), and 3 (D)

Section 3 (interior)

This section adjoined section 10 of ditch segment 1. Layer 0 was the ditch:

F35 (layer 1): silty clay loam; 10YR 3/4.
F36 (layer 1): loamy sand with even gravel mix; 10YR 5/8.

Section 4 (interior)

This section adjoined section 12 of ditch segment 1. Layers 0, 2, and 3 were the ditch:

F35 (layer 1): silty clay loam; 10YR 3/4.
F36 (layer 1): loamy sand with even gravel mix; 10YR 5/8.

Figure 62

Section 7

This transverse section was across ditch segment 1:

Layer 0: sandy/silt loam with scattered gravel pebbles; 10YR 4/2.
Layer 1: silt loam with few scattered gravel pebbles; 10YR 4/2–5YR 4/4.
Layer 2: sand and even gravel mix (2–500mm); 10YR 5/6–5/3.
Layer 3: sandy loam with even gravel mix (2–500mm); 10YR 5/6–5/3.
Layer 4: sandy loam with scattered gravel pebbles; 10YR 4/4.
Layer 5: organic sandy loam; 10YR 2/1.
Layer 6: detrital peat; 10YR 2/1.
Layer 7: sand/gravel and detrital wood fragments.
Layer 8: sand and gravel.

Section 10

This transverse section was across ditch segment 1 and F35 buried soil. It adjoined section 3 across F35 – see Figure 61, D:

Layer 0: silt clay loam with scattered gravel pebbles; 10YR 5/4.
Layer 1 (of enclosure ditch and F35): silt loam with scattered gravel pebbles; 10YR 4/4–5/4.
Layer 2: sandy loam, with gravel zones at top and bottom of layer; 10YR 5/6.
Layer 3: sandy loam with amorphous organic matter and even gravel mix; 10YR 4/3.
Layer 4: loamy sand; 10YR 5/2.
Layer 5: organic silt loam with scattered gravel pebbles and wood fragments; 10YR 3/2.
Layer 6: detrital peat; 10YR 2/1.
Layer 7: interbedded sand and fine gravel with wood fragments; 10YR 5/1–5/6.

Figure 63

Section 28

This transverse section was across ditch segment 2 and F66 pit:

Layer 1: sandy/silt loam with scattered gravel pebbles; 10YR 4/6.
Layer 1 of F66: loamy sand and gravel.
Layer 2: sandy loam with even gravel mix (<20 mm); 10YR 5/1–YR 4/6.
Layer 3: sandy loam with scattered gravel pebbles, even gravel mix at base of profile; 10YR 4/4.
Layer 4: silt loam with even gravel mix (<20mm), abundant roots and wood fragments; 10YR 4/2.
Layer 5: sandy loam and even gravel mix; 10YR 6/1–6/6.

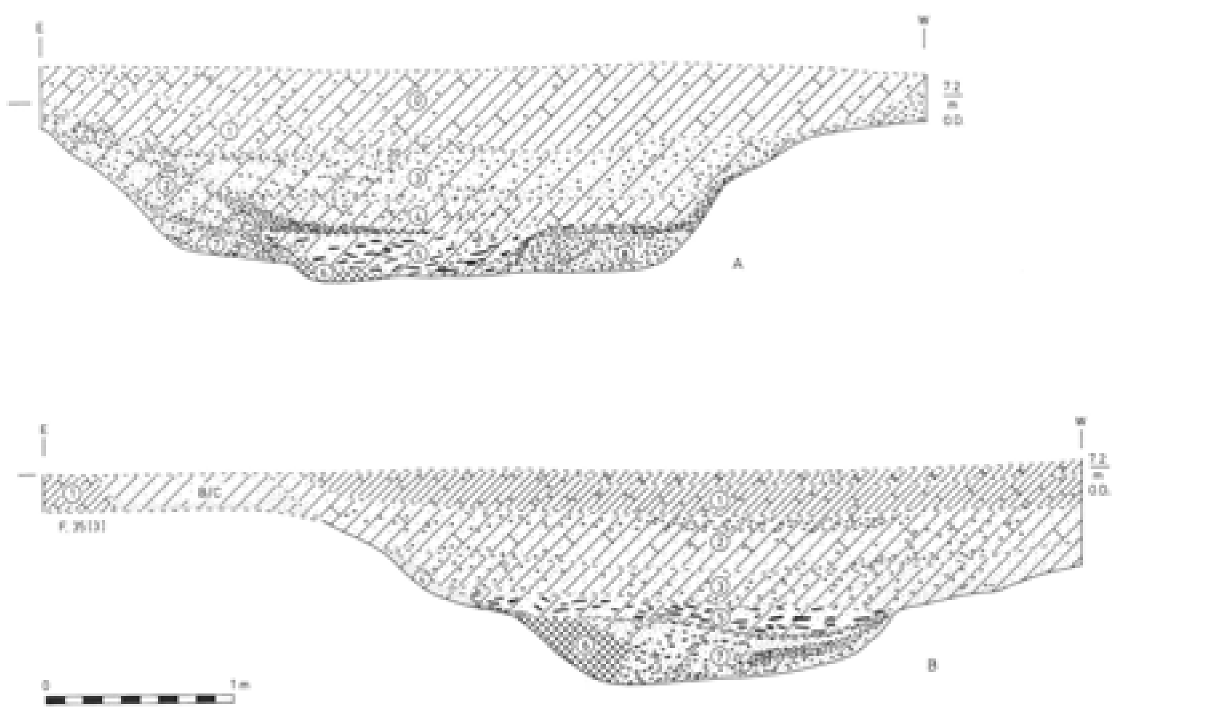


Fig 62 Enclosure ditch sections: section 7 (A) and section 10 (B)

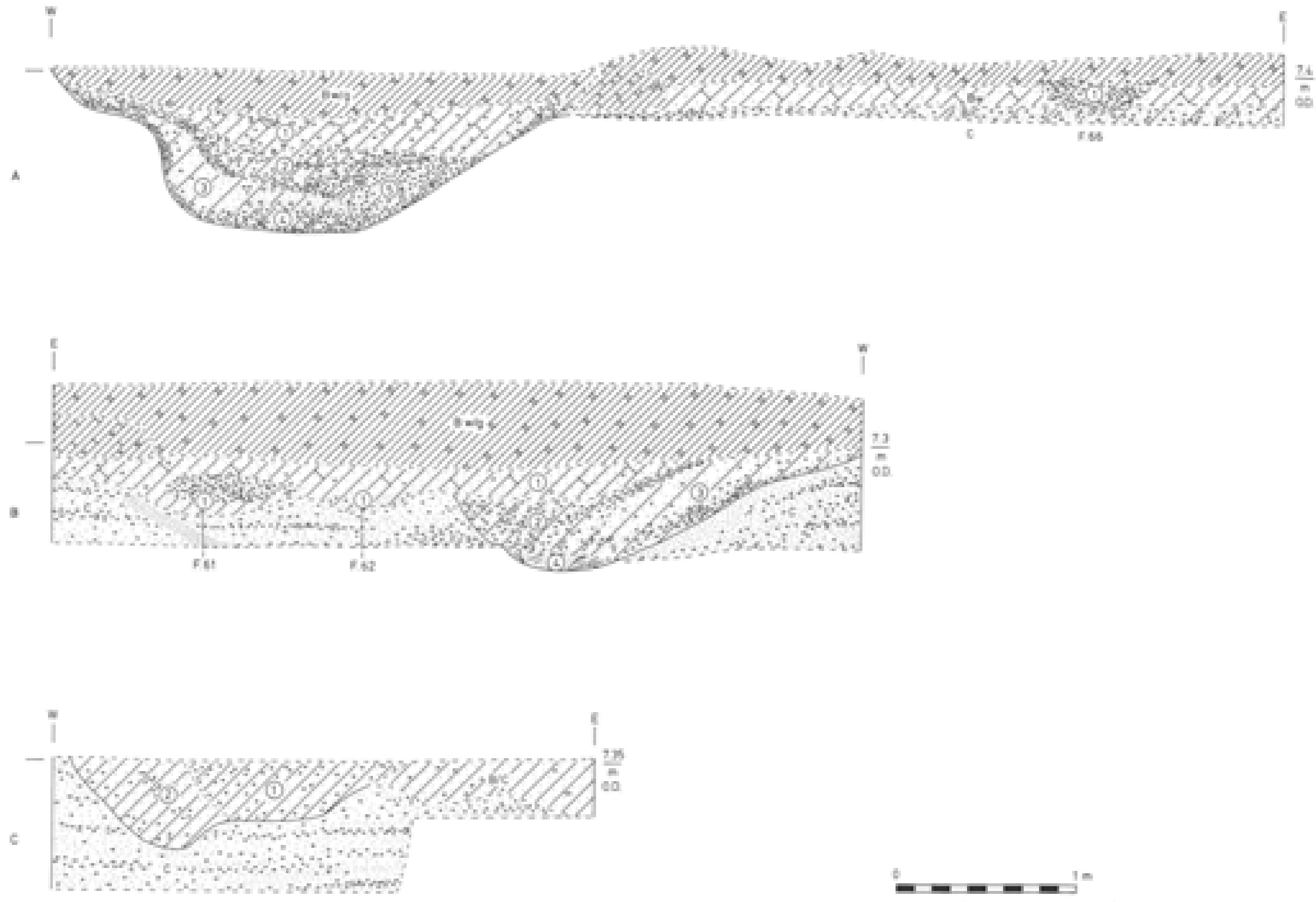


Fig 63 Enclosure ditch sections: section 28 of ditch and F66 (A), section 29 (B), and section 31 (C), possible extension of segment 3

Section 29

This transverse section was across segment 2:

Layer 1: sandy/silt loam with scattered gravel pebbles; 10YR 4/3.
Layer 2: sandy loam and even gravel mix; 10YR 4/3–5/6–6/1.
Layer 3: sandy loam with scattered gravel pebbles and a gravel lens at base of profile; 10YR 4/3.
Layer 4: organic sandy loam with roots, wood fragments, and even gravel mix. 10YR 2/1.

Section 31

This section was across a small possible extension of segment 3 – see Figure 106 for section location:

Layer 1: sandy/silt loam with scattered gravel pebbles; 10YR 4/3.
Layer 2: sandy loam with scattered gravel pebbles; 10YR 4/3.

Figure 64

Section 35

This transverse section was across ditch segment 3:
Layer 1: sandy loam with scattered gravel pebbles; 10YR 5/6.
Layer 3: sandy loam with abundant root/wood fragments and even gravel mix; 10YR 4/1.

Section 39

This transverse section was across ditch segment 3:

Layer 1: sandy/silt loam with scattered gravel pebbles; 10YR 4/2–7.5YR 5/6.
Layer 2: sandy loam with even gravel mix and sand lenses; 10YR 5/6–6/2.
Layer 3: silt loam with even gravel mix, abundant wood fragments, and roots; 10YR 5/2.
Layer 4: silt/sandy loam with even mix gravel and sand; 10YR 4/4.

Section 40

This transverse section was across ditch segment 3:

Layer 1: sandy loam with scattered gravel pebbles; 10YR 4/2.
Layer 2: sandy loam with even mix gravel and sand; 10YR 4/3–5/6.
Layer 3: organic silt loam with wood/root fragments and scattered to even mix gravel; 10YR 2.5/1.
Layer 4: loamy sand and even gravel mix; 10YR 5/6.

Section 41

This transverse section was across ditch segment 4:

Layer 1: sandy/silt loam with few scattered gravel pebbles; 10YR 4/2.

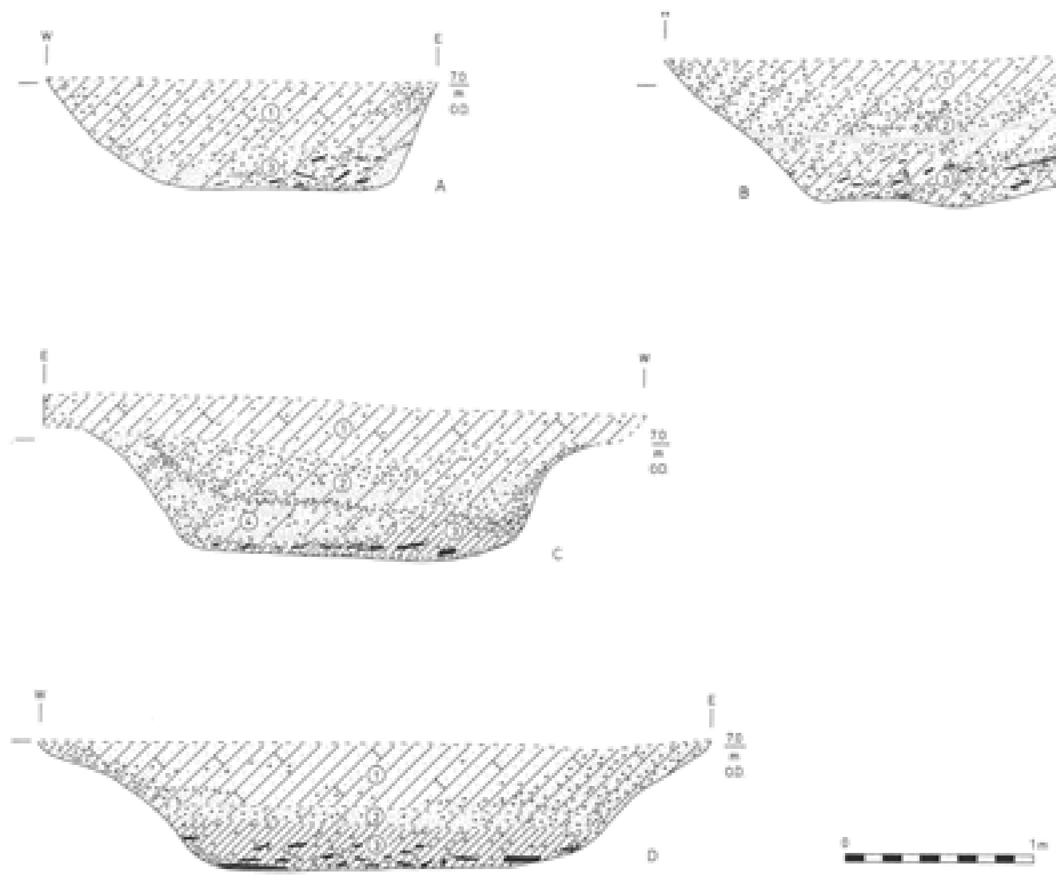


Fig 64 Enclosure ditch sections: section 35 (A), section 39 (B), section 40 (C), and section 41 (D)

Layer 2: sandy loam with even gravel mix; 10YR 5/6.
Layer 3: organic silt loam with abundant wood/root fragments and even gravel mix; 10YR 2.5/1.

Figure 65

These were longitudinal sections of ditch segment 5. For descriptions of section 51/53, see section 54; for descriptions of 56/58, see section 59; and for descriptions of 61/63, see section 64 (all on Fig 66).

Figure 66

These transverse sections were across ditch segment 5:

Section 54

Layer 1: sandy/silty (clay) loam with scattered gravel pebbles; 10YR 5/3–6/8.
Layer 2: sandy/silt loam with even gravel mix (2–200mm); 10YR 6/8–7/6.
Layer 3: organic silt loam with wood/root fragments and even gravel mix; 10YR 3/1.

Section 59

Layer 1: sandy/silty (clay) loam with scattered gravel pebbles; 10YR 5/3–6/8.
Layer 2: sandy/silt loam with even mix gravel (2–500mm); 10YR 6/8–7/6.
Layer 3: organic sandy/silt loam with abundant wood/root fragments and even gravel mix; 10YR 3/1.

Section 64

Layer 1a: silty clay.
Layer 1: sandy/silty (clay) loam with scattered gravel pebbles; 10YR 5/3–6/8.
Layer 2: sandy loam with even gravel mix (2–400 mm); 10YR 6/8–7/6.
Layer 3: organic sandy/silt loam with wood/root fragments, even gravel mix, and lenses of iron pan; 10YR 3/1.

Figure 67

These transverse sections were across ditch segment 5:

Section 69

Layer 1: silty clay loam (merges with adjacent stream channel) with scattered gravel pebbles; 10YR 5/3–6/8.
Layer 2: loamy sand and even mix gravel; 10YR 6/8.
Layer 3: sand and even gravel mix; 10YR 7/6.

Section 79

Layer 1: silt loam to sandy clay loam (merges with stream channel) with few scattered gravel pebbles; 10YR 5/3–6/8.
Layer 2: organic sandy/silt loam with abundant wood/root fragments and even gravel mix; iron pan at base of profile; 10YR 3/1.

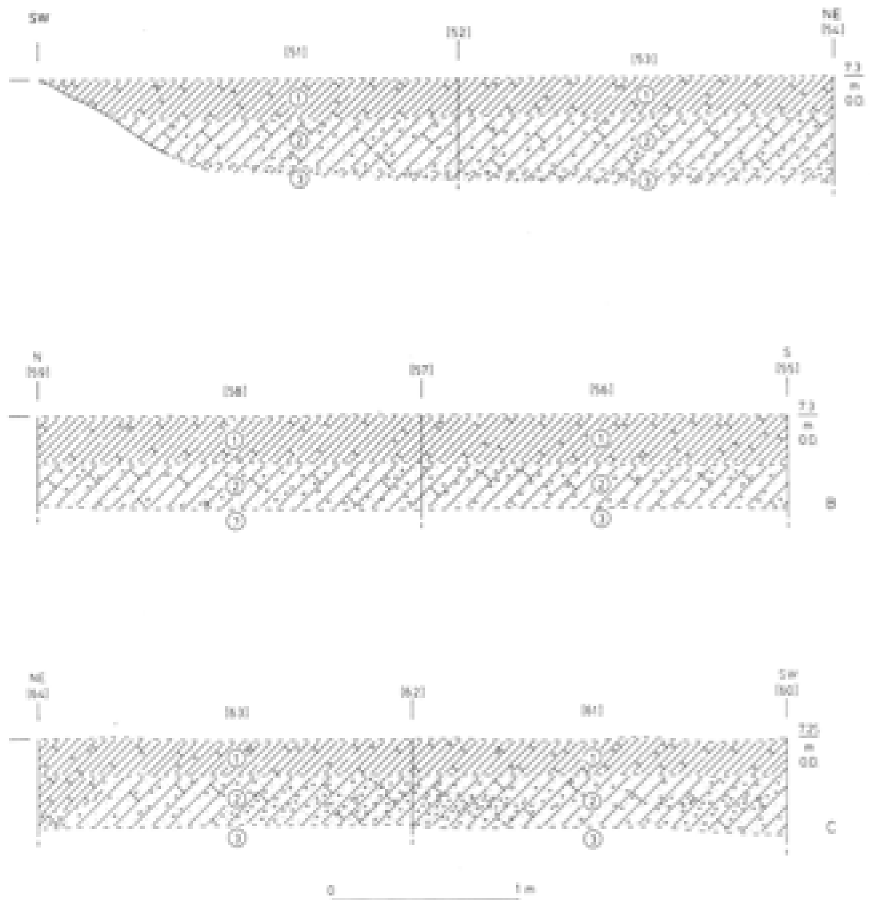


Fig 65 Enclosure ditch longitudinal sections (approximately down the ditch centre): section 51/53 from causeway E to section 54 (A), section 56/58 from sections 55 to 59 (B), and section 61/63 from sections 60 to 64 (C)

Figure 68

These transverse sections were across ditch segment 5:

Section 74

Layer 1: silty clay loam (merges with and overlapped by stream channel) with scattered gravel pebbles; 10YR 5/3–10YR 6/8.
Layer 2: sandy loam with scattered gravel pebbles; 10YR 5/6.
Layer 3 (not visible in section): very thin (<20mm) lens of organic detritus at base of profile; 10YR 2.5/1.

Section 84

Layer 1: silty clay loam (merges with and overlapped by stream channel) with scattered gravel pebbles; 10YR 5/3–6/8.
Layer 2: organic silt loam with even mix gravel; 10YR 3/1.
Layer 3 (not visible in section): thin lens (<20mm) of organic loam; 10YR 2.5/1.

Section 89

Layer 1: silty clay loam (overlapped by stream channel) with scattered gravel pebbles; 10YR 5/3–6/8.
Layer 2: silt loam with scattered gravel pebbles; 10YR 3/1.
Layer 3: sandy loam with even gravel mix, slightly organic with a few fragments of wood; 10YR 2.5/1.

Section 94

Layer 1: silty clay loam (merges with and overlapped by stream channel) with scattered gravel pebbles; 10YR 5/3–6/8.
Layer 2: silty (clay) loam to loam with scattered gravel pebbles; 10YR 4/2.
Layer 3: organic loam with wood fragments and scattered gravel pebbles; 10YR 3/1.

Figure 69

These transverse sections were across ditch segment 5:

Section 106

Layer 1: silty clay loam with scattered gravel pebbles; 10YR 4/1–5/6.
Layer 2: silt loam with roots and scattered gravel pebbles; 10YR 3/2.

Section 118

Layer 1: silty clay loam with scattered gravel pebbles (ditch merges with and overlaps stream channel); 10YR 5/2–5/6.
Layer 2: silt loam with scattered gravel pebbles; 10YR 4/4.
Layer 3: organic silt loam with few root/wood fragments and even gravel mix (100–200mm); 10YR 4/2.
Stream channel: sandy silts with rooting.

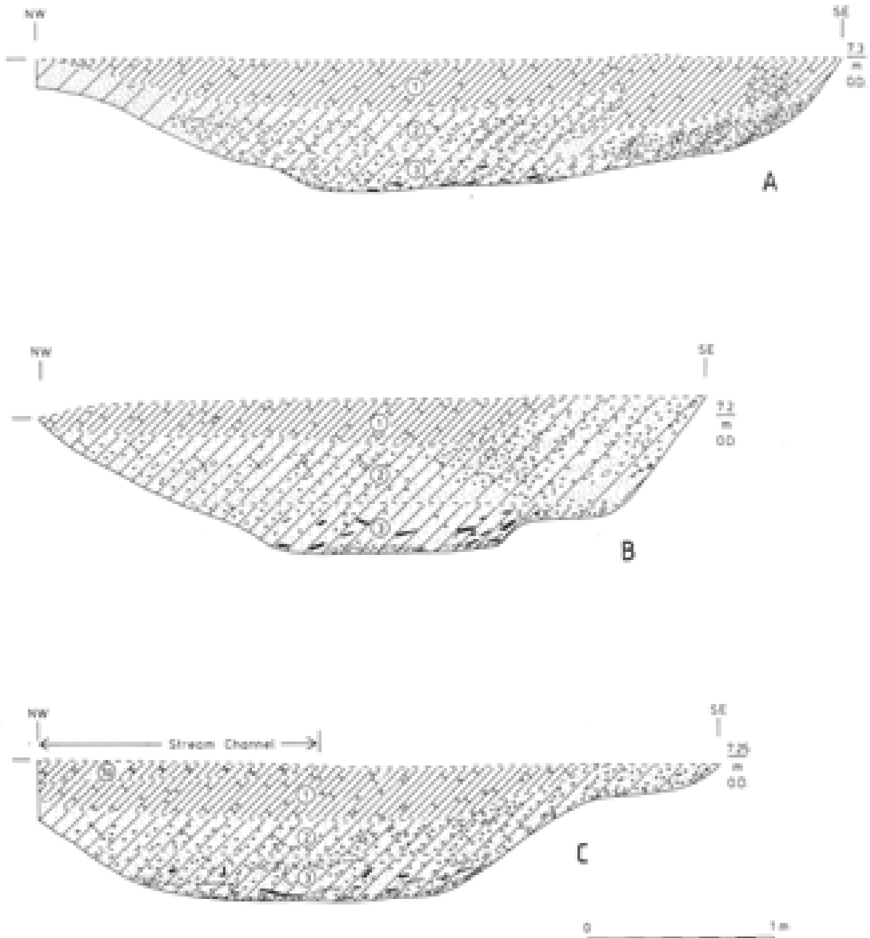


Fig 66 Enclosure ditch sections: section 54 (A), section 59 (B), and section 64 (C)

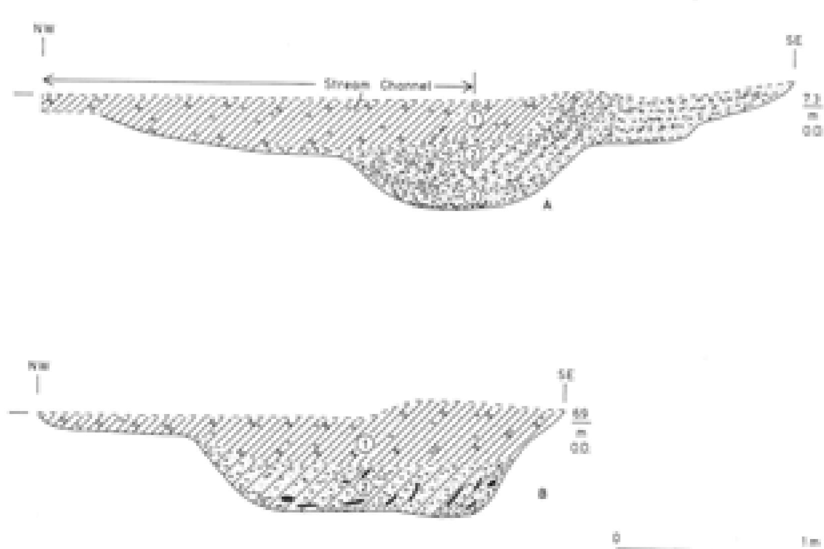


Fig 67 Enclosure ditch sections: section 69 (A) and section 79 (B)

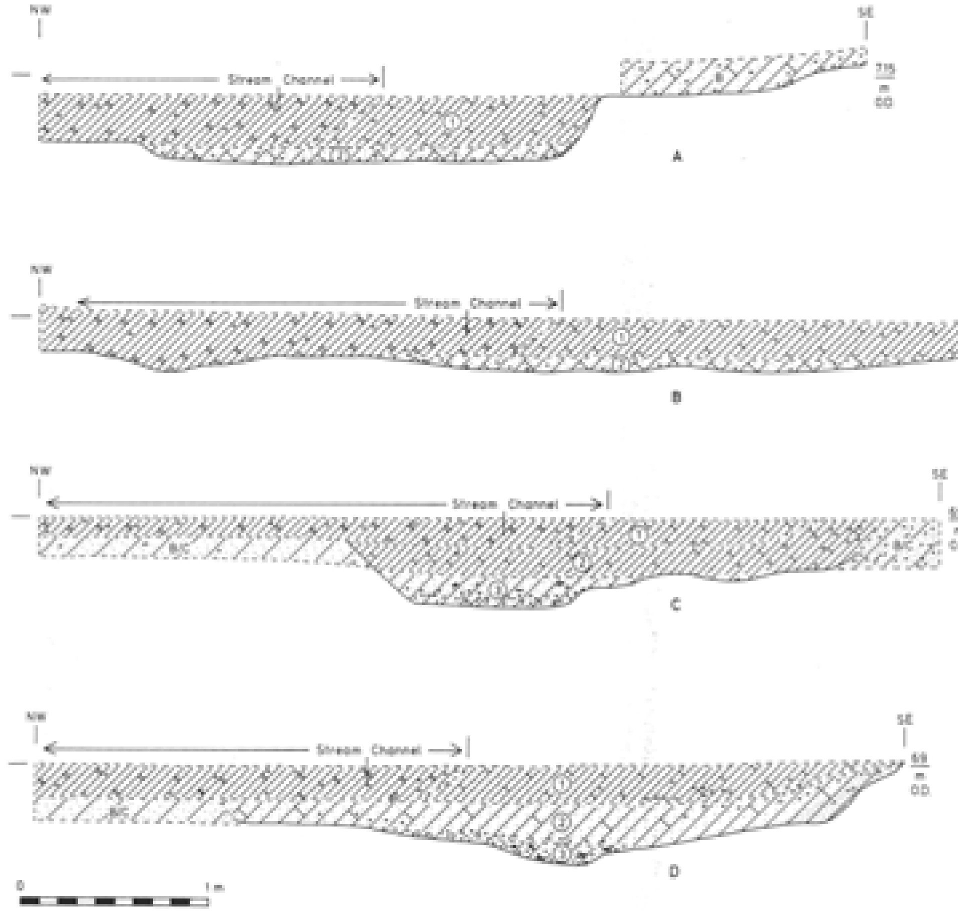


Fig 68 Enclosure ditch sections: section 74 (A), section 84 (B), section 89 (C), and section 94 (D)

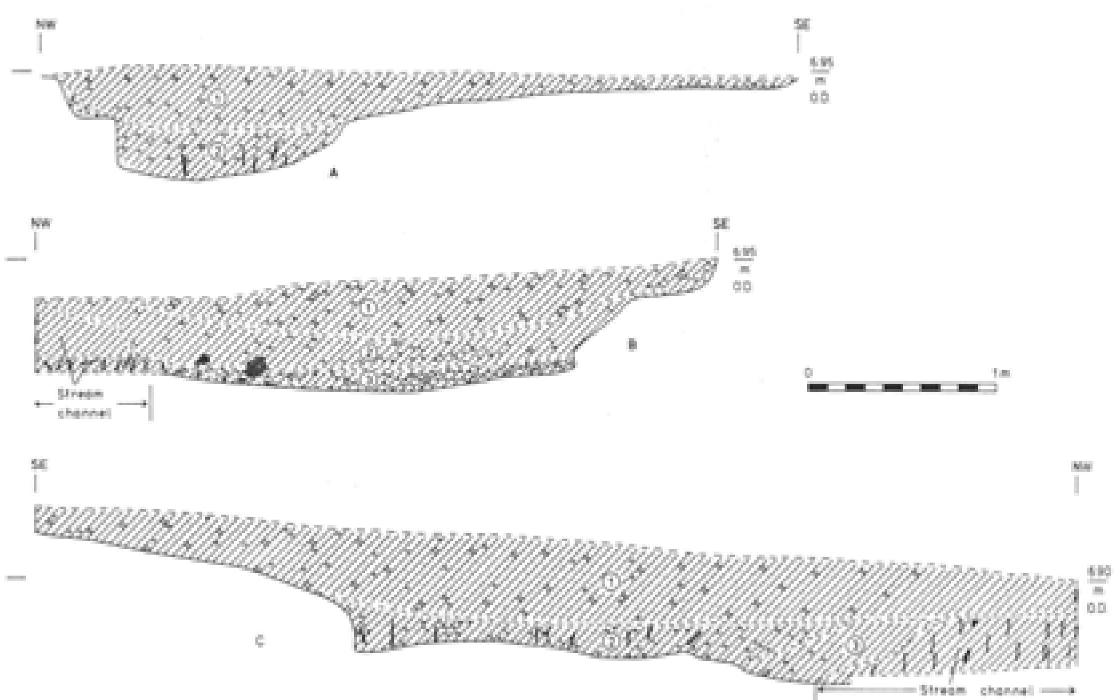


Fig 69 Enclosure ditch sections: section 106 (A), section 118 (B), and section 125 (C)

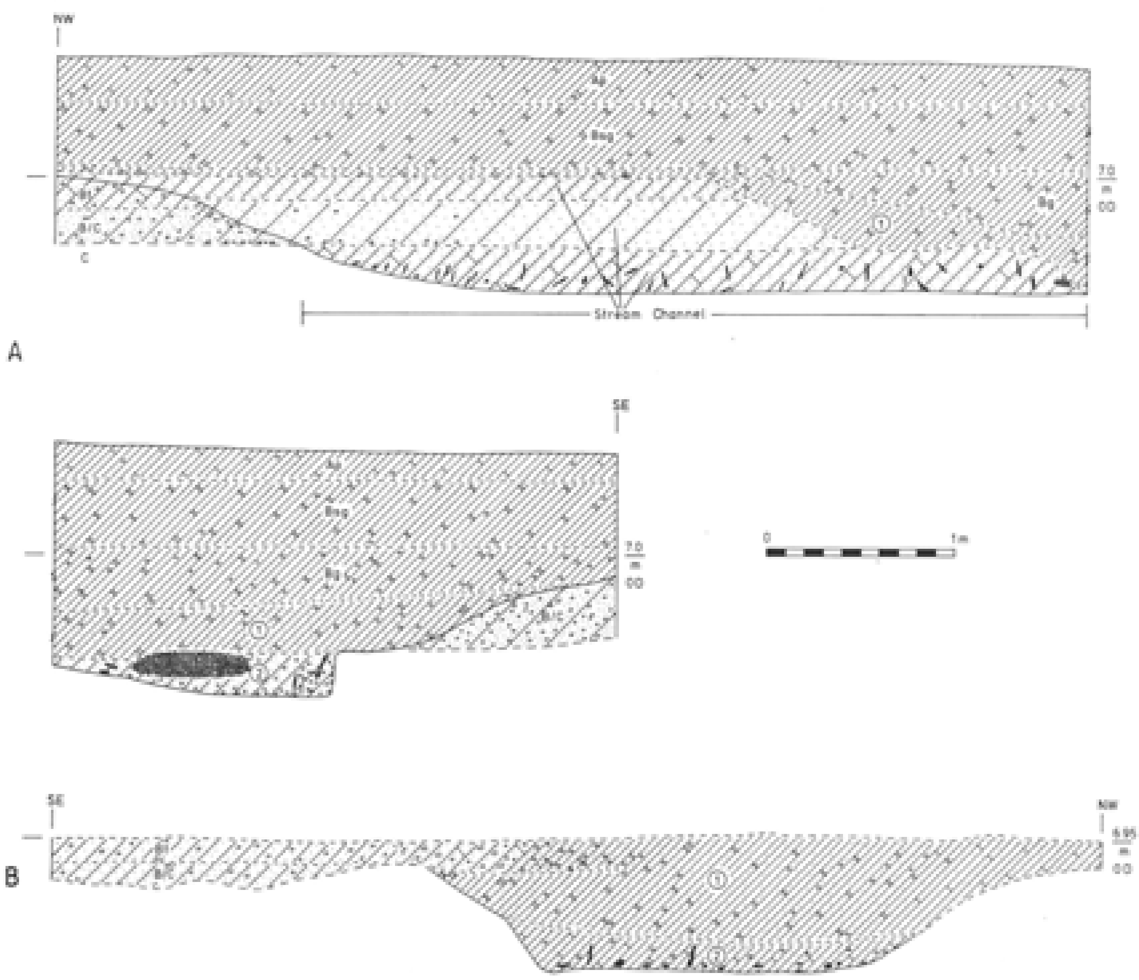


Fig 70 Enclosure ditch sections: section 139 (A) and section 146 (B)

Section 125

Layer 1: silty clay loam with scattered gravel pebbles (merges with upper fill of stream channel); 10YR 4/2–5/6.
Layer 2: organic silt loam with roots and scattered to even gravel mix; 10YR 4/2.
Layer 3: silt loam with few scattered gravel pebbles (overlaps lower fill of stream channel); 10YR 4/2.
Stream channel: sandy silts with rooting.

Figure 70

Section 139

This transverse section was across ditch segment 5 and the stream channel:

Ap: alluvial ploughsoil.
Bsg: gleyed and sesquioxide-impregnated silty clay alluvium.
Bg: gleyed silty clay alluvium.

Layer 1: silty clay loam with few scattered gravel pebbles; 10YR 4/2–5/6.
Layer 2: silt/sandy loam with even gravel mix and large aggregates of concreted sand and gravel and calcium carbonate impregnation of most of the matrix; 10YR 5/2.
Stream channel: silt loam (upper layer), loamy sand (middle), and sandy clay with rooting (bottom).

Section 146

This transverse section was across ditch segment 5. The stream channel at this point was further west, separate from the enclosure ditch:

Bt: base of buried soil – (argillic) brown earth; 10YR 4/3.
Layer 1: silty clay loam with scattered gravel pebbles; 10YR 5/2–5/6.
Layer 2: organic silt loam with few roots and few scattered gravel pebbles; 10YR 4/1.

Figure 71

These transverse sections were across ditch segment 6:

Section 161

Layer 1: silty (clay) loam with scattered gravel pebbles; 10YR 5/4.
Layer 2: silty clay loam with few scattered gravel pebbles; 10YR 4/2–5/4.

Section 171

Layer 1: silty clay loam with scattered gravel pebbles; 10YR 4/2–5/6.

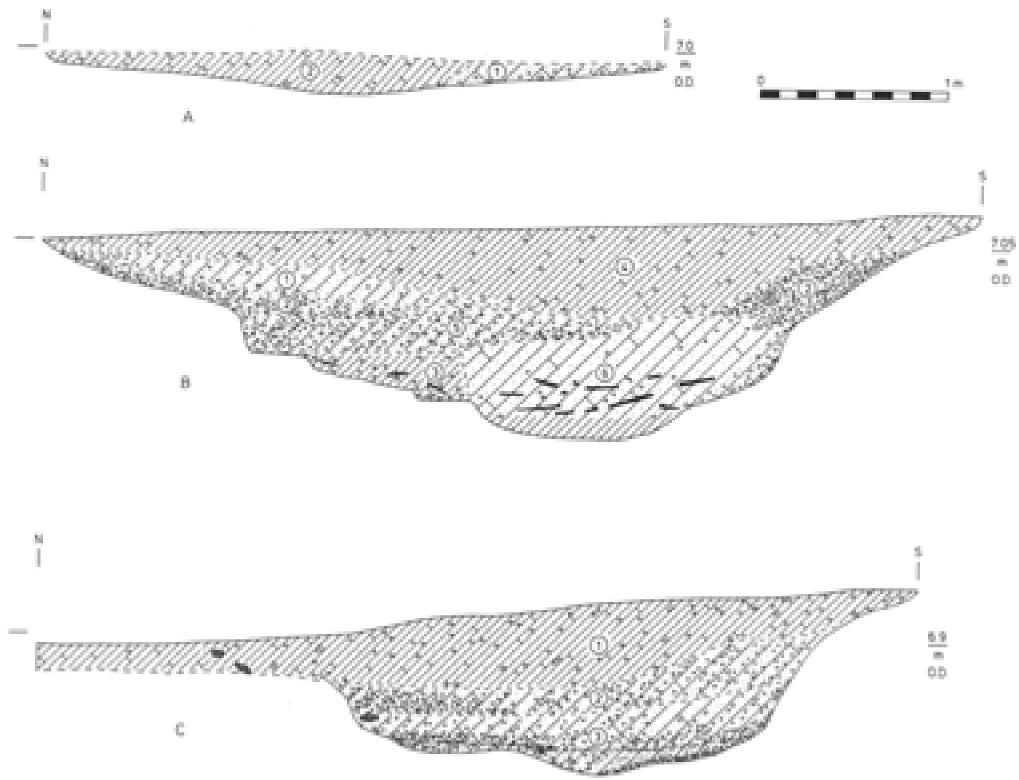


Fig 71 Enclosure ditch sections: section 161 (A), section 176 (B), and section 171 (C)

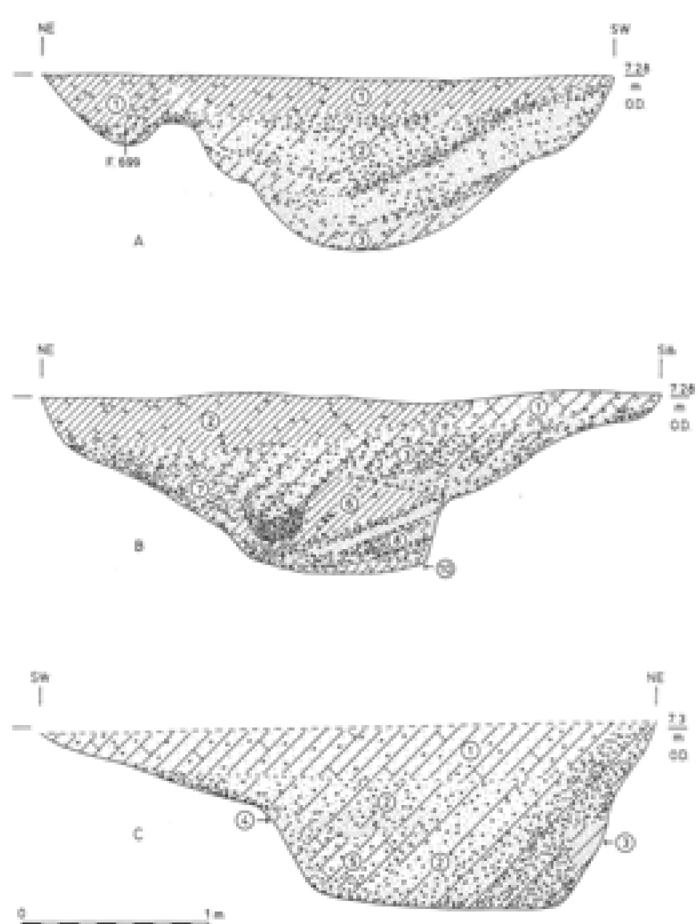


Fig 72 Enclosure ditch sections: section 184 of the ditch and F699 (A), section 189 (B), and section 200 (C)

Layer 2: silt loam with even gravel mix; 10YR 5/1–6/6.
Layer 3: silt loam with even gravel mix and lenses of iron pan; 10YR 5/1–6/6.

Section 176

Layer 1: sandy loam with scattered gravel pebbles; 10YR 6/4.
Layer 2: sand and gravel; 10YR 6/4.
Layer 3: organic silt loam with few wood/root fragments and even gravel mix; 10YR 3/2.
Layer 4: silt loam with scattered gravel pebbles; 10YR 5/4.
Layer 5: loamy sand and even gravel mix; 10YR 6/4.
Layer 6: organic silt loam with abundant wood and roots and few scattered gravel pebbles; 10YR 2/1.

Figure 72

Section 184

This transverse section was across ditch segment 7 and F699:

Layer 1: silt loam with scattered gravel pebbles; 10YR 4/4.
Layer 1 of F699: silty clay loam with even gravel mix towards base.
Layer 2: sandy loam with sand and gravel lenses; 10YR 4/3–6/2.
Layer 3: sandy loam with even gravel mix; 10YR 6/2.

Section 189

This transverse section was across ditch segment 7:

Layer 1: sandy loam with scattered gravel pebbles; 10YR 4/6.
Layer 2: silt loam with scattered gravel pebbles; 10YR 4/3.
Layer 3: loamy sand with even gravel mix (mainly <100mm, few 200–400mm); 10YR 5/4.
Layer 6: sandy/silt loam with very few fine scattered gravel pebbles; 5YR 4/4.
Layer 7: sandy loam with sand lens and even gravel mix; 10YR 4/4–5/6.
Layer 8: lens of silt/sandy loam with even gravel mix; 10YR 6/6–7/3.
Layer 10: sandy/silt loam with a very few fine gravel pebbles (<50mm); 5YR 4/4.

Section 200

This transverse section was across ditch segment 8:

Layer 1: sandy/silt loam with scattered gravel pebbles; 10YR 3/3.
Layer 2: sandy loam with scattered to even gravel mix; 10YR 5/6.
Layers 3 and 4: sand/silt loam; 5YR 4/4.
Layer 5: organic sandy/silt loam with few scattered gravel pebbles; 10YR 2/1.

Figure 73

Section 203

This transverse section was across ditch segment 9:

Layers 1 and 2: silt loam with scattered gravel pebbles; 10YR 4/4.
Layer 3: sandy loam and even mix of fine gravel (<50mm); 10YR 6/3–6/6.
Layer 4: loamy sand and gravel; 10YR 5/6.
Layer 5: lens of organic loam with few gravel pebbles; 10YR 4/2.
Layer 6: silt/sandy loam; 5YR 4/3.

Section 204

This transverse section was across ditch segment 9:

Layer 1: silt loam with few scattered gravel pebbles; 10YR 4/4.
Layers 2a and 2b: same as layer 1.
Layers 3 and 4: loamy sand and even gravel mix; 10YR 7/6.
Layer 5: silt loam with central zone of silt loam and even gravel mix; 10YR 4/4.
Layer 6: silt loam; 5YR 4/4.

Section 206

This transverse section was across ditch segment 10:

Layer 1: sandy loam with scattered gravel pebbles; 10YR 4/6.
Layer 2: loamy sand and even gravel mix; 10YR 5/4.
Layer 3: lens of silt loam with scattered gravel pebbles; 10YR 5/8.
Layer 4: sand and gravel; 10YR 4/6–7/3.
Layer 5: sandy loam and even gravel mix; 10YR 5/3.
Layer 6: sandy/silt loam with few scattered gravel pebbles; 10YR 4/6.
Layer 7: silt loam with flecks of charcoal; 5YR 7/2.

Section 207

This transverse section was across ditch segment 10:

Layer 1: sandy loam with scattered gravel pebbles; 10YR 4/6.
Layer 2: loamy sand with even gravel mix; 10YR 5/4.
Layer 3: sandy/silt loam with scattered gravel pebbles; 10YR 5/2–7.5YR 5/8.
Layer 4: loamy sand and gravel; 10YR 8/2.
Layer 5: sandy loam and even gravel mix; 10YR 7/2.
Layer 6: sandy/silt loam with few scattered gravel pebbles; 10YR 5/6.
Layer 7: silt loam with flecks of charcoal; 10YR 3/2.
Layer 8: sand and gravel; 10YR 5/4–8/2.

Section 208A

This transverse section was across ditch segment 11:

Layer 1: sandy loam with few scattered gravel pebbles; 10YR 4/6.
Layer 2: sandy loam with scattered gravel pebbles; 10YR 3/3.
Layers 3 and 4: loamy sand and even gravel mix (200–400mm); 10YR 3/6.
Layer 5: sand and gravel; 10YR 8/3.
Layer 6: sandy/silt loam with few scattered gravel pebbles; 10YR 4/6.
Layer 7: turf incorporated in layer 6; 10YR 2/2.
Layer 8: sand and gravel; 10YR 6/6.

Section 209

This transverse section was across ditch segment 11:

Layers 1 and 2: sandy loam with few scattered gravel pebbles; 10YR 5/4.
Layer 3: sandy loam with few scattered gravel pebbles; 10YR 3/1.

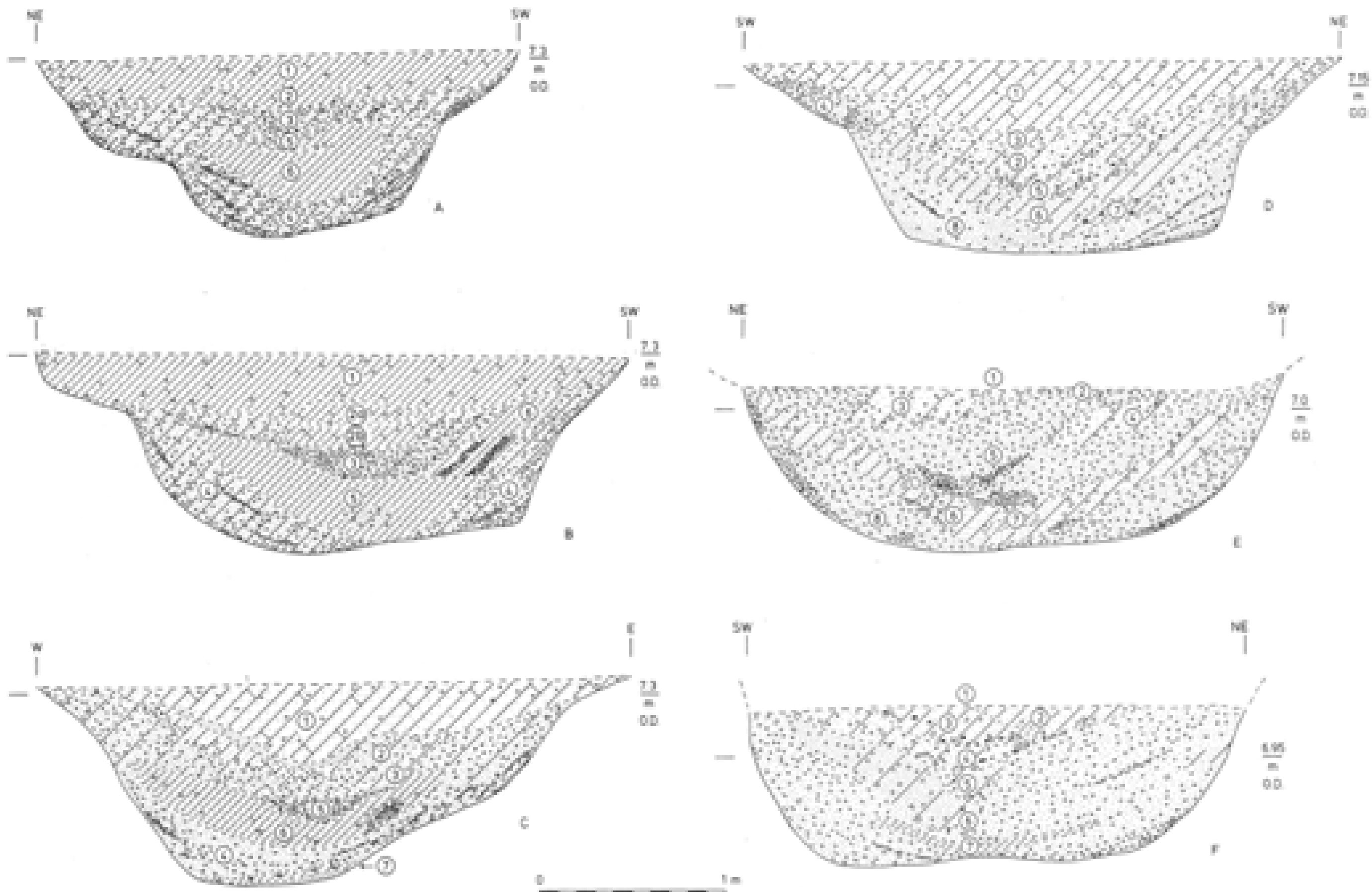


Fig 73 Enclosure ditch sections: section 203 (A), section 204 (B), section 206 (C), section 207 (D), section 208A (E), and section 209 (F)

Layer 4: loamy sand with few scattered gravel pebbles; 10YR 4/2.
Layer 5: loamy sand with few gravel pebbles; 10YR 5/6.
Layer 6: loamy sand and gravel; 10YR 6/3.
Layer 7: lens of sandy/silt loam, probably turves; 10YR 2/2.

Figure 74

Section 216

This transverse section was across ditch segment 12:

Layer 1: sandy loam with few scattered gravel pebbles towards top of layer; 10YR 4/4.
Layer 2: loamy sand with scattered gravel pebbles; 10YR 4/4.
Layer 3: loamy sand and gravel; 10YR 7/2.
Layer 4: sandy loam with scattered to even fine gravel mix (<50mm); 10YR 4/4.
Layer 5: loamy sand with scattered gravel pebbles; 10YR 4/1.
Layer 6: sandy/silt loam with thick lens of even gravel mix; 7.5YR 5/6.
Layer 7: turf; 10YR 2/1.

Section 221

This transverse section was across ditch segment 12:

Layer 1: silt loam with few scattered pebbles; 10YR 5/8.
Layer 2: loamy sand with even gravel mix; 10YR 5/4.
Layer 3: sandy loam with even gravel mix; 10YR 4/3.
Layer 4: sand and gravel; 10YR 6/3.
Layer 5: sand and gravel; 10YR 7/3.
Layer 6: sandy/silt loam with thick gravel lens; 7.5YR 5/6.
Layer 7: turf; 10YR 3/1.

Section 227

This transverse section was across ditch segment 12:

Layer 1: sandy loam with scattered gravel; 10YR 5/6.
Layer 2: sandy loam with few scattered gravel pebbles and flecks of charcoal; lens of iron pan at the base of the layer; 10YR 4/2–4/3.
Layer 3: sand and gravel; 10YR 7/4.
Layer 4: sandy loam with scattered gravel pebbles and lens of iron pan; 10YR 5/8.
Layer 5: loamy sand and gravel; 10YR 6/1.
Layer 6: lens of turf; 10YR 4/1.

Figure 75

Section 228

This transverse section was across ditch segment 13:

Layer 1: sandy/silt loam with few scattered gravel pebbles; 10YR 3/3.
Layer 2: sandy loam with few gravel pebbles; 10YR 4/4.
Layer 3: loamy sand with scattered to even gravel mix; 10YR 3/2.

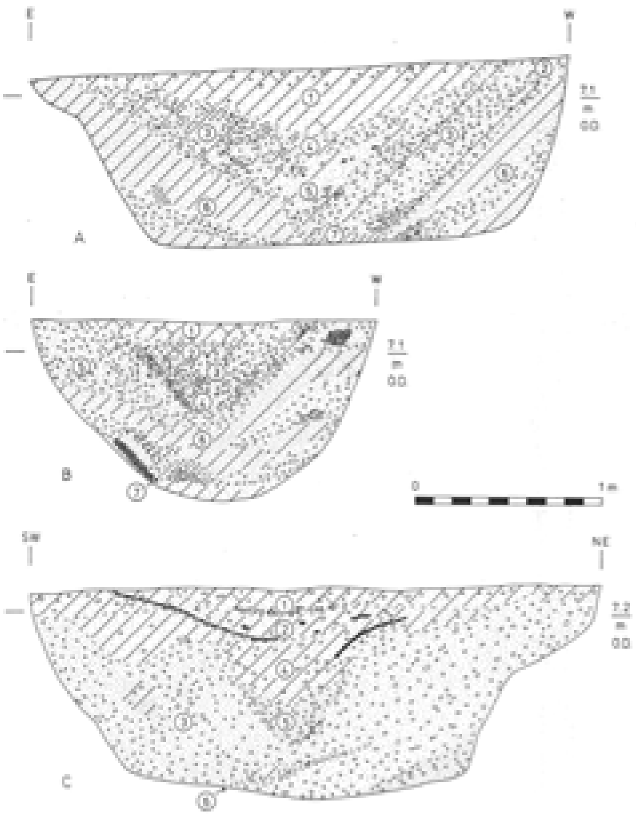


Fig 74 Enclosure ditch sections: section 216 (A), section 221 (B), and section 227 (C)

Layer 4: sandy loam with few flecks of charcoal and scattered to even gravel mix; 10YR 4/1.
Layer 5: sand and gravel; 10YR 7/3.
Layer 6: sand and gravel; 10YR 5/4.
Layer 7: sand and gravel; 10YR 4/6.

Section 234

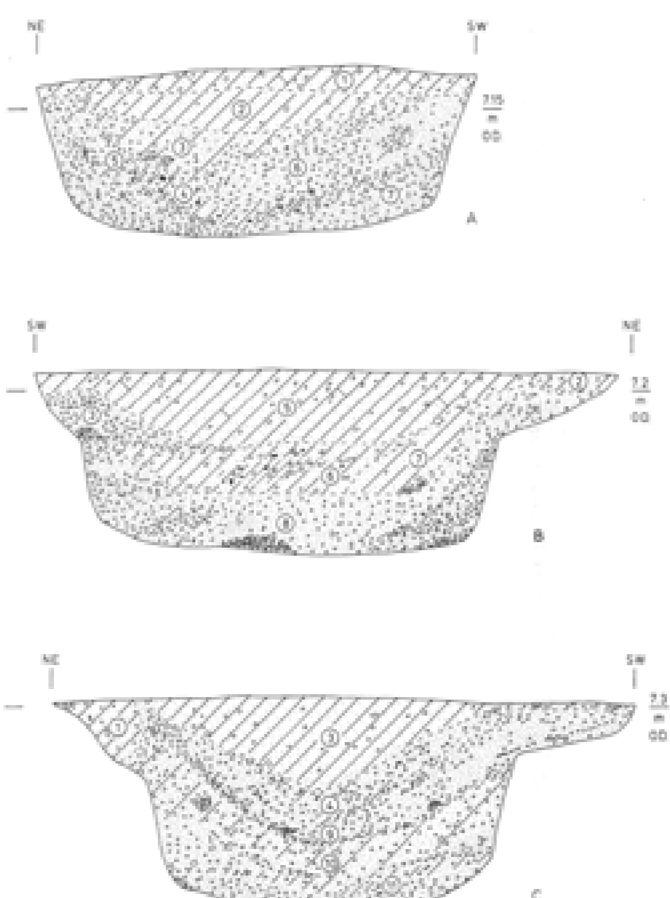
This transverse section was across ditch segment 13:

Layer 2: loamy sand to gravel.
Layer 3: sand to gravel.
Layer 5: sandy loam with scattered gravel pebbles; 10YR 4/3.
Layer 6: sandy loam with scattered gravel pebbles and lens of silt/charcoal/gravel; 10YR 4/4–7/1.
Layer 7: sandy loam with few scattered gravel pebbles; 7.5YR 5/6.
Layer 8: sand and gravel; 10YR 6/4.

Section 238

This transverse section was across ditch segment 13. It should be noted that layers 3, 4, 9, and 10 contained quantities of wood ash and comminuted charcoal:

Layer 1: loamy sand and gravel.
Layer 3: sandy loam with few scattered gravel pebbles; 10YR 4/3.
Layer 4: loamy sand and gravel; 10YR 3/2.
Layer 9: sand and gravel; 10YR 7/4.
Layer 10: loamy sand and even gravel mix; 10YR 6/8.
Layer 11: turf; 10YR 3/1.



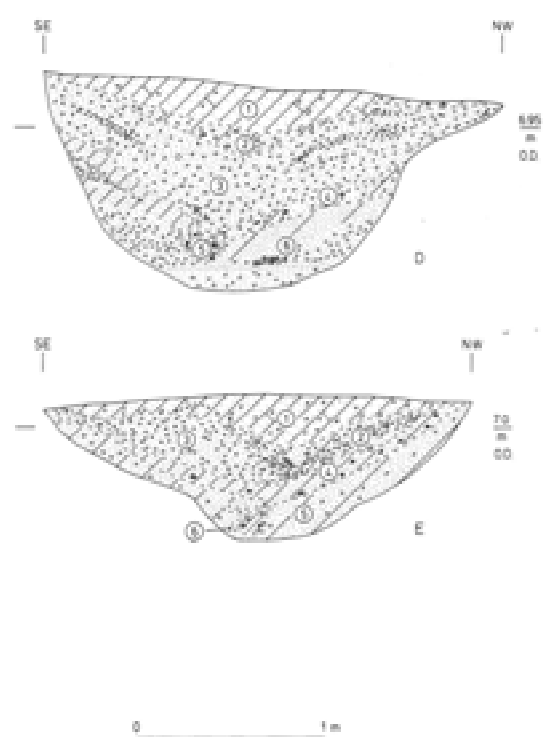


Fig 75 (above and left) Enclosure ditch sections: section 228 (A), section 234 (B), section 238 (C), section 245 (D), and section 250 (E)

Section 245

This transverse section was across ditch segment 14:

Layer 1: sandy/silt loam with few scattered gravel pebbles; 10YR 3/3.
Layer 2: loamy sand and gravel; 10YR 5/4.
Layer 3: sand and gravel; 10YR 6/3.
Layer 4: loamy sand with few flecks of charcoal and scattered gravel; 10YR 3/2.
Layer 5: silt/sandy loam with flecks of charcoal and few gravel pebbles; 10YR 4/6.
Layer 6: loamy sand with gravel in lens; 10YR 2/2.

Section 250

This transverse section was across ditch segment 14:

Layer 1: sandy/silt loam with scattered gravel pebbles; 10YR 4/4.
Layer 2: loamy sand and gravel; 10YR 4/2.
Layer 3: sand and gravel; 10YR 7/2.
Layer 4: sandy/silt loam with few flecks of charcoal and very few gravel pebbles; 10YR 3/2.
Layer 5: loamy sand with few scattered gravel pebbles; 10YR 4/6–7.5YR 5/8.
Layer 6: turf; 10YR 3/1.

Discussion

Differences between western and eastern arcs

The segments of the western arc differed in several significant respects from those of the eastern arc. It is noted in Chapter 12 that ditch deposits in the western arc contained very much less sand and gravel, nor was there so consistent a pattern of successive recutting. The organic remains were extensive, but except for part of segment 6, they were almost entirely absent from the eastern arc. There is also evidence to suggest that the rarity of wood in the eastern segments could have been deliberate, and was not the result of post-depositional factors alone. Other explanations are also very possible, however. The contrast between the infilling of ditch segments in the two arcs was pronounced: the western segments showed much more evidence for waterlogging than did those to the east. This could reflect a change in the level of the groundwater table across the enclosure and/or proximity to the channel meander to the north; alternatively, it can be argued that the change in groundwater level across the enclosure is an indication that the two parts of the site were excavated at different times of the year and/or were not contemporary by gaps of years rather than months.

In plan, the segments of the western arc were laid out in a gradual curve, but the ditches themselves were both longer and shorter than those of the eastern arc. This heterogeneity extended into the infillings of the western ditch segments: segments 1 and 2 showed extensive evidence for recutting, and in certain cases primary deposits were disturbed (a rare occurrence on the eastern side of the enclosure). The majority of these recuts, up to seven in one instance and discussed by Charles French (pp 319–21), were within the higher, non-waterlogged levels.

By contrast, the deposits of segments 3–5 showed a simple succession, with no unequivocal evidence for recutting at any level. The lowest, waterlogged deposits were undisturbed, except perhaps by the natural action of water in wetter parts of segment 5.

Date of structured deposits

The butt-end structured deposits of segment 1 could probably be dated to Phase 1B; the original (Phase 1A) butt end at causeway A did not contain a deliberately placed deposit. Other butt-end structured deposits in segments 2–5 could all be dated quite confidently to Phase 1A. This was in contrast to the structured deposits of the eastern arc, where the majority were dated to Phases 1B and 1C. It should, however, be noted that many of the recuts in the eastern area extended to the full depth of the ditch, but leaving undisturbed backfilled deposits *in situ* along the ditch edges; it is quite possible that earlier material was either cut out or disturbed in this process (for example, Fig 28). On the other hand, this sort of disturbance could have been minimal, as many of the recuts in the eastern ditch segments clearly stopped short of lower backfilled deposits – as if the people who carried out the recuts were aware of the existence of buried material, which they did not wish to disturb (such as Figs 29 and 30).

Distribution of structured deposits

All the segments of the western arc, including segments 1 and 2 that resembled those of the eastern arc in their recutting episodes, contained primary *in situ* deposits that generally spread across the entire width of the base of the ditch (Fig 12). There was much evidence that these layers contained the remains – including debris and by-products – of certain activities, in particular woodworking, bark working, and antler working. The butt ends of the ditches contained structured deposits somewhat reminiscent of the eastern arc, but these did not extend further along the ditch segments.

When pottery occurred (which was quite rare), it was in concentrations across the ditch; linear spreads and butt-end deposits of pottery were not found (with the exception of the single Mildenhall bowl at causeway A). The pottery distribution (Fig 12) was calculated from all Phase 1 levels of the ditch; it inevitably includes some secondary and derived material, which would tend to obscure contrasts. The western arc yielded less than one-quarter (by weight) of the pottery recovered from the eastern arc, yet the average sherd weight was significantly higher in the eastern arc. The figures would have been even more extreme had not ditch segment 1 produced one large vessel and a significant single pottery concentration.

Given these figures, it can confidently be said that pottery was deliberately excluded from segments 2–5.

The other important 'domestic' element was usually flint, in the form of by-products and finished implements. Again, the distribution plan of the western arc shows a very low occurrence of flint – less than three dozen pieces over the entire length of ditch (Fig 12). The flint assemblage from the eastern arc was far larger and richer (see Chapter 6). The distinction between the deposits of the two arcs can be expressed in terms of scale. Patterning in the western arc is best seen at a large scale, across several segments. The changes in the patterning of material of the eastern arc is best appreciated at the micro-level; sometimes this may involve one level across a whole segment (for example, Fig 43), while at other times the deposits covering a metre or so of recut can be significant (for example, Fig 34).

The ditches of the eastern arc were of more uniform size, and the material from within them was also superficially more uniform. Certainly, the three sub-phases of Phase 1 could be followed with more confidence than on the western side of the enclosure, but the apparent uniformity of ditch deposits concealed some important internal trends and distinctions.

Positioning of deposits

The primary deposits of the western arc contained woodworking material and other finds, including structured butt-end deposits. This material was found *in situ*, but there were no reasons (with the exceptions of the butt-end material) to suppose that it had been arranged in the mud or on the ground. Moreover, unlike the practice on the eastern arc, recuts did penetrate to the primary levels in segments 1 and 2, where pre-existing deposits were disturbed. By contrast, the Phase 1 and possibly the Phase 2 levels of all eastern arc ditch segments showed clear evidence for the careful positioning of material (artefacts and ecofacts) within their deposits. In most cases, these items were then covered with soil and/or gravel and were thus buried. There was no evidence to suggest that any of the finds from Phase 1 and 2 eastern arc contexts represented casual loss or disposal of rubbish, or were derived or residual. Everything that was found there was put there – and presumably for a purpose.

Differences in lower deposits

Before we consider the ditch deposits in greater detail, it is necessary to consider why the lower level deposits within the segments of the western and eastern arcs were so very different, especially when it is suggested that the ditch was initially laid out and excavated during one event. In part, this difference can be explained in terms of backfilling and recutting, but the fact remains that the segments of the eastern arc contained very little waterlogged material, whereas those to the west were characterised by quantities of wood, bark, and other organic matter. At least four hypotheses are possible (Charles French personal communication).

The first hypothesis would suggest that the initial excavation (if not the initial laying out) of the enclosure ditch took place in two distinct 'events'. These events need not have been separated by a prolonged lapse of time; perhaps the eastern arc was excavated in the summer months, when the groundwater table would have been higher, whereas the western arc could have been first constructed during the wetter part of the year.

One of the characteristics of the enclosure ditch was the multiplicity of recuts that were observed. It is always possible that the initial construction was very shallow and did not penetrate to the water table. In effect this would have amounted to an exercise in marking out. Subsequently the segments were sunk to their deepest (our Phase 1A) levels on a series of quite separate occasions.

A second hypothesis is that the stream channel broke into the western arc, from the north-west, at some time after the initial digging of the enclosure ditch (which had taken place in dry conditions). By this time the eastern segments had been backfilled. In stratigraphic terms, this would place the formation of the waterlogged deposits in the western arc segments within Phase 1B. It depends, of course, when the Phase 1A backfill deposits were cut into by the Phase 1B recut. Even if this did not happen immediately after the initial excavation of the ditch (that is, as part of the same 'event'), analysis of the sediments suggests that there was a very short interval between Phases 1A and 1B.

A third hypothesis may be developed from the second: the lowest levels of the large Phase 2 pits, F1054 and F1060, were waterlogged, and this would suggest that there was a general rise in the local water table in the Late Neolithic. By this time, however, the segments of the eastern arc had already accumulated a sufficient quantity of backfilled material for the recuts of Phases 1C and 2 not to be affected.

Perhaps the simplest hypothesis is that originally the entire ditch was once waterlogged; the wet deposits were removed in the eastern arc only by a recut that was almost immediately backfilled. The weakness of this explanation, however, is the almost complete lack of organic material in the otherwise 'clean' sand and gravel of the lowest ditch filling. On the other hand, it is quite possible that all the waterlogged material dug out from the enclosure ditch segments and the interior pits during recutting was removed from Etton altogether. The answer to the problem most probably lies in the waterlogged segments of ditch that are concealed beneath the bank of the Maxey Cut.

Ritual deposits?

Any consideration of the arranged, structured, or positioned deposits within the ditch is necessarily difficult. Some structured deposits, such as the complete bowl or the bundle of cattle ribs in segment 1, can be readily assigned to ritual or symbolic behaviour. Others, such as the small-scale, possibly symbolic, arrangements in segment 8 (Fig 33), are very much more contentious. At present there are very few published accounts of such deposits, and it will not be possible to reject spurious or coincidental associations until a corpus of possibilites has been built up. The suggested symbolic or structured deposits described here are therefore put forward as possibilities only. Future research alone will be able to show which of the selected identifications offered here have any validity. It should also be noted that the identified structured or arranged deposits were those that could be recorded under sometimes difficult, salvage conditions.

Phases 1A and 1B deposits

In the field, it was noted that the structured deposits of all sub-phases of Phase 1 in the eastern arc altered subtly from north to south. The lowest structured deposits of segments 6–8 contained a number of discrete 'statements', albeit within a linear pattern. For example, the offerings in segment 6 began, at causeway G, with a clearly defined spread of pyre-like material down the clean gravel (interior) side of the ditch. After a short space, a small deposit included an antler 'baton', a human cranium, and other bone; after another space there was a large stone of calcrete, with pottery beneath.

Segment 7 contained a remarkable basal deposit of discrete 'statements' that included an inverted fox head alongside an inverted Mildenhall bowl (perhaps a skeuomorph or symbolic representation of a human head), an antler comb, and another complete vessel, but this time rightside-up.

Elsewhere, in eastern arc segments 8–13, the lowest (Phase 1A) levels were largely devoid of finds, and yet there can be no doubt that the ditch segments were dug out and backfilled. In one instance (in segment 9) the backfilling included a linear deposit of turf and topsoil, which must be considered itself a structured deposit.

The digging out of the ditch in Phase 1A to form a complete circle was clearly important, as was the subsequent – possibly immediate – backfilling. The backfilling sometimes involved the placing of artefact or bone deposits. Once the ditch had been completely excavated, and in some cases backfilled, the space that it enclosed could be considered defined. Thereafter activities never involved a complete circuit of recuts.

The recuts of Phase 1B were difficult to characterise. Although two interpretations of phasing are available for segment 9, it appears most likely that in Phase 1B the structured deposit was linear, but less so than in the later (1C) phase; the segment was, moreover, broken up into three equal lengths by quernstone fragments that had been carefully arranged in the ground. A similar careful arrangement was also found in Phase 1B contexts in segment 12, where a quern served to divide the ditch into two equal halves.

Phase 1C deposits

The structured deposits of Phase 1C were usually laid in a linear band along the length of the narrow recut, often (but not always) down the centre of the ditch. The narrowness of the recuts was a consistent and doubtless deliberate feature of Phase 1C. The width of the recuts gave form to the deposits within them; indeed, it is possible to argue that the distinction between the structured deposit and the ditch in which it was placed was beginning to break down – the two formed part of a more homogeneous symbolic structure. It was also notable that these recuts in the eastern arc usually ran along the entire length of the Phase 1 ditch segments. This might indicate that the length of the individual ditch segment was significant, perhaps as a means of marking out part of the nearby interior.

In segment 6 the Phase 1C (or possibly 1B) structured deposits contained wood, and the butt end stopped well short of the earlier (Phase 1A) butt end. The deposit terminated with a broken Mildenhall bowl, whose sherds were carefully arranged in the ground. In segment 7 the Phase 1C deposits were linear. In segment 8 the Phase 1C spread included an extraordinary linear arrangement of objects, including a round stone with pecked hole (perhaps representing a human skull), a fragment of human skull, and other items including a decorated fragment of limestone.

The Phase 1C structured deposits of segment 9 were again very linear, and apparently showed no butt-end patterning, although a very small round stone was found right at the butt end, which had also been modified by pecking, in the same way as the round stone in the previous segment. The pecking could be either natural or anthropogenic, but the selection of the two rounded stones and their placing within the enclosure ditch were, it is suggested, deliberate. The point to emphasise is that the linear spreads of Phase 1C probably contained quite elaborate symbolic expressions that we do not understand and are unable to 'read'; the clue to their understanding must lie in the more overtly expressed 'statements' of the earlier, Phase 1A and 1B, structured deposits.

Human heads

Perhaps the simplest recurrent statement is the human head. Heads are commonly found in the ditches of British causewayed enclosures (for example, Mercer 1988, pl 5.III.B); similarly, inverted pots, generally accepted as symbolic representations of skulls, are also found at ditch butt ends in closely comparable contexts (Andersen 1988, 350). It is not a large step to move from an inverted pot to a rounded stone, or indeed to a fired clay ball, as was found in segment 7.

Single segments in use

There are no good reasons to believe that the post-Phase 1A episodes of recutting or reuse of the eastern arc ditch segments necessarily involved more than a single segment at any one time. The Phase 1C narrow recut cannot be used as a starting point for subsequent retrogressive phasing, as was done at Briar Hill (Bamford 1985). We have seen that segments 3–5 have no Phase 1C recut, and the phasing of segments 1 and 2 can only be forced into the tripartite scheme with difficulty: there are no linear deposits and little backfilling, and the numerous recuts of the upper levels of both segments do not allow a simple Phase 1A–1C interpretation. Similarly, on the eastern side of the enclosure, Phase 1C is dubiously present in segment 6 and is represented by linear 'heaped' deposits in segments 9 and 10, where there was very little evidence for much actual recutting.

Phase 1B recuts were absent in segments 3–5, but they were also very hard to define in segment 12, and indeed in segment 6. Again, the evidence suggests that the use of the individual segments need not have been strictly contemporary in any one phase.

Further very tentative evidence for the use of individual ditch segments on their own is provided by the narrow width of the 'segmental' (as opposed to 'entrance') causeways. There is much evidence (as in segments 9–13) that the cutting or recutting of the ditch involved rapid backfilling with gravel topsoil and turf. It is quite possible that this material was heaped up along the interior and exterior only, but the width of each causeway would also allow spoil to be heaped there if one segment only was being excavated and filled at a time. The spoil heap around each segment would have provided a vantage point for spectators, and it would have effectively doubled the depth of each segment; moreover, it is possible that the act of backfilling would have involved many people.

The complexity of the deposits within the various segments of the enclosure ditch cannot be over-stated. The simple scheme of phasing is probably valid in general terms in the segments of the eastern arc, but it fits the succession observed in the western arc poorly. There is some evidence to suggest that the initial digging of the enclosure ditch segments took place in one episode or event, but subsequent use of the ditch was both episodic and possibly irregular. After the initial definition of the entire enclosure (in Phase 1A), the evidence suggests that individual segments were probably used one at time. If more than one segment was used at the same time, there are no grounds to believe that they were necessarily next to each other.

Segments and interior features

It will be suggested, in Chapter 3, that many of the features of the interior periphery could be related in some way to the different segments of the nearby ditch. This is clearly seen in segments 10 and 11, which were immediately alongside the area of high magnetic susceptibility enhancement (Fig 79). In segment 10 four pits, or miniature ditch segments (two with possible butt-end deposits), were placed along the inside edge of the ditch; they were packed with charcoal and other 'pyre-like' material, most reminiscent of 'small filled pits'. Segment 11 also had 'pyre-like' material in two concentrations, along its inner edge. Segment 13 produced a butt-end deposit at causeway N that uniquely included a pile of potsherds that had been tipped down the outer edge of the ditch (Fig 56). This, however, was an area where there were many probable Neolithic features outside the ditch. A link between the two is indicated.

Finally, the stratigraphic, sedimentary, and archaeological evidence emphasises the differences between ditch segments of the eastern and western arcs. There are also discernible differences between ditch segments north and south of the east and west 'entrance' causeways (B and M).

3 Survey and excavation of the interior

Introduction

This chapter is in two parts. The first is a discussion of the various surveys that were undertaken on the ancient soil buried beneath the alluvium which lay directly under the ploughsoil. The second part both describes and discusses the excavation of features within the area enclosed by the segmented enclosure ditch, F1, whose excavation was described in the previous chapter. The reader is referred to Chapter 12 for a more detailed consideration of the various soils and sediments that form the basis of the discussion. A summary list of features is given in Appendix 1.

Etton was a monument enclosed by a single segmented ditch. The plan of the enclosure is best described as a squashed or flattened oval, with the flattened side to the south, hidden beneath the bank of the Maxey Cut (Fig 4). The area enclosed by the segmented ditch was approximately 1.75ha (4.32 acres). About 70% of the interior was excavated to a satisfactory archaeological standard, and about 80% of the remainder was observed during and after mechanical clearance to the 'ballast level' (Fig 76), the level at which the quarry could obtain viable supplies of clean, clay-free gravel (and where only deep archaeological features survived). The significance of the 'ballast level' at Maxey Quarry has been fully discussed (Crowther 1985). The area examined satisfactorily was approximately 12,250 square metres, or 1.23ha (3.03 acres). Some 5250 square metres, or 0.53ha (1.30 acres) could not be examined satisfactorily.

Alluvium and buried soil

The Etton enclosure was located to the south-east of the main complex of cropmarks in Maxey parish (Fig 2), in an area subject to alluviation. This clay alluvium has protected the site from significant modern plough damage. The most important archaeological benefit of this protection is undoubtedly the largely pre-Roman soil that still survives over several hectares between the causewayed enclosure and the modern village of Etton (French and Pryor 1992). The overburden that concealed archaeological features was therefore removed in two operations. The modern topsoil and alluvium were first removed to reveal the truncated palaeosol (Fig 100). This buried soil was in turn removed, once a programme of survey and sampling had been satisfactorily completed (Fig 101).

The examination of the buried soil (see Chapter 12) showed it to have been slightly truncated in antiquity, but a sufficient thickness survived at Etton to provide an important horizontal element that is usually not to be found on comparable plough-damaged sites. While the actual ground surface of Neolithic times may have been removed, a significant part of the A soil horizon did survive beneath the alluvium. It is reasonable to suppose, therefore, that earthworms and other natural soil processes would have incorporated material from the surface into the topsoil, so that although truncated, the buried soil would reveal data that were directly relevant to activities that took place on the original surface (Haselgrove 1985). The deposits overlying the B/C horizon (in which features first became clearly visible) were removed in two distinct operations: the clay alluvium was removed to reveal the truncated buried soil, which was then subjected to various survey and artefact-recovery procedures; after several weeks, during which time it was allowed to weather, the buried soil was removed to reveal the features beneath. The excavation of these features is discussed in the second part of this chapter.

The buried soil artefact survey

The presence of a buried soil, albeit slightly truncated, was recognised from the outset as one of the most important discoveries of the Etton project. Considerable care was taken in the mechanical removal of the superficial ploughsoil and alluvium, but the sandy nature of the underlying ballast in certain areas made it difficult to remove the clay from the buried soil cleanly. The two would stick together and adhere to the bottom of the mechanical excavator's bucket. Fortunately these problems were confined to two areas: the slope from the Phase 1C ditch F313 (Fig 88) down to segment 5 of the enclosure ditch, and the area south of the Phase 5 east–west ditch F499 (Fig 122), as far approximately as the grid line 7330N.

Archaeological patterns could not be seen in the buried soil, with the exception of a few later or larger features (such as the enclosure ditch, F1) that contained alluvium in their upper, tertiary, infilling. Despite a most careful search both inside and outside the enclosure ditch, no certain traces could be found of a bank or banks alongside any of the ditch segments. The best candidate was in segment 1, close to the ditch edge on the interior side of sections 7–12, but this has been discounted by Charles French after soil analyses. However, there was a possible bank on the eastern side (see Chapter 12). Given the excellent preservation of the site, one might have expected substantial, perhaps turf-revetted, gravel banks (with buried soils beneath). Given also the clear distinction between the buried soil and the underlying loose terrace gravels, one would not have anticipated any problems in their archaeological recognition.

The sieved survey

The original intention was to carry out a conventional fieldwalking survey of the buried soil. It was also intended to cultivate the soil lightly (with a small

Fig 76 Plan showing the progress of the excavations, 1982–7. The areas labelled F were excavated at the ballast level only: the survival of features in these areas was poor

spring-tined harrow) and then to allow it to weather. In the event, these plans were abandoned, firstly because the buried soil was too thin and would be dragged forwards by the cultivator in the sandier areas; secondly, it was felt that the absence of potential floors required explanation. If the buried soil was to be cultivated, there would be no possibility of identifying a floor, and further research would then be impossible. The best hope was to leave the ground flat and to watch for differential drying out after rain. The machine-cleaned flat surface was not suitable for conventional fieldwalking; several flints were recovered, especially near well-trodden paths to ditch segments that were being excavated, but the distribution was recognised as being very biased. These finds did, however, indicate that the buried soil required a thorough survey.

It was decided to adopt a chequerboard grid, aligned on the site grid, at a sample interval of 5m. Approximately 0.5m square of buried soil was taken from the centre of each 1m grid square sampled and was screened through a 63mm (/-inch) dry shaker sieve. This survey employed four people for three weeks and delayed the progress of the excavation considerably. It was, nonetheless, well worth the effort. The results are quite straightforward: they show a clear distinction between the east and west halves of the interior (Fig 77). The squares with the densest concentration of flints were mainly found to the west. The low concentrations around causeway F and the easterly part of ditch segment 5 were almost certainly the result of water action, as alluvium was deep in these areas. The buried soil was very thin and disturbed to the extreme north-east, and the localised, but high, concentrations of material in this area probably reflect the fact that the samples were taken from the uppermost filling of small filled pits; these pits were fully revealed when the buried soil was subsequently removed.

It should be noted that pottery survived poorly within the buried soil, and the roughness of the sieving process probably destroyed the little that did survive. An attempt was made to wet sieve the buried soil samples, but the nearest available water supply was half a mile to the west, and the active quarrying that was taking place between the site and the wet sieves made travel at times hazardous. There were too many samples to store temporarily. The survey was therefore confined to the recovery of flint.

The magnetic susceptibility survey

by Adrian Challands

Introduction

At an early stage in the investigation of the causewayed enclosure, it was decided that a detailed magnetic susceptibility survey should be carried out over the entire area. High magnetic susceptibility values are normally the result of human activity (Tite 1972, 12). Fires burning on soils containing naturally occurring iron oxides cause the iron oxides to be converted into a more magnetic form. The magnetic effects can be measured, and the data, when used in conjunction with the results of excavation, can appreciably enhance subsequent site interpretation (Challands 1992).

Survey methods

Magnetic susceptibility measurements were taken on site using a 180mm diameter field coil wired to a Bartington MS1 magnetic susceptibility meter. As the site covered a substantial area, 1m reading increments were selected. However, in order to maximise the coverage at 1m increments, measurements were taken on a staggered grid; in effect this meant that alternate traverses were shifted either way by 0.5m along the east–west axis of the site grid.

After removal of the topsoil and overlying alluvial deposits on the western half of the site in 1985, magnetic susceptibility readings were taken over the whole of the exposed buried soil (area D in Fig 76). The results are given in Figure 78. Further earthmoving was later carried out, including the removal of the buried soil exposed in 1985. Magnetic susceptibility readings were then systematically taken over the whole of the stripped surface (the soil B/C and C horizons). By this time a number of features had been fully or partially excavated; consequently, magnetic susceptibility measurements were omitted at these positions. The results are given in Figure 79.

A total of 16,583 magnetic susceptibility readings was taken. The 5198 magnetic susceptibility measurements recorded over the B horizon ranged between 3 and 454 MS units, with a mean of 42.1 and a standard deviation of 19 MS units. A larger area was magnetically surveyed over the B/C and C soil horizons, where the 11,385 readings ranged between 1 and 1348 MS units, having a mean of 27.1 and a standard deviation of 25.8 MS units.

Data processing methods

The magnetic susceptibility values obtained during the survey are not absolute because the density of the soil at the point of measurement is not constant and cannot be quantified. It follows that the magnetic susceptibility values, referred to throughout as MS units, are relative, one to another (ibid, 35).

All of the data obtained were manually logged in 20m squares, and the resulting dot density diagrams (Figs 78, 79) are mosaics of the 20m squares. These diagrams have been merged and displayed by means of a computer programme developed by Robert Randall for the IBM PC.

The dot density diagram (Fig 78) displays a gradation of shading ranging from light to dark, which equates to 9–78> MS units obtained over the western

Fig 77 Distribution of flints from 5m squares sampled by dry sieving

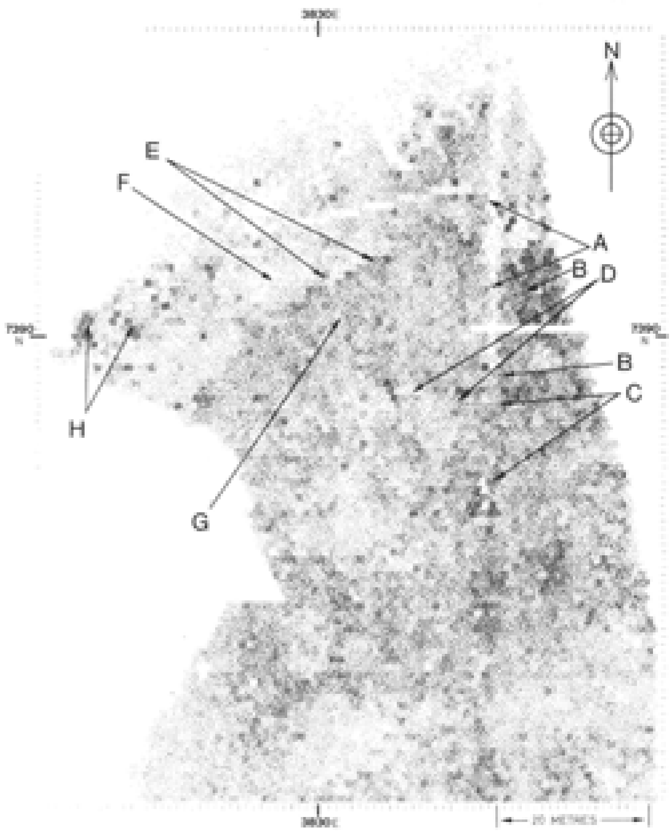


Fig 78 Dot-density diagram of the magnetic susceptibility survey across the surface of the buried soil in the western part of the enclosure (see text for an explanation of A–H)

half of the buried soil surface. The dot density diagram representing the MS units obtained from the survey of the stripped surface (Fig 79) is printed at a range of 7 (lightest) to 77 (darkest) MS units.

The buried soil survey

The most obvious features of the buried soil survey (Fig 78) were the later prehistoric and Romano-British ditches, F361 and F469, which were filled by natural silting and had a low magnetic susceptibility (A on Fig 78). The adjacent and approximately parallel feature, F363, was probably Neolithic and had a somewhat higher magnetic susceptibility (B on Fig 78). It was also possible to discern a continuation of the ditches to the south as higher magnetic susceptibility units (C on Fig 78). The east–west Romano-British ditch, F317, was represented by sporadic lengths containing higher readings (D on Fig 78).

The sinuous V-shaped Neolithic ditch, F313, running north-east to south-west (E on Fig 78) appeared on the basis of the magnetic susceptibility units to form a boundary between an area of less intensive human activity to the north-west (F on Fig 78) and an area of more intensive human activity to the south-east (G on Fig 78). Further north-west of F313, intensive human activity was represented by high magnetic susceptibility values (H on Fig 78) – many of which upon excavation proved to be pits containing burnt material. Maisie Taylor (p 129) considers that this burning may be associated with coppicing activities in the nearby long enclosure ditch segment 5.

The stripped soil survey

The features that stand out prominently from the stripped soil survey are the linear ditches of the interior (see Fig 88): F317 and F361 (J on Fig 79), F318 (L on Fig 79), and F363 (K on Fig 79). Some of the eastern enclosure ditch segments, 8 to 12 (M and N on Fig 79), also stand out prominently. (It should be noted that at this point in the magnetic susceptibility survey, substantial lengths of the linear ditches had been excavated and are shown in white on Fig 79.)

The cursus ditch, F318, is shown partially excavated (north-east of its gap or entrance), but where it was unexcavated it showed up as a somewhat higher magnetic enhancement compared to the slightly lower magnetic background around it (L on Fig 79). It is interesting to note that the areas of enhancement to the south-west formed a linear pattern parallel to F318 (P on Fig 79), and probably represented a 'ghost' of a second, less substantial, south-western cursus ditch (Challands forthcoming).

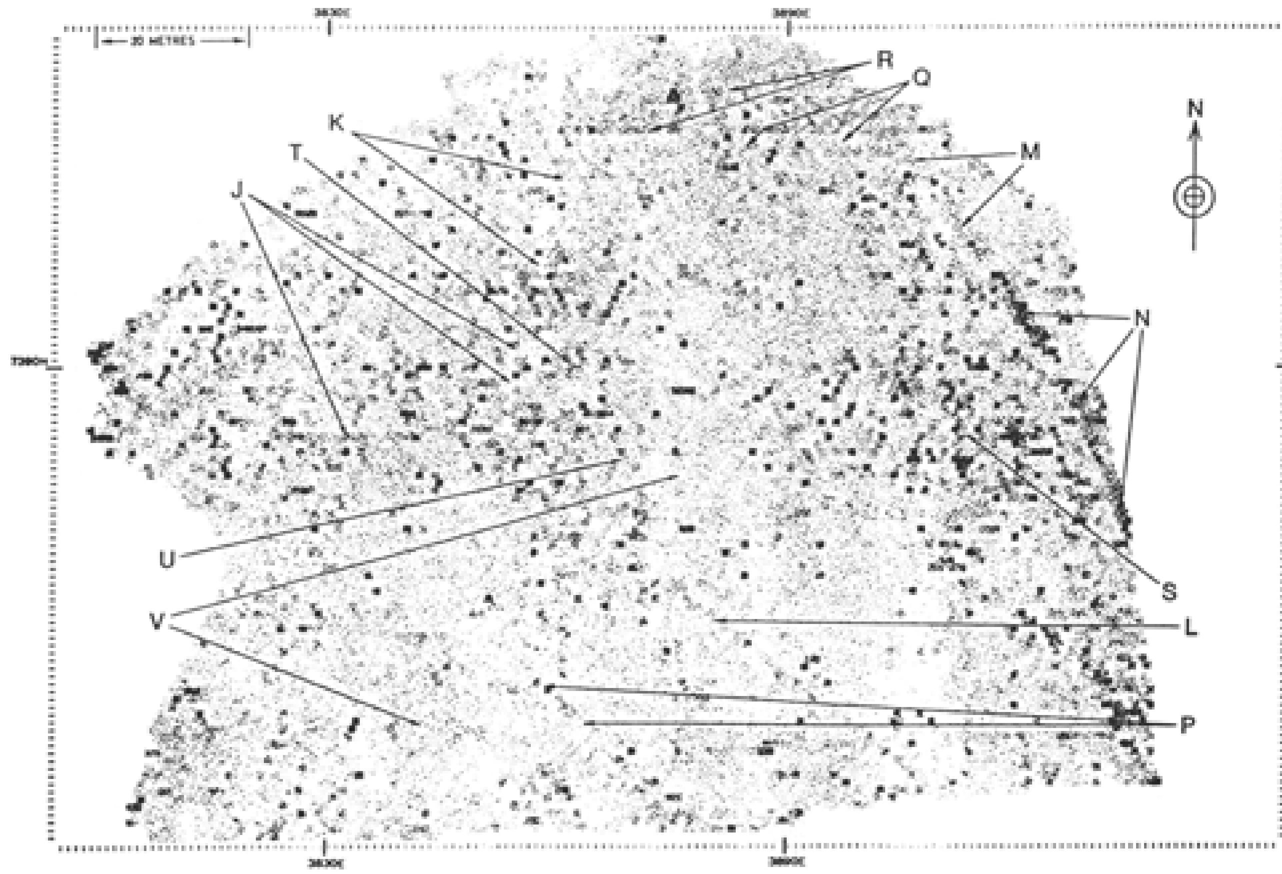


Fig 79 Dot-density diagram of the magnetic susceptibility survey across the stripped surface of the excavated area. The cursus ditch (F318) runs across the area diagonally; enclosure ditch segments 10, 11, and 12 are particularly prominent

A weak magnetic fill of the Romano-British field boundary ditch, F648 (Q on Fig 79), bounded an area of increased magnetic enhancement (R on Fig 79), which was perhaps due to the spreading of domestic refuse over a small field post-dating and magnetically obscuring the enclosure ditch segments 6 and 7.

Human activity areas may be clearly seen on the dot-density diagram, particularly where high magnetic susceptibility readings clustered along the eastern side of the enclosure (S on Fig 79). Some of the pits in this eastern area had very high magnetic susceptibility readings. Excavation in this area proved that the pits contained burnt animal bone that had been transported from elsewhere (see Chapter 9). More interestingly in this eastern part, areas of reddened gravel subsoil produced very high magnetic susceptibility readings (in excess of 1000 MS units). It is very likely that these reddened gravel areas were the location of animal cremation activities where intense burning had generated sufficient heat to penetrate through the old land surface to the gravel. It is possible that the cremated animal bone recovered from the pits was derived from these zones of intense burning. This is corroborated by the analysis of the cremated bone, which indicated burning at high temperatures – between 200 and 600°C (see Chapter 9).

Undoubtedly, the high magnetic susceptibility values recorded over the redeposited upper fill of ditch segments 10–12 (N on Fig 79) have their origins in the intensive burning in area S. Also, it can be clearly seen that these three well-enhanced ditch segments differed dramatically from the relatively low magnetic susceptibility of ditch segments 8 and 9 (M on Fig 79), immediately to the north.

Another area of high magnetic susceptibility (although not as high as the eastern area) lay north-west of centre (T on Fig 79) and was bounded by a sinuous line of high magnetic susceptibility readings (U on Fig 79). This sinuous boundary was composed of magnetic enhancement of the natural gravel linking the high magnetic susceptibility fill of small pits, many of which contained burnt animal bone. Between the areas of high magnetic susceptibility in area T in the north-west and the high values in area S the east (a distance of some 35m), the background magnetic susceptibility (V on Fig 79) was normal; the normal background values extended south and west to the edge of the excavated area. This area of less intensive human activity involving fire contained only a random scatter of pits containing high magnetic susceptibility deposits.

Interpretation

The stripped soil survey clearly revealed the careful ordering of human activity within the causewayed enclosure. It is undeniable that fire formed an important part in the activities being carried out within the enclosure. Both the magnetic susceptibility and the cremated bone evidence suggests that combustion occurred at very high temperatures, and it is tempting to suggest that bundles of copsewood rods (from the north-western ditch segments) were ignited to produce these very high temperatures. Field magnetic susceptibility survey has shown that fire was used in a structured way, with its use confined to specified zones within the enclosure. Certainly, the confinement of Phase 1 burning activities to the western and eastern sides of the enclosure cannot be accidental (T and U on Fig 79). Similarly, the area between the two zones of fire activity had a normal background magnetic susceptibility (V on Fig 79) and must fit into the general order within the enclosure as a whole.

Another, possibly planned, activity was the deposition of the results of fire (magnetically enhanced soil containing cremated animal bone) in small pits within the interior of the enclosure. The fact that intense burning took place on the site is undeniable, as was the careful and deliberate redistribution into small pits of the burnt products, suggesting perhaps ceremonial rather than domestic activities. Undoubtedly, the analysis of the magnetic susceptibility survey, in conjunction with the excavated information, points to ritual rather than settlement use of the enclosure.

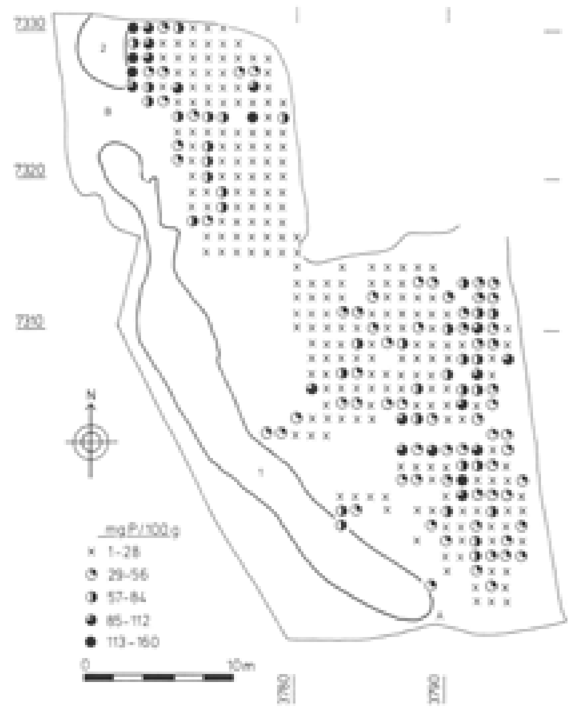


Fig 80 Phosphate survey: results of the detailed survey (1m grid) of the buried soil in the south-west area, expressed as mg of phosphate per 100g of soil. The enclosure ditch segments 1 and 2 are shown in outline

The phosphate surveys

by David Gurney and Francis Pryor

Introduction

Following the success of the Maxey phosphate surveys, it was decided to undertake similar surveys at Etton (Gurney 1985a). The methods of the Etton survey were identical to those used at Maxey and have already been described in full (Craddock 1985). The results are expressed in milligrams of phosphate per 100g of soil. The analyses were undertaken by David Gurney with advice and assistance kindly provided by Dr Paul Craddock of the British Museum Research Laboratory. Two surveys were undertaken: the first (in 1982) was confined to a small area of the interior near enclosure ditch segment 1. The second took place in 1985 and 1986 and covered almost the entire buried soil. The plots of the 1985 and 1986 data were image processed by Drs Buck and Litton, and interpretive comments follow their report.

The 1982 survey

The first soil phosphate survey took place on a 1m grid across a small area of the interior bounded by ditch segment 1 and the south part of segment 2 (Fig 80). The results in very general terms showed that the concentration of phosphate in the buried soil appeared to increase towards causeways A and B. The southerly concentration seemed to extend further into the enclosure interior than did that around causeway B. The latter was more closely confined around the immediate periphery of ditch segment 2 and might possibly be taken to indicate that there was no internal bank at this point. The higher concentrations of soil phosphate seemed to avoid Structure 1 (suggesting perhaps that this was not a domestic structure). These conclusions are expressed very tentatively, given the statistically 'noisy' nature of such data (a phenomenon discussed more fully by Buck and Litton, below).

The main interior buried soil survey

The statistical basis of the survey is given in Microfiche table 1, and the results are presented in Figure 81. The samples were taken on a 5m grid. The data were given to Drs Buck and Litton for further study and analysis, and their results are presented below.

Image processing of the phosphate survey data

by C E Buck and C D Litton

Introduction

In September 1988, as part of a Science and Engineering Research Council-funded research project entitled 'Statistical methods for the detection of boundaries in archaeological field surveys', carried out at the University of Nottingham, soil phosphate data were obtained, through David Gurney, from the site at Etton. The samples were taken from the buried soil

Fig 81 Phosphate survey: results of the general phosphate survey across the buried soil surface, expressed as mg of phosphate per 100g of soil. The enclosure ditch outline has been omitted

surface to investigate activity within the interior of the causewayed enclosure. The sampling interval (5m) was selected with a view to studying changes in the phosphate distribution across the site, rather than to locate individual features within it.

When the data were first made available to us, the research at Nottingham was involved almost entirely with developing a method of image segmentation based upon Bayesian change-point analysis (Buck *et al* 1988). For various reasons this method was not entirely suitable for the Etton data, and we have since adopted an alternative technique that we believe to be more appropriate in this case. The image processing technique used here is described in detail in Buck and Litton (1989), but the following is an outline of the methodology as it has been applied to the Etton data.

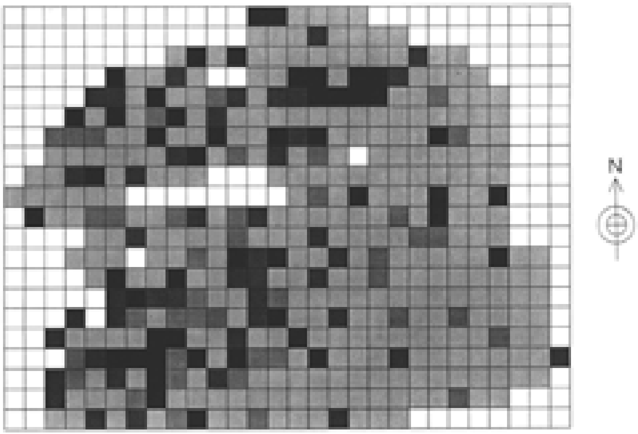


Fig 82 Greyscale plot of soil phosphate data with percentiles at 60, 70, 80, and 90%. White cells indicate missing data

Results

Figure 82 shows a greyscale plot of the phosphate data with percentiles at 60, 70, 80, and 90%. It is clear from this plot that, as with the data from many phosphate surveys, there is a great deal of noise present. Although it appears that there are possible significant changes in phosphate intensity within the data, it is very difficult to ascertain where the changes occur and to distinguish likely boundaries from anomalies caused simply by the noise.

The image-processing technique adopted in an attempt to reveal any zones within the phosphate data is that of Besag (1986). This method allows for definition of changes of phosphate concentration across the site. Previous work (Cavanagh *et al* 1988) has shown that the natural logarithm of soil phosphate concentration has an approximately normal distribution, and hence all values quoted with regard to the image processing refer to the logarithm of the raw data (which was in mg P/100g soil). To implement the Besag method, it is necessary to specify the number of levels expected within the data, and to provide an initial estimate of mean and standard deviation of each of those levels.

Observation of the frequency distribution of the logged data allows the likely number of levels and their means and standard deviations to be obtained. In the case of the Etton data this leads us to believe that there are two levels with means at about 2.7 and 4.0, and with a standard deviation of approximately 0.4. From these values an image based on maximum likelihood estimates is obtained, which is then used as the initial image for processing.

The image processing used is iterative, with the picture being increasingly smoothed until the zones defined within the data remain the same from repetition to repetition. It is necessary for the amount of smoothing to be selected before the image processing takes place. This selection should be made, ideally, with the initial archaeological aims of the survey in mind. That is, if small features are to be seen as significant, then less smoothing should be used than if larger features or areas are expected.

Figures 83–85 show the results of image processing using increasingly large smoothing parameters. Figure 85 shows the results of substantial smoothing and indicates areas that can confidently be described as having enhanced phosphate concentration in comparison to the rest of the survey area. Figure 84 shows regions in addition to those of Figure 85, and these should be noted as of possible archaeological significance. Figure 83 provides little more insight into the data than does Figure 82, but is included here in order to demonstrate the range of smoothing effects possible.

Conclusion

It is hoped that the Besag method of image processing data in this way can lead to the smoothing out of fine detail, and the results of this process are possibly of archaeological significance. It is important to stress here how extremely noisy are archaeological phosphate data. Under normal circumstances, unless there is other supporting archaeological evidence, information from one survey point (or even two adjacent points) should not be seen as constituting a change within the data. The interval for soil phosphate survey should always therefore reflect the size of features sought.

It is hoped that the Besag method of image processing has, in this case, produced plots that avoid too much 'noise-based' information, while at the same time not losing much valuable information present in the data. This balance can only be achieved by close collaboration between data analyst and archaeologist to produce a range of plots that show the full range of archaeological information present.

Comments on the results of the image processing

by Francis Pryor and David Gurney

The results of the image processing of Buck and Litton (above) are clear and unambiguous. They show a distinct contrast between soil phosphate levels of the interior, east and west of a north–south line running midway across the site. This contrast is best seen in Figure 84, but is also clearly apparent in Figure 85, the image subject to maximum screening for noise. The only substantial concentration of soil phosphate east of the north–south median line approximately follows the east–west Roman field boundary ditch, F648 (Fig 91), and a link between the two seems probable. It is not possible to say from these data alone whether the phosphate enrichment to the west is a Neolithic phenomenon, as the linear ditches of Phases 4 and 5 (Iron Age and Roman: F361 and F469) have a north–south alignment (Fig 122) that is broadly coincident with that of the Phase 1C linear ditch and fence line (F363;

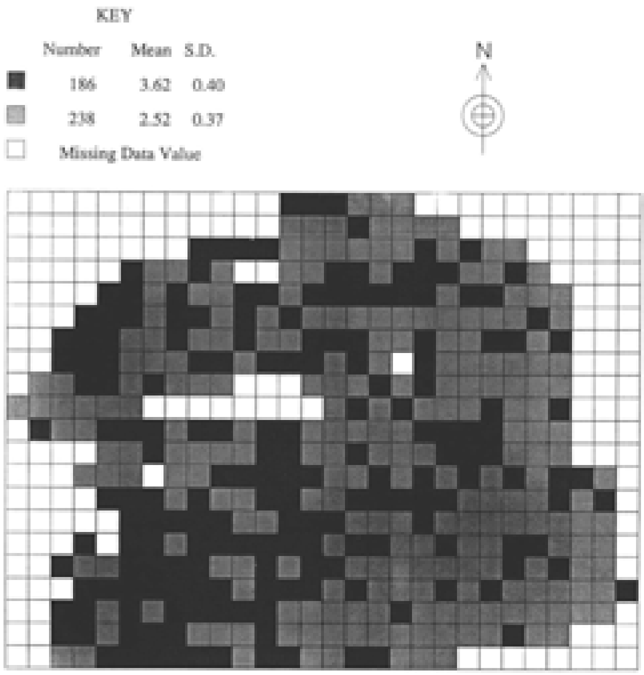


Fig 83 Plot of soil phosphate data after image processing, with smoothing parameter of 0.0015625

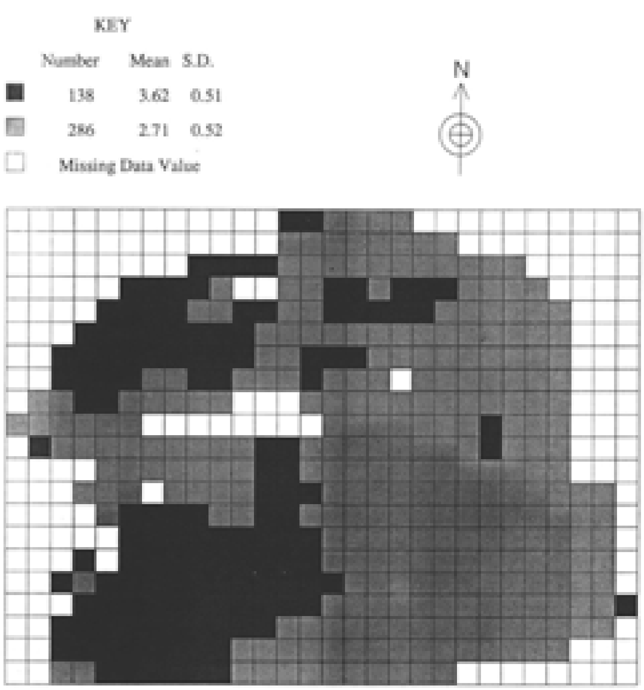


Fig 84 Plot of soil phosphate data after image processing, with smoothing parameter of 0.6375

Fig 115). There is, however, no evidence for Romano-British activity in the south-west area of the site, where the phosphate levels are highest.

The general phosphate concentration seen in Figure 84 is not what one would expect of a settlement: there are, for example, no local high spots that might indicate manure heaps or stockyards. Such an even distribution might result from the grazing of livestock.

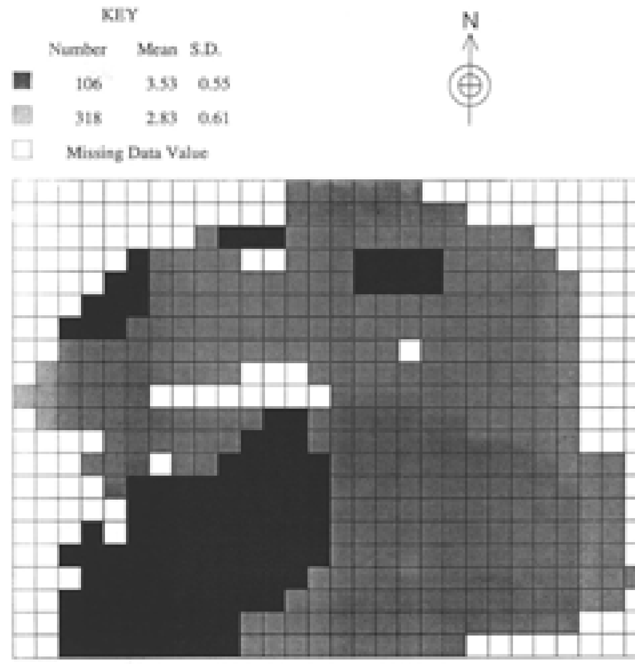


Fig 85 Plot of soil phosphate data after image processing, with smoothing parameter of 1.0109375

It should be stressed that these potentially very significant conclusions would have been impossible had the unprocessed noisy data (Fig 82) alone been available. This case illustrates the great importance of image processing where such complex data are to be assessed.

Excavation history

The excavation of the interior took second place to the excavation of the ditch in the first three seasons (1982–4). This was because the ditch contained waterlogged deposits that were rapidly being dewatered by the nearby quarry. Inevitably, this meant that work within the ditch took place 'blind', without being related to the nearby interior, but limits of time and money allowed no alternative plan of campaign. There was also a considerable quantity of spoil from the ditch (mainly alluvium) which could not be stored in the quarry immediately west of ditch segments 1–4 (where it would normally have been placed). It was therefore heaped on the interior in a very steep-sided pile immediately east of segments 1–4.

Work in the final three seasons attempted to correct the bias of attention showed to the ditch, and a large part of the interior was stripped and excavated. It was still necessary, however, to store loose earth within the interior, and it was heaped to the south, in a band approximately 40m wide, immediately alongside the dyke that ran parallel to the north bank of the Maxey Cut. Eventually this spoil heap was removed by the quarry operators using large box-scrapers, which also stripped the buried topsoil straight down to ballast level. Only the largest features (part of ditch segment 14 and two pits, F1054 and F1060) survived to be excavated.

The excavation of the causewayed enclosure was synchronised with the operations of the Maxey quarry, which was eventually to destroy almost the entire monument. Generally speaking it was possible to carry out the two operations in harmony. The only exception to this was in the late autumn of 1987, when a combination of unusual circumstances made it necessary for the quarry to extract gravel in the south-eastern part of the enclosure, in an area approximately defined by the grid lines 3860E and 7360N. This extraction took place at short notice. Ditch segments 13 and 14 were fully, if rapidly, excavated, together with as many internal features as could be managed in the time available (a judgemental sample was taken in the hope that it would be representative). A plan was drawn of the features that were considered at the time to be of human origin (Fig 86). Certain features were especially clear, undoubtedly ancient, and probably of Phase 1 date; these have been indicated by crosses in Figure 102. A small group of pits around causeway N (Fig 103) were almost certainly 'small filled pits' (discussed below).

Methods of excavation and recording

The Etton project arose out of the previous Welland Valley Project (Pryor and French 1985), and data from the two are comparable. The presence of a buried soil, of waterlogging in deeper features, and the recognition in the field of complex structured deposits along the enclosure ditch, led to the abandonment of the 20% sample strategy of the Maxey project (ibid, 24–6). Instead, we attempted to excavate a 100% sample of interior features; of these, all were sectioned in half, and many (especially 'small filled pits' recognised as such in the field) were emptied and wet sieved through 4mm circular mesh. The recording system made use of larger (A2) finds distribution plans, as befitted the more complex data, but was otherwise closely similar to that employed at Maxey. Data were logged using Ben Booth's Maxarc software (Booth 1985; Booth *et al* 1984).

Excavation of the interior was carried out by a small team, often of four to six archaeologists, but rarely comprising more than 12 people. The excavation season was generally from spring to autumn.

The depth and area of overburden to be removed called for a large-scale, but careful, earthmoving operation. The upper 100–200mm of topsoil (over the entire area to be cleared) was bulldozed into a linear spoil heap parallel to the Maxey Cut bank. This heap could not be piled against the bank, as there was a counter drain running along it, on its northern side; this drain took surface water from surrounding fields and could not be blocked. The spoil heap was 40m wide and formed the southern boundary of the main excavated area. After removal of the highest overburden, the alluvium capping the topsoil was removed with an excavator fitted with a 2m toothless bucket. A system of 'slot-dozing' was developed whereby loose earth produced by the excavator could be dozed to the southern spoil heap on a low 'pad' of loose earth (this work was carried out by an International 600 dozer). Slot-dozing was found to be necessary to prevent damage to the delicate buried soil below (Pryor 1986). A variety of wheeled and tracked excavators was employed throughout the project. The buried soil was removed in the same manner, but a smaller bulldozer (Caterpillar D4) was used. All bulldozers and excavators were fitted with wide, low ground pressure, tracks.

Post-excavation history

It is usual to outline the history of a project's fieldwork, as this can materially affect the quality and quantity of the data recovered; in the previous section, therefore, we have attempted to indicate areas of bias or partial recovery at the stage of data collection. But post-excavation analysis is of equal importance in the production of a synthesis, and it can affect the quality and quantity of information that is finally published. The Etton post-excavation project has not always been undertaken in ideal circumstances.

The chequered history of post-excavation research has inevitably involved a number of fresh starts. Each time that this happened, features were reassessed, often *ab initio*. Usually the reassessment resulted in simplification: features were run together, and doubtful features were rejected; the tendency was to 'lump' rather than 'split'. Once rejected, however, the nature of the filing system meant that features rarely reappeared. The prolonged process of post-excavation seemed to be producing (without any prior intention to do so) a minimalist view of the site. The interpretation to be offered in the published report was in danger of departing markedly from the observations that were originally made in the field. Accordingly, the present author decided to reassess the entire original field record in the last stages of the writing-up process. The result is that many rejected features have been replaced, and much greater emphasis has been given to opinions expressed in the field notes.

One example will illustrate the extent of the changes brought about by this late reassessment. The only probable building at Etton, Structure 1, was excavated in 1983. The general site plan of 1982 and 1983 was drawn for publication in 1984 and is reproduced here as Figure 106 (cf Pryor *et al* 1985, fig 6). Structure 1, as excavated, consisted of gullies and postholes, arranged in a general L-shape; the features were filled with silty material and were cut into a similar natural subsoil; they did not therefore photograph very well (Fig 116). By the end of the prolonged post-excavation process, Structure 1 consisted of just three postholes, a single unnumbered stakehole, and a small apparently unconnected gully to the north; this 'minimalist' interpretation is illustrated, for record purposes, in Figure 87. In the field, however, the structure was clearly visible as a complex of shallow features that included the remains of a darker possible floor. These features, taken together, were fully accepted as Neolithic (and of human origin) by excavators and supervisors alike. They have therefore been reinstated (Fig 106).

All site records, finds, and archive are housed in The British Museum.

The features

In the interests of brevity, as much data as possible have been placed in tables and figures. Lengthy descriptions of features have been avoided, and it has not proved possible to differentiate between description and discussion, as was the case in Chapter 2. This is because many of the perceived groups or arrangements of features depend upon interpretive hypotheses for their distinction. Accordingly, discussion and description have been integrated.

The basic source of data is Appendix 1, a list of all the features of human origin encountered at Etton, in numerical order. Each of the features listed in Appendix 1 appears on one of four detailed quadrant plans. It was not possible to excavate some features, and their outlines can be seen on Figure 86. The detailed quadrant plans are arranged from south-west, clockwise, to south-east (Figs 87–90). The location of the quadrant plans is shown in Figure 91.

Sections or profiles through features of the interior appear in Figures 92–99, arranged in numerical order. A few features were omitted by oversight in the field, or because of shortage of time, during the episode of salvage excavation in 1987. Conventions used in the section drawings are shown on p xxii.

Preservation and survival

Generally speaking, features were excellently preserved beneath the truncated ancient soil. The gravel subsoil was base-rich, and bone was therefore preserved. Pollen and organic material were preserved in waterlogged features.

The topography of Etton is better described as micro-topography, as the area bounded by the enclosure ditch was essentially flat. The modern ground surface, being composed of topsoil that formed on and out of alluvium, was flat – after spot levels had been taken, contour plans were not prepared. The buried soil surface formed a low, flat rise that peaked slightly west of centre (Fig 100); this rise was no more than 100–200mm. The 'natural' surface (B/C horizon) beneath the buried soil also formed a low rise, but was centred further eastwards (Fig 101). The principal physiographic feature was a steady downslope of 300–400mm, on the interior side, to the enclosure ditch at segment 5. The top of the slope was marked by the Phase 1C ditch F313. We have already noted that the buried soil was either very thin or absent in this area; this may have been due to water action. This slight slope was visible to the naked eye; otherwise the entire area appeared uniformly flat (see, for example, Fig 120).

Phasing and chronology

Archaeological features at Etton could be grouped into five phases (Table 6), based largely upon pottery typology. Phase 1 (characterised by Mildenhall and Fengate wares) was Middle Neolithic in date and was further subdivided into Phases 1A–1C; this subdivision was based largely upon stratigraphic and spatial considerations. Phase 2 (Grooved Ware and Mortlake style pottery) was Late Neolithic. Phase 3 was Bronze Age and included features that yielded Beaker and otherwise undiagnostic Late Neolithic/Early Bronze Age ceramics. Phase 4 was Iron Age, and Phase 5 Roman (local Romano-British wares, including Nene Valley products). The vast majority of features belonged to Phase 1 (Table 6). In post-Roman times the site would have been too wet for more than intermittent occupation. The phases may be summarised as follows:

Phase 1: Middle Neolithic
Phase 2: Late Neolithic
Phase 3: Bronze Age
Phase 4: Iron Age
Phase 5: Roman

Groups

Appendix 1 lists all the archaeological features found at Etton, in numerical order. Natural and probably natural features have been omitted. For the purposes of this discussion, features of all phases were arranged into four arbitrary groups (Table 6):

Group 1: otherwise undiagnostic pits or postholes. Many were most probably the truncated remains of 'small filled pits'; a few others could be seen to form distinct fence lines.

Group 2: possible floors, or buried soils in hollows or scoops (of natural or human origin). Group 2 also included possible structural features (such as timber slots), hearths and areas of burning, and wells or waterholes. This group is best categorised as 'miscellaneous'.

Group 3: 'small filled pits' (Table 8). This class of feature is believed to have religious, funerary, or ritual significance; it consisted of small, usually steep-sided and flat-bottomed pits, which were filled in very shortly after initial excavation. Finds included pottery, flint, bone, and items of value, such as querns, polished axes, or axe fragments. Small filled pits are discussed more fully below (under Phase 1).

Group 4: linear features, such as ditches and gullies.

Finally, it should be noted that doubtful, or probably natural, features have been omitted from this report. They have been retained in the site archive.

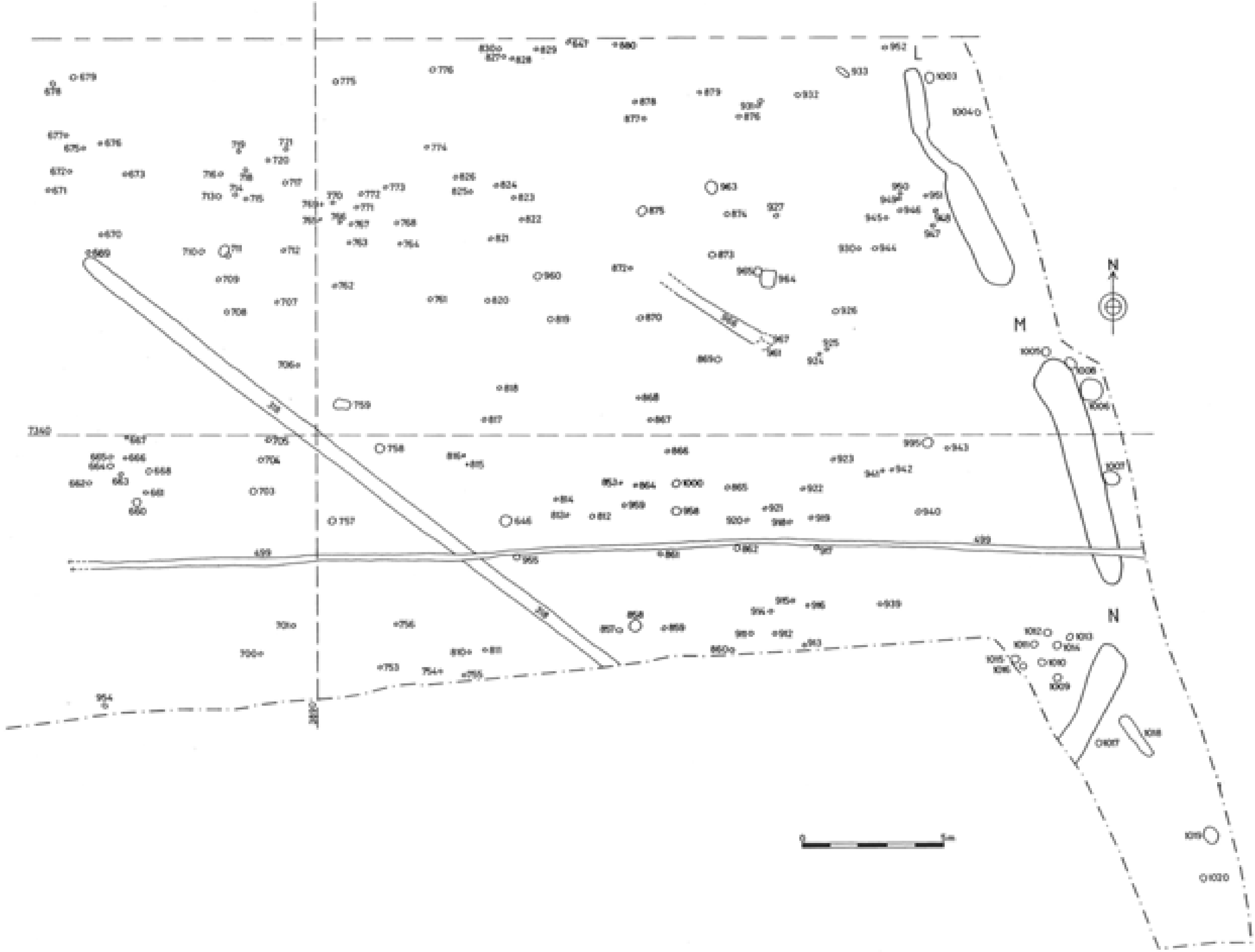


Fig 86 Provisional pre-excavation plan of features and possible features recorded directly after the removal of the buried soil in the south-east of the enclosure. Excavation in this area was prematurely curtailed to make way for quarrying. Features that could be excavated and ones that appeared after weathering are shown on Figures 89 and 90. Causeways L–N are labelled, as well as grid lines 3890 (east) and 7340 (north)

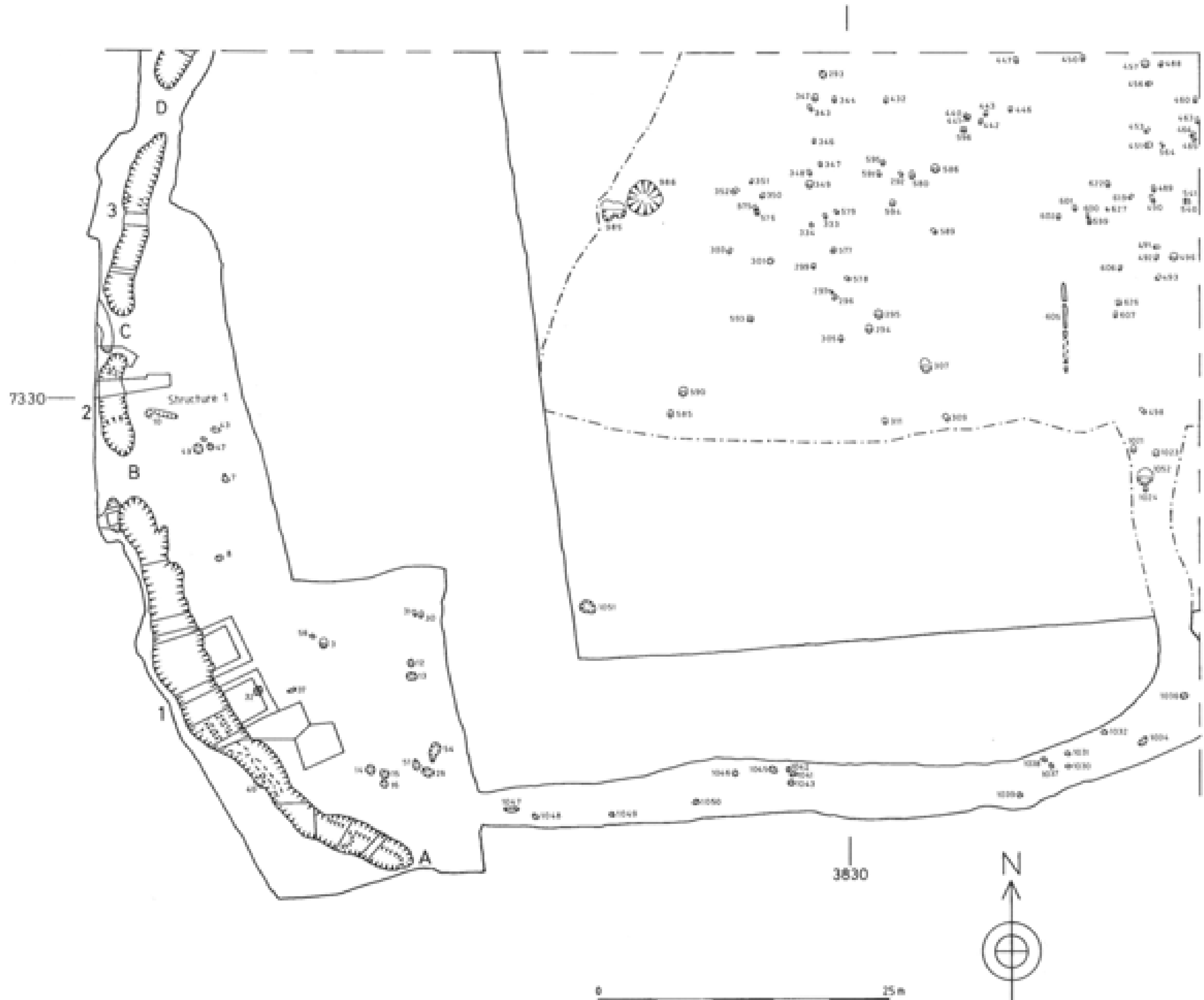


Fig 87 Plan of the south-west quadrant. The features of Structure 1 are here given a 'minimalist' interpretation (compare with Fig 106). The ditch segments are numbered 1–3; A–D are the causeways. Feature numbers are without their F prefix

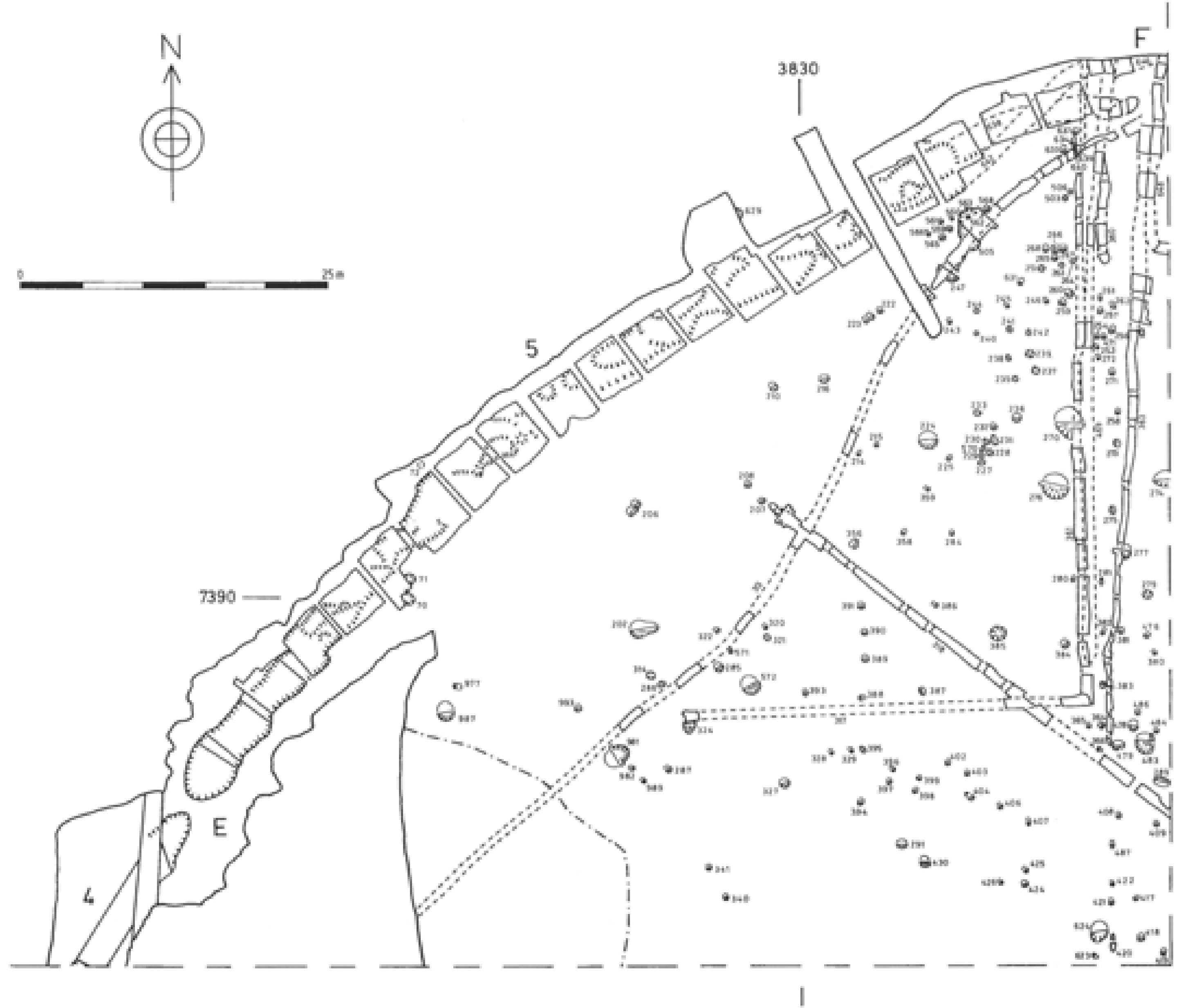


Fig 88 Plan of the north-west quadrant. Dashed lines represent visible but unexcavated ditches. The ditch segments 4 and 5 are numbered; E and F are causeways. Feature numbers are without their F prefix

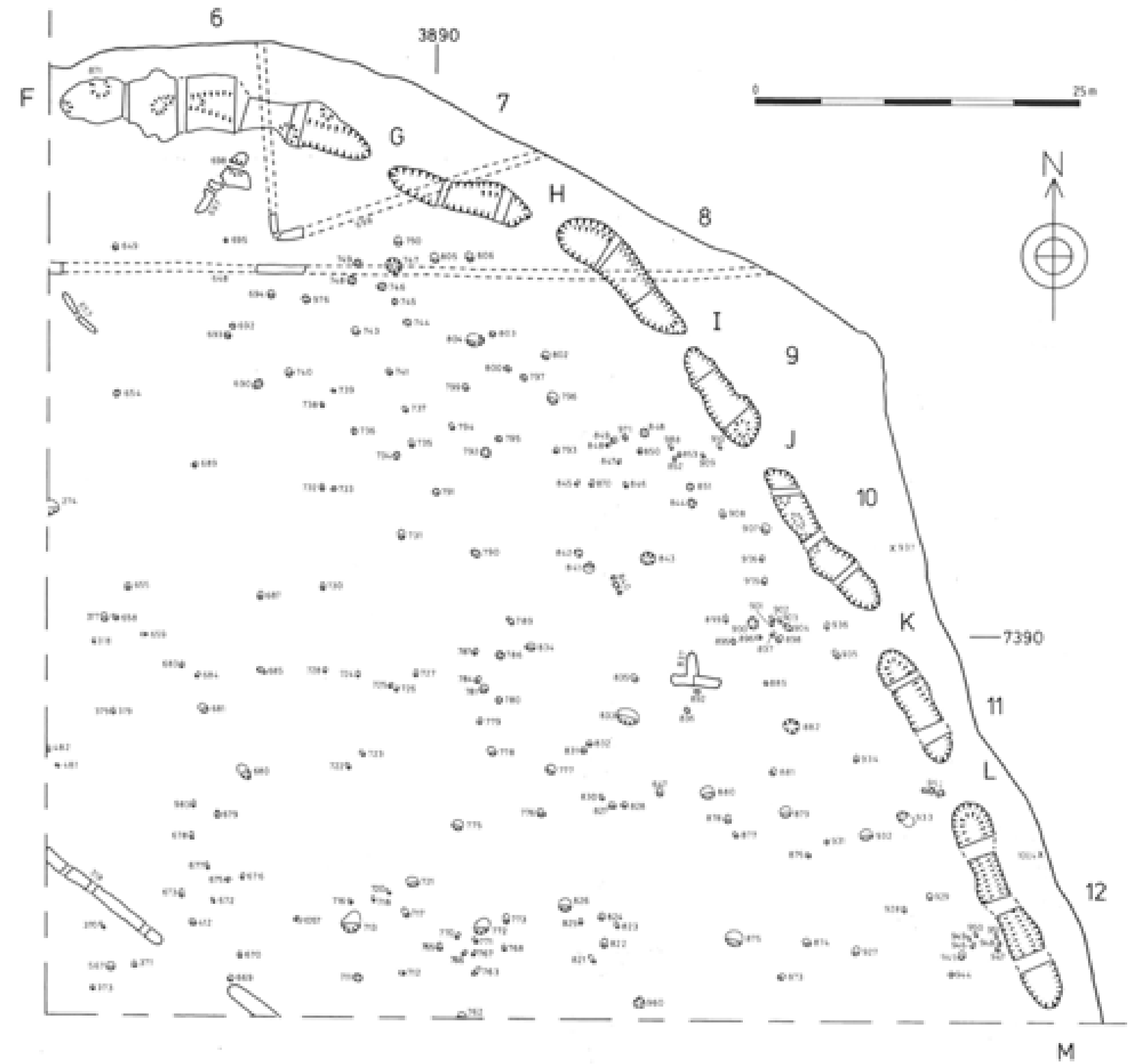


Fig 89 Plan of the north-east quadrant. The ditch segments 6–12 are numbered; G–L are causeways. Feature numbers are without their F prefix. Dashed lines represent visible but unexcavated ditches. Crosses mark the position of definite archaeological features that could not be excavated – see Figure 86

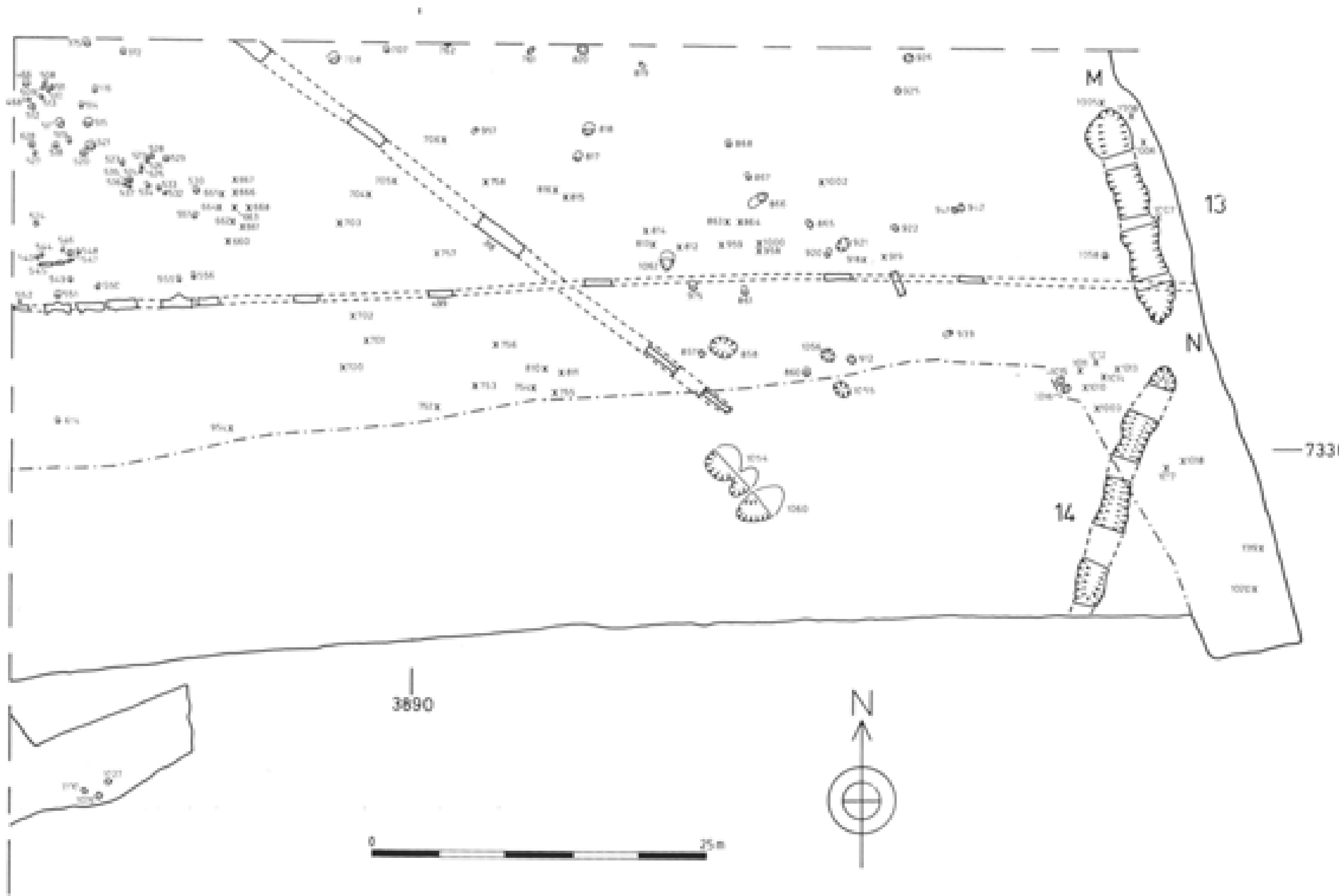


Fig 90 Plan of the south-east quadrant. Dashed lines represent visible but unexcavated ditches. Crosses mark the position of definite archaeological features that could not be excavated – see Figure 86

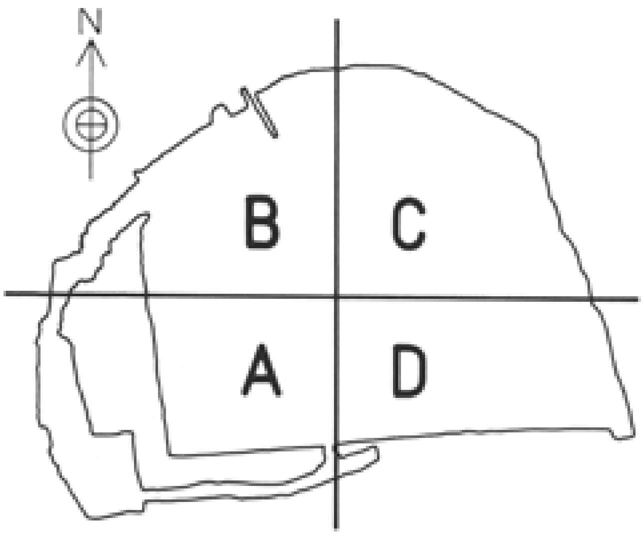


Fig 91 Location of the detailed excavation plans: A, Figure 87; B, Figure 88; C, Figure 89; D, Figure 90

Phase 1

Introduction

This phase saw the laying out and the principal, archaeologically visible, 'use' of the causewayed enclosure (Fig 102). In ceramic terms, diagnostic pottery from Phase 1 features is of the Mildenhall and Fengate styles (see Chapter 5). A total of 594 features (including the enclosure ditch) could be attributed to Phase 1 (Table 6); this attribution was either probable, 'possible/probable', or possible (Table 7). Figures 86–90 should be consulted for the location of feature numbers; Appendix 1 gives grid references for each feature.

Probable Phase 1 features

Probable Phase 1 features were reliably dated: they were filled (often deliberately) with fresh, unweathered material that included diagnostic pottery or flints. Undecorated bodysherds or waste flakes, however large or fresh they might be, were not considered diagnostic. Probable Phase 1 features totalled 118:

Group 1 (pits, postholes, stakeholes): feature numbers 40, 43, 47, 49–51, 60, 236, 247–8, 275, 277, 288–9, 294, 296, 307, 334, 371–2, 379–80, 398, 432, 478, 505, 507, 528, 558, 622, 624, 639, 644, 660, 664, 681, 710–11, 713, 763, 772, 775, 790, 802, 818, 821, 848, 871, 874, 882, 933, 953, 975, 1055-6 (total 55)

Group 2 (floors, scoops, soil, hearths, miscellaneous): feature numbers 6, 32, 44, 474, 483, 504, 563, 650, 682, 837, 839, 917, 943, 976, 981, 986, 1040, 1050 (total 18)

Group 3 (small filled pits): feature numbers 228, 233, 237–9, 241–2, 293, 314, 321, 570, 654, 734, 746–7, 749, 761, 792, 795, 797, 800, 851, 900, 942, 944–5, 962, 994, 1015–16 (total 30)

Table 6 Analysis of features by phase and groups

	number	%
Phase 1		
group 1	440	74.07
group 2	39	6.57
group 3	95	15.99
group 4	20	3.37
total	594	100.00
Phase 2		
group 1	4	40.00
group 2	–	–
group 3	5	50.00
group 4	1	10.00
total	10	100.00
Phase 3		
group 1	7	53.85
group 2	3	23.08
group 3	2	15.38
group 4	1	7.69
total	13	100.00
Phase 4		
group 1	1	25.00
group 2	1	25.00
group 3	–	–
group 4	2	50.00
total	4	100.00
Phase 5		
group 1	3	33.33
group 2	–	–
group 3	–	–
group 4	6	66.67
total	9	100.00
all phases		
Phase 1	594	93.69
Phase 2	15	2.37
Phase 3	13	2.05
Phase 4	3	0.47
Phase 5	9	1.42
total	634	100.00
all phases		
Phase 1 (probable and possible/probable only)	465	92.08
Phase 2	15	2.97
Phase 3	13	2.57
Phase 4	3	0.59
Phase 5	9	1.78
total	505	100.00
all phases (features of groups 1 and 3 only)		
Phase 1 (probable and possible/probable only)	426	94.46
Phases 2 and 3	22	4.88
Phase 4	–	–
Phase 5	3	0.67
total	451	100.00

key: group 1 = pits, postholes, stakeholes; group 2 = floors, scoops, hearths, etc; group 3 = small filled pits and possible small filled pits; group 4 = linear features

Table 7 Analysis of probable, possible/probable, and possible features of Phase 1

	number	%	% of all group features
probable features			
group 1	56	47.06	12.73
group 2	18	15.13	46.15
group 3	30	25.21	31.58
group 4	15	12.61	75.00
totals	119	100.00	20.03
possible/probable features			
group 1	280	80.92	63.64
group 2	4	1.16	10.26
group 3	60	17.34	63.16
group 4	2	0.58	10.00
totals	346	100.00	58.25
group 1 (fence posts excluded)	256	73.99	58.18
group 2 (fence posts included)	28	8.09	71.79
group 3	60	17.34	63.16
group 4	2	0.58	10.00
totals	346	100.00	58.25
probable and possible/probable features			
group 1	336	56.57	
group 2	22	3.70	
group 3	90	15.15	
group 4	17	2.86	
totals	465	100.00	
possible features			
group 1	104	80.62	23.64
group 2	17	13.18	43.59
group 3	5	3.88	5.26
group 4	3	2.33	15.00
totals	129	100.00	21.72
all features			
group 1	440	74.07	
group 2	39	6.57	
group 3	95	15.99	
group 4	20	3.37	
totals	594	100.00	

key: group 1 = pits, postholes, stakeholes; group 2 = floors, scoops, hearths etc; group 3 = small filled pits; group 4 = linear features

Group 4 (linear features): feature numbers 1, 41–2, 45–6, 48, 61–2, 313, 360, 363, 638, 645, 697, 798 (total 15)

Probable Phase 1 features amounted to 20.03% of all Phase 1 features (Table 7). They included the enclosure ditch and were characterised by a high proportion of Group 3 features (small filled pits). This reflects the fact that many were deliberately backfilled with deposits that included pottery. The vast majority of Group 1 features occurred in areas that included small filled pits, and it is most probable that many of the former – perhaps as many as 80–90% – ought to be classified as small filled pits.

With the exception of the two major Phase 2 ditches (F313 and F363), Group 4 linear features consisted of small gullies. The majority of Group 2 features are described as 'scoops' or 'hollows'; in reality these probably represented the truncated remains of concavities or undulations in the base of the Phase 1 topsoil, in areas where artefacts, for whatever reason, were relatively abundant. It is difficult to be certain whether these slight features were necessarily the result of human activity.

'Possible/probable' Phase 1 features

'Possible/probable' Phase 1 features contained material (such as plain bodysherds and waste flakes) that was probably Middle Neolithic in date. Certain features were well defined within the subsoil (prior to excavation), contained charcoal, bone, and other material, and were located in proven areas of Middle Neolithic activity; these were also considered 'possible/probable' Phase 1 features. The possible/probable Phase 1 features were:

Group 1 (pits, postholes, stakeholes): feature numbers 7, 12–13, 15–16, 222–3, 225, 227, 232, 235, 253–4, 256–8, 260, 262, 265, 271–3, 284, 292, 297, 299, 303, 305, 309, 311, 320, 328–9, 333, 340–4, 346–52, 356, 358–9, 364–5, 373, 375, 377–8, 381–2, 386–91, 393–4, 396–7, 399, 402–4, 406–9, 412, 417–18, 420–2, 424–6, 430, 440–3, 446, 450–1, 453, 456–7, 466, 471, 476, 481–2, 484, 486–7, 489–93, 496, 506, 508, 515, 517, 521, 524, 529–30, 542, 571–2, 580, 585–6, 589, 591, 593–5, 647, 649, 655, 658–9, 669–70, 672, 675–8, 680, 683–5, 687, 689, 692, 694, 707–8, 712, 716–18, 720–8, 731–3, 735, 737–8, 740–1, 743, 762, 765–6, 768, 770–1, 773, 776, 778–9, 781, 784, 787, 789, 791, 793–4, 799, 804–6, 817, 819–20, 822–8, 831, 834–5, 840, 845–7, 849–50, 852–3, 860–1, 865, 867–8, 873, 875–9, 881, 885, 892, 895–9, 901–12, 928–9, 931–2, 935–6, 939, 946–52, 957, 960–1, 982, 993, 1031, 1034, 1038, 1041–3, 1045–9, 1051–2, 1057–8, 1062 (total 280)

Group 2 (floors, scoops, soil, hearths, miscellaneous): feature numbers 360, 383, 479, 645 (total 4)

Group 3 (small filled pits): feature numbers 8, 229–31, 236, 240, 243–5, 263–4, 266–8, 285–6, 291, 295, 301, 322, 324, 327, 366, 370, 395, 419, 673, 679, 695, 730, 736, 739, 744–5, 748, 750, 780, 786, 803, 832, 836, 842–4, 857, 866, 920–1, 927, 934, 941, 985, 1021, 1026–7, 1030, 1032, 1036–7, 1039 (total 60)

Group 4 (linear features): feature numbers 10, 653 (total 2)

Features considered 'possible/probable' would be classed as of 'probable' Phase 1 date on a settlement site such as Maxey East Field (Pryor and French 1985). They comprised 58.25% of all Phase 1 features (Table 7). A more cautious approach has been adopted in the present instance because the usual 'visual clues' that aid the spatial interpretation of a settlement site (such as house plans, stackstands, droveways, fields, paddocks, middens) were largely absent.

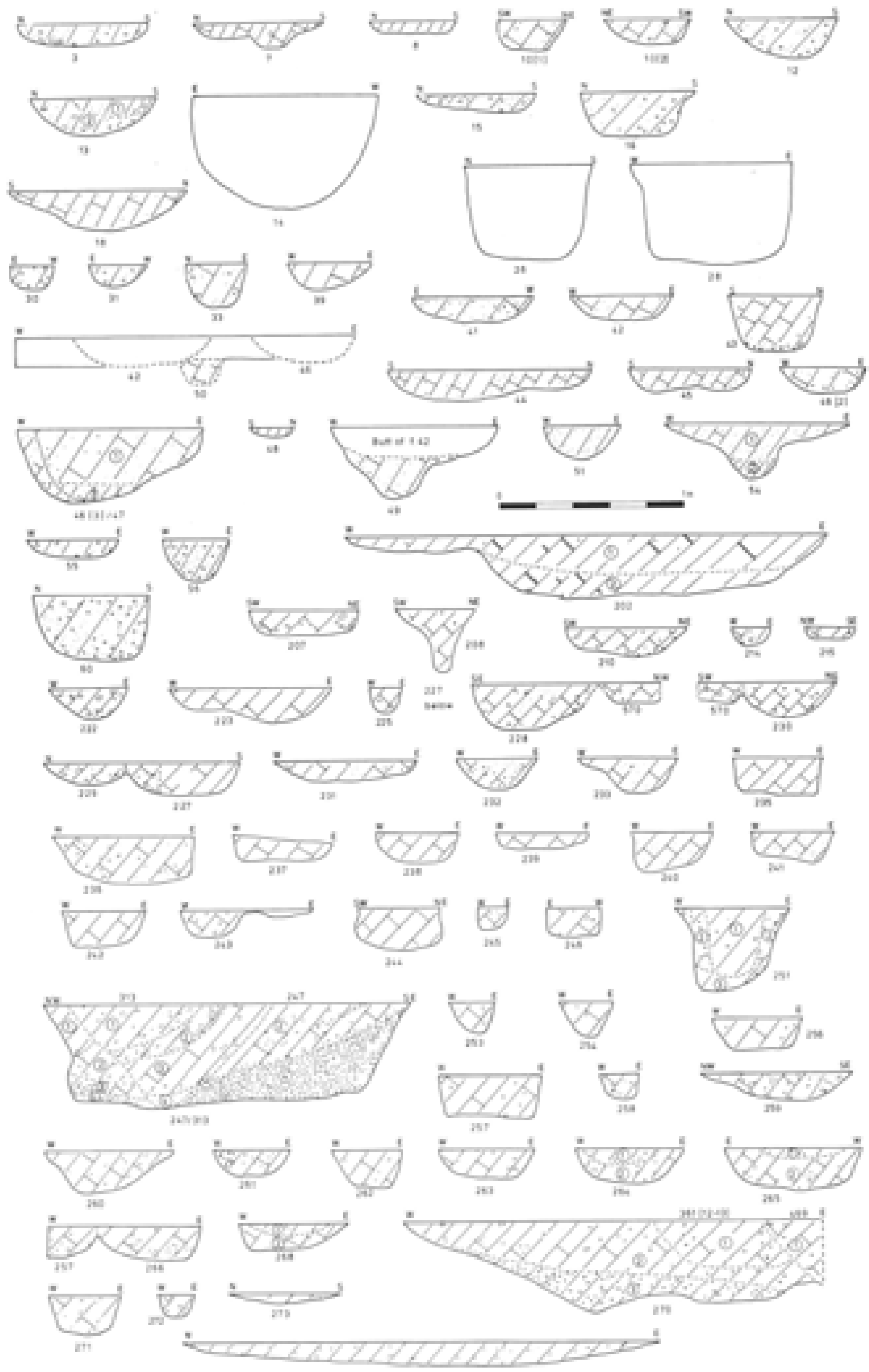


Fig 92 Sections and profiles of selected features (F3 to F274); section numbers of linear features are in square brackets

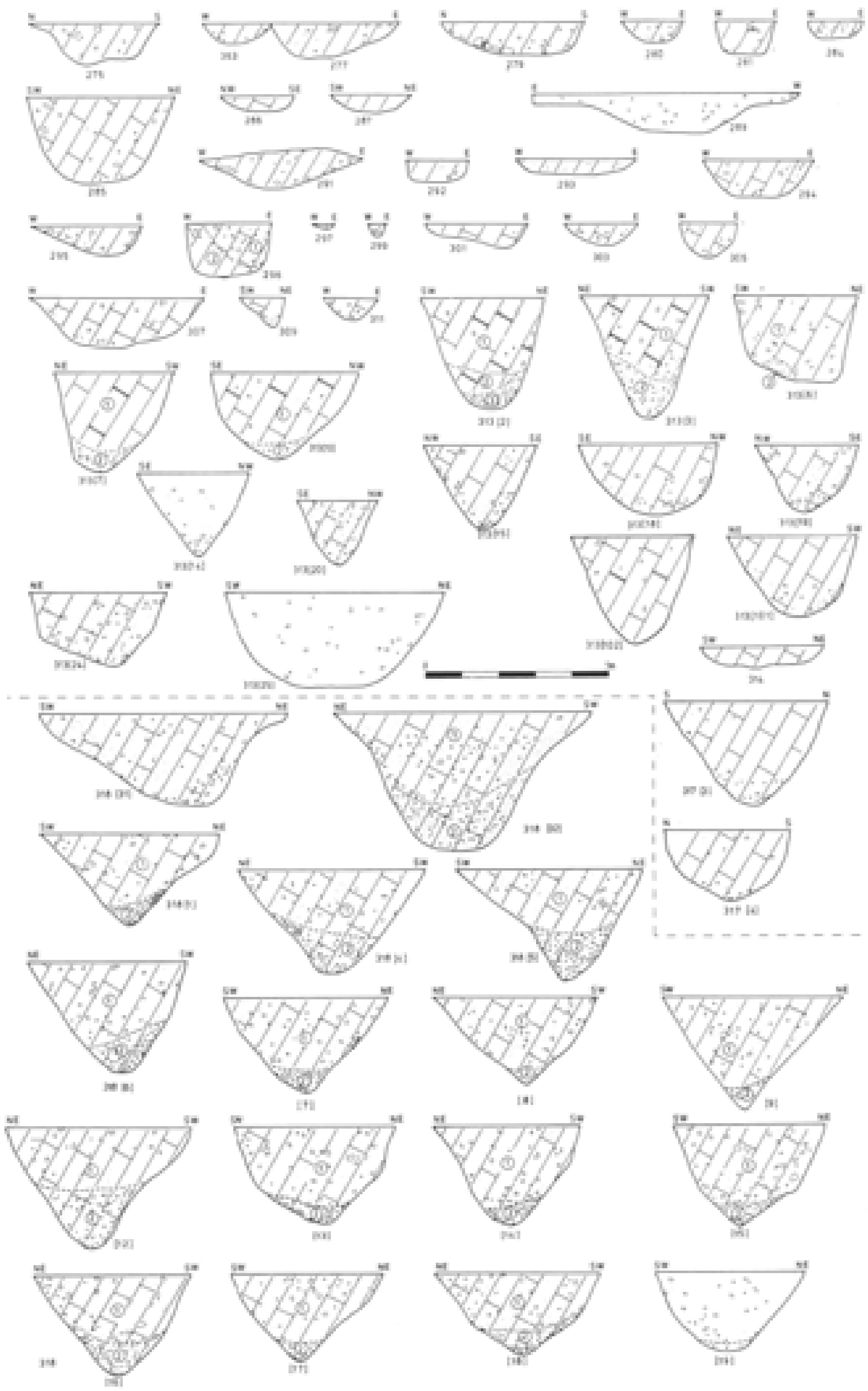


Fig 93 Sections and profiles of selected features (F275 to F318); section numbers of linear features are in square brackets. Cursus ditch (F318) sections are below the dashed line (continued on Fig 94). See also Figures 92 and 96 for further sections of F313

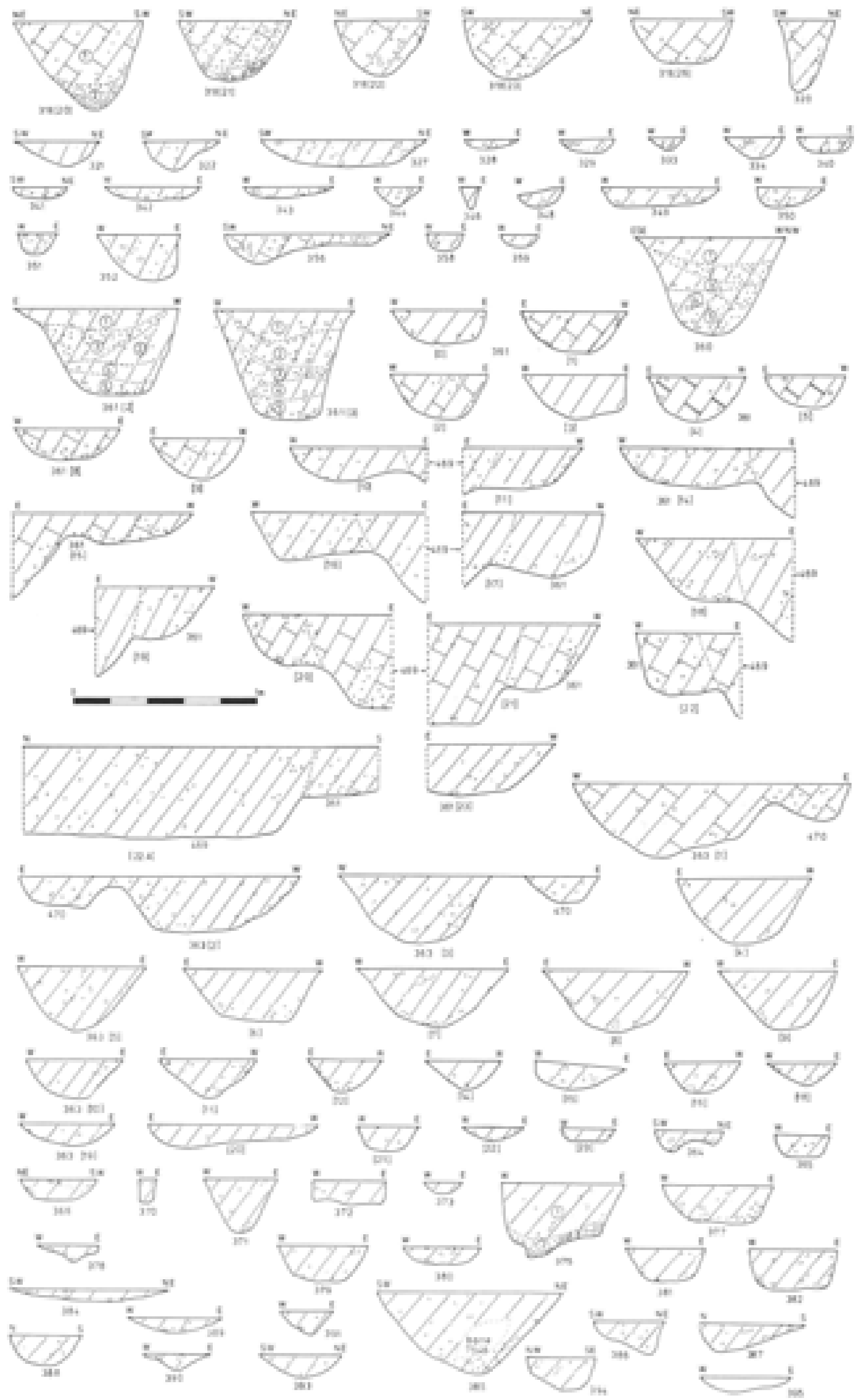


Fig 94 Sections and profiles of selected features (F318 to F395); section numbers of linear features are in square brackets

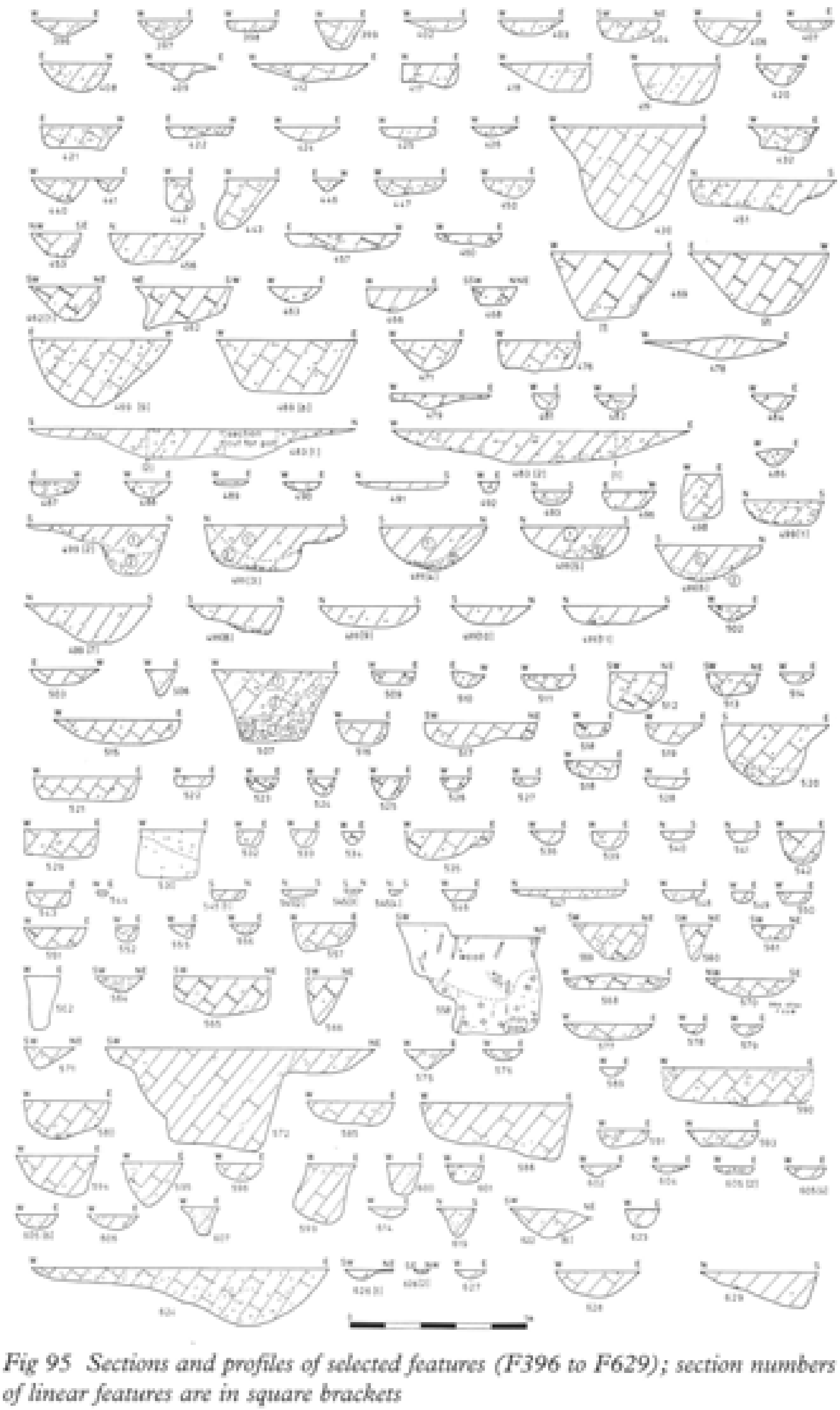


Fig 95 Sections and profiles of selected features (F396 to F629); section numbers of linear features are in square brackets

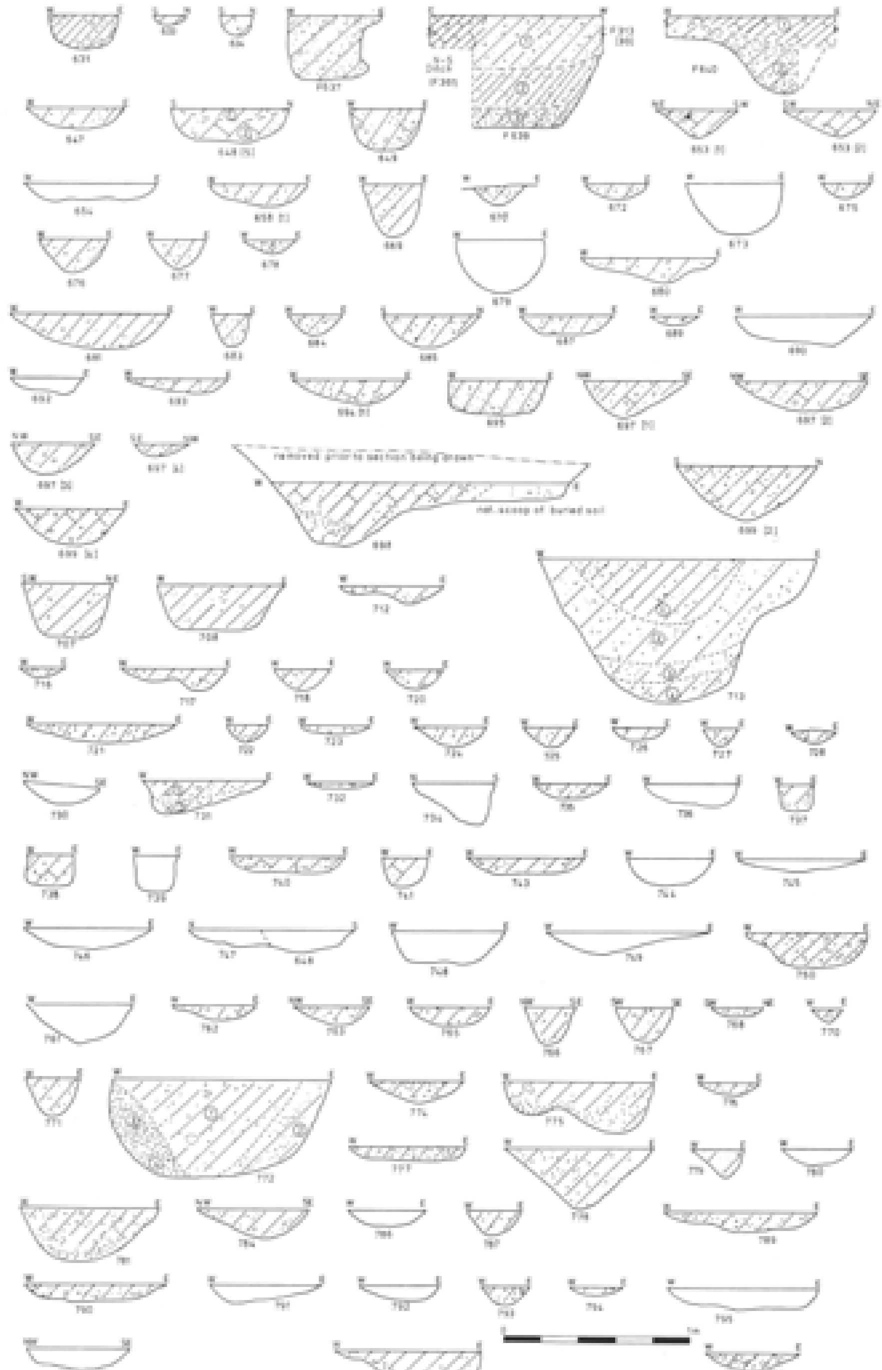


Fig 96 Sections and profiles of selected features (F631 to F799); section numbers of linear features are in square brackets

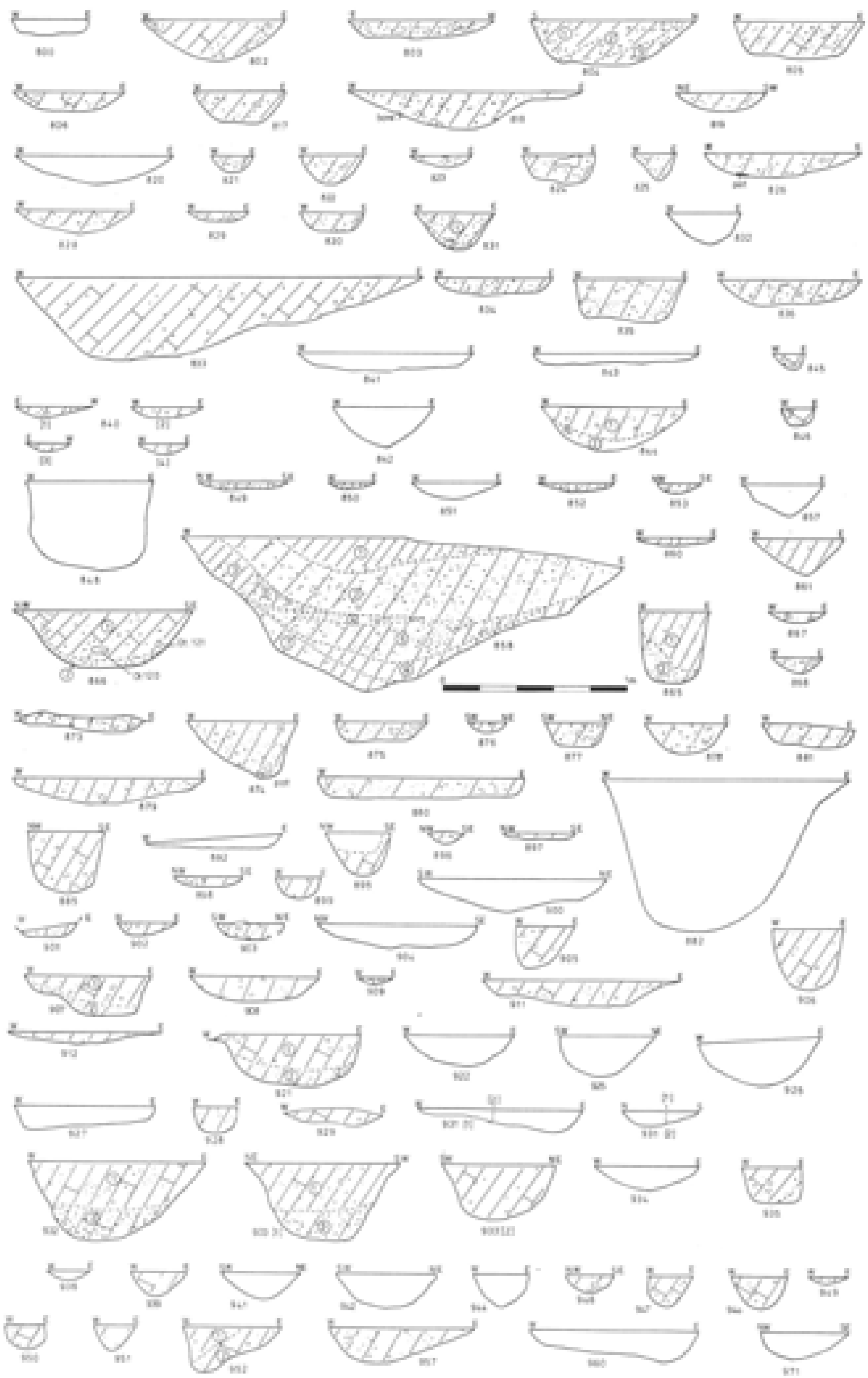


Fig 97 Sections and profiles of selected features (F800 to F971); section numbers of linear features are in square brackets

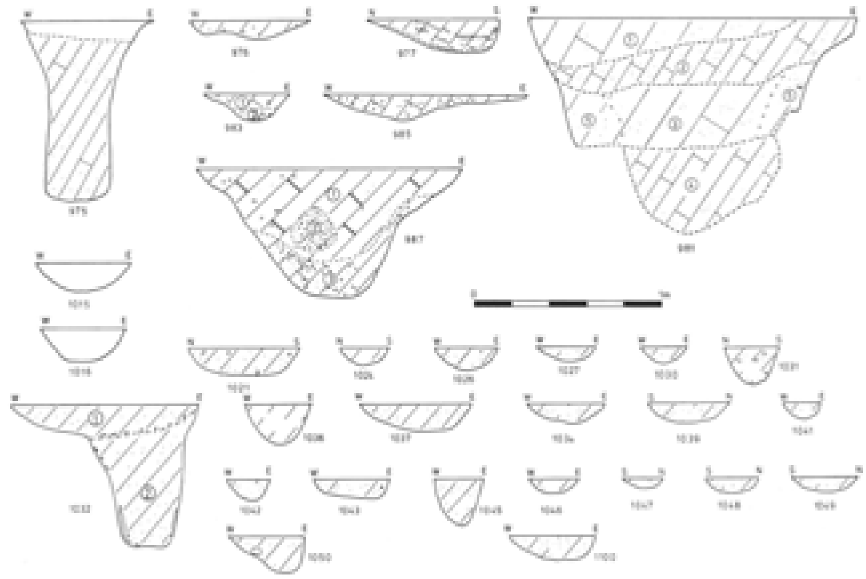


Fig 98 Sections and profiles of selected features (F975 to F1050)

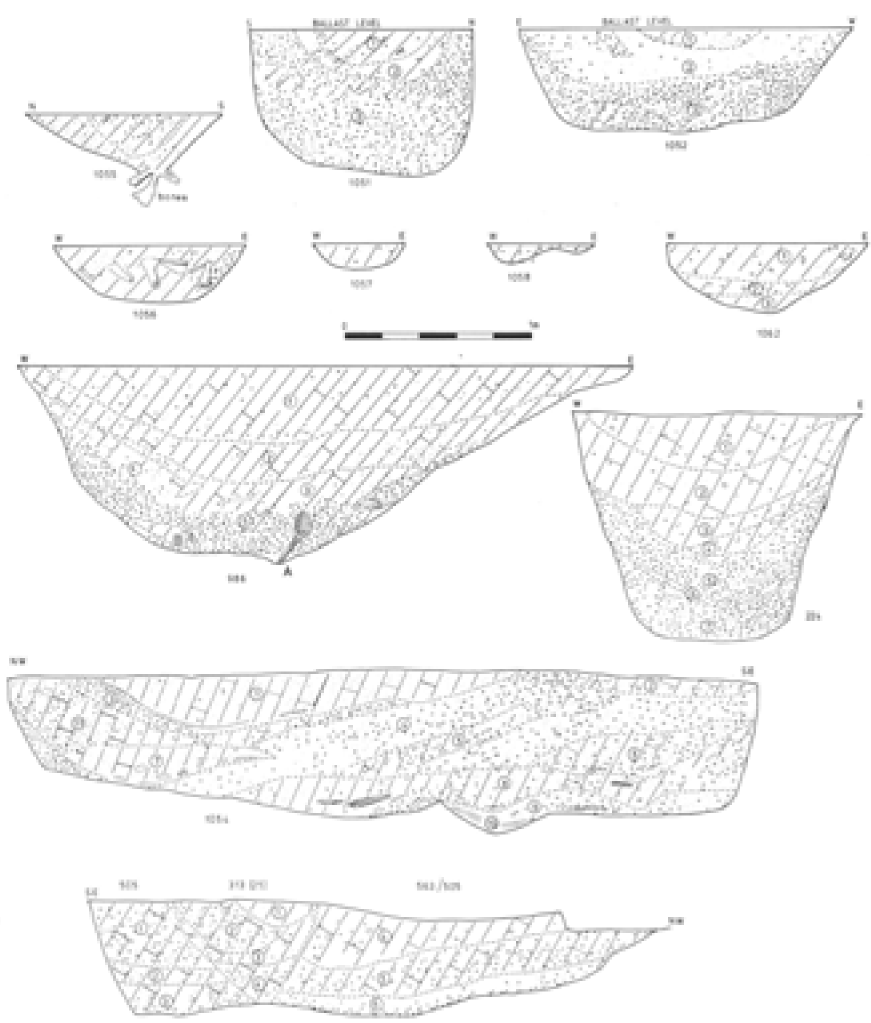


Fig 99 Sections of selected features (F224, F505, F986–F1062). On F986, (A) is wood that projected beyond the section into the natural

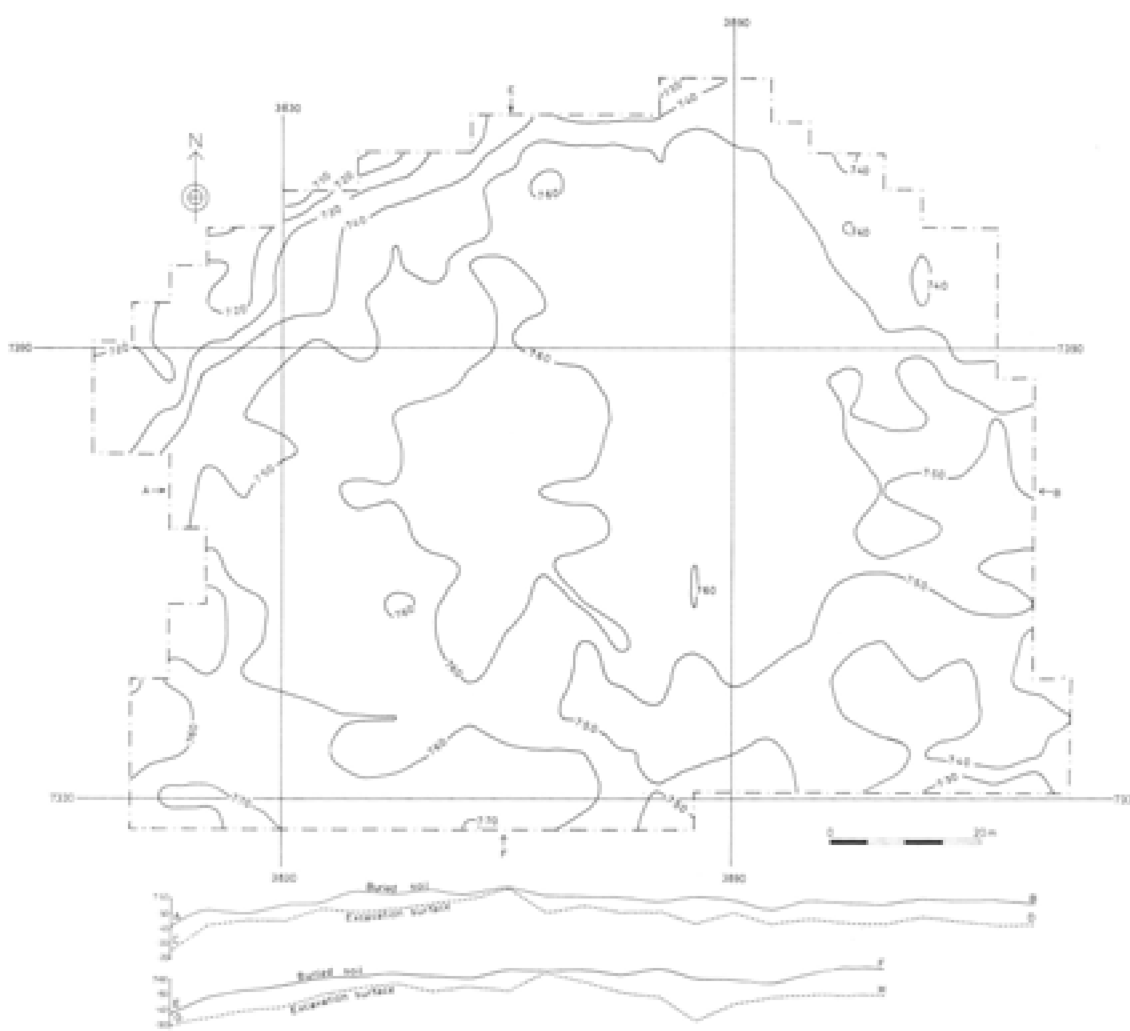


Fig 100 Contour plan of the buried soil surface, after mechanical removal of the overlying alluvium. Height in metres above OD. A–B and E–F are profiles of the buried soil surface

The vast majority of 'possible/probable' Phase 1 features belonged to Group 1. This group included elements of two probable fence lines (in all, 24 postholes); however, if these fence posts are excluded and added to Group 2, the features of Group 1 still comprised over 70% of the whole (see Table 7). Small filled pits were the second most numerous group; it is very probable that a high proportion of Group 1 pits represented the truncated remains of small filled pits.

Possible Phase 1 features

Possible Phase 1 features were generally very slight and may originally have existed largely within the A soil horizon. They were of probable anthropogenic origin, and their location was consistent with known Phase 1 activity. Possible Phase 1 features totalled 129:

Group 1 (pits, postholes, stakeholes): feature numbers 3, 31, 202, 207–8, 210, 214–16, 243, 245, 264, 266–8, 280, 285, 287, 291, 295, 322, 327, 366, 370, 419, 460, 463–5, 468, 488, 509–14, 516, 518–20, 522–3, 525–7, 532–7, 540–1, 543–4, 546–52, 555–7, 559–62, 564–6, 575–9, 584, 596, 599–602, 606–7, 614, 619, 623, 626–9, 631, 640, 695, 858, 979, 983, 988–9, 991, 1055–6 (total 104)

Group 2 (floors, scoops, soil, hearths, miscellaneous): 21, 34–6, 70–2, 259, 273, 349, 384, 568, 590, 685, 977–8, 987 (total 17)

Group 3 small filled pits): 503, 791, 820, 931, 960 (total 5)

Group 4 (linear features): 409, 420, 840 (total 3)

Possible Phase 1 features consisted of 21.72% of the total number of Phase 1 features (Table 7). Group 1 comprised some 80% of the possible Phase 1 features, but in this instance a high proportion of rather doubtful features (460–627) occurred in an area measuring about 25 square metres, centred approximately on grid 38707350 (Fig 90); this area was characterised by apparently gravel-cut features with dark filling. Many of these features were very shallow indeed (10–30mm), and very few produced finds of any sort. They appeared as convincing features of human origin prior to excavation and have been treated as such subsequently. Their area of distribution did not, however,

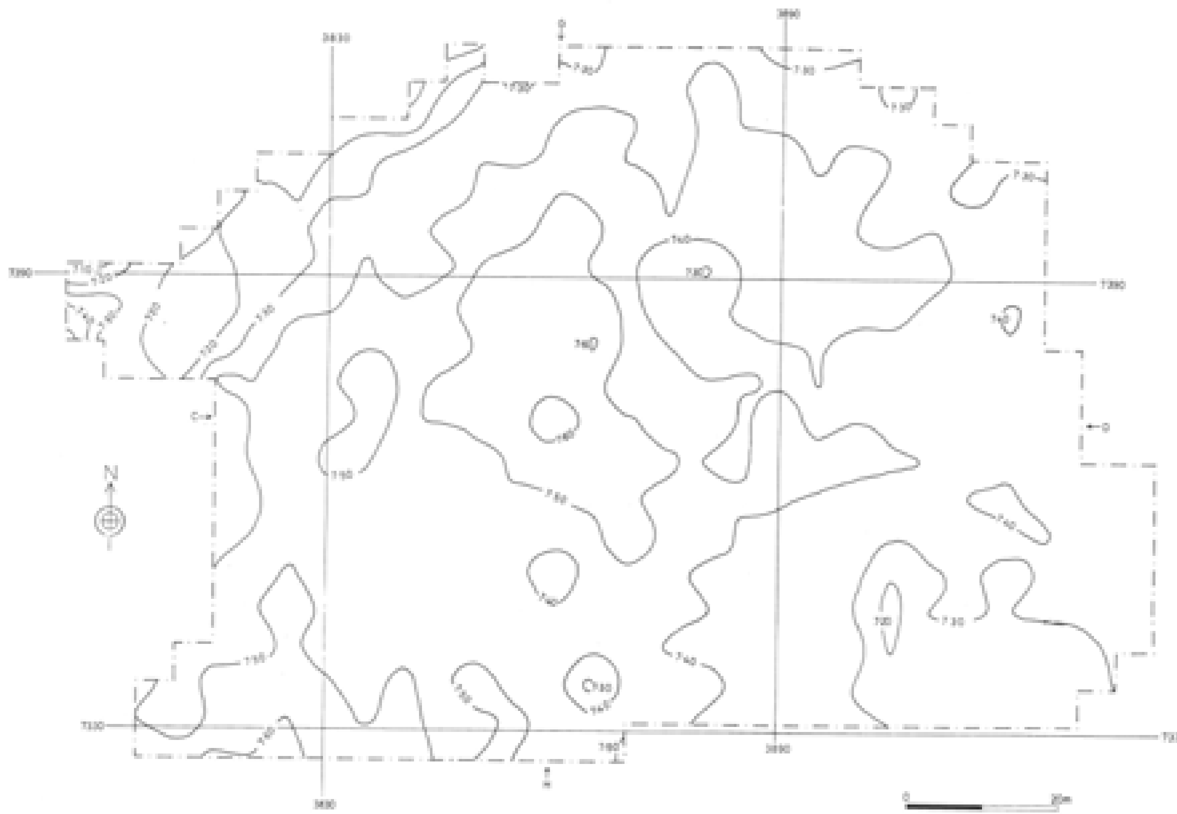


Fig 101 Contour plan of the excavation surface, after removal of buried soil. Height in metres above OD. For profiles C–D and G–H, see Figure 100

even include any possible/probable small filled pits (Group 3 features), and their precise status was difficult to assess. The area in which they occurred yielded low phosphate concentrations in the buried soil (Fig 84). Settlement, as an explanation, is therefore improbable. On balance, it would be safest not to regard them as truncated small filled pits.

Phases 1A and 1B

It was not possible to differentiate between features of Phases 1A and 1B within the interior of the enclosure. The plan of features of Phases 1A and 1B (Fig 103) shows all small filled pits (Group 3 features) as if they belonged to these phases. This is a matter of convenience only, as it was not possible to decide whether non-linear features could be attributed to any one of the three sub-phases. We will see that there are good reasons to suppose that some non-linear features, perhaps many, probably date to Phase 1C.

Causeway F gateway

We have already discussed (Chapter 2) the probability that the enclosure ditch was broached by three (and possibly four) major 'entrance causeways', at each of the cardinal points of the compass. The main 'entrance causeway' was F, and it was probably positioned in an area that was either slightly higher or was naturally drier than ground in its immediate vicinity. In Phases 1A and 1B it was by far the widest causeway, measuring about 25m between segments 5 and 6 (greater precision was impossible due to disturbance of the ground by water action). The butt end of enclosure ditch segment 5 was 2m east of section 146 in Phases 1A and 1B. The butt-end deposit consisted of wood and large quantities of animal bone (Fig 139). Immediately alongside (and south-east) of this butt end was a large pit, F505/563, which had been dug to the water table and below. It contained very few twigs, but a large quantity of animal bone as well as sherds of Mildenhall type. The bone deposit lay at the bottom of the pit (Fig 104) on clean gravel subsoil and had been covered by layers of backfilled, loose gravel. The backfill extended to the excavated surface and was clearly cut through by the Phase 1C ditch, F313. The positioning of the pit F505/563 is of interest, as the butt end of the enclosure ditch alongside it might well have been hidden below water; it must be concluded that the pit was dug (and filled in) as an additional marker of a very significant part of the enclosure. If the large recut pit F505/563 served to mark the western edge of the original, wide, causeway F, the gully F697 (Fig 89), which produced Mildenhall and Fengate wares, could have marked its eastern edge.

At the centre of causeway F was a very substantial gateway structure comprising two large timber slots, F360 and F645 (Fig 102). The gateway was set back slightly from the entrance causeway and was placed on level ground immediately to the south of a slight natural dip in which the ditch and entrance causeway

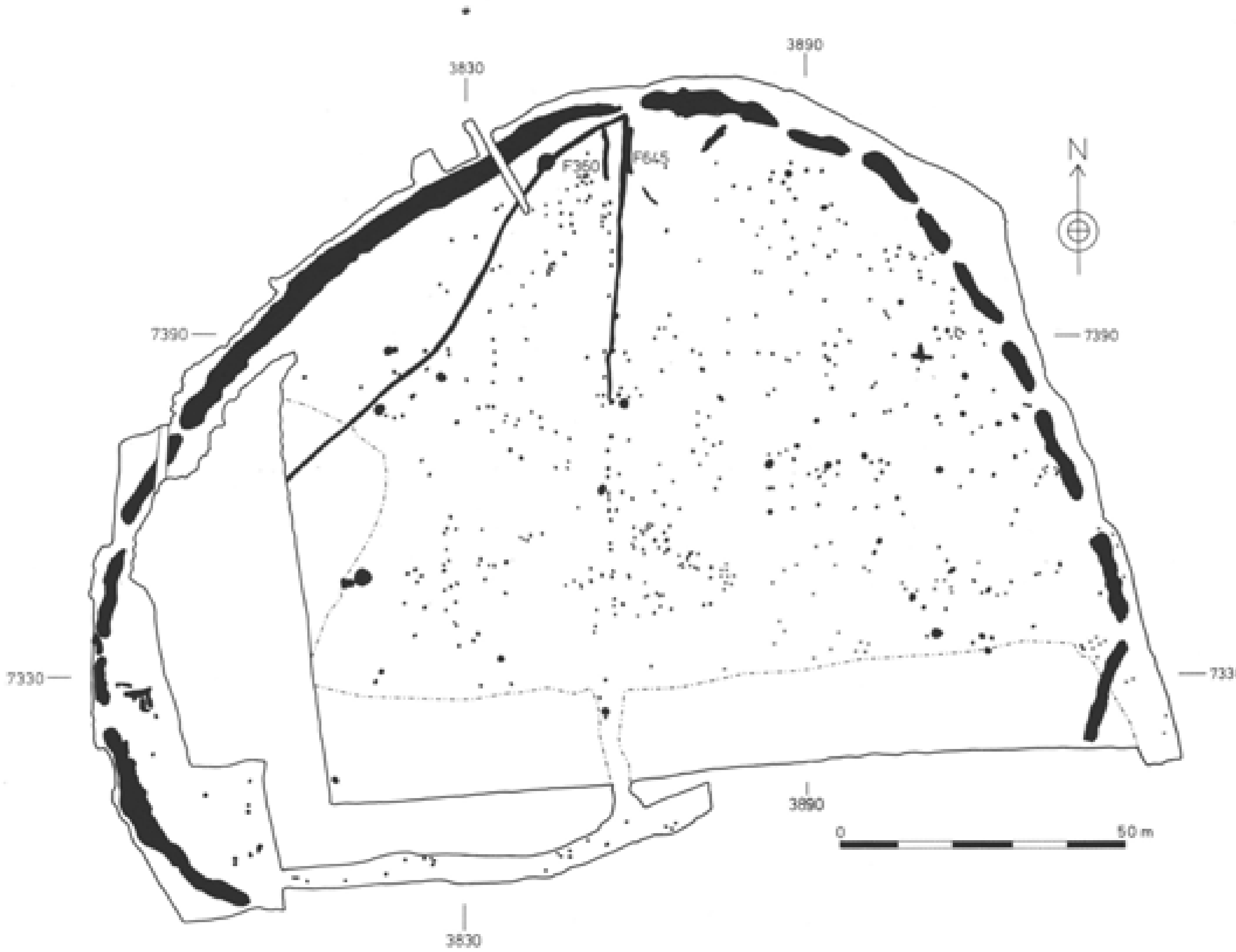


Fig 102 Plan of all features of Phase 1 (shown in black). Those features indicated by crosses could not be excavated before destruction, but were most probably Phase 1. For areas of excavation, see Figure 76

were located (see Fig 100). The gateway was placed at the centre of the causeway, and the gap between the two timber slot trenches was 3m. The slots were approximately 8m long and had steep, clearly defined, butt ends. Both slots were marked by a distinct kink towards the south-east, at their southern ends; this was clearly visible in F360.

The westerly slot, F360, was well preserved; it was steep sided and round to flat bottomed (Fig 94), and in places showed indications of possible gravel packing around timber (Fig 105, layer 3). It was 600mm wide and could have received squared timbers perhaps 300–400mm in width. A relatively clean lens of gravel in the higher filling (layer 2) probably represents backfilling (after removal of the posts). The easterly gateway slot, F645, had been damaged by the Phase 5 ditch F648, which had been cut through it along its entire length. The earlier feature was, however, very slightly deeper and was positioned a few centimetres east of the centre line of the later ditch. With very careful excavation it was possible to trace the entire course of F645 with some precision. Its depth (and probably its width, too) was identical to F360.

At the time of excavation it was believed that the two slots probably formed part of the timber revetment of a barrow or mortuary structure, similar to that excavated in the entranceway of the large Maxey henge complex (Pryor and French 1985, fig 40, feature 541). Posts of the latter had been burnt *in situ* and were clearly visible as dark stains. Post 'pipes' or 'ghosts' could not be seen in the Etton slots, and the absence of charcoal or scorched gravel suggests that they had not been burnt out; this hypothesis is supported by the low magnetic susceptibility readings in this area (Fig 79). The available evidence would suggest that the posts had been removed, probably at the close of Phase 1B, and the slots backfilled. Finally, it should be noted that the barrow hypothesis was abandoned when no trace of burial or mound could be found.

Reserved area

The Phases 1A and 1B plan (Fig 103) shows a clear reserved area south and east of the gateway. It must be recalled, however, that the phase plan only shows the location of probable small filled pits, and we have

Fig 103 Plan of features of Phases 1A and 1B. Small filled pits are indicated in black – all small filled pits of Phase 1 are shown here, as it is not possible to group them within Phases 1A–1C. The four main entranceways are indicated by arrows

already seen that many of the undiagnostic pits and postholes of Group 1 could well be the truncated remains of small filled pits. It is significant, therefore, that the plan of all Phase 1 features (Fig 102) shows an identical 'blank' or reserved area south and east of the gateway.

Fence line

It is suggested that the west side of this reserved area was marked by a fence, whose postholes are shown in Fig 103 by open symbols joined by a dashed line; the fence was aligned on the westerly timber slot (F360). It ran due south for some 40m, and its postholes were (from north to south) features F262, F256, F271, F258, F273, F275, F382, F383, and F364 (Fig 88). The small filled pit, F281 (which contained the best part of a possible later Bronze Age jar), had been placed directly on the fence line and most probably completely cut out an earlier posthole. The southern end of the fence was marked by two possible small filled pits, F366 and F478. It must be emphasised that the postholes of the fence line were insubstantial and were probably affected by later activity in Phases 1B, 4, and 5. The fence line could not be followed beyond features 364 and 366. It is, however, just possible that the fence line attributed to Phase 1C (see below) could in fact be the Phase 1A/1B southerly continuation of this fence line; however, the slight misalignment of the two sets of posts tends to argue in favour of the fence line being constructed in two phases (1A/1B and 1C).

The fence line was aligned on a large possible small filled pit (F624), about 20m to the south, which produced diagnostic sherds of Mildenhall pottery. This feature was a possible contender for a 'central marker' of the site. It would have appeared central on the ground (even though not completely central on the site plan).

Screens

The south-westerly edge of the reserved area south of the gateway was marked by a small, slightly curved, gully (F653) that was aligned on the southern end of

Fig 104 Deposit of bone at the bottom of the Phase 1A/1B pit complex, F505/563

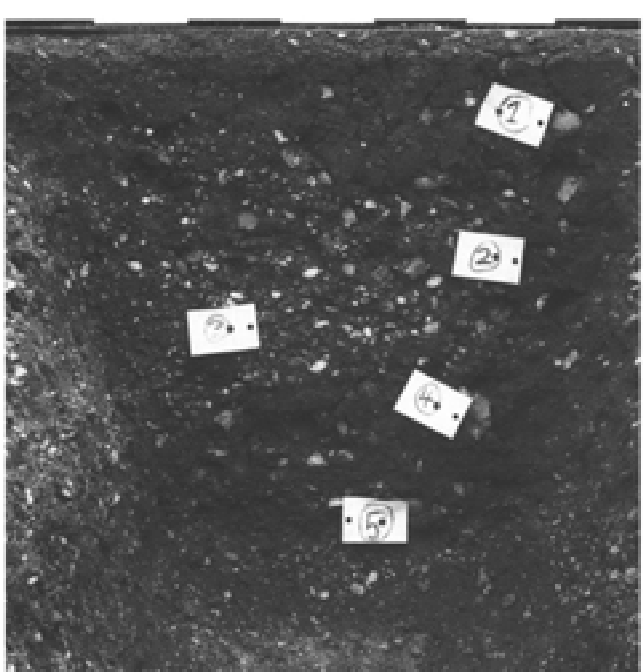


Fig 105 Transverse section through the western timber slot F360 of the gateway at causeway F. Scale with 0.10m divisions

the easterly gateway slot. This feature did not have clearly defined ends, and it probably originally extended further in either direction. Although shallow (150–200mm; see Fig 96), this gully could have provided the footings for a timber or wattle screen that would have concealed the small filled pits behind it from the gaze of people entering the enclosure. Similarly, the north–south fence line cannot be interpreted as a stock-proof or defensive fence/palisade. It was also far too slight, and again should best be seen as a screen that may have been erected and used just once.

Causeway M entrance

The easterly entrance causeway (M) was significantly wider (6m) than any of the others of the eastern arc. Unlike any of the other causeways of the eastern arc, there was a small reserved area on the interior of causeway M (Figs 90, 102). It may also perhaps be significant that at this point features began to be found outside the enclosure ditch (Fig 86); unfortunately, the change in quarry operations, mentioned above, meant that these features could not be excavated (there is little doubt, however, that they were Neolithic in date).

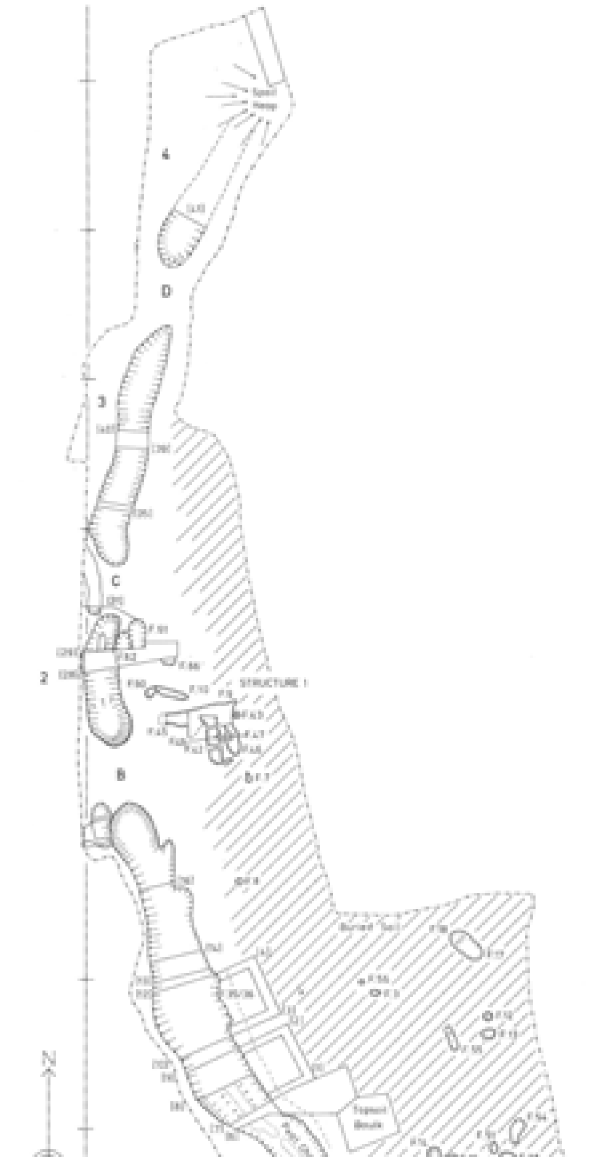


Fig 106 General plan of the excavations, 1982 and 1983 seasons. The features of Structure 1 are drawn as excavated (compare with Fig 87). Hatching indicates areas of buried soil

The magnetic susceptibility survey shows that the area within causeway M and the filling of ditch segments to the north of it had been subject to considerable heat (see Fig 79). The area on either side of the causeway contained many small filled pits. If causeway M served a specific purpose it would have been to provide access to the area of many small filled pits and high magnetic susceptibility.

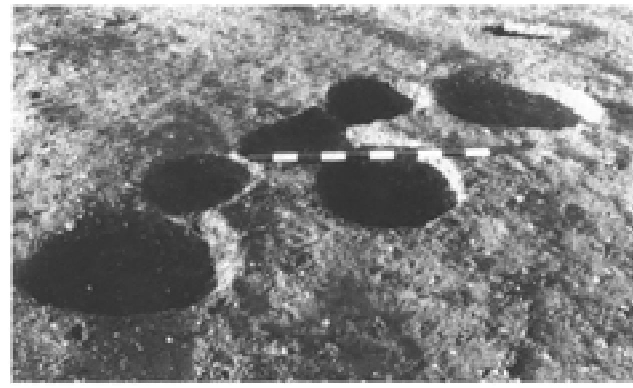


Fig 107 Group of six small filled pits located about 3m south-west of causeway F. Pit F227 is on the far left, in the foreground. 1m scale

Causeway B or C entrance

The westerly 'entrance causeway' was most probably between segments 1 and 2 (causeway B). Although not significantly wider, this causeway was marked by a possible 'guardhouse' (Structure 1 – Fig 87). However, Structure 1 is more likely to be of Phase 1C date (see below). The other contender for the western entrance causeway was C, immediately to the north; it was perhaps more directly opposite causeway M, but it was undoubtedly blocked by a smaller ditch, possibly an extension of segment 3 (see Chapter 2). The precise layout and phasing of this smaller ditch were hard to ascertain, as it lay in an area of thick alluvium and very close to the spoil heaps (which could not be moved as they were on the quarry boundary). The ditch is shown in plan on Figure 106; for a section through the ditch, see Figure 63, C. Ditch segment 2 was very short, and it is quite possible that the original entrance causeway lay between segments 1 and 3; if that were the case, it would have been some 15m wide.

Southerly entrance

The question of a southerly entrance causeway must await Chapter 16, but it should be noted here that there was a distinct cluster of small filled pits at the southernmost edge of the excavation, towards the eastern end of the narrow excavated strip (Fig 103).

Small filled pits

The small filled pits were a particularly important aspect of the site (Fig 103; Table 8). Although areas of the western and southern parts of the enclosure could not be excavated, small filled pits were found in most parts of the excavated area. There was, however, a cluster around the eastern segments (6–14) of the enclosure ditch. The absence of small filled pits immediately alongside enclosure ditch segment 5 should also be noted.

There were two areas where small filled pits clustered closely together. The first was immediately south-west of the main entranceway at causeway F.

Fig 108 Polished stone axe (Other 63) in situ *in pit F263, close to the edge and near the top of the pit filling. Calcined bone is visible between the axe and the section string. Scale with 0.10m divisions*

This group spread from the gateway and fanned out south-westwards; in all it covered a triangular area about 25 x 16 x 12m. In this area the small filled pits and possible small filled pits were densely grouped together, but none intercut; this must surely indicate that they were excavated and filled within a short period of time and that they bore a surface marker of some sort. Within this spread were two clusters: one group of six pits, comprising F227–231 and F570 (centred on grid 38467402), was particularly tightly arranged (Fig 107). Another concentration of five pits was located just to the north, between the large backfilled pit F505/563 (p 98) and the westerly gateway timber slot F360 (Figs 88, 103); small filled pits in this concentration included F263, F264, and F266–268. Other small pits nearby were also probably small filled pits, but they lacked the finds or were too slight to be more certain (for example, F259, F265, F631).

Feature 251 formed part of this northern group; initially it was thought to be a small filled pit, but excavation proved it to have been a posthole for a large squared post approximately 250mm thick (Fig 92 – the post 'ghost' is layer 1). This post stood close to small filled pits, but was not accompanied by any other posts. It could not therefore have formed part of a structure, but must surely be interpreted as a marker. The post was packed into the posthole with quantities of pottery and flint, highly reminiscent of other small filled pits. A complete greenstone axe (Fig 237) was found in F263, one of the tight group of five small filled pits. The complete axe, the large post, and the location close to the main entranceway suggest that this was a very important, as well as a prominent and visible, part of the site. The alterations to causeway F, and the construction, in two episodes, of the central partition fence line, also indicate that this area was seen to have had special significance.

The second group of small filled pits lay inside (and probably outside, too) causeway N. They effectively constricted the causeway. Eight are shown in Figure 103, but it was possible to excavate only F1015 and F1016 before quarrying began. This group was relatively isolated, and the surface evidence suggested that all the pits respected one another; again, this suggests deposition within a short period.

Less distinct patterning in the distribution of small filled pits can be seen in the vicinity of enclosure ditch segments 6–9. Firstly, enough of the exterior was excavated to be certain that small filled pits did not extend beyond the enclosure at this point. Second, there does seem to have been a tendency for small filled pits to group together behind the shorter ditch segments, as if the individual ditch segments were providing a focus for their deposition. In the case of longer ditch segments, small filled pits tended to cluster around butt ends (for example, segment 5 at causeway F and segment 14 at causeway N). It should be recalled that higher phosphate levels were noted around the butt ends of ditch segment 1.

Material found in the small filled pits reflects and complements that found in structured deposits within the enclosure ditch (Table 8). The site produced only one complete polished axe, from F263 (Fig 108), but many smashed fragments were found, often from small filled pits and possible small filled pits (see Fig 109). A fine quartzite axe polissoir was found (as with the complete axe) at the top of the filling of the small filled pit F786 (Fig 110). The careful placing of important items in the upper filling of pits and small filled pits indicates beyond all reasonable doubt that they were deliberately backfilled. The axes are discussed in Chapter 7.

Querns were treated in a similar way. Only one saddle quern was found intact (Other 93); it had been placed on edge within the small filled pit F711 (Figs 111, 112). Directly beneath it had been placed its rubber, with its grinding face on the pit bottom (Fig 113). The pit had been infilled with material that contained Mildenhall pottery, bone, and flint debris. The edge of the quern would have protruded above the Neolithic ground surface and would have provided quite a striking marker, especially when viewed from above in the manner of certain petroglyphs in the highland zone (Bradley *et al* 1995, fig 9). Another, even larger, but smashed saddle quern fragment was found in a larger, backfilled pit F713, just 3m north of F711. The distribution of querns shows a clear concentration within the eastern half of the enclosure (Fig 114).

Phase 1C

During Phase 1, enclosure ditch segment 5 became increasingly wet and an integral part of a migrating stream channel. This led to its probable abandonment

Table 8 Dimensions and finds of small filled pits (Phases 1–3)

					finds (–, absent; X, present)						
feature number	*grid reference*	*depth (m)*	*diam (m)*	*pottery type*	*pot*	*flint*	*other*	*bone*	*charcoal*	*burnt bone*	*finds' score*
8	37767318	0.07	0.50	–	–	–	–	X	X	X	3
228	38457401	0.25	0.75	M	X	X	–	X	–	–	3
229	38447401	0.12	0.48	–	X	X	–	X	–	–	3
230	38447402	0.16	0.46	–	X	X	–	X	–	–	3
231	38457403	0.11	0.80	–	X	X	–	X	–	–	3
232	38447305	0.17	–	–	X	X	–	X	–	–	3
233	38447405	0.19	0.51	M	X	X	–	X	X	–	4
236	38477304	0.25	0.79	FG	X	X	–	–	–	–	2
237	38497408	0.13	0.77	FG	X	X	–	X	–	–	3
238	38467409	0.17	0.47	FG	X	X	–	X	–	–	3
239	38487410	0.09	0.60	M	X	X	–	X	–	–	3
240	38447411	0.22	0.44	–	X	X	–	X	–	–	3
241	38457412	0.25	0.46	M	X	X	–	X	–	–	3
242	38487411	0.20	0.48	FG	X	X	–	X	–	–	3
243	38427312	0.18	0.38	–	X	–	–	–	–	–	1
244	38447413	0.23	0.45	–	X	X	–	X	–	–	3
245	38467314	0.12	0.36	–	–	X	–	–	–	–	1
246	38507314	0.15	0.31	LNEBA	X	X	–	–	–	–	2
263	38517417	0.16	0.51	–	X	X	X	X	–	–	4
264	38527318	0.19	0.62	–	X	–	–	X	–	–	2
266	38517318	0.20	0.55	–	X	X	X	X	–	–	4
267	38507318	0.19	0.42	–	X	X	–	X	–	–	3
268	38507318	0.15	0.58	–	X	–	–	–	–	–	1
281	38547391	0.18	0.34	Beaker	X	–	–	X	–	–	2
285	38227384	0.44	0.81	–	X	X	–	X	–	–	3
286	38187383	0.10	0.42	–	X	X	–	X	–	–	3
291	38377370	0.21	0.93	–	X	X	–	X	–	–	3
293	38277358	0.09	0.64	M	X	X	–	X	–	–	3
294	38317336	0.19	0.58	M	X	–	–	–	–	–	1
295	38317337	0.15	0.64	–	X	X	–	X	–	–	3
296	38287339	0.20	0.45	M	X	X	–	X	–	–	3
301	38227342	0.12	0.58	–	X	X	–	X	–	–	3
314	38177384	0.12	0.69	M	X	X	–	X	–	–	3
321	38277387	0.16	0.40	M	X	X	–	X	–	–	3
322	38227387	0.15	0.43	–	–	X	–	–	–	–	1
324	38207380	0.10	0.68	–	X	X	–	X	–	–	3
327	38287375	0.14	0.86	–	X	X	–	X	–	–	3
334	38277345	0.11	0.33	M	X	X	–	–	–	–	2
366	38547378	0.11	0.42	–	–	–	–	X	X	–	2
370	38647367	0.13	0.10	–	–	–	–	X	–	–	1
371	38667364	0.28	0.39	M	X	–	–	X	–	–	2
372	38677359	0.13	0.40	M	X	–	–	–	–	–	1
395	38347378	0.12	0.46	–	X	–	–	–	–	–	1
419	38587361	0.23	0.47	–	X	X	–	–	–	–	2
432	38327356	0.13	0.44	M	X	–	–	X	–	–	2
447	38437360	0.08	0.39	GW	X	–	–	X	–	–	2
478	38567379	0.12	0.80	M	X	X	–	X	–	–	3
503	38517420	0.10	0.35	–	X	X	–	X	–	–	3
507	38647363	0.39	0.74	M	X	X	–	X	–	–	3
570	38447402	0.08	0.47		X	X	–	X	–	–	3
624	38527363	0.32	1.81	M	X	X	–	X	–	–	3
654	38657408	0.10	0.70	M	X	X	–	–	X	–	3
660	38767390	–	destroyed	–	X	–	–	–	–	–	1
664	38757374	–	destroyed	–	–	X	–	–	–	–	1
673	38707369	0.28	0.52	–	–	–	–	–	–	–	0
679	38727374	0.28	0.48	–	X	–	–	–	–	–	1
690	38737409	0.16	0.74	–	X	X	–	–	X	–	3
695	38737320	0.18	0.53	–	X	X	–	–	–	–	2
698	38747426	0.50	1.85	M	X	X	–	–	X	–	3
730	38817393	0.12	0.41	–	X	X	–	–	X	–	3
734	38877403	0.23	0.45	M	X	X	–	–	X	–	3
736	38847405	0.14	0.54	–	X	X	–	–	X	–	3
739	38827408	0.21	0.41	–	X	–	–	–	X	–	2
744	38887414	0.16	0.50	–	X	–	–	–	X	–	2
745	38877415	0.07	0.67	–	–	–	–	–	X	–	1
746	38867417	0.12	0.55	M	X	X	–	–	X	–	3
747	38877418	0.13	1.10	FG	X	X	–	–	X	–	3
748	38837417	0.17	0.59	–	X	X	–	–	X	–	3

Table 8 ***continued***

					finds (–, absent; X, present)						
feature number	*grid reference*	*depth (m)*	*diam (m)*	*pottery type*	*pot*	*flint*	*other*	*bone*	*charcoal*	*burnt bone*	*finds' score*
749	38847418	0.12	0.75	M	X	X	–	–	X	–	3
761	38987359	0.22	0.59	M	X	X	–	–	–	–	2
763	38937363	0.10	0.41	M	X	X	–	–	–	–	2
780	38957384	0.08	0.39	–	X	X	–	–	–	–	2
786	38957388	0.08	0.41	–	–	–	–	–	–	–	0
791	38907400	0.11	0.52	–	X	X	–	–	X	–	3
792	38937403	0.08	0.41	M	X	X	–	–	X	–	3
795	38947406	0.12	0.81	M	X	X	–	–	X	–	3
796	38997308	0.20	0.84	GW	X	X	–	–	–	–	2
797	38977409	0.12	0.71	M	X	X	–	–	X	–	3
800	38967410	0.08	0.62	M	X	–	–	–	X	–	2
802	38987311	0.20	0.79	M	X	X	–	–	–	–	2
803	38957413	0.10	0.80	–	–	–	–	–	X	–	1
820	39027359	0.16	0.84	–	X	X	–	–	–	–	2
821	39027364	0.09	0.24	FG	X	X	–	–	–	–	2
832	39027381	0.17	0.42	–	–	X	–	–	–	–	1
836	39097385	0.14	0.77	–	–	X	–	–	–	–	1
842	39007396	0.21	0.53	–	X	X	–	–	X	–	3
843	39067395	0.10	0.88	–	–	X	–	–	X	–	2
844	39107400	0.25	0.79	–	X	X	–	–	X	–	3
848	39067304	0.45	0.68	FG	X	X	–	–	X	–	3
851	39097402	0.10	9.66	M	X	X	–	–	X	–	3
857	39117336	0.17	0.46	–	X	X	–	–	X	–	3
866	39157348	0.43	0.91	–	X	X	–	–	–	–	2
882	39187382	0.82	1.36	M	X	X	–	–	–	–	2
900	39147390	0.18	1.25	M	X	X	–	–	X	–	3
920	39207344	0.20	0.60	–	–	X	–	–	–	–	1
921	39217344	0.26	0.73	–	–	X	–	–	X	–	2
922	39257346	0.16	0.60	M	X	X	–	–	X	–	3
925	39257355	0.22	0.52	GW	X	X	–	–	X	–	3
926	39267358	0.25	0.70	GW	X	X	–	–	X	–	3
927	39227365	0.12	0.77	–	–	–	–	–	–	–	0
931	39247373	0.10	0.49	–	X	–	–	–	X	–	2
933	39277374	0.41	0.86	FG	X	X	–	–	–	–	2
934	39227380	0.13	0.56	–	X	X	–	–	–	–	2
941	39307347	0.15	0.44	–	X	X	–	–	X	–	3
942	39317347	0.20	0.68	M	X	X	–	–	X	–	3
944	39297363	0.21	0.29	M	X	X	–	–	X	–	3
945	39307365	0.10	0.69	M	X	X	–	–	X	–	3
960	39057361	0.17	0.94	–	X	X	–	–	–	–	2
975	39107341	0.95	0.66	FG	X	X	–	–	X	–	3
985	38097346	0.15	2.05	–	–	X	–	–	X	–	2
1015	39387333	0.20	0.46	–	X	X	–	–	–	–	2
1016	39397333	0.18	0.43	–	X	X	–	–	–	–	2
1021	38537327	0.15	0.60	–	X	X	–	–	–	–	2
1026	38657303	0.12	0.33	–	X	X	–	–	–	–	2
1027	38667304	0.07	0.32	–	–	X	–	–	–	–	1
1030	38487398	0.15	0.60	–	–		–	–	–	–	0
1032	38517301	0.75	1.00	PR	X	X	–	X	–	–	3
1036	38577304	0.21	0.35	–	X	X	–	–	–	–	2
1037	38467298	0.14	0.60	–	X	–	–	–	–	–	1
1039	38447295	0.12	0.44	–	X	–	–	–	–	–	1
1050	38167395	0.19	0.40	M	X	X	–	–	–	–	2
1055	39217334	0.45	0.90	M	X	X	–	–	–	–	2
1056	39207336	0.30	1.50	M	X	X	–	–	–	–	2

average depth	0.20 (standard deviation 0.13)
average diameter	0.62 (standard deviation 0.32)
total pot score	103
total flint score	97
total other score	2
total bone score	39
total charcoal score	40
total burnt bone score	2

key: FG, Fengate Ware, GW, Grooved Ware, M, Mildenhall pottery, PR, Peterborough Ware

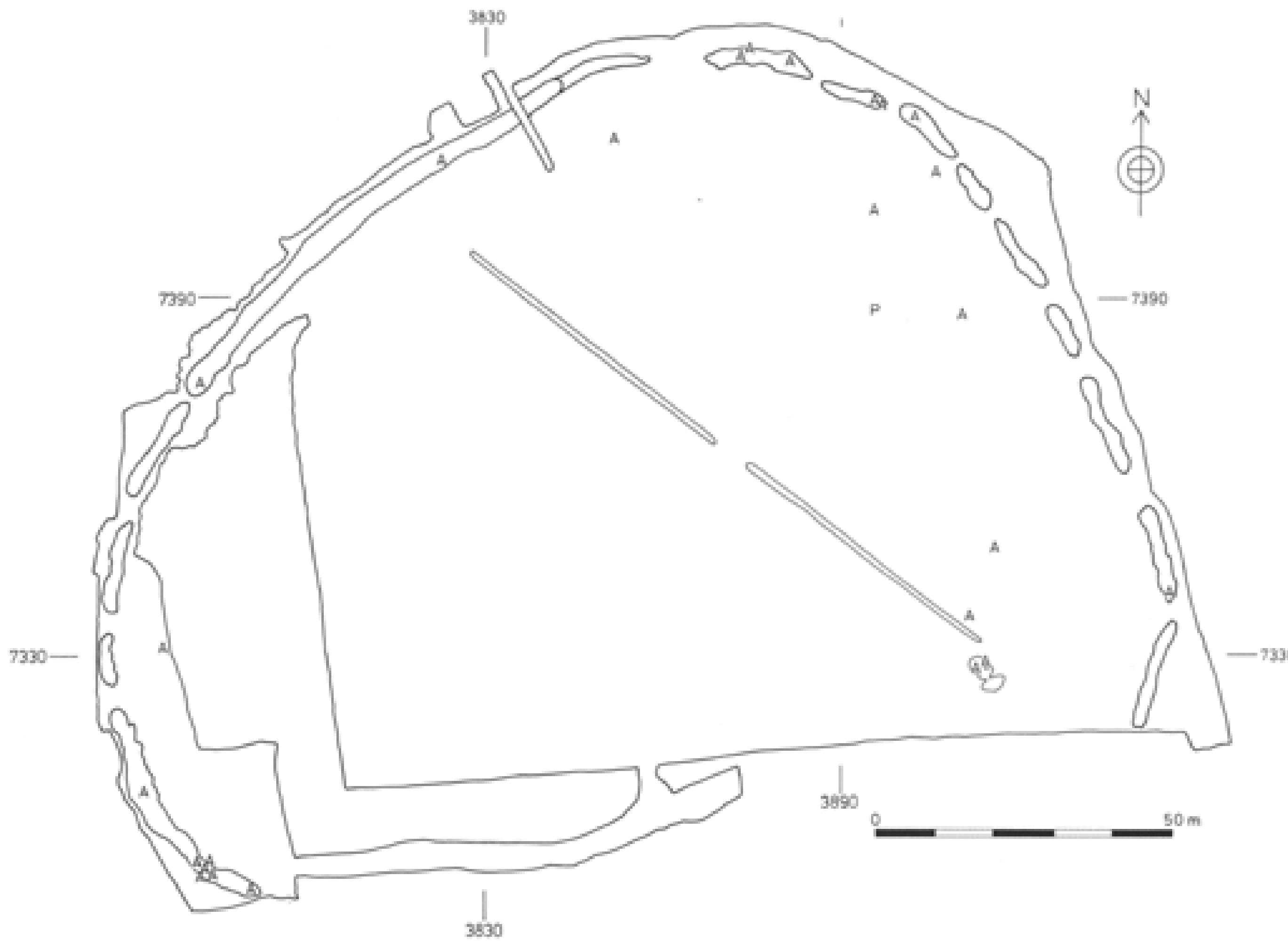


Fig 109 Distribution of polished stone implements and fragments (A) and a polissoir (P)

as a maintained feature, by, or during, Phase 1C (Fig 115). As conditions grew wetter it became necessary to modify entrance causeway F, first by a shallow extension of segment 5 eastwards, and second by the excavation of a V-shaped ditch, F313, on higher ground. This ditch cut off segment 5 and possibly segments 3 and 4 from the enclosure. Ditch F313 skirted around the western side of the small group of Phase 1A–1B small filled pits, which were situated west of the original gateway structure. The ditch did cut through the filled-in pit F505/563, of Phase 1A/1B. The butt end of ditch F313 was next to the extension of enclosure ditch segment 5, at what was now the west side of causeway F. The south-westerly termination of F313 could not be fixed with even slight precision. It was covered by large spoil heaps that were removed at short notice with bulldozers and towed box scrapers. These machines worked fast and took deep cuts at each pass. It was possible to follow F313 some 10m under the spoil heap, where it continued on its pre-existing alignment; further work, however, had to be abandoned for reasons of safety.

The V-shaped ditch, F313, in effect defined a linear enclosure marked by enclosure ditch segments 4 and 5, and possibly segment 3 as well, on its north and west sides. This enclosure could not have been entered via entrance causeway F; instead, access was probably from the south-west (Fig 115), in which case the Structure 1 guardhouse could have served as a means of controlling both the western entrance causeway B and the entrance to the long, thin enclosure. Structure 1 (Fig 116) can be tentatively dated to Phase 1 on ceramic grounds (Mildenhall pottery was found in gully F42). The structure cannot be attributed to a sub-phase of Phase 1 on artefactual or stratigraphic grounds; however, its possible relationship with ditch F313 suggests that it is of Phase 1C date. It was noted above (under post-excavation history) that it was possible to offer two interpretations: a minimalist view (Fig 87) and a fuller view (Fig 106). If the latter reading is accepted, then the postholes and shallow gullies that comprise the structure could form part of a small squareish building, measuring perhaps 4 × 5m.

Fig 110 Quartzite polissoir (Other 83) in situ *at the top of the exposed filling of pit F786*

Fig 112 A complete saddle quern (Other 94) on edge within the partially excavated pit F711; pit F710 is in the foreground. Scale with 0.10m divisions

A new ditch (F363) was started at the north-easterly butt end of ditch F313. It ran southwards for a distance of 50m, and its line was continued, further south, by a fence that ran for another 38m. Evidence for the fence consisted of very shallow postholes that were arranged in pairs (Fig 115); the place of one pair of posts was taken by a shallow gully, F420. The fence-posts (from north to south) consisted of features F408, F487, F422, F421, F457, F456, F453, F451, F489, F490, F491, F492, and F493. The paired arrangement of posts suggests that the fence consisted of panels anchored to the ground at each end; the presence of a

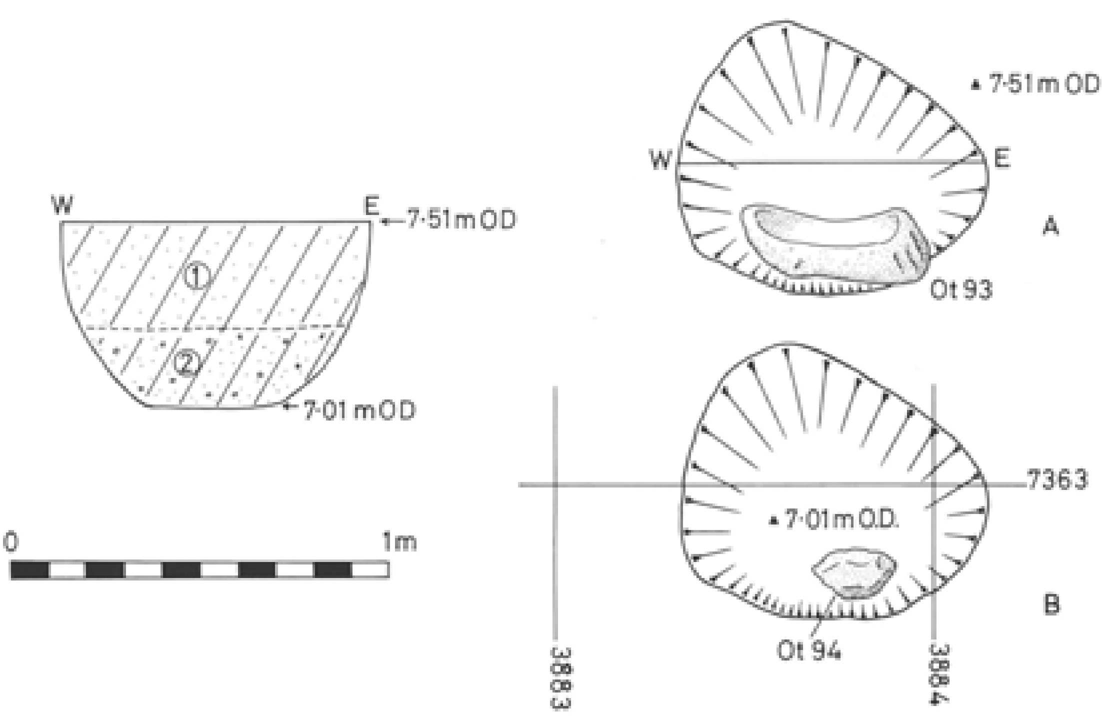


Fig 111 F711, a small filled pit containing a saddle quern (Other 93) (plan A) and a rubber (Other 94) (plan B)

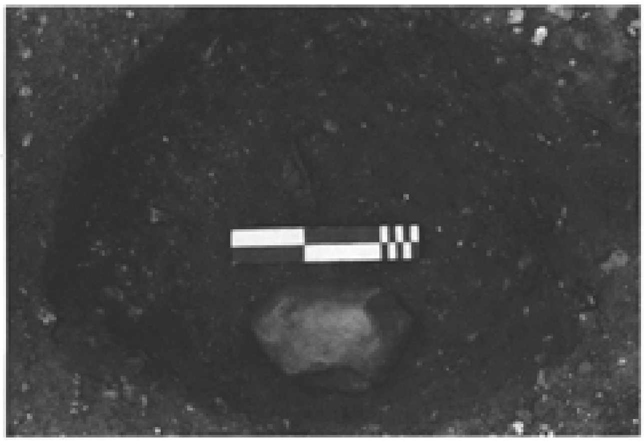


Fig 113 Pit F711 fully excavated with the rubber (Other 95) in situ *on the bottom, with its working face downwards. Scale 0.25m*

single post at either end of the fence line supports this suggestion. There was an entranceway between the north–south ditch and the fence line approximately 8m wide. A shallow scoop (F479) for a large hearth existed at the southern end of the ditch F363, on the north side of the entranceway. There was also evidence that the entranceway surface had been hollowed, possibly by trampling (F483).

The ditch and fence line continued the bipartite division of the enclosure, noted in the earlier phase, but on a very slightly different alignment; this was doubtless subsequent to, and caused by, the narrowing of causeway F. The fact that the V-shaped ditch F313 respected a group of small filled pits suggests that there was no appreciable lapse of time between Phases 1B and 1C. It also suggests that small filled pits continued to be dug and filled during the latter period.

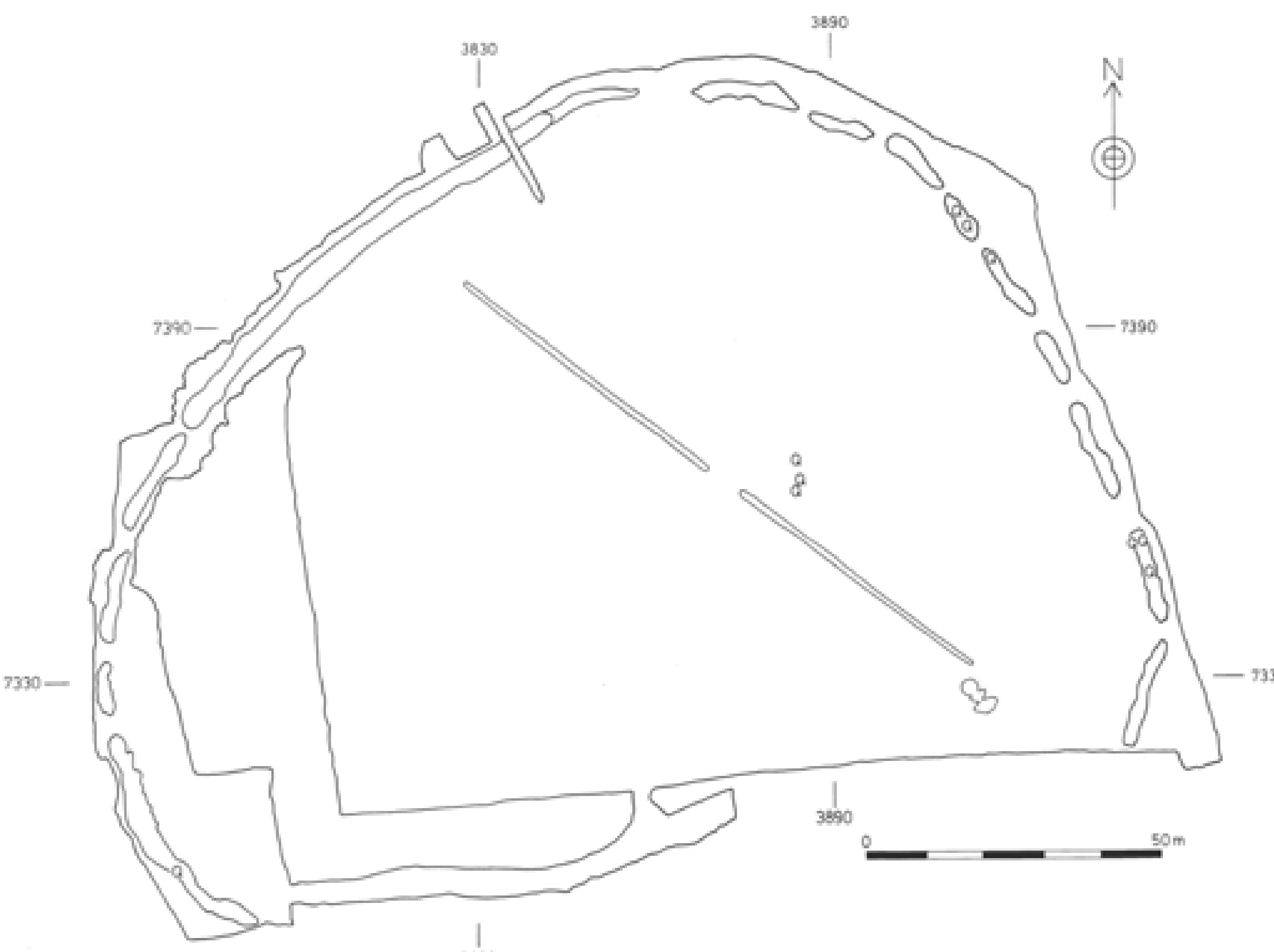


Fig 114 Distribution of querns and rubbers (Q)

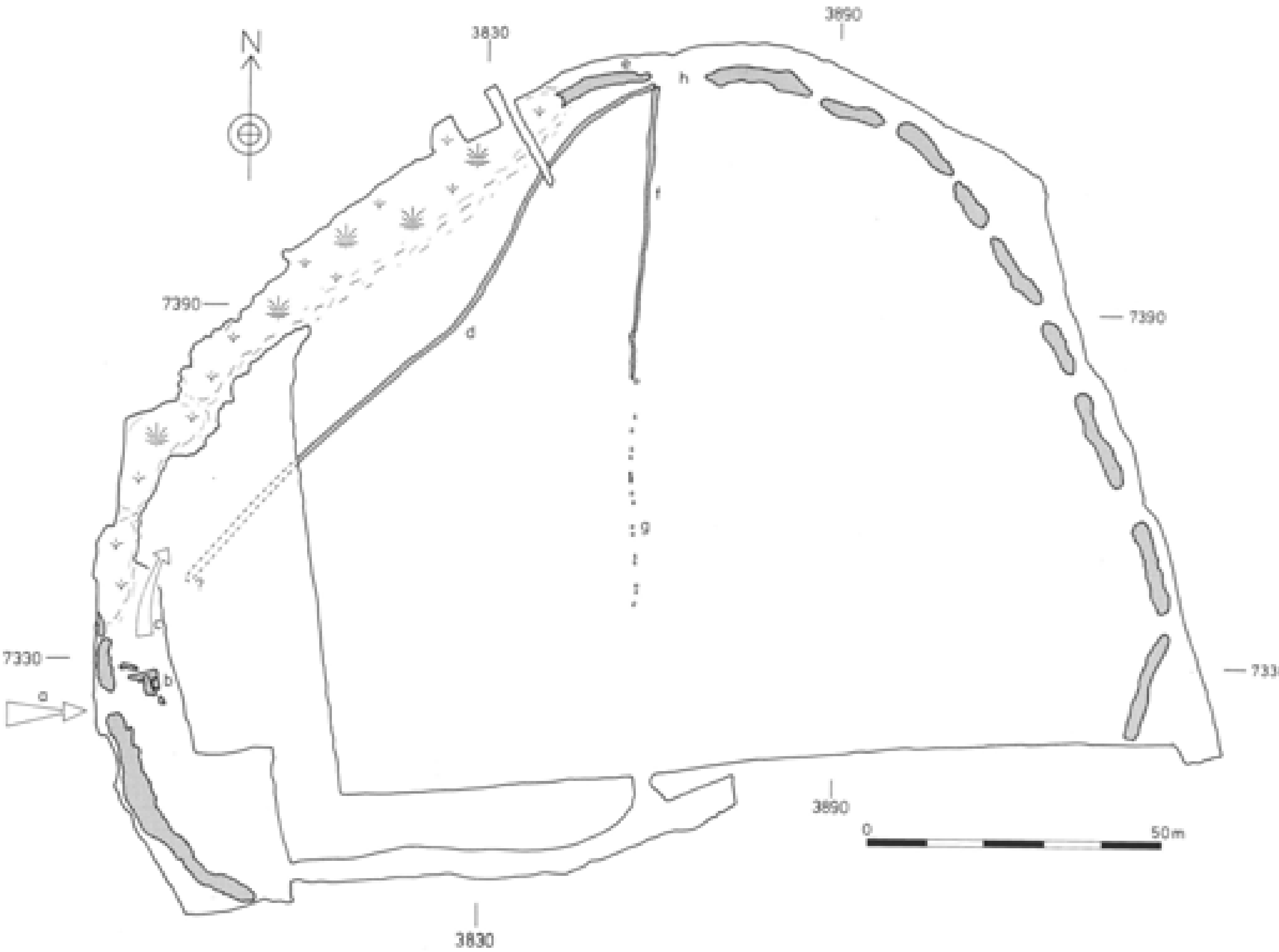


Fig 115 Plan of features of Phase 1C (see Fig 103 for small filled pits): a, possible western entranceway; b, Structure 1; c, entrance to long, thin enclosure; d, ditch F313; e, segment 5 extension; f, ditch F363; g, fence line; h, causeway F

Phase 2

A most striking decline occurred in the number of features between Phases 1 and 2 (Fig 117; Table 6). There was also evidence that the period of time between the two phases need not necessarily have been very long. Figures 87–90 should be consulted for the location of feature numbers; Appendix 1 gives grid references for each feature.

Earlier features

Group 1 features comprised four pits. Phase 2 also yielded five probable small filled pits (Tables 6, 9), all of which were found in areas where Phase 1 small filled pits were common, suggesting continuity of tradition. Apart from different pottery, the size of the pits and the nature of the material filling them were indistinguishable from Phase 1.

Fig 116 Pits and gullies of Structure 1, a possible guardhouse or entrance structure immediately east of causeway B. Looking east, with F42 and F49 in the foreground. Scales 1m long (0.5m divisions)

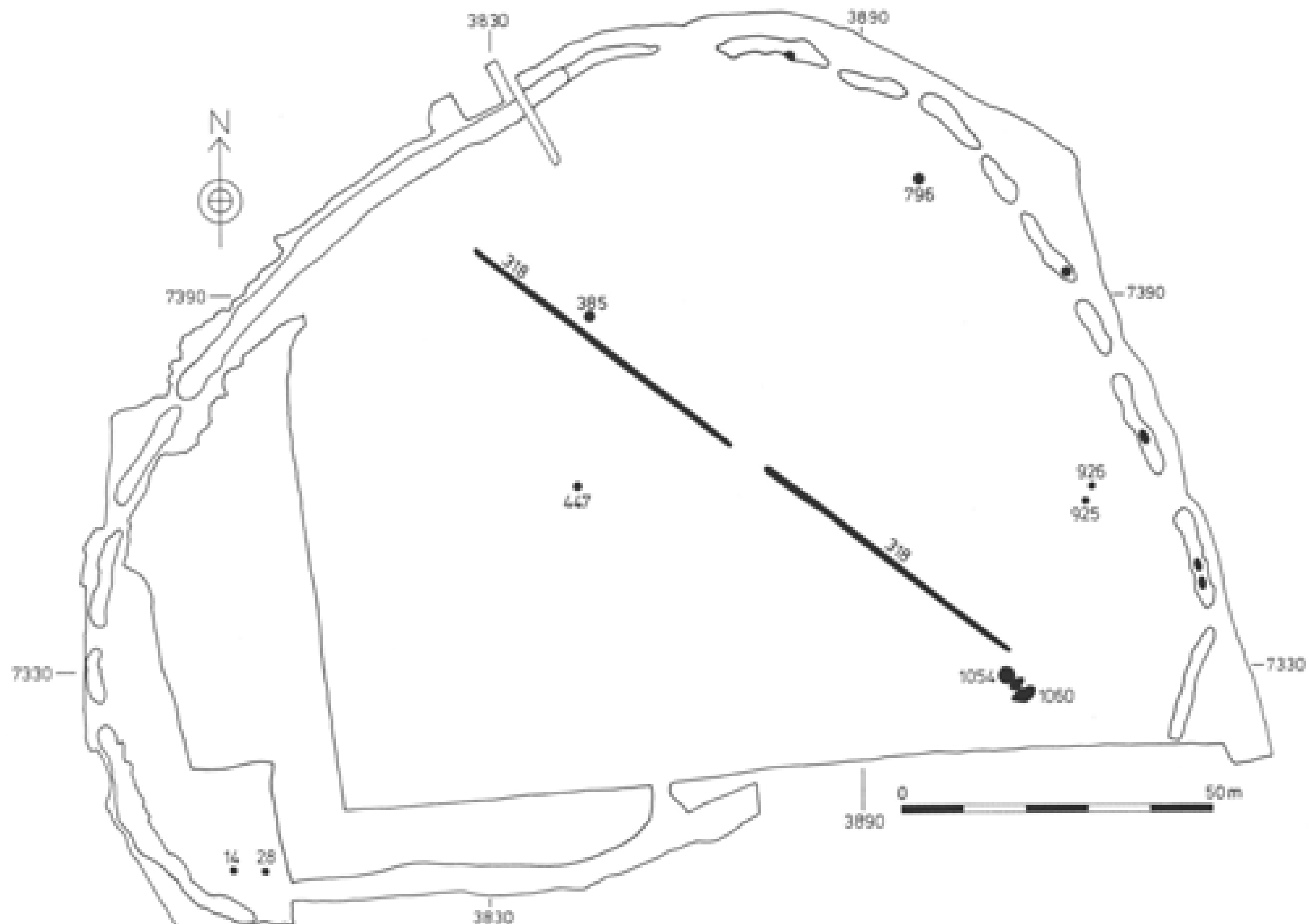


Fig 117 Plan of Phase 2 (features shown in black)

Later features

The principal later feature of Phase 2 was the cursus ditch, F318. It was originally thought that this ditch was an off-centre southerly extension of the Maxey cursus, but recent research has shown that it belonged to a separate, but associated monument, the Etton cursus. The northern ditch of the Etton cursus lies outside the causewayed enclosure (Fig 4). The southern ditch, F318, terminated at grid 38237398. Three metres south of this butt end the cursus ditch cut the Phase 1C V-shaped ditch, F313. It was also cut by the Phase 4 field boundary ditch, F317. The cursus ditch within the Etton causewayed enclosure was in two approximately equal straight lengths. The north-western part was 52m long, and the south-eastern was 50m long; the gap between the two was 6m wide. The Etton ditch was most unlike that excavated at Maxey (which was very shallow and wide), being narrow (0.90m), steep sided, and V-shaped (Fig 93).

The Maxey cursus ditch, approximately 150m to the south-west, produced Beaker pottery in lower secondary contexts (Pryor and French 1985, 299–304). Despite extensive excavation and a careful search, F318 yielded no datable material, but there are reasons to believe it to be somewhat earlier. The principal reason was the presence of two large backfilled pits,

Table 9 List of feature numbers, Phases 2–5, divided into groups

Phase 2	
group 1	F14, F28, F1054, F1060
group 2	F940
group 3	F385, F447, F796, F925, F926
group 4	F318
Phase 3	
group 1	F30, F261, F279, F767, F777, F833, F841
group 2	F270, F274, F276
group 3	F246, F690
group 4	F470
Phase 4	
group 1	F281
group 2	F224
group 3	–
group 4	F361, F699
Phase 5	
group 1	F500, F501, F502
group 2	–
group 3	–
group 4	F317, F469, F499, F545, F605, F648

key: group 1 = pits, postholes, stakeholes; group 2 = floors, scoops, soil, hearths, miscellaneous; group 3 = small filled pits and possible small filled pits; group 4 = linear feature

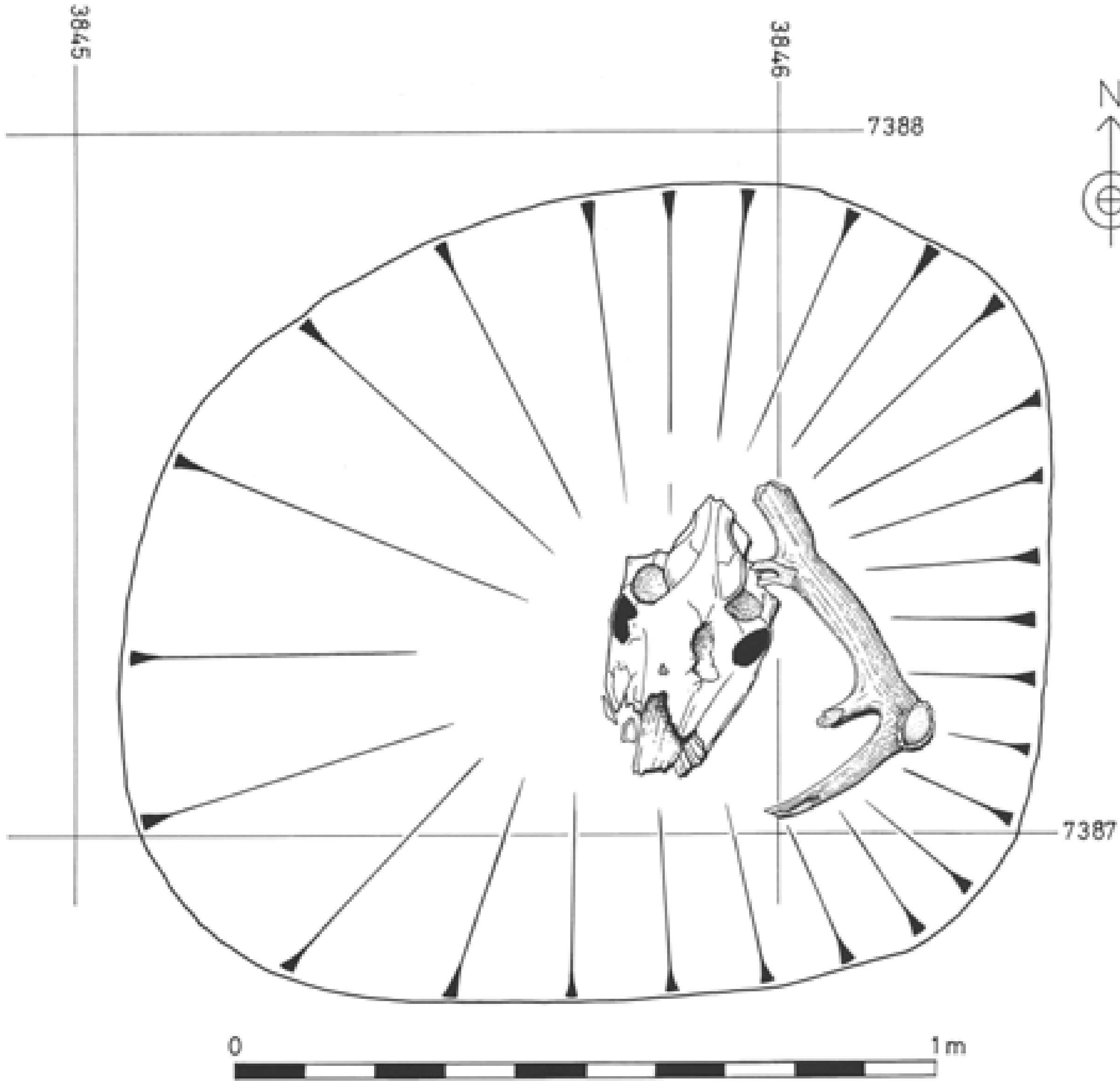


Fig 118 Position of a horse skull and red deer antler pick within pit F385

pits, F1054 and F1060, at its south-east butt end. F1054 produced fresh sherds of Grooved Ware, and F1060 was probably contemporary. They were excavated hurriedly, under salvage conditions, during the removal of the large southern spoil heap and the reduction of the original (pre-1982) field surface to the 'ballast level' required by the quarry. The pits were large and may themselves have served as quarries; they were filled with numerous layers of backfilled material (for F1054, see Fig 99), and under normal circumstances would have been excavated with some care. The alignment of the cursus ditch diagonally across the causewayed enclosure might suggest that the former was constructed long after the latter's complete abandonment. On the other hand, the cursus did terminate

Fig 119 A horse skull and red deer antler pick in pit F385

Fig 120 Pit F385 with an antler pick and a horse skull in situ*; beyond, the cursus ditch (F318) runs diagonally. 1m scale*

within the causewayed enclosure, and its southern ditch, F318, more or less bisected the enclosure and passed through the central gap in the Phase 1C north–south division (Fig 88). The cursus ditch had a gap near its centre that would allow access between the two areas it divided.

Feature F385 was a pit containing two finds: a horse skull and a red deer antler pick (Figs 118, 119). There was no artefactual dating evidence, and the feature was located just (but only just) outside an area of Phase 1 small filled pits. The presence of cursus ditch F318 about 1m to the south suggests that the two might possibly have been linked (Fig 120); the antler pick in the pit was roughly parallel to the cursus. The question of dating is further considered in Chapter 9 (pp 282–3).

Phase 3

Although numerically similar to the preceding phase (Tables 6, 9), the features of Phase 3 (Fig 121) mark a significant decline in the archaeologically visible 'use'

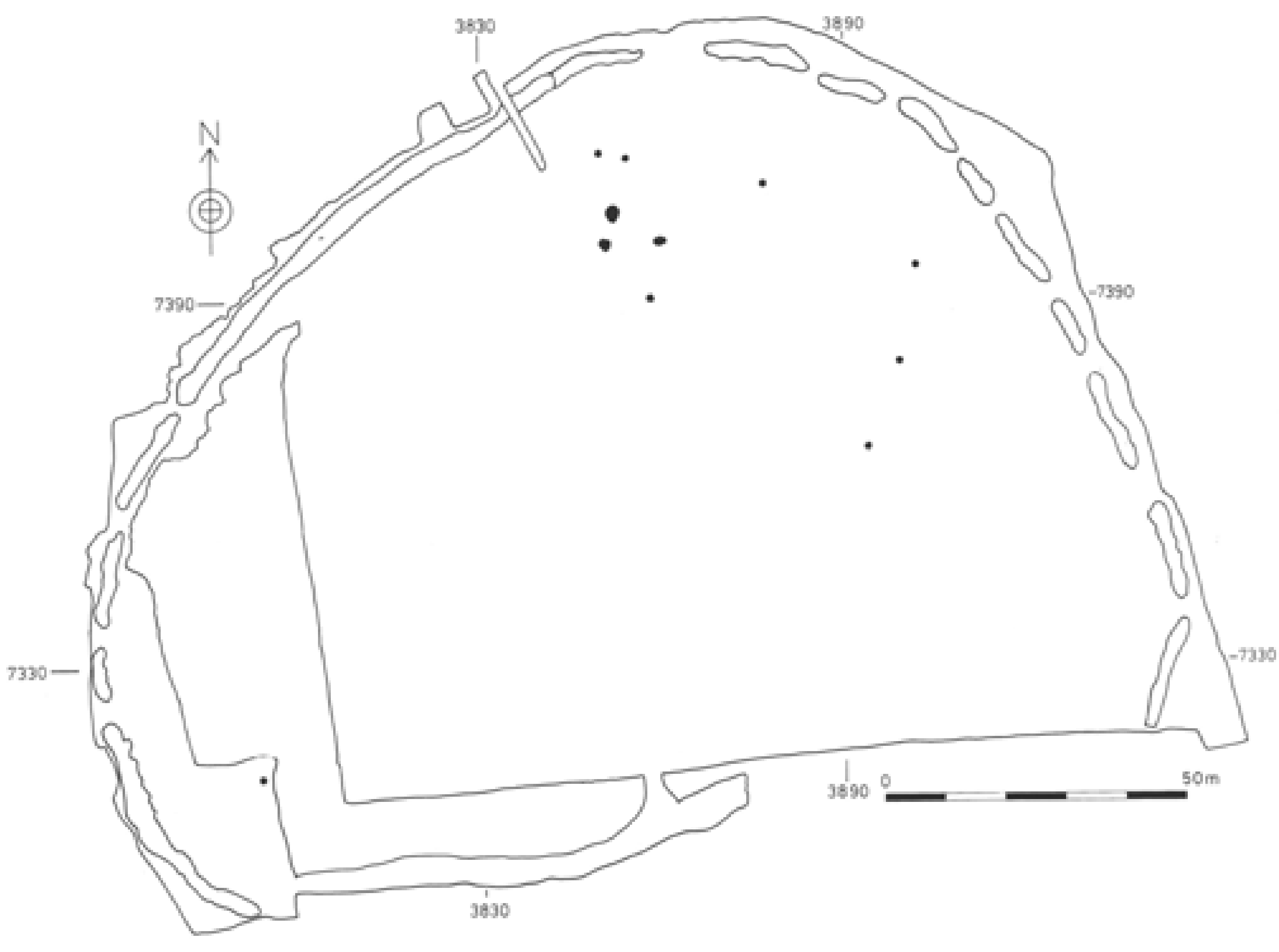


Fig 121 Plan of Phase 3 (features shown in black)

of the enclosure. Figures 86–90 should be consulted for the location of feature numbers; Appendix 1 gives grid references for each feature.

There were no linear features for this phase. The larger pits or scoops were grouped in the northern central part of the site and may possibly represent intermittent occupation. The two pits of Group 3 (Table 9) were only assigned to this phase on the basis of plain bodysherds: F246 was located at the centre of the Phase 1 northern spread of small filled pits (Fig 88); F690 lay on the south-west periphery of the group of small filled pits that clustered around ditch segment 7 (Fig 89). The pottery from the latter feature was better fired and more diagnostically Bronze Age than that from F246.

The remaining Phase 3 small pits of Group 1 all occurred in areas where Phase 1 small filled pits were frequently found. With one exception, their distribution was in the northern central and north-east parts of the enclosure. The exception was the small pit or posthole F30, which was located near segment 1; it contained fresh sherds of Beaker pottery.

It should be noted that the chronological separation of many of the smaller features of Phases 2 and 3 is probably doubtful. In particular, it is quite probable that the later elements of Phase 2 were contemporary with Phase 3. Whatever the true picture, there was a striking disparity in the number of features belonging to Groups 1 and 3 in Phase 1 and to Groups 1 and 3 in Phases 2 and 3 combined (Table 6). This clearly indicates that the tradition of digging and filling small filled pits at Etton only just outlived the Neolithic period.

Phases 4 and 5

Features of Phase 4 (Iron Age) and Phase 5 (Roman) are taken together as they clearly represented developments of what was essentially the same field system (Fig 122). Figures 86–90 should be consulted for the location of feature numbers; Appendix 1 gives grid references for each feature.

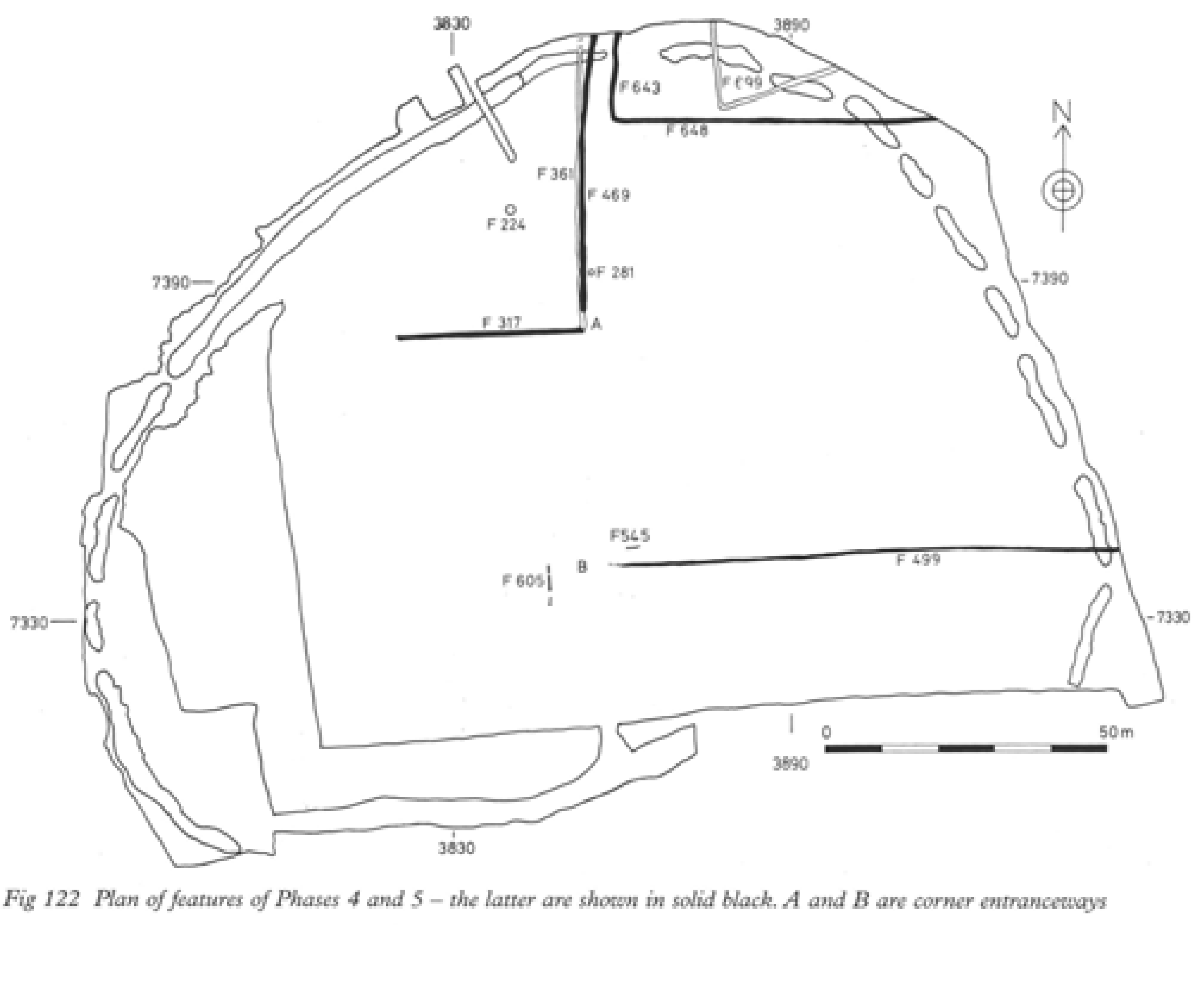


Fig 122 Plan of features of Phases 4 and 5 – the latter are shown in solid black. A and B are corner entranceways

One striking coincidence must first be mentioned, and that is the positioning of a Phase 5 droveway (formed by ditches F469 and F643) directly through the middle of the main northerly entrance causeway F (and its timber gateway) of Phase 1A/1B. This could indeed just be coincidence, or (perhaps more probably), it reflects that fact that the Neolithic entrance causeway made use of a naturally slightly higher piece of ground. Unfortunately it was very difficult to discern the underlying rise-and-fall of the land in this part of the site during the excavations, owing to the thick accumulations of alluvium.

Phase 4 (Iron Age) features included a small pit (F281), an unlined 'sock' well (F224, down to the top of the groundwater table), and two linear ditches of a wide north–south droveway (F361 and F699) (Tables 6, 9; Fig 123). These linear ditches were filled with stiff clay alluvium in their northern lengths and defined parts of a paddock/droveway system that was remodelled in Phase 5. The wide Iron Age north–south droveway in the north part of the excavated area was narrowed and redefined in Roman times by ditches F469 and F643. The more northerly elements of the fragmentary field or paddock system seem to have been used in both phases, whereas the southerly ditches and possible associated postholes came into use in Phase 5. The positioning of entranceways at the corners of fields and paddocks (see Fig 122, A, B) is commonly found in areas where livestock farming is practised. This arrangement takes advantage of the 'funnelling' effect of the sides of the field; animals tend to bunch and disperse if they are driven through a gateway positioned midway along the side of a field. A good local example of corner entranceways is provided by the ditches of Storey's Bar Road sub-site, Fengate (Pryor 1978, fig 6, features B21 and B38).

Fig 123 Excavation within the interior of the enclosure in 1985, looking south from causeway F. The linear ditch in the centre is F361 (Iron Age); F363 is the more sinuous, converging ditch to its left. The bank in the background is that of the Maxey Cut

In summary, the presence of a clearly defined droveway in Phase 5 and a probable precursor in Phase 4, together with an isolated well and two corner entranceways, all suggest that the fields or paddocks were used to contain and manage livestock.

4 Wood and bark from the enclosure ditch

by Maisie Taylor

Introduction

This chapter considers organic material, other than bone and antler, found within the waterlogged deposits of enclosure ditch segments 1–6, as well as a much-decayed plank from the Phase 2 pit in segment 12. The enclosure ditch was the only ancient feature of any significance that consistently penetrated below the water table. Ditch segments 1–5 (the western arc) produced quantities of wood and waterlogged material; a smaller amount was also recovered from segment 6 and from a large Phase 2 pit (F953) that had been cut into segment 6, between sections 172 and 176. A Phase 2 pit in segment 12 also produced the deteriorated remains of a probable oak plank below two aurochs skulls.

The first part of this chapter describes the history of the excavations, the development of field techniques, and our response to the crisis posed by rapid dewatering. The wood and bark report occupies most of the chapter, with an analysis of the evidence for woodworking and a consideration of wooden artefacts. The chapter concludes with a discussion of the wider significance of the entire assemblage.

Dating

Most of the material derives from contexts that can be dated with some assurance to Phase 1, and in the majority of instances to Phases 1A and 1B.

With the exception of the Phase 2 pits in segments 6 and 12, all the material from the enclosure ditch can be placed within Phase 1. The precise phasing of the wood deposits to the sub-phases of Phase 1 is addressed in the Discussion on p 157, but here it is sufficient to note that the lowest levels of ditch segments in the western arc (from where the vast majority of wood derived) belonged mostly to Phases 1A and 1B.

Definitions

The terminology used in this report follows Corkhill (1979) and The British Standards Institution (BS 565: 1972). Both these sources are, however, principally concerned with modern structural timber. It has therefore proved necessary to introduce a number of new terms to describe the wood encountered at Etton. Some fundamental terms may briefly be defined (after Corkhill 1979):

Bark: the outer covering of trees. It protects the cambium layer, the removal of which destroys the tree.

Cambium: the wood-forming layer immediately under the bark.

Coppice or *copse:* a plantation in which the trees are not allowed to grow to timber size. The trees are cut and allowed to stool.

Copsewood: branches cut from a coppice.

Crown: the top of a tree including branches and foliage.

Heartwood: the inner part of trees that does not normally contain living cells. Heartwood is usually harder, heavier, less permeable, and more durable than sapwood.

Pollarding: continuous lopping of the top, or poll, of a tree to encourage fresh growth.

Root: the part of the plant fixed in the earth and through which the sap is drawn from the soil.

Roundwood: in Corkhill's terminology this would be defined as 'small round timber'. This definition is not adequate for present purposes, and further qualifications are suggested on p 133.

Sapwood: the outer part of a tree trunk that contains the living cells in the growing tree.

Timber: wood suitable for building and structural purposes, whether as standing trees, logs, or converted. Small stuff is usually termed wood.

Trunk: the stem of a tree.

Wood: the lignified part of a tree within the cambium.

Woodchip: a fragment of wood, with or without bark, that has been detached by an axe blow.

The principal categories of wood found in the enclosure ditch at Etton are given in Table 10. Each will be discussed further in this chapter.

Aims of the report

The Etton assemblage is the only large collection of organic material yet to have been found at a British causewayed enclosure. It is also the only substantial British Neolithic wood assemblage that includes clear evidence for *in situ* woodworking (Earwood 1993, xviii). British studies of prehistoric woodworking have tended to address technology from an experimental, typological, or qualitative standpoint, and there is as yet no published corpus of metrical data that can be used for comparative purposes in studies of this sort.

Table 10 The wood assemblage from enclosure ditch segments 1–6

	numbers	percentage of category	percentage of total wood assemblage
naturally occurring wood			
roots	344	27.61	7.12
bark (unattached)	447	35.87	9.25
natural roundwood: untrimmed	423	33.95	8.75
natural roundwood: trimmed	32	2.57	0.66
total	1246	100.00	25.78
by-products			
woodchips	899	25.20	18.60
straight roundwood: untrimmed	1637	45.89	33.87
straight roundwood: trimmed	266	7.46	5.50
debris: roundwood	695	19.48	14.38
debris: trimmed	60	1.68	1.24
debris: split	5	0.14	0.10
debris: trimmed and split	3	0.08	0.06
timber debris: trimmed and split	2	0.06	0.04
total	3567	100.00	73.81
products			
timber	2	10.00	0.04
artefacts and fragments	18	90.00	0.37
total	20	100.00	0.41
overall total	4833	100.00	100.00

The quantitative approach adopted here owes much to the pioneering research of Grahame Clark who worked in a similar environment, but on a very different source material, namely flint (Clark 1933; Clark *et al* 1960). It has proved possible to adapt the measurement of wood to accord with many of the accepted routine statistical procedures of flintwork analysis.

Several additional categories of information have also been put forward. There are still no mutually agreed categories of information that ought always to be recovered from an ancient woodworking site, and it is hoped that this report will provide some provisional guidance in this regard. In particular it should be stressed that entire categories of data should not be disregarded out of hand, until clear reasons for so doing can be demonstrated. This report will show that many seemingly insignificant classes of information – such as roots or bark – have yielded unexpectedly important information.

Etton Woodgate

The principal aim of this report is to describe the distribution of wood at Etton and Etton Woodgate and to explain how and why that distribution occurred. In Chapter 16 the broader relationships of the activities observed in the western ditch segments will be discussed. For comparative purposes two smaller assemblages of wood are included here, from the approximately contemporary nearby site of Etton Woodgate. The Etton Woodgate site was located some 80m from Etton (Fig 4), on the north-west side of the stream channel that skirted the enclosure, on gently sloping land that formed the southern limit of Maxey 'island'. Etton Woodgate had two distinct phases. The first consisted of a substantial earlier Neolithic ditch that ran along the stream channel edge; behind the ditch were a number of small pits and postholes containing numerous blade-based flints, plain bowl pottery, fired clay, and burnt stones. One of the pits contained a crouched burial. These features were grouped close to the only break in the ditch; it was presumably an entranceway that faced the causewayed enclosure across the stream channel. The second phase of activity included a large Beaker period pit/water-hole, filled with much charcoal, wood, and other cultural material. The upper filling of the pit was 'sealed' by a crouched burial. The ground around the Beaker pit was spread with pottery, flint debris, burnt stones, fired clay, and very large quantities of ash and charcoal.

Subdivision of the enclosure ditch

During the post-excvation analysis of the wood it became clear that the scale of possible patterning required that the longer ditch segments be subdivided. Because unexcavated baulks had been left, the subdivisions were partly dictated by their presence. Another constraint was the depth of waterlogged deposits encountered. It was therefore decided to divide the longer ditch segments into approximately equal-sized lengths for the purpose of the analyses that follow. This sub-sampling procedure was also based on field observation and on non-wood phenomena, such as recuts. As a sub-sampling scheme, it cannot therefore pretend to be statistically random or unbiased. As a general sampling scheme using individual ditch segments, it could possibly reflect some of the cultural preferences that lay behind the selection of particular segments.

Ditch segment 1 was divided into two lengths: segment 1A (from causeway A to section 8) and segment 1B (section 8 to causeway B); segment 2 was not subdivided; segment 3 was divided into two lengths: 3A (from causeway C to section 39) and 3B (from section 39 to causeway D); segment 4 was in two lengths: 4A (from causeway D to section 41) and 4B (from section 98 to causeway E); segment 5 was in three parts: 5A (from causeway E to section 79), 5B (from section 79 to section 118), and 5C (from section 118 to causeway F).

Techniques of excavation and recording

The site was excavated under rescue conditions, and the excavation techniques were developed accordingly. The first season (1982) was very difficult to organise, as the nature and potential of the deposit had yet to be determined. Once that initial season was over, an assessment could be made and a method of excavation and recording devised. The need for speed had to be balanced against the need to obtain maximum levels of information from the material. For this reason, the archaeologist supervising the excavation of the ditch deposits was also the wood specialist. Decisions about sampling and conservation, together with concise records of the wood, were made while it was still in the ground; these could be adjusted, if necessary, upon lifting.

Alluvium

The highest 'clean' alluvium was removed by machine, which stopped when the first indications of the ditch tertiary levels were detected. The clay, sand, and gravel filling of the upper levels of the ditch segments of the western arc was removed rapidly by hand, with finds recorded by 1m square and by depth (see also Chapter 2, p 21). This material was heavy, sticky, and very difficult to remove. It also included occasional finds of pottery, flint, and bone. The presence of a thin layer of decayed organic material indicated when excavators were nearing the top of the primary, waterlogged, fill, and the method of excavation would then be changed.

Shelters

Before excavation of waterlogged layers could begin, it was necessary to construct shelters to shade the delicate waterlogged wood and to protect it from drying winds. A relatively inexpensive tent-like A-frame of scaffold poles was settled upon; lightweight tarpaulins were then lashed to it (see, for example, Fig 124). Each A-frame was heavy enough to be stable in high winds, but was light enough to be moved by four to six people.

Tools

The best tool for the removal of the matrix from the waterlogged wood was generally considered to be a wooden spatula or flat wooden lolly stick. In some parts of the deposit the matrix had a very high clay content; when this was the case, the best tool was generally a small trowel or plasterer's leaf – wooden implements soon became soft and would break. Metal tools had to be used with great care and sensitivity if the waterlogged wood was not to be damaged. The wooden spatulas were also harder than the ancient wood and could do considerable damage if carelessly handled. Even in the first two seasons the wood, although very well preserved, was always very soft indeed. It was often difficult to avoid a certain amount of damage when the wood was lifted, as it was generally much softer than the matrix in which it lay. Partly because of this, it was decided to do as much of the recording as possible while the wood was still in the ground.

Finds numbers

A length of the ditch would be taken down to a 'natural' layer of wood. These natural layers defined themselves, and it was very unusual to have to saw through a piece of wood that sloped from one layer to the next layer below. The deepest waterlogged deposits in the western arc of the ditch would be excavated in four or five 'natural' layers, each one representing the removal of approximately 100mm of wood and matrix. Very few waterlogged deposits were thicker than 500mm – the average was *c* 200–300mm.

All the wood was left *in situ*, but the matrix was removed as far as possible to leave the wood sitting slightly 'proud'. It was, however, necessary to avoid 'pedestalling', as this would lead to rapid drying out. When the whole length was exposed, all finds would be numbered. Finds numbers were allocated from computer-generated lists for each class of object, such as wood, pottery, and bone. The wood numbers, embossed onto plastic Dymo tape, were pinned to the individual pieces using stainless steel pins (as in Fig 135).

Recording

Once the numbering was complete, the length of the ditch was photographed and planned at 1:10, using a very lightweight planning frame. The purpose of the plans was to record the relative position of the pieces of wood to each other, to other classes of artefact, and to the edges of the ditch. They were not intended as a record of dimensions or of the appearance of the wood.

Fig 124 Shelters of scaffold poles and tarpaulins being used in the excavation of enclosure ditch segment 1 in 1982. Looking north-east

Keeping the wood moist

Once the wood had been exposed, it required constant protection from drying out while the rest of the deposit was being excavated. The excavators would make sure that any exposed areas were protected from sun and wind. The wood was also sprayed from time to time with a fine mist of water from a garden sprayer. If exposed wood was left unattended for more than half an hour, the entire exposure would be covered.

Experience showed that because of its extreme fragility, only a limited number of materials could be allowed to come into immediate contact with the wood. Plastic sheeting caused condensation that puddled within the matrix and weakened it; despite this condensation, the wood itself did not seem to keep particularly damp. A layer of dampened newspaper was found to provide the best protection directly next to the wood. Sheets of synthetic 'foam rubber' were laid on the newspaper and were thoroughly sprinkled with water. The whole deposit was then covered with a layer of plastic sheeting that was carefully weighed down at the edges, to prevent it being lifted by the wind. Beneath an A-frame shelter, this arrangement would keep the wood moist for at least 24 hours, depending on the temperature.

Lifting and recording

As the wood was lifted, provenance data were added to the pre-printed number lists, which were the primary location record. Each excavation team (usually two to three people) also maintained a notebook where additional observations were recorded. Lists of basic dimensions of the wood were recorded as the lifting continued. This was particularly important for lengths of roundwood. It was not normally possible to lift long, slender stems without them breaking under their own weight. The only reliable length, therefore, was the one taken while the wood was still in the ground. Decisions about whether to conserve were made in the field in order to cut down, as far as possible, the expense of unnecessary storage. Material for conservation was packed as wet as possible and sent direct to The British Museum for freeze drying.

At the time of lifting, or as soon as possible thereafter, a separate data sheet would be completed for each piece of wood. These pre-printed sheets formed the basis for the computer record. They contained such details as provenance, a descriptive classification of the piece (roundwood, artefact, and so on), evidence for coppicing, toolmarks, condition of the wood, woodworking, charring, dimensions, and associations.

The information was recorded on the pre-printed sheets and later transferred onto a computer.

Preservation of the waterlogged material

Some 5200 pieces of individually numbered wood were excavated between 1982 and 1987; of these, about 4000 were excavated in the first three seasons, 1982–4. It was during the third season (1984) that the early signs of damage from dewatering were first noticed (Fig 125). By 1986 the quality of preservation had drastically deteriorated, but the main waterlogged deposits of enclosure ditch segments 1–5 had been almost completely excavated by then (French and Taylor 1985). The 1986 season yielded only 400 pieces of wood.

The wood at Etton was very degraded. Most of the material excavated in the first three years contained about 70% water by weight. The percentage was lower in the later years of the excavation, because the wood had begun to dry out after the turning on of the quarry pumps in June 1983 (ibid, fig 4).

If the effects on the wood of the dewatering of the surrounding area were serious, archaeological excavation posed an even more violent disruption of that equilibrium. Such very late post-depositional effects should never be underestimated. If the wood was allowed to start drying out during excavation, experience showed that it would distort out of all recognition in a very short time.

During an extended period of waterlogging, the cell walls of the wood slowly dissolve, leaving the wood with very little strength. Even a small piece of wood from Etton was not capable of supporting its own weight. Once exposed, if not kept wet and shaded from sun and wind, it would rapidly crack and distort as it dried. These effects are irreversible, and most significant archaeological data are rapidly lost with the surface of the wood.

Fig 125 The immediate effects of dewatering on wood preservation (1984 season); the wood debris in situ *(above) shows no cracking, but when lifted (below) its underside is shown to be deeply fissured*

Wood species

The degraded structure of the wood resulted in some problems in taking sections for species identification. When samples were initially taken from wood that was still fully waterlogged, the main difficulty was to cut the thin sections for the microscope slide. The normal method of identifying wood to species is by taking thin sections in three different planes for examination under a microscope (Wilson and White 1986, 9–23, 251–64). Where the sample is composed of 70% water, it is almost impossible to cut clean, thin, sections. With less degraded wood it may help to dry the piece a little, making it easier to cut without tearing. With wood as degraded as the Etton material, lowering the water content leads to deterioration and distortion faster than the wood can be sectioned. It was often possible, however, to get reasonable sections if the wood was frozen first and the sections cut from the frozen surface. Wood which had been frozen showed considerable signs of stress and was even softer when it was thawed – this was inevitable with such a weak structure engorged with so high a proportion of water. For this reason separate samples were always taken for freezing.

The problems in the identification of species became much worse as the deposits began to dry out significantly from 1984 onwards. When this drier wood was sectioned for species identification, microscopic features were distorted and the cell structure was beginning to collapse, indicating that the damage was occurring at the cellular level. The fragility of the material meant that it was vulnerable to further deterioration or physical damage in storage. It was decided to freeze dry a proportion of the samples so that their survival was more or less guaranteed. Extra samples were freeze dried for experiments into the most satisfactory way of 'reversing' the process.

Table 11 Wood species identifications

species	*number of samples*
alder (*Alnus glutinosa*)	38
hazel (*Corylus avellana*)	11
oak (*Quercus* sp)	23
birch (*Betula* sp)	13
willow/poplar (*Populus* sp/*Salix* sp)	11
field maple (*Acer campestre*)	8
ash (*Fraxinus excelsior*)	4
Pomoideae	1
purging buckthorn (*Rhamnus catharticus*)	1
bird cherry (*Prunus avium*)	10
Rosaceae	1
spindle bush (*Euonymus europaeus*)	1
total	122

It is almost impossible to cut freeze-dried material for thin sections, as the wood becomes soft, brittle, and congested with the polyethylene glycol of the pre-treatment. A simple method of preparing the freeze-dried samples for thin sectioning was evolved, however. The sample would be soaked in water for 24 hours, allowed to drain slightly, and then placed in the freezer for several hours, or preferably overnight. It would then be ready for thin sectioning in a manner similar to that used on normal frozen waterlogged samples. The main difference between the two types of samples was that the previously freeze-dried material tended to thaw more quickly. Samples had to be kept in the freezer until the last minute and were then sectioned quickly. If the sections were not successfully cut, another attempt could not be made until the sample was fully frozen again. This obviously meant that the freeze-dried material was not as simple to work with as the normal waterlogged samples, but in a season such as 1983, when over 2000 samples were taken, there was a serious, and expensive, problem in the storage and monitoring of this very delicate material. Where possible, freeze-dried samples were always sub-sampled before soaking and freezing, leaving the remainder available for further work if it should become necessary.

The problems of sampling, storing, sectioning, and identifying this highly degraded wood meant that the process became very expensive (of time and money). Ultimately far fewer identifications were completed than would have been ideal. The freeze-dried archive (housed at The British Museum) is, however, very stable.

It was not possible, given constraints of time and resources, to carry out an exhaustive programme of wood species identifications. As discussed above, much of the material was also degraded and difficult to identify with any certainty. Approximately 300 identifications were attempted from Phase 1 contexts in segments 1–5, and positive results were achieved in 122 cases (Table 11). This is a small sample, but surprisingly diverse. Most of the species either favour or will tolerate wet ground conditions. The alder samples were from straight roundwood, often with evidence for chopping/coppicing. All identifications were of immature wood, including the oak. The bird cherry identifications were from different-sized pieces of wood (that is, not twigs off the same branch) found within a concentration of wood and bone at the butt end of ditch segment 5, at causeway F. The occurrence of bird cherry in this, the wettest part of the site, is unusual.

Origins and deposition

The wood found in waterlogged deposits of the enclosure ditch was mainly confined to the five segments of the western arc (1–5); a relatively small amount was also found in segment 6, both in the Phase 2 pit F953 (between sections 176 and 172) and in Phase 1B contexts in areas of the ditch that had been flooded by encroachment of the nearby stream channel (Fig 26).

The distribution of the wood was generally quite regular, without obvious concentrations – piles or heaps. In this respect it contrasted with the distribution of animal bone, which was often characterised by partial skeletons of pig or sheep (Chapter 9). The evenness of the wood distribution might in part be accounted for by post-depositional factors, of which water movement is the most obvious. Water movement may account for the lower frequency of wood in segment 5 between, approximately, sections 74 and 106 – an area known to have been subject to flooding from the stream channel to the north-west. Some pieces were undoubtledy unaffected by such factors (for example, the birch bark sheet in segment 2). It would seem improbable that wood was moved over long distances – for example, from one segment to another. Segments 5 and possibly 6 aside, water movement was probably confined to a seasonal rise and fall of the groundwater table; in Neolithic times there would have been little sideways flow within the other ditch segments.

With two significant exceptions, wood or wood products were not used in the arrangement of structured deposits. The exceptions were a birch bark mat beneath the complete bowl in segment 1 at causeway A and a complete, unused, sheet of birch bark and a piece of flax twine in segment 2. The distribution of wood coppice stools, roots, and woodworking debris suggests that the vast majority of the wood recovered during the excavations derived from activities that were actually carried out in the enclosure ditch or its immediate vicinity.

Wood and bark are resilient materials that do not shatter on impact. Post-depositional damage – when for example the wood had become fully waterlogged and had lost its elasticity – is easily recognised and was absent at Etton. Consequently the wood pieces and fragments revealed in the excavations can be taken to represent what was deposited in antiquity. In other words, the fragment, chip, or piece of wood was a meaningful entity in its own right, and there was no

Fig 126 Butt-end deposit of wood, in particular 'matted' roundwood, in enclosure ditch segment 1, layer 4. Looking north towards causeway B from section 16. 1m scales (with 0.10m divisions)

Fig 127 Deposit of wood, pottery, and bone in enclosure ditch segment 1, layers 2 and 3, between sections 13 and 14. 1m scale (with 0.5m divisions)

necessity to provide other, more reliable, quantitative measures, such as volume. Weight, of course, is entirely dependent on water retention, which will vary according to factors such as species, type of wood, and ground conditions.

The nature of the wood deposits

The wood deposits in the various ditch segments were by no means homogeneous. In some cases there was considerable variation along individual segments, such as the longer segments 1 and 5.

Segment 1

Segment 1 was especially heterogeneous, and this may in part have been caused by recutting. A few selected illustrations will be used to highlight the variation encountered. The deposits are best described in reverse order, working south from causeway B. The butt end at causeway B contained a large quantity of 'matted' roundwood (Fig 126). The central part of the ditch segment showed a gradual change: between sections 13 and 14 the roundwood still predominated, but was less dense than at the butt (Fig 127). By sections 10–12 the roundwood was less dense, but in longer pieces; there were also more woodchips, and pottery was encountered in some quantity (Figs 128, 129). At a lower level in this part of ditch segment 1, the roundwood was generally smaller and the debris much larger (Fig 130). By sections 7–8 the wood deposit had begun to thin out (Figs 131, 132), and as causeway A was approached the scatter of wood was very much slighter (as in Figs 159 and 160).

Segment 2

Segment 2 was smaller than the rest and may even have been cut somewhat later. At causeway B the ditch was deep and wide and probably extended well below the groundwater table. The highest waterlogged deposits of this enlargement contained very little material, despite favourable conditions of preservation (Fig 133). A sharp change occurred in the matrix towards the butt end – the junction is indicated by a dashed line in Figure 133. To the south was much sand, probably from the sandy ditch sides; very little wood was present in this deposit, which may have been deliberately kept clear of obstructions. At the bottom of the deepened area was a sheet of birch bark (see Fig 172).

Fig 128 Deposit of wood, pottery, and animal bone within layer 3 of enclosure ditch segment 1 (Phase 1B), between sections 10 and 12, viewed from the interior of the enclosure. 1m scale

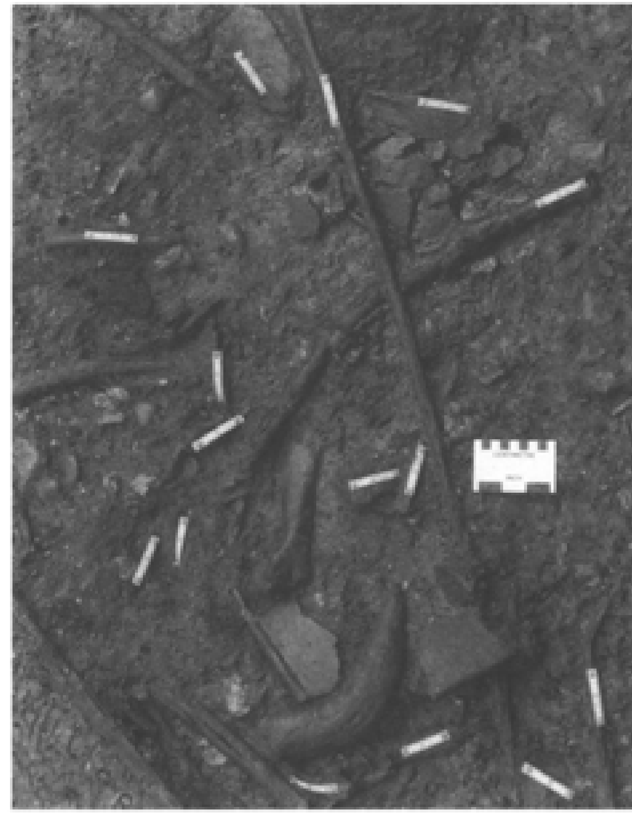


Fig 129 The deposit of wood, pottery, and animal bone shown in Fig 128, lower right; this deposit was found near the eastern (interior) side of ditch segment 1, between sections 10 and 12. Scale in 10mm divisions and in inches

Fig 130 Roundwood and wood debris within layer 4 of ditch segment 1 (Phase 1B), between sections 10 and 13. Bone is largely present in the background. Butt ends of two recuts are visible. 1m scales

Fig 131 Distribution of wood in enclosure ditch segment 1, layer 4, looking south-east from section 8 to section 7. See the opposite view in Figure 132. 1m scales (with 0.5m divisions)

Fig 132 Distribution of wood in enclosure ditch segment 1, layer 4, looking north-west from section 7 to section 8. See the opposite view in Figure 131. 1m scale (with 0.5m divisions)

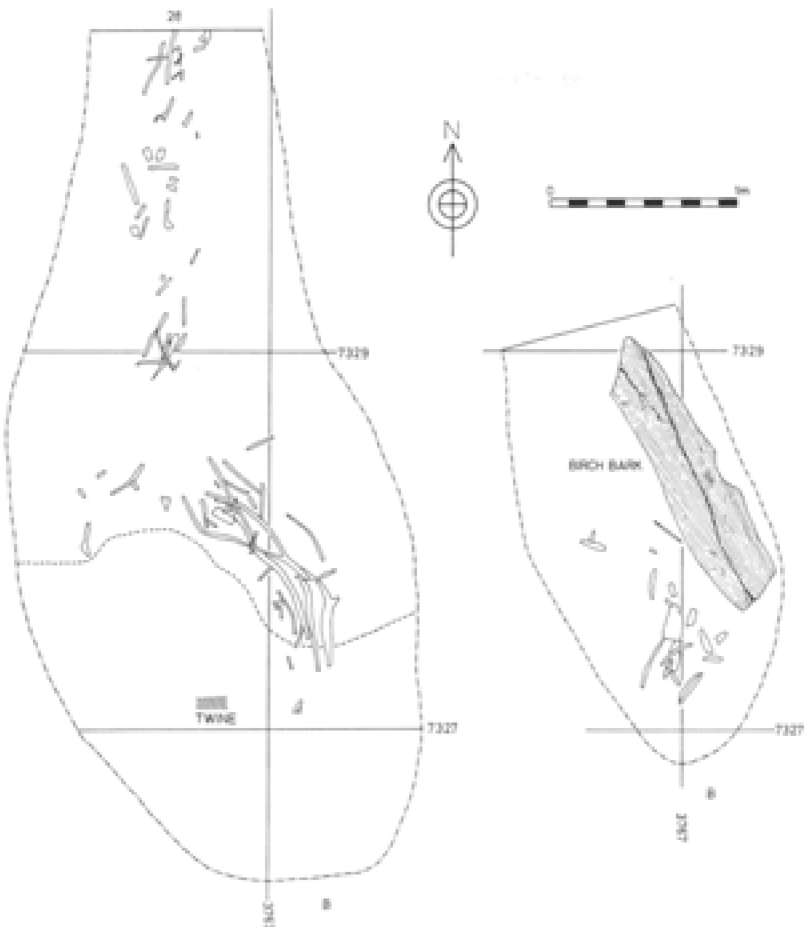


Fig 133 Plan of the distribution of wood and other material in ditch segment 2, at causeway B, layer 4, Phase 1A. The right-hand plan is about 300mm below the left-hand plan. The dashed line indicates a sharp change in the matrix

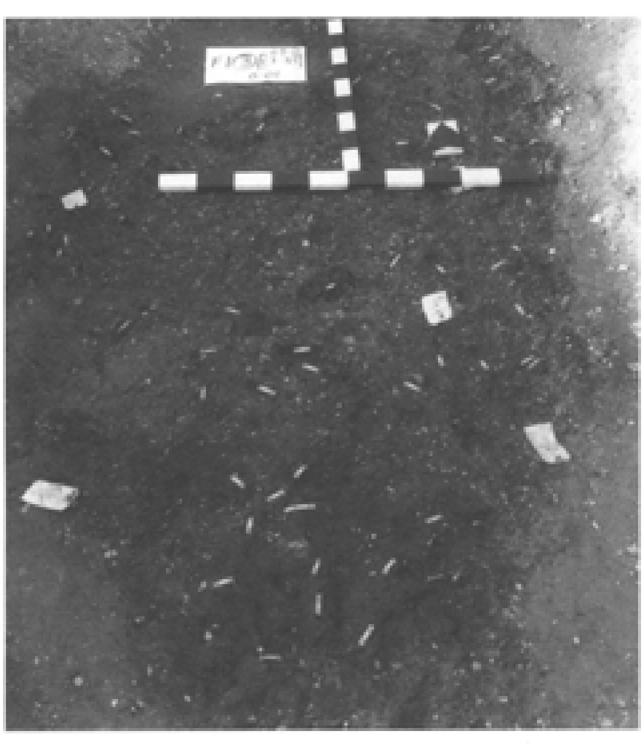


Fig 134 Deposit of wood in enclosure ditch segment 3, layer 3, looking from causeway C to section 35. This deposit is approximately 0.10m above that shown in Figure 135. 1m scales (with 0.10m divisions)

Fig 135 Deposit of wood in enclosure ditch segment 3, layer 3, between causeway C (left) and section 35 (right). This deposit is approximately 0.10m below that shown in Figure 134. 1m scales (with 0.10m divisions)

Fig 136 Deposit of wood in enclosure ditch segment 4, layer 4, between causeway E and section 50. Scale 0.25m

Fig 137 Deposit of wood in enclosure ditch segment 5, layer 3, looking north-east from section 70 to section 74 (top). 1m scale

Segment 3

Segment 3 was very deep and steep sided at the butt end by causeway C, in a manner perhaps reminiscent of segment 2. Unlike segment 2, however, this deposit revealed four densely packed layers of wood, much of which consisted of small stuff (Figs 134, 135). North of section 35 the ditch became shallower and the wood somewhat larger, although less densely packed.

Segment 4

The material in the southern butt end of segment 4 was closely similar to that within the northern part of segment 3, but slightly more dense. The centre of segment 4 could not be excavated, but the northern end at causeway E revealed very similar wood to that in segment 3, much of it consisting of larger pieces (Fig 136). By this point in the excavations the effects of dewatering were becoming noticeable (see Fig 125).

Segment 5

The homogeneity encountered within segment 5 can doubtless be explained in great part by the encroachment of the nearby stream. At causeway E the wood was small and dispersed, and there was much debris (Fig 19); coppice stools grew in some abundance around section 60, but were thinning out by sections 70 and 74; here the waterlogged deposits were confined within a narrow channel, and the full effects of the stream water disturbance were beginning to be apparent (Fig 137). The ditch became wider from section 79, and the effects of stream disturbance were pronounced. A typical view of this part of segment 5 is shown in Figure 138.

The ditch resumed a less disturbed profile from section 140, and large quantities of wood were found at the butt end by causeway F; the wood in this butt end was notably larger than the norm and the concentration remarkably dense. Unfortunately, by this stage of the excavation preservation had become very poor indeed (Fig 139).

Segment 6

Finally, section 6 showed clear signs of stream channel disturbance in the vicinity of causeway F, and wood was thinly scattered and very poorly preserved. The only *in situ* deposit of probable Phase 1 date was confined to a narrow band or strip along the centre of the ditch (Fig 26).

Naturally occurring wood

Definition

A minor but significant part of the wood assemblage derived from trees or shrubs of irregular habit that showed no evidence for having been tended or managed in any way. These 'natural' pieces could possibly have derived from the crown wood of managed trees or coppice, but there was no evidence for this. The wood was often gnarled and bent. Roots and unattached bark have been included in this category.

Roots

Roots are not generally regarded as being archaeologically significant and are frequently ignored. At Etton it was found that modern roots, which were tough, fibrous, and easy to distinguish, generally did not penetrate into primary or later Neolithic contexts. At first, other possibly ancient roots within the ditch deposits were carefully traced and excavated so that they could be removed – as a potential source of contamination. It was soon discovered, however, that in certain instances the non-fibrous roots within the waterlogged ditch deposits formed a coherent, radiating, crown-like pattern; it became plain that these roots came from plants that had been actually growing in the waterlogged deposits, mostly during Phases 1 and 2. In certain cases (especially in segment 5), it was possible to find traces of stool wood. The roots therefore provided an important clue to the positioning of the possible coppices, and their numbers are given in Table 10. Other roots formed no coherent pattern and seemed to derive from higher contexts; they were removed as potential sources of contamination and were not included in Table 10.

Possible coppice stools

The distribution of coppiced and other roundwood products is an extension of work already published (Pryor *et al* 1985). The pattern described at that interim stage continued in the remaining length of segment 5, and the entire distribution of the selected categories of wood, as far as causeway F, is shown in Figure 140.

Early in the excavations it was realised that probable Neolithic coppiced stools had been preserved in the bottom of the ditch (Fig 141). Indirect evidence for Neolithic coppicing in the Somerset Levels had already been published (such as Rackham 1977), but it was unexpected to find the stools *in situ* and within the enclosure ditch itself.

Butt ends

The stools in segment 1B were very well preserved and were the first to be recognised. In segments that were excavated subsequently, stools or possible stools were often in or near the butt ends – segments 2 (at causeway B), 3 (at causeway D), 4 (at both causeways), and 5 (at causeway F) – but this was not the case in segment 1 (Fig 140). There were, however, alder roots in the top of the pre-Neolithic peat channel that could not be accounted for at the time. Segment 2 had a coppice stool in the southern end at causeway B, but not at the other. The northern part of the segment was, however, very shallow and might not have provided a particularly suitable environment for the wet-loving trees (mainly alder) that were being coppiced elsewhere in the ditch. Also, the ditch was so shallow at that point that wood deposits were very poorly preserved. Certain butt ends, where conditions might have been right for a coppice stool, did not in fact contain one; these butt ends were in segments 1A, 1B, 3A, and 5A. Segment 5C did not have a coppice actually in the ditch itself, but had one growing on the outer edge.

Naturally occurring?

The question must arise as to whether these stools were planted, or were plants that had grown naturally in the ditch by seeding or vegetative reproduction. A 'minimalist' hypothesis would suggest that the stools were merely naturally occurring trees that were managed secondarily. However, the presence of so many butt-end stools might indicate a degree of manipulation: willow, alder, and poplar twigs sprout freely if offcuts are left in wet or muddy conditions, so the generation of new plants would not have caused any difficulties. The matter cannot be settled definitively one way or another, but communities who were capable of growing cereal crops would surely have possessed the practical knowledge to set young plants for coppice management.

Roundwood with heels

The distribution of roundwood with evidence for the coppiced heel follows the same pattern as that of the stools (Fig 140), indicating that the coppices were trimmed after cutting and that some of the heels were discarded on the spot. Some of the butt ends that did not yield evidence for stools did produce roundwood with heels. This probably implies that stools had once been in these places, but that for some reason they had not survived. This phenomenon was noted at the following butt ends: 1B, 3A, and 5A.

Fig 138 (opposite, above) Deposit of wood in enclosure ditch segment 5, layer 3, looking north-east from section 125 to section 134. Note the antler tine above the 1m scale

Fig 139 (opposite, below) Deposit of wood (in poor condition) and animal bone (mostly cattle) in enclosure ditch segment 5 at causeway F. Looking southwards, with section 146 on the extreme right. 1m scale

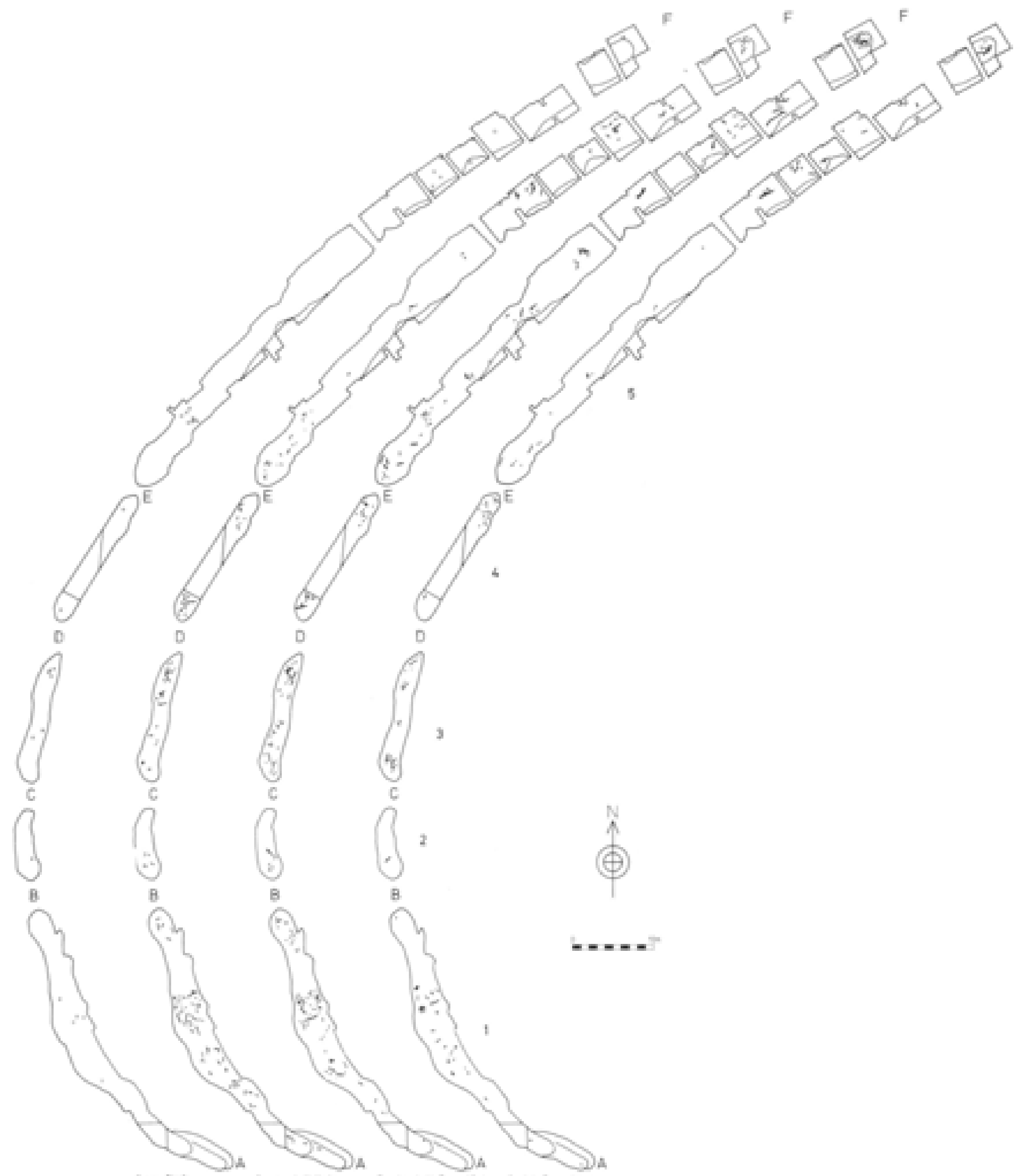


Fig 140 Selected categories of wood from Phase 1 contexts, enclosure ditch segments 1–5. The four plans show distributions of coppice stools, roundwood with heels, roundwood with chopped ends, and partially charred wood

Two additional hypotheses might provide an explanation: first, that the stools were growing higher up the side of the ditch, above the water table, and did not survive; second, that the debris from other coppiced stools was placed in these butt ends. Where the side of the ditch was very low-lying, in segment 5C, two stools were preserved, one on the inner edge and one at the butt end. It was also noticed by excavators that remains of roots were in the side of the ditch south of the butt end at causeway D in segment 3B. Adjacent to these roots was an area with a concentration of roundwood with heels (Fig 140). This suggests the presence of coppice stools on the ditch sides or higher on the brink. The debris in the ditch indicates that coppicing and perhaps the trimming of coppice products were taking place in the immediate vicinity of, if not actually in, certain ditch butt ends.

Removal of stools

It seems unlikely that stools in these butts could have been removed at a later recutting of the ditch without disturbing the associated wood debris surrounding them. One would also expect to find the truncated

Fig 141 Roots of coppice stools growing in situ *along the base of the interior edge of the enclosure ditch in segment 5, between sections 60 and 64. Scale 0.25m*

remains of old root systems. There is, however, quite convincing evidence for the removal of a stool in the butt end of ditch segment 1A, at causeway A, which had very little debris – and what existed was scattered and set well back from the extended butt end (Fig 140). This would confirm the hypothesis that a Phase 1A stool (or stools) was removed when the ditch was extended and altered to receive the Mildenhall bowl on a birch bark mat in Phase 1B or 1C. The alder roots in the pre-Neolithic peat channel could also have belonged to Phase 1A coppices that were subsequently removed. Although the butt end was altered and recut, the remainder of the ditch must have remained largely undisturbed and open, or else the coppices would not have thrived.

Causeway F

At the other end of the western arc, the stool at causeway F, which was an important entranceway in Phase 1A, was not located in the ditch itself, but stood on the outside, marking the way into the enclosure.

Charred wood

The central part of segment 5 (between approximately sections 65 and 94) showed a different pattern to the rest of the western arc of the ditch. For a considerable length there were no coppice stools, and the remains of trimmed and burnt rods were scattered (Fig 140). This area coincided with a part of the ditch that was most disturbed by the gradual encroachment of the stream channel that ran alongside. To judge from the occasional concentration of debris, some coppice stools must have grown in the vicinity of this part of the ditch; the most likely reason for the lack of a coherent pattern in the coppice material in these deposits is disturbance, perhaps by moving water or by people's efforts to keep the channel clear.

Wood from segment 5 included a number of charred pieces (Fig 140). The most interesting of these were a number of wedge-shaped fragments of dense, burred, alder (*Alnus glutinosa*), which may have been hacked off coppice stools. It is possible that this took place as part of ditch maintenance or clearance, but it is also possible that the dense wood of the coppice stools was sought as a material from which wooden bowls or containers were manufactured. The wooden bowls from the Phase 2 pit F953 in segment 6 were manufactured from burred alder wood, and the manufacturing process probably involved charring.

The distributions of roundwood with chopped ends and the partially charred wood mirror the distributions of stools and roundwood with heels so closely that they must surely represent debris from the same operation. This co-distribution shows that the stools were cut, the rods were trimmed, and the unwanted material was burnt close to the ditch. The magnetic susceptibility survey (Chapter 3) revealed no evidence for bonfires actually in or near the ditch itself (possibly because of wet ground conditions?), but they could not have been located at any significant distance. There was also very little evidence for anything other than coppiced roundwood being burnt in the immediate area.

Finally, it should be noted that virtually no wholly carbonised wood (charcoal only) was found in the ditch. This was in marked distinction to the large Beaker period pit at Etton Woodgate, which contained large quantities of charcoal in sometimes quite large lumps. If the enclosure ditch had not been waterlogged, evidence for charcoal would have comprised small and fragmentary pieces – and it would not have been obvious that most of the charcoal had found its way into the ditch as the slightly, or lightly, charred ends of much larger pieces of wood.

Bark

Definition

The bark is a very important part of a tree. As the outer covering of the stem, it protects the living and growing parts from injury and from the extremes of climate. The inner layers of the bark conduct food material, manufactured in the leaves, to other parts of the tree where it can be stored. The presence of these substances in the bark means that it is potentially rich in chemicals, which may be of value, particularly for tanning and dyeing. Although largely forgotten as a commodity today, it had many uses in the ancient world, and its presence in some quantity in the enclosure ditch needs to be examined (Table 10). In Britain, because of the cold winter, woody plants produce most of the new wood and bark tissue in the spring and summer. At these times of strong growth, the bark is less securely attached to the wood and may most easily be removed. A number of birch trees (*Betula* spp) produce bark with special qualities that have led to its exploitation as a raw material (Clark 1952, 209–11; Earwood 1993, 164–6).

Table 12 Distribution of unattached bark at Etton and Etton Woodgate

Etton enclosure ditch

segments	*1A*	*1B*	*2*	*3A*	*3B*	*4A*	*4B*	*5A*	*5B*	*5C*	*6*	*total*
numbers	18	37	11	57	28	27	45	75	58	58	33	447
% of total	4.02	8.27	2.46	12.75	6.26	6.04	10.06	16.77	12.97	12.97	7.38	100.00

Etton Woodgate

	numbers	*%*
Neolithic ditch F132	11	33.33
Beaker pit F108	22	66.67
total	33	100.00

In northern Scandinavia and Russia birch bark has been widely used as a waterproof roofing material – bark for this purpose has to be removed in large sheets.

The diameter of the woody stem is increased by the new wood (the tree ring) that is laid down beneath the bark, but a small amount of new tissue is also laid down in the bark itself, adding to its thickness. The outer part of the bark, which forms the important protective layer over the wood, is largely dead. The inner part, the phloem, is alive and helps conduct food substances around the tree. The fibres, known as bast, from this inner layer of many trees – especially lime (*Tilia* spp) – can be used for the production of cordage and ropes (Gramsch 1992, 69). Cork cells may be formed in the outer part of the bark, and the patterns on this outer surface may vary widely, depending upon the manner in which the bark has formed, the species of tree, and the age of the tree.

Recording

It should be noted that it was not assumed in the field that bark would provide evidence for woodworking. The presence of bark was recorded and measured to the same standard as the woodworking debris. The coincidence of the two classes of data was noted in post-excavation research. All bark pieces were also carefully re-examined to make sure that no sapwood was still attached (which would have led to reclassification as woodchips). The bark was also examined for signs of working (the impression of an axe, carefully squared shape, and so on). In general, the examination of the bark produced very little supplementary data.

Distribution

The distribution of bark followed a very similar pattern to the distribution of tangential splits (Tables 12, 20): the ditch segments with a fairly high incidence of tangentially split wood (1B, 3A, 4B, 5A, 5B, and 5C) were the segments that also tended to have a fairly high incidence of bark.

The distribution of measurable pieces of bark alone (Fig 142) was very different to roundwood (Fig 150) and woodchips (Fig 149). Woodchips occured most frequently in segments 1B, 3A, and 4B. Thick bark, on the other hand, was concentrated in segments 5 and 6 and was not as plentiful in segments 1B and 3A, despite the fact that these deposits were very deep and produced very large quantities of organic material. The contrast between the bark distribution and that of the roundwood was similar, but both showed high concentrations within segment 5A.

Removal of bark

The similar distribution of bark and tangentially split wood is probably the best evidence we have that bark was being removed systematically, possibly by chopping tangentially (see Table 20).

It is possible, but not very likely, that bark was cut off the branch or trunk with only small amounts of sapwood attached; it is also just possible that adhering sapwood was lost through post-depositional processes. However, it was generally the case that when bark was found with sapwood still attached, it remained over the whole surface, and although often in very poor condition, it was still clearly identifiable.

No conclusion could be drawn in the field as to whether the bark was removed with axes or simply fell off wood that was lying about. The pattern of distribution, however, does suggest that the bark was removed systematically, although not necessarily with axes. The birch bark mat beneath the bowl in segment 1A and the sheet of birch bark from segment 2 were both neatly trimmed square. As already discussed, bark is best cut off cleanly in sheets over a limited season, in the spring and early summer. Bark to be used for other purposes, for example tanning, does not have to be in sheets. In fact, for the most efficient extraction of the tanning acids, smallish pieces of reasonably mature oak bark are to be preferred. There is therefore no reason to think that the thicker bark of more mature trees could not also have been deliberately removed.

Thickness

As bark is such a complex part of the tree, it seems unlikely that that there is any simple way of correlating the age of a tree with the thickness of its bark. In general, however, it is obvious that as a tree matures, the thicker will its bark become.

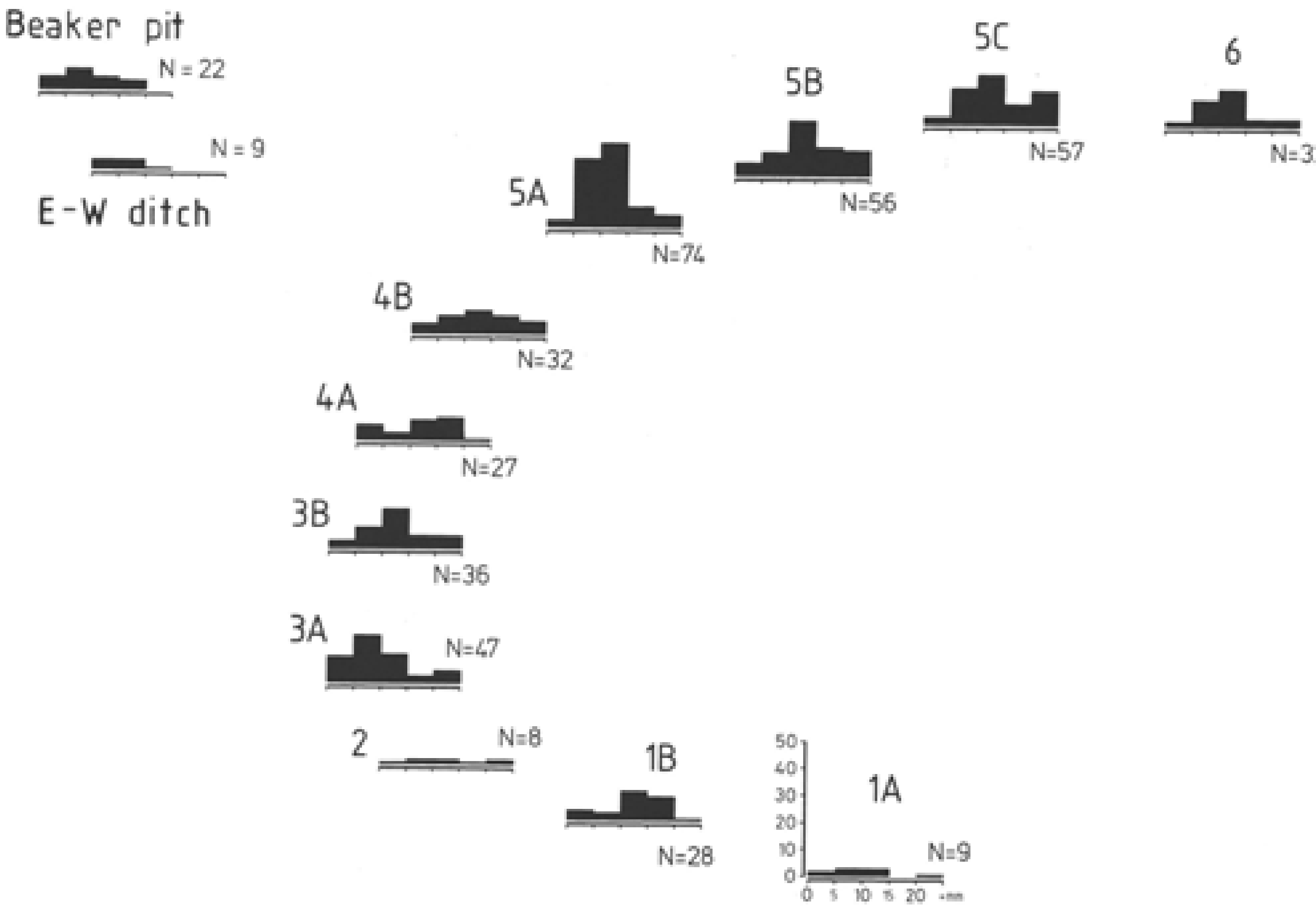


Fig 142 Thickness (in mm) of bark pieces from Phase 1 contexts, enclosure ditch segments 1A–6, and from Etton Woodgate (Neolithic ditch and Beaker pit). N represents total numbers of bark pieces

Most of the roundwood and debris that survived with its bark still attached probably had bark less than 5mm thick. A modern, ten-year old ash sapling cut down recently was examined for comparative purposes; the tree trunk was 175mm in diameter, and the bark was 4mm thick. Roundwood as large as this was unknown at Etton. When considering the occurrence of the bark alone from the ditch, the quantity of bark that was less than 5mm thick was very small indeed – only slightly more than 10% of the total wood assemblage. The biggest group is of thickness ranging from 10 to 15mm (Figs 142, 143; Table 13). This latter group must surely represent fairly mature trees – and certainly far more mature than the coppices or saplings that provided the bulk of the roundwood found in the enclosure ditch. In fact, more than half the bark alone from the ditch was more than 10mm thick, and more than 12% was over 20mm in thickness; the latter must have come from very substantial trees. Bearing in mind that there was very little direct evidence for woodworking involving large trees and that even the pollen evidence for substantial forest cover was lacking (Chapter 11), the presence of such thick bark in some quantity is the more remarkable. There are two possible explanations.

Commodity

Perhaps the most logical and straightforward answer to the problem is that the mature bark was a commodity in its own right and was brought to Etton from the forest areas where the larger trees were felled and split, while their timber was still green. It is also interesting that segments 1A and 2, which contained the birch bark mat and the large sheet of birch bark, contained fewer loose pieces of bark and less of the coarse, thicker bark than any of the other segments (Fig 142). This might suggest that the important distinction did not lie in the working of bark, as opposed to other types of woodworking, but in the size and nature of the tree and where it was growing.

By-product

The second explanation also hinges upon a perceived distinction between the working of coppice and timber. It has already been noted that the distribution of bark and tangentially aligned woodchips coincides (Tables 12, 20); these woodchips may have been associated with working larger timber. Similarly, the thick bark noted in segment 5 could have been an accidental by-product of a similar process. It is perhaps not

Table 13 Thickness (where measurable) of unattached bark from enclosure ditch segments 1–6 and Etton Woodgate

	0–5mm	*5–10mm*	*10–15mm*	*15–20mm*	*20+mm*	*total numbers*	*total %*	*standard deviation*	*mean*
segment 1A									
numbers	2	3	3	–	1	9	2.22	9.23	10.55
%	22.22	33.33	33.33	–	11.11	100.00			
segment 1B									
numbers	4	3	11	9	1	28	6.90	4.78	11.00
%	14.29	10.71	39.29	32.14	3.57	100.00			
segment 2									
numbers	1	2	2	1	2	8	1.97	6.08	11.25
%	12.50	25.00	25.00	12.50	25.00	100.00			
segment 3A									
numbers	10	18	11	3	5	47	11.58	5.81	8.83
%	21.28	38.30	23.40	6.38	10.64	100.00			
segment 3B									
numbers	3	8	15	5	5	36	8.87	7.40	12.63
%	8.33	22.22	41.67	13.89	13.89	100.00			
segment 4A									
numbers	6	3	8	9	1	27	6.65	5.48	10.88
%	22.22	11.11	29.63	33.33	3.70	100.00			
segment 4B									
numbers	4	7	9	7	5	32	7.88	7.20	12.40
%	12.50	21.88	28.13	21.88	15.63	100.00			
segment 5A									
numbers	3	26	32	8	5	74	18.23	4.04	10.60
%	4.05	35.14	43.24	10.81	6.76	100.00			
segment 5B									
numbers	5	9	21	11	10	56	13.79	6.51	12.73
%	8.93	16.07	37.50	19.64	17.86	100.00			
segment 5C									
numbers	3	14	19	8	13	57	14.04	8.89	14.12
%	5.26	24.56	33.33	14.04	22.81	100.00			
segment 6									
numbers	2	10	14	3	3	32	7.88	4.69	10.62
%	6.25	31.25	43.75	9.38	9.38	100.00			
totals									
numbers	43	103	145	64	51	406	100.00	6.697	11.64
%	10.59	25.37	35.71	15.76	12.56	100.00			
Etton Woodgate ditch									
numbers	4	4	1	–	–	9	–	2.93	5.22
%	44.44	44.44	11.11	–	–	100.00			
Etton Woodgate pit									
numbers	5	8	5	4	–	22	–	4.58	8.27
%	22.73	36.36	22.73	18.18	–	100.00			

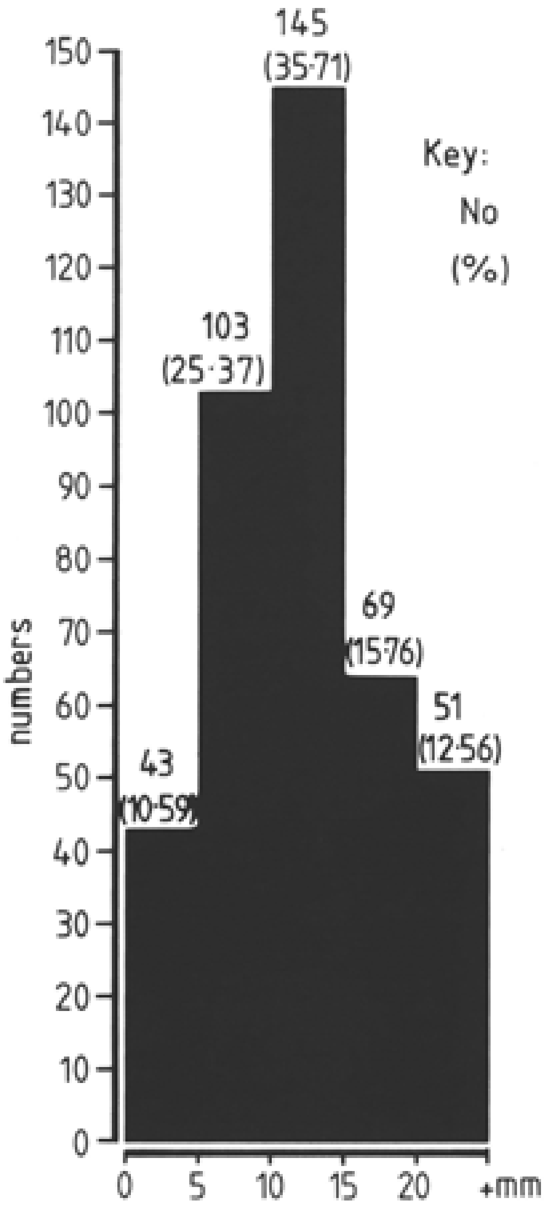


Fig 143 Thickness of all bark pieces from Phase 1 contexts, enclosure ditch segments 1–6

coincidental that the only substantial timber from Etton (Fig 158) came from segment 5. This segment was also the closest to the timber gateway of Phase 1A and to the only feature (F251) that was known to have held a substantial, squared-off timber. It is entirely possible that any timber-working debris, being intimately associated with display and ritual, could have been removed with deliberate thoroughness.

Natural roundwood

The term 'roundwood' in this report is used to describe wood that had not been split or hewn, but retained the cylindrical shape of the trunk or branch. It may have lost its bark, or had the bark removed, the ends may have been shaped, and there may be other woodworking evidence, but the original shape of the stem was not altered. If there was any evidence for woodworking it is described as 'trimmed'. There is no implication of size in this definition, although at Etton no large roundwood trunks or round timber were excavated.

The analysis of roundwood has concentrated upon the straight material, as this was more probably worked, or managed, by man. A small proportion of the 'natural' roundwood was, however, trimmed (Table 10), and this provides unequivocal evidence that some at least was worked. All the natural roundwood was sampled, recorded, measured, and entered into the computer database; these data are available for study at The British Museum. See below for a discussion of straight roundwood.

By-products

Definitions

The term by-products in this context refers to material that included offcuts, debris, and spent, rejected, or discarded pieces of wood that were produced during the processes of trimming or reducing timber, of harvesting copsewood, or of woodworking in general. In archaeological terms it is the flintworking equivalent of debitage. At Etton there was very little evidence indeed for the working or reducing of timber; the by-products nearly all arose from the working of roundwood or coppice.

Woodchips

Woodchips have already been defined as a fragment of wood, with or without bark, that has been detached by an axe blow. In this report the term is used to describe a chip of wood so small that it was not possible to determine with any accuracy the size, diameter, or shape of the wood that was being chopped. Larger woodchips, or pieces of wood that had been chopped and split, are treated as 'debris' (see below).

Roundwood

It became apparent early on in the excavation that there was a high proportion of long, straight stems among the roundwood. This would suggest that rods had been produced by pollarding and/or coppicing. It seemed dangerous, however, to assume that this was necessarily copsewood when very few retained the heel where they had been attached to the stool. It was certainly not a judgement to be made in the field, and so it was decided to distinguish the roundwood which, because it was gnarled, knobbly, or bent, was unlikely to be the product of management; this was recorded as 'natural roundwood', and has been included above.

All other roundwood was mostly straight and without pronounced side shoots and branches; in the archive and field notes it was described as 'roundwood', but in this report the distinction between it and 'natural' roundwood has been emphasised by adopting the term 'straight roundwood'.

Table 14 Woodchips from enclosure ditch segments 1–6 (dimensions in mm)

length	*0–50*	*50–100*	*100–150*	*150–200*	*200–250*	*250–300*	*300–350*	*350–400*	*400+*	*total*
numbers	53	319	241	138	71	36	16	10	15	899
% of total	5.90	35.48	26.81	15.35	7.90	4.00	1.78	1.11	1.67	100.00
standard deviation: 89.25 mean: 132.26										
breadth	*0–10*	*10–20*	*20–30*	*30–40*	*40–50*	*50–60*	*60–70*	*70–80*	*80+*	*total*
numbers	4	77	232	217	146	105	52	27	39	899
% of total	0.44	8.57	25.81	24.14	16.24	11.68	5.78	3.00	4.34	100.00
standard deviation: 19.02 mean: 37.80										
thickness	*0–5*	*5–10*	*10–15*	*15–20*	*20–25*	*25–30*	*30–35*	*35–40*	*40+*	*total*
numbers	24	149	237	177	130	63	48	23	34	885
% of total	2.71	16.84	26.78	20.00	14.69	7.12	5.42	2.60	3.84	100.00
standard deviation: 10.54 mean: 16.64										
breadth:length ratio (x5)	*0–0.5*	*0.5–1.0*	*1.0–1.5*	*1.5–2.0*	*2.0–2.5*	*2.5–3.0*	*3.0–3.5*	*3.5–4.0*	*4.0+*	*total*
numbers	25	156	226	211	113	68	48	26	26	899
% of total	2.78	17.35	25.14	23.47	12.57	7.56	5.34	2.89	2.89	100.00

Debris

Debris is a by-product of working roundwood or timber where it is possible to determine the shape or nature of the parent wood. The commonest category was roundwood debris. It may sometimes be qualified further. 'Timber debris', for example, is used when the piece is of such a size and shape that it can be seen to be an 'offcut' from a piece of timber.

Woodchips

Dimensions

Much of the wood from the enclosure ditch consisted of small woodworking debris (Table 10). It was decided to record the dimensions of woodchips in a manner similar to the methods conventionally used for recording flint debris: measurements (in mm) were taken of length, breadth, and thickness (Table 14). Breadth:length ratios were calculated from these measurements (Figs 144, 147).

Wood lays down its annual growth in rings, and since almost all woodworking debris would have originated from a cylinder (the trunk or branch), the alignment of the measurement must take into account this growth pattern – the 'grain' of the wood (Fig 148). The longitudinal grain of the wood is quite easy to see in most species, and so the measurement of length was seldom difficult.

The measurement of breadth was at right-angles to the length, 'across the grain'. The breadth was measured as if the woodchip was still part of its original log, that is, tangentially across the grain. The thickness was thus aligned radially with the original log. All measurements taken in the field were checked by the wood specialist. In certain cases where wood was badly deteriorated, it was not possible to measure thickness accurately. This accounts for an apparent discrepancy in some tables (such as Table 14, where thickness was available in 885 out of 899 woodchips). Weight was not used because of short-term variation caused by differences of moisture content.

Figure 144 shows a sharp peak between 50 and 100mm, falling away steadily, for all lengths. This gives a unimodal distribution, heavily skewed towards smaller values. The histogram for all breadths also shows a unimodal distribution, but with a slightly more pronounced rise in the broadest material. For all thicknesses, the distribution closely follows that of breadth, which suggests that woodchips were quite thick relative to their width. This is seen in Figure 145 and was the result of trimming smaller roundwood rather than timber (which would probably have produced a thinner, flatter woodchip).

The distribution on the breadth:length ratio histogram (Fig 144) was also unimodal, favouring long, narrow (in flint terminology, 'blade-like') woodchips. These would be the type of woodchip one might expect to produce with an oblique or angled axe blow (see Fig 146). Experience has shown that this pattern of axe use is necessary when working small roundwood, wattle, and coppice products (Francis Pryor personal communication). The shorter, more squat woodchips were found in smaller quantities than long narrow ones.

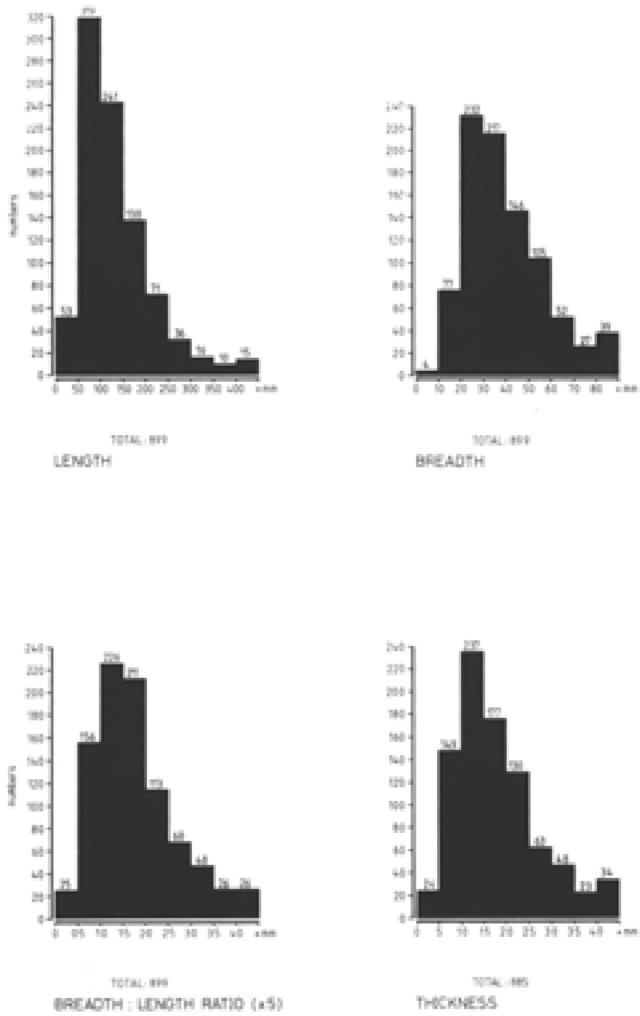


Fig 144 Length, breadth, thickness, and breadth:length ratio of woodchips from Phase 1 contexts, enclosure ditch segments 1–6

Fig 145 Short, squat woodchips, thick in proportion to their length, from Phase 1 contexts, ditch segment 1; two of this group conjoin

Fig 146 Four long, thin, 'blade-like' woodchips

It is to be hoped that histograms of Neolithic timber-working by-products at other sites will be published to test these hypotheses.

Perhaps the most important point to note from these figures is that the recording and plotting of the woodworking debris in this way do appear to produce a statistically coherent picture, with a slightly skewed, but otherwise 'normal', unimodal distribution.

Distribution in segments

Examination of the breadth:length figures by individual ditch segment again revealed statistically coherent results, but variation between individual segments is apparent. The data are presented in Microfiche tables 2–12 and in Figure 147.

Considerable variation occurred in the numbers and breadth:length ratios of woodchips, not only between different segments of the ditch, but also within the same segment (Fig 147). There was, for example, a sharp difference between 1A and 1B – the two parts of segment 1. Segment 1B was also the only sub-assemblage to exhibit a clear bimodal distribution, in which the lesser peak indicated a significant proportion of shorter, squatter flakes. The histograms are similar for each part of ditch segment 3 (3A and 3B) and ditch segment 4 (4A and 4B); this perhaps suggests that the activities in and around these shorter lengths of ditch were very similar. In segment 1, on the other hand, the figures for 1A and 1B could indicate as many as three separate types of activity. In segment 5 the numbers of woodchips remained generally steady along the length (5A–5C), but the shape of the woodchips changed. There was a much stronger tendency for 'blade-like' woodchips in segment 5A than in the more easterly part of the ditch. Segment 5C showed a pronounced bimodal distribution (also hinted at in the much smaller assemblage from segment 6).

The histograms for segments 1B and 3A are strikingly similar and provide very tentative grounds to support the hypothesis that segment 2 was a later insertion, perhaps intended to restrict the width of an original, very wide, western entrance causeway in Phase 1A.

The predominance of relatively long, narrow woodchips begins to slip as we move into segment 3B, a pattern that is reinforced in 4A and 4B. In segment 5A the

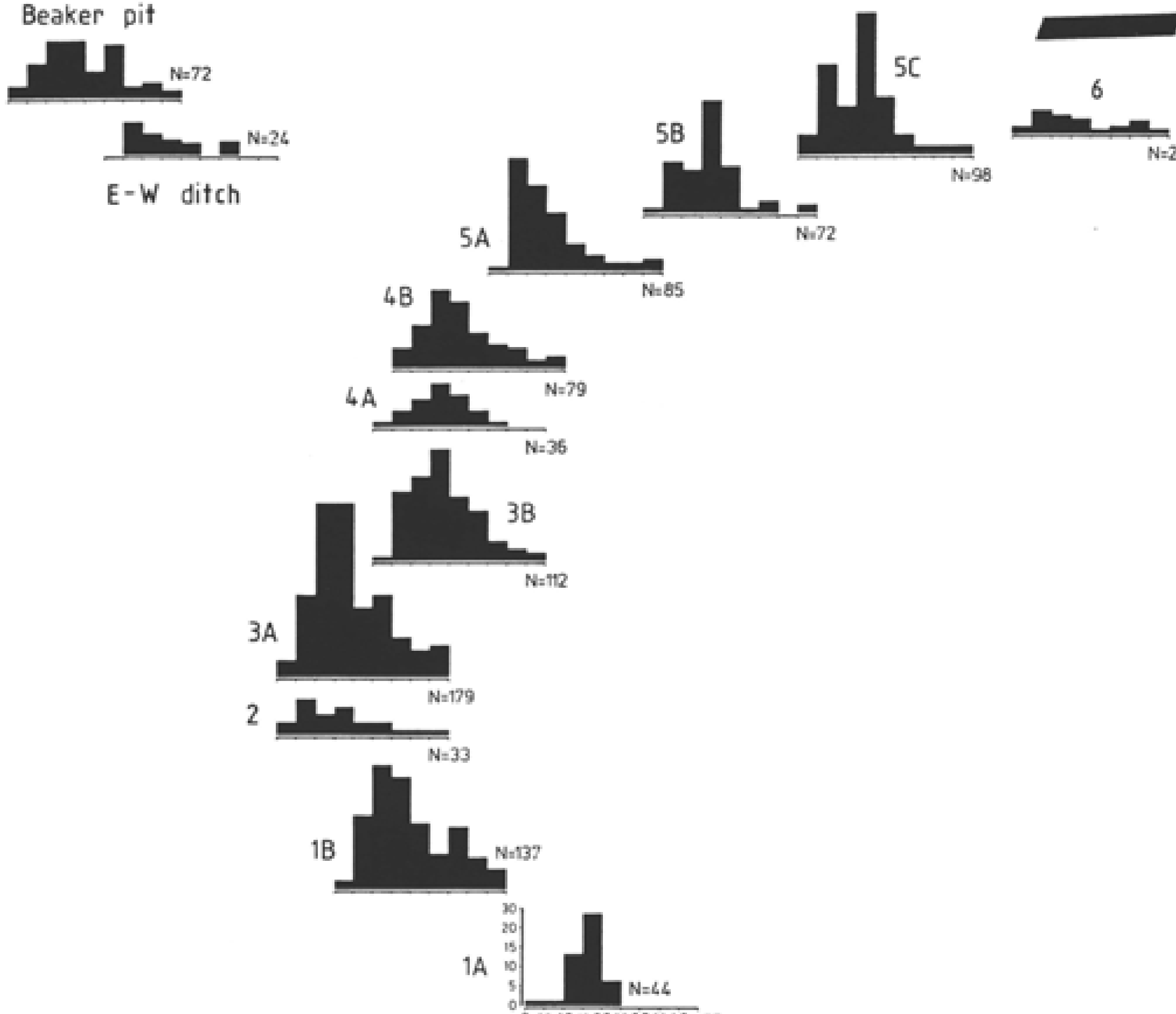


Fig 147 Breadth:length ratios of woodchips from Phase 1 contexts, enclosure ditch segments 1A–6, and from Etton Woodgate (Neolithic ditch and Beaker pit)

tendency for shorter and squatter woodchips is suddenly and sharply reversed. In segments 5B to 6 the shorter, squatter woodchips are again encountered, but accompanied by a significant proportion of 'blade-like' woodchips. This gives rise to a slightly bimodal curve in the histograms for segments 5B to 6.

Etton Woodgate

Comparison of the enclosure ditch breadth:length histograms with that from the Beaker pit at Etton Woodgate shows a preference in the latter for short, squat woodchips (Fig 147; Microfiche table 13). It is possible that the large pit served a specialist function, perhaps to do with the production of charcoal by means of partial charring, quenching, and chopping. This process would give rise to short, squat woodchips. The Neolithic ditch assemblage at Etton Woodgate was very small, but more blade like than the later pit (Microfiche table 14).

Categories

Despite their small size, it has proved possible to group the woodchips into four broad categories: slabs (or bark/sapwood trimming woodchips), tangentially aligned woodchips, radially aligned woodchips, and woodchips off roundwood (Table 15). The way in which these woodchips related to the original wood has been illustrated schematically (Fig 148). The quantities of these four types exhibit very considerable variation from one segment to another (Fig 149). It should be noted that the discrepancies between the total numbers of woodchips in the breadth:length and thickness histograms (such as Fig 147) and in Table 15 reflect the fact that many of the measurable woodchips could not be assigned to a specific type; similarly, some of the woodchips that had been assigned a type could not be measured. In broad terms, however, the numbers were comparable.

Table 15 Analysis of categories of woodchip from enclosure ditch segments 1–6 (Phase 1)

	slabs	*tangentially aligned*	*radially aligned*	*off roundwood*	*total numbers*	*% of total*
segment 1A						
numbers	13	12	20	16	61	7.17
%	21.31	19.67	32.79	26.23	100.00	
segment 1B						
numbers	44	32	30	28	134	15.75
%	32.84	23.88	22.39	20.90	100.00	
segment 2						
numbers	13	7	9	5	34	4.00
%	38.24	20.59	26.47	14.71	100.00	
segment 3A						
numbers	87	26	35	9	157	18.45
%	55.41	16.56	22.29	5.73	100.00	
segment 3B						
numbers	20	33	34	11	98	11.52
%	20.41	33.67	34.69	11.22	100.00	
segment 4A						
numbers	8	14	6	1	29	3.41
%	27.59	48.28	20.69	3.45	100.00	
segment 4B						
numbers	15	27	63	9	114	13.40
%	13.16	23.68	55.26	7.89	100.00	
segment 5A						
numbers	14	14	15	6	49	5.76
%	28.57	28.57	30.61	12.24	100.00	
segment 5B						
numbers	14	22	25	7	68	7.99
%	20.59	32.35	36.76	10.29	100.00	
segment 5C						
numbers	28	26	27	3	84	9.87
%	33.33	30.95	32.14	3.57	100.00	
segment 6						
numbers	4	8	9	2	23	2.70
%	17.39	34.78	39.13	8.70	100.00	
totals						
numbers	260	221	273	97	851	100.00
%	30.55	25.97	32.08	11.40	100.00	

Numerically the smallest category of woodchips were those from roundwood, which represented less than 12% of the total (Fig 149, category 4). This may be a reflection of the fact that the working of small roundwood need not necessarily produce woodchips: many axe (or today billhook) blows can sever a rod without the need to take a second stroke. When small roundwood is being worked, it is generally the second and subsequent strokes that will produce a woodchip. There was not a very great difference in the overall quantities of the other three types of woodchip but there was a significant variation in their composition between the segments (Table 15).

Woodchips that resulted from the removal of bark and/or sapwood are known as 'slabs'. They are probably the most distinctive of all woodchips (Fig 148).

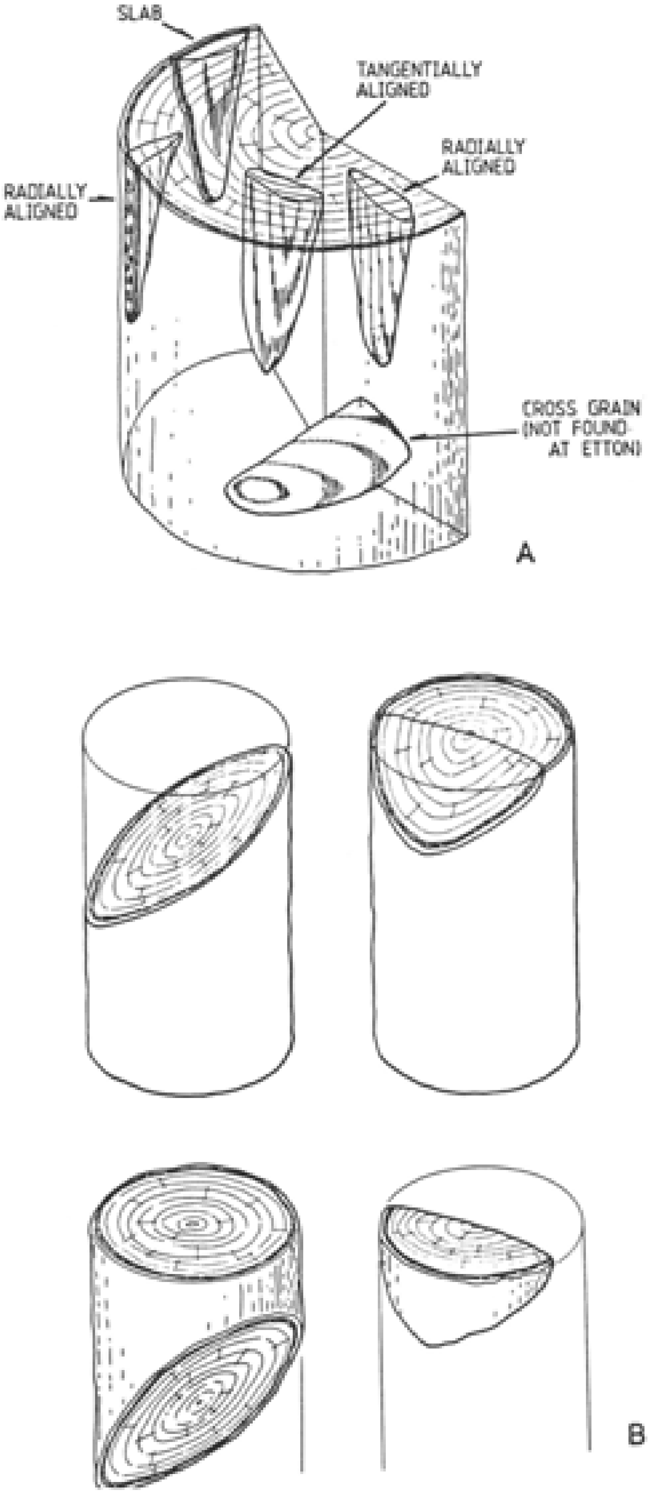


Fig 148 (A) Examples of commonly found woodchip types with the grain given added emphasis; (B) two examples of roundwood chips

Woodchips were only classified as slabs if they were relatively thin, and followed the grain exactly so that there was no heartwood attached. The term derives from the description applied to the bark/sapwood removal waste produced by the modern timber industry (BS 565:1972). Some woodchips, produced from the sharpening of roundwood, had a very small amount of heartwood, in addition to the sapwood and bark; these woodchips were classed not as slabs, but as roundwood woodchips. Tangential woodchips have their worked surfaces clearly running tangentially to the growth rings, whereas radial woodchips have them close to a radius (Fig 148).

The proportions of the different kinds of woodchip varied enormously (Table 15). Some ditch segments had a very high proportion of just one type of woodchip: more than half the woodchips in segment 3A were bark/sapwood trimming slabs; in segment 4B more than half were radially aligned. This great variation from one segment to another reinforces the impression that different woodworking activities were taking place in different parts of the ditch. If the woodworking debris was simply the result of occasional scrub clearance, it is hard to see how such a degree of variation could be produced. Only segment 5C had relatively even proportions of different woodchips.

The roundwood woodchips were distributed more evenly around the ditch than the other categories, but in general far more were in segment 1 than in other segments.

Slabs comprised 55.41% of all the woodchips in segment 3A, tangential woodchips made up 48.28% of all woodchips in segment 4A, and radial woodchips made up 55.26% of segment 4B. The distribution of classifiable woodchips in segment 4 was odd: 4A produced very few indeed, whereas 4B was quite prolific. This contrast cannot be attributed to post-depositional factors alone, although segment 4A was generally less productive than 4B. Only segment 6 produced fewer classifiable woodchips than 4A.

Bark removal

It is important to determine whether bark was removed from trees incidentally, as part of some other woodworking activity, or whether the intention was to remove the bark for its own sake. To answer this question the distribution of unattached bark (Table 12) was compared with that of 'slabs' – woodchips with bark and sapwood (Table 16). It is also possible that in certain instances tangential splits could have been produced by the over-vigorous hacking off of bark, especially during the times of year when bark does not separate readily. The distribution of tangential splits (Table 20) was therefore also compared. The distribution of the sapwood/bark trimming slabs did not coincide with that of either tangential splits or bark alone. This suggests that whatever the activity that generated the bark/sapwood slabs, it was different from the production (by whatever means) of unattached bark.

Straight roundwood

Compression

The diameters of the straight roundwood from the different ditch segments and from Etton Woodgate were recorded as 'compressed' and 'non-compressed' in

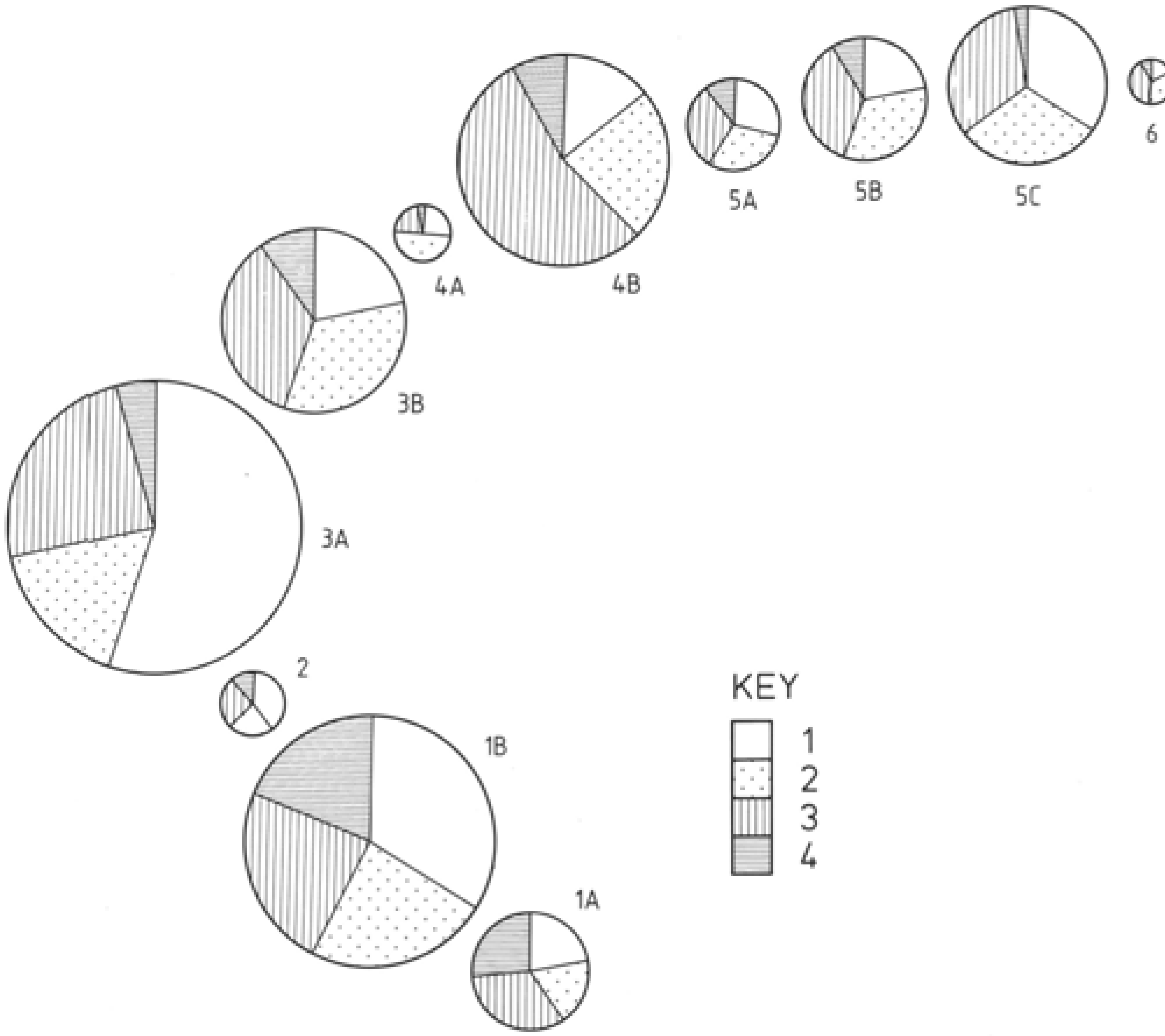


Fig 149 Distribution of woodchips by ditch segment (1A to 6) (based on data in Table 15): 1, slabs; 2, tangentially aligned; 3, radially aligned; 4, off roundwood

Table 16 Distribution of sapwood/bark trimming slabs from enclosure ditch segments 1–6 and Etton Woodgate

Etton ditch segments (divided)	*1A*	*1B*	*2*	*3A*	*3B*	*4A*	*4B*	*5A*	*5B*	*5C*	*6*	*total*
numbers	10	46	14	87	20	8	11	18	15	21	3	253
% of total	3.95	18.18	5.53	34.39	7.91	3.16	4.35	7.11	5.93	8.30	1.19	100.00

Etton ditch segments	*1*	*2*	*3*	*4*	*5*	*6*	*total*
numbers	56	14	107	19	54	3	253
% of total	22.13	5.53	42.29	7.51	21.34	1.19	100.00

Etton Woodgate	
Neolithic ditch F132	8
Beaker pit F108	16

Table 17 Diameters (in mm) of all straight roundwood from enclosure ditch segments 1–6

uncompressed diameter	*0–10*	*10–20*	*20–30*	*30–40*	*40–50*	*50–60*	*60–70*	*70–80*	*80+*	*total*
numbers	120	844	333	100	36	10	3	1	4	1451
% of total	8.27	58.17	22.95	6.89	2.48	0.69	0.21	0.07	0.28	100.00
standard deviation: 9.44										
mean: 17.23										
compressed (maximum) diameter	*0–10*	*10–20*	*20–30*	*30–40*	*40–50*	*50–60*	*60–70*	*70–80*	*80+*	*total*
numbers	10	201	150	50	29	5	3	2	2	452
% of total	2.21	44.47	33.19	11.06	6.42	1.11	0.66	0.44	0.44	100.00
standard deviation: 10.92										
mean: 22.09										
total number of diameters		1903								
% compressed		23.75								
% uncompressed		76.25								

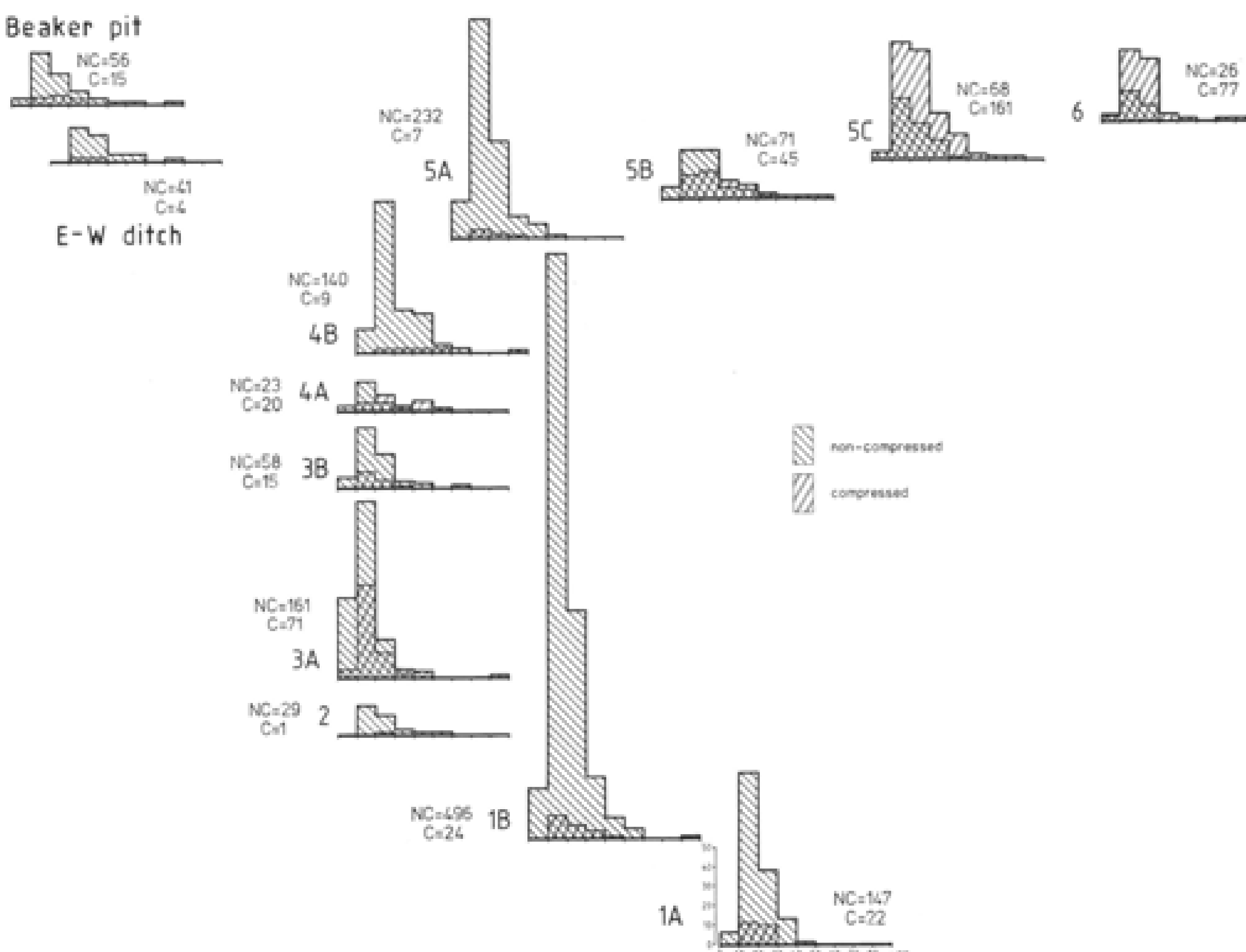


Fig 150 Distribution of compressed (C) and uncompressed (NC) straight roundwood diameters, from Phase 1 contexts, enclosure ditch segments 1A–6, and from Etton Woodgate (Neolithic ditch and Beaker pit)

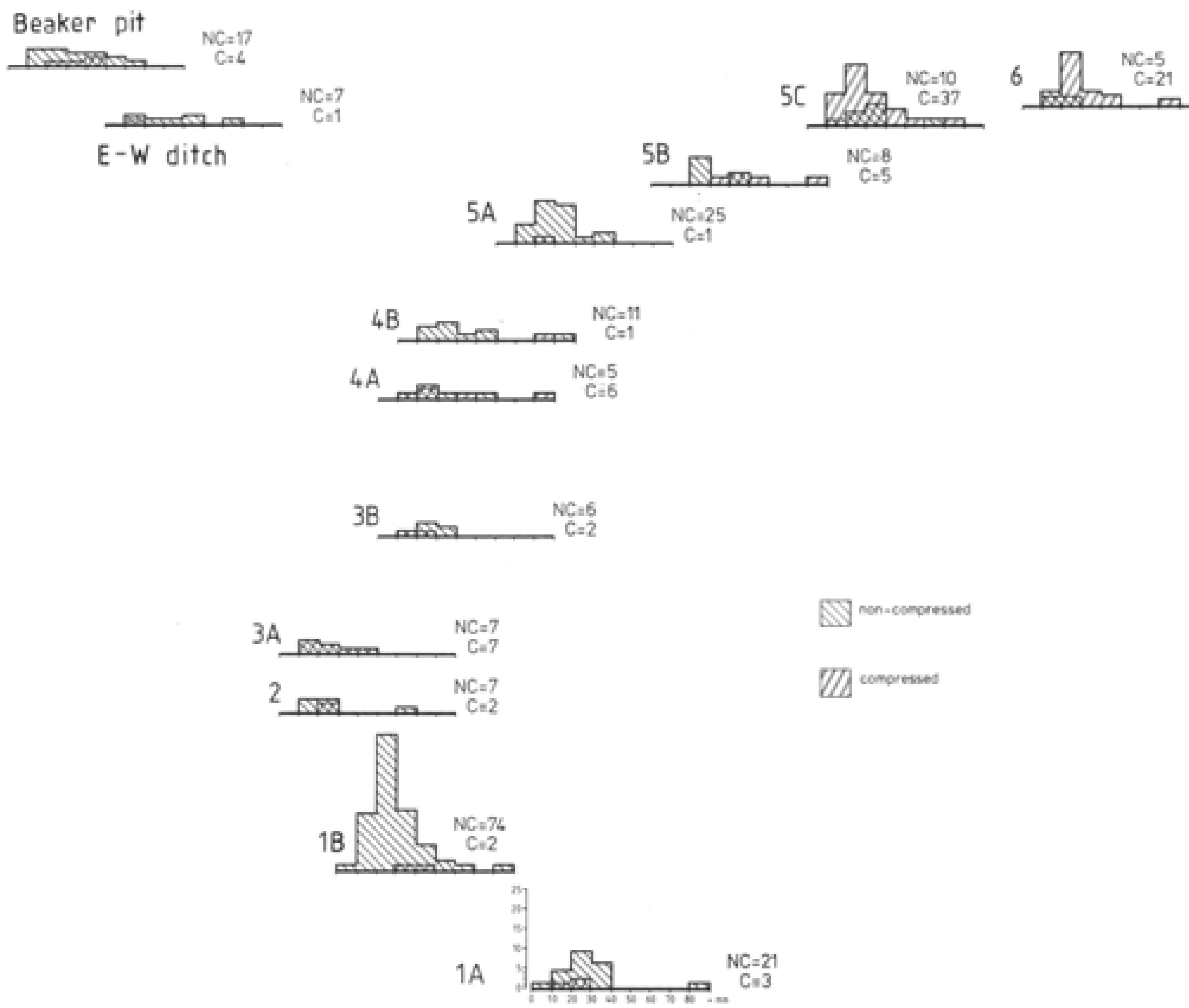


Fig 151 Distribution of compressed (C) and uncompressed (NC) trimmed straight roundwood diameters, from Phase 1 contexts, enclosure ditch segments 1A–6, and from Etton Woodgate (Neolithic ditch and Beaker pit)

Table 17, in Microfiche tables 15–40, and in Figures 150–152 and 155. Some of the problems associated with distorted diameters, especially with immature or fast-grown roundwood, have been dealt with elsewhere (Taylor 1992, 481). The bulk of the roundwood in the ditch deposits at Etton had a diameter of less than 30mm. This material usually displayed the very fast growth pattern that is often held to be a characteristic of coppiced wood material. Fast-grown wood is generally softer than slow-grown wood, and it was not surprising, therefore, that a great deal of it showed a distorted diameter, varying from the slightly oval to the almost completely flattened. When the dimensions of the roundwood were recorded, oval sections were recorded by two 'diameters': the maximum and the minimum. Roundwood that remained round was recorded by only one measurement of diameter. In the tables and figures, roundwood with a distorted diameter is shown separately as 'compressed'.

The separation of compressed from uncompressed wood not only removes a source of statistical bias, but it also provides an indication of certain post-depositional effects. It has been noted at Etton and elsewhere that as the ground dried out, so the fine-grained clays and clay silts tended to contract and squeeze the increasingly soft and less resistant wood. At Flag Fen, in the higher and drier levels, the process would produce flattened roundwood in the form of bands or strips some 3mm or 4mm thick, but perhaps 200mm wide. The process was less exaggerated at Etton, but from 1984 it became noticeably worse.

The progress of compression may be seen in Figures 150 and 151: compressed roundwood formed a small part of the assemblages from segments 1–3, which were excavated while the site was still relatively well waterlogged. By segment 5 (the last to be excavated), the position was actually reversed – it was notable that the deeper and damper deposits of 5A, which were

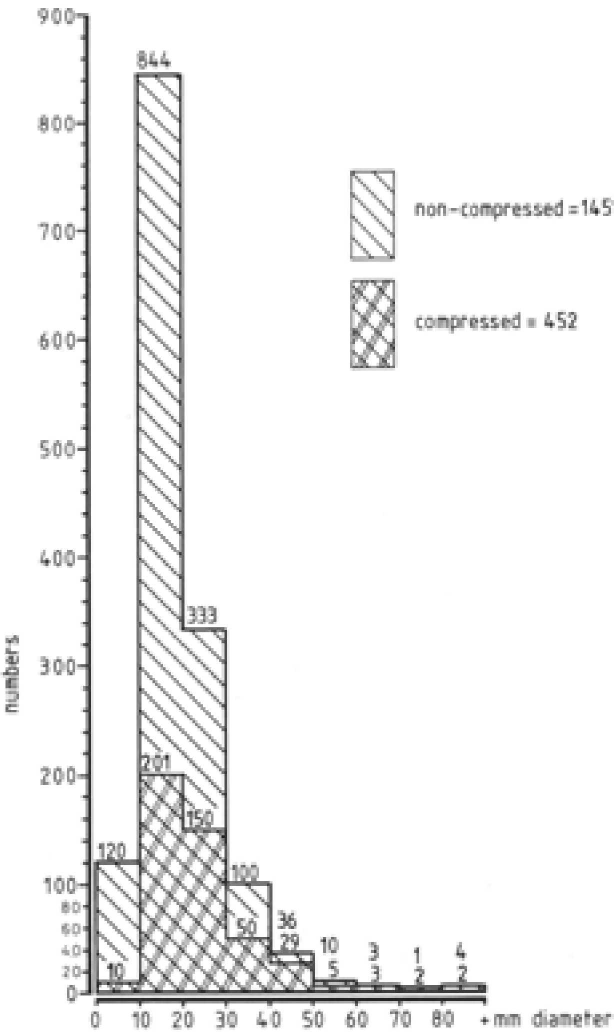


Fig 152 Compressed and uncompressed straight roundwood diameters, combined data from enclosure ditch segments 1–6, Phase 1 contexts

excavated ahead of those further east, were markedly less compressed than those of 5B, 5C, and 6. The picture provided by the ratio of compressed versus non-compressed wood is of course liable to distortion itself. The relatively high reading for compressed wood in segment 3A (Fig 150) may be a reflection of a slightly deeper and perhaps more clayey matrix in that area (see Fig 64, A, B). The filling was certainly more stiff and intractable during excavation than was the case elsewhere at Etton.

Similarly, the filling in segments 5B and 5C was shallower and more prone to drying out from the bottom up, than was the case elsewhere. These were not particularly deep deposits, and by the time they were excavated the dewatering effects of the quarry were becoming evident. Non-roundwood (woodchips, for example) from these deposits were often covered with open cracks. It is not unreasonable to suggest, therefore, that the first sign of distress from dewatering was a distortion of the diameter in roundwood.

Fortunately, the compression at Etton usually only amounted to a distortion in the order of plus or minus five, or at most, 10%. This has not distorted the statistics too seriously, provided, that is, they are used to test relatively straightforward propositions.

The structure of a tree and the way that the wood is laid down in a trunk or branch means that it is very strong in the round. With the softening and weakening of structure during waterlogging, it is not surprising that roundwood may eventually become compressed. The additional stress on the structure caused by the removal of the water that supported it would inevitably lead to a serious collapse and distortion. Longitudinal, or axial, shrinkage did occur, especially in the driest deposits, but it was not generally significant.

Distribution

In the western segments of the ditch, from 1A to 5A, the diameters of most of the roundwood were in the range of 10–20mm (Fig 150). In the northern part of the ditch, from 5B to 6, the diameters tended to be slightly greater. To some extent the tendency for the diameters to be larger in the latter segments was exaggerated because of the distorted diameter of the compressed roundwood noted above. The coppice stools in this part of the ditch were larger and more established than those excavated in other segments, however, and may have produced more substantial poles.

The most prominent feature of this distribution was the huge peak in roundwood with diameters between 10 and 20mm in segment 1B. There was a large quantity of roundwood in this segment compared to other segments, and a high proportion of that wood fell within this particular range of diameters.

Microfiche tables 28–38 present a detailed breakdown of the diameters of the straight roundwood segment by segment. Although the mean diameters fluctuate slightly, the difference is not vast and hovers around the mean (17.23mm) for all the segments (Table 17). The standard deviation for the assemblage is small (9.44). Segment 3A was the only segment that had a reasonably large amount of the more slender wood, but even that was only sufficient to reduce the mean for uncompressed straight roundwood in that segment to 13.80mm (Microfiche table 31).

As there was so much material in segment 1B, it was decided to do a more detailed breakdown, examining the size of the roundwood between 10 and 30mm in increments of 2mm (Microfiche table 29). This detailed analysis between 10 and 30mm shows a mean of 15.39mm, with the majority of diameters falling between 10 and 16mm and a slight additional peak between 20 and 22mm. It should be noted that all of the measurements in the latter cell were at 20mm, suggesting a tendency to round off measurements in the field. In common with most of the straight roundwood from the enclosure ditch, the assembage from segment 1B was massively dominated by short pieces (Fig 153). Straight roundwood was by far the biggest category of wood in this segment (316 pieces). It far

Table 18 Length (where measurable) of straight roundwood from enclosure ditch segments 1A–6 and Etton Woodgate

	0–250 mm	*250–500 mm*	*500–750 mm*	*750–1000 mm*	*1000–1500 mm*	*1500–2000 mm*	*2000+ mm*	*total numbers*	*total %*
segment 1A									
numbers	51	14	3	–	–	–	–	68	4.54
%	75.00	20.59	4.41	–	–	–	–	100.00	
segment 1B									
numbers	238	67	9	2	–	–	–	316	21.11
%	75.32	21.20	2.85	0.63	–	–	–	100.00	
segment 2									
numbers	21	5	3	1	1	–	–	31	2.07
%	67.74	16.13	9.68	3.23	3.23	–	–	100.00	
segment 3A									
numbers	177	39	14	4	–	–	–	234	15.63
%	75.64	16.67	5.98	1.71	–	–	–	100.00	
segment 3B									
numbers	51	19	3	1	–	–	–	74	4.94
%	68.92	25.68	4.05	1.35	–	–	–	100.00	
segment 4A									
numbers	20	16	4	–	1	–	–	41	2.74
%	48.78	39.02	9.76	–	2.44	–	–	100.00	
segment 4B									
numbers	99	26	4	5	–	–	–	134	8.95
%	73.88	19.40	2.99	3.73	–	–	–	100.00	
segment 5A									
numbers	186	49	9	3	–	–	–	247	16.50
%	75.30	19.84	3.64	1.21	–	–	–	100.00	
segment 5B									
numbers	75	25	7	2	4	–	–	113	7.55
%	66.37	22.12	6.19	1.77	3.54	–	–	100.00	
segment 5C									
numbers	151	55	9	7	6	–	2	230	15.36
%	65.65	23.91	3.91	3.04	2.61	–	0.87	100.00	
segment 6									
numbers	5	3	–	–	1	–	–	9	0.60
%	55.56	33.33	–	–	11.11	–	–	100.00	
totals									
numbers	1074	318	65	25	13	–	2	1497	100.00
%	71.74	21.24	4.34	1.67	0.87	–	0.13	100.00	
Etton Woodgate ditch									
numbers	47	18	3	2	–	–	1	71	
%	66.20	25.35	4.23	2.82	–	–	1.41	100.00	
Etton Woodgate pit									
numbers	36	9	1	–	1	–	–	47	
%	76.60	19.15	2.13	–	2.13	–	–	100.00	

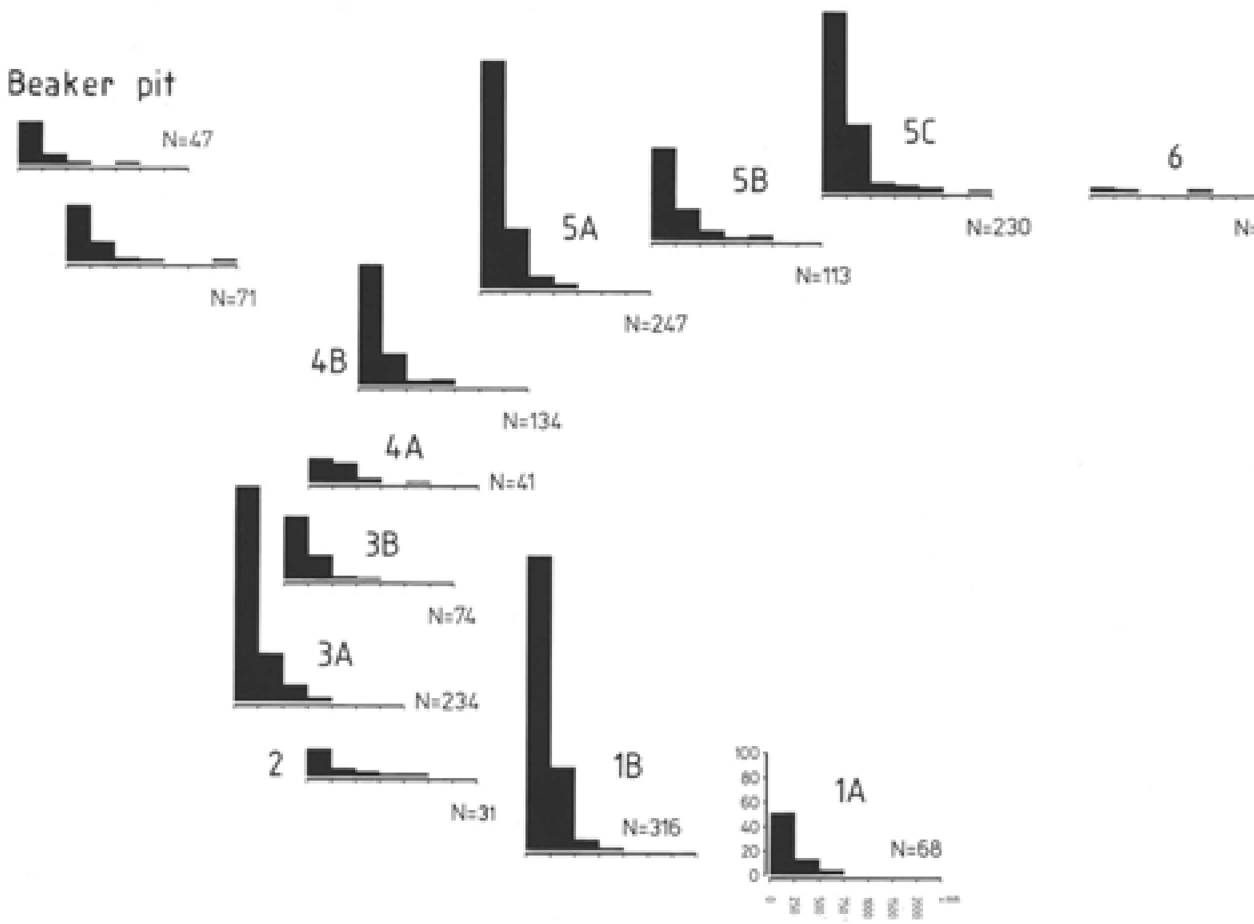


Fig 153 Measurable lengths (in mm) of straight roundwood from Phase 1 contexts, enclosure ditch segments 1A–6, and from Etton Woodgate (Neolithic ditch and Beaker pit)

exceeded classifiable woodchips (134 pieces), although it should be noted that this segment contained the densest quantity of wood of all kinds (except artefacts).

Segments 5B and 5C showed a definite trend towards roundwood with a larger mean diameter (of over 20mm), but again, the difference was not large (Fig 150).

The combined data for all straight roundwood from the ditch segments show a very pronounced peak in diameters between 10 and 20mm (Fig 152). The compressed roundwood displayed a tendency towards a larger diameter than the uncompressed. This was due to the fact that the data were compiled using the longer measurement of the oval 'diameter' of the compressed material. The overall picture presented by the unimodal peak of the histogram suggests that very little larger roundwood was being produced. The range of diameters indicates the production of raw material for perhaps basketry and wattle.

Length

The measurements for the lengths of straight roundwood are equally consistent (Fig 153; Table 18). They show an overwhelming preference in favour of pieces shorter than 500mm (Fig 154). Coppice stools producing rods of diameter slightly more than 17mm are likely to be prolific, and the rods will measure perhaps 2m, 3m, or more in length when cut down. At Etton, only 15 rods were longer than 1m, and of these only two were longer than 2m. Over 1000 measured less than 250mm.

Harvest of rods

It could be suggested that the woodworking debris at Etton merely represented the occasional cleaning out of the ditch, so that other activities could take place within or around it. If that were indeed the case, it is surely extraordinary that all the longer pieces were so punctiliously removed. It is more reasonable to suggest that the stools were regularly cut back and harvested. Their products were trimmed up close to or within the ditch, and the rods themselves were taken to be used in activities elsewhere within the enclosure. The harvest of rods may have been quite large: similar-sized stools at Flag Fen today produce several large bundles of rods each. Each segment of ditch would produce sufficient rods to make several hurdles.

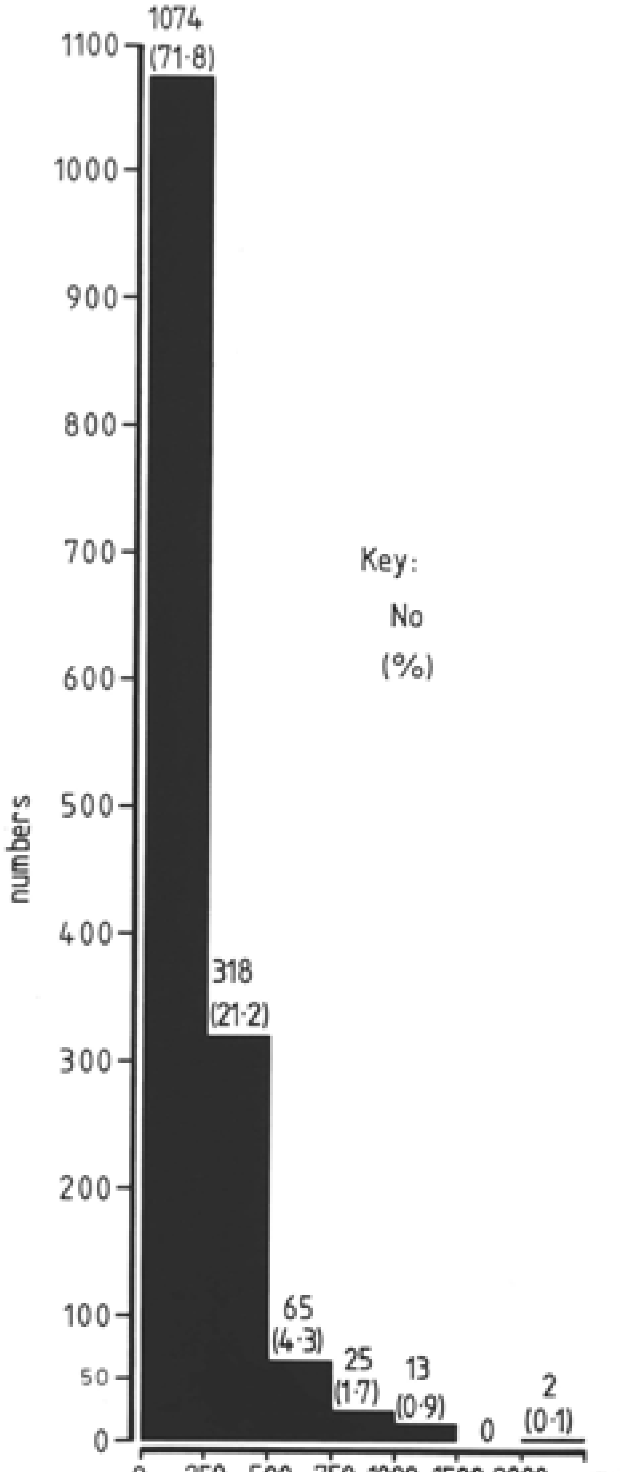


Fig 154 Thickness of straight roundwood from Phase 1 contexts, enclosure ditch segments 1–6

Trimmed roundwood

The mean diameter of trimmed uncompressed, straight roundwood from all segments is 27.63mm, which is more than 10mm greater than the mean diameter of uncompressed, untrimmed roundwood (Fig 155; Table 19). The figures given for all straight roundwood (such as in Table 17) include both trimmed and untrimmed pieces, and so the real distinction is even more pronounced.

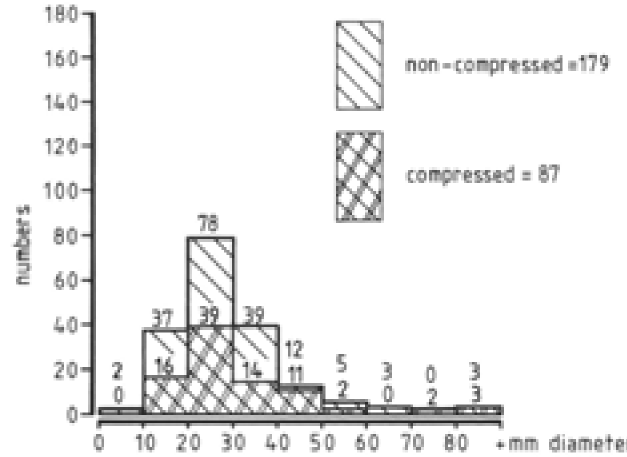


Fig 155 Compressed and uncompressed trimmed straight roundwood diameters, from Phase 1 contexts, enclosure ditch segments 1–6

There was also quite a strong contrast between the distribution of all straight roundwood (trimmed and untrimmed) and trimmed straight roundwood (Figs 150, 151). This was particularly marked in segments 5C and 6 where a far higher proportion was trimmed than in, for example, segment 3A, where very little of the roundwood was trimmed. In segments 1A and 1B, not only was there a slightly higher proportion of the wood trimmed than in the segments already mentioned, but the peak of the distribution tended towards a slightly greater diameter (Fig 151).

It is possible that the trimmed material from segments 1B, 5C, and 6 was being soaked in the same manner as the birch bark sheet (see below) prior to use (Edlin 1973, 45, 189). It should be noted here that the evidence for trimming would be an early victim of drying out, especially in the smaller pieces. This perhaps makes the relatively higher proportion of trimmed pieces from segments 5 and 6 even more significant, given the poorer quality of preservation in these areas and the low total numbers of straight roundwood pieces found.

Debris

Splits

The category 'debris' is far more straightforward to define and describe on a site such as Flag Fen, where large timber has been reduced or worked. At Etton much of the debris amounted to little more than large woodchips – and frequently the distinction was almost arbitrary. An attempt has been made, however, to analyse the occurrence of splits, from both larger woodchips and 'debris' as defined on p 134. These data are presented in Table 20: none of the wood from Etton could be classed as large timber (wood for building or structural purposes), and most of the listed pieces were split-down roundwood. Some were rather large to be strictly called woodchips, but were split down from roundwood of only moderate size (such as 150–200mm).

Table 19 Diameters of trimmed straight roundwood from ditch segment 3B (dimensions in mm)

uncompressed diameter	*0–10*	*10–20*	*20–30*	*30–40*	*40–50*	*50–60*	*60–70*	*70–80*	*80+*	*total*
numbers	–	1	3	2	–	–	–	–	–	6
% of total	–	16.67	50.00	33.33	–	–	–	–	–	100.00

standard deviation: 7.70
mean: 25.00

compressed (maximum) diameter	*0–10*	*10–20*	*20–30*	*30–40*	*40–50*	*50–60*	*60–70*	*70–80*	*80+*	*total*
numbers	–	1	1	–	–	–	–	–	–	2
% of total	–	50.00	50.00	–	–	–	–	–	–	100.00

standard deviation: 3.50
mean: 21.50

total number of diameters	8
% compressed	25.00
% uncompressed	75.00

Table 20 Distribution of types of splits of larger woodchips and splits of debris from enclosure ditch segments 1–6 and Etton Woodgate

Etton ditch segment	*1A*	*1B*	*2*	*3A*	*3B*	*4A*	*4B*	*5A*	*5B*	*5C*	*6*	*total*	*%*
probable/possible split	–	1	–	–	–	–	–	–	–	–	–	1	0.2
radial split	12	36	9	34	8	4	45	16	24	31	8	227	49.6
half split	11	17	3	4	–	1	1	2	6	3	2	50	10.9
tangential split	9	28	7	27	2	6	14	14	21	25	8	161	35.2
other splits	2	6	–	–	4	–	5	1	1	–	–	19	4.1
total	34	88	19	65	14	11	65	33	52	59	18	458	
% of total	7.4	19.2	4.1	14.2	3.1	2.4	14.2	7.2	11.4	12.9	3.9	100.0	

Etton Woodgate Neolithic ditch F132

	numbers	*%*
radial split	7	58.3
tangential split	5	41.7
total	12	100.0

Etton Woodgate Beaker pit F108

	numbers	*%*
radial split	22	45.8
half split	6	12.5
tangential split	20	41.7
total	48	100.0

Such material was far too small to be considered as timber, and there was very little evidence for the working of large roundwood to produce timber. Only four pieces were recorded as 'timber' or 'timber debris' (see below).

The largest group of split wood from Etton was 'radial' (that is, the log/roundwood was split along its radius), which accounted for nearly half the material; some 10.9% was formed by splitting roundwood in half (itself a form of radial split). The preponderance of radial splitting is what might be expected in situations where the diameter of the roundwood was not particularly large. Most species of wood will split more readily along the radius than the tangent.

Wood that is to be split tangentially is usually larger, and the technique is used to produce square timbers from large baulks of roundwood. Splitting tangentially off wood with a smaller diameter, combined with

Fig 156 An example of right-angled trimmed roundwood debris (Wood 395) from segment 1B, Phase 1A, possibly debris from hedge trimming. Scale with 10mm divisions

hewing, would probably be used to square up roundwood. Although the numbers of pieces were not very large (and it is difficult to draw firm conclusions from a small assemblage), it is interesting that most of the segments that produced the bulk of the tangentially split wood – 1B, 3A, 4B, 5A, and 5C – were also the segments that produced (small) quantities of larger roundwood (Figs 150, 151) and thick pieces of bark (Fig 142).

Right-angled wood

One important sub-group within the wider category of roundwood debris was right-angled wood. Although not particularly common, its shape was most distinctive, and it was quite frequently trimmed (Fig 156). It only occurred in the vicinity of the western entrance causeway B, and all examples could be dated to Phase 1A. The pieces are listed below by Wood number, segment, section, layer, grid reference, and diameter:

Wood 395: segment 1B, sections 13–14, layer 3, grid 37707310. Diameter 36mm (Fig 156).

Wood 1159: segment 2, causeway B–section 28, layer 4, grid 37667327. Diameter 15mm.

Wood 1192: segment 1B, sections 13–14, layer 4, grid 37727311. Diameter 44mm, tapering to 30mm.

Wood 1230: segment 1B, sections 13–14, layer 4, grid 37707311. Diameter 10mm.

Wood 1265: segment 2, causeway B–section 28, layer 4, grid 37667328. Diameter 90mm, tapering to 40mm.

Wood 1394: segment 3A, causeway C–section 35, layer 3, grid 37667339. Diameter 45mm.

Wood 2042: segment 3A, sections 35–39, layer 3, grid 37687344. No diameter recorded; one end trimmed and charred.

Wood 2955: segment 4A, causeway D–section 41, layer 3, grid 37717359. Diameter 10mm.

Fig 157 Part of an oak plank (Wood 3950), immediately after removal from the ground, showing fissures caused by drying out; there is a clear axe mark, lower right. Scale with 10mm divisions

These eight pieces exhibited a strong right-angled bend, a rare occurrence naturally. Such right-angled bends tend to develop where wood or root is damaged, and they are particularly associated with laying or trimming hedges (Jones 1978).

Products

Definition

The term timber has already been defined as wood suitable for building and structural purposes (standing trees, logs, or converted). In the present instance it is used to describe wood that has been converted from the round, usually by splitting, into a form suitable for use in joinery or a structure.

Artefacts are items that appear to be finished objects, or part of finished objects. There were very few artefacts of a recognisable form at Etton.

Timber

The enclosure ditch produced just two items of timber. Both were tangentially split oak planks, but both were also very small when compared, for example, with the timbers from the Sweet Track (Coles and Coles 1986, fig 10).

The best-preserved timber (Wood 3950) was from layer 3 in enclosure ditch segment 5, between sections 90 and 94, Phase 1A/1B (Figs 157, 158). It was tangentially split and trimmed square, with clear facets on one end. Overall dimensions were length 690mm, width 105mm, and thickness 26mm. The plank, or probably more

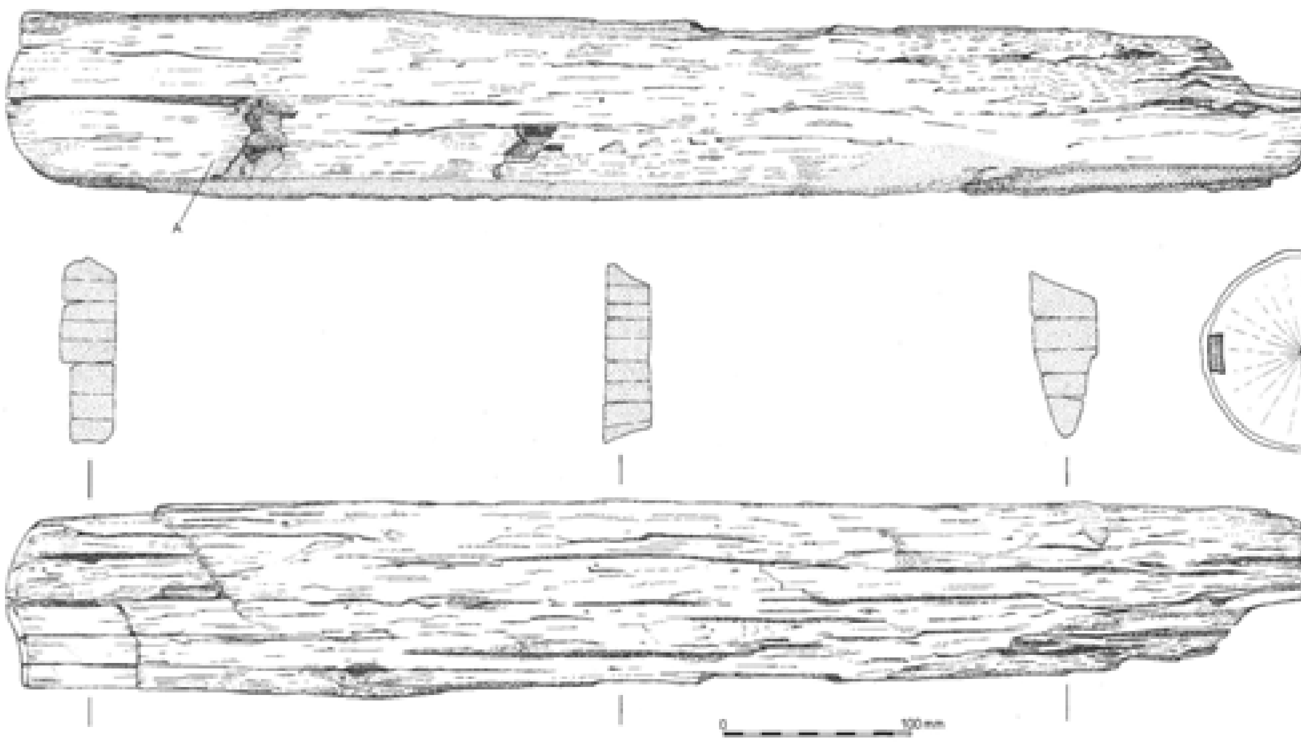


Fig 158 The two sides of a tangentially split oak timber (Wood 3950) from ditch segment 5. The upper view shows an axe impression (A)

Fig 159 Distribution of finds within ditch segment 1, between sections 1 and 4, layer 5, Phase 1A. The axe haft W409 is at the centre

accurately, the offcut from a plank, was hewn square, and the axe had bitten into the surface, leaving a clear impression. Unless a properly mounted adze is used, hewing (and especially a miss hit) can give rise to severe twisted or oblique stress that would lead to the type of damage that destroyed the Etton axe haft (see below).

A very poorly preserved oak plank was found beneath the two aurochs skulls in the Phase 2 pit in segment 12 (Fig 49). The wood could be identified as oak with some assurance (Francis Pryor personal communication), because the medullary rays were still clearly visible; these also showed that the plank had been tangentially split from a mature tree. Approximate dimensions were length 750mm, width 100–200mm, and thickness *c* 40mm). The plank, which was too decayed to lift, was not assigned a Wood number.

Artefacts and fragments

The enclosure ditch and the Phase 2 pit F953 in segment 6 yielded a total of 18 artefacts:

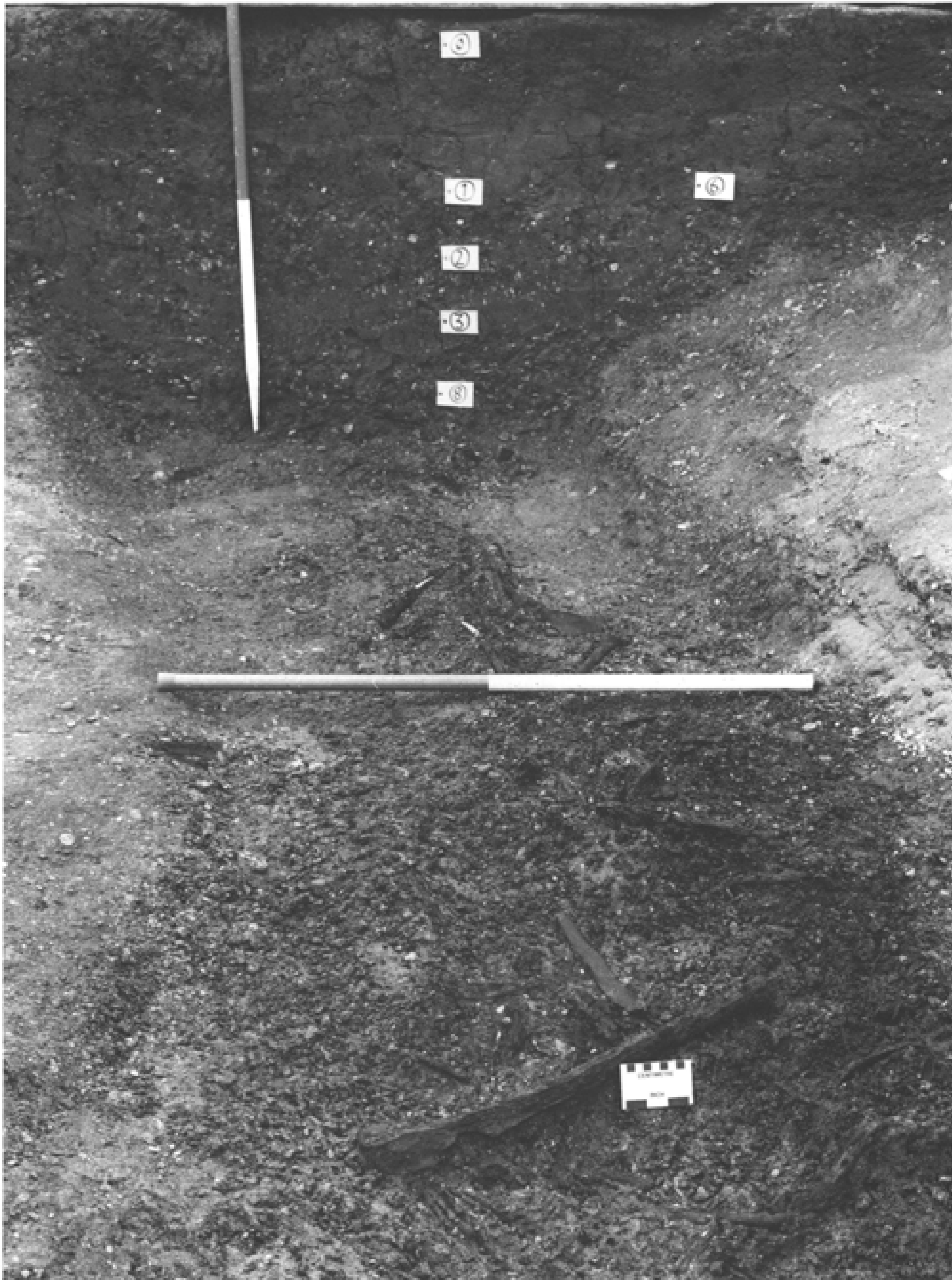


Fig 160 Wooden axe haft (W409) in situ *(foreground) in enclosure ditch segment 1, looking north-west from causeway A towards section 3*

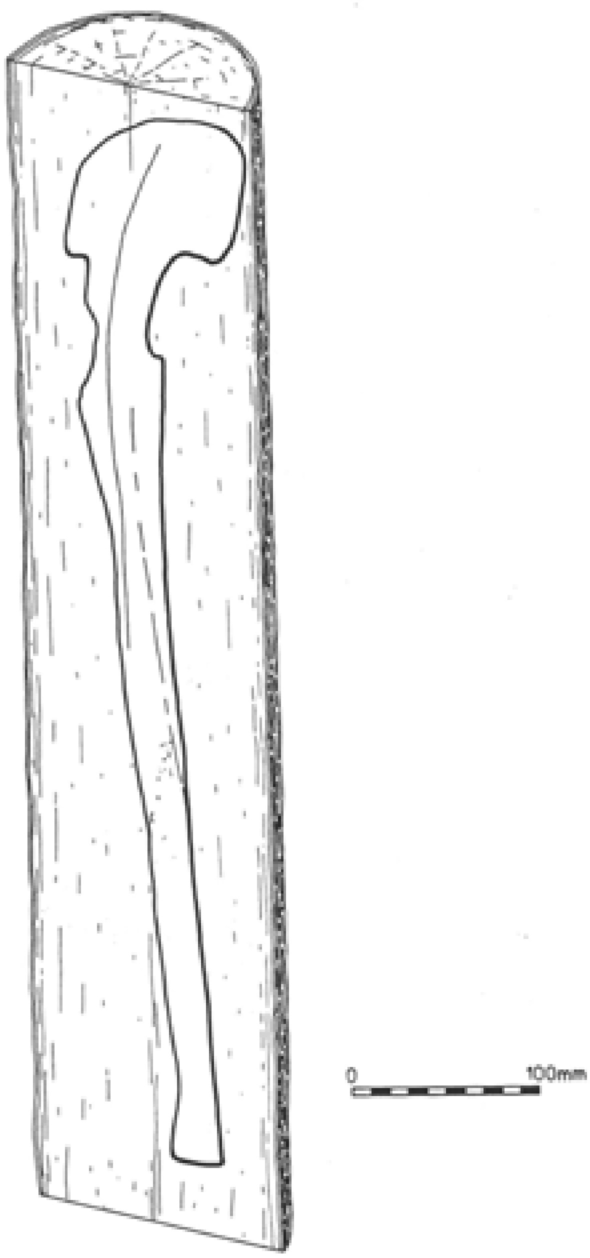


Fig 161 Diagram illustrating how the axe haft (Wood 409) was fashioned from a half-split log

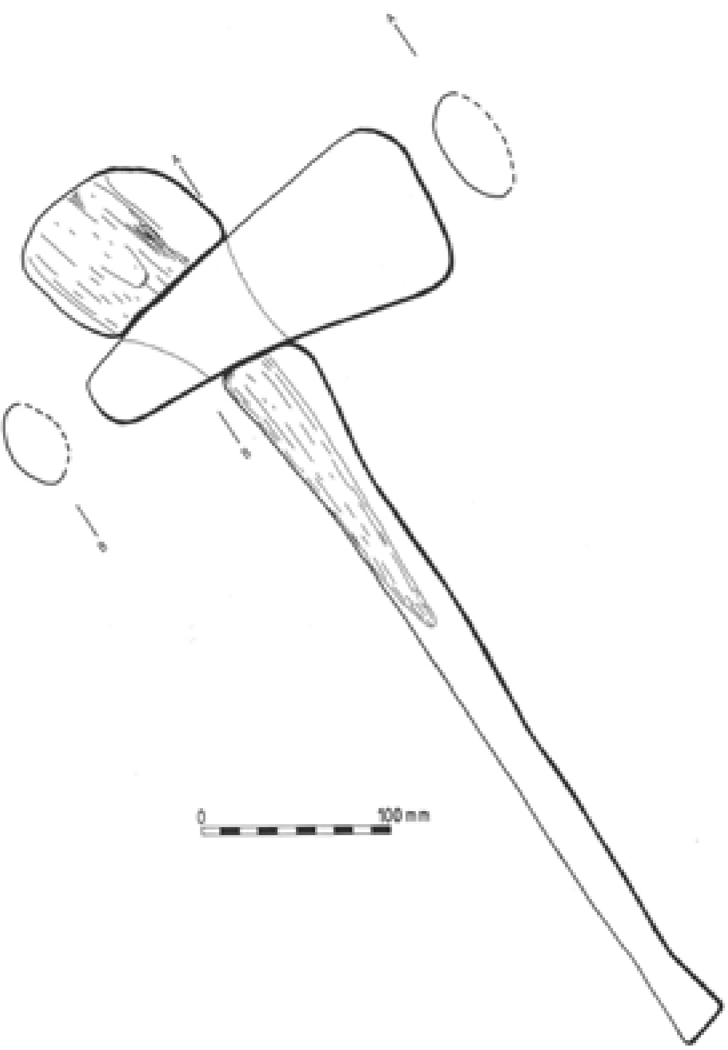


Fig 162 The complete axe haft (Wood 409) with a reconstructed stone axe head that conforms with the impression in the socket. The axe head could have been shorter or longer than shown here. The shaded area shows the scar left by the fragment that split off in antiquity. The dotted lines show the underlying haft

Axe haft

A wooden axe haft for a stone axe head (Wood 409) was found in 1982 in layer 8, sections 1–3, grid 37857292, in ditch segment 1A, Phase 1A (Figs 159, 160). It measured 560mm long, and the width of the head at its widest was 85mm; the diameter of the end of the handle was 20mm.

The axe haft was not sampled for identification before conservation (by freeze drying). It was very fragile and was difficult to sample. A very small (20 × 7 × 5mm) sliver of wood was subsequently removed from one of the cracks in the head of the haft. The wood was very degraded when excavated, and although the object came through conservation fairly well, the microscopic structure of the wood was adversely affected, making identification impossible without a very much larger sample. The wood appeared to be diffuse porous, which, it has been noted elsewhere, does not always survive the conservation process without damage to the woody structure (Earwood 1993, 213).

Being diffuse porous means that the haft was not made of oak, ash or elm. To judge by the volume of the rays and the strong radial collapse of the piece, it most probably originally had aggregate rays. The most commonly found wood at Etton that is both diffuse porous and has aggregate rays is alder.

The haft was shaped out of a half split log (Fig 161). The damaged side of the haft (where a fragment around the socket had split off) would have been nearest to the outside of the tree. Although the haft was not very well preserved, most of the visible damage had

Table 21 Axe hafts from Britain and Ireland

axe	*species*	*fabrication*
1 Edercloon, Co Longford	alder	–
2 'Co Monaghan'	pine	–
3 Maguire's Bridge, Co Fermanagh	rosaceous (apple)	–
4 Port Talbot, Glamorgan	birch	–
5 Solway Moss, Cumbria	rosaceous (apple or hawthorn)	shaped from quarter split
6 Ehrenside Tarn I, Cumbria	beech root	shaped from radial split; decorated
7 Ehrenside Tarn II, Cumbria	oak	–
8 Shulishader, Lewis	rosaceous (probably hawthorn)	shaped from quarter split; decorated
9 Coll, Lewis	rosaceous	–
10 Etton, Cambs	?alder	shaped from half split

sources: 1–5, Green 1978; 6–7, Darbyshire 1874; 8–10, Sheridan 1992

been caused by splitting through drying out. The surface of the haft between the splits was intact and showed no signs of faceting, but seemed to have been shaped by following the grain. An impression of the shape and size of the axe head was clearly preserved in the broken socket (Fig 162).

The haft was damaged before it was discarded by a clean longitudinal split. The split ran along the grain, through the socket that would have housed the axe head. This kind of damage has been recorded when difficulty had been encountered in removing an axe head from wood during use. Twisting the haft will result in it splitting longitudinally.

The methods employed to excavate and record the ditch deposits were very thorough, and every piece of wood, including small woodchips, was recorded. It is possible to say with some certainty that the piece of the axe haft that spalled off was not to be found in the immediate vicinity. This suggests, therefore, that the axe was not damaged in use in the precise area where it was found.

One of the interesting features of hafts for stone axes is the diversity of their form, fabrication methods, and the species of wood used (Table 21). The most common identification is of rosaceous wood, either hawthorn or apple (as at Maguire's Bridge, Solway Moss, Coll, and Shulishader). Others are recorded as alder, pine, birch, oak, and beech root (Darbyshire 1874). The identification of the Ehrenside Tarn I haft as beech root has been established in the literature for over 100 years. The haft was examined by the present author at The British Museum, but it was not possible to determine the species from the conserved piece. A determination of beech root would be controversial in any case, for reasons which have been clearly set down by Schweingrüber (1978, 186): 'Root wood can only in a very few cases be identified with absolute certitude because of a lack of uniform structure.' The Ehrenside Tarn haft was clearly fabricated from a radially split timber, with the axe head mounted in such a way that the cutting edge would have been pointing towards the centre of the tree. Root wood does not split so readily or in so regular a pattern.

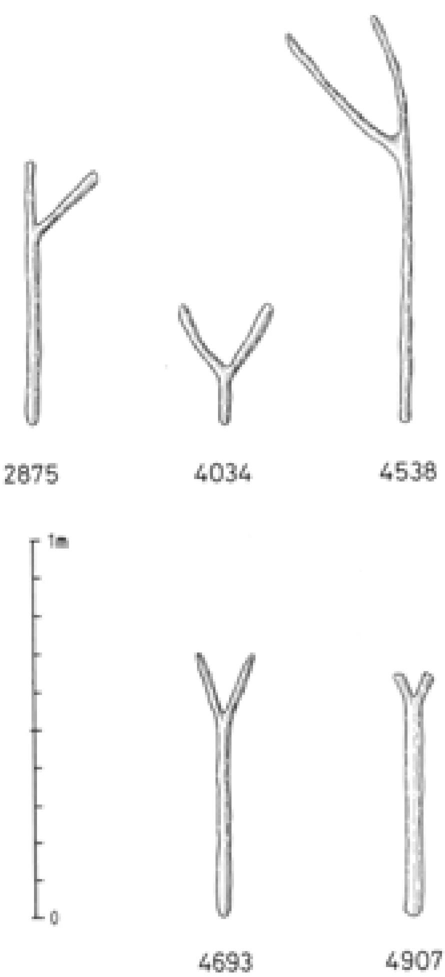


Fig 163 Wooden forks found in the enclosure ditch

All the hafts that have been examined by the author had been fabricated from split wood (Table 21). Two were decorated: one from Ehrenside Tarn has spiral cuts and ridges, and the Shulishader haft has beautifully executed fluting, probably carved with a stone axe (Sheridan 1992, 198–201; Taylor forthcoming).

Forks

Five forks or possible forks were found (Fig 163). None of the pieces classed here as 'forks' were highly fashioned, sophisticated tools, and they came in a variety of shapes and sizes. There was no evidence that they were anything more than fortuitous pieces that were trimmed up and possibly used during coppicing work. A relatively short-handled fork (600–700mm), with short prongs (60–160mm), might be a very useful tool in this context. There is no evidence for the purposeful altering of the growth pattern to produce a strong fork shape; these pieces had been trimmed, and extra side shoots removed, to leave the best shape available. They were probably used and discarded in the ditch close by. Alternatively they may have been 'rejects'. It is not apparent why they should be concentrated in segments 4 and 5:

Wood 2875: length 700mm; length of prongs 220mm and 190mm; diameter 26mm. Handle end trimmed from one direction; no detail of working survived on prongs; oak (*Quercus* sp). Segment 4A, causeway D–section 41, layer 3, grid 37717359; Phase 1A.

Wood 4034: length 330mm; length of prong 190mm; diameter 22mm. Ends of prongs trimmed from one direction. Segment 5B, sections 85–89, layer 3, grid 38047401; Phase 1A.

Wood 4538: length 1.08mm; length of prongs 330mm and 360mm; diameter of handle 26mm; diameter of prongs 18mm. One prong trimmed from one direction; some evidence for the removal of extra side shoots. The other prong and handle end were too dry for the fabrication detail to survive. Segment 5C, sections 135–136, layer 3, grid 38297417; Phase 1A.

Wood 4693: length 700mm; length of prongs 160mm; diameter of handle 38mm; diameter of prongs 22mm. One prong trimmed from two directions to a chisel shape; the other prong and handle were too decayed for the trimming detail to survive. This fork is visible, top right, in Figure 139. Segment 5C, sections 146–150, layer 3, grid 38417425; Phase 1A.

Wood 4907: length 640mm; length of prongs 60mm; diameter of handle 42mm (25mm compressed). Both prongs trimmed from one direction, handle end trimmed from two directions. Pit F953 in segment 6 at sections 172–176, layer 6, grid 38787428; Phase 2.

Bowls and vessels

Description

Four bowls and one other possible vessel fragment were found:

Wood 614: length 165mm, width 52mm, thickness 25mm. Small fragment identified in the field as a possible rim of a vessel (Fig 164). This object has not been seen after conservation and is not included in the discussion below. Segment 1B, sections 13–14, layer 2, grid 37727311; Phase 1B.

Wood 4885: length 200mm, width 13mm, thickness 18mm. Bowl fragment of alder (*Alnus glutinosa*). Pit F953 in segment 6 at sections 172–176, layer 6, grid 38787427; Phase 2.

Fig 164 Possible rim fragment of a wooden vessel (Wood 614), in situ *in ditch segment 1, between sections 13 and 14, layer 2 (Phase 1B)*

Wood 4905: length 165mm, width 85mm, thickness 10mm. Bowl fragment of alder (*Alnus glutinosa*). Pit F953 in segment 6 at sections 172–176, layer 6, grid 38787428; Phase 2.

Wood 4954: length 110mm, width 27mm, thickness 11mm. Bowl fragment of alder (*Alnus glutinosa*). Pit F953 in segment 6 at sections 172–176, layer 6, grid 38797429; Phase 2.

Wood 4960: length 76mm, width 65m, thickness 10mm. Bowl fragment of alder (*Alnus glutinosa*). Pit F953 in segment 6 at sections 172–176, layer 6, grid 38797428; Phase 2.

The four bowl fragments (Wood 4885, 4905, 4954, and 4060) derived from Phase 2 pit F953 in ditch segment 6. They may well have formed part of a structured deposit at the bottom of the pit.

The profile of the first bowl (Wood 4885) is complete (Fig 165). The form is very simple: it has low, straight, and slightly incurving sides and a flat bottom. In plan it is more oval than round. The shape of this vessel appears to have been dictated by the grain of the wood, rather than any attempt to mimic pottery. The top of the rim was marked by transverse cuts that recall rimtop decoration of Peterborough and Mildenhall pottery styles. The oval shape, rimtop decoration, low sides, and flat base of this wooden bowl are closely paralleled by a pottery vessel from Heathrow (Grimes 1960, fig 78). No other close pottery parallels are known from Britain (Ian Kinnes personal communication). In this instance it is probable that the pottery vessel from Heathrow was a skeuomorph of a wooden original.

Although only a small fragment survives, the rim and shoulder forms of the next bowl (Wood 4954) are more interesting (Fig 166). Again, this shape appears to have been made more in response to the grain and quality of the wood, rather than any effort to copy pottery. The simple, slightly pointed rim form does not find many parallels in the ceramic repertoire. The apparent 'collar' below the rim would appear to be an attempt to accommodate an irregularity in the grain.

Another bowl (Wood 4960) is different again (Fig 167) and would appear to have certain points in common with ceramic vessels. The chamfer (to use the

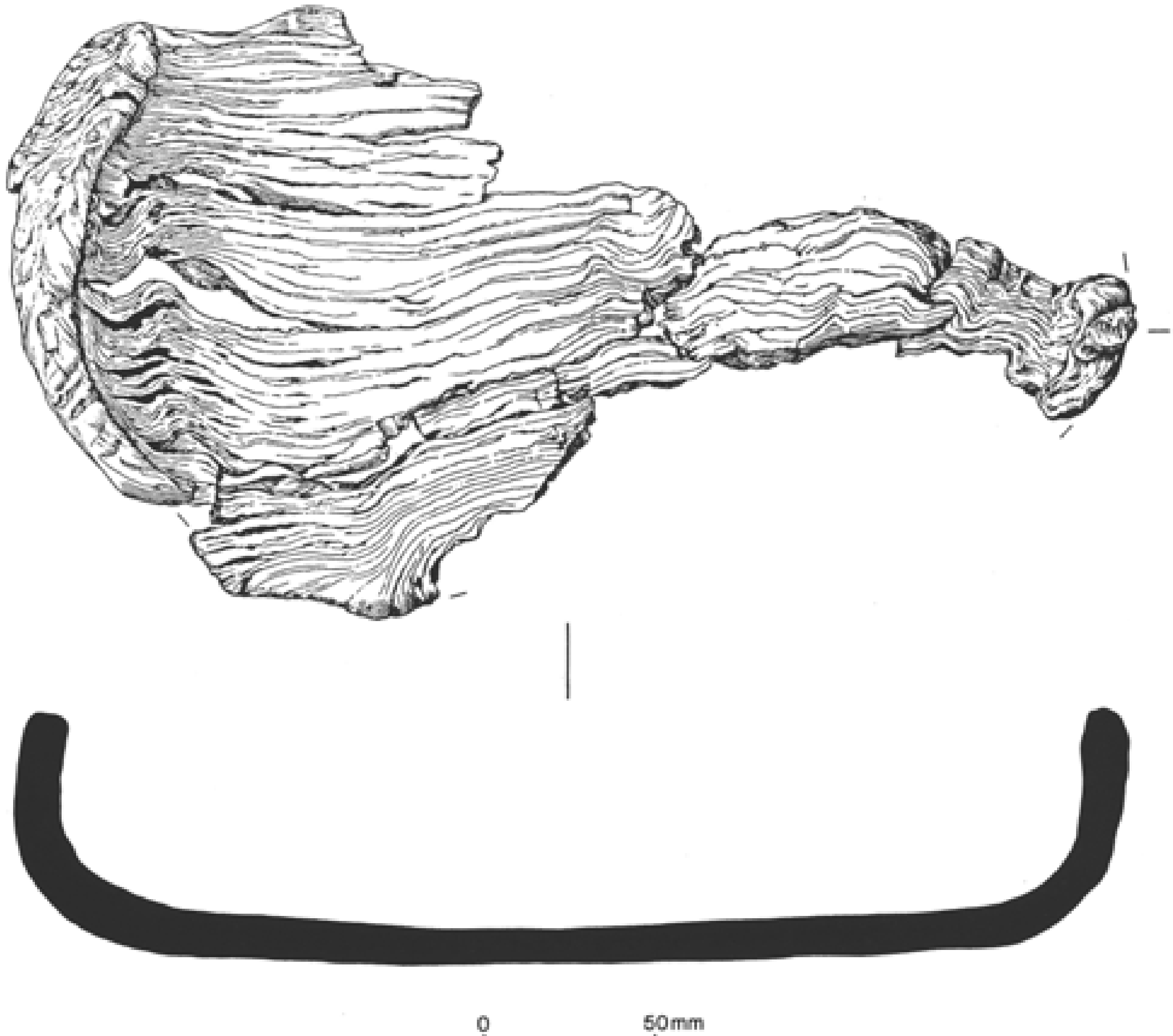


Fig 165 Part of wooden bowl (Wood 4885) from the Phase 2 pit F953, in ditch segment 6

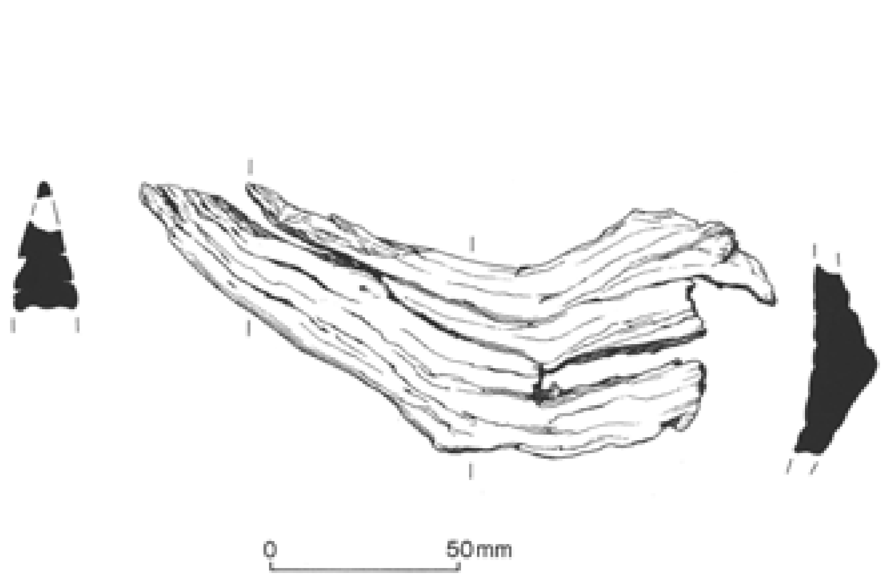


Fig 166 Fragment of wooden bowl (Wood 4954) from the Phase 2 pit F953, in ditch segment 6

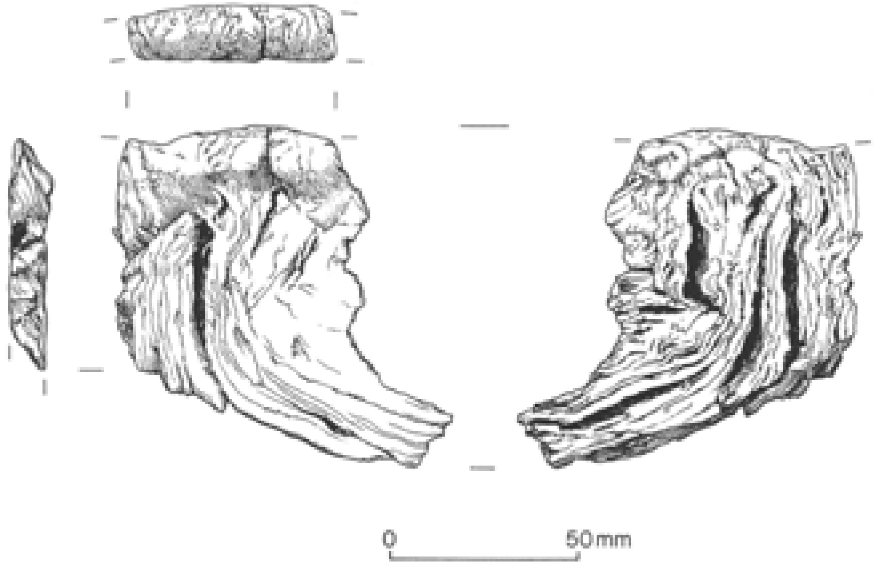


Fig 167 Fragment of wooden bowl (Wood 4960) from the Phase 2 pit F953, in ditch segment 6

woodworking term) of the rim recalls later Neolithic ceramic styles. Very slight traces of transverse 'decoration' are on the surface of the bevelled rim (to use the ceramic term) and just below the slight 'lip' on the interior. These could, however, be toolmarks left in the ordinary process of finishing.

A fourth bowl fragment (Wood 4905) is part of a simple, plain, deep bowl (Fig 168) that must surely be copying pottery (compare, for example, Clark *et al* 1960, fig 22, P29).

Production methods

All the bowl fragments suggest a closely similar method of fabrication. All are of alder and have the swirling and gnarled grain pattern of the coppice stool. The large pieces show clear signs of light charring, and there are fine toolmarks on some charred surfaces, especially near the rims. It seems most likely that they were made by lightly charring a chunk of alder coppice stool and then scraping away the charcoal (alder wood ash is especially fine and powdery). None of the surviving toolmarks appears to have been made by a stone axe, nor does an axe seem necessarily the best tool for the job. There are only very slight marks on the bowls, which were either scraped or finely abraded as part of the finishing process.

Although there is plenty of evidence for coppicing in segment 5, little survives of the actual stools (Taylor 1988). This might be explained if the stools were being chopped into large pieces to provide the raw material for bowl production. The natural shape of the stool would provide chunks of wood that could, with relative ease, be shaped into a bowl or vessel. This is clearly shown in Figures 169 and 170, which illustrate a fragment that had been chopped and then pulled away from the parent stool. The large scar already resembles a bowl and would have required relatively little work to fashion into a vessel.

Much evidence exists from later periods that burr wood was favoured for the production of bowls. Wood from a coppice stool might well be favoured for similar reasons. The swirled grain not only looks very attractive, but it is also less prone to split or shear on seasoning. Burr wood comprises abnormal growth or excrescences and is common to most trees, especially those that can reproduce by stooling (Corkhill 1979, 69).

Comparisons

Wooden Neolithic bowls and vessels are so rare in England that it is difficult to draw useful comparisons. The simple round-based bowl from Tirkernaghan, Co

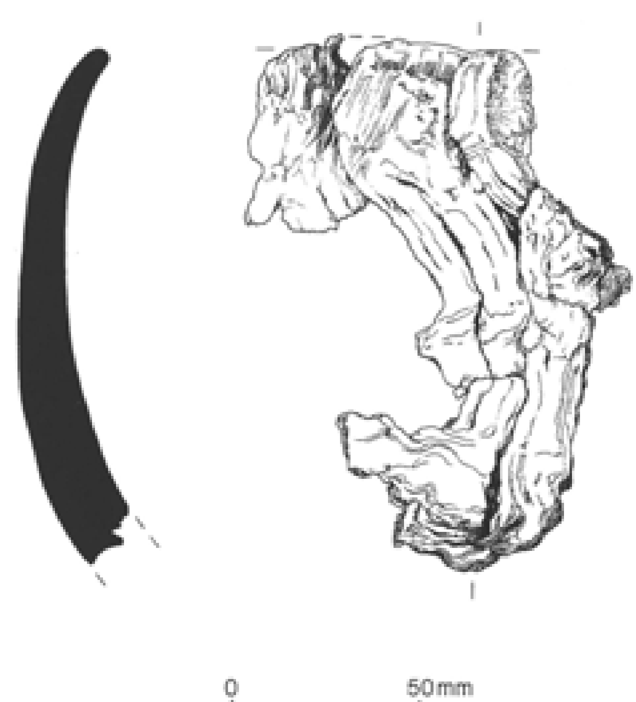


Fig 168 Fragment of wooden bowl (Wood 4905) from the Phase 2 pit F953, in ditch segment 6

Fig 169 Fragment of a coppice stool of alder (Wood 215) from segment 1, Phase 1A, showing the stumps of three chopped rods and the gnarled surface of the stool

Fig 170 Fragment of a coppice stool of alder (Wood 215) showing the scar where a piece was wrenched off the stool. Note how this scar naturally forms a bowl shape – this was probably how the wood used to form the smaller bowls (such as in Fig 167) was selected

Tyrone (Earwood 1993, fig 18) has a date range of 2870–2145 cal BC (OxA-3013, 3690 ± 100 BP), while the deposit from which the Etton bowls derived gave a range of 2135–2030 cal BC (BM-2891, 3680 ± 35 BP). There are archaeological grounds, however, to suggest that the Etton date is perhaps slightly younger than expected (Chapter 16, p 351).

One of the bowl fragments from Etton was large enough to give a complete profile (Fig 165). A comparison of this profile with the Tirkernaghan example shows that the two bowls are vaguely similar, but that the Etton bowl is less rounded and more shallow. All the Etton bowls, like the simple bowl from Tirkernaghan, are of alder.

Earwood raises the point that wooden bowls may or may not imitate contemporary pottery and illustrates this with some wooden polypod bowls from Ireland (ibid, 40 and fig 18). The rarity of wooden vessels may to some extent be due to difficulties of recognition, especially where preservation quality is not good. Partly because of the method of fabrication, the rims of the Etton bowls were particularly well preserved, allowing comparison with pottery forms. If the wooden bowls were also 'burnished' black because of the method of manufacture, then they may well have looked very like pottery of the same shape and size.

It is possible, not to say probable, that wooden bowls were sometimes made in imitation of pottery. It is also possible, but much more difficult to prove because of the lack of material, that pottery was sometimes made in imitation of wooden forms. One ceramic vessel at Etton (Fig 178, M39) was almost certainly a skeuomorph of a basketry or stitched bark container. An unusual, oval, flat-based ceramic bowl from Heathrow (Grimes 1960, fig 78) strongly resembles the largest wooden vessel from Etton (Fig 165), which might suggest that this type of oval wooden bowl was of more widespread distribution. The pottery vessel from Heathrow was found in closed contexts, in direct association with Peterborough pottery.

The two media of wood and pottery are very different to work. Clay is plastic and can be formed into many different and varied shapes. Wood on the other hand, because of its physiology, has planes of strength and weakness that an experienced woodworker can exploit. The four wooden bowl fragments from Etton are all of quite different forms. The way that they were shaped suggests that the character and grain of the wood were more important to the craftsman than a predetermined shape derived from pottery. Where the raw material was suitable, the shape does indeed resemble pottery, but the qualities of the wood were not sacrificed in order to produce a sub-standard pottery skeuomorph. For these reasons we can conclude that the bowls placed in the pit may have been 'offerings', but they were also attractive, well-finished vessels of high quality and practical utility.

Heel points

Five heel points were found. This new category of possible artefact type will discussed below:

Wood 313: length 232mm, diameter (at base) 23/28mm. Segment 1B, sections 13–14, layer 2, grid 37707310; Phase 1B (Fig 171, upper).

Wood 425: length 160mm, diameter (at base) 26mm. Field maple (*Acer campestre*). Segment 1B, sections 13–14, layer 2, grid 37727311; Phase 1B (Fig 171, lower).

Wood 755: length 230mm, diameter (at base) 22mm. Segment 1B, sections 10–12, layer 3, grid 37737309; Phase 1B.

Wood 2669: length 220mm, diameter (at base) 23mm. Segment 3B, causeway D–section 40, layer 3, grid 37697352; Phase 1A.

Wood 2930: length 210mm, diameter (at base) 30mm. Segment 4A, causeway D–section 41, layer 3, grid 37707359; Phase 1A.

Fig 171 Two heel points from segment 1B, layer 2, Phase 1B: Wood 313 (above) and Wood 425 (below)

Heel points are artefacts with a rounded, pistol-like grip formed from the heel and with a carefully fashioned point. They were made from part of the stem of coppiced stools. The heel is the point where a branch attaches to the trunk or another branch; it is characterised by a slight swelling, and the texture of the wood is often harder and more dense. Four of the points were made from closely similar stems, varying in length from 160 to 232mm. The diameters of the original stems are difficult to estimate because of the shaping of the point, but seem to vary from 23 to 30mm. The heel point W755 is slightly smaller than the others, and the point was slightly decayed. All heel points came from segments 1 to 4 of the enclosure ditch. Although there was plenty of coppiced wood with heels in the other segments (Fig 140), none possessed the carefully made point.

Only heel point Wood 425 (Fig 171, lower) was sufficiently well preserved for possible wear to be apparent. The 'polish' on the heel was in keeping with the use of that part of the artefact as a pistol-like handle. The point was slightly flattened, with light scoring on the flat surface.

Artefacts of bark

Two large, thin pieces of birch bark were found in the enclosure ditch:

Wood 184: approximately 300mm square. Birch bark mat under M3 – birch (*Betula* sp). Segment 1A, causeway A–section 1, layer 3, grid 37897920; Phase 1C.

Wood 1271: length 1460mm, breadth 550mm; thickness varied from 3mm to 7mm. Sheet of bark – birch (*Betula* sp). Segment 2, causeway B–section 28, layer 4, grid 37677328; Phase 1A.

The smaller piece (Wood 184) was used as a mat under the complete bowl M3 in the ditch segment 1A, Phase 1C, butt-end deposit at causeway A, and the other (Wood 1271) was a large, folded sheet found in segment 2 (Phase 1A). The first piece was in very poor condition when it was originally observed in the ground. It was lifted in a block with the pot and was transported to The British Museum for conservation.

The second piece of bark W1271 was lying in the bottom of the enclosure ditch (Fig 133) in an area that was deep and wet and seemed to have been kept reasonably clear of detritus; it had been partly folded over

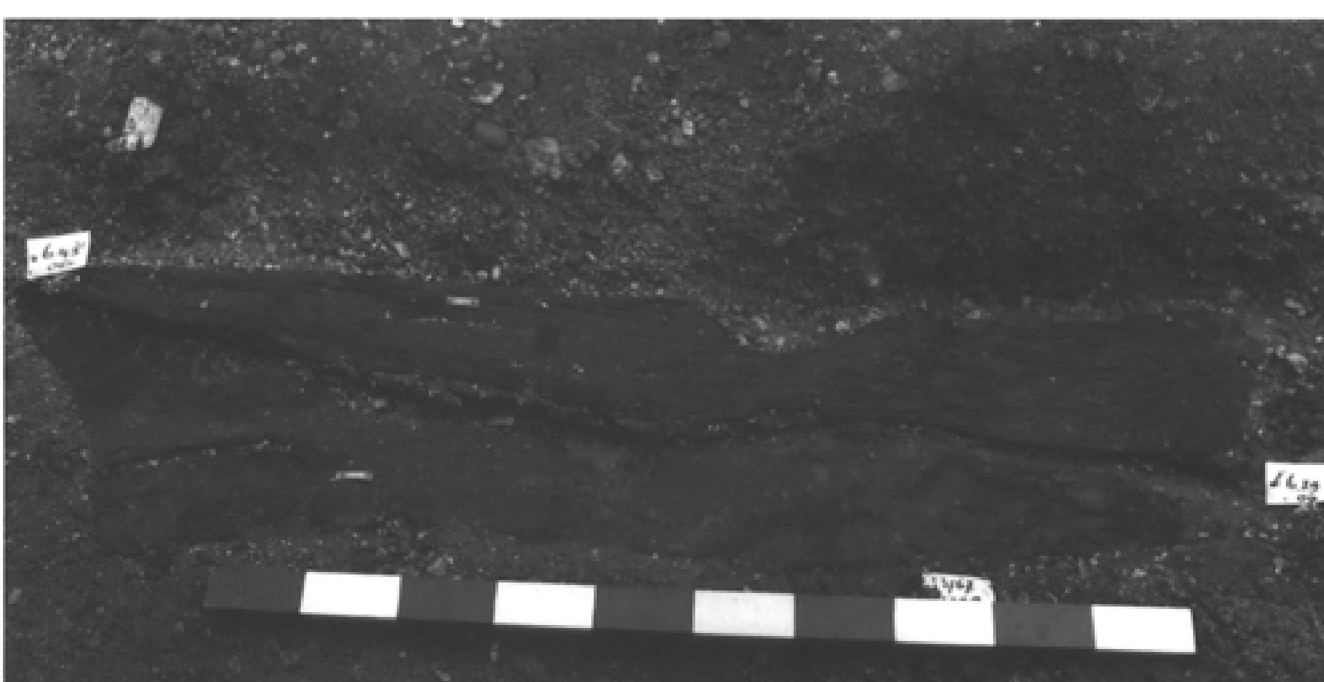


Fig 172 Folded sheet of birch bark (Wood 1271) in situ, *lying on the enclosure ditch bottom, segment 2, between causeway B and section 28. 1m scale*

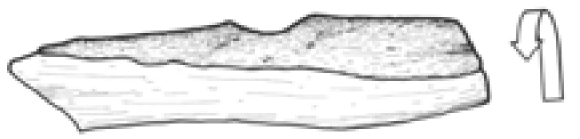


Fig 173 Diagram indicating how the birch bark sheet (Wood 1271) from enclosure ditch segment 2 had been folded

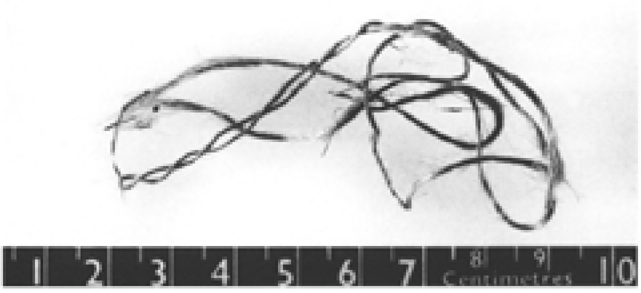


Fig 174 Vegetable-fibre twine from enclosure ditch segment 2 at causeway B. Photograph by courtesy of the Trustees of The British Museum

(Figs 172, 173). It was very thin and delicate and was cemented to the gravel of the ditch bottom by iron pan that had formed post-depositionally. Despite our best efforts it failed to survive the lifting process.

Birch bark has occurred in a number of contexts in the archaeological record. A common use of bark in Scandinavia and central Europe was as a waterproof floor covering; it was also used for wrappers and containers (Zvelebil 1987). There is now some evidence for the uses of bark from the British Neolithic: two sewn bark boxes were excavated at Manor Farm, Horton, Berkshire, and the wooden base of a sewn bark box was discovered at Runnymede Bridge (Earwood 1993, 42). Bark boxes were made by sewing a ring of bark to a base, and they sometimes possessed lids.

The large sheet of bark from the enclosure ditch at Etton had been carefully cut square and folded, but did not appear to have been modified in any other way, such as by beating. Repeated beating, folding, and soaking are part of the process recorded from ethnographic contexts in North America to soften birch bark prior to use in the manufacture of 'cloth', canoes, and containers (Stewart 1973, 122); the unmodified sheet in the enlarged and pit-like deepened ditch in segment 2 could have been the raw material for any of these items. The size of the piece suggests a tree with a minimum diameter of 180mm. The bark of a larger tree would have begun to grow corky and would not therefore have been suitable for making into sheets. In its unmodified state, this large piece of bark must represent a valuable commodity.

Twine

A single piece of vegetable-fibre twine was found in layer 4 (Phase 1A) of enclosure ditch segment 2, at the butt end, close by causeway B (Figs 133, 174). It was found in a fist-sized bundle, and the fibres were pliant and flexible. The bundle was unravelled at The British Museum. The length of the twine is 560mm. Identification of the source material was undertaken by Caroline Cartwright at the British Museum. Using optical microscopy the twine was identified as *Linum usitatissimum*, flax.

The twine exhibited an 'S' twist, and was twisted back on itself. Small pieces of detritus and connective tissue were still attached. One end was less heavily twisted and had 'ragged' ends that gradually tailed off. This end was coarser and had more detritus. The other end was twisted almost to the end, and the fibres had been frayed or matted together. This suggests that the length of twine is possibly complete; it does not appear to have been cut. Its appearance also suggests that it had just been made and had never been used.

Discussion

The wood found in the waterlogged deposits of the enclosure ditch was largely confined within segments 1–6; with the exception of Phase 2 pits in segments 6 and 12, it can be dated to Phases 1A and 1B. The waterlogged deposits in segments 1 and 2 showed some evidence for recutting – two episodes of recutting can be seen in Figure 130. Actual disturbance or truncation was very rare. Material from the waterlogged enclosure ditch deposits of Phase 1 can therefore be safely regarded as a homogeneous context that probably accumulated over a relatively short period of time (see Chapter 16, p 353).

The enclosure ditch yielded some 5200 individually numbered pieces of wood, of which about 400 (7.69%) could not be reliably assigned to any of the categories in Table 10. Some 4800 pieces from the enclosure ditch were either worked or had probably been managed by people in one way or another. Only around 1200 pieces were entirely 'natural' and apparently unaltered or unaffected by human intervention. By any standards these figures must represent an extraordinarily high proportion of worked to 'natural': some 4 to 1.

Clearance of enclosure ditch

There was clear evidence that the enclosure was used episodically, and yet the ditch contained only a small amount of natural brushwood; this must surely indicate that it was either kept reasonably clear of scrub and debris all year round, or was thoroughly cleared out when meetings took place. If the latter was the case, then it is remarkable that the many bone deposits, and especially the partial skeletons, were not also cleared away, and that such delicate structured deposits as the birch bark sheet (segment 2 at causeway B), the bundle of cattle ribs (segment 1 at causeway B), and the complete bowl on a birch bark mat (segment 1 at causeway A) were not trampled or damaged. This would suggest that the ditch and the area around it were not allowed to revert or 'grow wild' between major episodes of use.

Woodchips

The woodworking that took place within and around the enclosure ditch was of smaller roundwood, most probably derived from coppices, which themselves grew in and around the ditch. Study of the woodchips (Figs 147, 149, B) suggests that slender 'blade-like' woodchips (Fig 146) predominated throughout the site as a whole, but they were somewhat more significant in segments 1B, 2, 3A, and 5A. Shorter, squatter woodchips (Fig 145) were found in segments 1A and 4. Segments 5B, 5C, and 6 produced both.

The longer, narrower woodchips were produced by an oblique blow that might be used, for example, to sever pliant rods from a growing coppice (Brooks and Agate 1975, 75). The shorter, squatter chips might indicate secondary working. The point to be stressed is that the differences were clearly defined: the assemblage was not a homogeneous spread of similarly shaped and sized material that might result from periodic clearing out of the entire arc by gang labour.

Straight roundwood

The straight roundwood was probably obtained from coppices in and around the ditch. Most of this material was very short indeed, and very few full-length rods had been left in the ditch; the rest had been removed, doubtless to be fashioned into hurdles, biers, screens, and other items associated with the rites and rituals that took place within the enclosure.

Bark

The presence of thick, corky bark within the ditch (Fig 142) cannot be explained straightforwardly; most was found in segment 5, but especially in 5B and 5C. Ditch segment 5 yielded a high proportion of tangential splits and sapwood/bark trimming debris, despite its shallow depth and otherwise quite small wood assemblage (Tables 16, 20). Such splits and debris are usually the result of reducing timber, or in the present instance, larger roundwood. The only substantial piece of 'real' timber from the western arc of the enclosure ditch – the tangentially split oak plank (Fig 158) – also came from segment 5. The thick pieces of bark undoubtedly came from mature, even large, trees and could either have been brought to the enclosure as bark, perhaps for tanning, or else they fell from roundwood timbers that were being worked on in the ditch.

Large, squared-up (probably oak) timbers formed an important component of Neolithic ceremonial monuments in the region. The continuous massive wall or revetment of the oval barrow in the Maxey henge complex was a fine example, but slightly later (Pryor and French 1985, 62). The Phase 1A gateway immediately inside the entrance causeway F was formed from squared-up timbers, as was the single post within feature F251. Both were located close to segment 5. It is possible that timber felled in the winter could have been stored in the long, wet ditch segment 5 to prevent it from seasoning over summer, should it be required for use in ceremonies in the autumn. Seasoned wood will not split readily, and so the production of squared posts would be very much more difficult. Bark would certainly drop off if roundwood timber were occasionally stored in segment 5; whatever the explanation, the absence, or near absence, of timber offcuts or timber woodchips from the enclosure ditch is still most remarkable.

Unlike ditch segments of the eastern arc, those of the west were not subject to rapid or regular backfilling. Segment 1 required periodic cleaning out, but fortunately much of this activity (which took place in Phases 1C and 2) did not penetrate into the Phase 1A/1B deposits at the base of the ditch. The close similarity of woodchips from segments 1B and 3A might possibly suggest that the intervening ditch segment 2 was a later addition and that the 'entrance causeway' B had originally been much wider. Except for a pit-like deepening at its southern end (which held a large birch bark sheet), segment 2 was shallower than others and did not produce a large assemblage of wood.

The wood assemblage was generally spread evenly along the ditch, with very few obvious structured deposits. The birch bark sheet of segment 2 lay directly on the bottom of the ditch, and a piece of vegetable-fibre twine lay (or had been placed) close to it, but at a slightly higher level. It is tempting to suggest that the pit-like enlargement of segment 2 was deliberately dug down to the groundwater table to provide a natural 'tank' in which bark could be soaked and softened, either to produce sheets or to free up bast fibres. A small birch bark mat had been placed beneath the complete Mildenhall bowl (M3) that had been positioned at the extended butt end of segment 1 at causeway A. This extension can be dated, perhaps like segment 2, to a late episode of Phase 1; there is no evidence for the working of bark to produce sheets or twine in Phase 1A.

Axe haft

The discovery of an axe haft in segment 1A (Fig 162) is of particular interest. The stone axe itself was missing, and part of the head of the haft had split away, perhaps when the tool was either twisted or had struck a glancing blow. The wooden haft lay at an angle in the ditch bottom, presumably discarded close to where it had broken. Nothing about its position in the ditch suggested that it was part of a deliberately arranged or structured deposit. Given the treatment of stone axes (see Chapter 7), it might appear that Neolithic communities regarded axes and their hafts very differently.

An alternative explanation is that certain axes within the working environment were treated as tools, but outside that environment they played a different role.

Bowls

Four wooden bowls were found at the bottom of the large Phase 2 pit F953 in ditch segment 6, close to sections 172 and 176 (Figs 165–168). They had been fashioned from very gnarled 'burr' wood of common alder (*Alnus glutinosa*); this source material was probably derived from coppice stools. Suitable coppice stools of alder, some of which had been hacked with axes to remove burred wood, were found nearby in segment 5. The bowls has been fashioned by charring and chipping away the charred wood, and at least one was a clear skeuomorph of a Peterborough pottery bowl. Alder wood burns with a fine ash and is very resistant to rot, and it is possible that the charred wood and ash were rubbed into the exterior surface to give a fine, lustrous, 'burnished' finish to these vessels.

It is perhaps just possible to discern a tendency that the woodworking at Etton was becoming more specialised towards the latter part of Phase 1 and into Phase 2. Much, however, depends upon the precise dating of segment 2: if it was indeed dug later than the segments on either side, then such an argument can perhaps be sustained.

Use of enclosure

Finally, it remains to be considered when the ditch and the enclosure were used. There is no evidence to suggest that the ditch and the enclosure were used permanently – all year round – for woodworking. The quantities of woodchips and other debris are simply far too small. Examination of coppiced roundwood during species identification showed that the final growth rings of many samples had been truncated. This indicates that the wood had been harvested well before the completion of the year's growth, in late summer or autumn when the leaves would still have been green. Bark, on the other hand, separates best from the trunk when the sap is flowing freely, in the spring or early summer. Perhaps dispersed heaps of hazelnuts and sloe stones in segments 1 and 2 indicate that visits to Etton took place later in the autumn as well.

The general cleanliness of the ditch suggests that the site was not abandoned completely for extended periods. Taken together it would appear that the woodworking represented by deposits in the western arc occurred episodically, but possibly quite often – perhaps more than once a year, and at different times of the year.

A note on the wood from Etton Woodgate

The wood assemblage from Etton Woodgate was too small to merit detailed statistical analysis (Microfiche table 41). During excavation the subjective impression was that the Beaker period pit or water-hole and the earlier Neolithic ditch contained assemblages that differed qualitatively from each other. Wood from the ditch was far drier than that from the more water-retentive filling of the pit, but both lay west of the causewayed enclosure and well within the quarry, which had been dewatered for at least two months prior to archaeological excavation (French and Pryor forthcoming). The qualitative difference could not be attributed to post-depositional factors alone.

The assemblage from the earlier Neolithic ditch was smaller than that from the pit and in general terms resembled wood from the causewayed enclosure ditch. It was too small to allow statistical comparisons to be drawn.

The Beaker period pit included large quantities of charcoal, and there were indications that wood had been burnt and quenched and the charcoal hacked off with an axe. Evidence for burning around the edge of the pit included an oven-like structure. The roundwood assemblage was small, but the woodchips showed a distinct preference for short, squat, and rather thick shapes (Fig 147; Microfiche table 13).

5 The pottery

by Ian Kinnes

Introduction

The large assemblage of Neolithic pottery from Etton is of great importance, and the catalogue is therefore detailed; it also includes a discussion of some Beaker and earlier Bronze Age material. Every effort has been made to present information in a concise manner. The initial sorting and examination were carried out by Kasia Gdaniec, who also raised the comprehensive sherd-by-sherd computer record, using the Maxarc software suite (files EPOT3.BDF); a printout of these records is housed with the pottery in The British Museum. Ian Kinnes provided the final identifications and prepared the text of the catalogue. The catalogue is followed by a discussion of the entire assemblage and its regional affinities. The chapter concludes with a brief review of the later prehistoric and Romano-British pottery.

Editor's note

During the excavation of Etton, pottery sherds were assigned pot find numbers as they were cleaned and processed. During post-excavation analysis, the specialist report used a separate numbering system according to the type of pottery (eg Mildenhall, Fengate). The latter numbering system is also applied to the selective pot drawings.

To enable the reader to correlate the pottery descriptions with the field plans, two concordance lists, one for field number : illustration number and one for illustration number : field number, are provided in Appendix 3.

Catalogue of Neolithic and earlier Bronze Age pottery

based on data provided by Kasia Gdaniec

Layout of entries

The entries are listed by ceramic style in presumed chronological sequence. Numbering follows the enclosure ditch circuit from west to east by excavated section and layer sequence, and then internal features. Appendix 1 should be consulted for further details about individual features.

Pot number prefix

The illustrated Neolithic and Bronze Age pottery has been arranged in eight groups. The pottery is numbered (from 1) within each group, and each Pot number has a prefix, denoting its group: M, Mildenhall; E, Ebbsfleet; PR, Peterborough; FG, Fengate; GW, Grooved Ware; B, Beaker; EBA, Early Bronze Age; U, unknown or uncertain affinities. For example, M195 is pot number 195 within the Mildenhall group.

Part of vessel

The following parts of the vessel are described: body, base, collar, interior, lug, neck, rim, and shoulder. In the Mildenhall series, rims are qualified by form: simple, rolled over, externally thickened, expanded, T-shaped, and inturned.

Fabric

Seven main fabric types were identified: shell (fine, fine/medium, medium/coarse, and coarse); flint/shell (crushed flint, fine shell/flint, medium shell/flint, and coarse shell/flint); vegetable/shell/sand; grog/shell/sand; sand (fine, coarse, sand/shell, sand/flint); dissolved temper, including 'corky'; and no apparent temper.

Condition

The condition of the pottery at Etton was of special taphonomic importance; it provided a means of determining the various depositional circumstances that were encountered. Two states of condition were identified: abraded and non-abraded. Unless otherwise stated in the catalogue, all potsherds were non-abraded.

Decoration

The following decoration is noted: comb-stamped; diagonal; external; fingernail; fingertip; grooved; herringbone; impressed; incised; perforation; radial; twisted cord; vertical; and whipped cord.

Site context and phasing

Pottery from the enclosure ditch is designated by section and causeway numbers. Most enclosure ditch section numbers are shown in Figure 11. The feature number of interior features is given, prefixed by the letter F (feature). Interior feature numbers are shown in Figures 87–90; grid references are given in Appendix 1.

Mildenhall pottery

The following catalogue entries are illustrated in Figures 175 to 201:

Enclosure ditch

M1. Shoulder; fabric: fine shell; three rows of fingernail decoration on neck/shoulder. Causeway A–section 1, layer 6, Phase 1A.

M2. Externally thickened rim; fabric: medium/coarse shell; the neck has a pre-firing perforation. Causeway A–section 1, layer 8, Phase 1A.

M3. Bowl with inturned rim; fabric: fine/medium shell; incised radial decoration on the rim; rows of vertical and diagonal incised decoration on the neck; on the shoulder are two rows of incised diagonal decoration; two opposed strap lugs on the shoulder; shoulder decoration continues over the lugs. Causeway A–section 1, layer 8, Phase 1A.

M4. Expanded rim; fabric: fine/medium shell; abraded; rim has incised diagonal decoration. Sections 1–2, layer 2. Phase 1C.

M5. T-shaped rim; fabric: medium/coarse shell; incised radial decoration on rim; ovate stabs on neck. Sections 2–3, layer 2, Phase 1C.

M6. T-shaped rim; fabric: fine shell (obscured by PVA). Sections 2–3, layer 2, Phase 1C.

M7. T-shaped rim; fabric: medium/coarse shell; abraded; incised diagonal decoration on rim. Sections 3–4, layer 1, Phase 2(?).

M8. T-shaped rim; fabric: fine/medium shell; abraded; incised diagonal decoration on rim; neck has ?vertical cordon. Sections 3–4, layer 1, Phase 2(?).

M9. Rolled-over rim (four sherds); fabric: vegetable/shell/sand; abraded. Sections 6–7, layer 2, Phase 1 or 2.

M10. Externally thickened rim; fabric: fine/medium shell; abraded. Sections 7–8, layer 3, Phase 1B.

M11. Rolled-over rim; fabric: fine shell. Sections 8–9, layer 4, Phase 1.

M12. Rolled-over rim; fabric: fine/medium shell; abraded; rim with diagonal incised decoration(?). Sections 11–12, layer 1, Phase 2(?).

M13. Externally thickened rim; fabric: fine/medium shell; incised diagonal decoration on rim. Sections 11–12, layer 2, Phase 1B.

M14. Externally thickened rim; fabric: fine/medium shell; abraded; incised diagonal decoration on rim. Sections 11–12, layer 3, Phase 1B.

M15. Simple rim; fabric: crushed flint; abraded. Sections 11–12, layer 3, Phase 1B.

M16. Rolled-over rim; fabric: fine shell; incised diagonal decoration on rim. Sections 11–12, layer 3, Phase 1B.

M17. Externally thickened rim; fabric: fine/medium shell; abraded. Sections 11–12, layer 3, Phase 1B.

M18. Externally thickened rim (15 sherds); fabric: coarse shell/flint; one sherd is grass wiped. Sections 11–12, layer 3, Phase 1B.

M19. Externally thickened rim/shoulder (two sherds); fabric: fine shell; abraded; sections 11–12, layer 3, Phase 1B.

M20. T-shaped rim; fabric: sand/shell; abraded; incised diagonal decoration on rim. Sections 11–12, layer 3, Phase 1B.

M21. Inturned rim; fabric: medium shell/flint; abraded. Sections 11–12, layer 3, Phase 1B.

M22. Shoulder; fabric: fine shell/flint. Sections 11–12, layer 3, Phase 1B.

M23. Externally thickened rim; fabric: coarse shell; incised diagonal decoration on rim. Sections 11–12, layer 4, Phase 1.

M24. Rolled-over rim (two sherds); fabric: fine/medium shell. Sections 12–13, layer 4, Phase 1.

M25. Rolled-over rim; fabric: medium/coarse shell; abraded. Sections 12–13, layer 4, Phase 1.

M26. Externally thickened rim; fabric: fine/medium shell; abraded. Sections 13–14, layer 1, Phase 2(?).

M27. Simple rim; fabric: fine/medium shell; abraded. Sections 13–14, layer 2, Phase 1.

M28. Inturned rim (four sherds); fabric: fine/medium shell; abraded. Sections 13–14, layer 2, Phase 1.

M29. Externally thickened rim; fabric: fine/medium shell. Sections 13–14, layer 2, Phase 1.

M30. Externally thickened rim; fabric: medium/coarse shell. Sections 13–14, layer 2, Phase 1.

M31. Externally thickened rim; fabric: coarse shell. Sections 13–14, layer 2, Phase 1.

M32. Shoulder; fabric: fine shell. Sections 13–14, layer 4, Phase 1.

M33. T-shaped rim (two sherds); fabric: fine/medium shell; abraded. Causeway B–section 16, layer 3, Phase 1.

M34. Body (four sherds); vegetable/shell/sand fabric; rows of incised vertical decoration. Causeway B–section 16, layer 3, Phase 1.

M35. Externally thickened rim (two sherds); fabric: fine shell/flint; one row of incised diagonal decoration; incised diagonal decoration on rim; upper neck has a row of stabs, the lower neck two rows of stabs. Causeway B–section 16, layer 3, Phase 1.

M36. Rolled-over rim; fabric: medium/coarse shell. Causeway B–section 16, layer 4, Phase 1 (1A?).

M37. Rolled-over rim; fabric: fine/medium shell; abraded. Sections 16–17, layer 3, Phase 1.

M38. Rolled-over rim (14 sherds); fabric: medium/coarse shell; abraded. Sections 16–17, layer 3, Phase 1.

M39. Rolled-over rim (two sherds); fabric: medium/coarse shell; incised diagonal decoration on rim; the neck has panels divided by vertical applied cordons, decorated with stabs and punctate impressions; below the rim is a row of diagonal impressions above irregular slanting rows of lentoid impressions. Sections 16–17,layer 3, Phase 1.

M40. T-shaped rim; fabric: fine shell; incised diagonal decoration on rim. Sections 25–28, layer 1, Phase 2(?).

M41. Body; fabric: coarse shell/flint; two rows of stabs. Causeway B–section 35, layer 2, Phase 1.

M42. T-shaped rim; fabric: fine shell/flint; incised radial decoration on rim. Sections 35–39, layer 3, Phase 1A.

M43. Rolled-over rim; vegetable/shell/sand fabric; incised diagonal decoration on rim. Sections 59–60, layer 3, Phase 1A.

M44. Shoulder; fabric: fine/medium shell; applied cordon. Sections 65–67, layer 3, Phase 1A.

M45. Rolled-over rim; fabric: medium shell/flint; incised radial decoration on rim. Sections 100–106, layer 3, Phase 1A.

M46. Externally thickened and T-shaped rims (25 sherds); fabric: crushed flint; body grass wiped and burnished. Sections 100–106, layer 3, Phase 1A.

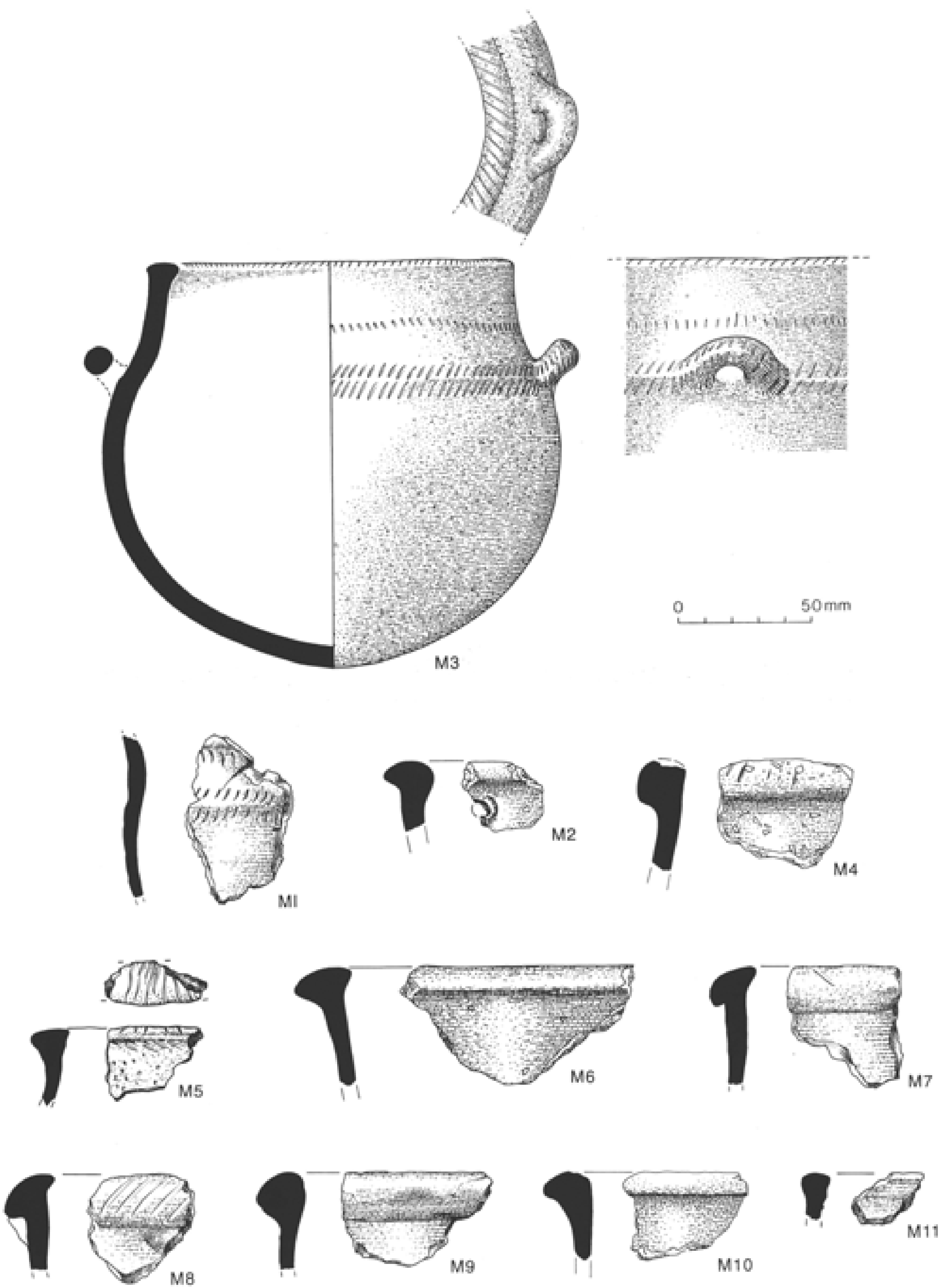


Fig 175 Mildenhall pottery from the enclosure ditch (M1 to M11) [for pot numbers see Appendix 3]

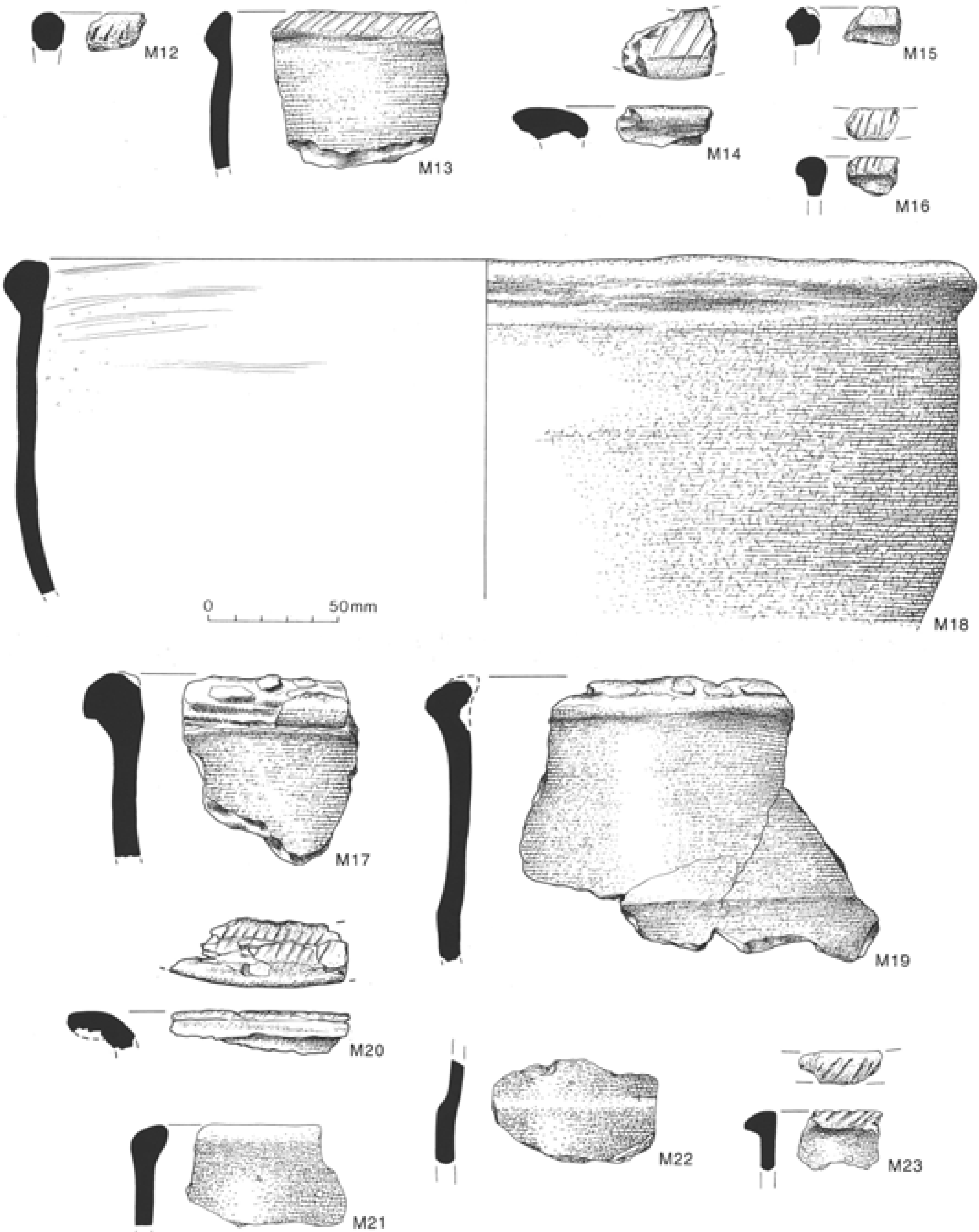


Fig 176 Mildenhall pottery from the enclosure ditch (M12 to M23) [for pot numbers see Appendix 3]

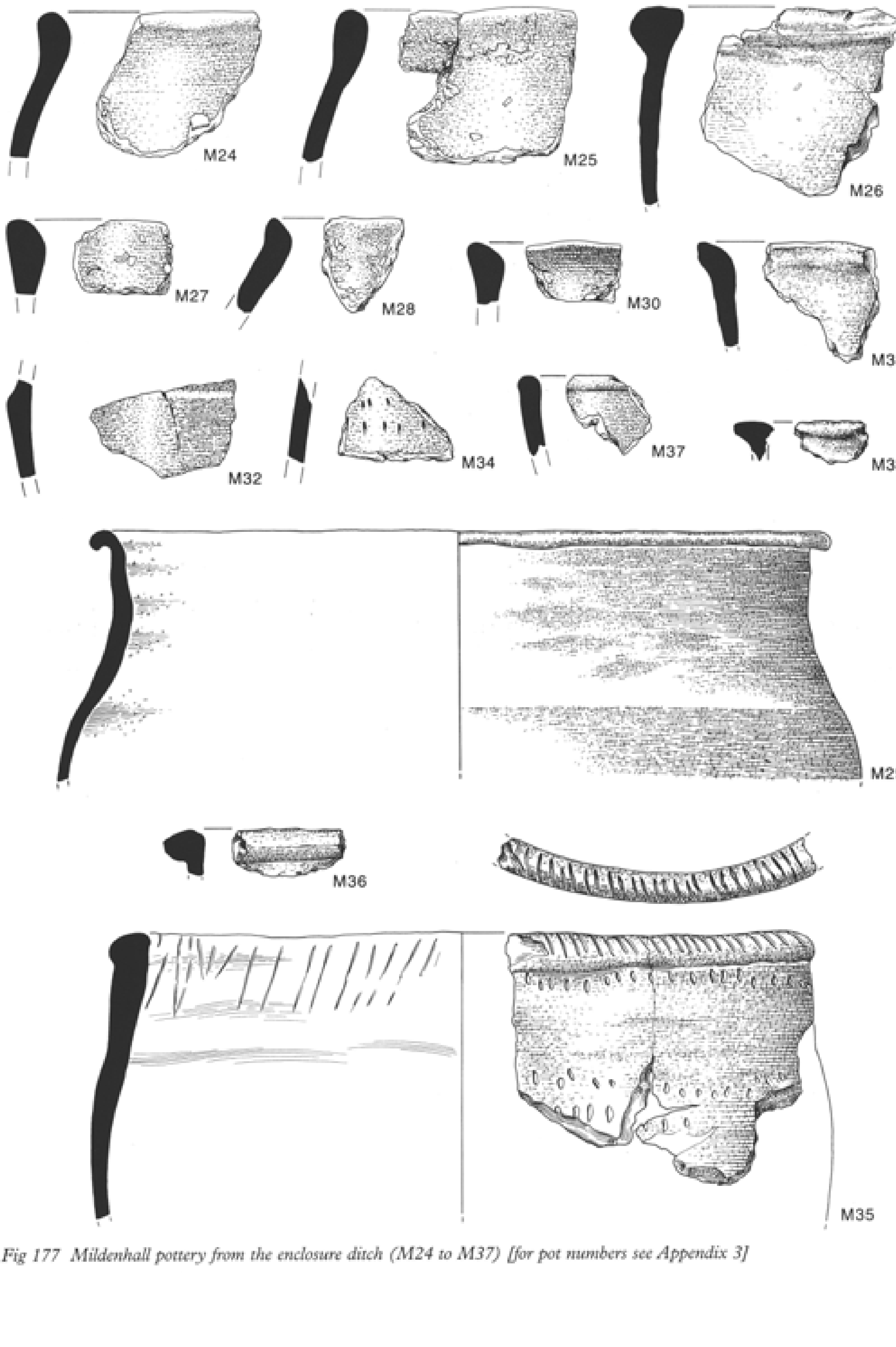


Fig 177 Mildenhall pottery from the enclosure ditch (M24 to M37) [for pot numbers see Appendix 3]

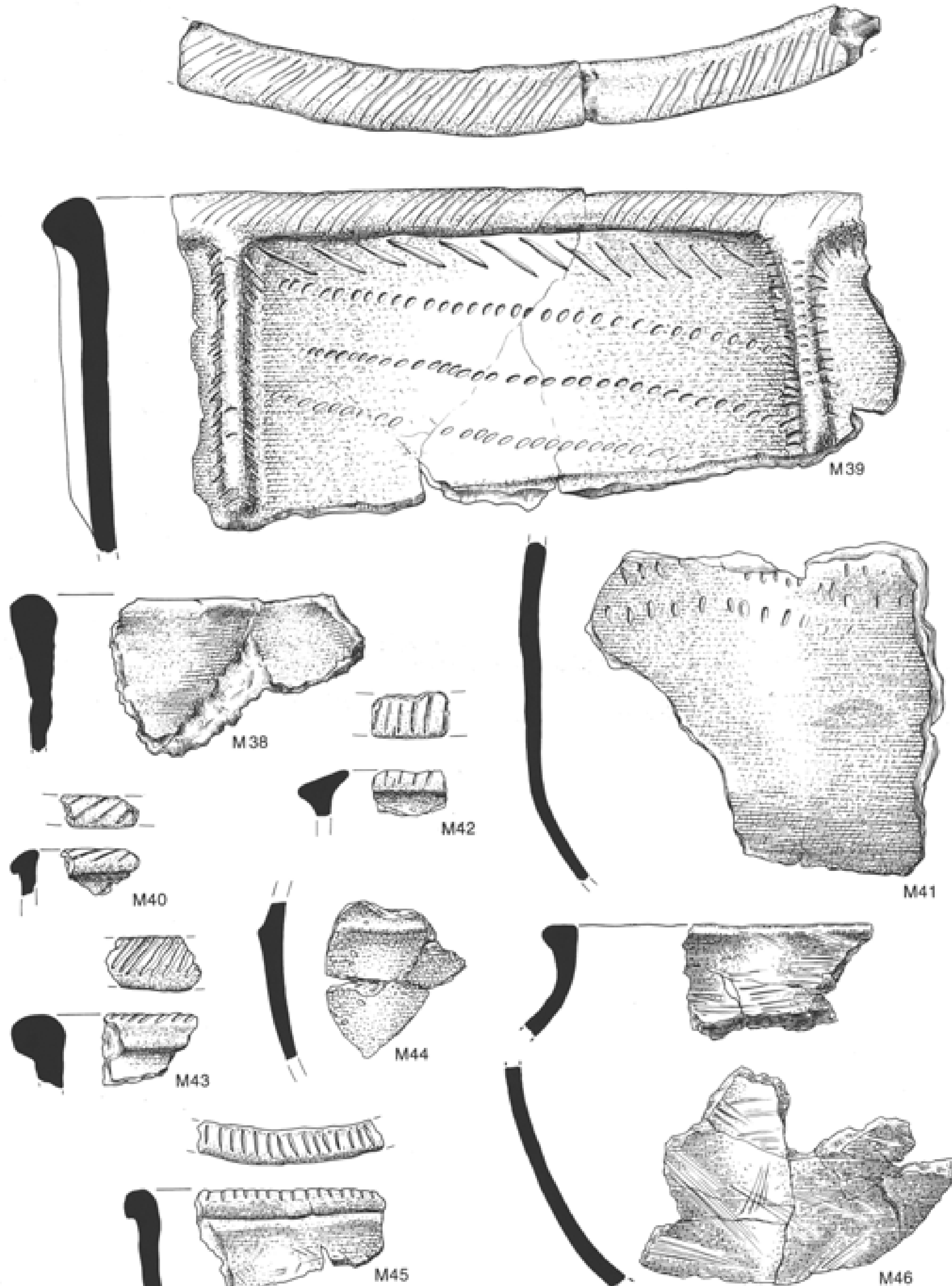


Fig 178 Mildenhall pottery from the enclosure ditch (M38 to M46) [for pot numbers see Appendix 3]

M47. Simple rim; vegetable/shell/sand fabric; abraded. Sections 107–112, layer 3, Phase 1A.

M48. Expanded rim; vegetable/shell/sand fabric; abraded; incised diagonal decoration on rim. Sections 113–116, layer 1, Phase 1(?).

M49. Expanded rim; fabric: fine shell; incised diagonal decoration on rim. Sections 113–118, layer 1, Phase 1(?).

M50. Expanded rim (seven sherds); fabric: vegetable/shell/sand; abraded. Sections 115–118, layer 1, Phase 1(?).

M51. Inturned rim (four sherds); fabric: fine/medium shell; abraded. Sections 116–118, layer 3, Phase 1A.

M52. Rolled-over rim; fabric: vegetable/shell/sand; abraded. Sections 119–121, layer 1, Phase 1(?).

M53. Externally thickened rim; fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. Sections 122–124, layer 1, Phase 1(?).

M54. Rolled-over rim. Sections 127–130, layer 2, Phase 1A.

M55. Externally thickened rim (six sherds); fabric: fine/medium shell; partly abraded; incised diagonal decoration on rim. Sections 128–130, layer 1, Phase 1(?).

M56. Rolled-over rim/shoulder (three sherds); fabric: crushed flint; abraded; body has ?panel of four rows of stabs with adjacent plain zone. Sections 137–139, layer 1, Phase 1(?).

M57. Externally thickened rim; fabric: sand/shell; abraded. Sections 146–151, layer 1, Phase 1(?).

M58. Expanded rim; fabric: fine/medium shell; abraded; incised diagonal decoration on rim. Sections 146–151, layer 2, Phase 1A.

M59. Rolled-over rim; fabric: fine/medium shell; incised radial decoration on rim. Sections 146–151, layer 3, Phase 1A.

M60. T-shaped rim (four sherds); fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. Sections 157–159, layer 1, Phase 1(?).

M61. T-shaped(?) rim; fabric: fine/medium shell; incised diagonal decoration on rim. Sections 167–171, layer 2, Phase 1.

M62. Rolled-over rim; fabric: fine/medium shell. Sections 169–171, layer 2, Phase 1.

M63. Rolled-over rim; fabric: fine/medium shell; abraded. Sections 169–171, layer 2, Phase 1.

M64. T-shaped rim; fabric: fine/medium shell; abraded. Sections 169–171, layer 2, Phase 1.

M65. Simple rim; fabric: coarse shell/flint; rim has ovate impressions. Sections 172–174, layer 2, Phase 1.

M66. Rolled-over rim; fabric: fine shell/flint. Sections 172–174, layer 2, Phase 1.

M67. Externally thickened rim (two sherds); fabric: fine/medium shell; abraded. Sections 172–176, layer 2, Phase 1.

M68. T-shaped rim (two sherds); fabric: fine/medium shell; abraded. Sections 174–176, layer 2, Phase 1.

M69. Rolled-over rim; fabric: fine/medium shell; abraded. Sections 177–179, layer 2, Phase 1.

M70. Rolled-over rim (63 sherds); fabric: fine/medium shell. Sections 177–179, layer 3, Phase 1.

M71. Rolled-over rim; fabric: medium shell/flint; incised radial decoration on rim. Sections 177–179, layer 3, Phase 1.

M72. Rolled-over rim (seven sherds); fabric: fine/medium shell. Sections 177–179, layer 3, Phase 1.

M73. Body; fabric: fine shell/flint; incised vertical decoration above rows of puncture stabs. Section 179–causeway G, layer 3, Phase 1.

M74. Rolled-over rim (three sherds); fabric: medium/coarse shell; abraded. Sections 182–184, layer 1, Phase 2(?).

M75. Externally thickened rim/shoulder/lug (eight sherds); fabric: fine shell/flint; incised diagonal decoration on rim; body and lug have pointillé rows; lug has a vertical perforation. Section 184–causeway G, layer 3, Phase 1A.

M76. Externally thickened rim/shoulder (12 sherds); fabric: fine shell; partly abraded; incised diagonal decoration on rim. Sections 185–187, layer 3, Phase 1A.

M77. Externally thickened rim; fabric: fine shell; incised diagonal decoration on rim. Sections 185–189, layer 11, Phase 1A.

M78. Bowl with simple rim; fabric: coarse shell. Section 189–causeway H, layer 3, Phase 1C.

M79. Bowl with rolled-over rim; fabric: fine shell; incised diagonal decoration on rim. Section 189–causeway H, layer 3, Phase 1C.

M80. Expanded rim (four sherds); fabric: coarse shell; abraded. Sections 189–190, layer 2, Phase 1.

M81. Shoulder; fabric: fine/medium shell. Sections 189–190, layer 2, Phase 1.

M82. Rolled-over rim; fabric: dissolved temper; abraded; incised diagonal decoration on rim. Sections 190–192, layer 1, Phase 2(?).

M83. Rolled-over rim (six sherds); fabric: vegetable/shell/sand; abraded. Sections 190–192, layer 1, Phase 2(?).

M84. Expanded rim; fabric: vegetable/shell/sand; abraded. Sections 190–192, layer 1, Phase 2(?).

M85. Rolled-over rim; fabric: fine shell; neck has ovate stab. Sections 197–causeway H, layer 1, Phase 2(?).

M86. Externally thickened rim; fabric: fine shell/flint; one row of oval impressions; incised radial decoration on rim; neck has multiple ovate impressions. Sections 197–causeway H, layer 1, Phase 2(?).

M87. Externally thickened rim; fabric: medium/coarse shell; abraded. Sections 197–causeway H, layer 1, Phase 2(?).

M88. Rolled-over rim; fabric: dissolved temper; abraded. Sections 197– 199, layer 1, Phase 2(?).

M89. Simple rim (two sherds); fabric: fine shell/flint. Sections 197–199, layer 2, Phase 1C.

M90. Expanded rim; fabric: fine shell; abraded. Section 199–causeway H, layer 2, Phase 1C.

M91. Rolled-over rim; fabric: fine shell; incised diagonal decoration on rim; burnished body. Section 199–causeway H, layer 5, Phase 1C.

M92. Simple rim (two sherds); fabric: fine/medium shell; abraded; above and below neck is an applied ledge cordon. Sections 199–200, layer 2, Phase 1C.

M93. Externally thickened rim; fabric: medium/coarse shell; incised radial decoration on rim. Sections 199–200, layer 2, Phase 1C.

M94. Shoulder; fabric: fine shell; two rows of lentoid impressions. Sections 199–200, layer 2, Phase 1C.

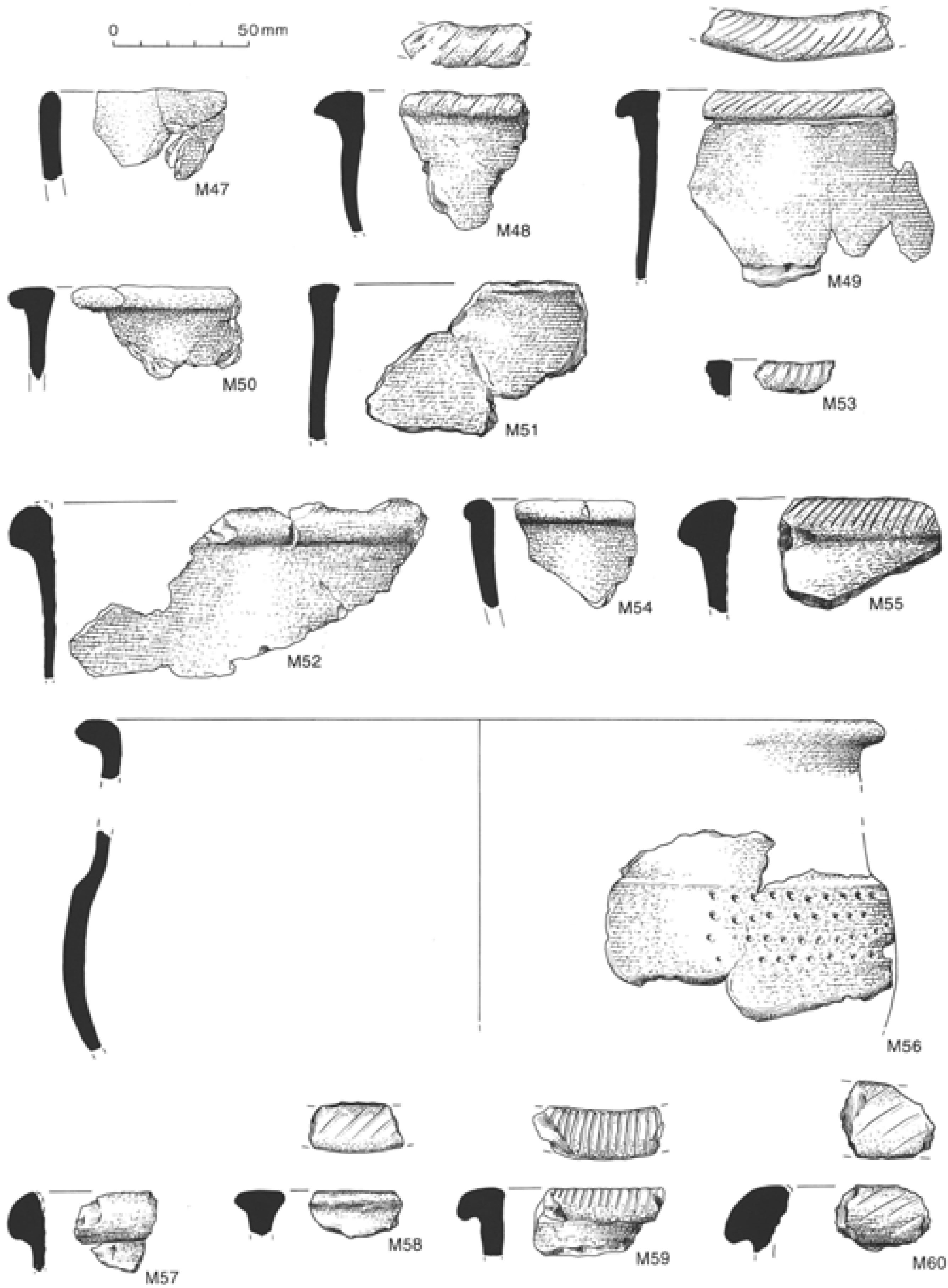


Fig 179 Mildenhall pottery from the enclosure ditch (M47 to M60) [for pot numbers see Appendix 3]

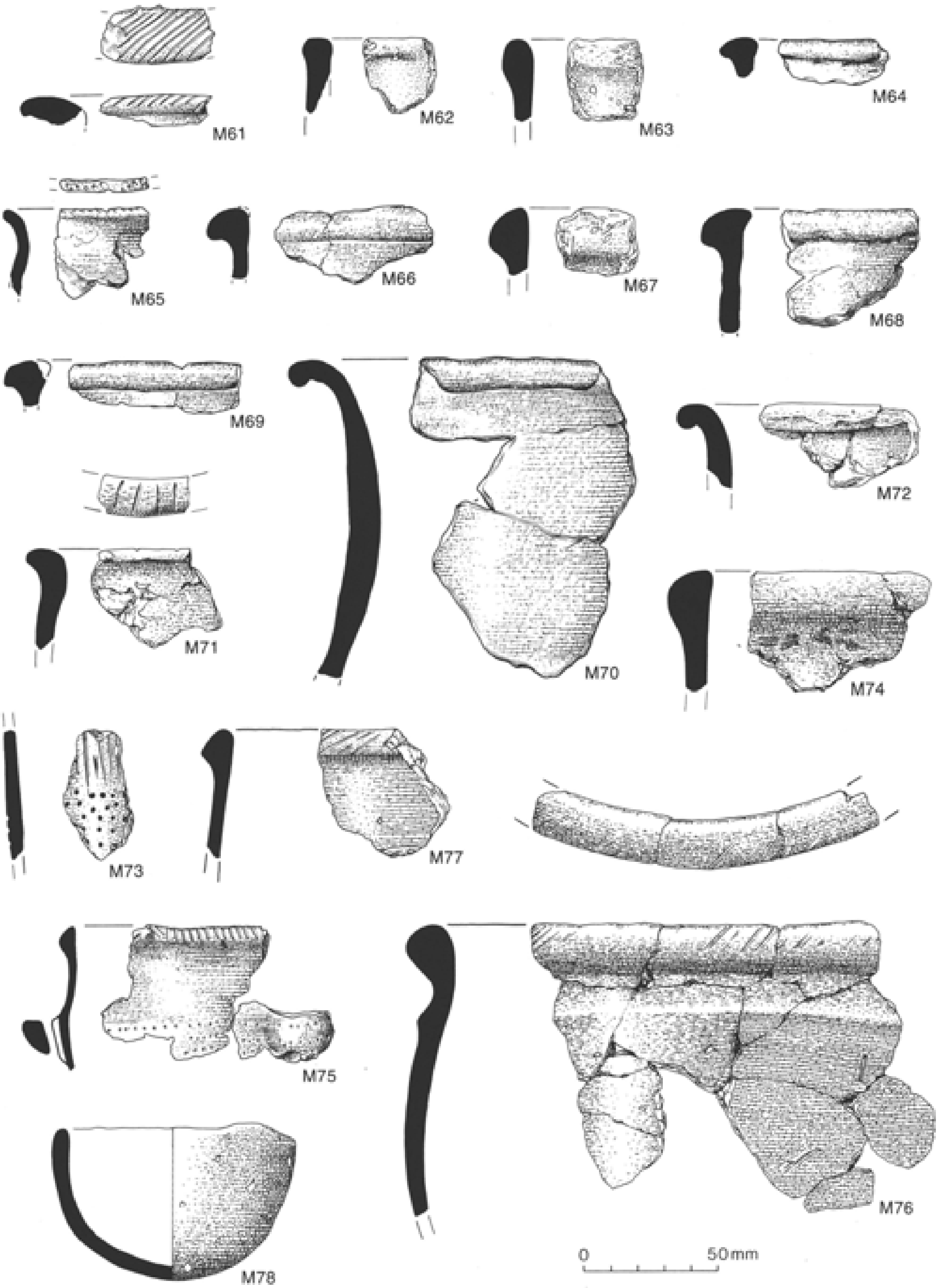


Fig 180 Mildenhall pottery from the enclosure ditch (M61 to M78) [for pot numbers see Appendix 3]

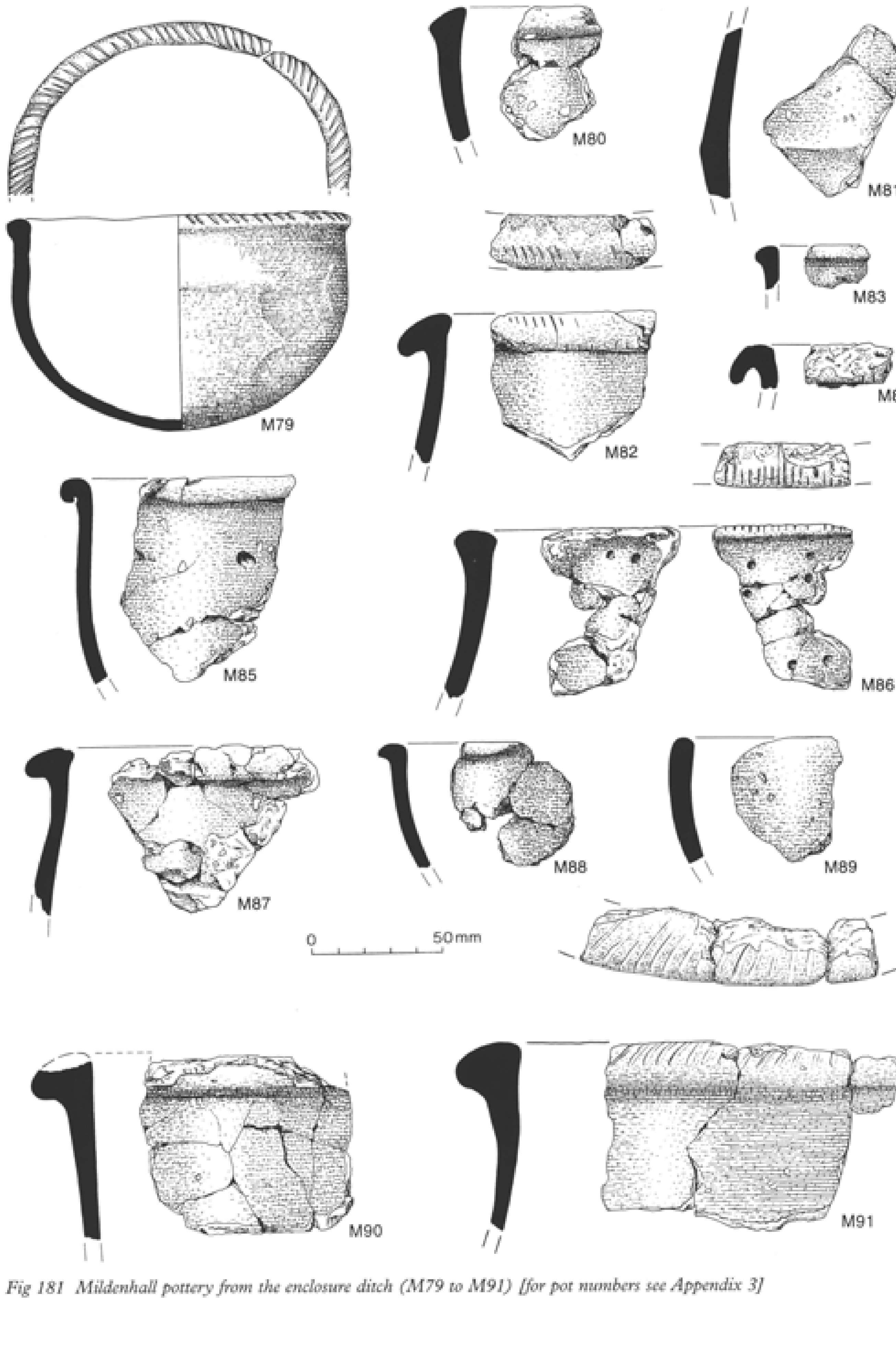


Fig 181 Mildenhall pottery from the enclosure ditch (M79 to M91) [for pot numbers see Appendix 3]

M95. Rolled-over rim (two sherds); fabric: fine/medium shell; incised lattice decoration on rim. Sections 200–201, layer 2, Phase 1C.

M96. Externally thickened rim (three sherds); fabric: fine/medium shell; partly abraded. Sections 200–201, layer 2, Phase 1C.

M97. Rolled-over rim (four sherds); fabric: medium/coarse shell. Section 201–causeway I, layer 2, Phase 1C.

M98. Shoulder; fabric: fine shell; rows of ovate stabs. Section 201–causeway I, layer 2, Phase 1C.

M99. Externally thickened rim (two sherds); fabric: vegetable/shell/sand; abraded. Sections 202–203, layer 1, Phase 2.

M100. Externally thickened rim; fabric: vegetable/shell/sand. Sections 202–203, layer 1, Phase 2.

M101. T-shaped rim; fabric: fine/medium shell. Section 203–causeway I, layer 1, Phase 2.

M102. Externally thickened rim (two sherds); fabric: fine shell/flint; incised radial decoration on rim. Section 203–causeway I, layers 5–6, Phase 1B/1C.

M103. Externally thickened rim; fabric: medium shell/flint; incised diagonal decoration on rim. Sections 203–204, layer 1, Phase 2.

M104. Simple rim; fabric: vegetable/shell/sand. Sections 203–204, layer 2, Phase 1(?).

M105. Externally thickened rim (two sherds); fabric: fine/medium shell; abraded; incised diagonal decoration on rim. Section 204–causeway J, layer 1, Phase 2.

M106. Externally thickened rim; fabric: fine/medium shell. Section 204–causeway J, layer 2, Phase 1C/2.

M107. Expanded rim (two sherds); fabric: coarse shell; abraded. Section 204–causeway J, layer 2, Phase 1C/2.

M108. T-shaped rim (two sherds); fabric: vegetable/shell/sand; abraded; incised radial decoration on rim. Section 204–causeway J, layer 2, Phase 1C/2.

M109. Rolled-over rim; fabric: fine/medium shell; incised radial decoration on rim. Section 204–causeway J, layer 3, Phase 1C/2.

M110. Expanded rim (two sherds); fabric: medium/coarse shell; abraded. Section 204–causeway J, layer 3, Phase 1C/2.

M111. Shoulder; fabric: fine/medium shell. Section 204–causeway J, layer 3, Phase 1C/2.

M112. Rolled-over rim (six sherds); fabric: fine/medium shell; abraded. Section 204–causeway J, layer 4. Phase 1C/2.

M113. Simple rim; fabric: fine shell. Section 204–causeway J, layer 5, Phase 1C/2.

M114. Expanded rim; fabric: fine/medium shell; abraded; incised diagonal decoration on rim. Sections 204–205, layer 1, Phase 2.

M115. Externally thickened rim; fabric: coarse shell; abraded; incised diagonal decoration on rim. Sections 204–205, layer 2, Phase 1C/2.

M116. Externally thickened rim/shoulder (three sherds); fabric: fine shell/flint; rim has incised diagonal decoration on interior and exterior; shoulder has two rows of pointillé. Sections 204–205, layer 2, Phase 1C/2.

M117. Expanded rim (three sherds); fabric: fine/medium shell; incised diagonal decoration on rim; one fingerprint on outer surface; neck has diagonal rows of ovate stabs. Sections 204–205, layer 2, Phase 1C/2.

M118. T-shaped rim/shoulder (eight sherds); fabric: fine/medium shell; incised diagonal decoration on rim; shoulder has two rows of circular stabs. Sections 204–205, layer 2, Phase 1C/2.

M119. Shoulder. Fabric: fine shell/flint; applied cordon; below the shoulder are diagonal rows of ovate impressions and burnishing. Sections 204–205, layer 3, Phase 1C.

M120. Neck; fabric: fine shell/flint; abraded; pointillé rows. Sections 204–205, layer 3, Phase 1C.

M121. Inturned rim; fabric: coarse shell; incised diagonal decoration on rim; neck has a row of incised fingernail decoration. Sections 204A–205A, layer 15, Phase 1C.

M122. Inturned rim (two sherds); fabric: fine shell; abraded; incised diagonal decoration on rim; neck has ovate impressions. Section 205–causeway J, layer 1, Phase 2.

M123. Rolled-over rim; fabric: medium/coarse shell; abraded. Section 205–causeway J, layer 2, Phase 2.

M124. Rolled-over rim; fabric: medium/coarse shell. Section 205–causeway J, layer 15, Phase 1C.

M125. Simple rim (four sherds); fabric: medium/coarse shell; abraded. Sections 205–206, layer 2, Phase 1C.

M126. T-shaped rim; vegetable/shell/sand fabric; abraded. Sections 205–206, layer 2, Phase 1C.

M127. Shoulder; fabric: fine/medium shell; body has a quadruple incised swag bordered by incised radial decoration. Sections 205–206, layer 3, Phase 1C.

M128. Rolled-over rim; fabric: fine shell/flint; one row of ovate impressions; incised diagonal decoration on rim; neck has vertical and horizontal rows of ovate impressions. Sections 205–206A, layer 3, Phase 1C.

M129. Expanded rim (three sherds); fabric: fine/medium shell; abraded; incised diagonal decoration on rim. Section 206–causeway J, layer 2, Phase 1C.

M130. Rolled-over rim; fabric: fine/medium shell. Sections 206–207, layer 2, Phase 1C.

M131. Externally thickened rim (six sherds); fabric: fine shell/flint; rim has alternating panels of incised diagonal decoration and circumferential to diagonal rows of short strokes. Sections 206–207, layer 2, Phase 1B.

M132. Shoulder; fabric: fine shell/flint; diagonal ovate impressions. Sections 206–207, layer 2, Phase 1B.

M133. Rolled-over rim; fabric: medium shell/flint. Sections 206–207, layer 4, Phase 1B.

M134. Expanded rim; fabric: fine/medium shell; incised lattice decoration on rim; neck has row(s) of impressed circles (cf M163). Sections 206–207, layer 4, Phase 1B.

M135. Body; fabric: fine shell; circular stabs. Sections 206–207, layer 4, Phase 1B.

M136. Inturned rim; fabric: fine shell/flint; incised diagonal decoration on rim. Sections 206–207A, layer 5, Phase 1B.

M137. Expanded rim (two sherds); fabric: fine shell; incised diagonal decoration on rim. Sections 206–207A, layer 10, Phase 1.

M138. Externally thickened rim/shoulder; fabric: fine/medium shell; rim/shoulder has incised diagonal decoration. Sections 206–207A, layer 10, Phase 1.

M139. T-shaped rim; fabric: fine shell; abraded. Sections 206–207A, layer 16, Phase 1.

M140. Body (five sherds); fabric: fine/medium shell; body has two rows of ovate stabs. Sections 206–207A, layer 16, Phase 1.

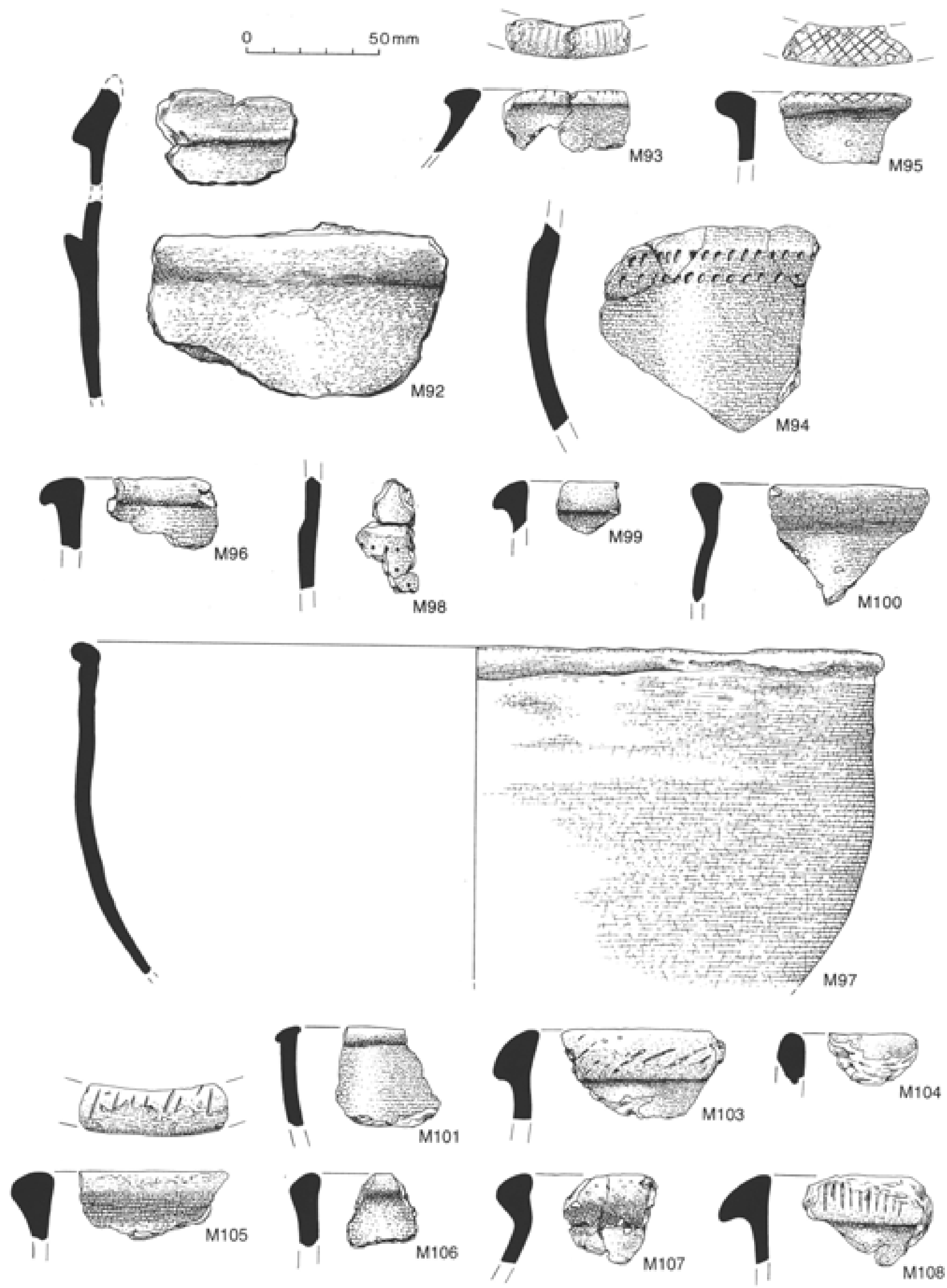


Fig 182 Mildenhall pottery from the enclosure ditch (M92 to M101, M103 to M108) [for pot numbers see Appendix 3]

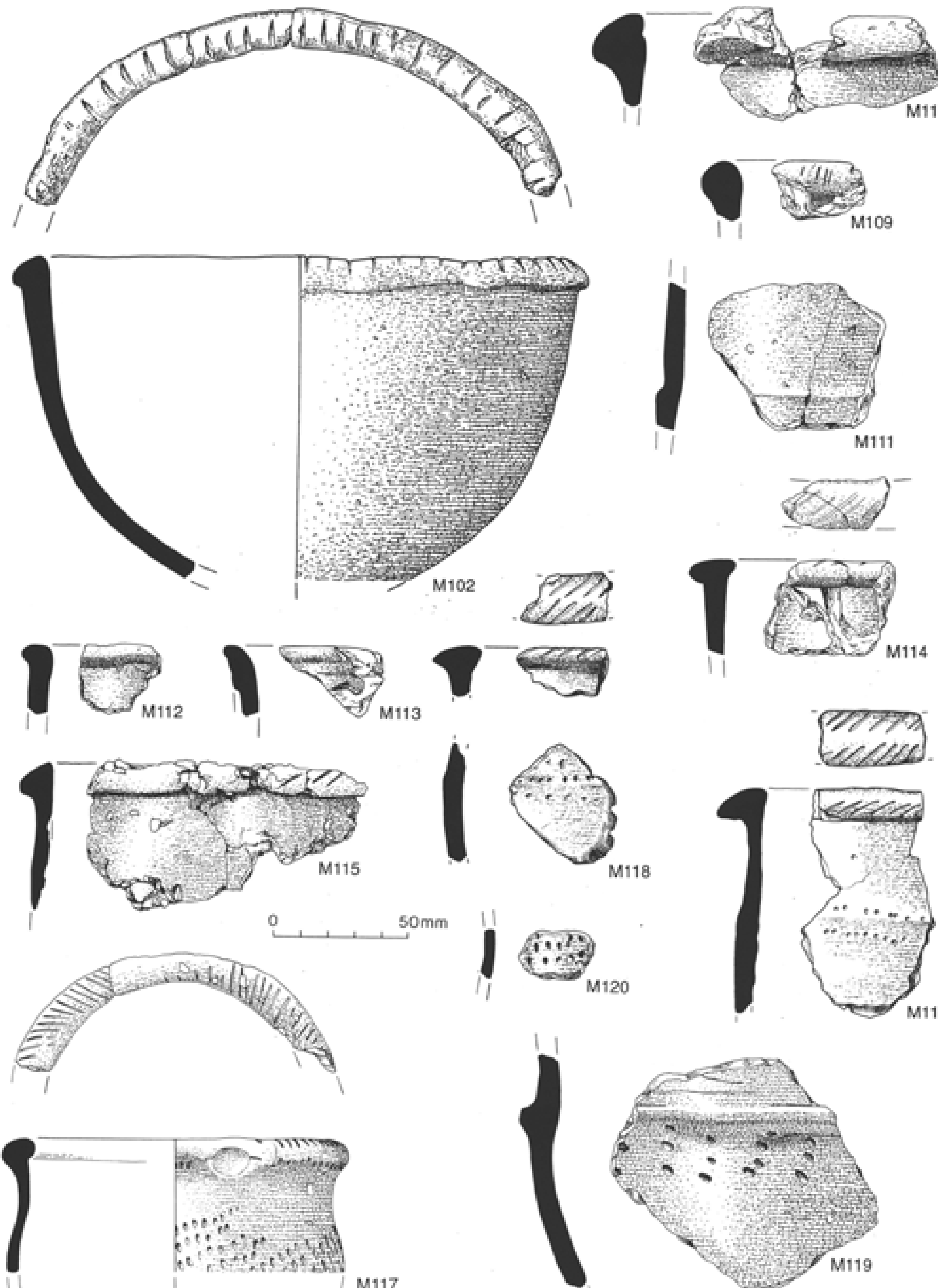


Fig 183 Mildenhall pottery from the enclosure ditch (M102, M109 to M120) [for pot numbers see Appendix 3]

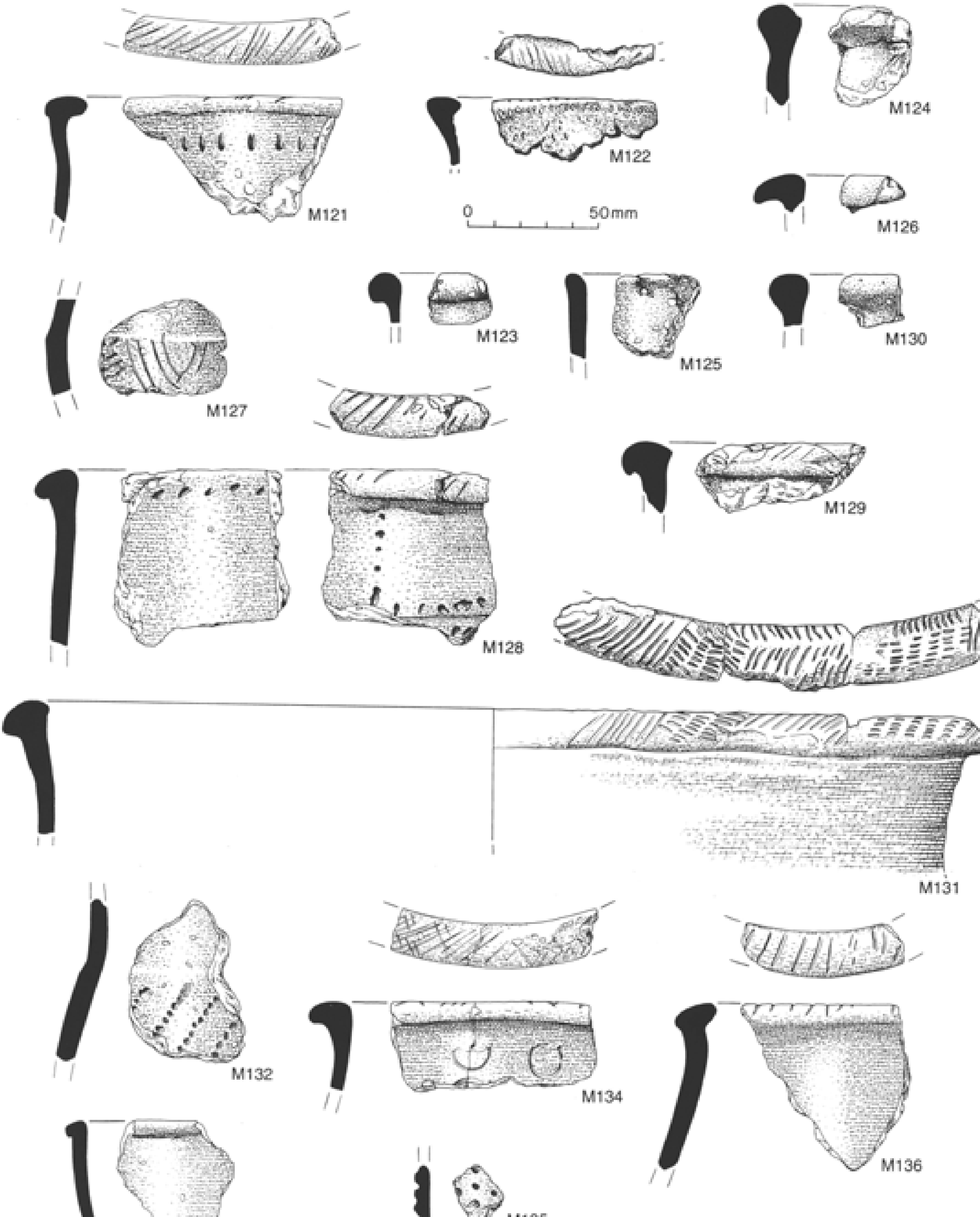


Fig 184 Mildenhall pottery from the enclosure ditch (M121 to M136) [for pot numbers see Appendix 3]

M141. T-shaped rim; fabric: fine/medium shell; abraded; incised vertical decoration on the inner bevel of the rim; rim has multiple diagonal short strokes. Section 207–causeway K, layer 2, Phase 2(?).

M142. Externally thickened rim (seven sherds); fabric: medium/coarse shell; abraded. Section 207–causeway K, layer 18, Phase 1.

M143. Expanded rim; fabric: fine/medium shell; incised radial decoration on rim. Section 207–causeway K, layer 19, Phase 1.

M144. Simple rim; fabric: vegetable/shell/sand; abraded. Sections 208–209, layer 2, Phase 2.

M145. Externally thickened rim; fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. sections 208–209A, layer 2, Phase 2.

M146. Rolled-over rim; fabric: coarse shell. Sections 208–209A, layer 3, Phase 1C.

M147. Externally thickened rim; fabric: fine shell; incised diagonal decoration on rim. Sections 208–209A, layer 3, Phase 1C.

M148. Externally thickened rim; fabric: fine shell; incised diagonal decoration on rim. Sections 208–209A, layer 3, Phase 1C.

M149. Externally thickened rim; fabric: fine shell; abraded; incised diagonal decoration on rim. Sections 208–209A, layer 3, Phase 1C.

M150. Externally thickened rim; fabric: medium/coarse shell; abraded; incised diagonal decoration on rim. Sections 208–209A, layer 4, Phase 2.

M151. Expanded rim; fabric: coarse shell; abraded; burnished body. Sections 208–209A, layer 4, Phase 2.

M152. Inturned rim; fabric: dissolved temper. Section 209–causeway L, layer 1, Phase 2.

M153. Rolled-over rim; fabric: fine/medium shell. Section 209–causeway L, layer 4, Phase 2.

M154. Rolled-over rim (four sherds); fabric: medium/coarse shell; abraded. Section 209–causeway L, layer 4, Phase 2.

M155. Inturned rim (four sherds); fabric: fine shell/flint. Section 209–causeway L, layer 4, Phase 2.

M156. Expanded rim; fabric: fine/medium shell; incised radial decoration on rim. Section 209–causeway L, layer 4, Phase 2.

M157. T-shaped rim (11 sherds); fabric: fine/medium shell; discontinuous incised diagonal decoration on rim. Section 216–causeway L, layer 1, Phase 2.

M158. Lug; fabric: dissolved temper; abraded; lug peaked with vertical perforation. Section 216–causeway L, layer 1, Phase 2.

M159. Body; fabric: fine/medium shell; abraded; row of incised vertical decoration. Section 216–causeway L, layer 1, Phase 2.

M160. Externally thickened rim; fabric: fine shell; incised radial decoration on rim. Section 216–causeway L, layer 3, Phase 1B/1C.

M161. Rolled-over rim (two sherds); fabric: fine/medium shell; abraded. Section 216–causeway L, layer 4, Phase 1B/1C.

M162. Rolled-over rim; fabric: medium/coarse shell; incised radial decoration on rim. Section 216–causeway L, layer 4, Phase 1B/1C.

M163. Expanded rim/shoulder; fabric: fine/medium shell; incised diagonal decoration on rim in two directions; neck has impressed circles; shoulder has three rows of ovate stabs (cf M134). Section 216–causeway L, layer 4, Phase 1B/1C.

M164. Simple rim; fabric: fine shell. Section 216–causeway L, layer 6, Phase 1A.

M165. Rolled-over rim; fabric: fine/medium shell; incised diagonal decoration on rim. Sections 217–221, layer 3, Phase 1C.

M166 Rolled-over rim (five sherds); fabric: fine/medium shell; abraded. Sections 217–221, layer 3, Phase 1C.

M167 T-shaped rim; fabric: fine/medium shell; incised diagonal decoration on rim. Sections 217–221, layer 3, Phase 1C.

M168. T-shaped rim; fabric: fine/medium shell; incised diagonal decoration on rim. Sections 217–221, layer 3, Phase 1C.

M169. Shoulder; fabric: fine/medium shell; abraded; two rows of round impressions. Sections 217–221, layer 3, Phase 1C.

M170. Externally thickened rim; fabric: fine shell; incised diagonal decoration on rim. Sections 217–221, layer 4, Phase 1C.

M171. Rolled-over rim/shoulder; fabric: medium/coarse shell; incised diagonal decoration on rim. Sections 222–226, layer 6, Phase 1A/1B.

M172 Expanded rim/shoulder/lug (23 sherds) fabric: medium/coarse shell; diagonal decoration on rim; ledge on lug. Sections 222–226, layer 6, Phase 1A/1B.

M173. T-shaped rim; fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. Sections 222–226, layer 6, Phase 1A/1B.

M174. Rolled-over rim; fabric: fine/medium shell. Section 227–causeway M, layer 2, Phase 2(?).

M175. Shoulder; fabric: fine/medium shell; incised diagonal decoration. Section 227–causeway M, layer 2, Phase 2(?).

M176. Rolled-over rim/neck (five sherds); fabric: coarse shell; neck has paired pre-firing perforations. Section 227–causeway M, layer 3, Phase 1(?).

M177. Externally thickened rim (four sherds); fabric: fine/medium shell; abraded; incised radial decoration on rim. Section 227–causeway M, layer 3, Phase 1(?).

M178. T-shaped rim (four sherds); fabric: medium/coarse shell; abraded; incised diagonal decoration on rim. Section 227–causeway M, layer 3, Phase 1(?).

M179. Shoulder; fabric: fine shell. Section 227–causeway M, layer 3, Phase 1(?).

M180. Simple rim (five sherds); fabric: fine/medium shell; abraded. Section 227–causeway M, layer 5, Phase 1A.

M181. Rolled-over rim; fabric: medium/coarse shell; incised diagonal decoration on rim. Section 227–causeway M, layer 5, Phase 1A.

M182. Externally thickened rim; fabric: fine shell; incised radial decoration on rim. Section 227–causeway M, layer 5, Phase 1A.

M183. Rolled-over rim; fabric: vegetable/shell/sand. Section 228–causeway M, layer 2, Phase 2 (possibly Phase 1).

M184. Expanded rim; fabric: fine/medium shell; abraded; incised diagonal decoration on rim. Section 228–causeway M, layer 2, Phase 2 (possibly Phase 1).

M185. Shoulder; fabric: fine/medium shell. Section 228–causeway M, layer 2, Phase 2 (possibly Phase 1).

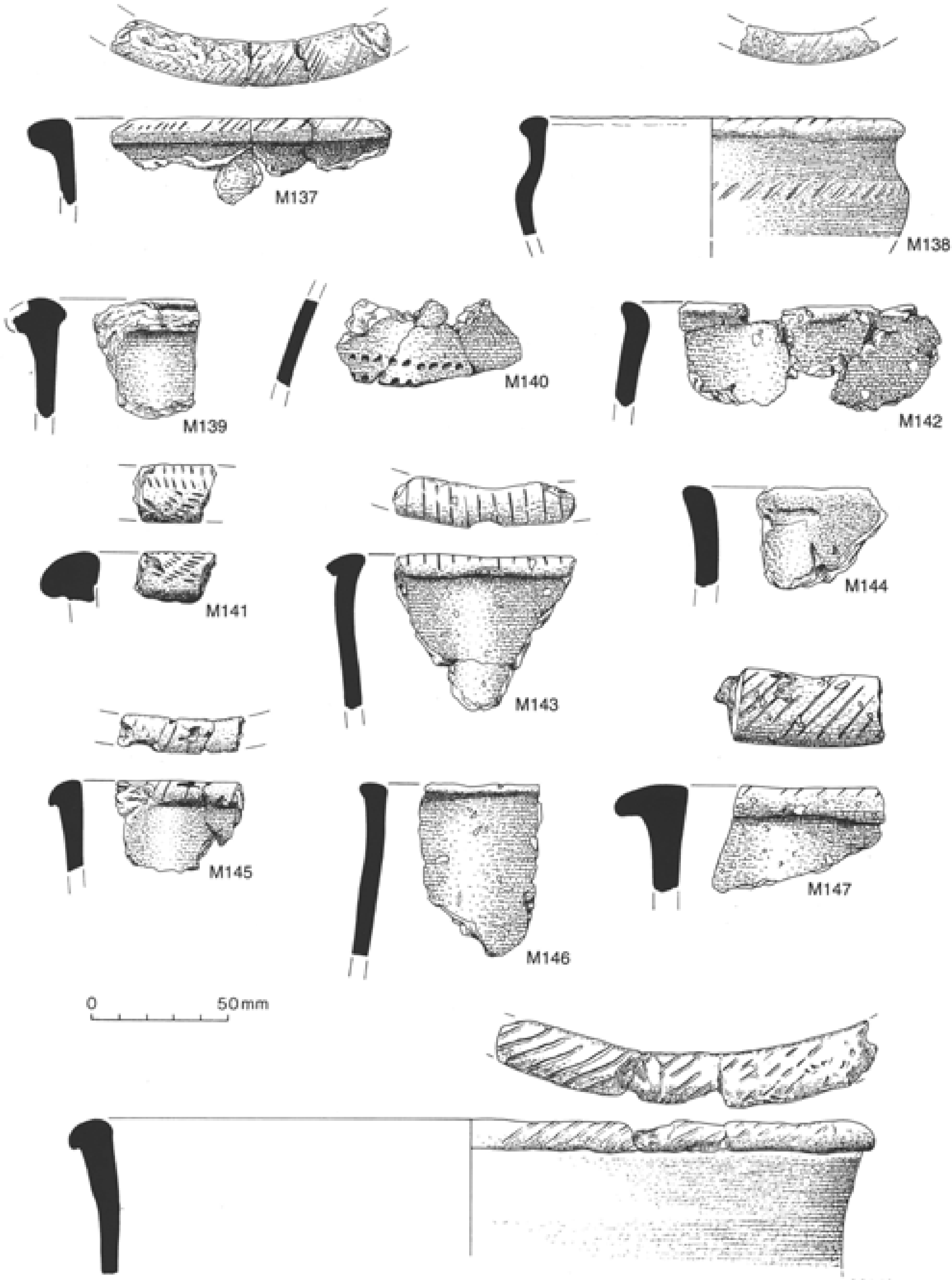


Fig 185 Mildenhall pottery from the enclosure ditch (M137 to M148) [for pot numbers see Appendix 3]

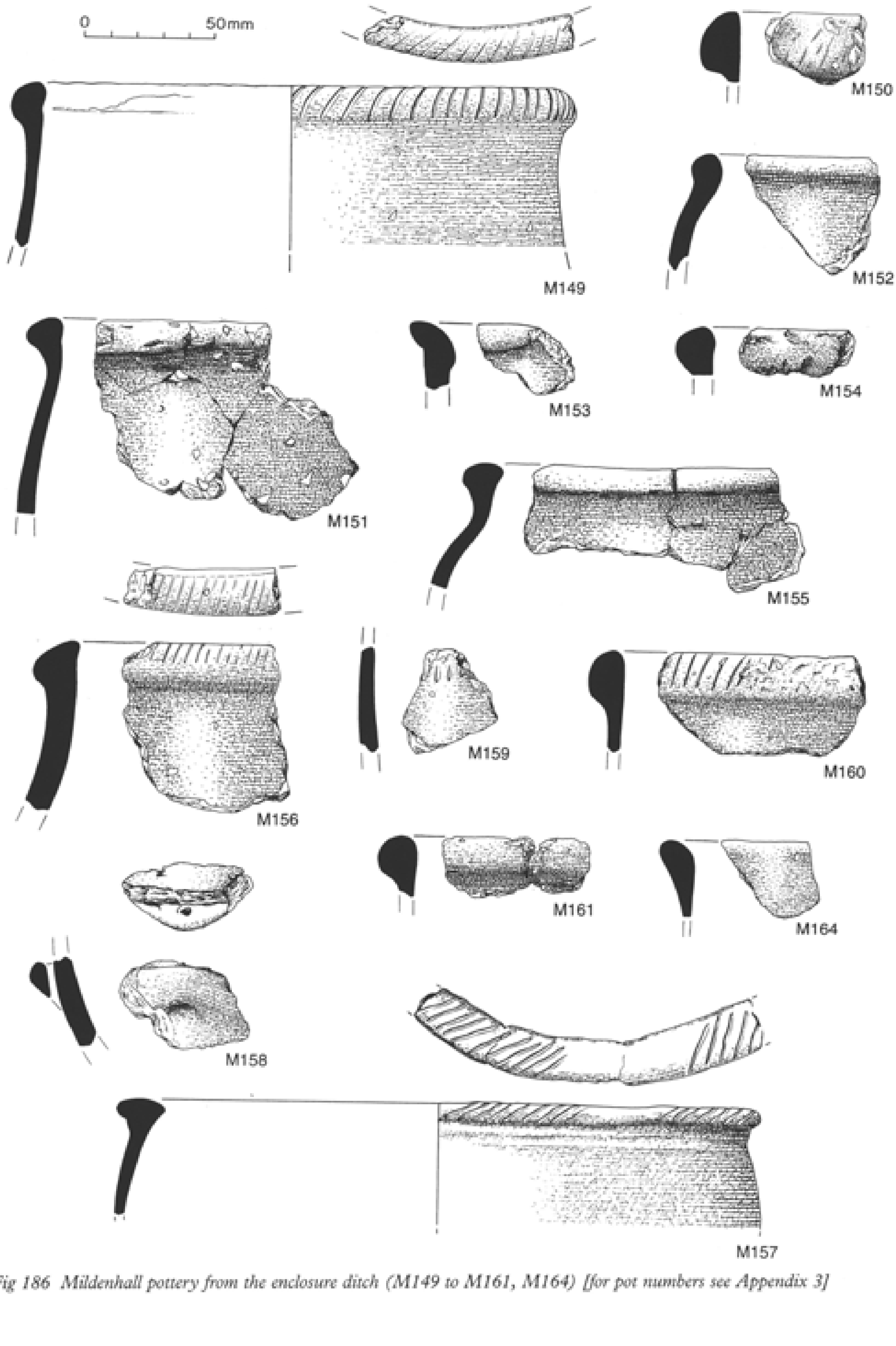


Fig 186 Mildenhall pottery from the enclosure ditch (M149 to M161, M164) [for pot numbers see Appendix 3]

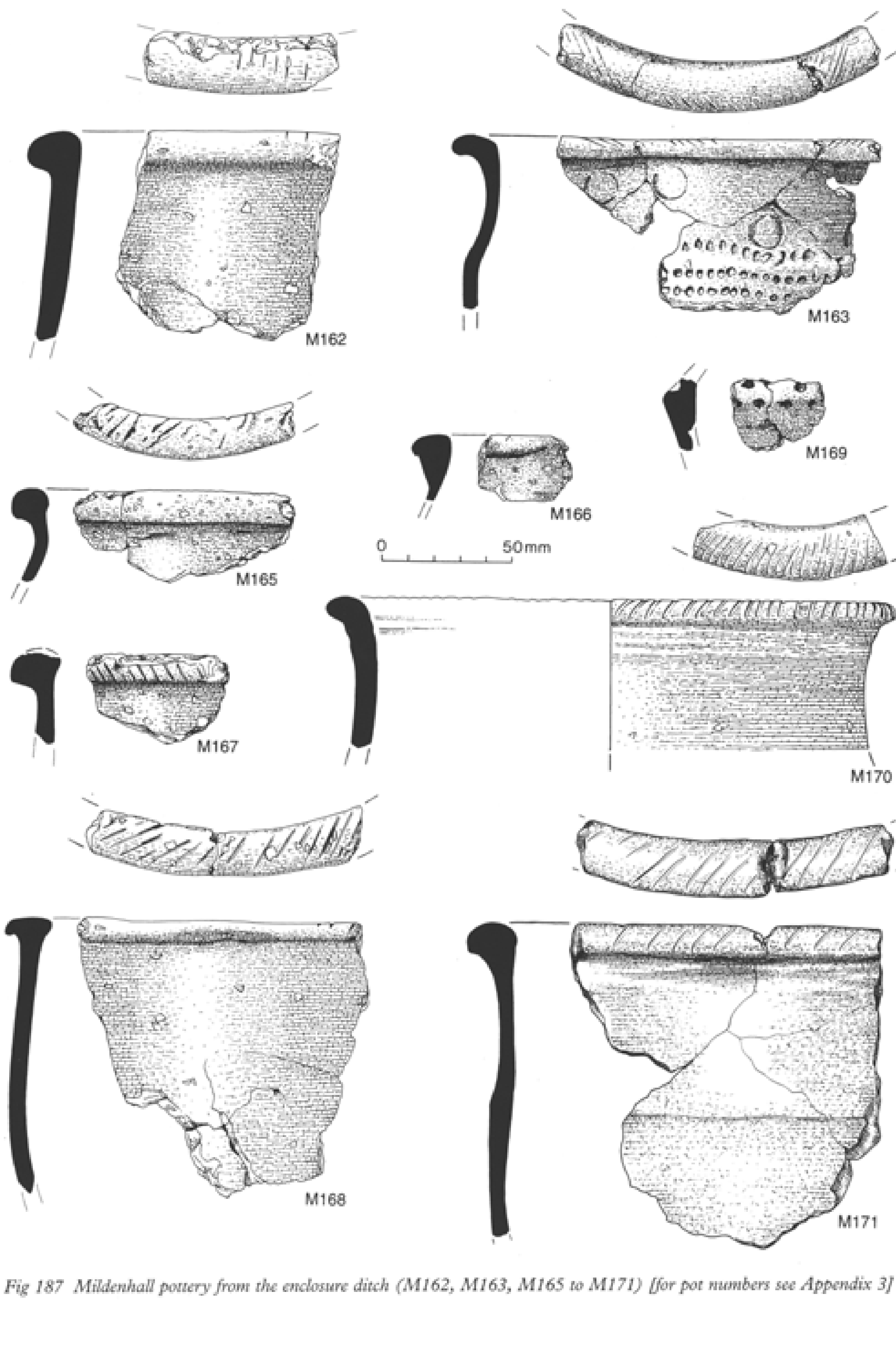


Fig 187 Mildenhall pottery from the enclosure ditch (M162, M163, M165 to M171) [for pot numbers see Appendix 3]

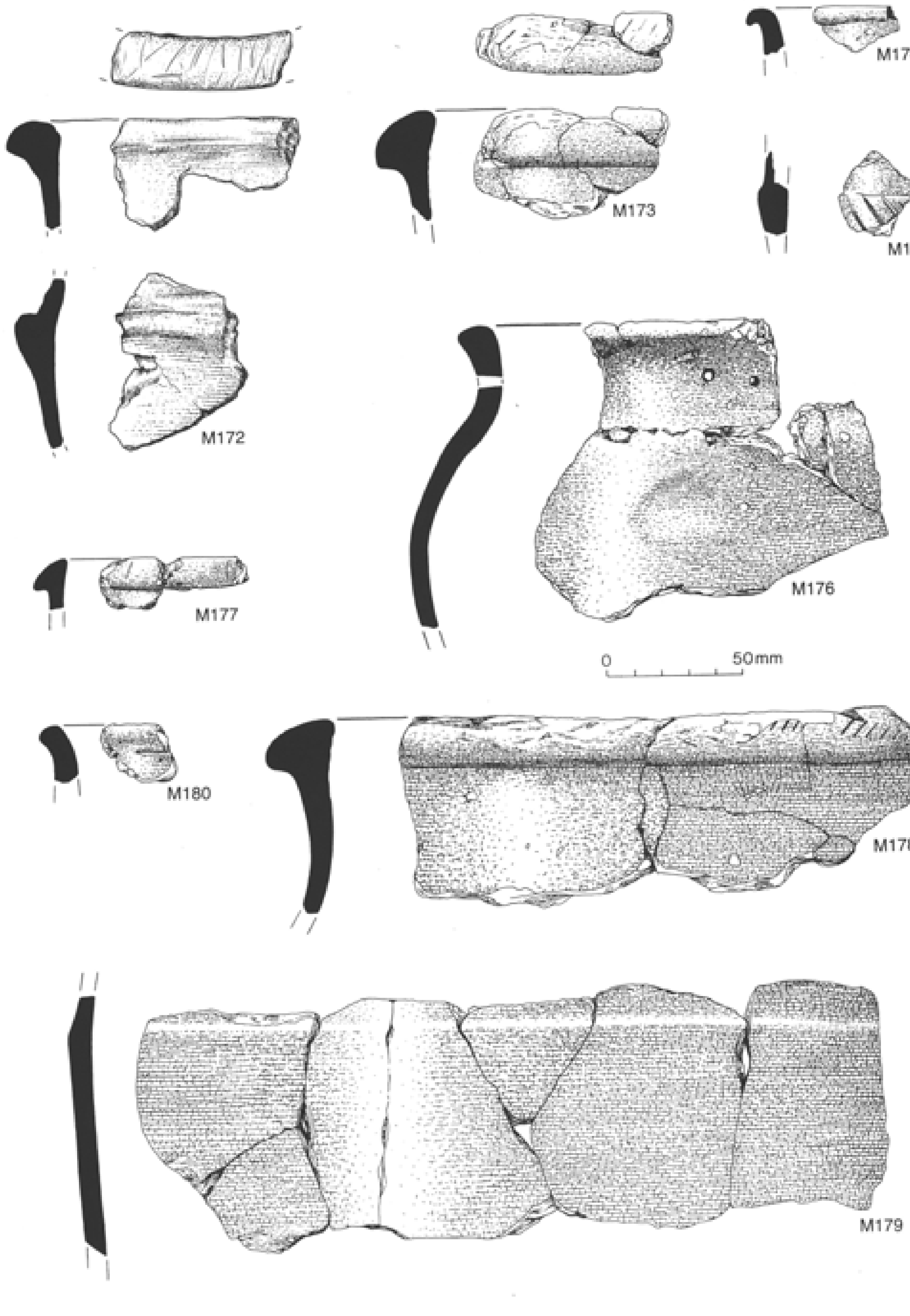


Fig 188 Mildenhall pottery from the enclosure ditch (M172 to M180) [for pot numbers see Appendix 3]

M186. Inturned rim; fabric: vegetable/shell/sand; incised diagonal decoration on rim. Section 228–causeway M, layer 4, Phase 1B.

M187. T-shaped(?) rim; fabric: coarse shell; abraded. Section 228–causeway M, layer 4, Phase 1B.

M188. Simple rim; fabric: fine/medium shell. Section 228–causeway M, layer 6, Phase 1B.

M189. Rolled-over rim; fabric: fine/medium shell. Section 228–causeway M, layer 6, Phase 1B.

M190. Rolled-over rim; fabric: fine shell; incised diagonal decoration on rim. Section 228–causeway M, layer 6, Phase 1B.

M191. Rolled-over rim/shoulder; fabric: crushed flint. Section 228–causeway M, layer 6, Phase 1B.

M192. Inturned rim/shoulder; fabric: fine/medium shell; incised diagonal decoration on rim; neck and body have rows of lentoid stabs. Section 228–causeway M, layer 6, Phase 1B.

M193. Externally thickened rim; fabric: fine/medium shell; rim has incised radial herringbone decoration. Section 228–causeway M, layer 6, Phase 1B.

M194. T-shaped rim; fabric: fine/medium shell; incised diagonal decoration on rim. Section 228–causeway M, layer 6, Phase 1B.

M195. Externally thickened rim; fabric: medium/coarse shell; abraded. Sections 229–233, layer 2, Phase 1.

M196. Rolled-over rim; fabric: fine shell. Sections 229–233, layer 3, Phase 1B.

M197. Simple rim (two sherds); fabric: fine shell. Sections 229–233, layer 4, Phase 1B.

M198. Externally thickened rim; fabric: medium/coarse shell; incised diagonal decoration on rim. Sections 229–233, layer 4, Phase 1B.

M199. Externally thickened rim; fabric: medium shell/flint; incised diagonal decoration on rim with further incised diagonal decoration on the outer bevel. Sections 229–233, layer 4, Phase 1B.

M200. Externally thickened rim; fabric: fine/medium shell. Sections 229–233, layer 4, Phase 1B.

M201. Rolled-over rim; fabric: fine/medium shell; incised diagonal decoration on rim. Sections 234–238, layer 1, Phase 2 or later.

M201A. Externally thickened rim; fabric: vegetable/shell/sand; partly abraded. Sections 234–238, layer 1, Phase 2 or later.

M202. Externally thickened/rolled-over rim; fabric: coarse shell; incised diagonal decoration on rim. Sections 234–238, layer 2, Phase 2.

M203. Externally thickened rim; fabric: fine/medium shell; abraded; rim has notched decoration on interior. Sections 234–238, layer 3, Phase 1C.

M204. Externally thickened rim (five sherds); fabric: fine/medium shell; partly abraded; rim has incised radial herringbone decoration; neck has incised vertical decoration. Sections 234–238, layer 3, Phase 1C.

M205. Shoulder (two sherds); fabric: coarse shell/flint; three rows of oval impressions. Sections 234–238, layer 3, Phase 1C.

M206. Inturned rim; fabric: fine shell; incised diagonal decoration on rim. Section 239–causeway N, layer 2, Phase 2(?).

M207. Expanded rim; fabric: fine/medium shell; abraded; incised diagonal decoration on rim. Section 239–causeway N, layer 2, Phase 2(?).

M208. Body; fabric: vegetable/shell/sand; diagonal rows of oval impressions. Section 239–causeway N, layer 2, Phase 2(?).

M209. T-shaped rim and shoulder; fabric: crushed flint; incised diagonal decoration on rim. Section 239–causeway N, layer 6, Phase 1.

M210. Simple rim; fabric: medium/coarse shell; abraded. Section 239–causeway N, layer 7, Phase 1.

M211. Rolled-over rim (four sherds); fabric: fine/medium shell; abraded. Section 239–causeway N, layer 9, Phase 1C.

M212. Rolled-over rim; fabric: fine/medium shell. Section 240-causeway N, layer 1, Phase 2.

M213. Externally thickened rim; fabric: vegetable/shell/sand; partly abraded; interior has one to two rows of ovate impressions; incised diagonal decoration on rim; neck has rows of incised vertical decoration. Section 240–causeway N, layer 1, Phase 2.

M214. Rolled-over rim; fabric: vegetable/shell/sand; abraded. Sections 241–245, layer 1, Phase 2.

M215. Simple rim; fabric: fine sand. Sections 241–245, layer 3, Phase 1B.

M216. Rolled-over rim; fabric: fine/medium shell. Sections 241–245, layer 3, Phase 1B.

M217. Rolled-over rim; fabric: fine/medium shell; interior has incised vertical decoration. Sections 241–245, layer 3, Phase 1B.

M218. Rolled-over rim (12 sherds); fabric: fine/medium shell; incised diagonal decoration on rim. Sections 241–245, layer 3, Phase 1B.

M219. Rolled-over rim (eight sherds); fabric: fine/medium shell. Sections 241–245, layer 3, Phase 1B.

M220. Externally thickened rim/shoulder (18 sherds); fabric: fine/medium shell; incised diagonal decoration on rim; above and below shoulder are rows of ovate impressions. Sections 241–245, layer 3, Phase 1B.

M221. Expanded rim (six sherds); fabric: fine/medium shell; abraded; incised diagonal decoration on rim. Sections 241–245, layer 3, Phase 1B.

M222. Inturned rim (two sherds); fabric: fine/medium shell. Sections 241–245, layer 3, Phase 1B.

M223. Shoulder (seven sherds); fabric: fine/medium shell. Sections 241–245, layer 3, Phase 1B.

M224. Simple rim (four sherds); fabric: fine/medium shell. Sections 241–245, layer 4, Phase 1B.

M225. Rolled-over rim; fabric: medium/coarse shell. Sections 241–245, layer 4, Phase 1B.

M226. T-shaped rim; fabric: fine shell; abraded; incised diagonal decoration on rim. Sections 241–245, layer 4, Phase 1B.

M227. Expanded rim; fabric: vegetable/shell/sand; incised diagonal decoration on rim. Sections 246–250, layer 1, Phase 2.

M228. Inturned rim; fabric: fine shell; abraded. Sections 246–250, layer 2, Phase 1C.

M229. Rolled-over rim (five sherds); fabric: fine/medium shell; abraded. Sections 246–250, layer 2, Phase 1C.

M230. Simple rim; fabric: fine shell; interior has vertical fluting. Sections 246–250, layer 4, Phase 1B.

M231. Externally thickened rim; fabric: fine/medium shell; abraded. Section 252–causeway O, layer 1, Phase 2.

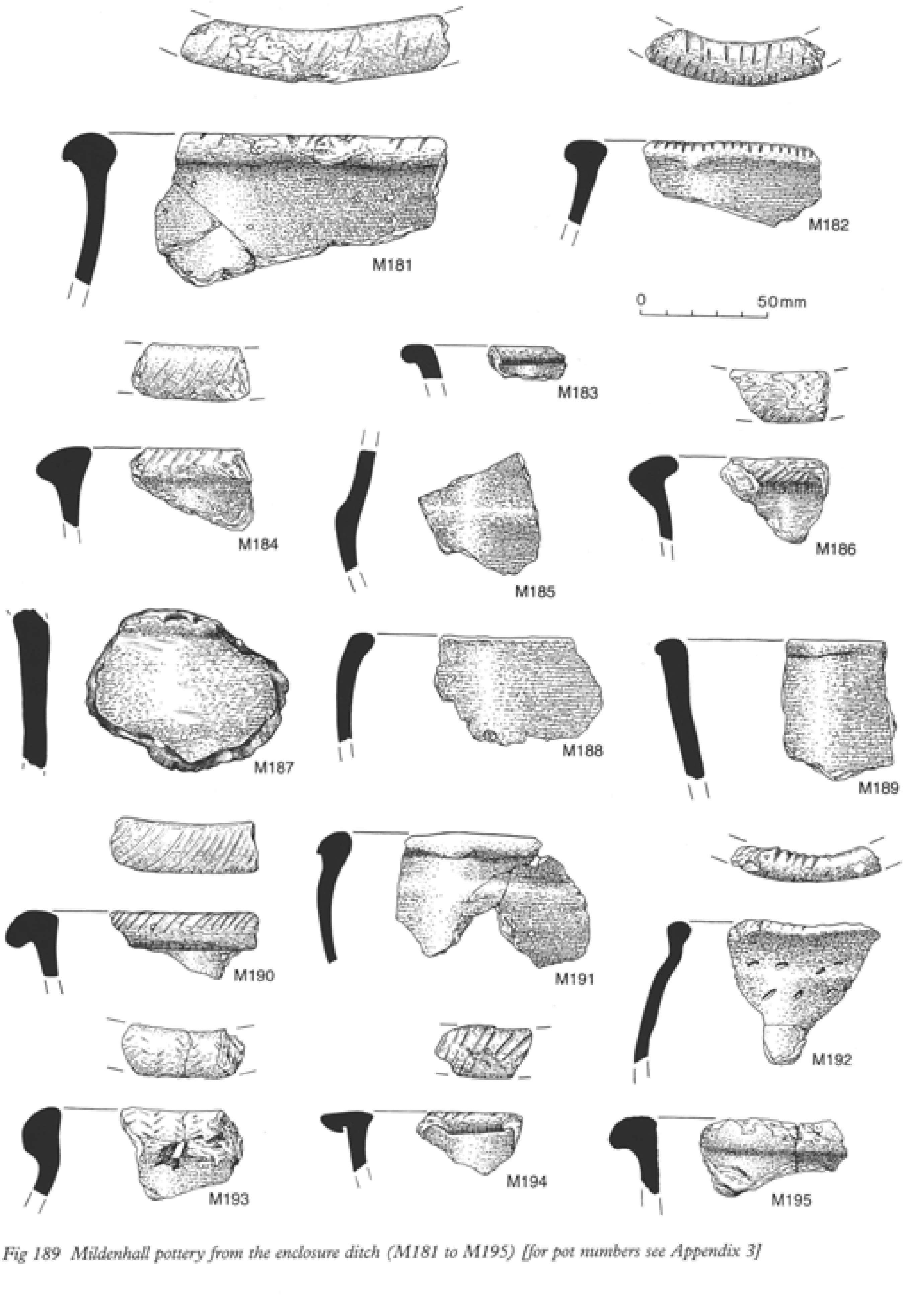


Fig 189 Mildenhall pottery from the enclosure ditch (M181 to M195) [for pot numbers see Appendix 3]

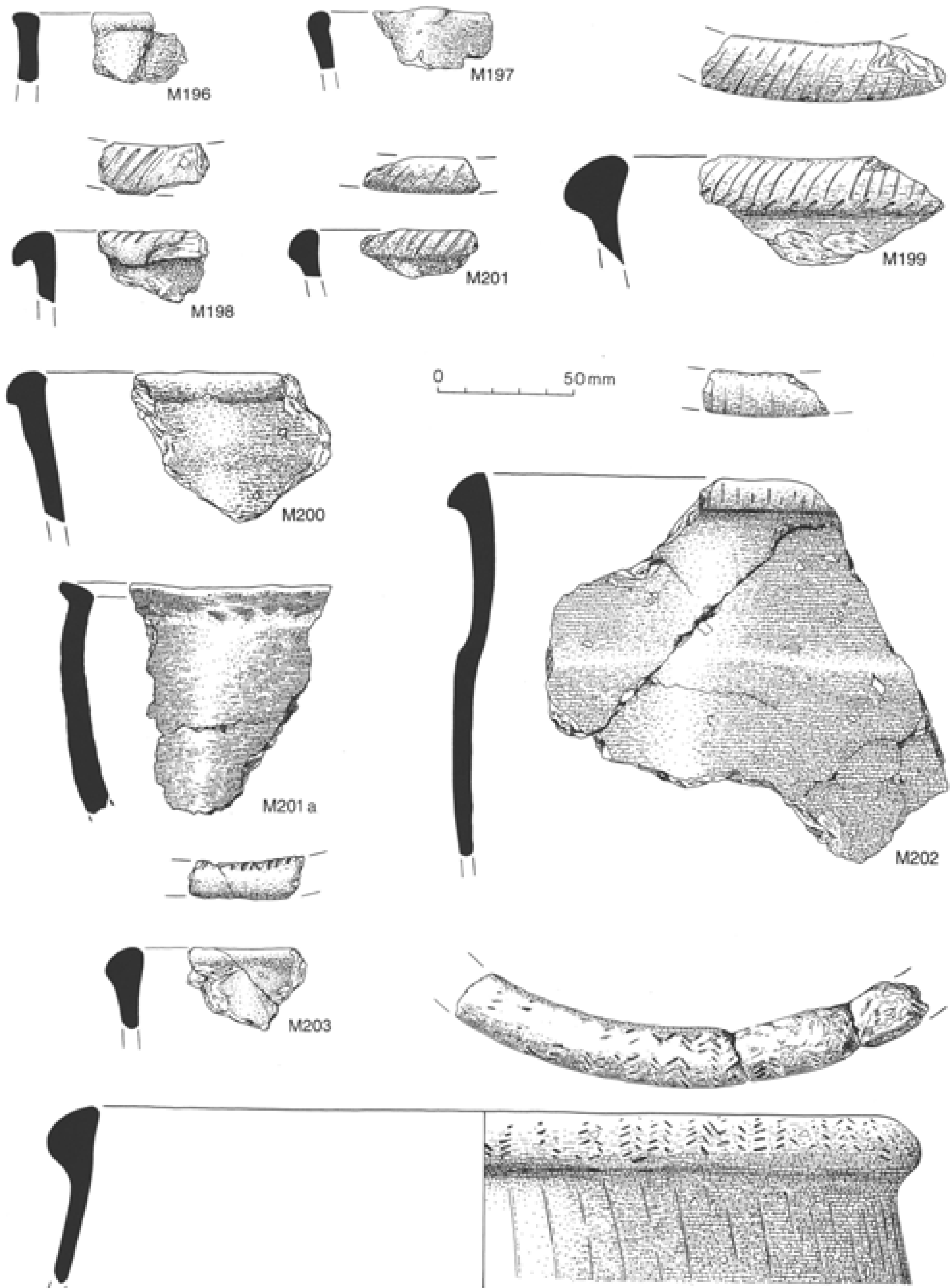


Fig 190 Mildenhall pottery from the enclosure ditch (M196 to M204) [for pot numbers see Appendix 3]

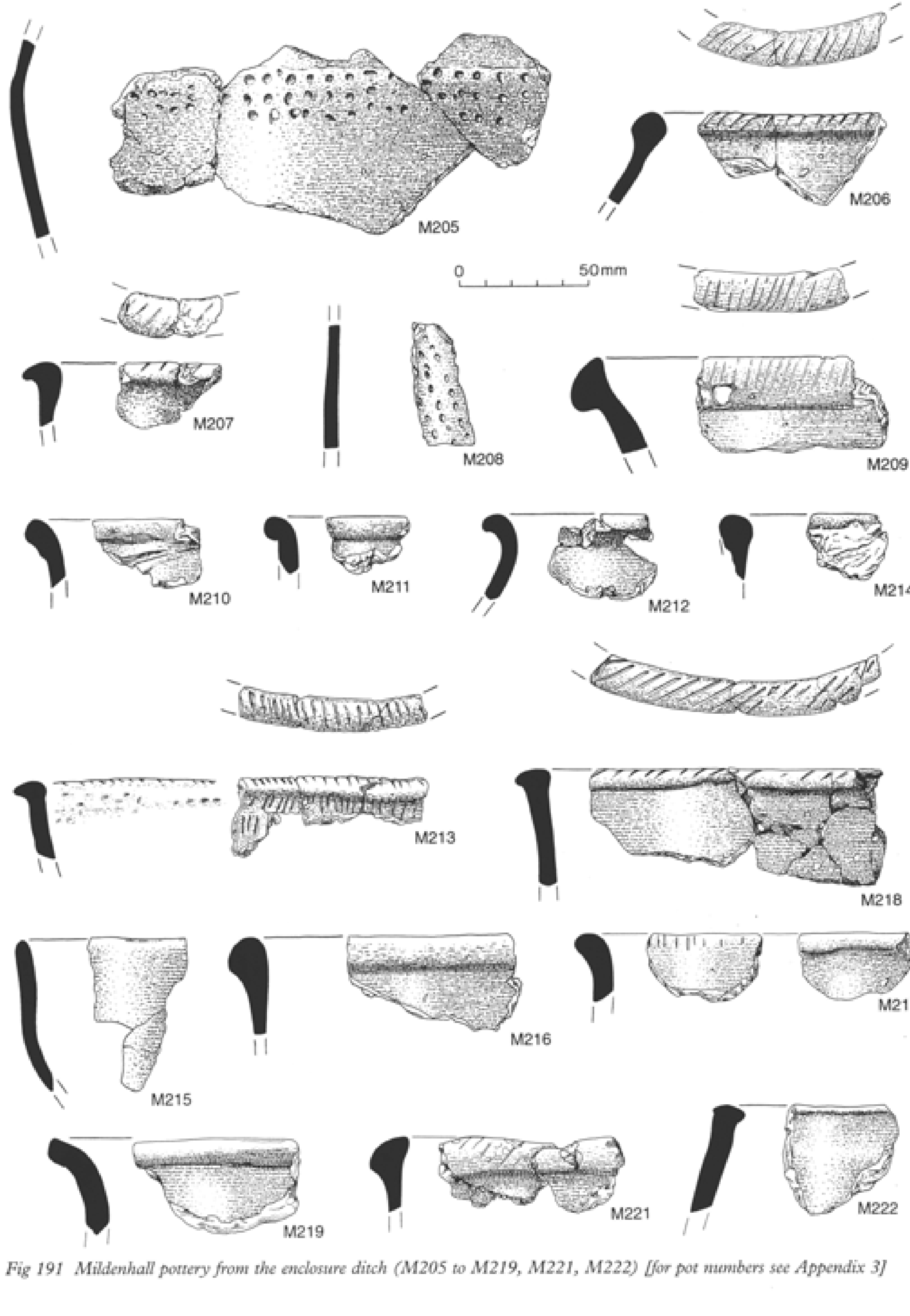


Fig 191 Mildenhall pottery from the enclosure ditch (M205 to M219, M221, M222) [for pot numbers see Appendix 3]

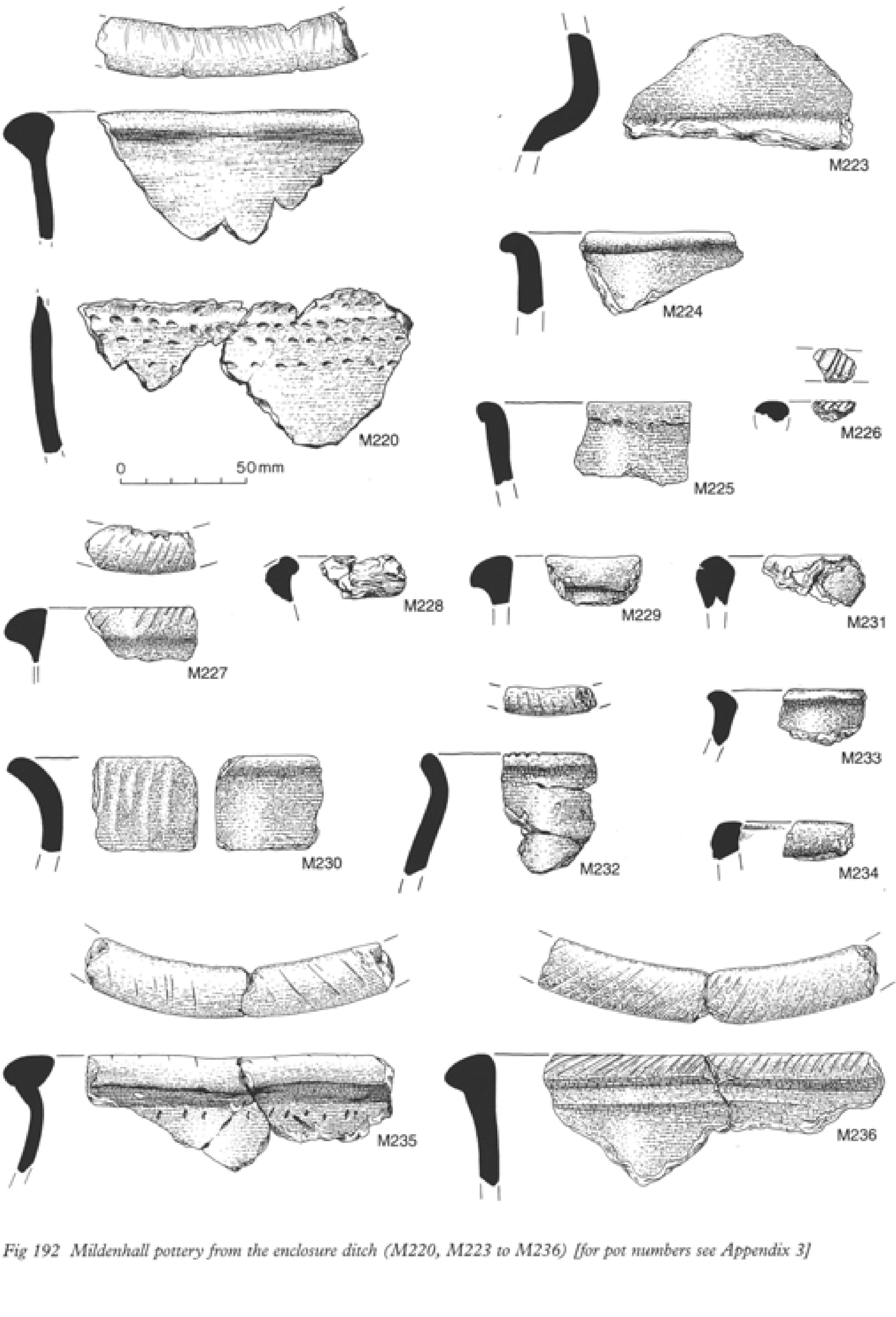


Fig 192 Mildenhall pottery from the enclosure ditch (M220, M223 to M236) [for pot numbers see Appendix 3]

M232. Simple rim (two sherds); fabric: fine shell; incised diagonal decoration on rim. Section 252–causeway O, layer 2, Phase 1C.

M233. Simple rim; fabric: fine/medium shell. Section 252–causeway O, layer 2, Phase 1C.

M234. Simple rim; fabric: fine/medium shell. Section 252–causeway O, layer 2, Phase 1C.

M235. Rolled-over rim; fabric: fine shell; incised diagonal decoration on rim; neck has row of stabs. Section 252–causeway O, layer 2, Phase 1C.

M236. Rolled-over rim; fabric: fine shell/flint; incised diagonal decoration on rim. Section 252–causeway O, layer 2, Phase 1C.

M237. Rolled-over rim; fabric: fine shell. Section 252–causeway O, layer 2, Phase 1C.

M238. Externally thickened rim/shoulder; fabric: fine shell. Section 252–causeway O, layer 2, Phase 1C.

M239. Externally thickened rim; fabric: fine shell/flint. Section 252–causeway O, layer 2, Phase 1C.

M240. Externally thickened rim/shoulder (five sherds); fabric: medium/coarse shell; incised diagonal decoration on rim. Section 252–causeway O, layer 2, Phase 1C.

M241. Expanded rim; fabric: fine/medium shell; incised radial decoration on rim; neck has stabs. Section 252–causeway O, layer 2, Phase 1C.

M242. T-shaped rim; fabric: fine shell; incised diagonal decoration on rim. Section 252–causeway O, layer 2, Phase 1C.

M243. Shoulder; fabric: fine shell/flint. Section 252–causeway O, layer 2, Phase 1C.

M244. Shoulder; fabric: fine/medium shell; abraded; incised diagonal decoration above two rows of shallow stabs. Section 252–causeway O, layer 2, Phase 1C.

See also pot numbers M392–M395 below.

Interior features

M245. Expanded rim; fabric: vegetable/shell/sand; abraded; F42, layer 1, Phase 1C.

M246. Expanded rim (eight sherds); fabric: vegetable/shell/sand; abraded; F228, layer 1, Phase 1.

M247. Externally thickened rim/shoulder; fabric: dissolved temper; F233, layer 1, Phase 1.

M248. Simple rim/shoulder (ten sherds); fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. F237, layer 1, Phase 1.

M249. Simple rim; fabric: vegetable/shell/sand; abraded; rim and body have incised diagonal decoration. F237, layer 1, Phase 1.

M250. Simple rim; fabric: vegetable/shell/sand; abraded; F239, layer 1, Phase 1.

M251. T-shaped rim; fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. F241, layer 1, Phase 1.

M252. Body; fabric: vegetable/shell/sand; two rows of shallow stabs. F244, layer 1, Phase 1.

M253. Simple rim; fabric: fine shell; abraded; F247, layer 1, Phase 1.

M254. Rolled-over rim; fabric: fine shell/flint; incised diagonal decoration on rim. F247, layer 1, Phase 1.

M255. Rolled-over rim; fabric: vegetable/shell/sand; F247, layer 1, Phase 1.

M256. Simple rim (two sherds); fabric: vegetable/shell/sand; abraded; notched rim; body has ovate impressions. F251, layer 1, Phase 1.

M257. Simple rim; fabric: vegetable/shell/sand; abraded; F251, layer 1, Phase 1.

M258. Rolled-over rim; fabric: vegetable/shell/sand; abraded; F251, layer 1, Phase 1.

M259. Rolled-over rim; fabric: medium/coarse shell; abraded; F251, layer 3, Phase 1.

M260. Rolled-over rim (five sherds); fabric: fine/medium shell; abraded; F251, layer 3, Phase 1.

M261. Externally thickened rim (seven sherds); fabric: fine shell. F251, layer 3, Phase 1.

M262. Rolled-over rim (two sherds); fabric: vegetable/shell/sand; abraded; F285, layer 1, Phase 1.

M263. Rolled-over rim; fabric: vegetable/shell/sand; abraded; stray find, surface of buried soil.

M264. Rolled-over rim; fabric: dissolved temper; rim has multiple incised chevrons. F289, layer 1, Phase 1.

M265. Externally thickened rim; fabric: vegetable/shell/sand. F293, layer 1, Phase 1.

M266. Externally thickened rim/shoulder/lug (34 sherds); fabric: fine/medium shell ; shoulder has rows of ovate impressions. F294, layer 1, Phase 1.

M267. Simple rim (two sherds); fabric: vegetable/shell/sand; abraded; F296, layer 1, Phase 1.

M268. Simple rim (three sherds); fabric: fine shell; abraded; F296, layer 1, Phase 1.

M269. Body (21 sherds); fabric: fine shell; abraded; multiple rows of round stabs. F296 layer 1, Phase 1.

M270. Externally thickened rim; fabric: fine/medium shell; abraded; incised diagonal decoration on rim. F313, layer 1, Phase 1C.

M271. Externally thickened rim; fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. F313, layer 1, Phase 1C.

M272. Rolled-over rim (two sherds); fabric: vegetable/shell/sand; abraded; F314, layer 1, Phase 1.

M273. Rolled-over rim; fabric: vegetable/shell/sand; abraded; F314, layer 1, Phase 1.

M274. Rolled-over rim (two sherds); fabric: vegetable/shell/sand. F314, layer 1, Phase 1.

M275. Externally thickened rim; fabric: vegetable/shell/sand. F314, layer 1, Phase 1.

M276. Expanded rim; fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim; row of ovate impressions. F314, layer 1, Phase 1.

M277. Expanded rim (seven sherds); fabric: vegetable/shell/sand; abraded; incised radial decoration on rim. F314, layer 1, Phase 1.

M278. Simple rim; fabric: dissolved temper. F318, layer 1, residual.

M279. T-shaped rim (four sherds); fabric: dissolved temper; incised diagonal decoration on rim. F321, layer 1, Phase 1.

M280. Rolled-over rim (seven sherds); fabric: vegetable/shell/sand; abraded; F321, layer 1, Phase 1.

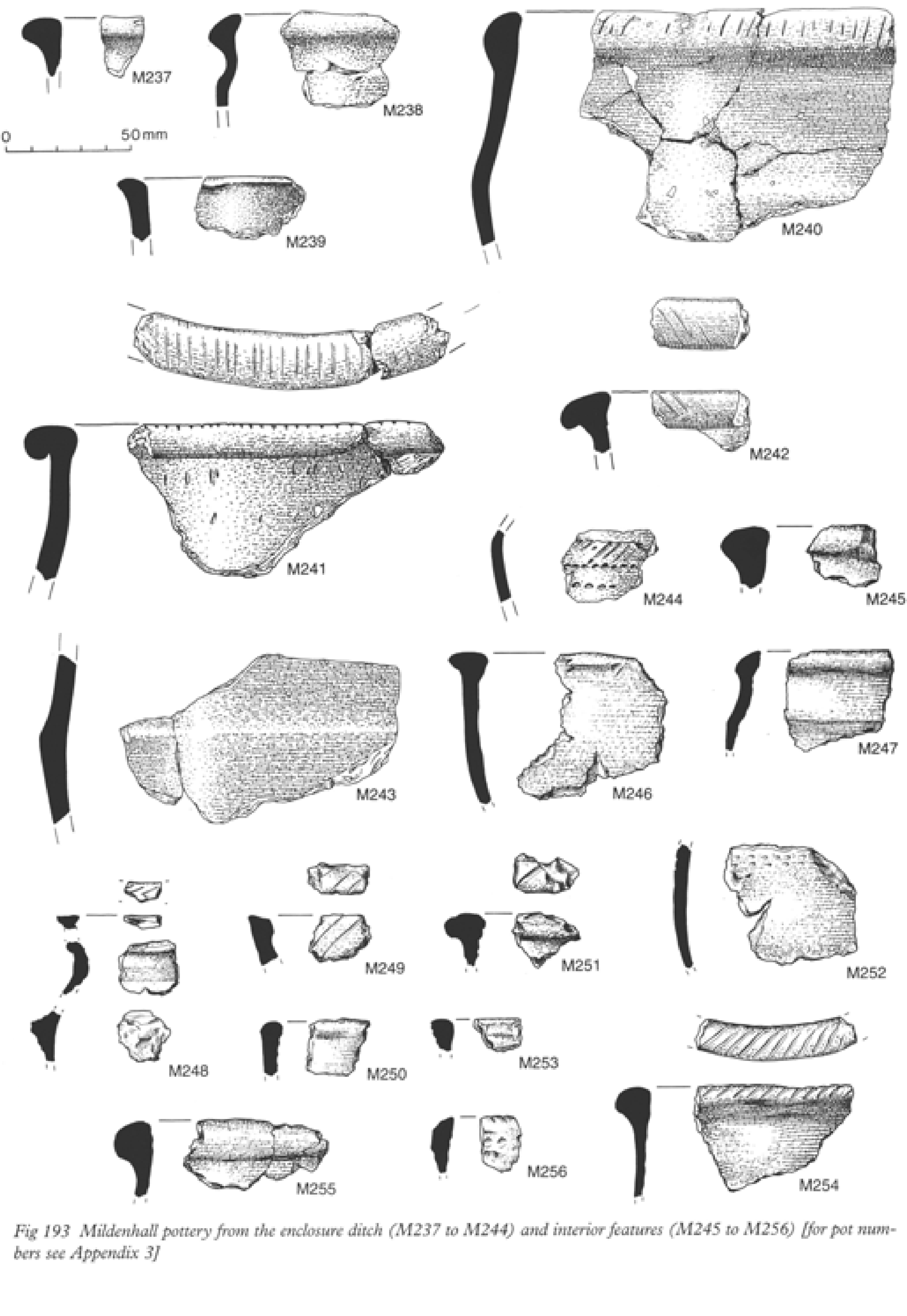


Fig 193 Mildenhall pottery from the enclosure ditch (M237 to M244) and interior features (M245 to M256) [for pot numbers see Appendix 3]

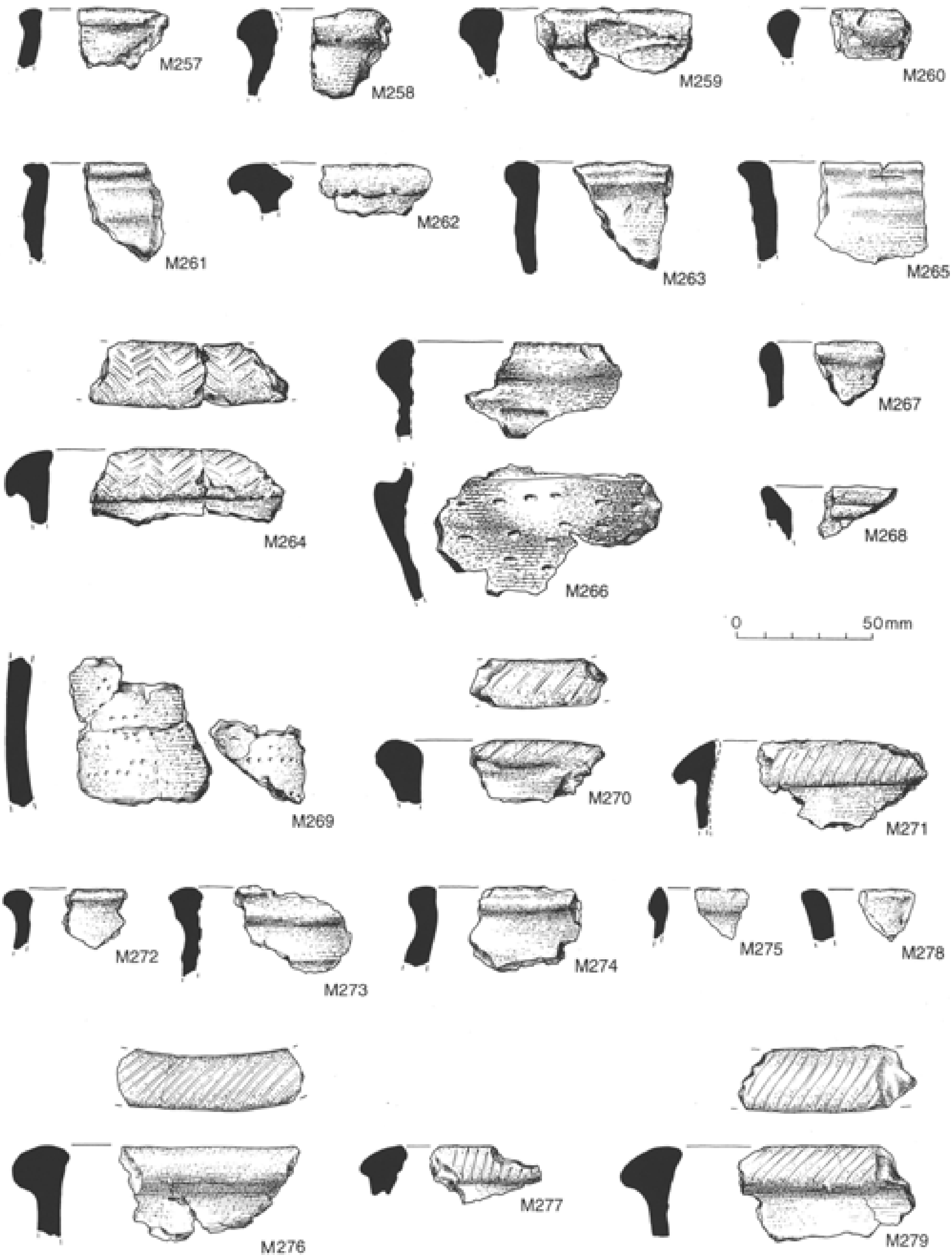


Fig 194 Mildenhall pottery from interior features (M257 to M279) [for pot numbers see Appendix 3]

M281. Rolled-over rim; fabric: dissolved temper; abraded; F334, layer 1, Phase 1.

M282. Rolled-over rim (six sherds); fabric: vegetable/shell/sand; abraded; F334, layer 1, Phase 1.

M283. Externally thickened rim; fabric: dissolved temper; abraded; F334, layer 1, Phase 1.

M284. Expanded rim; fabric: dissolved temper; incised diagonal decoration on rim. F334, layer 1, Phase 1.

M285. Externally thickened rim; fabric: vegetable/shell/sand; abraded; F363, layer 1, Phase 1.

M286. T-shaped rim; fabric: fine shell/flint; rim notches on outer bevel. F371, layer 1, Phase 1.

M287. Simple rim; fabric: vegetable/shell/sand. F372, layer 1, Phase 1.

M288. Expanded rim (two sherds); fabric: dissolved temper. F398, layer 1, Phase 1.

M289. Rolled-over rim (five sherds); fabric: dissolved temper. abraded; F432, layer 1, Phase 1.

M290. Externally thickened rim (three sherds); fabric: dissolved temper; abraded; F432, layer 1, Phase 1.

M291. Rolled-over rim; fabric: vegetable/shell/sand. F469, layer 1, residual.

M292. Rolled-over rim (six sherds); fabric: fine shell; incised radial decoration on rim. F471, layer 1, Phase 1(?).

M293. Rolled-over rim; fabric: vegetable/shell/sand; abraded; F487, layer 1, Phase 1.

M294. Rolled-over rim; fabric: vegetable/shell/sand; abraded; F483, layer 1, Phase 1(?).

M295. Rolled-over rim (six sherds); fabric: vegetable/shell/sand; abraded; F504, layer 1, Phase 1(?).

M296. Rolled-over rim; fabric: fine/medium shell; abraded; incised diagonal decoration on rim. F505, layer 1, Phase 1A/1B.

M297. Externally thickened rim; fabric: fine/medium shell; abraded; F505, layer 1, Phase 1A/1B.

M298. Externally thickened rim; fabric: fine shell; incised diagonal decoration on rim. F505, layer 1, Phase 1A/1B.

M299. Rolled-over rim; fabric: fine/medium shell; rim has diagonal notches. F505, layer 1, Phase 1A/1B.

M300. Expanded rim; fabric: vegetable/shell/sand; abraded; F505, layer 1, Phase 1A/1B.

M301. Simple rim; fabric: vegetable/shell/sand; abraded; F507, layer 1, Phase 1.

M302. Expanded rim (four sherds); fabric: vegetable/shell/sand; abraded; F507, layer 1, Phase 1.

M303. Rolled-over rim (two sherds); fabric: fine/medium shell; abraded; F563, layer 1, Phase 1A/1B.

M304. Rolled-over rim; fabric: dissolved temper; abraded; F624, layer 1, Phase 1.

M305. Neck; fabric: dissolved temper; incised vertical decoration. F624, layer 1, Phase 1.

M306. Rolled-over rim (three sherds); fabric: fine/medium shell; abraded; incised diagonal decoration on rim. F638, layer 2, Phase 1C.

M307. Expanded rim (15 sherds); fabric: fine/medium shell; abraded; incised diagonal decoration on rim. F638, layer 2, Phase 1C.

M308. Rolled-over rim; fabric: vegetable/shell/sand; abraded; F650, layer 1, Phase 1(?).

M309. Rolled-over rim (two sherds); fabric: vegetable/shell/sand; abraded; F654, layer 1, Phase 1.

M310. Simple rim; fabric: vegetable/shell/sand; abraded; F654, layer 1, Phase 1.

M311. Simple rim; fabric: dissolved temper; abraded; F654, layer 1, Phase 1.

M312. Rolled-over rim (three sherds); fabric: dissolved temper; abraded; F654, layer 1, Phase 1.

M313. Externally thickened rim; fabric: vegetable/shell/sand; abraded; F654, layer 1, Phase 1.

M314. Expanded rim; fabric: grog/shell/sand; abraded; F654, layer 1, Phase 1.

M315. Simple rim; fabric: vegetable/shell/sand; abraded; F681, layer 1, Phase 1(?).

M316. Rolled-over rim; fabric: grog/shell/sand; abraded; F682, layer 1.

M317. Rolled-over rim; fabric: vegetable/shell/sand; abraded; F697, layer 1, Phase 1 or 2.

M318. Expanded rim; fabric: vegetable/shell/sand; abraded; F697, layer 1, Phase 1A/1B.

M319. Simple rim (two sherds); fabric: vegetable/shell/sand; abraded; F698, layer 1, Phase 1.

M320. Expanded rim (two sherds); fabric: dissolved temper; abraded; incised diagonal decoration on rim. F698, layer 1, Phase 1.

M321. Expanded rim (eight sherds) fabric: grog/shell/sand; abraded; F698, layer 1, Phase 1.

M322 Neck; rows of lentoid stabs. F698, layer 1, Phase 1.

M323. Rolled-over rim; fabric: medium/coarse shell. F698, layer 1, Phase 1.

M324. Externally thickened rim; fabric: coarse shell; neck has thumb groove. F698, layer 2, Phase 1.

M325. Shoulder; fabric: medium/coarse shell; shoulder has rows of lentoid impressions. F698, layer 2, Phase 1.

M326. Body (two sherds); fabric: grog/shell/sand; abraded; body has incised ?double chevron. F698, layer 2, Phase 1.

M327. Rim; fabric: fine shell; row of diagonal impressions on rim. F698, layer 2, Phase 1.

M328. Externally thickened rim; fabric: fine shell; abraded; F698, layer 3, Phase 1.

M329. Externally thickened rim (four sherds); fabric: dissolved temper; abraded; neck has thumb groove. F698, layer 3, Phase 1.

M330. Expanded rim (20 sherds); fabric: dissolved temper; abraded; incised diagonal decoration on rim in panels. F711, layer 1, Phase 1.

M331. Externally thickened rim; fabric: vegetable/shell/sand; abraded; F713, layer 1, Phase 1.

M332. Rolled-over rim (four sherds); fabric: fine/medium shell; abraded; F713, layer 1, Phase 1.

M333. Rolled-over rim; fabric: dissolved temper; abraded; F341, layer 1, Phase 1.

M334. Rolled-over rim (two sherds); fabric: vegetable/shell/sand; abraded; F746, layer 1, Phase 1.

Fig 195 Mildenhall pottery from interior features (M280 to M299) [for pot numbers see Appendix 3]

Fig 196 Mildenhall pottery from interior features (M300 to M330) [for pot numbers see Appendix 3]

M335. Rolled-over rim (two sherds); fabric: grog/shell/sand; abraded; F749, layer 1, Phase 1.

M336. Externally thickened rim (two sherds); fabric: vegetable/shell/sand; abraded; F749, layer 1, Phase 1.

M337. Rolled-over rim (six sherds); fabric: vegetable/shell/sand; abraded; F761, layer 1, Phase 1.

M338. Rolled-over rim; fabric: vegetable/shell/sand; abraded; F761, layer 1, Phase 1.

M339. Rolled-over rim; fabric: vegetable/shell/sand; abraded; F761, layer 1, Phase 1.

M340. Rolled-over rim (16 sherds); fabric: vegetable/shell/sand; abraded; F763, layer 1, Phase 1.

M341. Simple rim; fabric: vegetable/shell/sand. F772, layer 1, Phase 1.

M342. Simple rim; fabric: fine/medium shell; abraded; F772, layer 1, Phase 1.

M343. Rolled-over rim (six sherds); fabric: vegetable/shell/sand; abraded; F772, layer 1, Phase 1.

M344. Rolled-over rim; fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. F772, layer 1, Phase 1.

M345. Inturned rim; fabric: vegetable/shell/sand; abraded; rim has external notches. F772, layer 2, Phase 1.

M346. Rolled-over rim; fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. F775, layer 1, Phase 1(?).

M347. Rolled-over rim; fabric: vegetable/shell/sand; abraded; F792, layer 1, Phase 1.

M348. Rolled-over rim; fabric: dissolved temper; abraded; F795, layer 1, Phase 1.

M349. Shoulder; fabric: dissolved temper; abraded; two rows of oval impressions. F795, layer 2, Phase 1.

M350. T-shaped rim; fabric: vegetable/shell/sand; abraded; F796, layer 1, Phase ?

M351. Rolled-over rim; fabric: vegetable/shell/sand; abraded; F797, layer 1, Phase 1.

M352. Simple rim (seven sherds); fabric: vegetable/shell/sand; abraded; F800, layer 1, Phase 1.

M353. T-shaped rim; fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. F802, layer 1, Phase 1.

M354. Simple rim; fabric: vegetable/shell/sand. F818, layer 1, Phase 1.

M355. Rolled-over rim; fabric: dissolved temper; incised diagonal decoration on rim. F818, layer 1, Phase 1.

M356. Rolled-over rim (four sherds); fabric: vegetable/shell/sand; abraded; F837, layer 1, Phase 1.

M357. Rolled-over/externally thickened rim; fabric: vegetable/shell/sand; abraded; F837, layer 1, Phase 1(?).

M358. T-shaped rim; fabric: dissolved temper. abraded; ?incised diagonal decoration on rim on panel. F837, layer 1, Phase 1(?).

M359. Lug; fabric: dissolved temper; abraded; two vertical perforations and incised diagonal decoration. F837, layer 1, Phase 1(?).

M360. Expanded rim; fabric: dissolved temper; incised diagonal decoration on rim. F839, layer 1, Phase 1(?).

M361. Rolled-over rim; fabric: vegetable/shell/sand; abraded; F851, layer 1, Phase 1.

M362. Rolled-over rim; fabric: fine shell. F874, layer 1, Phase 1.

M363. Rolled-over rim; fabric: medium shell/flint, abraded; F882, layer 1, Phase 1.

M364. Rolled-over rim; fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. F882, layer 1, Phase 1.

M365. Externally thickened rim; fabric: vegetable/shell/sand; abraded; rim has ovate impressions. F882, layer 1, Phase 1.

M366. Expanded rim; fabric: fine/medium shell; abraded; F882, layer 1, Phase 1.

M367. T-shaped rim (three sherds); fabric: fine shell; abraded; rim has incised herringbone decoration. F882, layer 1, Phase 1.

M368. Simple rim (four sherds); fabric: grog/shell/sand; abraded; F900, layer 1, Phase 1.

M369. T-shaped rim/shoulder (three sherds); fabric: dissolved temper; abraded; shoulder has applied cordon. F900, layer 1, Phase 1.

M370. Externally thickened rim (16 sherds) fabric: dissolved temper; abraded; F917, layer 1.

M371. Simple rim (two sherds); fabric: vegetable/shell/sand; abraded; F922, layer 1, Phase 1.

M372. Expanded rim (seven sherds); fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. F922, layer 1, Phase 1.

M373. Simple rim; fabric: vegetable/shell/sand; abraded; F933, layer 1, Phase 1.

M374. Rolled-over rim; fabric: dissolved temper; incised diagonal decoration on rim. F942, layer 1, Phase 1.

M375. Externally thickened rim (nine sherds); fabric: vegetable/shell/sand; abraded; F942, layer 1, Phase 1.

M376 Simple rim (nine sherds); fabric: fine/medium shell. F943, layer 1.

M377. Rolled-over rim (two sherds); fabric: fine shell/flint. F944, layer 1, Phase 1.

M378. Rolled-over rim (seven sherds); fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. F945, layer 1, Phase 1.

M379. Externally thickened rim/shoulder; fabric: dissolved temper; incised diagonal decoration on rim; shoulder has rows of vertical and diagonal strokes. F945, layer 1, Phase 1.

M380. Externally thickened rim/shoulder/lug (30 sherds); fabric: vegetable/shell/sand; abraded; F976, layer 1, Phase 1(?).

M381. Simple rim; fabric: dissolved temper; abraded; F981, layer 1, Phase 1.

M382. Externally thickened rim; fabric: dissolved temper; incised diagonal decoration on rim. F981, layer 1, Phase 1.

M383. Externally thickened rim; fabric: fine sand. F981, layer 1, Phase 1.

M384. Expanded rim; fabric: dissolved temper; abraded; F981, layer 1, Phase 1.

M385. Simple rim; fabric: grog/shell/sand. F981, layer 2, Phase 1.

M386. Rolled-over rim (four sherds); fabric: vegetable/shell/sand; abraded; F981, layer 2, Phase 1.

M387. Externally thickened rim; fabric: vegetable/shell/sand; abraded; incised diagonal decoration on rim. F981, layer 2, Phase 1.

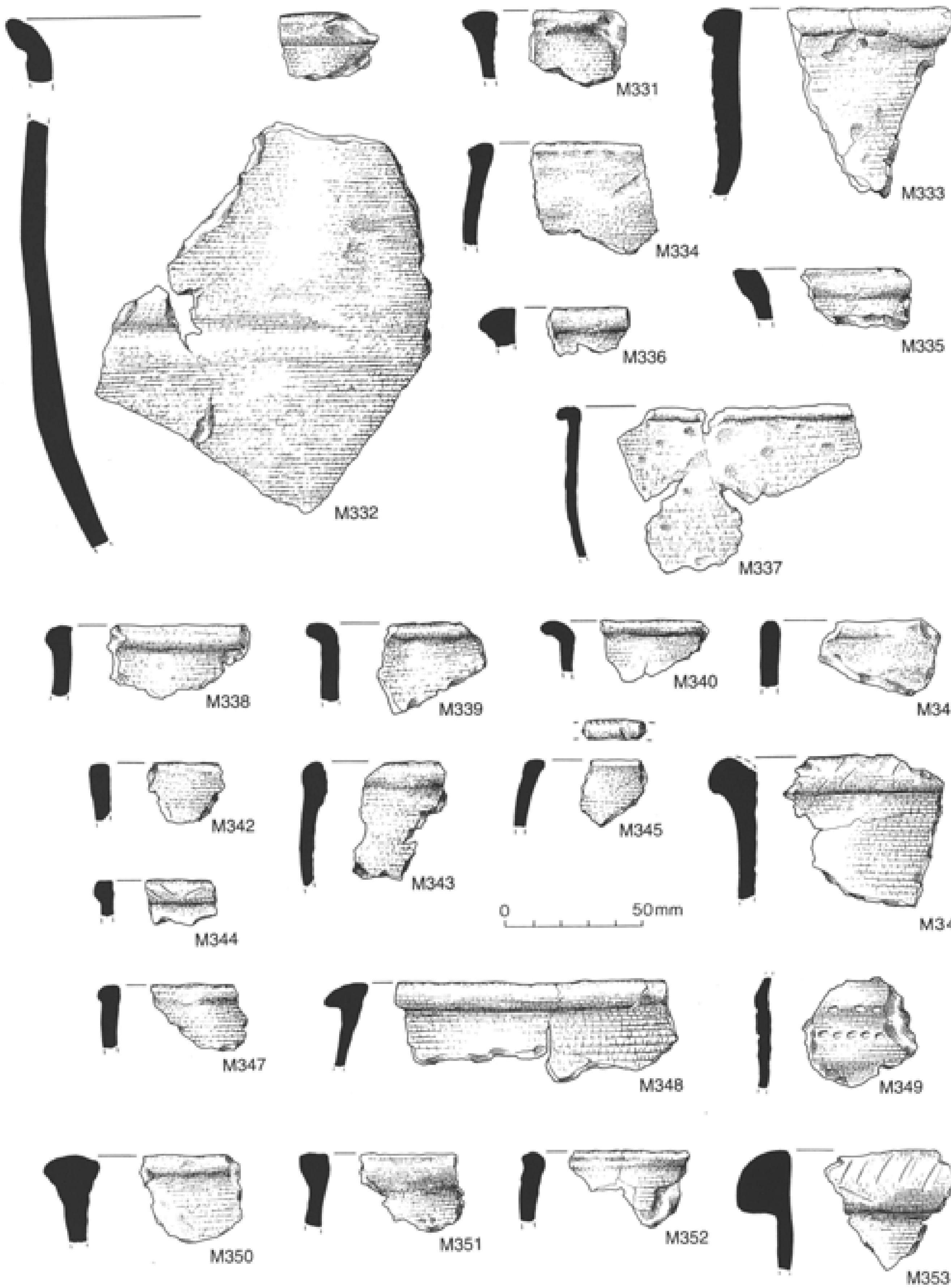


Fig 197 Mildenhall pottery from interior features (M331 to M353) [for pot numbers see Appendix 3]

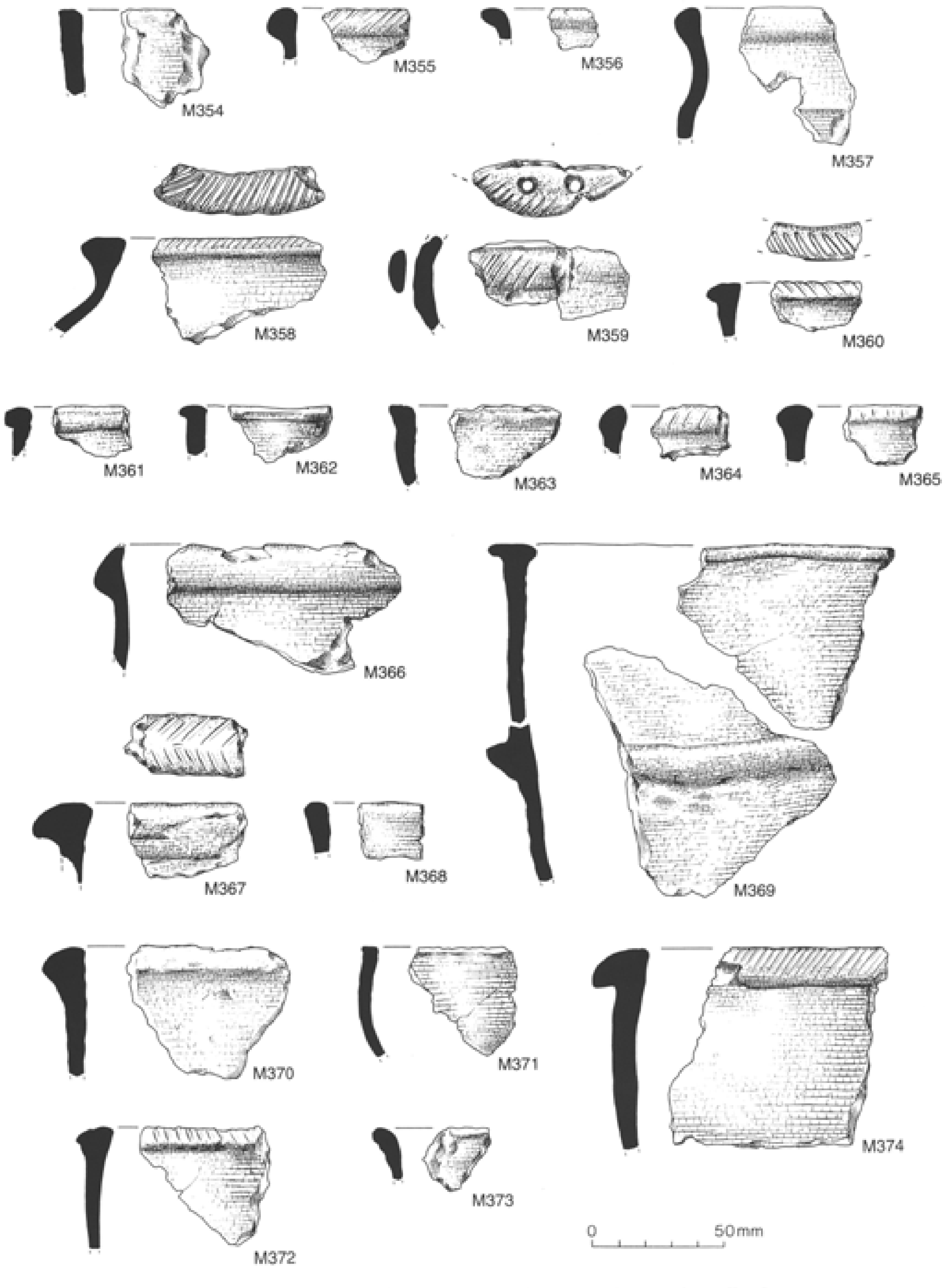


Fig 198 Mildenhall pottery from interior features (M354 to M374) [for pot numbers see Appendix 3]

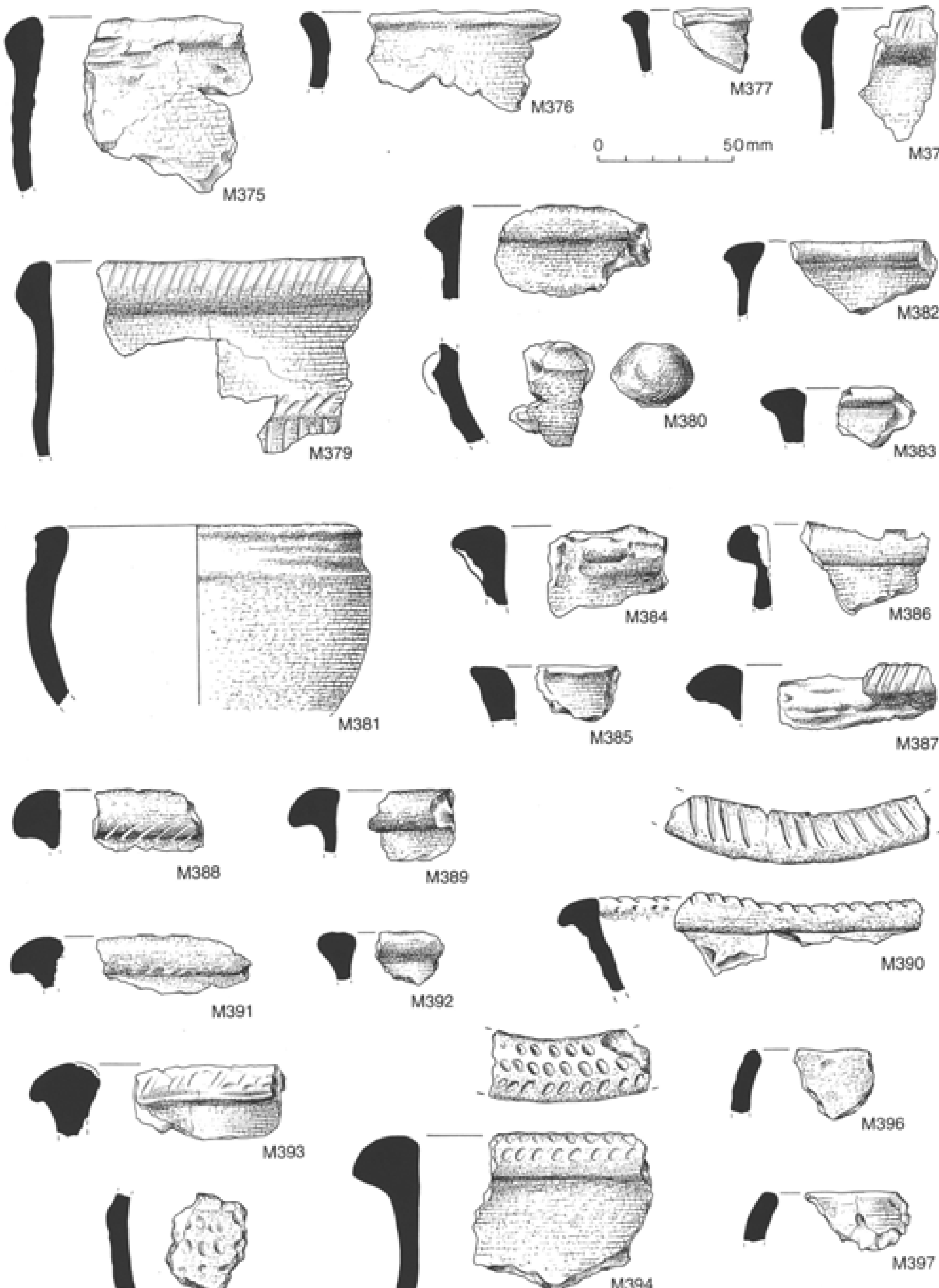


Fig 199 Mildenhall pottery from interior features (M375 to M397) [for pot numbers see Appendix 3]

M388. Expanded rim; fabric: fine/medium shell; abraded; incised diagonal decoration on rim. F981, layer 2, Phase 1.

M389. Expanded rim; fabric: vegetable/shell/sand; abraded; F981, layer 2, Phase 1.

M390. T-shaped rim (four sherds); fabric: dissolved temper; abraded; incised diagonal decoration on rim. F981, layer 2, Phase 1.

M391. T-shaped rim; fabric: vegetable/shell/sand; abraded; F981, layer 2, Phase 1.

M392. Rolled-over rim; fabric: vegetable/shell/sand. F994, layer 1, Phase 1B.

M393. Rolled-over rim; fabric: fine shell/flint; abraded; incised diagonal decoration on rim. F994, layer 2, Phase 1B.

M394. Rolled-over rim; fabric: crushed flint; rim has three circumferential rows of ovate impressions. F994, layer 2, Phase 1B.

M395. Body; fabric: fine/medium shell; rows of ovate impressions. F994, layer 2, Phase 1B.

M396. Simple rim; fabric: vegetable/shell/sand; abraded; F1050, layer 1, Phase 1.

M397. Simple rim; fabric: medium/coarse shell. F1055, layer 1, Phase 1.

M398. Simple rim (three sherds); fabric: coarse shell; abraded; F1056, layer 1, Phase 1.

M399. Rolled-over rim/shoulder/lug; fabric: fine shell; incised diagonal decoration on rim; shoulder and body have rows of ovate impressions; lug has two vertical perforations. F1056, layer 1, Phase 1.

M400. Externally thickened -im/shoulder; fabric: fine shell; abraded; rim has diagonal ovate impressions. F1056, layer 1, Phase 1.

M401. T-shaped rim; fabric: fine shell/flint; rim has irregular incised diagonal decoration. F1056, layer 1, Phase 1.

M402. T-shaped rim; fabric: fine shell/flint; rim has irregular incised diagonal decoration. F1056, layer 1, Phase 1.

M402. Shoulder (two sherds); fabric: fine/medium shell; neck has incised vertical decoration; shoulder has row of oval impressions. F1056, layer 1, Phase 1.

B horizon (prehistoric buried soil)

See also M263 above.

M403. Simple rim; fabric: vegetable/shell/sand; abraded.

M404. Simple rim (eight sherds); fabric: vegetable/shell/sand; abraded.

M405. Rolled-over rim (two sherds); fabric: vegetable/shell/sand; abraded.

M406. Simple rim; fabric: vegetable/shell/sand; abraded.

M407. Simple rim; fabric: vegetable/shell/sand; abraded.

M408. Rolled-over rim; fabric: vegetable/shell/sand; abraded.

M409. Rolled-over rim (three sherds); fabric: vegetable/shell/sand; abraded.

M410. Rolled-over rim; fabric: vegetable/shell/sand; abraded; row of incised diagonal decoration.

M411. Externally thickened rim; fabric: vegetable/shell/sand; abraded.

M412. Expanded rim; fabric: vegetable/shell/sand; abraded.

M413. Expanded rim (three sherds); fabric: vegetable/shell/sand; abraded.

M414. T-shaped rim; fabric: vegetable/shell/sand; abraded.

C horizon (at the junction with the B horizon)

M415. Externally thickened rim (12 sherds); fabric: grog/shell/sand; abraded.

M416. Externally thickened rim; fabric: vegetable/shell/sand; abraded.

M417. Expanded rim; fabric: dissolved temper; abraded.

M418. Expanded rim (two sherds); fabric: grog/shell/sand; abraded; incised diagonal decoration on rim.

M419. Externally thickened rim; fabric: vegetable/shell/sand; abraded.

Ebbsfleet pottery

The following catalogue entries are illustrated in Figures 201 and 202:

Enclosure ditch

E1. Rim; fabric: grog/shell/sand; incised lattice decoration on interior; incised diagonal decoration on rim; neck has thumb groove. Sections 87–89, layer 1, Phase 2(?).

E2. Rim/shoulder (14 sherds); fabric: medium shell/flint, partly abraded; interior has all-over multiple rows of fine bird-bone impressions – distal articular end of humerus on the interior and rim, proximal end on exterior of body; neck has rows of ovate impressions. Section 177–causeway G, layer 2, Phase 2.

E3. Rim; fabric: medium shell/flint; interior and rim have diagonal whipped cord 'maggots'. Causeway J–section 205, layer 2, Phase 1C or 2.

E4. Rim; fabric: fine shell/flint; interior has incised herringbone decoration; rim has twisted cord diagonal decoration. Section 216–causeway L, layer 1, Phase 2.

E5. Body (nine sherds); fabric: fine shell/flint; multiple rows of diagonal and vertical ?bird-bone impressions. Sections 241–245, layer 2, Phase 1C.

E6. Rim/shoulder; fabric: crushed flint; partly abraded; rows of fingernail decoration on the interior, rim, and lug. Sections 241–245, layer 2, Phase 1C.

E7. Rim; fabric: grog/shell/sand; incised chevron; incised herringbone decoration on rim. Sections 246–250, layer 1, Phase 2.

Peterborough Ware

The following catalogue entries are illustrated in Figures 202 and 203:

Enclosure ditch

PR1. Body; fabric: grog/shell/sand; rows of bird-bone decoration. Sections 174–176, layer 1, Phase 2 or later.

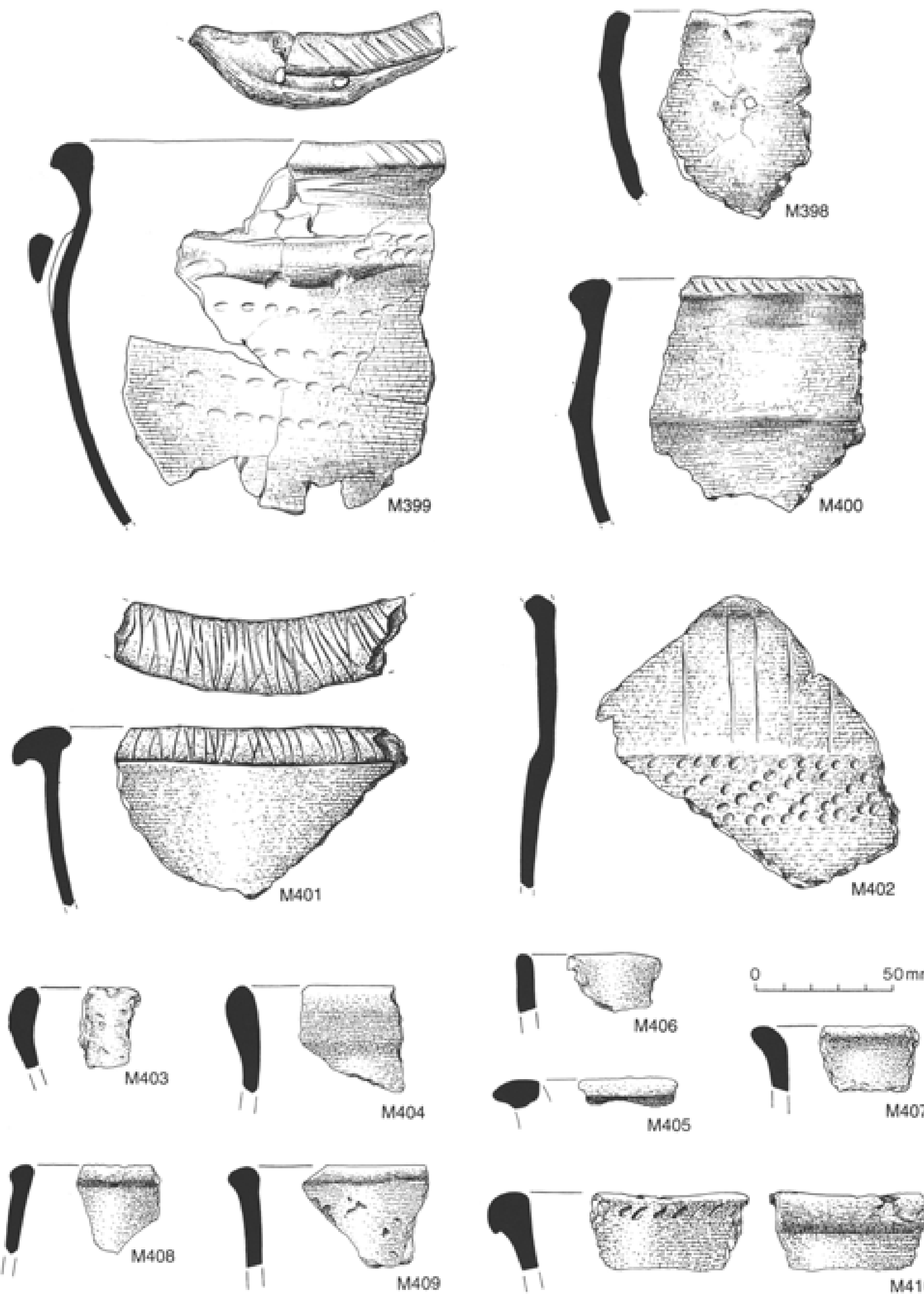


Fig 200 Mildenhall pottery from interior features (M398 to M402) and the buried soil (M403 to M410) [for pot numbers see Appendix 3]

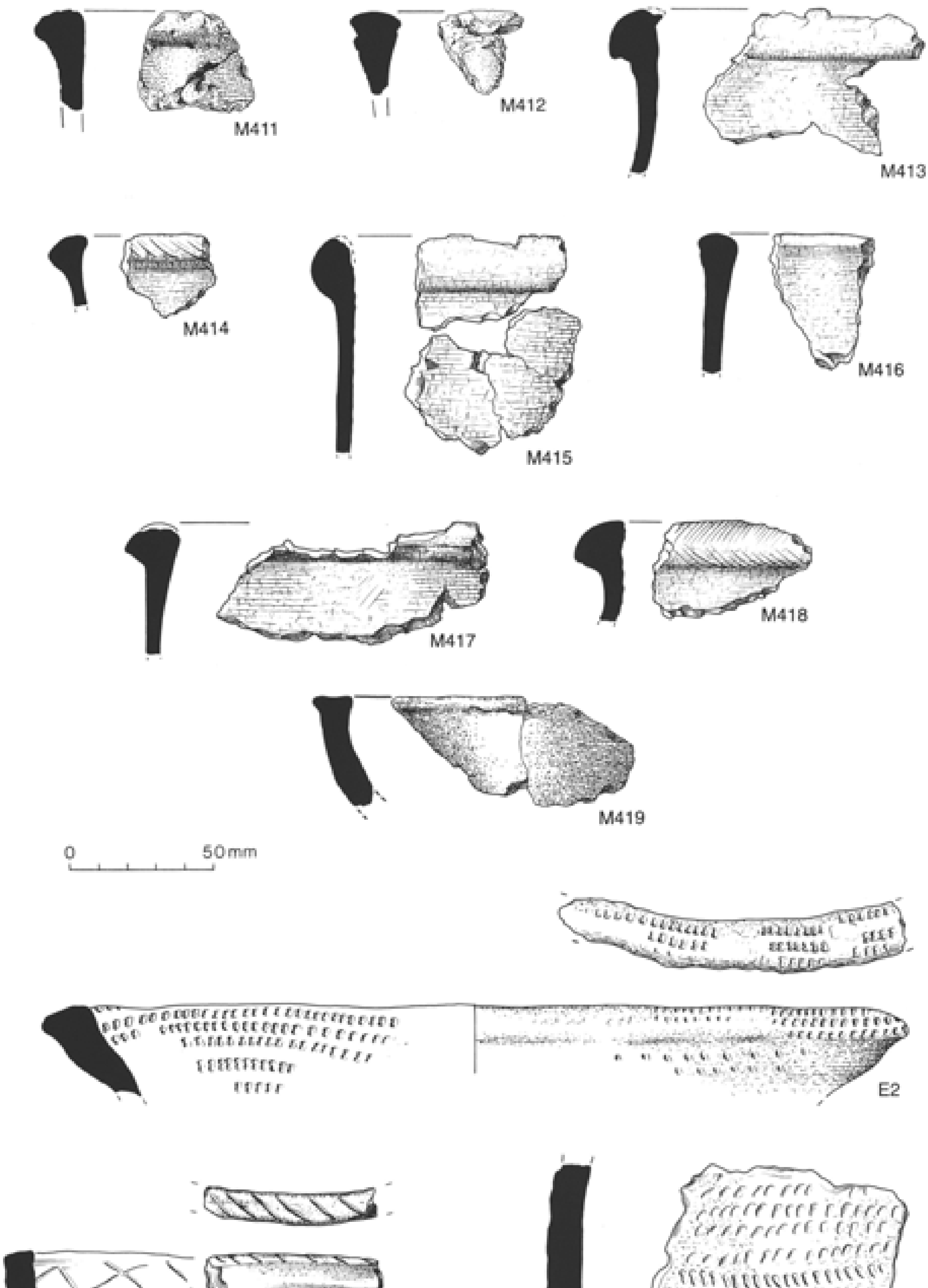


Fig 201 Mildenhall pottery from the buried soil (M411 to M414) and the C soil horizon (M415 to M419), and Ebbsfleet pottery from the enclosure ditch (E1, E2) [for pot numbers see Appendix 3]

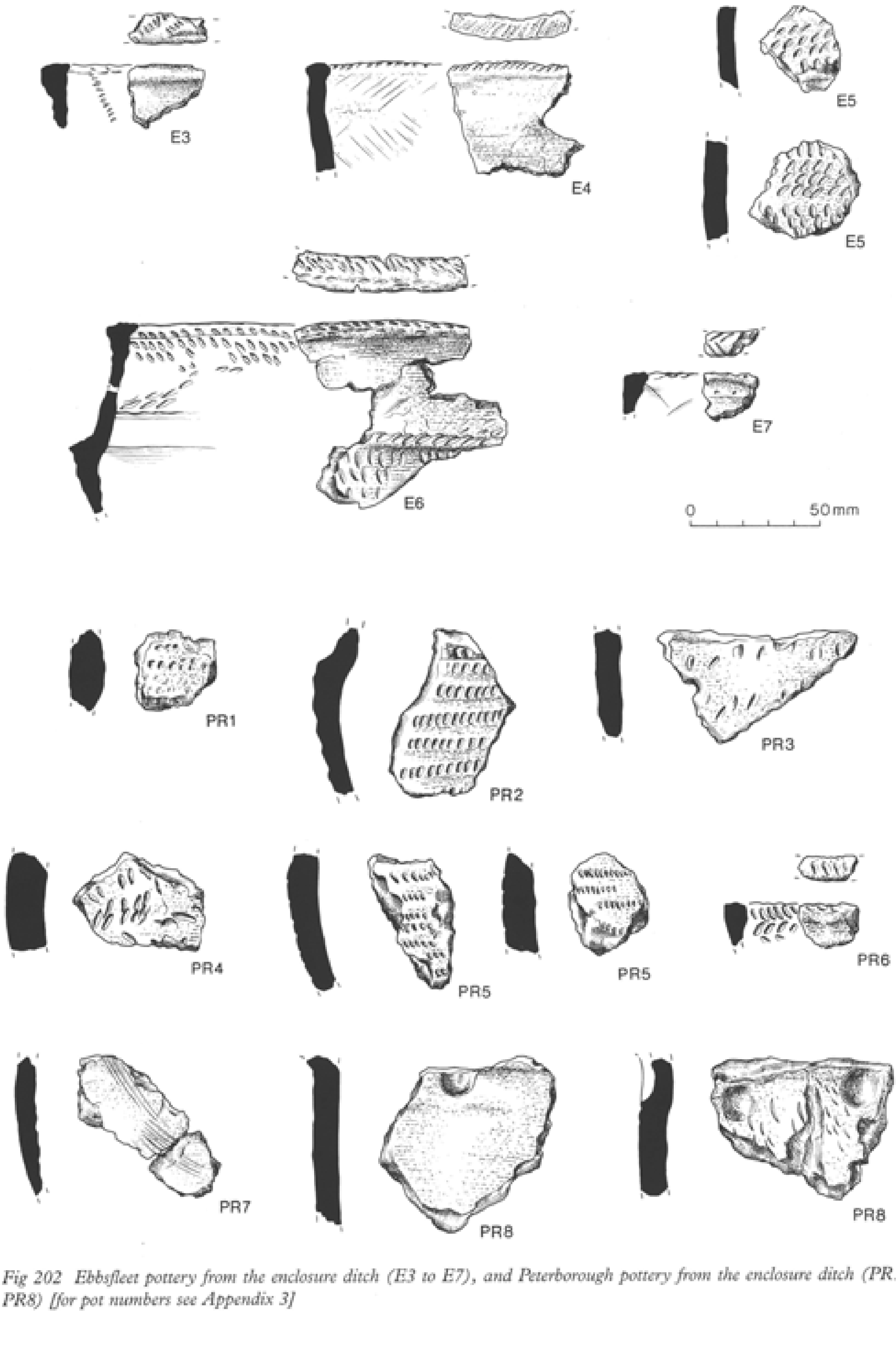


Fig 202 Ebbsfleet pottery from the enclosure ditch (E3 to E7), and Peterborough pottery from the enclosure ditch (PR1 to PR8) [for pot numbers see Appendix 3]

PR2. Shoulder (two sherds); fabric: medium shell/flint; body has rows of bird-bone impressions. Sections 177–179, layer 2, Phase 2.

PR3. Body (two sherds); fabric: medium shell/flint; rows of fingernail decoration. Sections 177–179, layer 2, Phase 2.

PR4. Body (three sherds); fabric: grog/shell/sand; partly abraded; neck has cord 'maggot' ?herringbone decoration and rows of fingernail decoration. Sections 205–206, layer 1, Phase 2.

PR5. Body (two sherds); fabric: medium/coarse shell; partly abraded; rows of whipped cord decoration. Sections 222–226, layer 3, Phase 1C.

PR6. Rim; fabric: grog/shell/sand; partly abraded; interior has fingernail herringbone decoration; radial fingernail decoration on rim. Section 227–causeway M, layer 1, Phase 2.

PR7. Body (two sherds); fabric: vegetable/shell/sand; arcuate combed lines, partly smoothed over. Section 227–causeway M, layer 2, Phase 2.

PR8. Body (two sherds); fabric: medium/coarse shell; fingertip impressions. Section 227–causeway M, layer 2, Phase 2.

PR9. Rim/shoulder; fabric: fine/medium shell. Sections 252–266, layer 2, Phase 1C.

Interior features

PR10. Body (two sherds); fabric: grog/shell/sand; incised herringbone decoration and parallel lines. F1023, layer 1, Phase 2.

PR11. Body (two sherds); fabric: grog/shell/sand; incised herringbone decoration. F1032, layer 1, Phase 2.

B horizon (prehistoric buried soil)

PR12. Body; fabric: grog/shell/sand; abraded; broad groove with pit-like impressions.

Fengate Ware

The following catalogue entries are illustrated in Figures 203 to 205:

Enclosure ditch

FG1. Body; fabric: grog/shell/sand; rim has multiple incised herringbone decoration; body has incised diagonal decoration. Sections 13–14, layer 2, Phase 1C/2.

FG2. Body; fabric: grog/shell/sand; multiple incised herringbone decoration. Sections 174–176, layer 1, Phase 2(?).

FG3. Body; fabric: grog/shell/sand; irregular fingernail decoration. Sections 190–199, layer 1, Phase 2.

FG4. Rim/collar; fabric: grog/shell/sand; incised diagonal decoration on rim; collar has incised lattice decoration; neck has a fingertip pit. Sections 197–199, layer 1, Phase 2.

FG5. Rim; fabric: grog/shell/sand; abraded; row of stabs; incised radial decoration on rim. Causeway J–section 205, layer 2, Phase 1C.

FG6. Rim; fabric: grog/shell/sand; abraded; rim has diagonal rows of stabs. Causeway J–section 205, layer 2, Phase 1C.

FG7. Rim; fabric: grog/shell/sand; incised radial decoration on rim; body has fingernail decoration. Section 207–causeway K, layer 1, Phase 2.

FG8. Body; fabric: grog/shell/sand; fingernail decoration. Section 207–causeway K, layer 2, Phase 2.

FG9. Rim/collar; fabric: grog/shell/sand; collar has fingernail decoration. Sections 207–208, layer 1, Phase 2.

FG10. Collar; fabric: grog/shell/sand; diagonal twisted cord impressions; body has incised multiple arcs. Causeway K–208, layer 1, Phase 2.

FG11. Body; fabric: grog/shell/sand; fingernail decoration. Causeway K–section 208, layer 1, Phase 2.

FG12. Rim; fabric: grog/shell/sand; fingernail herringbone decoration on rim; body has twisted cord upright and pendent triangles, filled with diagonal lines. Sections 208–209, layer 1, Phase 2.

FG13. Body; fabric: grog/shell/sand; incised lines of ?combed decoration. Sections 208–209, layer 1, Phase 2.

FG14. Body; fabric: grog/shell/sand; multiple incised decoration in a 'woven' pattern. Sections 208–209, layer 1, Phase 2.

FG15. Body; fabric: grog/shell/sand; incised lines of ?combed decoration. Sections 208–209, layer 1, Phase 2.

FG16. Body; fabric: grog/shell/sand; incised lines of ?combed decoration. Sections 208–209, layer 1, Phase 2.

FG17. Collar; fabric: grog/shell/sand; abraded; twisted cord diagonal and horizontal impressions with short arcs above the angle between them. Sections 208–209, layer 2, Phase 2.

FG18. Body; fabric: grog/shell/sand; incised lines of ?combed decoration. Sections 208–209, layer 2, Phase 2.

FG19. Rim; fabric: grog/shell/sand; abraded; incised diagonal decoration on rim. Section 209–causeway L, layer 1, Phase 2.

FG20. Rim; fabric: grog/shell/sand; abraded; incised double chevron; incised herringbone decoration on rim; body has incised decoration butting multiple arcs. Section 209–causeway L, layer 1, Phase 2.

FG21. Body (three sherds); fabric: grog/shell/sand; abraded; multiple combed arcs. Section 209–causeway L, layer 1, Phase 2.

FG22. Body (four sherds); fabric: grog/shell/sand; incised lines of ?combed decoration. Section 209–causeway L, layer 2, Phase 2.

FG23. Collar; fabric: grog/shell/sand; incised diagonal decoration. Section 216–causeway L, layer 1, Phase 2.

FG24. Body; fabric: grog/shell/sand; incised trellis decoration. Section 216–causeway L, layer 1, Phase 2.

FG25. Body; fabric: grog/shell/sand; incised lines of ?combed decoration. Section 216–causeway L, layer 1, Phase 2.

FG26. Body; fabric: medium/coarse shell; twisted cord diagonal decoration above multiple horizontal impressions. Sections 222–226, layer 3, Phase 1C.

FG27. Rim/collar; fabric: grog/shell/sand; multiple incised herringbone decoration; incised multiple arcs on rim. Section 227–causeway M, layer 2, Phase 2.

FG28. Rim; fabric: sand/flint; fingernail herringbone decoration on rim. Section 227–causeway M, layer 2, Phase 2.

FG29. Rim; fabric: medium/coarse shell; incised herringbone decoration on rim; body has incised horizontal lines and twisted cord and filled triangle. Section 227–causeway M, layer 2, Phase 2.

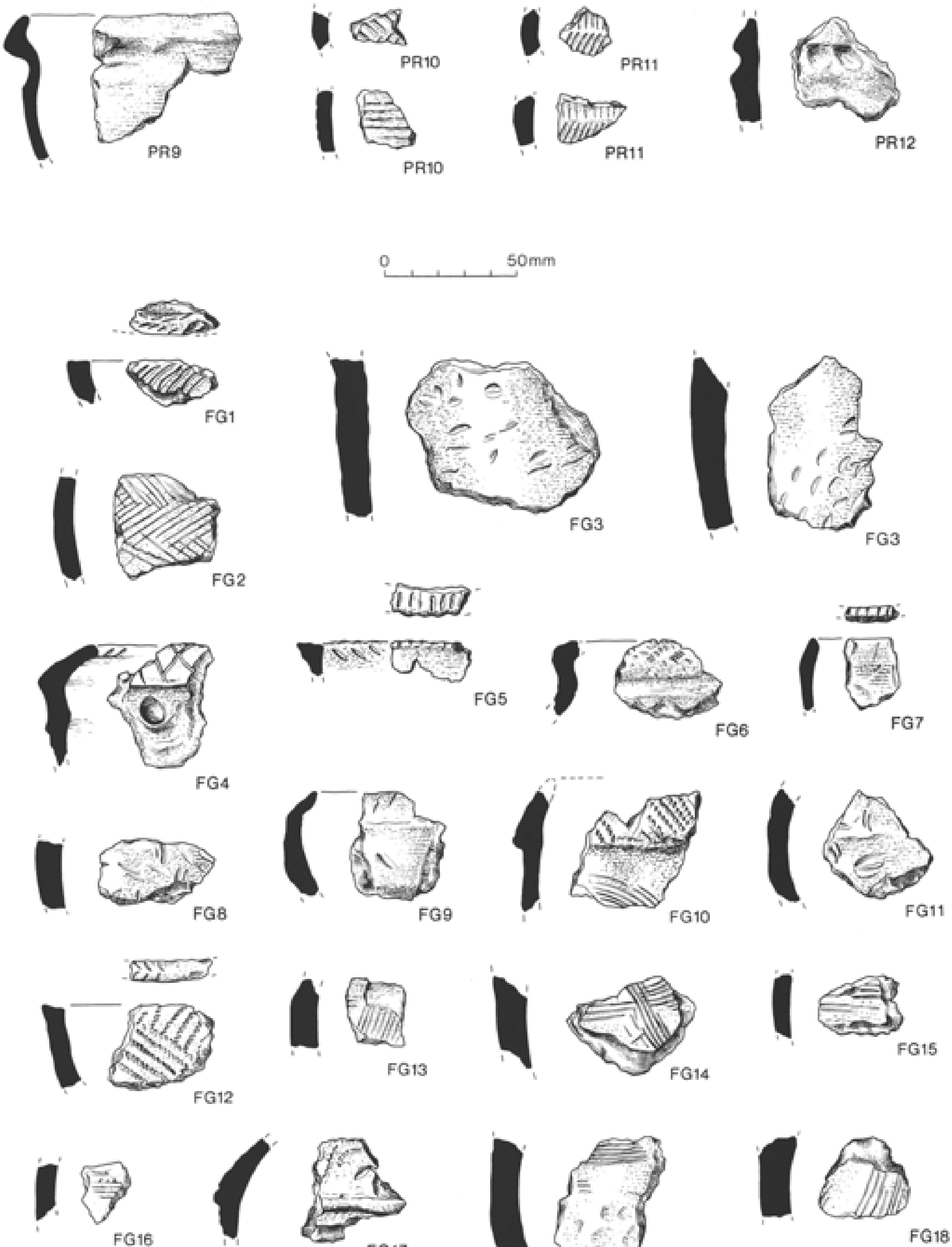


Fig 203 Peterborough pottery from the enclosure ditch (PR9), interior features (PR10, PR11), and the buried soil (PR12). Fengate pottery from the enclosure ditch (FG1 to FG18) [for pot numbers see Appendix 3]

FG30. Collar; fabric: vegetable/shell/sand; ?panel of diagonal fingernail decoration. Section 227–causeway M, layer 2, Phase 2.

FG31. Body (two sherds); fabric: grog/shell/sand; incised multiple arcs. Section 227–causeway M, layer 2, Phase 2.

FG32. Body; fabric: vegetable/shell/sand; fingernail decoration. Section 227–causeway M, layer 2, Phase 2.

FG33. Body; fabric: grog/shell/sand; incised vertical chevrons. Section 227–causeway M, layer 2, Phase 2.

FG34. Body; fabric: grog/shell/sand; incised lines. Section 227–causeway M, layer 2, Phase 2.

FG35. Body; fabric: vegetable/shell/sand; two zones of multiple arcuate ?combed decoration. Section 227–causeway M, layer 2, Phase 2.

FG36. Rim; fabric: fine/medium shell; interior has a row of pointillé decoration; rim has two slight circumferential grooves; body has incised diagonal decoration. Section 227–causeway M, layer 3, Phase 1C/2.

FG37. Rim (three sherds); fabric: grog/shell/sand; abraded; interior and rim have twisted cord diagonal impressions. Section 228–causeway M, layer 2, Phase 2.

FG38. Rim/collar; fabric: grog/shell/sand; rim has bird-bone impressions; collar has twisted cord, filled upright and pendent triangles. Section 228–causeway M, layer 2, Phase 2.

FG39. Rim/collar; fabric: grog/shell/sand; row of fingernail decoration; incised herringbone decoration on rim; body has incised filled upright and pendent triangles. Section 228–causeway M, layer 3, Phase 2.

FG40. Collar (three sherds); fabric: vegetable/shell/sand; collar and body have incised diagonal decoration. Section 228–causeway M, layer 2, Phase 2.

FG41. Body; fabric: medium/coarse shell; multiple incised decoration. Section 228–causeway M, layer 2, Phase 2.

FG42. Body (two sherds); fabric: grog/shell/sand; abraded; rows of fingernail decoration. Section 228–causeway M, layer 2, Phase 2.

FG43. Rim/collar; fabric: grog/shell/sand; row of fingernail decoration; incised herringbone decoration on rim; collar has incised diagonal (?multiple fingernail) decoration. Section 228–causeway M, layer 4, Phase 1B(?).

FG44. Rim/collar; fabric: grog/shell/sand; incised herringbone decoration on rim; collar has incised multiple arcs. Section 240–causeway N, layer 1, Phase 2.

FG45. Body (three sherds); fabric: grog/shell/sand; rows of twisted cord decoration. Sections 246–250, layer 1, Phase 2.

FG46. Body; fabric: grog/shell/sand; incised ?combed arcs. Sections 246–250, layer 1, Phase 2.

FG47. Rim; fabric: grog/shell/sand; abraded; incised diagonal decoration on rim; body has rows of fingernail decoration. Section 252–causeway O, layer 1, Phase 2.

FG48. Body (six sherds); fabric: fine sand; incised multiple diagonal decoration, separated by reserved diagonal decoration over multiple horizontal decoration above multiple vertical decoration. Section 252–causeway O, layer 1, Phase 2.

See also F68 below.

Interior features

FG49. Rim; fabric: grog/shell/sand; abraded; incised herringbone decoration on rim; collar has incised diagonal decoration. F6, layer 1, Phase 1 or 2.

FG50. Rim; fabric: grog/shell/sand; abraded; F6, layer 1, Phase 1 or 2.

FG51. Rim; fabric: grog/shell/sand; diagonal fingernail decoration on rim. F236, layer 1, Phase 1(?).

FG52. Rim; fabric: grog/shell/sand; interior and rim have incised multiple herringbone decoration; body has incised filled pendent and upright triangles. F237, layer 1, Phase 1.

FG53. Rim/collar (three sherds); fabric: grog/shell/sand; interior has incised diagonal decoration; incised multiple herringbone decoration on rim; collar has incised herringbone decoration. F237, layer 1, Phase 1.

FG54. Base; fabric: grog/shell/sand; abraded; F237, layer 1, Phase 1.

FG55. Rim; fabric: grog/shell/sand; abraded; incised herringbone decoration on rim; body has incised diagonal decoration. F238, layer 1, Phase 1.

FG56. Rim (three sherds); fabric: grog/shell/sand; abraded; one rim has incised herringbone decoration. F242, layer 1, Phase 1.

FG57. Body; fabric: grog/shell/sand; incised lines. F242, layer 1, Phase 1.

FG58. Rim; fabric: grog/shell/sand; incised multiple herringbone decoration on rim; body has incised filled triangles. F697, layer 1, Phase 1A/1B.

FG59. Rim (five sherds); fabric: grog/shell/sand; abraded; incised herringbone decoration on rim. F747, layer 1, Phase 1.

FG60. Body; fabric: vegetable/shell/sand; deep incised decoration. F821, layer 1, Phase 1(?).

FG61. Collar; fabric: grog/shell/sand; abraded; incised arcs. F848, layer 2, Phase 1(?).

FG62. Collar; fabric: grog/shell/sand; incised vertical decoration; neck has pits. F933, layer 1, Phase 1(?).

FG63. Rim; fabric: grog/shell/sand; body has incised lattice decoration. F940, layer 1.

FG64. Body; fabric: grog/shell/sand; abraded; incised ?lattice decoration. F940, layer 1.

FG65. Rim; fabric: grog/shell/sand; incised diagonal decoration on rim; body has incised multiple herringbone decoration. F975, layer 2, Phase 1(?).

FG66. Body; fabric: grog/shell/sand; incised vertical decoration. F986, layer 1, Phase 1(?).

FG67. Body; fabric: grog/shell/sand; incised multiple herringbone decoration. F986, layer 1, Phase 1(?).

FG68. Rim; fabric: grog/shell/sand; interior has whipped cord diagonal maggots; rim has whipped cord irregular herringbone maggots. F994, layer 1, Phase 1B.

Grooved Ware

The following catalogue entries are illustrated in Figures 206 to 209:

Enclosure ditch

GW1. Rim; fabric: fine sand; abraded; body has grooves. Sections 2–3, layer 1, Phase 2 or later.

GW2. Body; fabric: grog/shell/sand; horizontal incised decoration. Sections 2–3, layer 1, Phase 2 or later.

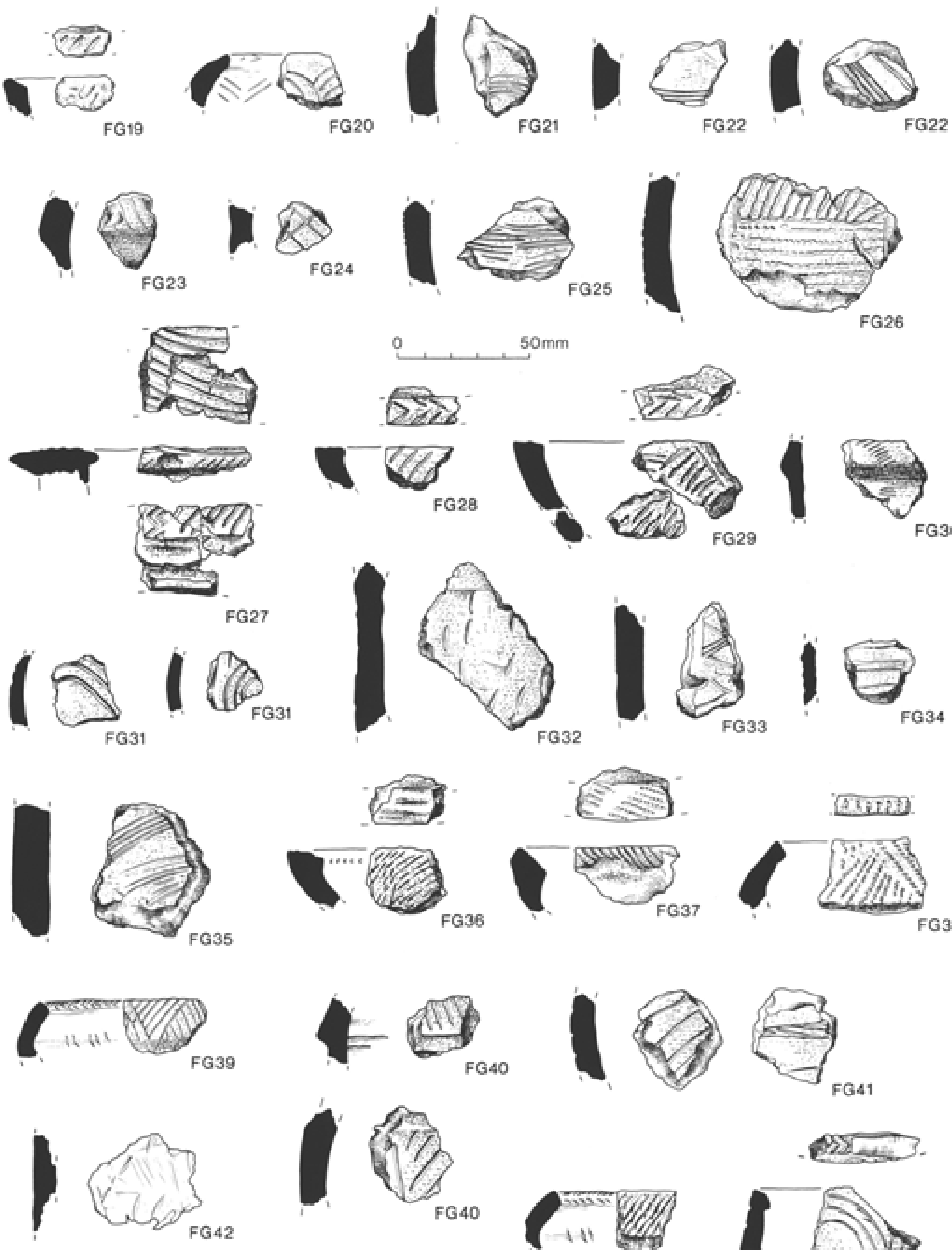


Fig 204 Fengate pottery from the enclosure ditch (FG19 to FG44) [for pot numbers see Appendix 3]

Fig 205 Fengate pottery from the enclosure ditch (FG45 to FG48) and interior features (FG49 to FG68) [for pot numbers see Appendix 3]

GW3. Body; fabric: grog/shell/sand; abraded; horizontal incised decoration, one with stabs. Sections 2–3, layer 1, Phase 2 or later.

GW4. Body; fabric: grog/shell/sand; abraded; grooves. Sections 4–5, layer 1, Phase 2 or later.

GW5. Rim (two conjoining sherds); fabric: dissolved temper; one sherd has two grooves; body has a plain zone above alternating zones of four grooves and ovate impressions forming reticulate decoration. One rim came from sections 7–8, layer 4, Phase 1/2, and one from F28, layer 1.

GW6. Body; fabric: grog/shell/sand; grooves above and below diagonal grooves. Sections 16–17, layer 3, possibly Phase 1.

GW7. Body; fabric: medium/coarse shell; incised irregular multiple herringbone decoration. Section 205–causeway J, layer 1, Phase 2.

GW8. Body; fabric: grog/shell/sand; incised lattice decoration. Sections 205–206, layer 1, Phase 2.

GW9. Body; fabric: fine/medium shell; abraded; ovate impressions. Sections 205–206, layer 1, Phase 2.

GW10. Body (seven sherds); fabric: grog/shell/sand; partly abraded; diagonal and horizontal incised decoration. Sections 205–206, layer 1, Phase 2.

GW11. Body (three sherds); fabric: grog/shell/sand; abraded; horizontal and diagonal ?panelled decoration. Section 208–causeway K, layer 1, Phase 2.

GW12. Body; fabric: grog/shell/sand; grooves over incised multiple herringbone decoration. Sections 208–209, layer 1, Phase 2.

GW13. Body (three sherds); fabric: grog/shell/sand; abraded; incised ?combed lines. Section 227–causeway M, layer 1, Phase 2.

GW14. Body; fabric: grog/shell/sand; abraded; incised line bordering filled triangles. Section 227–causeway M, layer 1, Phase 2.

GW15. Body; fabric: grog/shell/sand; interior has one, possibly two shallow grooves; the exterior has three grooves with an upper cordon. Section 227–causeway M, layer 2, Phase 2.

GW16. Body; fabric: grog/shell/sand; abraded; groove. Section 227–causeway M, layer 2, Phase 2.

GW17. Rim; fabric: medium/coarse shell; interior has grooves; exterior body has grooves below a plain zone. Sections 234–238, layer 6, Phase 1B(?).

Interior features

GW18. Rim (two sherds); fabric: vegetable/shell/sand; abraded; interior has two grooves. F14, layer 1, Phase 2.

GW19. Rim/shoulder (six sherds); fabric: grog/shell/sand; abraded; F14, layer 1, Phase 2.

GW20. Rim; fabric: grog/shell/sand; partly abraded; interior has three grooves with the lowest 'cordon' notched; body has grooves. F28, layer 1, Phase 2.

GW21. Rim/base (two sherds) fabric: fine sand; abraded; interior has ovate impressions; exterior body has grooves. F28, layer 1, Phase 2.

GW22. Body; fabric: grog/shell/sand; abraded; grooves and a notched 'cordon'. F28, layer 1, Phase 2.

GW23. Body (two sherds); fabric: grog/shell/sand; an incised line above multiple impressed herringbone decoration. F447, layer 1, Phase 2.

GW24. Body (two sherds) fabric: fine sand; abraded; incised herringbone decoration. F796, layer 1, Phase 1(?).

GW25. Body; fabric: fine sand; incised horizontal lines above diagonal decoration. F925, layer 1, Phase 2.

GW26. Body (three sherds); fabric: vegetable/shell/sand; partly abraded; interior has incised decoration, probably vertical. F925, layer 1, Phase 2.

GW27. Rim; fabric: grog/shell/sand; body has stab-and-drag lines above two line-bordered zones of alternating incised reserved and filled chevrons. F926, layer 1, Phase 2.

GW28. Rim/base (20 sherds); fabric: fine sand; body has grooves above panels of ?combed multiple chevrons. F1032, layer 1, Phase 2.

GW29. Base (11 sherds); fabric: fine sand. F1032, layer 1, Phase 2.

GW30. Base; fabric: grog/shell/sand; abraded; body has grooves. F1032, layer 1, Phase 2.

GW31. Rim/base (28 sherds); fabric: grog/shell/sand; body has grooves above incised vertical dividing panels of diagonal grooves in alternating zones. F1032, layer 1, Phase 2.

GW32. Body (two sherds); fabric: medium/coarse shell; partly abraded; interior has two grooves; body has incised lines and one zone with vertical ?maggots. F1054, layer 2, Phase 2.

GW33. Body (two sherds); fabric: grog/shell/sand; grooves and a 'cordon' alternately notched. F1054, layer 6, Phase 2.

GW34. Body; fabric: grog/shell/sand; partly abraded; rows of ovate impressions. F1054, layer 6, Phase 2.

GW35. Body (six sherds); fabric: fine/medium shell; grooves with two 'cordons' stab notched. F1054, layer 6, Phase 2.

GW36. Rim (16 sherds); fabric: fine/medium shell; interior has grooves; body has grooves above panels alternately filled with horizontal grooves and ovate impressions. F1054, layer 8, Phase 2.

GW37. Rim; fabric: medium/coarse shell; interior has grooves bordering fingerprints on a cordon; body has grooves bordering ovate impressions. F1054, layer 8, Phase 2.

GW38. Base; fabric: medium/coarse shell; partly abraded. F1054, layer 8, Phase 2.

GW39. Body (two sherds); fabric: fine/medium shell; neck has grooves with one notched cordon. F1054, layer 8, Phase 2.

GW40. Body; fabric: fine/medium shell; grooves. F1054, layer 8, Phase 2.

GW41. Body; fabric: fine/medium shell; grooves with one stab-notched cordon. F1054, layer 8, Phase 2.

Beaker pottery

The following catalogue entries are illustrated in Figure 209:

Enclosure ditch

B1. Body; fabric: grog/shell/sand; abraded; a comb-stamped chevron filled with incised vertical decoration. Sections 4–5, layer 1, Phase 2 or later.

B2. Base/body (three sherds); fabric: grog/shell/sand; neck has two zones of rows of lentoid stabs separated by a reserved zone. Sections 7–8, layer 1, Phase 2 or later.

B3. Body; fabric: grog/shell/sand; abraded; Sections 146–149, layer 1, Phase 2 or later.

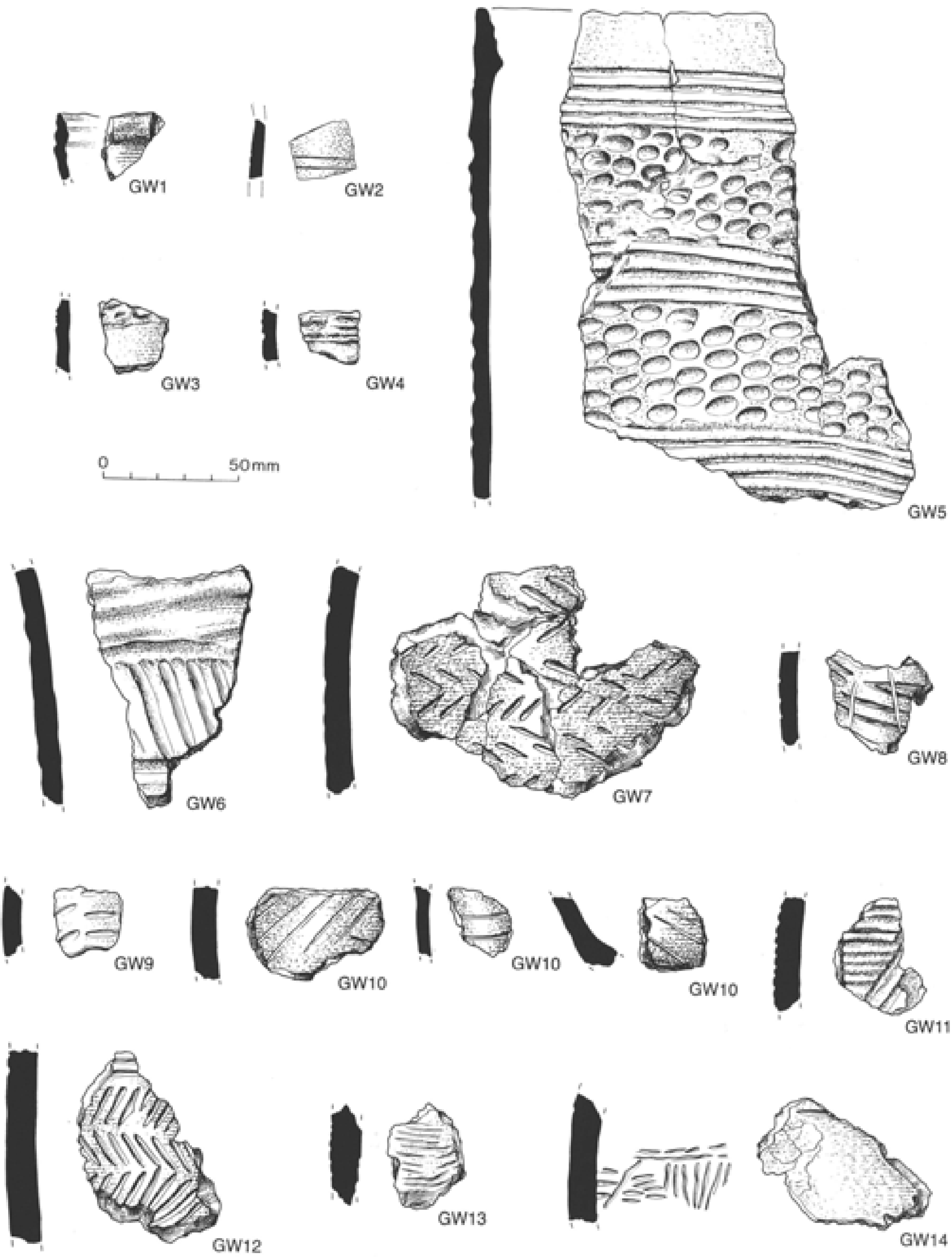


Fig 206 Grooved Ware from the enclosure ditch (GW1 to GW14) [for pot numbers see Appendix 3]

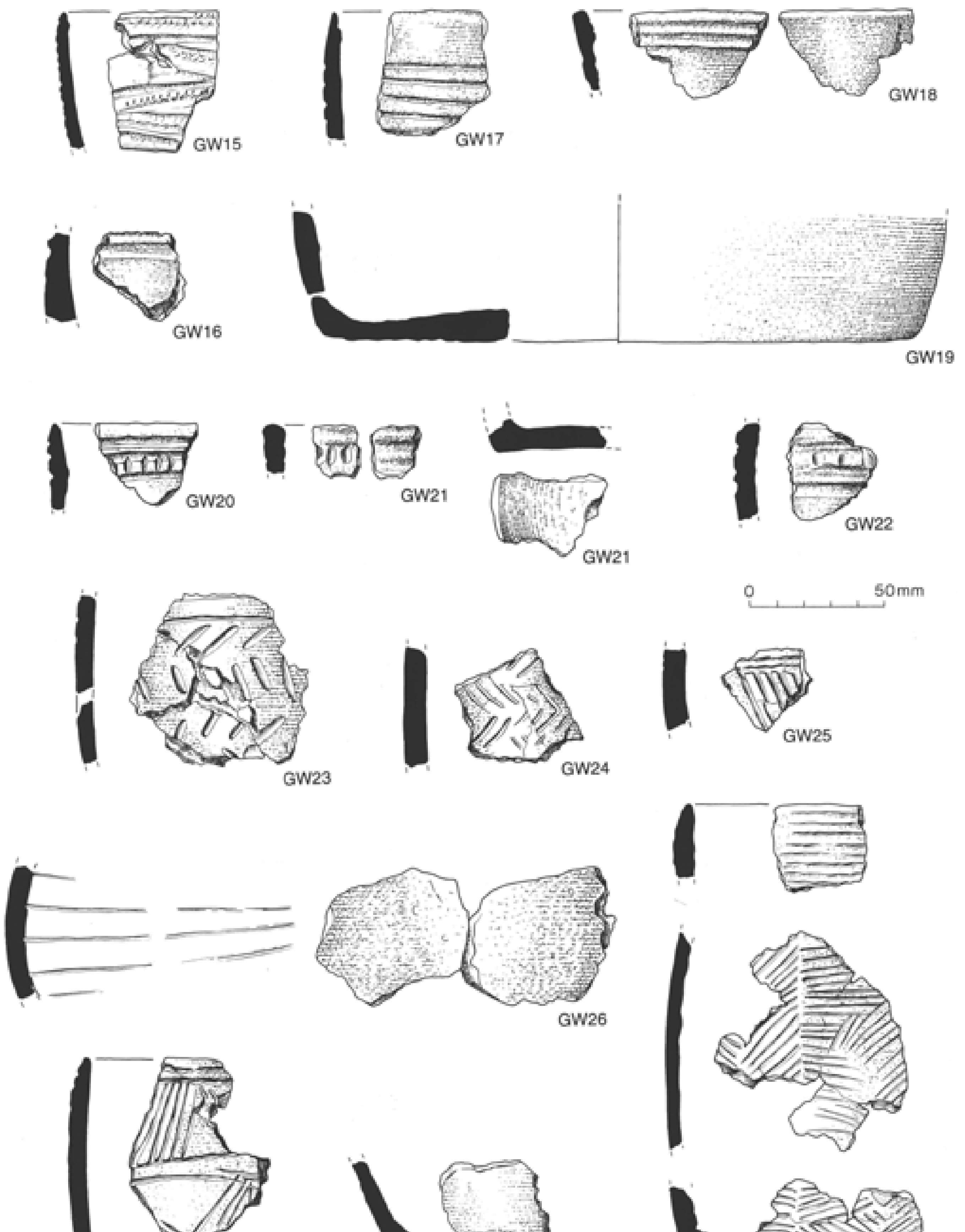


Fig 207 Grooved Ware from the enclosure ditch (GW15 to GW17) and interior features (GW18 to GW29) [for pot numbers see Appendix 3]

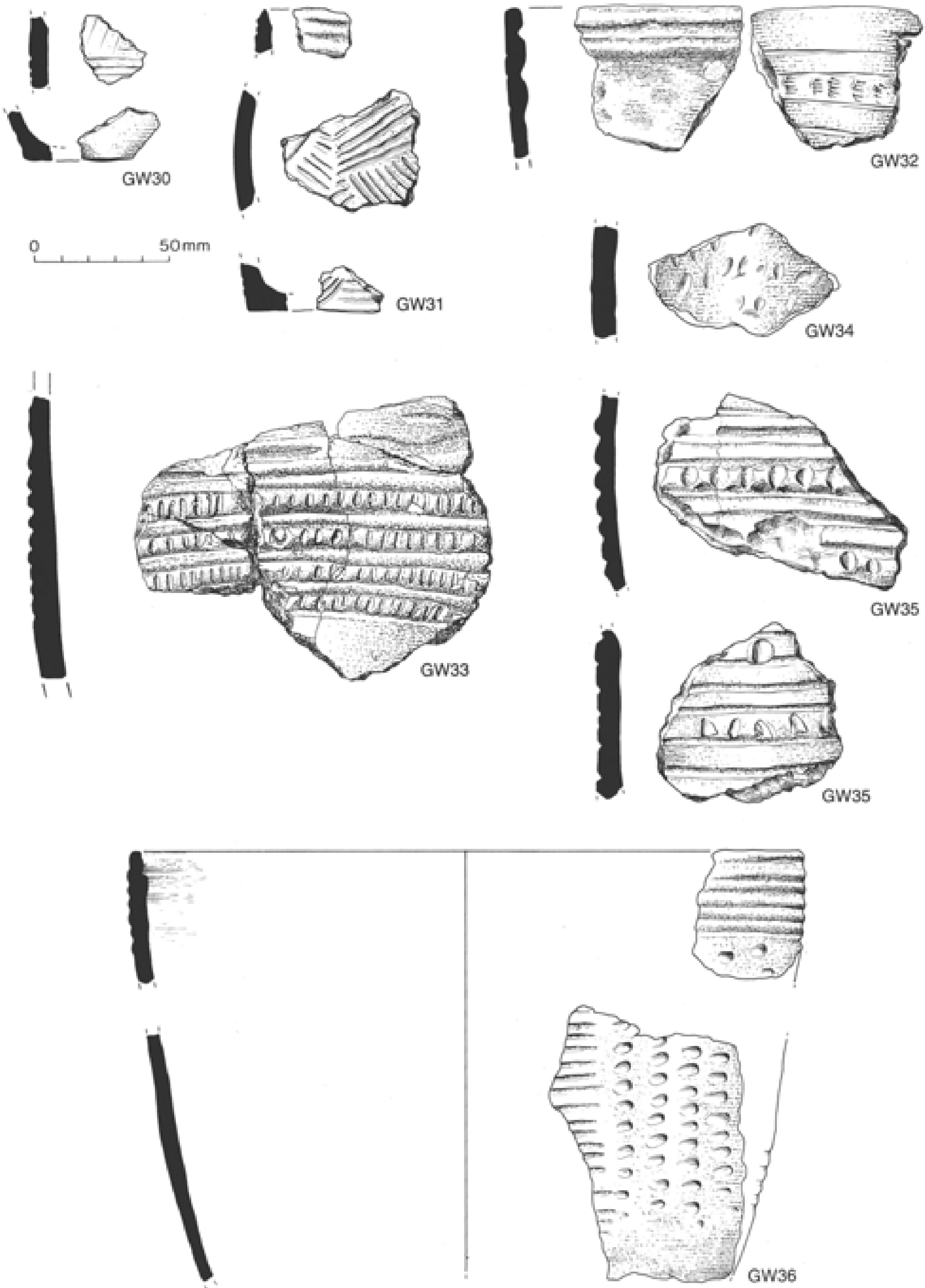


Fig 208 Grooved Ware from interior features (GW30 to GW36) [for pot numbers see Appendix 3]

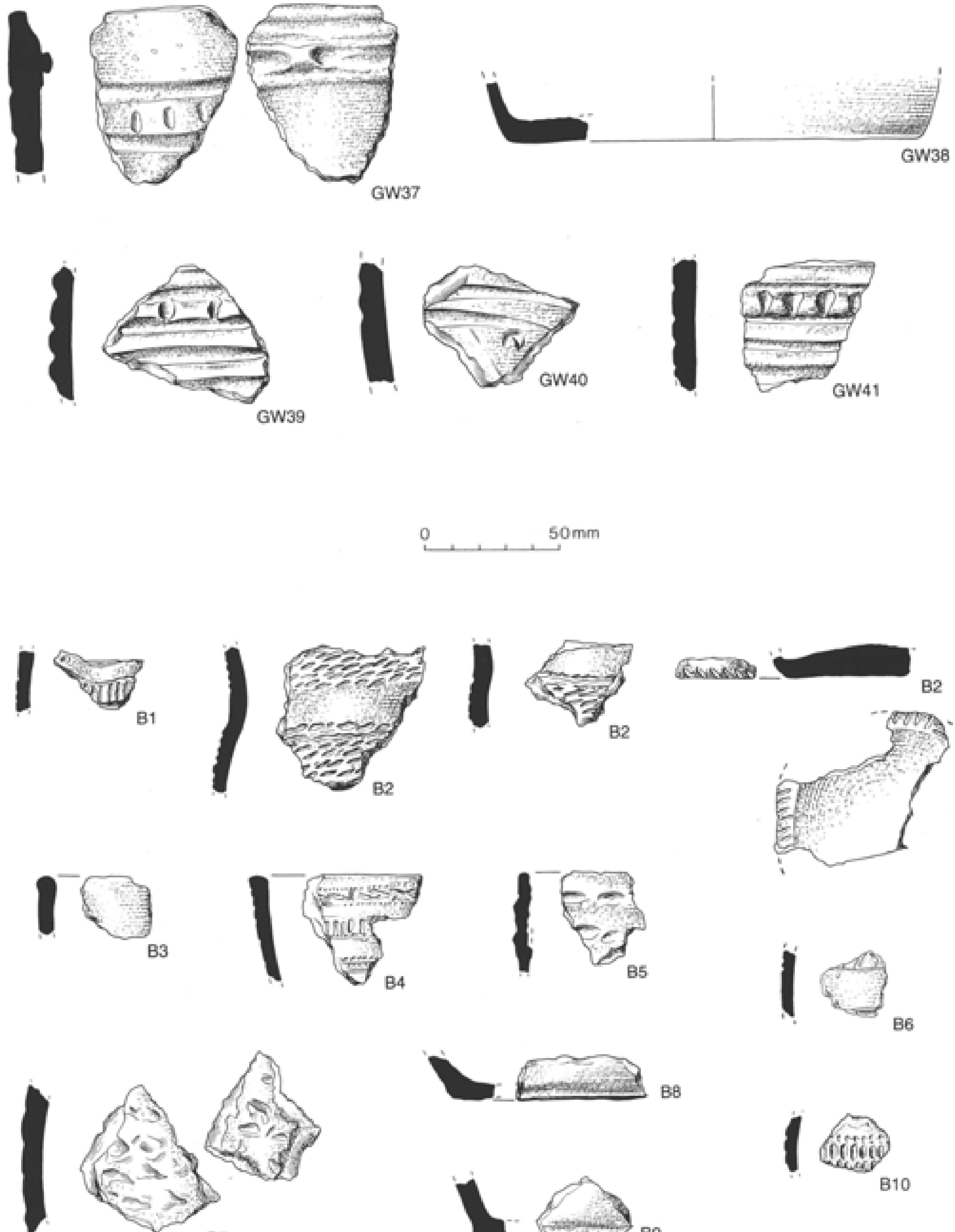


Fig 209 Grooved Ware from interior features (GW37 to GW41), and Beaker pottery from the enclosure ditch (B1 to B3) and interior features (B4, B5, B7 to B9) [for pot numbers see Appendix 3]

Interior features

B4. Rim; fabric: grog/shell/sand; neck has three comb-stamped zones, the upper filled with diagonal and cross-hatched strokes, the middle with vertical decoration, and the lower with horizontal lines, separated by reserved zones. F30, layer 1, Phase 3.

B5. Body; fabric: fine sand; abraded; impressions. F30, layer 1, Phase 3.

B7. Body (two sherds); fabric: grog/shell/sand; fingernail rustication. F30, layer 1, Phase 3.

B8. Base (two sherds); fabric: grog/shell/sand. F777, layer 1, Phase 2 or later.

B9. Base; fabric: grog/shell/sand. F841, layer 1, Phase 2 or later.

B10. Body; fabric: fine/medium shell; rows of bird-bone impressions. F1018, layer 1.

Early Bronze Age pottery

The following catalogue entries are illustrated in Figure 210:

Enclosure ditch

EBA1. Rim/base (82 sherds); fabric: grog/shell/sand. Sections 234–238, layer 1, Phase 2 or later.

Interior features

EBA2. Lid(?); fabric: grog/shell/sand. F690, layer 1, Phase 3.

EBA3. Rim (three sherds); fabric: grog/shell/sand; abraded; F767, layer 1, Phase 3(?).

Pottery of unknown or uncertain affinities

The following catalogue entries are illustrated in Figures 210 and 211:

Enclosure ditch

U1. Handle; fabric: fine/medium shell; abraded; Sections 98–99, layer 2, Phase 1 or 2.

U2. Body; fabric: grog/shell/sand; abraded; two rows of impressions. Sections 203–204, layer 1, Phase 2 or later.

U3. Body; fabric: grog/shell/sand; abraded; row of impressions. Section 205–causeway J, layer 1, Phase 2 or later.

U4. Body (three sherds); fabric: grog/shell/sand; abraded; incised lines. Sections 206–207, layer 1, Phase 2 or later.

U5. Rim; fabric: grog/shell/sand; abraded. Section 208–causeway K, layer 2, Phase 2.

U6. Body; fabric: grog/shell/sand; abraded; incised lines. At section 228, layer 2, Phase 2.

U7. Body; fabric: grog/shell/sand; incised lattice decoration. Section 252–causeway O, layer 1, Phase 2.

Interior features

U8. Rim; fabric: grog/shell/sand; abraded; F246, layer 1, Phase 2 or 3.

U9. Base (two sherds); fabric: grog/shell/sand. F270, layer 1.

U10. Rim; fabric: grog/shell/sand; abraded; notched rim. F274, layer 1.

U11. Body; fabric: grog/shell/sand; abraded; incised diagonal decoration. F933, layer 1, Phase 1.

U12. Base fragment and upper part of flare-necked jar with everted rim (63 sherds). Fabric: grog/shell/sand. Five grooves in neck hollow above a row of circular impressions above a curved running chevron in rocker technique. F281, layer 1, probably Bronze Age/Iron Age transition.

U13. Shoulder; fabric: grog/shell/sand; abraded; six grooves. F281, layer 1.

Discussion of Neolithic and earlier Bronze Age pottery

by Francis Pryor, with Ros Cleal and Ian Kinnes

The Neolithic pottery assemblage from Etton is important for its size, variety, and excellent condition. It has therefore been treated in some detail. No feature sherd has been omitted from the catalogue. In the following discussion we will briefly review the different ceramic styles, and will then consider the circumstances of deposition and the significance of the assemblage as a whole.

Mildenhall pottery

The Mildenhall assemblage exhibits a remarkable range and variety of decorative motifs, if not of form. The assemblage can clearly be grouped with the two other substantial published groups of Mildenhall pottery from East Anglia and the East Midlands, namely the eponymous site at Hurst Fen, Mildenhall (Clark *et al* 1960), and Briar Hill, Northampton, where it was classed as 'Neolithic Bowls' (Bamford 1985, 110-11). Although much degraded by soil acid erosion, the Briar Hill material exhibited similar, if more restrained, rimtop decoration, and there were traces of the neck/shoulder decoration that is a characteristic of Etton. The latter decoration is often shallow at Etton, and it is not surprising that it suffered severely at Briar Hill (such as Bamford 1985, nos NP 11, 12, 15, ?19, 30, and 31).

The Etton style of Mildenhall pottery shows some distinct differences from the type assemblage. The published illustrations of pottery from Hurst Fen (Longworth 1960, figs 21–26) are a selection from a much larger assemblage, and so quantitative comparisons with Etton are not possible. Nonetheless, Hurst Fen does show a far greater quantity and variety of plain forms (ibid, figs 21–23). At Etton, of the 352 sherds that were sufficiently well or extensively preserved to reveal rimtop decoration, only 140 could assuredly be considered undecorated. The range of rimtop decorative motifs at Etton is more varied than at Hurst Fen and some are quite elaborate (for

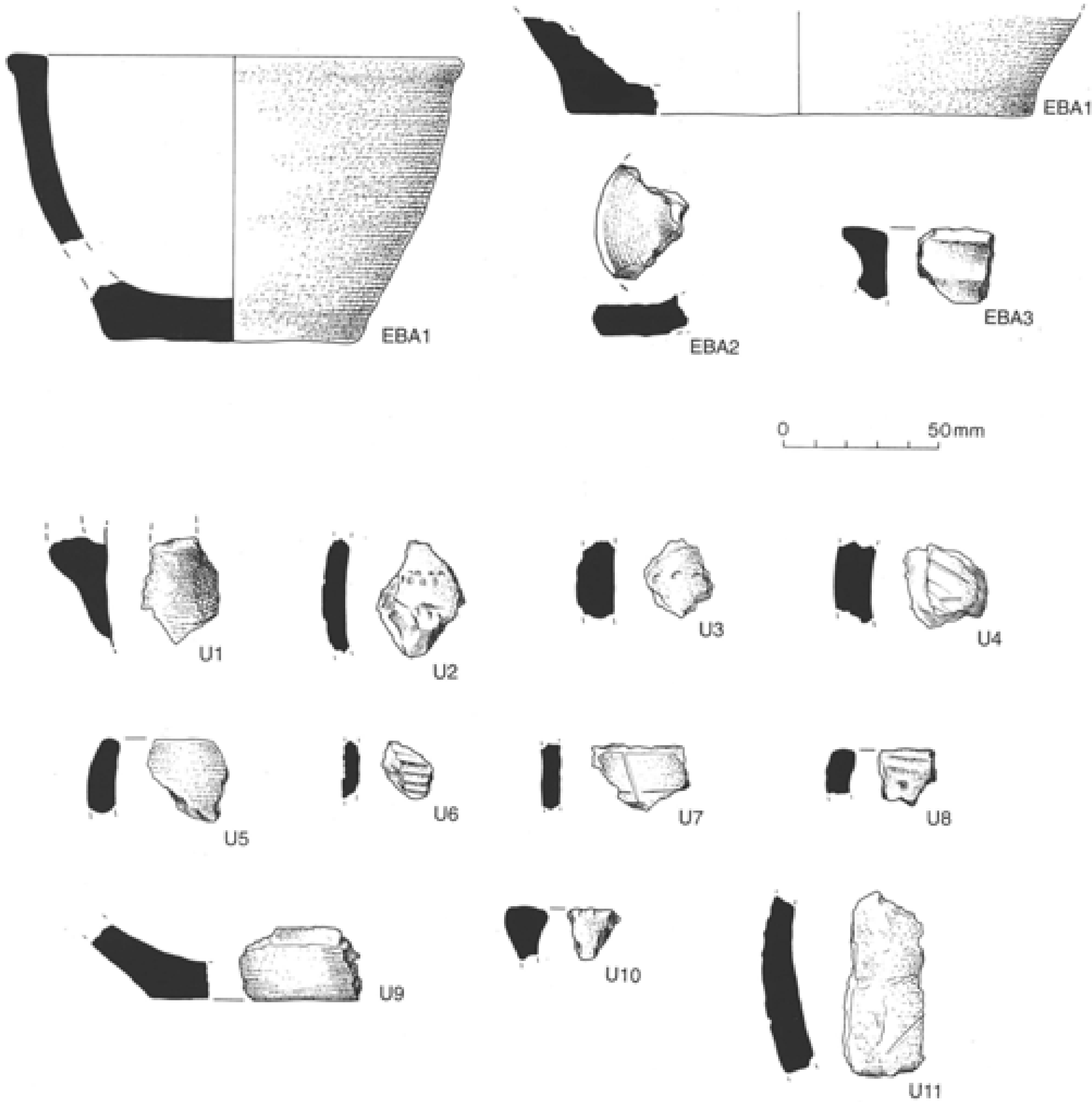


Fig 210 Early Bronze Age pottery from the enclosure ditch (EBA1) and interior features (EBA2, EBA3); pottery of unknown or uncertain affinities from the enclosure ditch (U1 to U7) and interior features (U8 to U11) [for pot numbers see Appendix 3]

example, M131, M264, M358). On the exterior of the vessels from Etton greater use is made of punctate impressions, of a type that possibly anticipates later Fengate and Ebbsfleet usage (for example, M117, M140, M163, M205, M208, M394, M395, M399, and M410).

Hurst Fen decoration frequently occurs on the upper part of the interior of the vessel. Although found at Etton (for example, M35, M230), such decoration is less formally executed than at Hurst Fen (for example, Longworth 1960, P51, P52, P54, and P55). At both sites decoration is confined to the upper part of the vessel, which when considered with the occurrence of interior decoration, would suggest that they were meant to be viewed from above. The deliberate placing of M79 (with its decorated rimtop) upside down in ditch segment 7 is, therefore, an act of some symbolic significance (Fig 31). Only one vessel at Etton (M46) carried informal decoration on its lower half.

Lugs are varied at both sites and occur in approximately equal quantities. Perhaps the principal stylistic difference between the two assemblages is the relatively

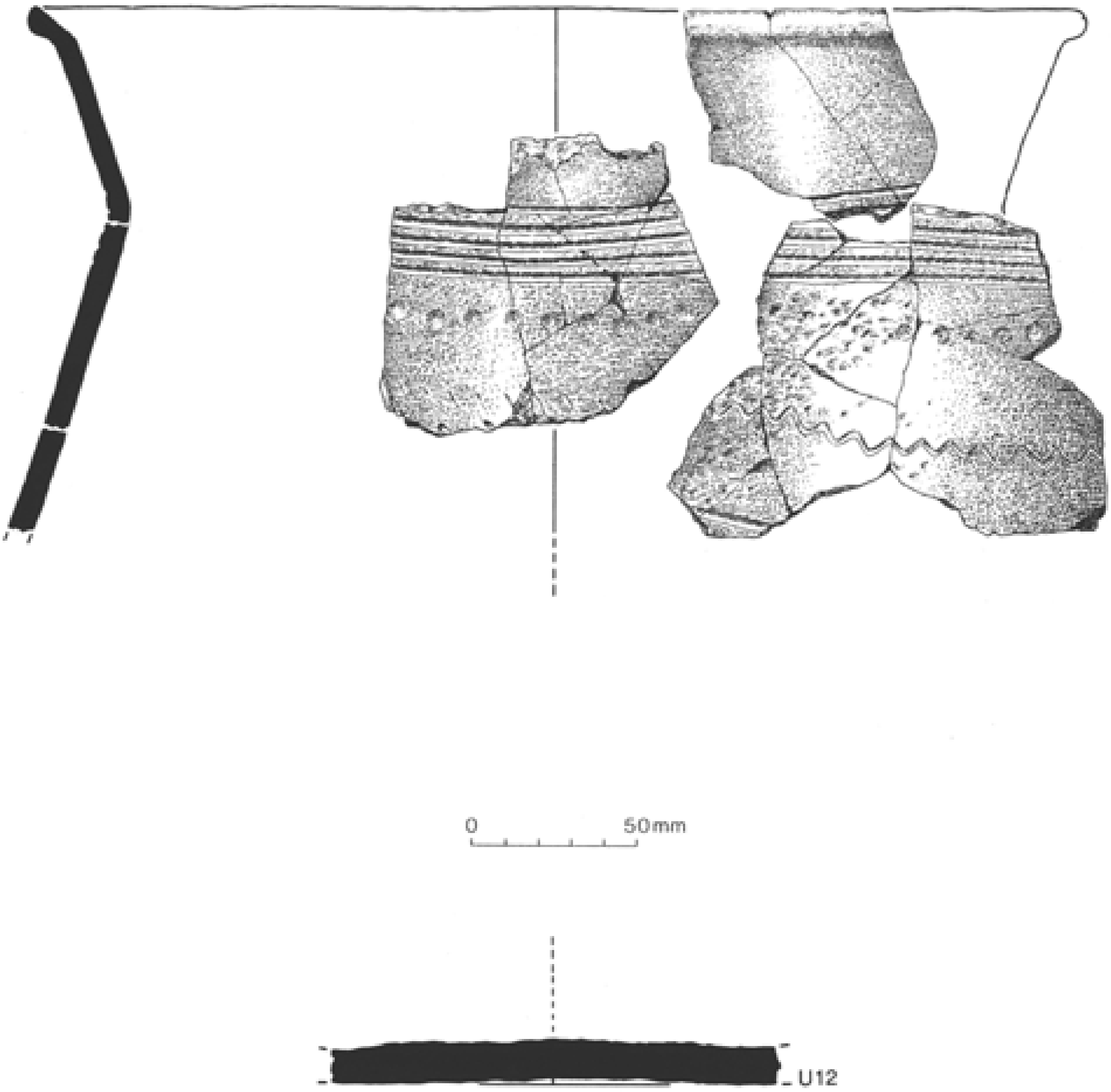


Fig 211 Vessel U12 from the pit F281. Possibly first millennium BC or AD [for pot numbers see Appendix 3]

rare use at Etton of incised linear decoration, especially the vertical variant. This was by far the commonest motif at Hurst Fen (ibid, fig 27).

Applied cordons are more commonly found at Etton than at Hurst Fen (for example, M39, M92, M266, and M369); the large, steep-sided jar (M39) with the applied vertical cordons has no parallels within the Mildenhall tradition. It was most probably a skeuomorph of a basketry or bark vessel, with clear indications of 'stitching' around the cordons and on the underside of the exterior rim bevel.

Taken as a whole, the Mildenhall pottery from Hurst Fen and Etton clearly belongs to the same general tradition, but there are sufficient differences to allow further distinction into regional sub-styles, as will be suggested with regard to Grooved Ware. There are no reasons at this stage to suppose that the stylistic distinctions between Etton and Hurst Fen are merely the result of chronology: the greater variety of decoration and vessel size at Etton originally suggested that the assemblage might fall late in the Middle Neolithic succession. The subsequent radiocarbon determinations have shown, however, that Etton falls well within the accepted range of dates for causewayed enclosures; indeed, if anything it is on the early rather than the late side of the mean.

The condition of the Mildenhall pottery from Phase 1 contexts in both the enclosure ditch and from small filled pits of the interior is very often fresh and unabraded. This would suggest that it was deposited, and perhaps backfilled, rapidly. It had not lain on the surface nor been subject to weathering or trample. This in turn might suggest that it did not derive from domestic contexts. The frequent occurrence of rimsherds and

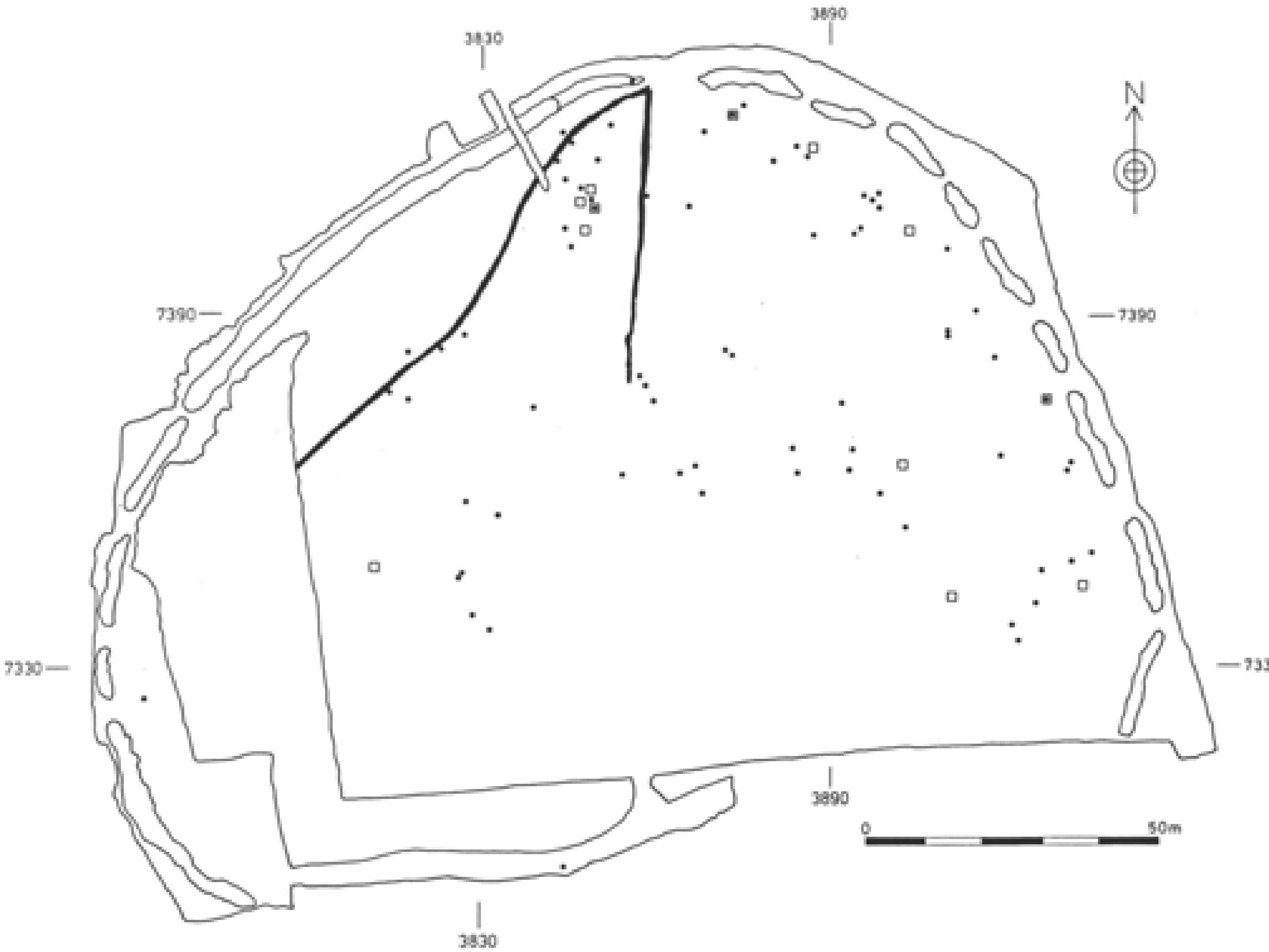


Fig 212 Interior features that produced Mildenhall pottery (solid circles) and Fengate pottery (open squares)

decorated pieces, as opposed to plain wallsherds, suggests that the assemblages in both the ditch and small filled pits had been subject to some kind of selection. This material was not rubbish to be 'disposed of'. It was both selected and placed within structured deposits.

Ebbsfleet pottery

The small Ebbsfleet assemblage derived from the enclosure ditch alone and was almost exclusively from Phase 2 contexts. Only one sherd (E1) derived from the western arc of the enclosure ditch. Ebbsfleet pottery does not occur commonly in the area. Large sherds of a single broken vessel were, however, found within a ditch of the complex hengiform monument EL2, to the north-west of the relict stream channel that bounded Etton (French and Pryor forthcoming).

Peterborough Ware

Peterborough Ware can be shown stratigraphically to post-date both Fengate Ware and Ebbsfleet pottery (and of course Mildenhall pottery). Like Ebbsfleet and Fengate, the Peterborough sherds were generally unabraded, and the sherds were also notably smaller than most of the Mildenhall pottery. Unlike the Mildenhall pottery, complete vessels are unknown for Ebbsfleet, Fengate, and Peterborough pottery. This suggests that there might have been a change in the rites associated with the deposition of Phases 1C and 2 pottery.

Fengate Ware

Fengate Ware can be shown stratigraphically to generally post-date Mildenhall pottery and to pre-date the introduction of Peterborough pottery. There is, however, a significant stratigraphic overlap between Fengate and Mildenhall pottery, both within Phase 1C deposits of the enclosure ditch and in small filled pits. Mildenhall and Fengate pottery was found together within the following small filled pits: F237, F697, and F933. The occurrence of Fengate Ware within interior features echoes the distribution of Mildenhall pottery (Fig 212). Fengate Ware was also only found in the ditch segments of the eastern arc.

The evidence from Etton would indicate that Fengate Ware and Ebbsfleet pottery were broadly contemporary, but their deposition began significantly earlier than Peterborough Ware or Grooved Ware. The close association between later deposits of Mildenhall pottery and the introduction of Fengate Ware are particularly notable (Kinnes and Gibson forthcoming).

Fengate Ware was also found at Briar Hill in Phase IX, which was dated *c* 1800–1600 uncal bc (Bamford 1985, 7 and fig 56); this phase was also characterised by finds of Beaker and Mortlake pottery; on the evidence provided by Etton this would indicate that it was very long lived indeed. In view of the suggested earlier date for the inception of Fengate Ware, it may prove necessary either to split this Phase IX into two subphases (which will depend on the stratigraphy), or else to extend the phase backwards by several centuries, perhaps as far back as 2100 uncal bc, to overlap with Phase VIII.

Fengate Ware at Fengate was only found within pits, most of which were probably slightly larger than the small filled pits at Etton. According to the original excavator, they often contained charcoal and burnt bone (G W Abbott personal communication). The sherd size of Fengate Ware at the eponymous site was notably larger than at Etton (Smith 1956, 78). These factors suggest that the original Fengate finds were from deliberately filled pits, closely comparable with Etton. No Mildenhall pottery is presently known from Peterborough, despite Abbott's researches at the turn of the century (Abbott 1910). It is therefore just possible that a ritual site, enclosed or unenclosed, similar perhaps to Etton, but of significantly later date, might be located in the original Fengate 'gravel pits settlement area', parts of which survive to this day (Pryor 1974, fig 1).

Grooved Ware

The Grooved Ware assemblage finds its closest parallels with the nearby Welland valley site of Barholm. The pit groups there included a smashed Group VII axe and a brown bear scapula; the Grooved Ware was arranged at the bottom of one pit (Simpson 1993, pl iv). They must surely represent deliberate deposition. As at Barholm, the Etton assemblage shows traits of both the Durrington and Woodlands styles, as defined by Wainwright and Longworth (1971, 238–42). It might perhaps be appropriate now to seek rather different, regional criteria of stylistic identity. It is probably significant that the Grooved Ware from Fengate, Storey's Bar Road (Pryor 1978, 69–103), is stylistically very different from Etton and Barholm. Perhaps a less universal distinction than Rinyo, Clacton, Woodlands, or Durrington is beginning to emerge; in the present instance this would be centred on the two neighbouring valleys, the Nene and Welland. Fengate would belong within the former, Etton and Barholm in the latter.

Beaker pottery

The Beaker pottery from the enclosure ditch derived from secondary infilling and was generally weathered. The main deposit of Beaker pottery was from the small filled pit, F30, which was located near ditch segment 1. This pit contained quantities of flint, as well as burnt bone. It is perhaps significant that F30 was located away from the main area of Middle Neolithic small filled pits, possibly suggesting that direct continuity of ritual use had lapsed.

Early Bronze Age

A near-complete Early Bronze Age jar (EBA1) was found incorporated within Phase 2 contexts in ditch segment 13. It was fresh and unabraded and in ceramic terms must represent the latest use of the enclosure ditch.

Uncertain pottery

One final vessel deserves mention: the broken but partly restorable flat-based, waisted jar from the pit F281 (Fig 211, U12). Despite exhaustive enquiries by one author (IAK), it has not proved possible to find parallels for this vessel. It was found in a small pit/posthole on the central boundary fence line. This feature was sealed, like others around it, by alluvium that did not dip into its upper filling (which would suggest it had been filled and compacted long prior to the alluviation); whatever the stylistic considerations in favour of a first millennium AD date, the depositional context as it is currently understood cannot support such an attribution.

The later prehistoric and Romano-British pottery

Introduction

This report is a brief description of diagnostic pottery found in features that post-date the main use of the enclosure in Phases 1–3. In the first millennium BC the area within and around the enclosure was becoming increasingly wet, which probably accounts for the rarity of later Bronze Age and Iron Age features. Conditions were more favourable by the Roman period (Pryor and French 1985, 307–10). The pottery is described by phase, in feature order; a full list of features belonging to Phases 4–5 is given in Table 9. None of this pottery has been illustrated.

The collection closely resembles that from Maxey (East Field), and the fabrics are classified using the same system (ibid, 116). The large Romano-British pottery assemblage from Maxey (Gurney 1985b) provides comparative material for the small collection from Etton.

Description of the pottery

Phase 4

F224 (well): three diagnostic Middle/Late Iron Age sherds. Rimsherd of small fineware jar in reduced black fabric with finely crushed shell temper (Maxey fabric IB); a simple rim very similar to one from Fengate (Pryor 1974, fig 21, 1). Rimsherd of larger jar, heavily burnt; possibly Maxey fabric 1C. Base of plain jar (diameter 70mm); Maxey fabric IC.

Phase 5

F499 (field boundary ditch): five weathered, conjoining, sherds of Nene Valley Grey Ware jar with everted rim and cordon in neck; closely similar to Maxey no 96. Rim diameter 220mm. Layer 1, sections 8–9, grid 38727339. Pottery numbers P1103–1107.

Enclosure ditch: three bodysherds of thick (15mm) shell-tempered (or calcite-tempered) storage jar. Storage jars were an important feature of the Maxey East Field assemblage (Gurney 1985b, fig 95). Layer 1, sections 6–7, grid 38687330. Pottery number P1643.

Discussion

The collection of later prehistoric and Romano-British pottery is too small for useful comment, but the well, F224, can confidently be dated to pre-Roman times – and perhaps as early as the second century BC. Middle Iron Age wells occur quite frequently in the region, and in many instances at a distance from settlement areas (Pryor 1974, 22–6; 1984a, 128). The Romano-British assemblage, although weathered, would appear to be contemporary with Maxey Phase 8 (second half of the first century to the mid-second century). After this period the region became very much wetter.

6 Flint and chert artefacts

by H Robert Middleton

Introduction

The major part of this chapter describes the technology and typology of the flint and chert artefacts recovered from the excavations of the enclosure. The size and preservation of the assemblage were exceptional, and a number of other factors also made it notable.

Firstly, the main characteristics of Middle Neolithic industries from the western fen edge were poorly defined and in need of clarification. Contemporary material was restricted to the small, but important group of finds from the earlier Neolithic funerary structure ('house') at Fengate (Pryor 1978, 7–10) and a very small number of pieces from Etton Woodgate (Middleton forthcoming). Neither of these assemblages could provide the large number of pieces from secure contexts necessary for the full characterisation of an industry.

Within a wider sphere, there was a need to establish the position of industries of the western fen edge in relation to the contrasting modes of flint manufacture and use that have been documented for the southern fen edge and for the Midlands (Healy 1984). The publication of the Briar Hill assemblage during the excavations at Etton (Bamford 1985) provided a useful starting point for the characterisation of Middle Neolithic assemblages from the Midlands, which this report supplements.

Secondly, the capping of alluvium at Etton not only provided excellent organic preservation in the lower enclosure ditch fills, but also protected the upper deposits and interior features from disturbance. This meant that the large majority of the flint assemblage was *in situ* and thus susceptible to the spatial analysis of flint discard through time. This study would include, for example, comparison of enclosure ditch with interior features, and patterning within the interior of the enclosure. When combined with other analyses, it was hoped that such a study would illuminate the manner in which the enclosure, within its landscape, was used by human groups in the past.

The intact and *in situ* nature of the site and its artefact assemblages suggested that the lithic assemblage was of more than local importance and of relevance to lithic and enclosure studies nationally. This was put into focus by recent publications of lithic assemblages from causewayed enclosures disturbed either by ploughing (for example, Bamford 1985, 3) or by later occupations (for example, Healey and Robertson-Mackay 1987), which relied on ditch fills for stratified and securely dated assemblages. At these sites meaningful comparisons between the enclosure ditches and interior features were impossible, and the scope for documenting changes in deposition strategies during the use of the sites was severely reduced. Similarly, periods of occupation represented purely by interior features tend to be overlooked. Analysis of the Etton material, therefore, presented the opportunity for overcoming these limitations in previous studies and examining the whole assemblage from all features.

A strategy was devised that encompassed all of these requirements and had the following aims:

- To describe the features of the assemblage and to compare and contrast them with contemporary assemblages to establish a technological and typological profile of the material.
- To determine patterns of raw material acquisition and use.
- To document usage and deposition between contexts across the site.

Each flint was examined and described individually in a uniquely numbered series, the results of which have been lodged in the archive. With this site-wide database, general technological and typological and technological trends were isolated and recorded. Groups of material were then selected for the more detailed analyses, with selection criteria dependent upon the questions to be answered at each stage of the study.

Of the flint artefacts and by-products recovered from the excavations, 2309 derived from the buried soil, 2194 from phased interior features, 1854 from the enclosure ditch, and 1052 from unphased features.

Condition of the flint and chert

Patination

Surface patination was extremely variable and did not appear to have any temporal, spatial, or contextual significance. It occurred either as discrete patches or was even over the whole surface. It varied from a faint trace to being thick enough to mask the colour of the flint. It was either off-white/light grey or mid-brown in colour, with the latter overlying the former where both colours were present; this may reflect a change in the mineral content of the local groundwater from base rich to iron rich.

This diversity of patination reflects variations in the groundwater table on a micro-scale, the degree to which flints were in contact with mineral-rich water, and the effect of fluctuating water tables where repeated wetting and drying can cause patination on flint surfaces (Gibbard 1986, 147). The fact that all of the artefacts from permanently waterlogged contexts were unpatinated suggests that the latter process was in operation on the rest of the site. The surface discolouration of the flints reflects the site's location where the water table would, until recent times, have been close to the ground surface. Its valley-bottom siting would also make the groundwater susceptible to fluctuations in level and changes in the mineral status of the river waters.

Edge damage

Artefacts in the buried soil and from naturally filled-in features exhibited light edge damage consisting of fine, steep removals at irregular intervals, especially on fragile edges. It was less apparent on pieces with steeper edge angles and thicker, more robust, margins. This created problems in the differentiation of damaged unretouched flakes from utilised flakes, inflating numbers of the latter.

The material from the enclosure ditch and from the closed deposits in the interior was largely very fresh and unabraded. The fact that edge damage was context dependent suggests that it was primarily created by post-depositional abrasion and could not be used as an indicator of the patterns of flint use and discard.

Reuse

Several implements had evidence for different modes of use on separate edges (such as Fig 222, no 61), which could be indicative of the reuse of worn implements. The fact that only one axe fragment from the whole assemblage had evidence for reflaking, however, suggests that Middle Neolithic artefacts were ignored by later occupants of the site. It also indicates a locally abundant supply of raw material, which contrasts with other areas of the western fen edge outlined by Pryor (1982, 134).

Raw material

Flint

With two exceptions, the whole assemblage was made of good-quality flint, having few planes of weakness and other flaws large enough to affect the quality of flaking. Faults, where present, were confined to the outer portion of the nodule and would have been removed by flaking prior to core manufacture. Where major flaws were encountered during knapping, it is likely that the pebbles would have split in half to allow two or more cores to be made.

There was, however, little evidence to suggest that poor-quality raw material had a significant effect on the way in which the flint was knapped. One exception was a core (Fig 219, no 2) that had been abandoned due to the presence of a large, unworkable inclusion in the centre of the nodule. There was no evidence for the use of either bipolar or écaille technology.

The flint varied greatly in colour from light grey and black to dark brown, with many pieces being of several colours and hues. There was no correlation between flint colour and artefact type, as, for example, at Hurst Fen (Clark *et al* 1960, fig 9). The cortex was generally thin and rolled, varying in colour from dark brown to light grey and indicative of an origin in the local terrace gravels.

The gravel flint takes two forms: the vast majority is angular and heavily stained orange-brown with numerous frost fractures, rendering it unusable for knapping. The second type is 'tertiary pebbles' (Gibbard 1986), comprising rounded nodules with a thin, pitted, and abraded cortex. These are seldom broken when found and exhibit few planes of weakness. This second type was exclusively selected for knapping.

Examination of 'waster' piles from the Maxey Quarry (which exploits the same terrace gravels) suggests that pebbles over 25mm long made up less than 10% of the gravel deposits. Of these, less than 1% were 'tertiary pebbles'. This indicates that less than 0.1% of the whole gravel deposit was suitable for flintworking and may suggest that workable flint would have been scarce. It is likely, however, that there would have been many exposures of gravel deposits in the landscape around the site. For example, the banks of the numerous stream channels in the vicinity may have provided ample opportunity for the collection of suitable raw material. The full availability of local raw materials would, however, have depended upon the territorial range exploited by the group(s) using the monument at any point in time. The exclusive use of the local materials may suggest, however, that it was the most available source of high-quality flint.

The only implements that may have been made from different raw material were the flint axes (described below). The number of these made on gravel-type flint (on the basis of colour and inclusions), however, would suggest that particularly large nodules from the local area may have been used specifically for axe manufacture. The examples made of black or dark grey flint could have derived from primary deposits either in Lincolnshire or the southern fen edge. The bright colours of some of the axes may suggest that distinctive flint was preferentially selected.

Chert

Two waste flakes of chert were recovered, one black and one light grey in colour. Both had abraded and rolled cortex, suggesting an origin in the local gravels. Small pieces of similar, unworked, material were excavated, although none was large enough to be knapped.

By-products

A total of 6063 by-product pieces was recovered, weighing 18,534.4g. The by-products comprised 81.9% of the assemblage by number (Table 22).

Table 22 The complete flint assemblage

type	numbers	%	weight (g)	%	average weight (g)
by-products					
waste flakes	5278	87.1	9493.8	51.2	1.8
irregular workshop waste	284	4.7	2167.6	11.7	7.6
cores	247	4.1	5175.4	27.9	21.0
core rejuvenation flakes	34	0.6	225.6	1.2	6.6
hammerstones	6	0.1	1213.2	6.5	202.2
too damaged to classify	214	3.5	258.8	1.4	1.2
total	6063	100.0	18534.4	100.0	3.1
% of total	81.9			73.7	
implements					
utilised flakes	410	30.5	1099.5	16.6	2.7
retouched flakes	227	16.9	1191.8	18.0	5.3
serrated flakes	219	16.3	734.4	11.1	3.4
scrapers	253	18.8	2080.9	31.4	8.2
piercers	58	4.3	228.4	3.5	3.9
denticulates	58	4.3	621.1	9.4	10.7
arrowheads	59	4.4	129.3	2.0	2.2
fabricators	6	0.4	72.3	1.1	12.0
rods	3	0.2	16.8	0.3	5.6
laurel leaves	4	0.3	20.5	0.3	5.1
axes	18	1.3	148.9	2.2	8.3
unclassified	29	2.2	274.9	4.2	9.5
total	1344	100.0	6618.8	100.0	4.9
% of total	18.1		26.3		
assemblage total	7407		25153.2		3.4

Hammerstones

Six hammerstones were found, weighing 1213.2g. These were any lithic pieces that had evidence of surface abrasion but were otherwise unworked. Three complete spherical flint nodules were found, all of which would have been too large (144g, 231g, and 405g) for the working of flint. Two smaller hammerstones were also recovered that could have been used for knapping: one (Fig 220, no 19) consisted of a flint nodule exhibiting abrasion on one end; the other (Fig 220, no 20) was a rounded sandstone pebble, with abrasion at both ends, found in the upper fills of F981 in close association with a large flint assemblage. The sixth example was a flake that had been detached from a hammerstone (Fig 220, no 18).

A lack of hammerstones, relative to the size of the flint assemblage, is a feature common to several earlier Neolithic flint collections (Healey and Robertson-Mackay 1983, table 8). At Etton, it is unlikely that such items were curated, given the abundance of suitable pebbles in the local gravels. Some of these may have been used for single episodes of knapping and were insufficiently abraded to be recognised during excavation. One explanation may be that flint pebbles were deliberately selected as hammerstones and then knapped into cores. The reason for this may be associated with the cortical covering of the 'tertiary pebbles' that would have provided a softer knapping medium than other pebbles. This would have allowed a greater degree of control over the working strategy adopted by the flint knapper. The relative 'softness' of the cortex may account for the some of the 'soft hammer' traits observed in the experimental sample knapped with cortical flint pebbles (see below for a discussion of waste flake technology). The lack of bone, antler, or wood hammers (despite the quality of preservation) may further substantiate this point.

Waste flakes

A total of 5278 waste flakes was found, weighing 9493.8g. They were studied with the aims of reconstructing the core reduction sequence and quantifying the size and shape of the assemblage.

Technology

For the examination of the core reduction strategies, closed groups of lithic material were isolated for detailed study. These were relatively large assemblages from discrete contexts that were likely to have been created and deposited in the same episodes. No *in situ* knapping floors were found. Where possible, groups were selected that represented different phases of the

Table 23 Waste flakes: technology

	initiation		termination										platforms							
	hertzian		*bending*		*feather*		*step*		*hinge*		*plunging*		*plain*		*faceted*		*abraded*		*cortical*	
	nos	%	nos	%	nos	%	nos	%	nos	%	nos	%	nos	%	nos	%	nos	%	nos	%
Middle Neolithic contexts																				
F1, section 252 to causeway 0, layer 2	53	91.4	5	8.6	54	75.0	–	–	12	16.7	6	8.3	53	81.5	5	7.7	1	1.5	6	9.2
F9, layer 1	42	95.5	2	4.5	43	95.6	–	–	2	4.4	–	–	42	89.4	–	–	–	–	5	10.6
F227, layer 1	3	50.0	3	50.0	5	83.3	–	–	1	16.7	–	–	4	57.1	2	28.6	–	–	1	14.3
F228, layer 1	9	90.0	1	10.0	11	91.7	–	–	–	–	1	8.3	8	80.0	2	20.0	–	–	–	–
F229, layer 1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
F230, layer 1	3	100.0	–	–	4	100.0	–	–	–	–	–	–	3	100.0	–	–	–	–	–	–
F231, layer 1	11	100.0	–	–	8	88.8	–	–	1	11.2	–	–	10	90.9	–	–	–	–	1	9.1
F240, layer 1	17	89.5	2	10.5	17	85.0	–	–	1	5.0	2	10.0	14	93.3	–	–	–	–	1	6.7
F570, layer 1	3	100.0	–	–	3	100.0	–	–	–	–	–	–	3	100.0	–	–	–	–	–	–
F746, layer 1	18	98.3	5	21.7	12	75.0	–	–	4	25.0	–	–	17	73.9	2	8.7	1	4.3	3	13.0
F748, layer 1	18	94.7	1	5.3	25	96.2	–	–	1	3.8	–	–	16	80.0	1	5.0	1	5.0	2	10.0
F857, layer 1	3	100.0	–	–	4	80.0	–	–	1	20.0	–	–	3	100.0	–	–	–	–	–	–
F866, layers 1 and 2	21	100.0	–	–	22	91.6	–	–	1	4.2	1	4.2	18	90.0	–	–	–	–	2	10.0
F922, layer 1	19	95.0	1	5.0	24	92.4	–	–	1	3.8	1	3.8	14	83.4	1	5.9	–	–	2	11.7
F981, layer 1	24	88.9	3	11.1	20	87.0	–	–	–	–	3	13.0	20	87.0	–	–	–	–	3	13.0
F981, layer 2	32	97.0	1	3.0	39	95.1	–	–	–	–	2	4.9	28	87.5	–	–	3	9.4	1	3.1
F981, layer 3	3	100.0	–	–	5	100.0	–	–	–	–	–	–	3	100.0	–	–	–	–	–	–
totals	279	92.1	24	7.9	296	87.8	–	–	25	7.4	16	4.8	256	84.8	13	4.3	6	2.0	27	8.7
post-Middle Neolithic contexts																				
F1, causeway A to section 1, layer 0	9	100.0	–	–	6	75.0	–	–	2	25.0	–	–	8	88.8	–	–	–	–	1	11.2
F1, sections 2–3, layer 0	22	95.7	1	4.3	19	86.4	–	–	3	13.6	–	–	21	91.4	1	4.3	1	4.3	–	–
F1, sections 3–4, layer 0	12	92.3	1	7.7	12	92.3	–	–	1	7.7	–	–	12	92.3	–	–	–	–	1	7.7
F1, sections 4–5, layer 0	46	97.9	1	2.1	39	90.7	1	2.1	3	7.0	–	–	43	93.5	1	2.2	–	–	2	4.3
F1, sections 5–6, layer 1	7	100.0	–	–	7	100.0	–	–	–	–	–	–	6	85.7	–	–	–	–	1	14.3
F14, layer 1	32	97	1	3.0	29	82.9	–	–	6	16.1	–	–	32	100.0	–	–	–	–	–	–
F28, layer 1	16	100.0	–	–	13	81.3	–	–	3	17.7	–	–	15	93.8	–	–	–	–	1	6.2
totals	144	97.3	4	2.7	125	86.8	1	0.7	18	12.5	–	–	137	93.8	2	1.4	1	0.7	6	4.1

use of the site from both the interior and the enclosure ditch. The dating of the features depended upon artefacts other than the flints.

Core reduction methods

In order to describe the technological features of the waste flakes, initiation and termination features were characterised using terminology developed by Cotterell and Kamminga (1979; 1987).

Table 23 shows that the large majority (92.1% by number) of the waste flakes had proximal hertzian fractures, with only 7.9% having bending fractures. Although the latter are most likely to have been produced using soft hammers (Cotterell and Kamminga 1987, 689), experiment by the author has indicated that they can occasionally be created by knapping with corticated flint pebbles (see above for discussion of hammerstones).

The overall quality of the knapping is attested by the small number of hinge (7.4%) and plunging (4.8%) terminations. Cores were not elaborately prepared; faceted and abraded platforms comprised 4.3 and 2.0% respectively of the assemblage. The small number of cortical platforms suggests that core preparation did involve the removal of primary flakes to create striking platforms.

The usual method of core rejuvenation was the creation of a new platform at 90° to the existing one, which resulted in the production of core recovery flakes (Fig 220, no 16). In two cases, core rejuvenation was by the removal of the existing platform, creating a core tablet as a by-product (Fig 220, no 17). Neither core recovery flakes nor core tablets were present within the closed groups.

The use of flint pebble hammers, associated with feather terminations and plain platforms, continued in the assemblages from the post-Middle Neolithic features.

Table 24 Waste flakes: types (by context)

	unretouched flake		*dressing chip*		*trimming flake*		*preparation flake*		*thinning flake*		*core recovery flake*	
	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
Middle Neolithic contexts												
F1, section 252 to causeway 0, layer 2	79	48.9	15	13.0	11	9.6	9	7.8	–	–	1	0.9
F9, layer 1	30	49.2	26	42.6	3	4.9	–	–	–	–	2	3.3
F227, layer 1	15	48.4	16	51.6	–	–	–	–	–	–	–	–
F228, layer 1	17	54.8	14	45.2	–	–	–	–	–	–	–	–
F229, layer 1	–	–	3	100.0	–	–	–	–	–	–	–	–
F230, layer 1	7	53.8	6	46.1	–	–	–	–	–	–	–	–
F231, layer 1	11	31.4	22	62.9	–	–	2	5.7	–	–	–	–
F240, layer 1	27	49.0	19	34.5	5	9.1	3	5.5	–	–	1	1.8
F570, layer 1	3	50.0	3	50.0	–	–	–	–	–	–	–	–
F746, layer 1	25	80.6	6	19.4	–	–	–	–	–	–	–	–
F748, layer 1	19	70.4	6	22.2	1	3.7	1	3.7	–	–	–	–
F857, layer 1	4	5.4	69	93.2	–	–	1	1.4	–	–	–	–
F866, layers 1 and 2	31	23.3	100	75.2	–	–	2	1.5	–	–	–	–
F922, layer 1	42	40.4	50	48.1	2	1.9	10	9.6	–	–	–	–
F981, layer 1	36	58.1	23	37.1	1	1.6	2	3.2	–	–	–	–
F981, layer 2	56	76.7	15	20.5	2	2.7	–	–	–	–	–	–
F981, layer 3	4	80.0	1	20.0	–	–	–	–	–	–	–	–
totals	406	48.4	394	45.9	25	2.9	30	3.5	–	–	4	0.5
post-Middle Neolithic contexts												
F1, causeway A to section A, layer 0	10	77.0	2	15.4	1	7.7	–	–	–	–	–	–
F1, sections 2–3, layer 0	28	70.0	5	12.5	7	17.5	–	–	–	–	–	–
F1, sections 3–4, layer 0	16	53.3	13	43.3	1	3.3	–	–	–	–	–	–
F1, sections 4–5, layer 0	58	58.0	34	34.0	6	6.0	–	–	2	–	–	–
F1, sections 5–6, layer 1	6	60.0	1	10.0	–	–	3	30.0	–	–	–	–
F14, layer 1	50	61.0	26	31.7	5	6.1	1	1.2	–	–	–	–
F28, layer 1	32	65.3	17	34.7	–	–	–	–	–	–	–	–
totals	200	61.7	98	30.7	20	6.2	4	1.2	2	0.6	–	–

The increase (to 12.5%) in the proportion of distal hinge fractures in these contexts may suggest a slight deterioration in the quality of knapping.

Core reduction stages

Two methods were employed to determine which stages of the core reduction sequences were present within the assemblage. Firstly, the waste flakes were divided into categories based upon their origin within the sequence (Table 24; Fig 213). This typology is based upon that of A Brown (personal communication) whose help is gratefully acknowledged:

Preparation flakes: flakes produced during the initial working of a nodule to shape it into a core. These are distinguished by large amounts of cortex on their dorsal surface and by thick profiles.

Trimming flakes: thick flakes with irregular edges produced as a by-product of the preparation of flake beds and platforms during knapping. Core recovery flakes and core tablets are special variants of this type.

Dressing chips: small spalls produced during knapping, as a product either of core trimming or retouching implements. Generally less than 15mm in length.

Thinning flakes: specialised unretouched flakes distinguished by small bulbs of percussion, small platforms, and thin, curving profiles. Produced from thinning bifacial implements.

Unretouched flakes: flakes, usually longer than 15mm, produced between nodule preparation and core trimming. None showed any signs of utilisation, although use in tasks that did not cause edge damage should not be discounted.

Unretouched flakes comprised 48.4% of the material, and dressing chips comprised 46.9%. Trimming, preparation, and core recovery flakes were present in small quantities (2.9, 3.5, and 0.5% respectively). The largest contrast was in the proportion of dressing chips between the groups from the enclosure ditch (F1, section 252–causeway 0, layer 2) and the interior features – 13% compared to 35–50%. This can be accounted for by the fact that the interior features were wet sieved (which permits the recovery of small artefacts – Lane 1985), unlike the upper enclosure ditch deposits. The widespread occurrence of incidental knapping by-products suggests that the whole of the knapping sequence was present on site, with no patterning to indicate selective deposition between contexts.

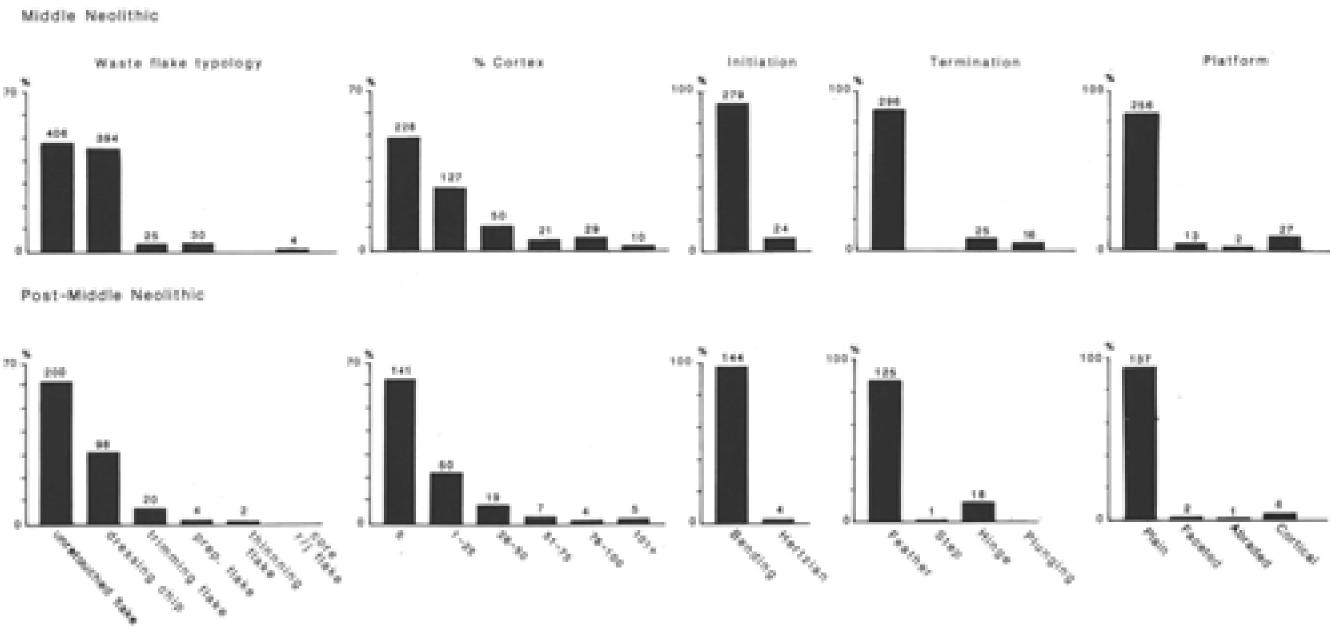


Fig 213 Aspects of waste flake technology

The second method of analysis quantified the amount of cortex present on the dorsal surfaces of waste flakes by dividing it into six classes based on the percentage coverage. This similarly suggested that all stages in the knapping sequence were present in all contexts (Table 25). It shows strong affinities with other contemporary, gravel-based lithic assemblages from causewayed enclosures, notably Briar Hill, Phases II to V (Bamford 1985, table 10) and Staines (Healey and Robertson-Mackay 1987, table 15).

This overall pattern, in both waste flake typology and cortex, was continued in the post-Middle Neolithic assemblages. The number of dressing chips, however, decreased to 30.7%, and the number of unretouched flakes increased marginally, with relatively fewer cortical pieces. This suggests that there was little change in the knapping strategies employed and the stages of the technology that were undertaken and discarded on site.

Refitting

In order to examine both technology and deposition, the closed groups were examined for refits. In no case, however, did more than three pieces fit together, and so the technological information retrieved was limited.

Some light was cast, however, on how these groups were deposited. On a subjective level, the material from each of the groups appears to have derived from three to five knapping episodes, based upon the colour and type of the flint and the cortex. Given the wide range in both variables, it was considered that such similarities were significant. The implications of this are considered below.

In only one case was a conjoin found between pits (F238 and F240). Both flints were in an extremely fresh condition, suggesting that the two features were contemporary.

Metrical analysis

In this analysis all complete waste flakes were used. They were grouped into five units based upon their date and location on the site. The metrical data for these groups are presented in Tables 26–31.

Although the differences are slight, the Phase 1 and 2 enclosure ditch contexts contained larger flakes than the buried soil and the interior features. This is reflected in larger values for all the metrical variables.

There was little variation in the breadth:length ratios, all of the contexts having 5.4–10.4% blades (breadth: length ratio of 2 or less), 68.7–76.4% flakes, and 16.6–25.4% broad flakes (breadth:length ratio of 5 or more).

The number of blades is lower than that suggested for other earlier Neolithic assemblages, such as Briar Hill, Phases II to V (19.7%) (Bamford 1985, fig 35), Fengate, Padholme Road Sub-Site (24%) (Pryor 1974, table 3), Tattershall Thorpe (15%) (Healy 1983, fig 2), Spong Hill, feature groups A–E (14.9%) (Healy 1988, fig 36), and for contemporary assemblages from southern England (10–30%) (Ford 1987, table 2). The number of broad flakes is, however, comparable to those recovered from these sites.

The platform angle (the angle between the ventral surface and the striking platform) was slightly less acute in the waste flakes from the buried soil than those from the other contexts. Given the overall integrity of the assemblage, it is difficult to interpret this single statistic.

Table 25 Percentage of cortex on unretouched flakes

% cortex	*0%*		*0–25%*		*25–50%*		*50–75%*		*75–100%*		*100%*	
	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
Middle Neolithic contexts												
F1, section 252 to causeway 0, layer 2	51	51.0	28	28.0	10	10.0	1	1.0	9	9.0	1	1.0
F9, layer 1	41	66.1	10	16.1	6	9.7	1	1.6	2	3.2	2	3.2
F227, layer 1	7	46.6	7	46.6	1	6.7	–	–	–	–	–	–
F228, layer 1	10	62.5	5	31.3	1	6.2	–	–	–	–	–	–
F230, layer 1	6	85.7	1	14.3	–	–	–	–	–	–	–	–
F231, layer 1	22	75.9	5	17.2	–	–	1	3.4	1	3.4	–	–
F240, layer 1	11	28.2	16	41.0	6	15.4	3	7.7	2	5.1	1	2.6
F570, layer 1	3	100.0	–	–	–	–	–	–	–	–	–	–
F746, layer 1	7	25.9	4	14.8	5	18.5	7	25.9	3	11.1	1	3.7
F748, layer 1	16	61.5	3	11.5	5	19.2	1	3.8	1	3.8	–	–
F857, layer 1	1	20.0	4	80.0	–	–	–	–	–	–	–	–
F866, layers 1 and 2	22	66.7	5	15.2	4	12.1	–	–	–	–	2	6.1
F922, layer 1	21	39.6	12	22.6	7	13.2	3	5.7	10	18.9	–	–
F981, layer 1	17	43.6	13	33.3	4	10.3	1	2.6	2	5.1	2	5.1
F981, layer 2	28	48.3	20	34.5	4	6.9	4	6.9	–	–	2	3.4
F981, layer 3	3	60.0	–	–	2	40.0	–	–	–	–	–	–
totals	266	51.5	133	25.7	55	10.6	22	4.3	30	5.8	11	2.1
post-Middle Neolithic contexts												
F1, causeway A to section 1, layer 0	10	90.9	–	–	1	9.1	–	–	–	–	–	–
F1, sections 2–3, layer 0	18	51.4	16	45.7	1	2.9	–	–	–	–	–	–
F1, sections 3–4, layer 0	13	76.5	3	17.6	–	–	1	5.9	–	–	–	–
F1, sections 4–5, layer 0	37	59.8	12	19.4	8	12.9	3	4.8	1	1.6	1	1.6
F1, sections 5–6, layer 1	5	55.6	1	11.1	–	–	–	–	1	11.1	2	22.2
F14, layer 1	40	69	7	12.0	7	12.0	3	5.2	1	19.2	–	–
F28, layer 1	20	57.1	10	28.6	2	5.7	–	–	1	2.9	2	5.7
totals	143	63.0	49	21.6	19	8.4	7	3.1	4	1.8	5	2.2

Table 26 Complete waste flakes: length

	enclosure ditch				**buried soil**		**interior features**				**all features**	
	Phase 1		*Phase 2*				*Middle Neolithic*		*post-Middle Neolithic*			
length (mm)	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
0–5	1	0.3	5	1.0	2	0.3	19	3.1	8	2.5	38	1.3
5–10	3	0.9	31	6.5	45	7.2	94	15.6	35	11.1	264	9.3
10–15	34	10.5	69	14.4	133	21.2	104	17.2	65	20.2	490	17.3
15–20	55	16.9	101	21.0	155	24.7	99	16.4	63	19.9	563	19.9
20–25	62	19.1	93	19.4	127	20.3	99	16.4	58	18.3	515	18.2
25–30	48	14.8	71	14.8	80	12.8	80	13.2	36	11.4	393	13.9
30–35	57	17.5	52	10.8	45	7.2	56	9.3	23	7.3	276	9.7
35–40	34	10.5	21	4.4	23	3.7	32	5.3	15	4.8	148	5.2
40–45	19	5.8	17	3.5	10	1.6	17	2.8	8	2.5	81	2.9
45–50	3	0.9	14	2.9	4	0.6	1	0.2	3	1.0	35	1.2
50+	9	2.8	6	1.3	3	0.4	3	0.5	3	1.0	30	1.1
totals	325	100.0	480	100.0	627	100.0	604	100.0	317	100.0	2833	100.0
means	27.4		24.8		21.1		20.6		20.9		22.5	
standard deviations	10.6		30.7		8.8		10.2		10.0		15.7	
medians	26.0		21.8		20.0		20.0		20.0		21.0	

Table 27 Complete waste flakes: breadth

	enclosure ditch				buried soil		interior features				all features	
	Phase 1		*Phase 2*				*Middle Neolithic*		*post-Middle Neolithic*			
breadth (mm)	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
0–5	–	–	10	2.0	3	0.5	42	7.0	7	2.2	78	2.8
5–10	22	6.8	69	14.4	81	12.9	152	25.2	73	23.0	483	17.0
10–15	71	21.8	113	23.5	197	31.4	166	27.5	76	24.0	776	27.4
15–20	75	23.1	107	22.3	158	25.2	128	21.2	73	23.0	647	22.8
20–25	71	21.8	87	18.1	101	16.1	64	10.5	39	12.3	424	15.0
25–30	38	11.7	51	10.6	58	9.2	31	5.1	31	9.8	233	8.2
30–35	26	8.0	23	4.8	20	3.2	16	2.6	6	1.9	103	3.6
35–40	13	4.0	10	2.0	2	0.3	4	0.7	6	1.9	50	1.8
40–45	3	0.9	2	0.4	3	0.5	1	0.2	2	0.6	15	0.5
45–50	4	1.2	2	0.4	4	0.6	–	–	–	–	11	0.4
50+	2	0.6	6	1.3	–	–	–	–	4	1.3	13	0.4
totals	325	100.0	480	100.0	627	100.0	604	100.0	317	100.0	2833	100.0
means		21.1		18.9		17.6		14.7		17		17.4
standard deviations		8.7		9.1		7.2		7.2		8.8		9.2
medians		20.0		17.0		16.0		13.5		16.0		16.0

Table 28 Complete waste flakes: thickness

	enclosure ditch				buried soil		interior features				all features	
	Phase 1		*Phase 2*				*Middle Neolithic*		*post-Middle Neolithic*			
thickness (mm)	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
0–1	2	0.6	39	8.1	14	2.2	96	15.9	32	10.1	228	8.0
1–2	49	15.0	68	14.2	86	13.7	117	19.4	59	18.6	476	16.8
2–3	61	18.8	72	15.0	126	20.1	140	23.2	54	17.0	539	19.0
3–4	44	13.5	74	15.4	113	18.0	70	11.6	54	17.0	432	15.2
4–5	52	16.0	70	14.6	96	15.3	69	11.4	43	13.6	384	13.6
5–6	32	9.8	44	9.2	60	9.6	36	6.0	19	6.0	228	8.0
6–7	22	6.8	22	4.6	39	6.2	16	2.6	19	6.0	140	4.9
7–8	12	3.7	24	5.0	28	4.5	18	3.0	12	3.8	115	4.1
8–9	9	2.7	17	3.5	19	3.0	17	2.8	11	3.5	87	3.1
9–10	12	3.7	13	2.7	11	1.8	12	2.0	2	0.6	58	2.0
10–11	7	2.2	9	1.9	9	1.4	2	0.3	4	1.3	37	1.3
11–12	5	1.5	9	1.9	6	1.0	3	0.5	2	0.6	28	1.0
12–13	3	0.9	6	1.3	9	1.4	2	0.3	1	0.3	23	0.8
13–14	5	1.5	5	1.0	3	0.5	–	–	1	0.3	16	0.6
14–15	4	1.2	1	0.2	2	0.3	–	–	1	0.3	8	0.3
15+	6	1.8	7	1.5	6	1.0	6	1.0	3	0.9	34	1.2
totals	325	100.0	480	100.0	627	100.0	604	100.0	317	100.0	2833	100.0
means		5.5		5		4.9		3.9		4.3		4.6
standard deviations		3.5		3.4		2.9		2.9		2.9		3.1
medians		5		4		4		3		4		4

The small amount of comparative material, such as the data from the Bronze Age industry from Maxey, would appear to be very similar (Pryor 1985, table 21). This may suggest, in the absence of further data, that in this area platform angles may not be chronologically diagnostic.

Cores

A total of 247 cores was found, weighing 5175.4g (Fig 219). The overall core typology (modified after Clark *et al* 1960, 216) is given in Tables 32 and 33. As with most other earlier Neolithic industries from southern and eastern England (Healy and Robertson-Mackay 1983, table 12; Whittle 1977, 69), type A2 was predominant

Table 29 Complete waste flakes: weight

	enclosure ditch				buried soil		interior features				all features	
	Phase 1		*Phase 2*				*Middle Neolithic*		*post-Middle Neolithic*			
weight (g)	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
0–1	121	37.2	256	53.3	403	64.3	514	85.1	265	83.6	1785	63.0
1–2	61	18.7	81	16.9	85	13.5	52	8.6	25	7.9	390	13.8
2–3	39	12.0	43	8.9	43	6.8	14	2.3	8	2.5	199	7.0
3–4	19	5.9	16	3.3	25	4.0	9	1.5	8	2.5	107	3.8
4–5	12	3.7	18	3.9	21	3.3	7	1.2	3	0.9	75	2.6
5–6	12	3.7	11	2.3	13	2.1	3	0.5	2	0.6	52	1.8
6–7	13	4.0	7	1.4	9	1.4	2	0.3	1	0.3	46	1.6
7–8	11	3.4	5	1.0	7	1.2	1	0.2	2	0.6	32	1.1
8–9	3	0.9	10	2.1	5	0.8	2	0.3	1	0.3	25	0.9
9–10	4	1.2	5	1.0	5	0.8	–	–	–	–	22	0.8
10+	30	9.2	28	5.8	11	1.8	–	–	2	0.6	99	3.5
totals	325	100.0	480	100.0	627	100.0	604	100.0	317	100.0	2832	100.0
means		3.7		2.8		1.9		1.3		2.1		2.1
standard deviations		6.8		4.8		2.6		2.1		7.6		4.5
medians		1.8		1.0		1.0		0.5		1.0		1.0

Table 30 Complete waste flakes: breadth:length ratios

	enclosure ditch				buried soil		interior features				all features	
	Phase 1		*Phase 2*				*Middle Neolithic*		*post-Middle Neolithic*			
ratio	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
0–1	–	–	1	0.3	–	–	6	1.1	2	0.9	11	0.6
1–2	18	7.0	17	5.1	26	5.9	52	9.4	17	8.0	156	7.9
2–3	59	22.9	84	25.2	70	15.8	143	25.7	44	20.8	452	22.9
3–4	81	31.4	85	25.5	118	26.8	141	25.4	56	26.4	539	27.3
4–5	57	22.1	75	22.5	115	26.1	104	18.7	49	23.1	434	22.0
5–6	19	7.4	37	11.1	63	14.3	48	8.6	21	9.9	187	9.5
6–7	16	6.2	20	6.0	27	6.1	33	5.9	9	4.2	107	5.4
7–8	2	0.8	8	2.4	16	3.6	13	2.3	7	3.3	45	2.3
8–9	5	1.9	4	1.2	6	1.7	10	1.8	6	2.8	28	1.4
9–10	1	0.4	2	0.6	–	–	2	0.4	1	0.4	8	0.4
10+	–	–	–	–	–	–	4	0.7	–	–	6	0.3
totals	258	100.0	333	100.0	441	100.0	556	100.0	212	100.0	1973	100.0
means		3.87		3.97		4.21		3.86		4.00		3.91
standard deviations		1.50		1.53		1.50		1.74		1.63		1.60
medians		3.67		3.80		4.10		3.57		3.76		3.70
% blades		7.00		5.40		5.90		10.40		9.00		8.10
% flakes		76.40		73.20		68.70		69.80		70.20		72.60
% broad flakes		16.60		21.40		25.40		19.80		20.80		19.30

(27.5%). Other types, except for unclassified examples and core fragments, were only present in small numbers. This pattern was broadly reflected in the different contexts, although the Phase 3 levels contained relatively fewer of type A2 and more of types B3 and D.

The vast majority of the pieces exhibited evidence of flaking from other directions prior to the final, surviving platform. This is further attested by the presence of core recovery flakes, signifying the start of a new flaking direction during knapping.

Table 31 Complete waste flakes: platform angles

	enclosure ditch				buried soil		interior features				all features	
	Phase 1		*Phase 2*				*Middle Neolithic*		*post-Middle Neolithic*			
angle (degree)	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
<90	3	2.8	17	12.8	6	6.9	14	18.7	9	15.5	128	20.9
90–95	21	19.4	15	11.3	4	4.6	10	13.3	5	8.6	70	11.5
95–100	24	22.2	32	24.1	15	17.2	10	13.3	13	22.4	113	18.5
100–105	22	20.3	16	12.0	19	21.8	7	9.3	10	17.2	83	13.6
105–110	16	14.8	18	13.5	11	12.6	14	18.7	10	17.2	80	13.1
110–115	10	9.6	17	12.8	12	13.8	10	13.3	2	3.5	59	9.7
115–120	9	8.3	8	6.0	13	14.9	7	9.3	3	5.2	44	7.2
120–125	2	1.8	7	5.3	5	5.8	2	2.7	3	5.2	24	3.9
125–130	1	0.9	2	1.5	1	1.2	–	–	1	0.2	5	0.8
130–135	–	–	1	0.7	1	1.2	–	–	2	3.5	4	0.6
135–140	–	–	–	–	–	–	1	1.3	–	–	1	0.2
140+	–	–	–	–	–	–	–	–	–	–	–	–
totals	108	100.0	133	100.0	87	100.0	75	100.0	58	100.0	611	100.0
means		102.2		102.1		106.9		101.3		102.3		99.4
standard deviations		13.1		14.6		9.8		16.3		13.7		16.6
medians		102.5		102.0		105.0		103.0		101.5		100.0

Table 32 All cores: types

	enclosure ditch				buried soil		all features	
	Phase 1		*Phase 2*					
type	numbers	%	numbers	%	numbers	%	numbers	%
A1	4	12.5	–	–	–	–	7	2.8
A2	6	18.8	5	12.8	27	31.0	68	27.5
B1	2	6.3	4	10.3	10	11.5	20	8.1
B2	1	3.1	–	–	4	4.6	7	2.9
B3	1	3.1	4	10.3	6	6.9	16	6.5
C	–	–	1	2.5	1	1.1	5	2.0
D	3	9.3	4	10.3	5	5.8	23	9.3
E	–	–	4	10.3	1	1.1	6	2.5
pebble core	4	12.5	4	10.3	7	8.1	22	8.9
unclassified	4	12.5	7	17.9	6	6.9	27	10.9
core fragment	7	21.9	6	15.3	20	23.0	46	18.6
totals	32	100.0	39	100.0	87	100.0	247	100.0

core:flake ratio = 1:21.4

Table 33 Complete cores: types

	Phase 1A		*Phase 1B*		*Phase 1C*	
type	numbers	%	numbers	%	numbers	%
A1	4	12.5	–	–	–	–
A2	6	18.8	5	12.8	27	31.0
B1	2	6.3	4	10.3	10	11.5
B2	1	3.1	–	–	4	4.6
B3	1	3.1	4	10.3	6	6.9
C	3	9.3	1	2.5	1	1.2
D	–	–	4	10.3	1	1.2
E	–	–	4	10.3	5	5.6
pebble core	4	12.5	4	10.3	7	8.1
unclassified	4	12.5	7	17.9	6	6.9
fragments	7	21.9	6	15.3	20	23.0
totals	32	100.0	39	100.0	87	100.0

Table 34 All cores: weights

	enclosure ditch				buried soil		all features	
	Phase 1		*Phase 2*					
weight (g)	numbers	%	numbers	%	numbers	%	numbers	%
0–5	1	3.1	3	7.7	3	3.4	17	6.9
5–10	4	12.5	5	12.8	12	13.7	33	13.4
10–15	6	18.7	6	15.3	24	27.5	54	21.9
15–20	8	25.0	5	12.8	17	19.5	49	19.9
20–25	4	12.5	6	15.3	15	17.2	33	13.4
25–30	–	–	3	7.7	5	5.7	13	5.3
30–35	4	12.5	5	12.8	8	9.2	24	9.8
35–40	–	–	1	2.5	1	1.1	4	1.6
40–45	–	–	1	2.5	–	–	2	0.8
45–50	–	–	1	2.5	1	1.1	3	1.2
50+	5	15.6	3	7.7	1	1.1	14	5.7
totals	32	100.0	39	100.0	87	100.0	246	100.0

Table 35 Complete flint implements: length

	utilised flakes		*retouched flakes*		*serrated flakes*		*scrapers*		*unbroken waste flakes*	
length (mm)	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
0–5	–	–	–	–	–	–	–	–	38	1.3
5–10	–	–	–	–	–	–	–	–	264	9.3
10–15	5	2.2	–	–	–	–	1	0.6	490	17.3
15–20	9	4.0	3	3.0	–	–	11	6.5	563	19.9
20–25	23	10.2	8	7.9	2	1.5	11	6.5	515	18.2
25–30	41	18.2	18	17.8	7	5.4	27	15.8	393	13.9
30–35	42	18.7	22	21.8	20	15.4	44	25.9	276	9.7
35–40	43	19.1	16	15.8	38	29.2	44	25.9	148	5.2
40–45	19	8.4	12	11.9	27	20.8	17	10.0	81	2.9
45–50	21	9.3	9	8.9	15	11.5	11	6.5	35	1.2
50+	22	9.9	13	12.9	21	16.2	4	2.3	30	1.1
totals	225	100.0	101	100.0	130	100.0	170	100.0	2833	100.0
means	36.1		37.8		41.7		33.9		22.5	
standard deviations	12.0		12.1		9.1		8.7		15.7	
medians	35.0		35.0		40.0		34.5		21.0	

None of the cores showed any indisputable evidence for use as hammerstones, nor was secondary retouch present. All had evidence of light trimming on the edge of the striking platform to remove overhangs caused by previous flaking. More elaborate platform preparation is attested on a few waste flakes (see above).

An analysis of the core weights (Table 34) indicates their small size, with 62.1% weighing less than 20g. The cores from the whole site had an average weight of 21.5g. This, along with the subjective assessment of the small size of the remaining flake beds, suggests that the cores were worked to the point where no further usable flake could be removed.

Irregular workshop waste

A total of 284 pieces of workshop waste was found, weighing 2167.6g. These were all pieces that did not display the characteristics of a flake (that is, bulb of percussion and striking platform) and could not be classed as cores, hammerstones, or implements. Most were accidental by-products created when a flaw or plane of weakness was encountered during knapping. The small number of pieces (4.7% of by-products) suggests that this was a relatively rare process and so indicates the overall quality of the raw material. The number recovered is similar to that from Briar Hill (4.5% of by-products; Bamford 1985, table 4), but contrasts with later assemblages using a similar raw material, such as the Early Bronze Age material from Fengate (Newark Road Subsite) (31.1% of by-products; Pryor 1980, 123).

Implements

A total of 1344 implements (18.1% of the overall total), weighing 6618.8g, was found. The implement metrical

Table 36 Complete flint implements: breadth

	utilised flakes		*retouched flakes*		*serrated flakes*		*scrapers*		*unbroken waste flakes*	
breadth (mm)	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
0–5	–	–	–	–	–	–	–	–	78	2.8
5–10	4	1.8	–	–	1	0.8	1	0.6	483	17.0
10–15	32	14.2	6	5.9	26	20.0	2	1.2	776	27.4
15–20	57	25.3	20	19.8	54	41.5	15	8.8	647	22.8
20–25	54	24.0	23	22.8	23	17.7	34	20.0	424	15.0
25–30	37	16.4	24	23.8	15	11.5	49	28.8	233	8.2
30–35	23	10.2	14	13.9	7	5.4	37	21.8	103	3.6
35–40	7	3.1	9	8.9	4	3.1	22	12.9	50	1.8
40–45	7	3.1	2	2.0	–	–	7	4.1	15	0.5
45–50	1	0.4	2	2.0	–	–	3	1.8	11	0.4
50+	3	1.3	1	1.0	–	–	–	–	13	0.4
totals	225	100.0	101	100.0	130	100.0	170	100.0	2833	100.0
means	23.6		27.0		20.4		29.0		17.4	
standard deviations	8.6		8.8		6.3		7.2		9.2	
medians	22		26		19		29		16	

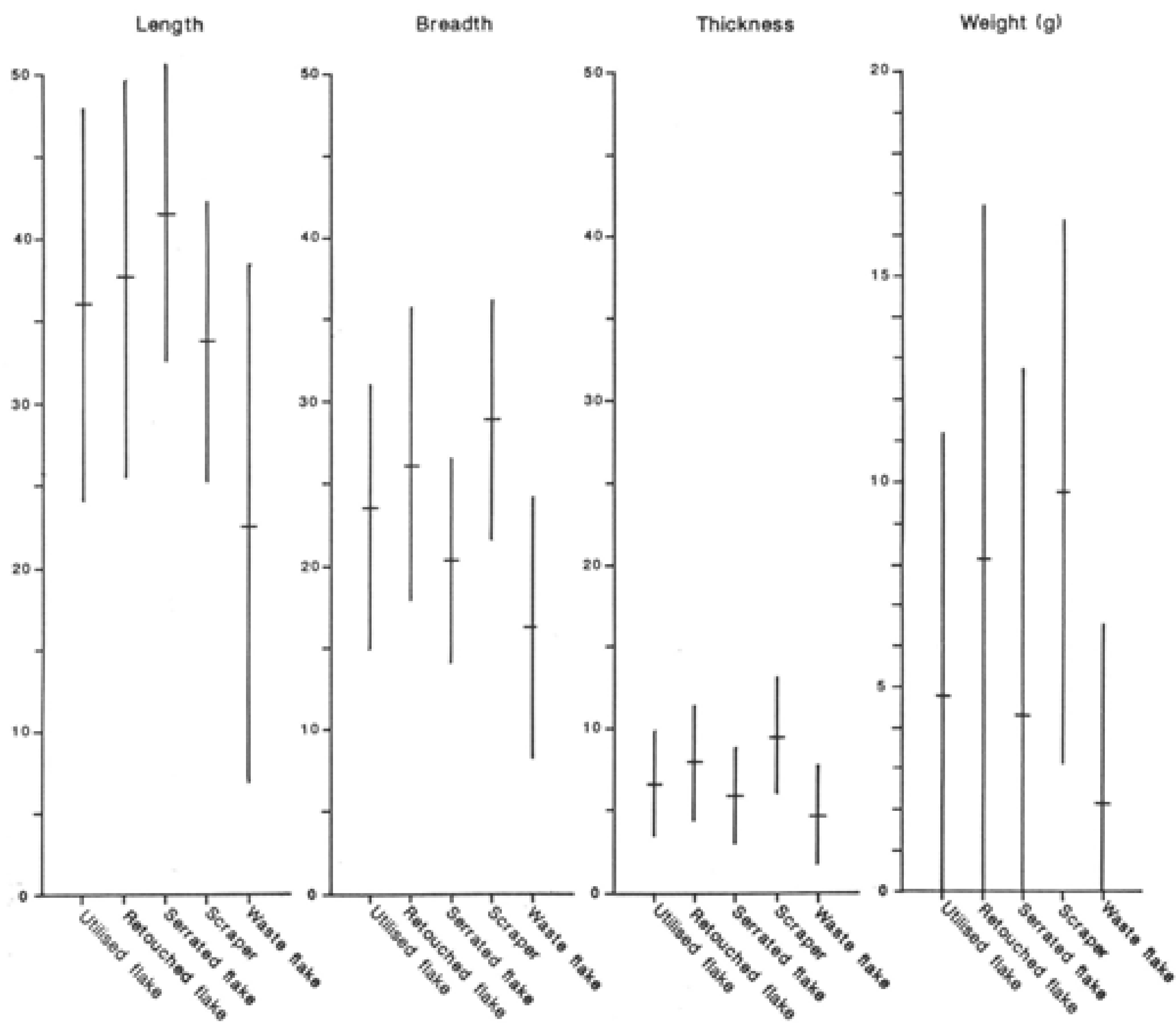


Fig 214 Dimensions (in mm) and weights (in grams) of complete flint implements and waste flakes

Table 37 Complete flint implements: thickness

	utilised flakes		*retouched flakes*		*serrated flakes*		*scrapers*		*unbroken waste flakes*	
thickness (mm)	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
0–2	6	2.7	1	1.0	1	0.8	–	–	706	24.8
2–4	44	19.6	13	12.9	43	33.1	7	4.1	971	34.2
4–6	87	38.7	28	27.8	48	36.9	27	15.9	576	20.3
6–8	38	16.9	19	18.8	22	16.9	41	24.1	255	9.0
8–10	28	12.5	17	16.8	8	6.1	32	18.8	145	5.2
10–12	8	3.6	11	10.9	2	1.5	31	18.3	65	2.4
12–14	6	2.7	7	6.9	3	2.3	17	10.0	39	1.5
14–16	3	1.3	2	2.0	–	–	7	4.1	15	0.5
16–18	3	1.3	3	3.0	2	1.5	5	2.9	14	0.5
18–20	2	0.9	–	–	1	0.8	1	0.6	13	0.4
20+	–	–	–	–	–	–	2	1.2	34	1.2
totals	225	100.0	101	100.0	130	100.0	170	100.0	2833	100.0
means	6.6		8.0		5.9		9.7		4.6	
standard deviations	3.2		3.5		2.9		3.6		3.1	
medians	6		7		5		9		4	

Table 38 Complete flint implements: weight

	utilised flakes		*retouched flakes*		*serrated flakes*		*scrapers*		*unbroken waste flakes*	
weight (g)	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
0–1	63	28.0	17	16.8	25	19.2	3	1.8	1785	63.0
1–2	38	16.9	9	8.9	23	17.7	6	3.5	390	13.8
2–3	24	10.7	8	7.9	19	14.6	12	7.1	199	7.0
3–4	19	8.4	9	8.9	24	18.5	16	9.4	107	3.8
4–5	16	7.1	5	4.9	12	9.2	7	4.1	75	2.6
5–6	14	6.2	6	5.9	3	2.3	16	9.4	52	1.8
6–7	9	4.0	9	8.9	8	6.2	15	8.8	46	1.6
7–8	8	3.6	7	6.9	6	4.6	13	7.6	32	1.1
8–9	9	4.0	3	3.0	5	3.8	12	7.1	25	0.9
9–10	6	2.7	3	3.0	2	1.5	12	7.1	22	0.8
10+	19	8.4	25	24.7	3	2.3	58	34.1	99	3.5
totals	225	100.0	101	100.0	130	100.0	170	100.0	2832	100.0
means		4.8		8.2		4.3		9.8		2.1
standard deviations		6.4		8.6		8.5		6.7		4.5
medians		3		6		3		8		1

data, along with the unbroken waste flakes for comparison, are presented in Tables 35–40 and in Figure 214.

Utilised flakes

A total of 410 utilised flakes, weighing 1621.9g, was found, of which 225 were unbroken (Fig 220, nos 21–29). These were defined as flakes with light edge damage caused by the deliberate use of an unretouched edge. They are likely to be over-represented, since post-depositional edge damage can give similar morphological characteristics.

It was apparent that the average size flakes chosen for utilisation were larger than that of the waste flakes, with only 6.2% of unbroken examples being under 20mm in length (Table 35). A wide range of flake shapes was used (Fig 215), but with a slight preference for blades and blade-like flakes, the most common breadth:length ratio being between 2:1 and 3:1. This reflects the fact that relatively thin, straight edges were important rather than the form of the whole piece. In many cases the working edge was backed by cortex (see Fig 220, nos 22–24, 26, 28) to make the piece easier to handle in use.

In two cases (such as Fig 220, no 24) the area of utilisation was associated with a thin band of gloss on the ventral surface. The general correspondence between serrated flakes and the occurrence of lustre suggests that serrated flakes may be worn examples of

Table 39 Complete flint implements: breadth:length ratios

	utilised flakes		*retouched flakes*		*serrated flakes*		*scrapers*		*unbroken waste flakes*	
ratio	numbers	%	numbers	%	numbers	%	numbers	%	numbers	%
0–1	–	–	–	–	–	–	–	–	11	0.6
1–2	26	11.9	5	5.1	32	24.4	2	1.2	156	7.9
2–3	72	32.9	23	23.5	74	56.4	17	9.9	452	22.9
3–4	53	24.2	36	36.7	15	11.5	45	26.3	539	27.3
4–5	42	19.2	27	27.6	9	6.9	70	40.9	434	22.0
5–6	15	6.8	5	5.1	–	–	29	17.0	187	9.5
6–7	8	3.6	–	–	1	0.8	5	2.9	107	5.4
7–8	2	0.9	1	1.0	–	–	1	0.6	45	2.3
8–9	–	–	–	–	–	–	–	–	28	1.4
9–10	1	0.5	1	1.0	–	–	1	0.6	8	0.4
10+	–	–	–	–	–	–	1	0.6	6	0.3
totals	219	100.0	98	100.0	131	100.0	171	100.0	1973	100.0
means		3.87		3.97		4.21		3.86		3.91
standard deviations		1.50		1.53		1.50		1.74		1.60
medians		3.67		3.80		4.10		3.57		3.70
% blades		11.9		5.1		24.4		1.2		8.1
% flakes		76.2		87.8		74.8		77.0		72.6
% broad flakes		11.9		7.1		0.8		21.8		19.3

Table 40 Mean dimensions of flake implements and scrapers

type	*utilised flakes*		*retouched flakes*		*serrated flakes*		*scrapers*	
dimensions	mean	standard deviation	mean	standard deviation	mean	standard deviation	mean	standard deviation
length (mm)	36.1	12.0	37.8	12.1	41.7	9.1	33.1	7.6
breadth (mm)	23.6	8.6	27.0	8.8	20.4	6.3	28.1	6.6
thickness (mm)	6.7	3.3	8.0	3.5	6.0	2.9	9.7	3.3
weight (g)	4.8	6.4	8.2	8.6	4.3	8.5	9.9	6.2
breadth:length ratio		3.27		3.57		2.44		4.25

utilised flakes. This may also be true for two of Class A type (as defined by Smith 1965, 92) (such as Fig 220, no 25), where the edge damage is far more regular than on the other examples.

Figure 216 shows the position of edge modification in the utilised flakes. In the majority of cases this occurred on the middle of the dorsal edges, with a bias toward the right-hand side and an even fall off from the centre to either end. Where damage appears on the tips, this was confined to the distal end, usually as a result of edge damage on one or both edges extending onto a pointed or rounded end. The lack of edge damage on the proximal ends is due to them being the thickest part of the flake and thus unsuitably blunt. This pattern of edge damage reflects the use of relatively straight, thin edges, which most commonly occur in the centre portion of each lateral edge.

Retouched flakes

A total of 226 retouched flakes was found, weighing 1186.8g (Fig 221, nos 30–41). There were 101 complete examples. This was also a broad category of largely expedient implements comprising flakes showing signs of deliberate shaping by edge retouch. They could be roughly divided into four classes based upon their overall morphology:

1 Flakes with irregular retouch confined to the immediate edge, on a wide variety of flake forms (such as Fig 221, nos 30–31).

2 Thin flakes with fine, invasive retouch on one or both edges (such as Fig 221, nos 32, 38).

3 Thick flakes with retouch on one edge, either bifacial or unifacial (Fig 221, nos 34, 37). In one case (no 34) this was associated with crude ventral retouch. These flakes tended to occur in post-Middle Neolithic contexts, notably the tertiary enclosure ditch fills.

4 The fourth class comprised a single example of a 'knife' made on a thin flake, with both sides having relatively crude invasive, bifacial retouch (Fig 221, no 39).

When the location of the retouch is considered, a similar pattern to that of the utilised flakes is encountered, with a concentration in the centre of the edges on the dorsal side (Fig 216). The ventral faces and both edges, however, appear to have had greater use.

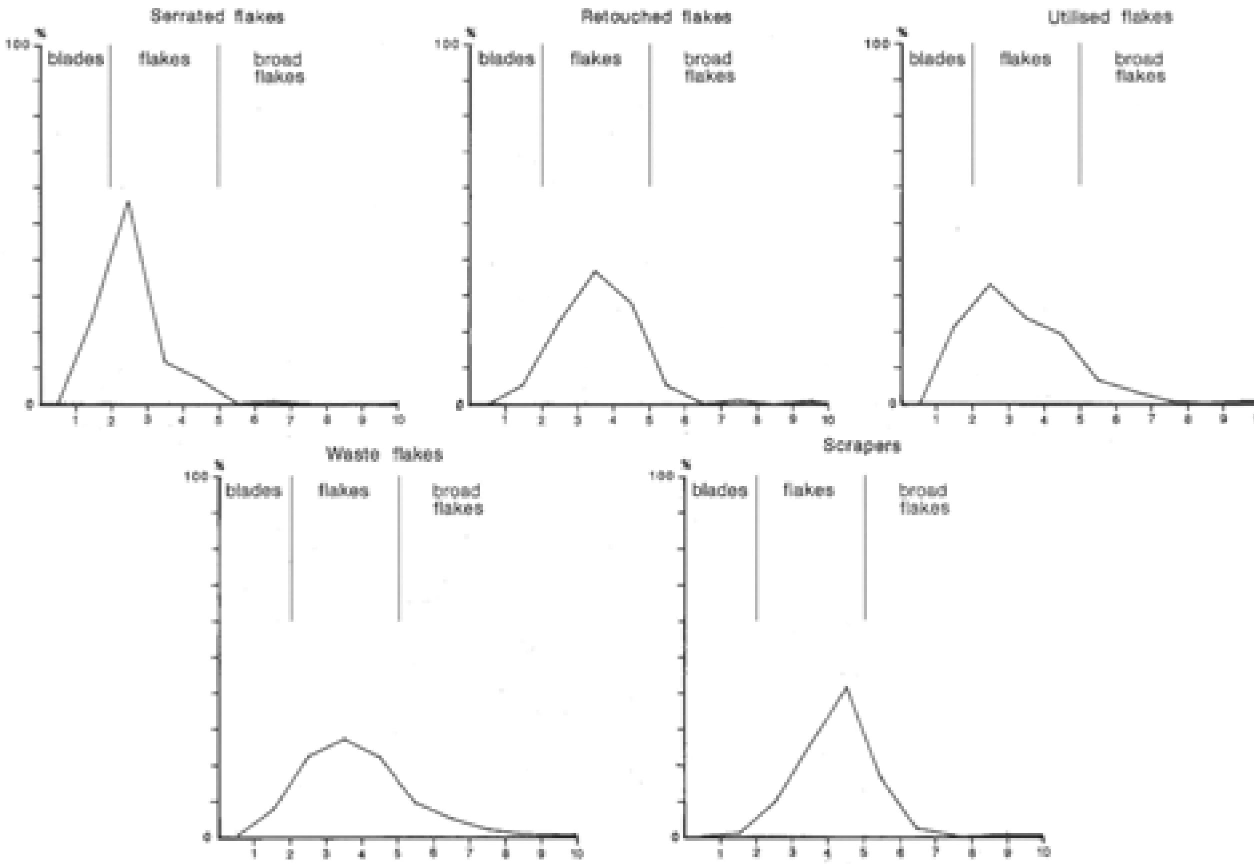


Fig 215 Breadth:length ratios of complete flint implements and waste flakes

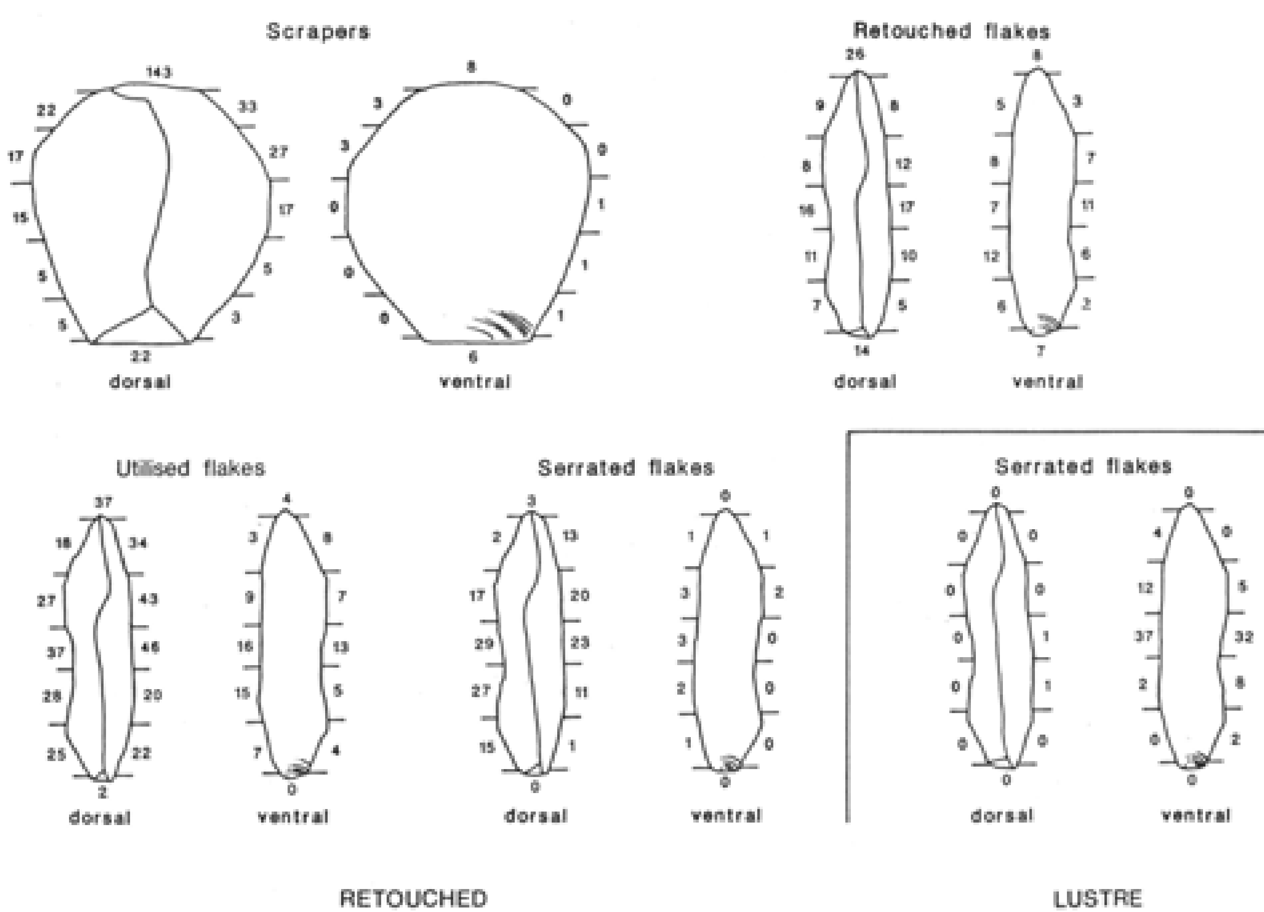


Fig 216 Retouch on flint implements; the position of lustre is also indicated for serrated flakes

Table 41 Scraper types (all phases)

type	*number*	*%*
A1 (long end)	18	7.1
A2 (short end)	202	79.8
B2 (double-ended)	5	2.0
C (disc)	7	2.8
D1 (short side)	3	1.2
D2 (long side)	5	2.0
E (on broken flake)	3	1.2
F (hollow)	1	0.4
too damaged to classify	9	3.5
total	253	100.0

The metrical attributes suggest that relatively long, thick flakes were selected (Tables 35, 36). This reflects the need for thick flakes to provide robust edges for retouching.

Serrated flakes

A total of 219 serrated flakes was found, weighing 734.4g (Fig 22, nos 42–61). There were 130 complete examples. Serrated flakes were defined by the presence of fine denticulations on one or both dorsal edges, often associated with a thin band of macroscopic lustre on the opposite side of the piece. Where lustre was not present, the edges appear to have been heavily abraded, indicating that it may have been removed by later use.

The complete serrated flakes were divided into three classes, depending upon the position of the serrations on their dorsal edges: for 51 examples (39.2%) this was on the left-hand side, for 49 (37.7%) on the right-hand side, and for 30 (23.1%) on both sides.

Figure 216 indicates the position of the serrations and associated edge modification on the complete pieces. As with the utilised and retouched flakes, the retouch was confined to the dorsal edges. Where retouch did occur on the ventral surfaces, this tended to be edge damage produced as a result of the use of the serrations on the dorsal edge. In only three cases were the dorsal, distal ends used, with the serrations extending to the tip of the blade.

The metrical data reveal that a restricted range of blank shapes was chosen for the production of serrated flakes (Fig 215), which were longer, narrower, and thinner (25% blades, 75% flakes, and <1% broad flakes) than those for other artefact types.

The consistent occurrence of lustre on these implements suggests that they were used for a specific function, but the problem of interpreting these artefacts has, however, remained unresolved (Bamford 1985, 77; Saville 1981, 144; Smith 1965, 92). This is compounded by the fact that experiments have failed to reproduce the type of macroscopic use-wear encountered on archaeological examples (Torsten Madsen personal communication). Recent low-power use-damage data have suggested that they may have been associated with the harvesting of cereals, but their specific mode of use remains unknown (A Brown personal communication).

Scrapers

A total of 253 scrapers was found, weighing 2080.9g (Fig 223, nos 62–88). They were classified (Tables 41, 42) according to the system of Clark *et al* (1960, 217). As is usual with British later prehistoric assemblages, the short-end (A2) variety was the most common. Other types were only present in small quantities. The retouch location diagram (Fig 216) indicates that the dorsal, distal end and its adjacent edges were used almost to the exclusion of the other areas. The diagram also shows the slight preference for the use of the right-hand side of the dorsal surface. This tendency is similar to that noted for the utilised flakes.

Scrapers with ventral retouch (such as Fig 223, nos 67–69) may be a class of scrapers that had a chronological significance and a particular mode of use. This retouch appears to have been a device to produce a convex ventral surface, possibly in order to shape the working edge in a particular manner. This approach also appears to have been used on other implements such as denticulates (Fig 226, no 104), with which the scrapers bear a strong similarity. The relatively small number of scrapers with ventral

Table 42 Scraper types (Neolithic phases)

Phase	*1A*		*1B*		*1C*	
type	numbers	%	numbers	%	numbers	%
A1	1	3.2	2	2.8	11	17.7
A2	26	83.9	59	82.0	43	69.4
B1	–	–	–	–	–	–
B2	1	3.2	3	4.2	–	–
C	–	–	3	4.2	–	–
D1	–	–	–	–	1	1.6
D2	2	6.5	2	2.8	1	1.6
F	–	–	–	–	1	1.6
fragments	1	3.2	3	4.2	5	8.1
totals	31	100.0	72	100.0	62	100.0

Table 43 Complete scrapers: length

	Phase 1A		*Phase 1B*		*Phase 1C*	
length (mm)	numbers	%	numbers	%	numbers	%
15–20	–	–	2	4.2	7	17.1
20–25	1	5.6	2	4.2	5	12.2
25–30	2	11.1	9	18.8	8	19.5
30–35	9	50.0	9	18.8	9	22.0
35–40	5	27.7	16	33.3	7	17.1
40–45	–	–	5	10.4	3	7.3
45–50	1	5.6	4	8.3	1	2.4
50+	–	–	1	2.1	1	2.4
totals	18	100.0	48	100.0	41	100.0
means		33.72		34.89		30.63
standard deviations		5.34		8.75		8.81
medians		33.5		36.0		31.0

Table 44 Complete scrapers: breadth

	Phase 1A		*Phase 1B*		*Phase 1C*	
breadth (mm)	numbers	%	numbers	%	numbers	%
0–5	–	–	–	–	–	–
5–10	–	–	–	–	1	2.4
10–15	–	–	–	–	1	2.4
15–20	3	16.7	1	2.1	6	14.6
20–25	4	22.2	10	20.8	11	26.8
25–30	6	33.3	13	27.1	7	17.1
30–35	3	16.7	16	33.3	9	22.0
35–40	2	11.1	5	10.4	6	14.6
40–45	–	–	2	4.2	–	–
45–50	–	–	1	2.1	–	–
50+	–	–	–	–	–	–
totals	18	100.0	48	100.0	41	100.0
means		27.33		30.12		26.82
standard deviations		6.24		5.91		7.59
medians		28.5		30.5		26.0

retouch did not, however, allow a precise date to be determined for this type.

The metrical data indicate that the scrapers were made on flakes that, in their final form, were relatively square and thick (Fig 215). Most examples were 30–40mm long, 20–35mm broad, and 6–12mm thick (Tables 43–45). The vast majority were made on slightly plunging flakes to produce an effective (presumed) scraping edge.

These general dimensions fit with contemporary local industries, such as Briar Hill (Bamford 1985, fig 38), although they were slightly smaller than those from Hurst Fen (Clark *et al* 1960, fig 12). They were thinner than Late Neolithic examples, such as those from Storey's Bar Road, Fengate (Pryor 1980, fig 71), and larger than those from Bronze Age contexts at the Newark Road sub-site (ibid, fig 70). The weight of the scrapers (Table 46) may in part be determined by the source material, but the average was somewhat lighter than, for example, Storey's Bar Road (Pryor 1978, 140).

Nineteen small, scale-flaked scrapers, made on squat, thick flakes ('thumbnail scrapers') were present (Fig 223, nos 75, 77). These were found in post-Middle Neolithic contexts, such as the tertiary enclosure ditch fills, the buried soil, and the upper fills of the cursus ditch (F318). This fits with their well-recorded Beaker associations (for example, Bamford 1982, 74).

Scrapers made on broken flakes (Class E) were relatively under-represented (1.2% of the scrapers) compared to, for example, 13.3% at Hurst Fen (Clark *et al* 1960, 217). The problem in the definition of these pieces lies in determining whether broken blanks were deliberately selected for retouch, or whether the truncations occurred after deposition. The Etton examples represent only those where the retouch extended around (and thus post-dated) the truncation.

Table 45 Complete scrapers: thickness

	Phase 1A		*Phase 1B*		*Phase 1C*	
thickness (mm)	numbers	%	numbers	%	numbers	%
0–2	–	–	–	–	–	–
2–4	1	5.6	2	4.2	3	7.3
4–6	2	11.1	8	16.7	6	14.6
6–8	1	5.6	8	16.7	13	31.7
8–10	5	27.7	12	25.0	6	14.6
10–12	6	33.3	7	14.6	10	24.4
12–14	1	5.6	6	12.5	3	7.3
14–16	1	5.6	2	4.2	–	–
16–18	1	5.6	2	4.2	–	–
18–20	–	–	–	–	–	–
20+	–	–	1	2.1	–	–
totals	18	100.0	48	100.0	41	100.0
means		10.33		9.95		8.85
standard deviations		3.41		3.78		2.70
medians		10.5		10.0		8.0

Table 46 Complete scrapers: weight

	Phase 1A		*Phase 1B*		*Phase 1C*	
weight (g)	numbers	%	numbers	%	numbers	%
0–2.5	–	–	–	–	–	–
2.5–5	4	22.2	6	12.5	11	26.8
5–7.5	1	5.6	12	25.0	9	22.0
7.5–10	4	22.2	10	20.8	8	19.5
10–12.5	2	11.1	6	12.5	3	7.3
12.5–15	3	16.7	3	6.3	2	4.9
15–17.5	2	11.1	4	8.3	–	–
17.5–20	1	5.6	2	4.2	1	2.4
20–22.5	–	–	2	4.2	1	2.4
22.5–25	–	–	2	4.2	1	2.4
25+	1	5.6	1	2.1	–	–
totals	18	100.0	48	100.0	41	100.0
means		11.23		10.72		7.64
standard deviations		7.05		6.13		5.29
medians		10.0		8.45		6.0

Sixty-seven examples (26.5%) of all the scrapers had proximal truncations (Table 47), compared to only four (1.6%) with distal truncations and eight (3.2%) with multiple breaks. This suggests that post-depositional breakage was minimal and that proximal truncation was used to shape blanks prior to flaking. The crudeness of the truncation and the fact that it did not occur on short, square flakes would suggest that this was a utilitarian, rather than stylistic, device.

Mean scraper retouch angles (between the ventral surface and the retouched edge: Smith 1965, 95–6) indicate that the preferred angles were between 50° and 70° (Table 48; Microfiche table 42). Data from sites in the March/Manea area (Middleton 1992) suggest that this range remained the most common in Late Neolithic and Early Bronze Age assemblages. This contrasts with the situation in parts of Wessex (Smith 1965, 96) where the angles became less acute in the later periods.

Hafting may be indicated by abrupt retouch on one example (Fig 224, no 80), which may have been to thin the proximal end. The rarity of this type of working suggests that few scrapers can have been hafted.

Piercers

A total of 58 piercers was found, weighing 228.4g. This was an eclectic group of expedient tools, unified by an overall morphological integrity and a (presumed) non-rotary piercing function. They comprised largely broken pointed flakes, which had the point shaped and strengthened by light retouch. They varied from blades

Table 47 Scrapers: condition

	Phase 1A		*Phase 1B*		*Phase 1C*	
breakage	numbers	%	numbers	%	numbers	%
complete	18	58.1	51	70.8	41	66.1
proximal truncation	10	32.3	19	26.4	16	25.8
distal truncation	1	3.2	1	1.4	–	–
both ends truncated	2	6.4	1	1.4	5	8.1
totals	31	100.0	72	100.0	62	100.0

Table 48 Scraper retouch angles (estimated average per scraper)

	Phase 1A		*Phase 1B*		*Phase 1C*	
angle (degree)	numbers	%	numbers	%	numbers	%
30–35	1	3.3	–	–	–	–
35–40	–	–	–	–	–	–
40–45	3	10.0	4	6.1	6	10.9
45–50	1	3.3	1	1.5	2	3.6
50–55	6	20.0	12	18.2	10	18.2
55–60	1	3.3	8	12.1	6	10.9
60–65	6	20.0	20	30.3	14	25.5
65–70	1	3.3	5	7.6	10	18.2
70–75	9	30.0	12	18.2	6	10.9
75–80	1	3.3	3	4.6	–	–
80+	1	3.3	1	1.5	1	1.8
totals	30	100.0	66	100.0	55	100.0
means		61.86		62.95		61.07
standard deviations		11.75		9.24		9.13
medians		62.0		63.5		65.0

with light dorsal trimming (such as Fig 225, no 89) to cruder flakes where slightly more elaborate shaping was required (Fig 225, no 90). In one case (Fig 225, no 93) a core recovery flake was used. These points came from both Middle Neolithic and later deposits.

No implements were present suggestive of a rotary boring motion, such as those from Hurst Fen (Clark 1960 *et al*, F50–58) or the more elaborate examples associated with later periods (such as Smith 1965, F161).

Denticulates

A total of 58 denticulates was found, weighing 621.1g (Fig 226, nos 99–105). This was a general class of implements with two or more points around their circumference formed by the removal of small, thick dressing chips. They were divided into three classes, based upon the number of their points. Of the 49 that were classifiable, 8 (16.3%) had 2 points, 10 (20.4%) had 3 points and 31 (63.3%) had 4 or more points. It appears that the differences between these types may, in part, be related to the size of the original blank, as the average weight for the three types was 6.6, 10.7, and 12.5g respectively. This suggests that the maximum number of points as possible was put on each piece, dependent upon its size.

The large majority of these pieces was from mixed contexts, with 46.6% deriving from the buried soil. Only seven (12%) came from closed Middle Neolithic deposits. The fact that most of these implements can be assigned a Late Neolithic/Early Bronze Age date reflects the relatively large numbers that occur in other industries of this date in the area, such as Fengate (Newark Road subsite) where they comprised 5.7% by number of the implements (Pryor 1980, 118–21) and Maxey where they comprised 9.4% of the implements (Pryor 1985, 161–3).

Arrowheads

A total of 59 arrowheads (leaf, transverse, and tanged) was found, weighing 129.3g. They are listed in Table 49.

Leaf arrowheads

A total of 29 leaf arrowheads was found, weighing 34.7g (Fig 227, nos 106–118). The 27 certain, finished examples have been divided into five approximate types, according to their shape and method of manufacture:

Table 49 Arrowhead types

type	*numbers*	*%*
leaf	29	49.2
transverse	28	47.5
tanged	2	3.3
totals	59	100.0

Table 50 Transverse arrowhead types

	numbers	*%*
unclassified	13	46.4
Type A	1	3.6
Type C1	4	14.3
Type C2	3	10.7
Type D	4	14.3
Type E	1	3.6
Type H	2	7.1
totals	28	100.0

1 The first class comprised two finely made elongated examples (Fig 227, nos 106, 107), both exhibiting delicate, invasive, bifacial retouch. These would be included within Green's (1980; 1984) category 2C.

2 Three examples (Fig 227, nos 108, 109, 115) had bifacial retouch confined to the proximal end, with the remainder of the piece having light edge trimming. These are of Green's (1980; 1984) type 3B (ogival).

3 This class of leaf arrowhead falls approximately into Clark's (1960, 220–3) and Smith's (1965, 100) class A. The 16 arrowheads had invasive retouch on one or both surfaces (such as Fig 227, nos 110, 111, 114).

4 In this category, retouch was confined to marginal trimming (seven examples) to produce a thin, straight profile (such as Fig 227, nos 112, 113, 116, 117). This type conformed to Class B of Clark *et al* (1960) and Smith (1965).

5 Two unfinished pieces were present: the first was a flake with its bulb and platform partially removed. The second (Fig 227, no 118) was an incomplete kite-shaped example; the quality of the flaking and the nature of the transverse truncation would suggest that this piece had broken during manufacture. Similar, but larger, artefacts have been classified under laurel leaves due to their greater overall dimensions. These pieces could not, however, be classified with certainty.

All of these types occurred in contexts that could either be dated to the Middle Neolithic by other means, or in the buried soil. One was unstratified. There was no correlation between the types outlined above and their context.

The relatively large number of complete examples (55.2%) contrasts with the situation at sites where there is evidence for archery, notably Carn Brea, where only 4% was intact (Saville 1981). This, and the small number present, may suggest that most of the Etton pieces were never used. The unfinished examples suggest that they were being manufactured *in situ*.

Transverse arrowheads

A total of 28 transverse arrowheads was recovered, weighing 92.3g (Figs 227, nos 119–122, and 228, nos 123–133). They comprised 47.5% of the arrowheads. Classification was attempted (Table 50) in accordance with Clark's (1934) scheme, although the large majority of the pieces could not be classified closer than the broad 'chisel' type defined by Green (1980). The majority of these pieces were simple in execution, being thin flakes with steep, bifacial retouch on the thicker, proximal end and light trimming on the distal end. The cutting edge was left unretouched. One example was made on a flake off a polished flint implement.

Most derived from contexts dated by other means to the Late Neolithic, such as the Grooved Ware pits and pit/postholes F14, F28, and F1054, and from multi-period contexts such as the tertiary enclosure ditch fills and the buried soil. However, three examples (such as Fig 227, no 120) occurred in pits associated with Mildenhall pottery (F711, F866). This may support the Middle Neolithic date for the development of the transverse types suggested by the examples from Broome Heath associated with radiocarbon dates of 4523 ± 67 BP (BM-756) (3360–3040 Cal BC) and 4579 ± 65 BP (BM-757) (3380–3130 Cal BC) (ibid, 385; calibration by author).

Tanged arrowheads

Two Early Bronze Age tanged arrowheads were recovered, weighing 2.3g (Fig 228, nos 134, 135) falling in Green's (1980; 1984) 'Sutton a' type. One derived from the buried soil, the other from the north–south ditch F363. The dating of this latter arrowhead conflicts with the undoubted Middle Neolithic date of this feature, although contemporaneity is indicated by the location of the piece on the base of the ditch. A particularly early date for this artefact type (Green 1984, table 1) is, therefore, indicated.

Summary

The evidence suggests that three arrowhead types were current during the Middle Neolithic use of the site, but any chronology currently lacks precision. The occurrence of leaf arrowheads in all contexts would suggest that they were used through the Middle Neolithic use of the site. The association of simple transverse arrowheads with Mildenhall pottery may suggest that these were early examples of the type, the development of which may have been functional rather than stylistic. The presence of the tanged arrowhead in a feature that can be related to the last Middle Neolithic use of the site may suggest that this event occurred at a time when similar arrowhead types are associated with Peterborough Wares in the Yorkshire Wolds (Manby 1975).

Laurel leaves

Four examples of this class were recovered, weighing 24.2g (Fig 228, nos 136, 137). They were all variable in form. Three pieces were small (30–50mm long), with bifacial, invasive retouch, but larger than the unfinished leaf arrowheads (see above). The only other laurel leaf was an incomplete example (Fig 228, no 137) from the upper ditch fills, whose transverse break is characteristic of those caused during the manufacture of bifacial implements (Mark Edmonds personal communication).

Fabricators

A total of six fabricators was found, weighing 83.1g (Fig 229, nos 138–140). These are thick, elongated flakes with crude retouch on both lateral edges. This retouch is either unifacial or bifacial and leads to an abraded and/or rounded point on the distal end. All the fabricators were derived from mixed contexts, either the upper layers of the enclosure ditch or the buried soil. As such, none was necessarily associated with the Middle Neolithic occupation of the site.

Rods

Three rods were found, weighing 16.8g. This small group of artefacts consisted of small, thick flakes with crude, bifacial retouch on both edges. As with the fabricators, none of these pieces was found in demonstrably Middle Neolithic deposits.

Polished flint axe fragments

A total of 20 polished flint axe fragments was found, weighing 148.9g (Fig 229, nos 141–148). These artefacts could be arranged in four groups:

1 Grooved Ware pits F14 and F1054 produced three flakes. The two from F14 were possibly from the same axe on the basis of their colour; one of these (Fig 229, no 148) was produced accidentally as a result of use of the axe edge (Olausson 1983).

2 Two fragments were from the buried soil; one was subsequently made into a transverse arrowhead.

3 The tertiary fills of enclosure ditch segment 1 between sections 3 and 5 produced six flakes, two of which were accidental spalls off the tip of an axe (Fig 229, no 147). All these pieces were made from a distinctive orange-brown flint that was scarce within the assemblage as a whole. This suggests that these were likely to be the result of the use and reflaking of a single axe.

4 This group consisted of nine flakes made of a creamy-white flint with many medium-grained inclusions. The only other artefact made of this flint was a transverse arrowhead from F14 (Fig 228, no 123). These axe flakes derived from four contexts:

a Tertiary filling of enclosure ditch segment 13 between section 228 and causeway M: one flake (Fig 229, no 145).

b Tertiary filling (layers 1 and 2) of enclosure ditch segment 12 between section 227 and causeway M: six flakes, two of which conjoined (Fig 229, nos 141–144).

c Pit F866: one flake (Fig 229, no 146).

d Pit F746: one flake.

These nine flakes were all much larger than those from the other contexts, and none were accidental spalls off an axe tip. This, along with the lack of secondary use of the flakes, may indicate that these pieces derived from the deliberate flaking of a single axe. The dating of this episode would appear to post-date the last recut of the enclosure ditch, but was contemporary with the main use of the interior, since the examples from F746 and F866 were both associated with non-residual Mildenhall pottery.

With the exception of the two flakes from the interior pits F746 and F866, none of the polished flint axe material appears to be related to the Middle Neolithic use of the site. This is particularly surprising given the extensive woodworking debris from the enclosure ditch in Phase 1 and the polissoir from F786 (Fig 239). The lack of evidence for axe manufacture, including a paucity of thinning flakes, may suggest that the polissoir was associated with resharpening, rather than initial polishing.

Other polished implements

The single example in this category (Fig 229, no 149) was a finely made, partially polished blade, weighing 5g. It had a faceted platform and parallel sides. Locally, a parallel can be found in an example from Etton Woodgate (Middleton forthcoming). Similar examples in the 'Macehead Complex' of northern England (Manby 1974, 86–90) may suggest a Late Neolithic date for both pieces.

Unclassified retouched pieces

A total of 29 unclassified retouched pieces was found, weighing 274.9g (Fig 229, nos 150–154). This was a broad group covering pieces that could not be classified under the categories outlined above. Most were flake fragments with signs of retouch, while other complete examples included a single uniface (Fig 6.11, 150) and two bifaces (Fig 229, nos 151, 152). None came from readily datable contexts.

Discussion

This discussion will focus on three aspects of the Etton lithic assemblage: the typological and technological

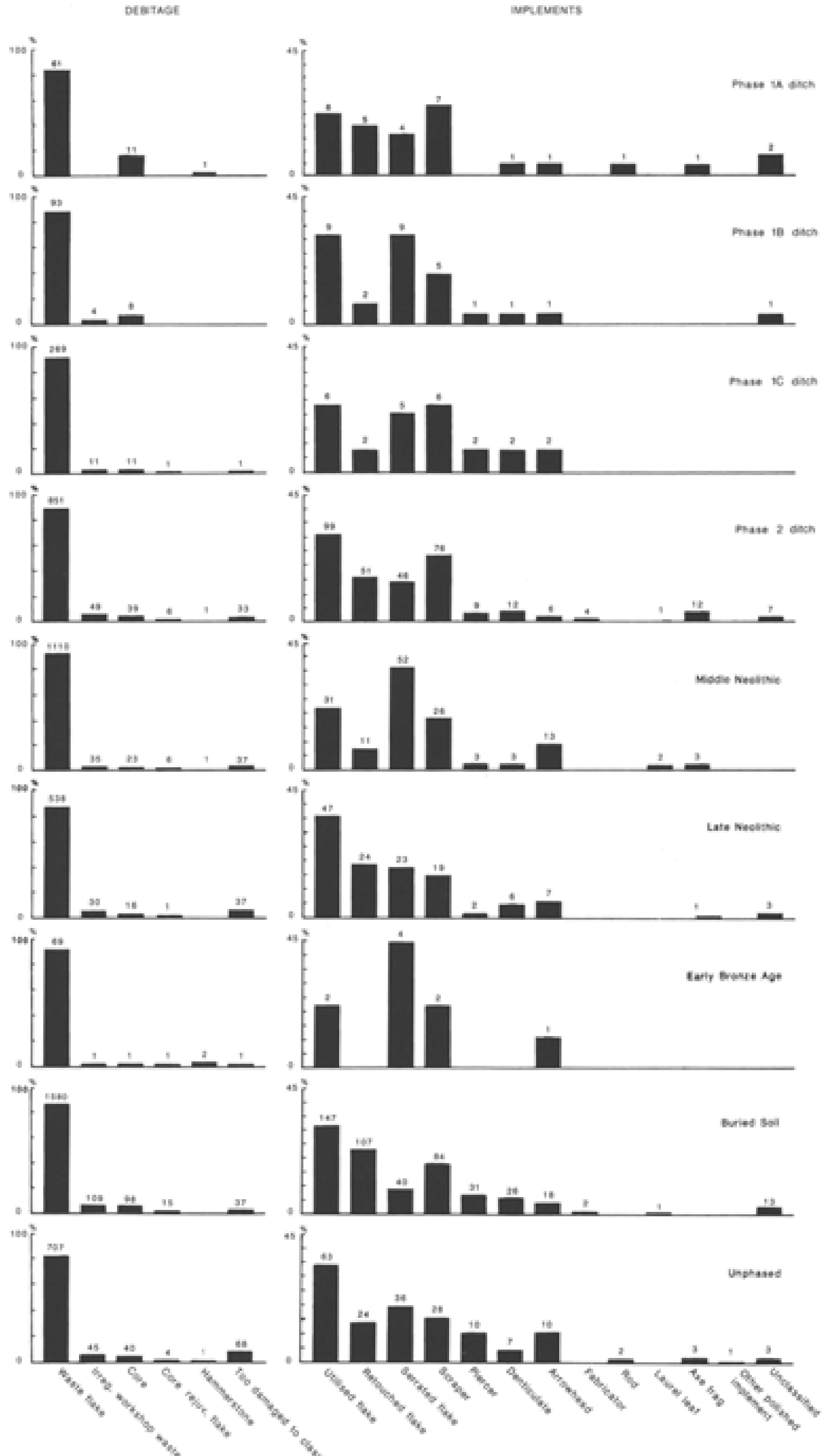


Fig 217 Occurrence of all flint types by phase from the enclosure ditch and interior features

Table 51 Comparative typology per 1000 waste flakes

	scrapers	*serrated flakes*	*piercers*	*denticulates*	*fabricators*	*laurel leaves*	*axes*	*leaf arrowheads*
Etton	48.0	43.0	11.0	11.0	1.1	0.8	8.0	5.9
Briar Hill	113.8	52.2	21.4	2.5	1.3	0.6	10.7	7.5
Staines (ditches)	24.2	30.9	5.1	–	0.5	4.6	4.0	1.1
Abingdon	39.9	65.3	1.2	–	0.5	1.2	0.4	4.1
Carn Brea	6.5	0.1	4.3	–	–	–	4.3	36.9
Spong Hill	22.8	8.1	2.2	1.1	0.8	–	2.0	0.6
Hurst Fen (sample)	23.5	24.5	0.6	–	0.3	1.6	0.2	2.3
Broome Heath	28.4	0.3	0.4	–	–	0.4	3.1	0.8
Bishopstone (all Neolithic pits)	15.9	36.2	0.7	–	–	–	2.9	1.4
Hemp Knoll	22.0	76.9	2.6	–	–	–	0.5	–

affinities with assemblages from other sites, evidence for raw material exploitation, and use and modes of deposition across the site.

The Etton assemblage fits well within the earlier Neolithic flint industries of southern England outlined by Whittle (1977, 62–73) and Healey and Robertson-Mackay (1983). Despite their apparent homogeneity, a number of differences are apparent in typology and technology.

Typology

A phase-by-phase summary of the changing composition of the flint assemblage is given in Figure 217. However, in order to standardise typological data for comparative purposes, the number of each implement type per 1000 waste flakes has been calculated for a variety of contemporary sites (Table 51). The data were derived from Bamford (1985), Healey and Robertson-Mackay (1983), modified after Healey and Robertson-Mackay (1987), and Healy (1988). Utilised and retouched flakes have been omitted due to the proliferation of descriptive terms used in the different reports.

This analysis established that the Etton assemblage is broadly consistent with the other enclosure sites, being dominated by scrapers and serrated flakes. It differs from the other enclosure assemblages only in the large number of denticulates, which may be due to contamination from Bronze Age denticulate- and point-dominated industries of the area (Pryor 1985, 161). The higher ratio of implements to waste flakes for the enclosure sites may have implications for the import and export of finished implements (see below).

Technology

The most commonly used, and hence most appropriate, comparative measure of overall flake technology is flake breadth:length ratios. The Etton data (Fig 218) show the now-familiar trend for a reduction in the number of blades, associated with a rise in the number of broad flakes through time, from the later Mesolithic to the Bronze Age (Ford 1987; Pitts 1978).

The Etton contexts were consistent in their composition, with each having relatively few blades compared to other, contemporary sites such as Briar Hill, but fewer broad flakes than those of the Late Neolithic. Figure 218 illustrates the complex relationship between waste flake shape and time; it also shows that other interrelated factors, such as technology, raw material availability, and implement production, were involved. Examination of the Welland valley gravels has suggested that suitable flint would have been freely available to prehistoric knappers. The study of the technology employed reveals a lack of features designed to conserve flint, including the production of crested blades, the use of soft hammers, and careful platform preparation (Bradley *et al* 1984, 109). Allied to this strategy may have been the lack of need for blade production to conserve raw material (Bradley 1987; Schofield 1986).

Another factor pertaining to blade production is that their occurrence in assemblages is in direct proportion to the implements – serrated flakes made on blade blanks. This implies that blades may have been produced solely as blanks for serrated flake production and that the complete, unretouched blades in the assemblage could be those unsuitable for further retouch. It is unlikely that there was such a simple causal relationship, which negates the stylistic importance that blades may have had. It may also undervalue the role of blades in unretouched form. The importance of the production of blades as serrated flake blanks may, however, account for their relatively large numbers on Middle Neolithic sites and for the decline in blade production in the Late Neolithic as serrated flakes become reduced in importance. This is particularly important at Etton where many other traits within the lithic assemblage were retained in the later Neolithic.

In summary, the availability of raw material, combined with the importance of serrated flakes, suggests that the relatively small number of blades may be mainly the by-products of serrated flake manufacture. This indicates that blades may not have been important in their own right nor substantially used in their unretouched state.

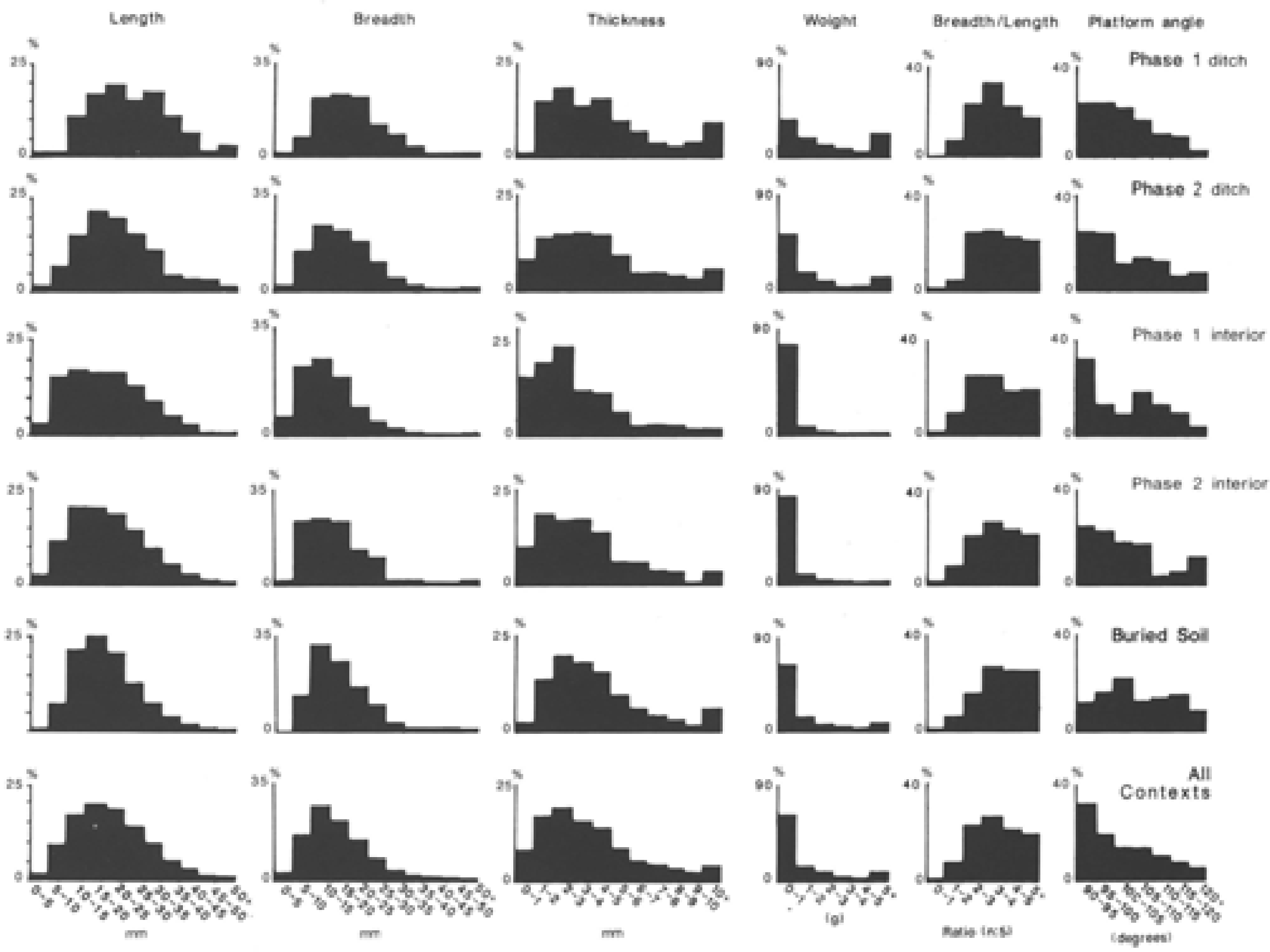


Fig 218 Dimensions, weights, and breadth:length ratios of all complete waste flakes (by phase)

Raw material exploitation and use

The evidence from the analysis of the raw material type and morphology suggests that all the lithic artefacts were the product of material collected from the local area. Although flint cannot be sourced to one particular location within that area, the lack of contemporary flintwork from the landscape around the enclosure (Middleton forthcoming) and from other excavations in the locality (for example, Maxey: Pryor and French 1985) would suggest that flintworking was exclusively undertaken within the boundaries of the site. The question to be resolved is: how much of the finished material was made on site and how much was imported in a finished or part-finished state? The analysis of the assemblage revealed that the whole core reduction sequence was present, although unworked flint nodules and hammerstones were substantially under-represented. The lack of hammerstones may have been due to the use of flint nodules prior to their reworking into cores.

The complete absence of unworked material from the excavations, however, needs further explanation, given the abundance of raw material and the lack of conservation strategies employed in the technology. Although it is difficult to be certain, unworked nodules may have been removed after the seasonal abandonment of the site. This would imply that at least part of the annual movements of the population involved going to areas where flint was difficult to obtain, including the limestone uplands to the west and other areas away from the river terrace gravels of the fen edge.

The relatively high numbers of implements, coupled with a ready supply of raw material and substantial flintworking evidence, implies that causewayed enclosures acted as foci for both the manufacture and discard of implements. If this is the case, then it may have formed an important component in the overall function of the monument. Thus raw material exploitation may have been a determinant in the position of the monument within the landscape.

Deposition

Methods of analysis

In order to examine the distribution of lithic material from different stratigraphic contexts, four methods were used:

Table 52 Flints from the enclosure ditch (by phase)

	Phase 1A		Phase 1B		Phase 1C		Phase 2	
	numbers	*weight (g)*	*numbers*	*weight (g)*	*numbers*	*weight (g)*	*numbers*	*weight (g)*
by-products								
waste flakes	61	191.1	93	255.9	269	720.3	851	2093.4
iregular workshop waste	–	–	4	17.9	11	195.9	49	537.0
cores	11	381.5	8	118.3	11	267.5	39	1009.7
core rejuvenation flakes	–	–	–	–	1	1.1	6	35.7
hammerstones	1	405.0	–	–	–	–	1	35.0
too damaged	–	–	–	–	1	2.2	33	90.6
totals	73	977.6	105	392.1	293	1187.0	979	3801.4
implements								
utilised flakes	6	15.1	9	49.5	6	33.7	99	560.9
retouched flakes	5	59.0	2	7.9	2	21.9	51	363.7
serrated flakes	4	9.0	9	32.1	5	18.4	46	244.8
scrapers	7	116.2	5	62.1	6	41.9	76	732.8
piercers	–	–	1	1.0	2	7.2	9	49.9
denticulates	1	18.5	1	19.5	2	1.6	12	182.0
arrowheads	1	1.9	1	6.9	2	6.6	6	22.1
rods	1	4.8	–	–	–	–	3	37.3
laurel leaves	–	–	–	–	–	–	1	13.0
axes	1	1.0	–	–	–	–	12	127.3
unclassified	2	53.0	1	8.8	–	–	7	84.9
totals	28	219.7	29	187.8	25	131.3	322	2418.7

1 A chi-squared analysis was undertaken for each implement type to examine the contribution of each context to the overall typology. The null hypothesis was that each context contained the same artefact proportions as the whole assemblage, suggesting, if true, that all deposits received material from a homogeneous assemblage that did not change through time. This analysis revealed whether particular contexts contained more or less of a particular type than expected from the site typology. Because of the small numbers of artefacts present in some cases, a number of constraints were placed upon the analysis (Thomas 1976, 298):
   a Enclosure ditch Phase 1 deposits were grouped together.
   b Early Bronze Age features were excluded.
   c Artefact types that only occurred in low numbers were eliminated.
2 Comparison of technological data was undertaken on secure contexts, thereby excluding the buried soil. The comparison used waste flake shape, waste flake typology, and core typology.
3 Percentage data on waste flake shape, implement:by-products ratio, and the number of burnt pieces were analysed by finding measurements that lay outside one standard deviation from the mean. This was done in order to locate outliers.
4 The number of flint artefacts in the enclosure ditch were plotted on the basis of total weight of flint per 4m excavated section. These figures were divided into the four phases where flints were present.

The results of this analysis are presented in Microfiche tables 43–47 and are discussed below.

Enclosure ditch

The Phase 1 deposits were very uniform in all facets, with the exception of the low implement:by-products ratio in Phase 1C. This, and the larger number of flint artefacts from this phase, are attributable to the large number of waste flakes in the ditch between section 252 and causeway O (layer 2). This concentration, however, was not in a primary position within the recut and so may be later than Phase 1C.

Phase 1 contexts were not contaminated by post-Middle Neolithic material, as indicated by the lack of transverse arrowheads and thumbnail scrapers (Table 52). The relatively large size of the pieces is probably due to the lack of post-depositional attrition compared, for example, to exposed contexts such as the buried soil. A second factor was the lack of dressing chips relative to the other contexts – despite a significant number of cores being present, indicating knapping in the vicinity of the ditch. This may suggest that the ditch itself was deliberately kept free of flint debris, evidence for which is shown in the overall paucity of material (despite careful excavation methods) and in the lack of implements associated with the contemporary woodworking, notably axe flakes.

The distributional data indicate a change in the mode of deposition between Phases 1A/1B and 1C. In the former, a small amount of flint was evenly distributed in the enclosure ditch. The small concentration

Table 53 Flints from the interior (by phase)

	Middle Neolithic (Phases 1A–1C)		Late Neolithic (Phase 2)		Early Bronze Age (Phase 3)		buried soil	
	numbers	*weight (g)*	*numbers*	*weight (g)*	*numbers*	*weight (g)*	*numbers*	*weight (g)*
by-products								
waste flakes	1110	1303.2	538	825.8	69	82.6	1580	2708.8
irregular workshop waste	35	272.0	30	194.7	1	1.0	109	653.1
cores	23	432.2	16	399.9	1	3.0	98	1835.5
core rejuvenation flakes	6	58.6	1	8.5	1	1.0	15	90.0
hammerstones	1	1.5	–	–	2	0.5	–	–
too damaged	37	35.2	37	19.2	1	0.9	37	47.5
totals	1212	2102.7	622	1448.1	75	89.0	1839	5334.9
implements								
utilised flakes	31	125.6	47	179.0	2	2.0	147	412.0
retouched flakes	11	107.0	24	89.7	–	–	107	373.1
serrated flakes	52	153.5	23	65.2	4	13.5	40	106.0
scrapers	26	232.8	19	118.2	2	8.2	84	444.9
piercers	3	20.2	2	11.5	–	–	31	122.1
denticulates	3	34.1	6	54.9	–	–	26	246.0
arrowheads	13	31.1	7	19.9	1	0.5	18	34.5
fabricators	–	–	–	–	–	–	1	9.0
rods	–	–	–	–	–	–	2	12.0
laurel leaves	2	5.7	–	–	–	–	1	5.5
axes	3	6.9	1	1.0	–	–	–	–
unclassified	–	–	3	16.8	–	–	13	88.5
totals	144	716.9	132	556.2	9	24.2	470	1853.6

between sections 241 and 245 represents a diffuse cluster of flints in the upper Phase 1B deposits, some or all of which may belong within Phase 1C. In this phase there was a marked change in depositional strategy, with a concentration of material in the north-east quadrant of the site, associated with large amounts of other cultural material.

Phase 2 was represented by uppermost ditch deposits that developed slowly after the last recut of Phase 1C. The mixed nature of this material is reflected in its typology (leaf and transverse arrowheads and thumbnail scrapers), suggesting that artefacts from the Late Neolithic and Bronze Age use of the site collected in the largely filled-in ditch. This change in the use of the ditch is reflected both in the larger numbers of artefacts present and in the patterning, which does not respect that of the preceding phase. This implies that, although the ditch was no longer used for the formal disposal of artefacts, extensive activity within the enclosure resulted in ad hoc deposition.

Interior features

In terms of typology, the Middle Neolithic features presented the greatest divergence from the remainder of the assemblage (Table 53). Finely made implements, particularly serrated flakes and arrowheads, were preferentially deposited, with fewer cores and simple artefacts, notably retouched flakes and, to a lesser extent, utilised flakes.

The technological analysis revealed that all stages of the knapping sequence were present, including large numbers of dressing chips (recovered through wet sieving). This has had the effect of reducing the average size of the material in relation to other contexts. The relatively high proportion of burnt material fits with the general character of some of the pits containing quantities of comminuted charcoal.

The assemblage from the Late Neolithic pits did not diverge from the overall typology significantly. The presence of serrated flakes, the numbers of which decline in post-Middle Neolithic contexts (Saville 1981, 144), may suggest a degree of continuity with earlier activities. Their reduced importance, however, and the decrease in the proportion of burnt material, coupled with an increase in the number of retouched and utilised flakes, suggest a marked change.

Buried soil

A number of factors indicate that the buried soil contained an assemblage far more mixed than those from the other contexts: greater numbers of points, denticulates, and retouched flakes associated with the significant lack of serrated flakes and broad flakes. These characteristics are shared with local Early Bronze Age assemblages (Pryor 1982), suggesting that a major component of the buried soil material may be of this date.

The archaeological evidence indicates that the enclosure was largely invisible in the Early Bronze Age and that the area was probably undistinguished from the surrounding landscape. It is likely, therefore, that the enclosure was covered with the same uniform distribution of Early Bronze Age material, which has become mixed with earlier material (ibid, 134; Taylor 1985a). As such, it is possible to derive an approximate figure for the Early Bronze Age contribution to the buried soil assemblage. The ploughsoil of the Maxey excavation (Crowther and Pryor 1985) and the Barnack/Bainton excavation (Taylor and Pryor 1985) revealed an even scatter of about 28–60 pieces per hectare. Extrapolated directly to Etton (*c* 1ha in extent), then the Early Bronze Age component would be between 28 and 58 pieces. This probably represents an underestimate, given the degree of Early Bronze Age activity in the vicinity of, but not directly related to, the enclosure.

The overall distribution of the buried soil assemblage reveals an even scatter with no concentrations, a pattern further supported by the dry-sieving survey (Fig 77). It has been suggested that the Bronze Age component arrived through landscape-wide processes, possibly manuring (Pryor and French 1985, 305). The extrapolated figures presented above, however, suggest that most of the buried soil assemblage comprised Middle and Late Neolithic material, for which there was substantial evidence for on-site knapping. The absence of concentrations within the buried soil therefore requires explanation. The evidence from the interior features suggests that the flints within them may have derived from discrete activities undertaken elsewhere on site. It may be suggested, therefore, that knapping probably occurred on the buried soil, and the by-products of this process became incorporated into the filling of certain interior features, such as pits, ditches, and postholes.

The Neolithic flint assemblage

The analysis of the Etton flint assemblage has confirmed its importance in terms of characterising Middle Neolithic lithic assemblages from the western fen edge. It can be seen as a direct precursor to the local Late Neolithic and thence Bronze Age assemblages, which are locally (relatively) common. The major post-Middle Neolithic change is the relative decline in the importance of serrated flakes and a commensurate decline in blades, which were mainly produced as blanks. A slight decline in the quality of knapping was also observed.

At a wider scale, the profile of the assemblage can be seen to fit with other enclosure assemblages in overall composition, notably Briar Hill. However, significant technological differences were observed that may reflect the relative importance of blades and serrated flakes at the individual site level. The relatively high numbers of implements at Etton highlight a contrast between assemblages from enclosures and from open sites that may reflect the importance of the former in implement production and use. This is also reflected in the exploitation of the local gravels for workable flint, the relative abundance of which may have provided a source of flint for the annual movement of the enclosure users, some possibly from areas devoid of usable flint. The availability of flint may therefore have been one factor in the importance attached to river valleys by early farming communities for settlement and monument construction.

Detailed intra-site analysis of the assemblage has confirmed the hopes expressed during excavation that the excellent preservation of interior features would permit a diachronic study of deposition patterns. This revealed a major break between Phases 1A and 1B, where the enclosure and its ditches were largely 'cleaned' and kept free of flint debris, and Phase 1C, where relatively large quantities of flint were placed both in the enclosure ditch and interior features. This may have been partially due to the increased use of the site for flint working, the debris of which accumulated on the buried soil, to become incorporated within features of the interior.

Analysis of subsequent phases has demonstrated unstructured deposition in the upper ditch fills, indicating the continued use of the site in the Late Neolithic and Early Bronze Age. The evidence from the buried soil for the latter period suggests that the enclosure was not demarcated and was subjected to landscape-wide depositional processes.

Catalogue of the illustrated flints

The catalogue entries include the feature number (such as F201) and layer number. For F1 (the enclosure ditch), section numbers and causeway letters are also given: most sections are shown in Figure 11. The site grid reference is also given and finally the individual flint number.

Figure 219: cores

1 Type A1. Weight 13g. F1, causeway C–35, layer 1. Grid 37667340. Flint 1933.

2 Type A1. Weight 65g. F1, sections 64–65, layer 3. Grid 37887384. Flint 2519.

3 Type A2. Weight 16g. Buried soil. Grid 38237408. Flint 2579.

4 Type A2. Weight 35g. F789, layer 1. Grid 38977390. Flint 7661.

5 Type A2. Weight 74.9g. F763, layer 1. Grid 38927363. Flint 7942.

6 Type C. Weight 22.5g. F1, sections 162–166, layer 1. Grid 38677431. Flint 4181.

7 Type C. Weight 32.5g. Buried soil. Grid 38717402. Flint 4992.

8 Type B1. Weight 34g. F1, sections 113–116, layer 1. Grid 38187409. Flint 3164.

9 Type B1. Weight 11g. F201. Grid 38847364. Flint 4897.

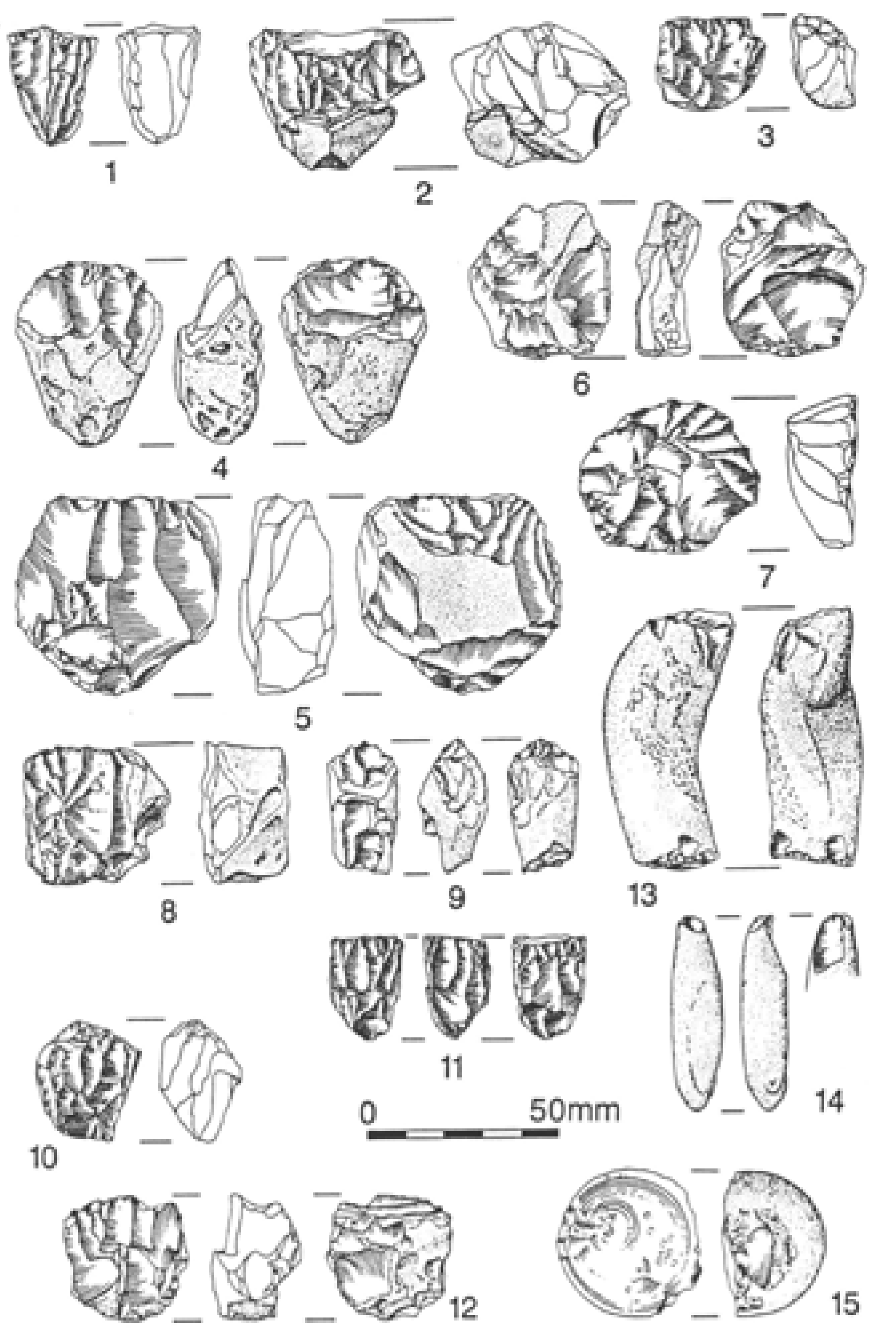


Fig 219 Flint cores

10 Type B1. Weight 9g. F1, section 16–causeway B, layer 4. Flint 1502.

11 Type B1. Weight 10g. F1, sections 119–124. Grid 38217413. Flint 3939.

12 Type B3. Weight 22g. F1, sections 142–146. Grid 38387423. Flint 4017.

13 Pebble core. Weight 73.5g. F318, layer 1. Grid 38957345. Flint 5867.

14 Pebble core. Weight 12.2g. F779, layer 1. Grid 38957383. Flint 7658.

15 Pebble core. Weight 45.7g. F1, sections 3–4, layer 1. Grid 37867291. Flint 820.

Figure 220: core rejuvenation flakes, hammerstones, and utlised flakes

Core rejuvenation flakes

16 Core recovery flake. Weight 6g. F1, sections 113–119, layer 1. Grid 38197412. Flint 3180.

17 Core tablet. Weight 13.1g. F836, layer 1. Grid 39097383. Flint 7816.

Hammerstones

18 Hammerstone fragment. Weight 12.3g. F1, sections 4–5, layer 0. Grid 37837293. Flint 310.

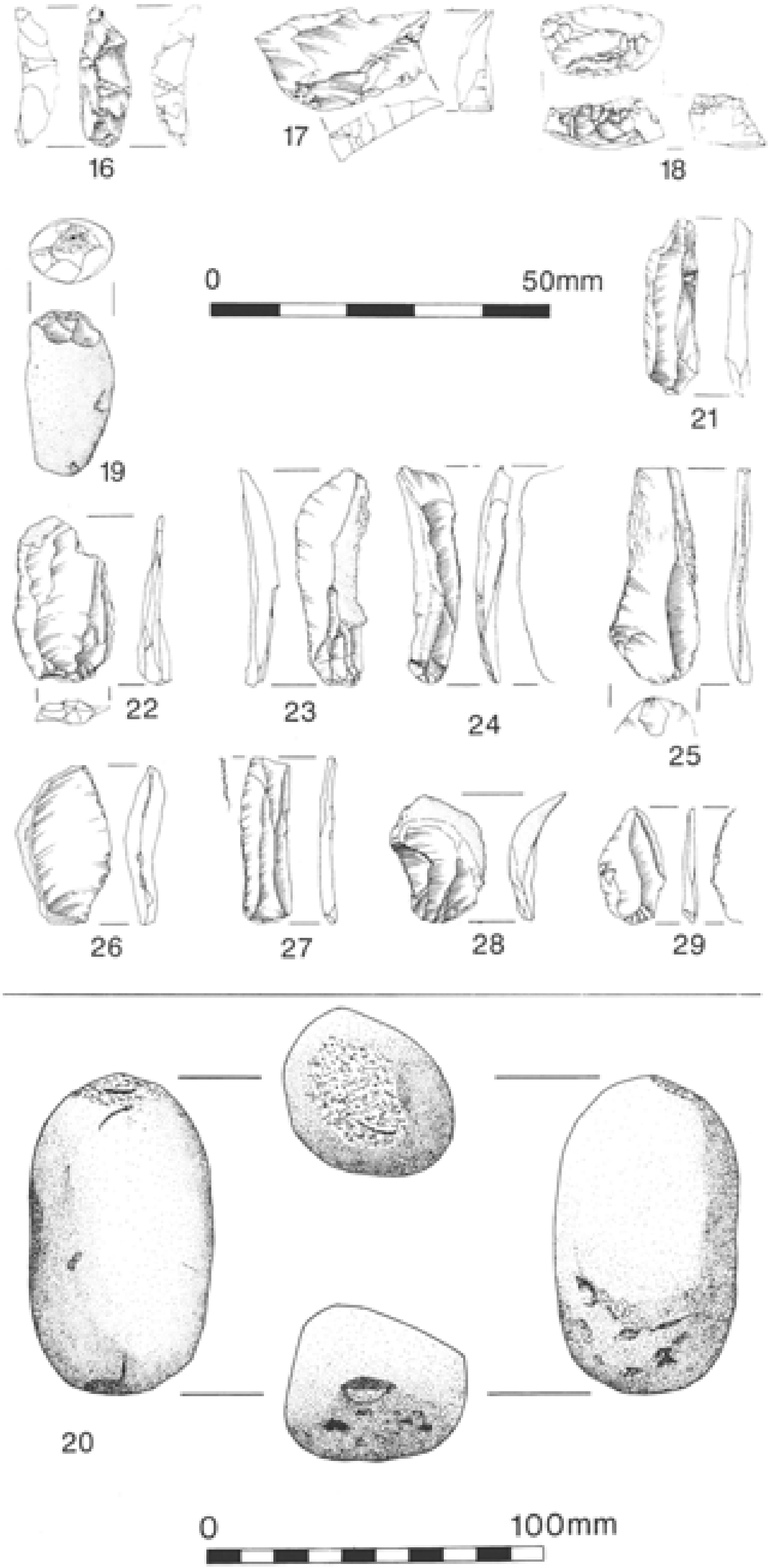


Fig 220 Flint core rejuvenation flakes (16, 17), hammerstones (18–20), and utilised flakes (21–29). Note the scale of no 20

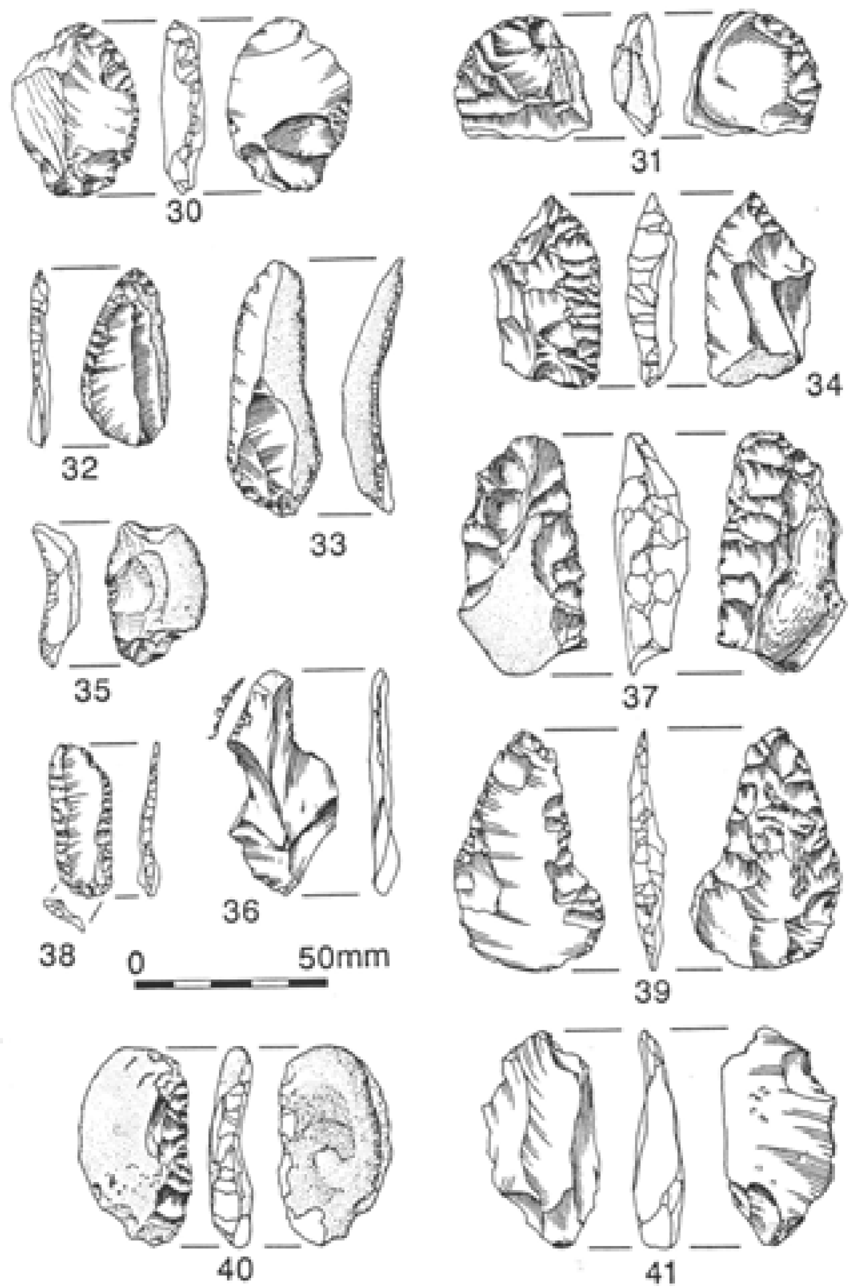


Fig 221 Flint retouched flakes

19 Weight 35g. F1, sections 146–150, layer 1. Grid 38417427. Flint 3878.

20 Weight unrecorded. F981, layer 1. Grid 38147377. No Flint number.

Utilised flakes

21 Weight 4g. F1, sections 125–135, layer 1. Grid 38287416. Flint 3968.

22 Weight 8g. F1, sections 119–124, layer 1. Grid 38217412. Flint 3941.

23 Weight 8g. F1, sections 146–150, layer 1. Grid 38417427. Flint 3877.

24 Weight 8g. Buried soil. Grid 38907400. Flint 5203.

25 Weight 8.5g. Buried soil. Grid 38757335. Flint 7163.

26 Weight 9.5g. F1, at section 166, layer 1. Grid 38697433. Flint 4173.

27 Weight 2g. Buried soil. Grid 38397410. Flint 2849.

28 Weight 7g. F981, layer 1. Grid 38137376. Flint 6586.

29 Weight 1.5g. F981, layer 1. Grid 38137376. Flint 6576.

Figure 221: retouched flakes

30 Weight 15g. F1, sections 4–5, layer 0. Grid 37857294. Flint 544.

31 Weight 12g. Buried soil. Grid 38697420. Flint 4667.

32 Weight 3g. F1, sections 137-139, layer 1. Grid 38547419. Flint 2786.

33 Weight 10g. F1, sections 60–64, layer 2. Grid 37867383. Flint 2315.

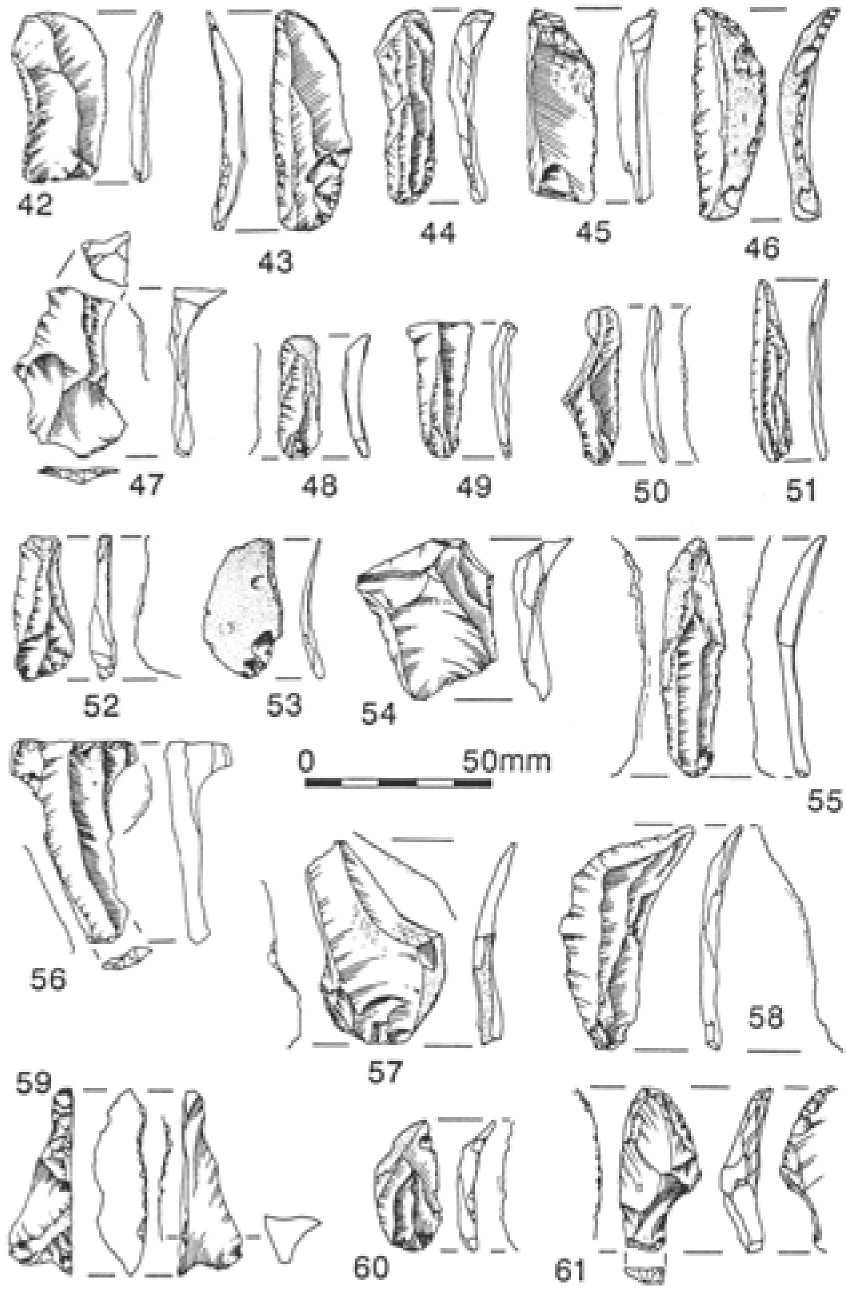


Fig 222 Flint serrated flakes

34 Weight 16g. F1, sections 85–89, layer 1. Grid 38047400. Flint 2319.

35 Weight 7g. F746, layer 1. Grid 38867416. Flint 6486.

36 Weight 6g. F238, layer 1. Grid 38467409. Flint 3711.

37 Weight 31g. F1, sections 146–150, layer 1. Grid 38427427. Flint 3885.

38 Weight 2.3g. F1, sections 234–238, layer 6. Grid 39447345. Flint 7348.

39 Weight 13.6g. F1, section 227–causeway M, layer 2. Grid 39367363. Flint 7367.

40 Weight 18.8g. F1, causeway H–section199, layer 3. Grid 39027420. Flint 6378.

41 Weight 18.2g. F1, sections 229–233, layer 4. Grid 39437349. Flint 7303.

Figure 222: serrated flakes

42 Weight 5.4g. F1, sections 4–5, layer 0. Grid 37847294. Flint 345.

43 Weight 7.2g. F1, sections 4–5, layer 0. Grid 37857294. Flint 542.

44 Weight 4.5g. Buried soil. Grid 38817394. Flint 5372.

45 Weight 8.4g. F1, sections 4–5, layer 0. Grid 37837293. Flint 561.

46 Weight 8.7g. F1, sections 5–6, layer 1. Grid 37797296. Flint 111.

47 Weight 5.8g. F839, layer 1. Grid 39097388. Flint 7806.

48 Weight 1g. Buried soil. Grid 38637385. Flint 2913.

49 Weight 2.3g. F229, layer 1. Grid 38447401. Flint 8828.

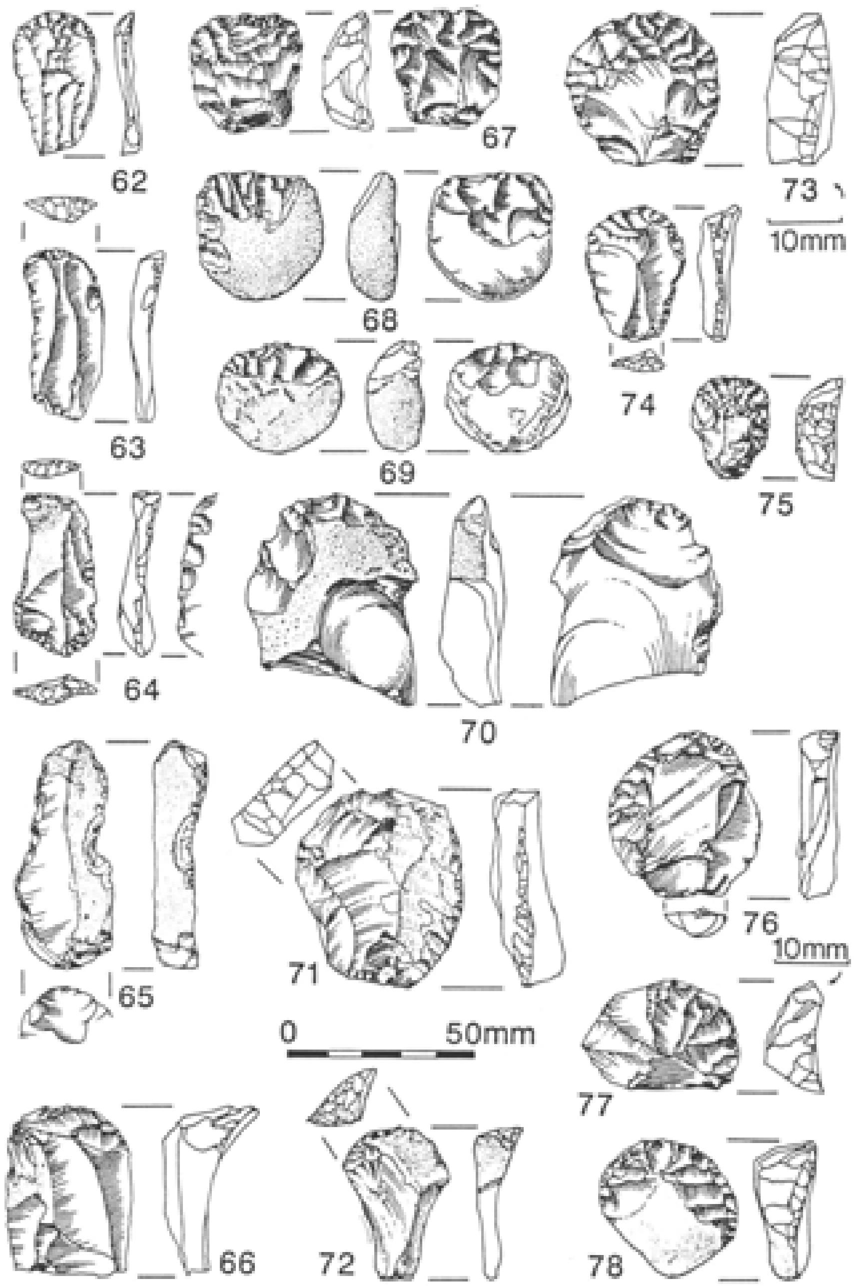


Fig 223 Flint scrapers

50 Weight 1g. F313, layer 1. Grid 38447420. Flint 2705.

51 Weight 1.2g. F836, layer 1. Grid 39097383. Flint 7815.

52 Weight 2.5g. F1, causeway C–section 35, layer 3. Grid 37667340. Flint 2116.

53 Weight 0.5g. F505, layer 1. Grid 38447419. Flint 2763.

54 Weight 1g. F836, layer 1. Grid 38097383. Flint 7814.

55 Weight 4.5g. F318, layer 1. Grid 38467382. Flint 2659.

56 Weight 10.5g. F1, sections 75–79, layer 1. Grid 37957393. Flint 2512.

57 Weight 9g. F1, sections 140–145, layer 1. Grid 38377422. Flint 4021.

58 Weight 6.6g. F836, layer 1. Grid 39097383. Flint 7817.

59 Serrated flake on core recovery flake. Weight 6g. F247, layer 1. Grid 38427416. Flint 2290.

60 Weight 1g. F630, layer 1. Grid 3825/7392. Flint 3048.

61 Serrated flake/scraper type A2. Weight 7.8g. F1, sections 206–207A, layer 6. Grid 39197397. Flint 7654.

Figure 223: scrapers

Type A1

62 Weight 4g. Buried soil. Grid 38107382. Flint 2911.

63 Weight 6g. Buried soil. Grid 38307409. Flint 3139.

64 Weight 5.5g. Buried soil. Grid 38607410. Flint 4692.

65 Weight 15g. F839, layer 1. Grid 39107387. Flint 8456.

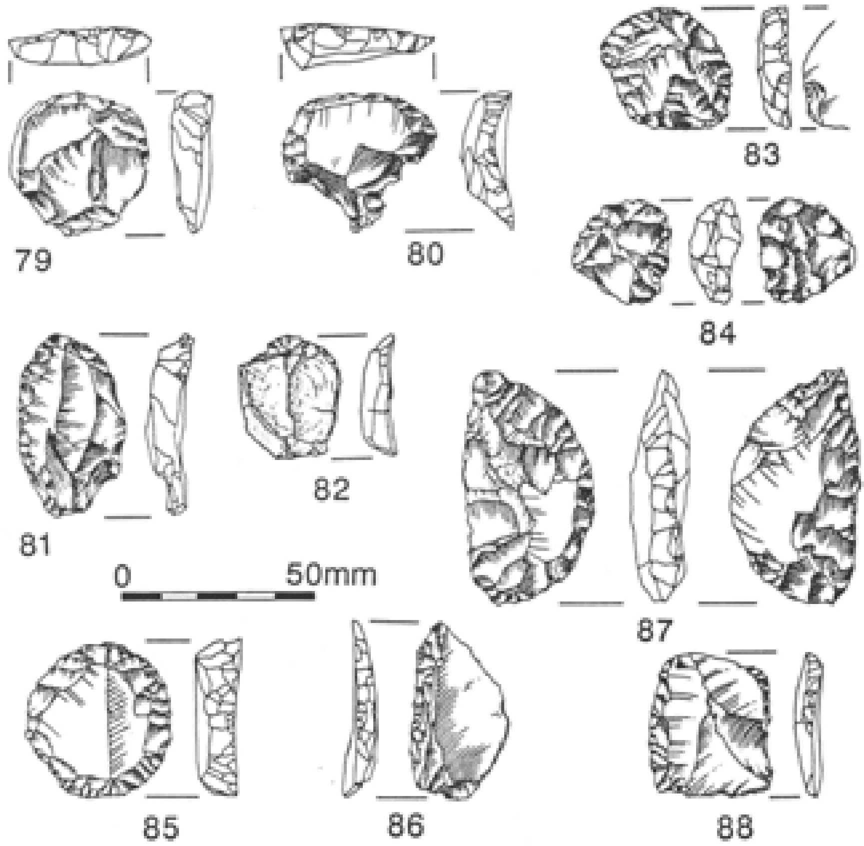


Fig 224 Flint scrapers

Type A2

66 Weight 26g. F1, sections 137–139, layer 1. Grid 38327418. Flint 3954.

67 With ventral retouch. Weight 13.5g. F1, sections 75–79, layer 1. Grid 37947392. Flint 2515.

68 With ventral retouch. Weight 30.2g. F1, sections 203–204, layer 2. Grid 39127408. Flint 5357.

69 With ventral retouch. Weight 16g. Buried soil. Grid 38507375. Flint 3683.

70 Weight 37.1g. F1, section 227–causeway M, layer 2. Grid 39367363. Flint 7366.

71 Weight 10g. F14, layer 1. Grid 37887298. Flint 1081.

72 Weight 8g. F259, layer 1. Grid 38517414. Flint 2864.

73 Weight 4.2g. F824, layer 1. Grid 39027367. Flint 7753.

74 Weight 7g. Buried soil. Grid 38207352. Flint 2965.

75 Weight 7.5g. F318, layer 1. Grid 38767359. Flint 5857.

76 Weight 20g. F239, layer 1. Grid 38497410. Flint 2863.

77 Weight 1g. F28, layer 1. Grid 37937298. Flint 727.

78 Weight 18.5g. F505, layer 1. Grid 38447428. Flint 2348.

Figure 224: scrapers

Type A2

79 Weight 15g. F286, layer 1. Grid 38187383. Flint 2871.

80 Weight 18g. F838, layer 1. Grid 39087386. Flint 5326.

81 Weight 12.5g. F866, layer 1. Grid 39157348. Flint 6410.

Type B2

82 Weight 7.4g. F1, sections 4–5, layer 0. Grid 37837295. Flint 584.

Type C

83 Weight 11.1g. F1, sections 5–6, layer 1. Grid 37797296. Flint 104.

84 With ventral retouch. Weight 8g. Buried soil. Grid 8587369. Flint 3580.

85 Weight 22g. Buried soil. Grid 38087341. Flint 6302.

Type D1

86 Weight 6g. Buried soil. Grid 38167395. Flint 2977.

87 Weight 4g. F254, layer 1. Grid 38547411. Flint 2233.

Type D2

88 Weight 11.5g. F1, causeway E–section 54, layer 2. Grid 37797371. Flint 2207.

Figure 225: piercers

89 Weight 0.6g. F1, sections 203–204, layer 2. Grid 39127408. Flint 5358.

90 Weight 2g. F1, section 209–causeway L, layer 1. Grid 39307381. Flint 5833.

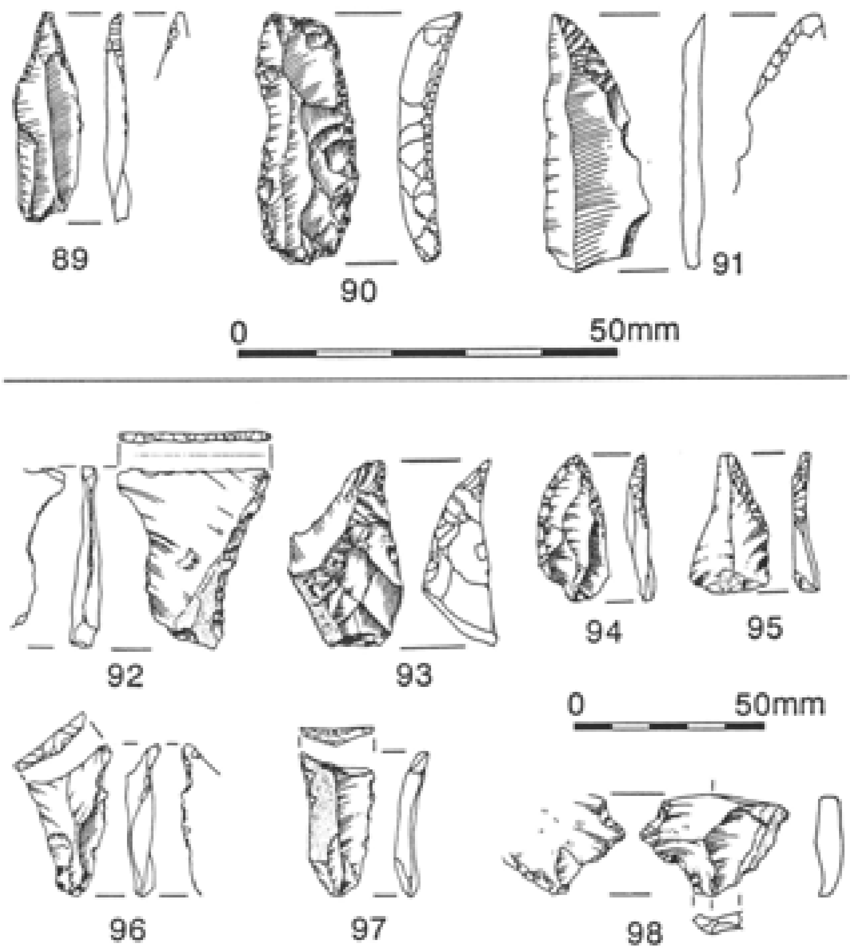


Fig 225 Flint piercers

91 Weight 1g. F1, section 227–causeway M, layer 5. Grid 39377363. Flint 7531.

92 Weight 8.7g. F1, section 207–causeway K, layer 1. Grid 39247392. Flint 5572.

93 On core recovery flake. Weight 20.1g. F1, section 252–causeway O, layer 1. Grid 39407320. Flint 7739.

94 Weight 3.6g. F1, section 252–causeway O, layer 1. Grid 39407318. Flint 8071.

95 Weight 2.8g. F301, layer 1. Grid 38227342. Flint 8977.

96 Weight 3g. Buried soil. Grid 38577373. Flint 2904.

97 Weight 2g. Buried soil. Grid 38417407. Flint 2855.

98 Weight 7g. F318, layer 1. Grid 38557377. Flint 2488.

Figure 226: denticulates

99 Weight 11g. F1, sections 176–177, layer 5. Grid 38797429. Flint 5582.

100 Weight 12g. F1, sections 176–177, layer 6. Grid 38797428. Flint 5595.

101 Weight 12g. Buried soil. Grid 39037343. Flint 4950.

102 Weight 18g. Buried soil. Grid 38847332. Flint 5047.

103 Weight 7g. Buried soil. Grid 38937394. Flint 5182.

104 Weight 11.5g. Buried soil. Grid 39337370. Flint 6072.

105 Weight 44g. Buried soil. Grid 38907364. Flint 5058.

Figure 227: arrowheads

Leaf

106 Type 1. Weight 1.6g. F940, layer 1. Grid 39307374. Flint 5784.

107 Type 1. Weight 2.5g. F379, layer 1. Grid 38657383. Flint 2262.

108 Type 2. Weight 0.5g. F698, layer 2. Grid 38737425. Flint 5912.

109 Type 2. Weight 1g. F275, layer 1. Grid 38557398. Flint 2868.

110 Type 3. Weight 1.5g. F361, layer 1. Grid 38537407. Flint 2639.

111 Type 3. Weight 0.5g. F644, layer 1. Grid 38647429. Flint 4149.

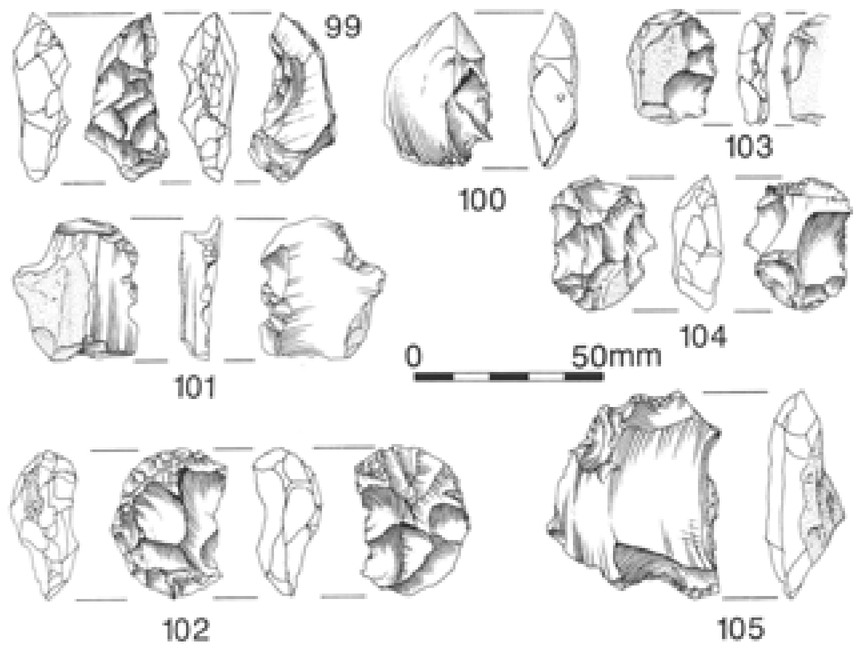


Fig 226 Flint denticulates

112 Type 4. Weight 1g. F1, sections 203–204, layer 2. Grid 39117409. Flint 5603.

113 Type 4. Weight 0.5g. F293, layer 1. Grid 38277358. Flint 3391.

114 Type 3. Weight 1.9g. F1, causeway M–section 228, layer 5. Grid 39417351. Flint 7409.

115 Type 2. Weight 0.7g. F746, layer 1. Grid 38867417. Flint 8407.

116 Type 4. Weight 1g. Buried soil. Grid 38457405. Flint 2912.

117 Type 4. Weight 1g. Buried soil. Grid 38127410. Flint 2890.

118 Leaf arrowhead – ?unfinished. Weight 3g. Buried soil. Grid 38477357. Flint 6393.

Transverse

119 Type C1. Weight 2.5g. Buried soil. Grid 39267380. Flint 7228.

120 Type C1. Weight 1.5g. F866, layer 1. Grid 39157348. Flint 6408.

121 Type C1. Weight 3g. Buried soil. Grid 38527406. Flint 3977.

122 Type A. Weight 6g. F14, layer 1. Grid 37887298. Flint 909.

Figure 228: arrowheads

Transverse

123 Type C2. Weight 1g. F14, layer 1. Grid 37887298. Flint 1093.

124 Type C2. Weight 5g. F1, sections 185–189, layer 5. Grid 38927424. Flint 5247.

125 Type C2. Weight 4.3g. F1, sections 222–226, layer 4. Grid 39367363. Flint 7521.

126 Type C2. Weight 3g. Buried soil. Grid 38477357. Flint 2909.

127 Type D. Weight 2.4g. F1, sections 7–8, layer 0. Grid 37757301. Flint 407.

128 Type D. Weight 5.5g. F1, sections 85–89, layer 1. Grid 38037402. Flint 2320.

129 Type H. Weight 3g. F1, sections 146–150, layer 1. Grid 8417425. Flint 3956.

130 Unclassifiable. Weight 2g. F318, layer 1. Grid 38557341. Flint 2487.

131 Unclassifiable. Weight 2.6g. F1054, layer 6. Grid 39137326. Flint 8650.

132 Weight 2g. F528, layer 1. Grid 38627351. Flint 2557.

133 ?Transverse arrowhead. Weight 3.8g. F1054, layer 3. Grid 39127326. Flint 7859.

Tanged

134 Weight 1.5g. F363, layer 1. Grid 38567401. Flint 2464.

135 Weight 1g. Buried soil. Grid 38487378. Flint 3996.

Laurel leaves

136 Weight 5.5g. Buried soil. Grid 38067377. Flint 4955.

137 Weight 13g. F1, sections 125–135, layer 1. Grid 38257416. Flint 4045.

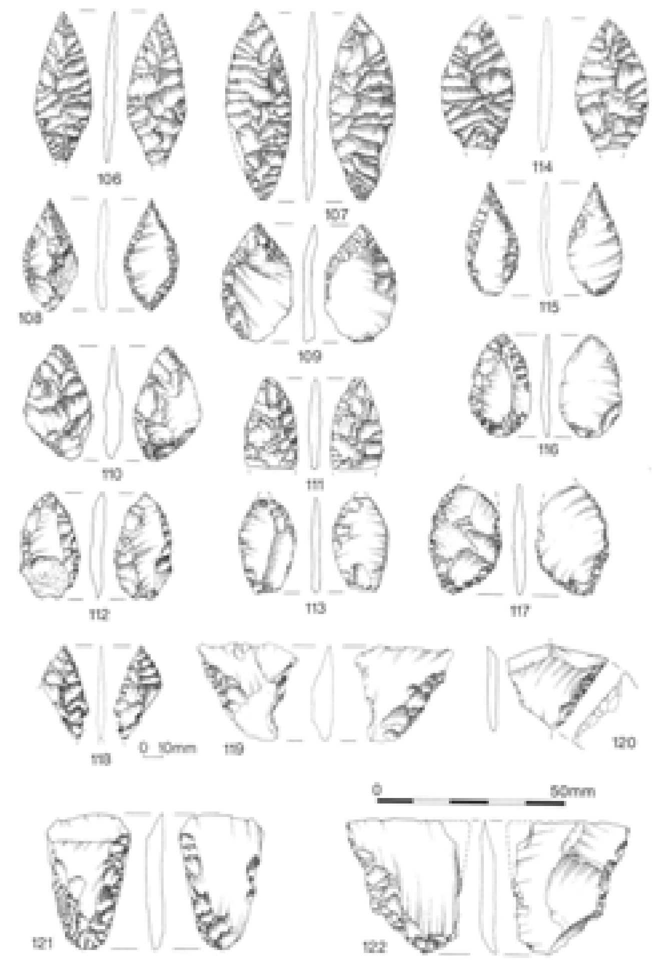


Fig 227 Flint leaf arrowheads (106–118) and transverse arrowheads (119–122)

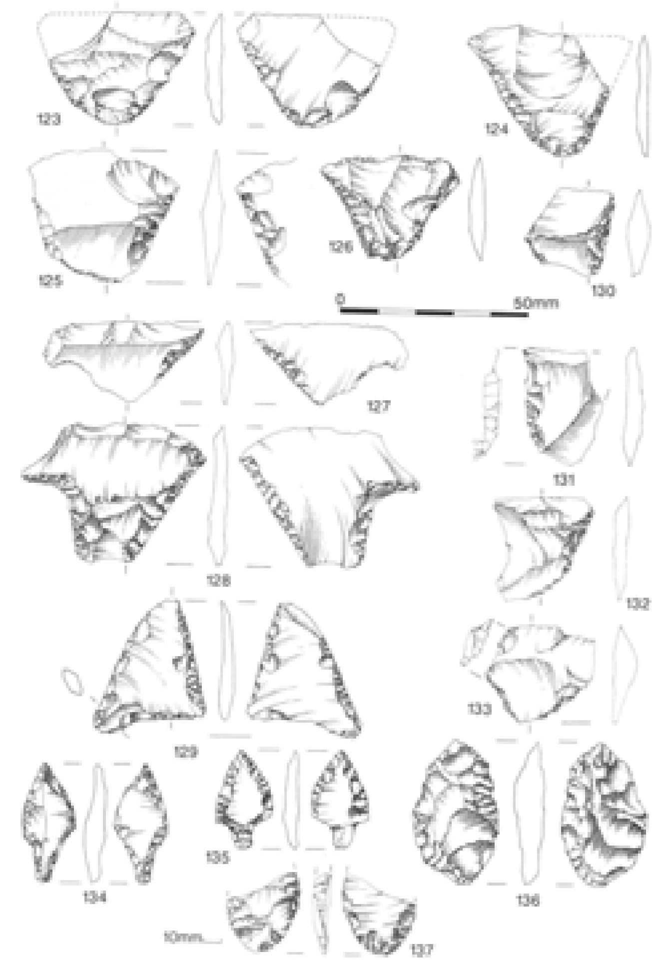


Fig 228 Flint transverse arrowheads (123–133), tanged arrowheads (134, 135), and laurel leaves (136, 137)

Figure 229: fabricators, polished implements, and unclassified implements

Fabricators

138 Weight 13.1g. F1, causeway M–section 228, layer 2. Grid 39437353. Flint 7393.

139 Weight 23g. F1, sections 140–145, layer 1. Grid 38387429. Flint 3963.

140 Weight 18g. F1, sections 107–110, layer 1. Grid 38177408. Flint 2606.

Flakes from polished flint axes

141 Weight 6g. F1, section 227–causeway M, layer 1. Grid 39387362. Flint 7432.

142 Weight 4g. F1, section 227–causeway M, layer 1. Grid 39367363. Flint 7427.

143 Conjoining. F1, section 227–causeway M, layer 1. Grid 39367362. Flint 7422 and 7434.

144 Weight 3.3g. F1, section 227–causeway M, layer 2. Grid 39377363. Flint 7445.

145 Weight 2.3g. F1, causeway M–section 228, layer 2. Grid 39427353. Flint 7398.

146 Weight 5.4g. F866, layer 1. Grid 39157348. Flint 8635.

147 Weight 3.6g. F1, sections 4–5, layer 0. Grid 37847294. Flint 565.

148 Weight 1g. F14, layer 1. Grid 37887298. Flint 1057.

Other polished implements

149 Polished blade. Weight 5g. F469, layer 1. Grid 38527393. Flint 2249.

Unclassified implements

150 Unifacially retouched implement. Weight 12g. F1, sections 116–118, layer 1. Grid 38207412. Flint 3193.

151 Bifacially retouched implement. Weight 17g. Buried soil. Grid 38587411. Flint 6876.

152 Bifacially retouched implement. Weight 9g. F1, sections 10–12, layer 0. Grid 37717307. Flint 628.

153 Retouched implement. Weight 9g. Buried soil. Grid 38977380. Flint 4349.

154 Bifacially retouched implement. Weight 19g. F1, sections 167–171, layer 2. Grid 38727432. Flint 5439.

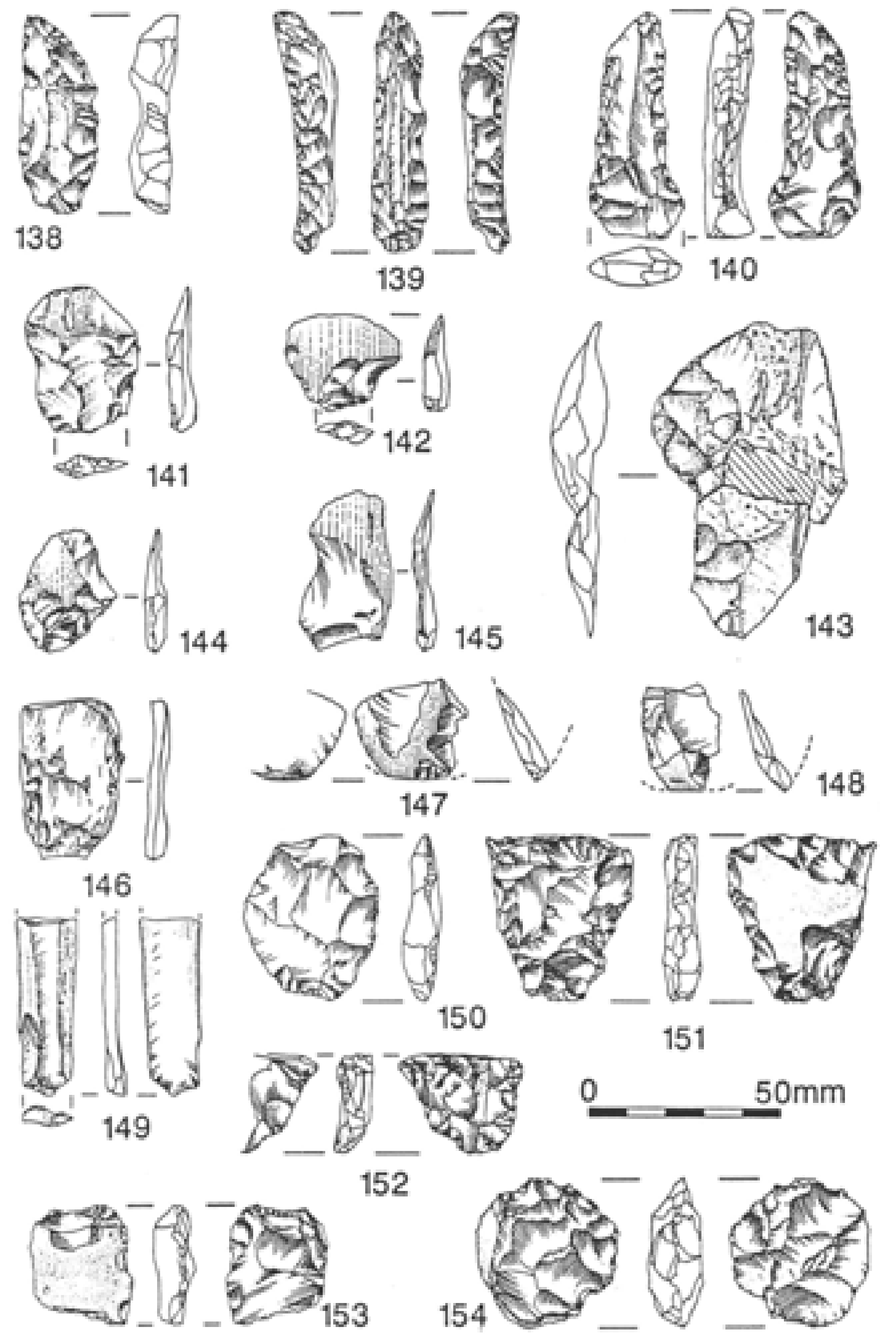


Fig 229 Flint fabricators (138–140), polished flint axe fragments (141–148), polished blade (149), and unclassified implements (150–154)

The distribution of flints in the enclosure ditch

by Francis Pryor

Introduction

Middleton's report above has concentrated upon typological and technological aspects of the flint/chert assemblage. The spatial patterning of this material is also of significance and will be considered below. The distributions to be discussed are based upon Middleton's archive database and upon his distribution lists, in Microfiche tables 43–48.

The western arc

Middleton has drawn attention to the distinction between the flint distributions of the eastern and western arcs of the enclosure ditch. The flints in the western arc, plotted in Figure 12, generally derived from secondary contexts, and very few indeed can be reliably

Fig 230 Plans of the distribution of flint implements and by-products in the ditch segment sections of the eastern arc, based on Microfiche tables 43–45: a, Phase 1A by-products; b, Phase 1C by-products; c, Phase 2 by-products; d, Phase 1A implements; e, Phase 1C implements; and f, Phase 2 implements

ascribed to Phase 1A/1B. The thin scatter of flints shows very few points of interest, apart from slight concentrations at the causeway D butt end of segment 3 and the causeway F butt end of segment 5. Of these, only the latter is at all convincing and coincides with concentrations of bone, pottery, and wood (Figs 12, 140). Causeway F is considered to have been a major entranceway. A corresponding cluster of flints occurred in segment 6, at the other side of this causeway (see below).

The eastern arc

The eastern arc presents a very different picture. The earliest Phase (1A) yielded very few flints indeed (Fig 230, a, d), and it is tempting to suggest that the deposition of flint within the enclosure ditch was actively excluded at this phase. This contrasts markedly with broadly contemporary assemblages in long barrow ditches, where flints were often deliberately deposited in primary contexts (Thomas 1991, 68). Middleton has demonstrated, however, that the situation was to change fundamentally in Phases 1C and 2: quite suddenly we find flint incorporated within deposits of these periods, and in considerable amounts.

Inspection of the detailed distribution plans shows that flint was integrated within the structured deposits of Phases 1C and 2 (for example, Figs 24, 36, 38, 39, 42–44, 46, 48, 51). Again, unlike long barrow ditches, there does not appear to have been extensive *in situ* flint knapping actually within the ditch (cf Pollard 1993, fig 10); the only possible exception is the small butt-end deposit in segment 14 at causeway O (Fig 230, b, e). Otherwise, the flint within the structured deposits included waste flakes and other by-products, but this material would appear to have been placed within the ditch (that is, it was not produced there), along with the pottery and bone. Its actual place of production could have been at Etton, but not necessarily so.

Robertson-Mackay's excavations at Staines demonstrated a clear tendency for flints to concentrate around butt ends (Robertson-Mackay 1987, figs 31–35), and a similar tendency was also visible at Etton. As at Staines, the butt-end concentrations did not always occur at both ends of a ditch segment, nor were they necessarily found on either side of a causeway, although this pattern can be observed in several instances at Staines. At Etton there was a pronounced concentration of Phase 1C flints in the original western butt end of segment 6 (later enlarged and disturbed by stream action), which formed the eastern side of the main entrance causeway F (Fig 230, b). A concentration, albeit much smaller, has already been noted above in segment 5, on the other side of the causeway. Other butt-end deposits of Phase 1C (Fig 230, b, e) occured in segments 8 (causeway H), 9 (causeway J), and 14 (causeway O). The latter, as we have seen, may have included *in situ* flint knapping.

If the relationship of implements to by-products in Phase 1C is examined for each segment, it soon becomes apparent that there are discrepancies (Fig 230, b, e). Within segment 6 there are many more by-products than implements, but in segment 7 the ratio is fairly even. In segments 8 and 9 the two patterns bear little relationship to each other. The pattern in the remaining five segments is, however, consistent. It is difficult to explain these divergencies from a consistent implement:by-products ratio in each segment other than to suggest that the flint assemblages in the various deposits may have derived from a number of quite different sources. In other words, the flints found in the enclosure ditch deposits do not just represent a selection from a single presumably intact assemblage: we are probabably looking at selections from a variety of different sources. Any statistical inferences, particularly as regards the ratio of implements to by-products, should therefore be made with very considerable caution, as we do not yet know the original selection criteria. The distinction between implement and by-products may have had no relevance at all.

The distribution of implements and by-products in deposits of Phase 2 (Fig 230, c, f) shows similar inconsistencies, but the numbers are higher than in the previous phase. Butt-end concentrations continued to be found. The major entrance causeway at M still continued to be marked by high concentrations of flint on either side, but other possible butt-end deposits were less obvious. The distribution is less markedly uneven, except for segment 7, which continued to contain virtually no flint whatsoever (as in Phases 1A and 1C).

The continuity exhibited by the flint distribution around causeway M and segment 8 illustrates that the rites that gave rise to certain patterns of distribution were long lived.

The distribution of the various artefact types is also irregular and must surely indicate that all the material from the ditch, including that from the highest deposits (Phase 2) (Microfiche table 45), owes its place to deliberate deposition. There seems no reason whatsoever to suggest that the essentially symbolic/ceremonial role of the monument altered in any significant respect.

Turning to individual artefact types (in all phases), the distribution is again far from homogeneous (Fig 231). Causeway M would appear to have been particularly important, as would befit its suggested status as an entrance causeway. It was marked by significant butt-end concentrations of burnt flint, scrapers, flint axe fragments, and arrowheads.

Scrapers tended to concentrate around butt ends, but serrated flakes – so typical of causewayed enclosures (Smith 1965, 90–1) – showed a rather different distribution pattern, in which they were found spread more evenly along ditch deposits. Cores tended to occur in clusters that were sometimes, but not always, found at butt ends (Fig 231, a).

Significant concentrations of burnt flints were found at either side of causeways H and M, but segments 9 and 10 had especially large numbers (Microfiche table 48); these coincided with high magnetic susceptibility

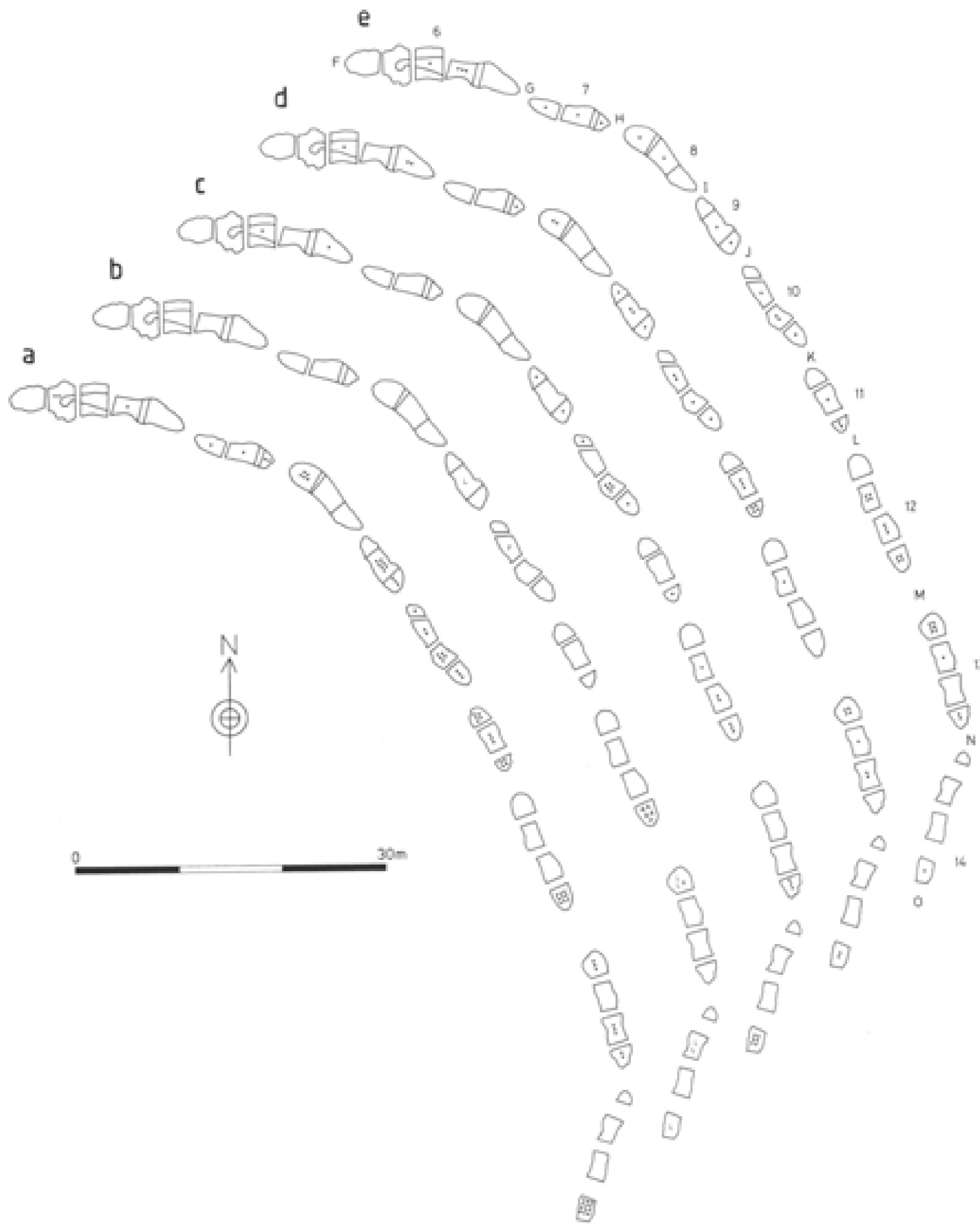


Fig 231 Plans of the distribution of selected flint types, in Phases 1A–2 of the eastern arc: a, burnt flint; b, various (A, axe fragments; L, leaf arrowheads; P, transverse arrowheads); c, cores and core fragments; d, serrated flakes; e, scrapers

readings (see Chapter 3). Another concentration of burnt flint was observed in segment 14 at causeway O; sadly, however, we were not able to examine the other side of this causeway.

Discussion

A number of general trends in the various distributions could be observed (Figs 230, 231). First and foremost the patterning was not homogeneous; this indicates beyond reasonable doubt that the assemblage(s) was not the result of random processes, such as the mixing together of so-called 'secondary refuse' (Schiffer 1976). The great rarity of flint from Phase 1A or Phase 1B contexts in either arc must surely indicate that there was no prolonged or extended settlement within the vicinity of the enclosure ditch at that time. It might also indicate that flint was perhaps deliberately excluded from these deposits. The sudden inclusion of flint within Phase 1C and 2 deposits might be attributable to settlement, were it not for the fact that the flint occurred in distinct patterns that recalled, but did not precisely mirror, the distinctive patterns shown by the occurrence of animal bone, stone axe fragments, quern fragments, and pottery. The flint showed a tendency to cluster at butt ends, as at Staines (Robertson-Mackay 1987), and entrance causeway M, the widest of the eastern arc, was obviously of special significance.

The occurrence of burnt flint was particularly irregular and contrasted markedly with the pattern one might expect on a settlement: segments 6, 7, 12 (apart from a concentration at M), and 14 (apart from a concentration at O) were almost devoid of it, whereas it was common in segments 9–11; these segments were alongside the highest area of magnetic enhancement (Fig 79, N).

The distribution of implements and by-products (Fig 230) did not form a consistent pattern, which suggests that the selection of material to be placed in the ditch either did not take place in a consistent manner, or that the assemblages within the ditch probably represented selections from a variety of original sources. This calls into question the meaning of implement:by-products ratios, and indeed of many quantitative studies of artefact types. What, culturally speaking, do these statistics represent if they are not a straightforward reflection of ancient discard patterns? There can be little doubt that the composition of the Etton flint assemblage reflects the fact that it was itself a selection from other assemblages; but we do not understand the cultural criteria behind this selection process or processes. In other words, we still cannot explain why certain types were selected, nor what they may originally have represented.

7 Stone and fired clay artefacts

Querns, rubbers, and polishing stones

All geological identifications were by Alan Dawn.

Figure 232

1 Other 98. Fragment of (?saddle) quern with small (67 × 15mm) remnant of grinding and outer surfaces; edges carry extensive impact fractures. Quartzite. Enclosure ditch segment 9, layer 3, sections 203–204, grid 39137407.

2 Other 99. Fragment of saddle quern with convex surface; no outer surface; all edges carry extensive impact fractures. Found *in situ*, with quern surface vertical (Fig 41). Quartzite. Enclosure ditch segment 9, layer 3, sections 203–204, grid 39117409.

3 Other 206. Complete cushion quern or pounder. Pure quartzite, probably Upper Carboniferous. Enclosure ditch segment 10, layer 2, sections 205–206, grid 39167400.

Figure 233

4 Other 152. Large fragment of saddle quern, with convex grinding surface and part of two external edges. Impact fractures on edges. Probably dolerite and probably from Whin Sill. Enclosure ditch segment 13, layer 4, sections 229–233, grid 39437347.

5 Other 166. Rubber, quite heavily worn. Mature quartzite. Found below Other 167 (the stones are shown *in situ* in

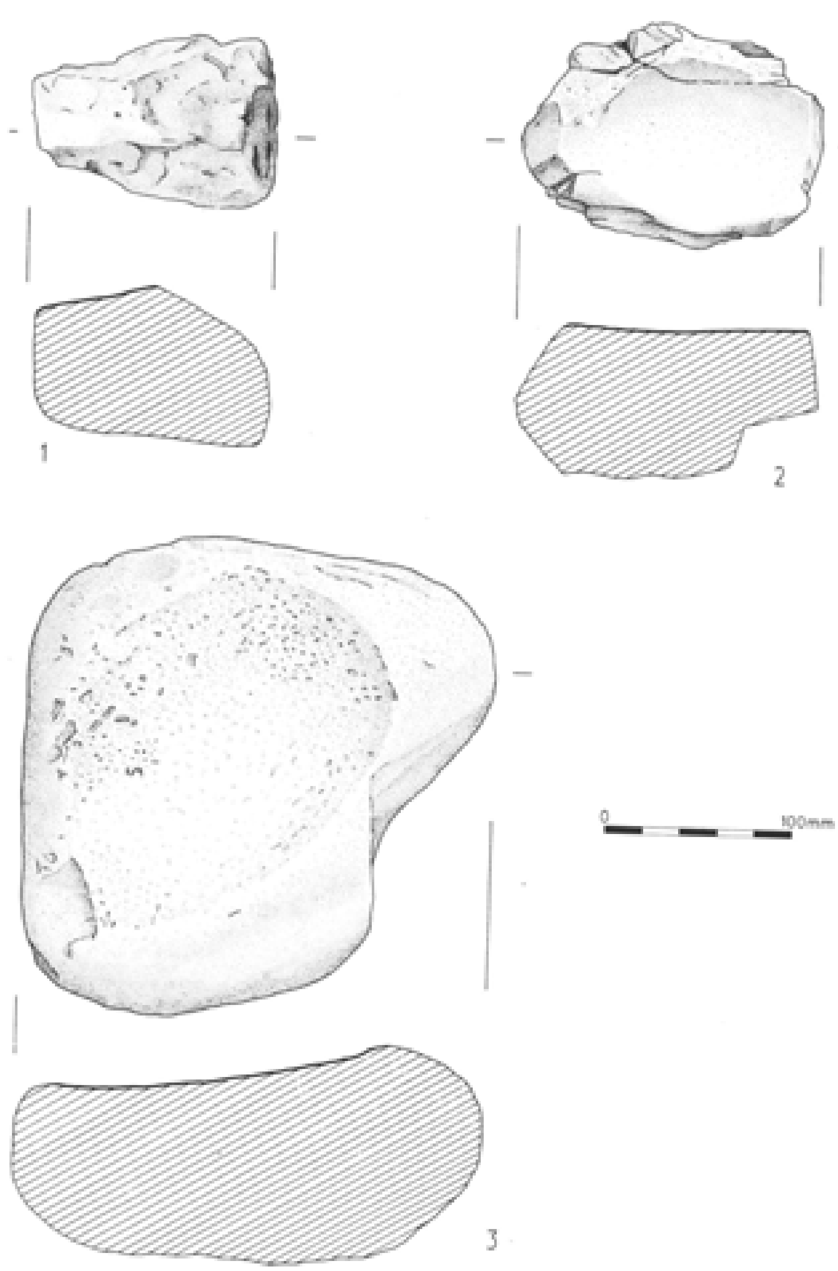


Fig 232 Querns from the enclosure ditch (1–3)

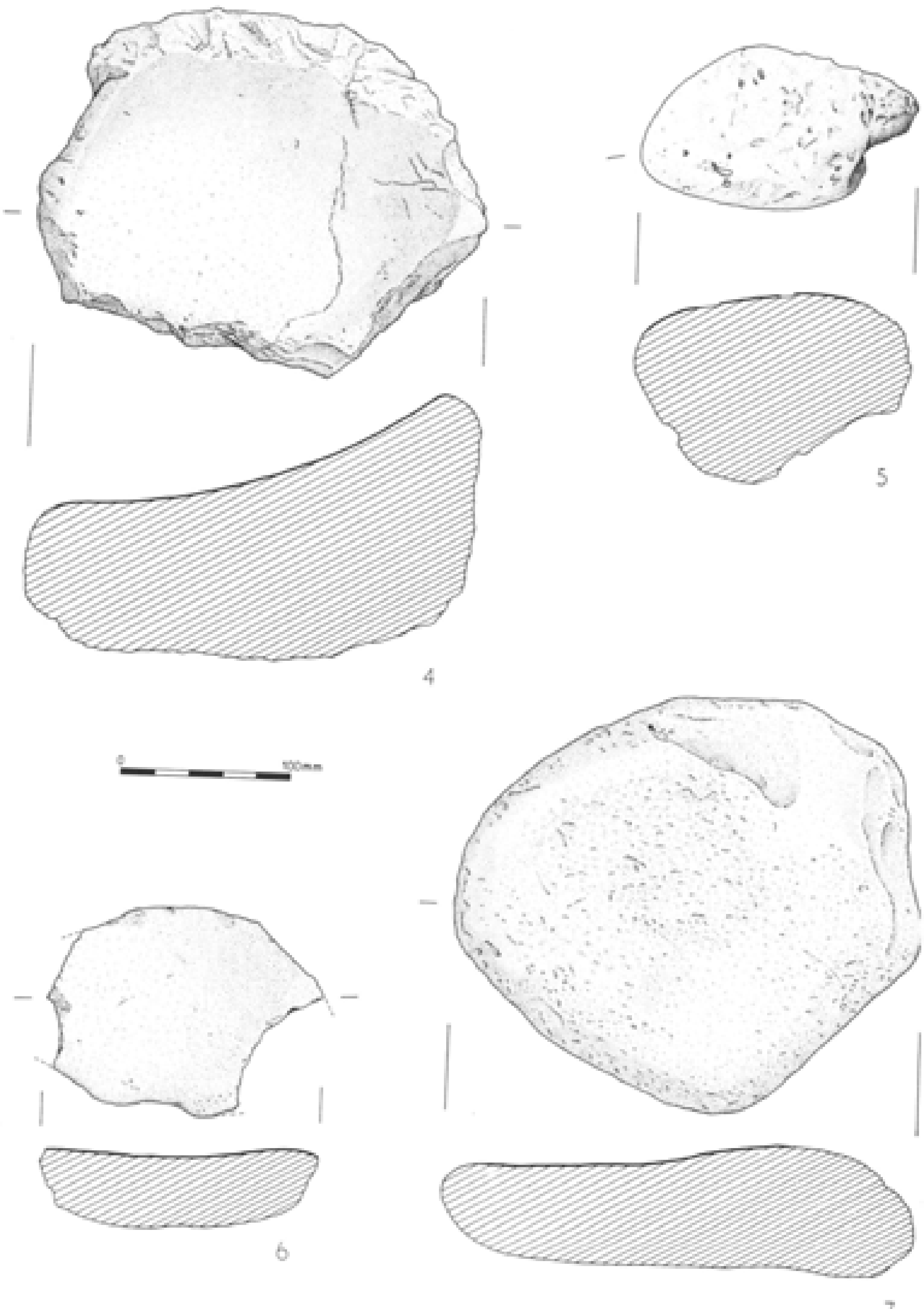


Fig 233 Querns (4, 6, 7) and a rubber (5) from the enclosure ditch; 5 and 6 were found together

Fig 58); enclosure ditch segment 13, layer 4, causeway M–section 228, grid 39427352.

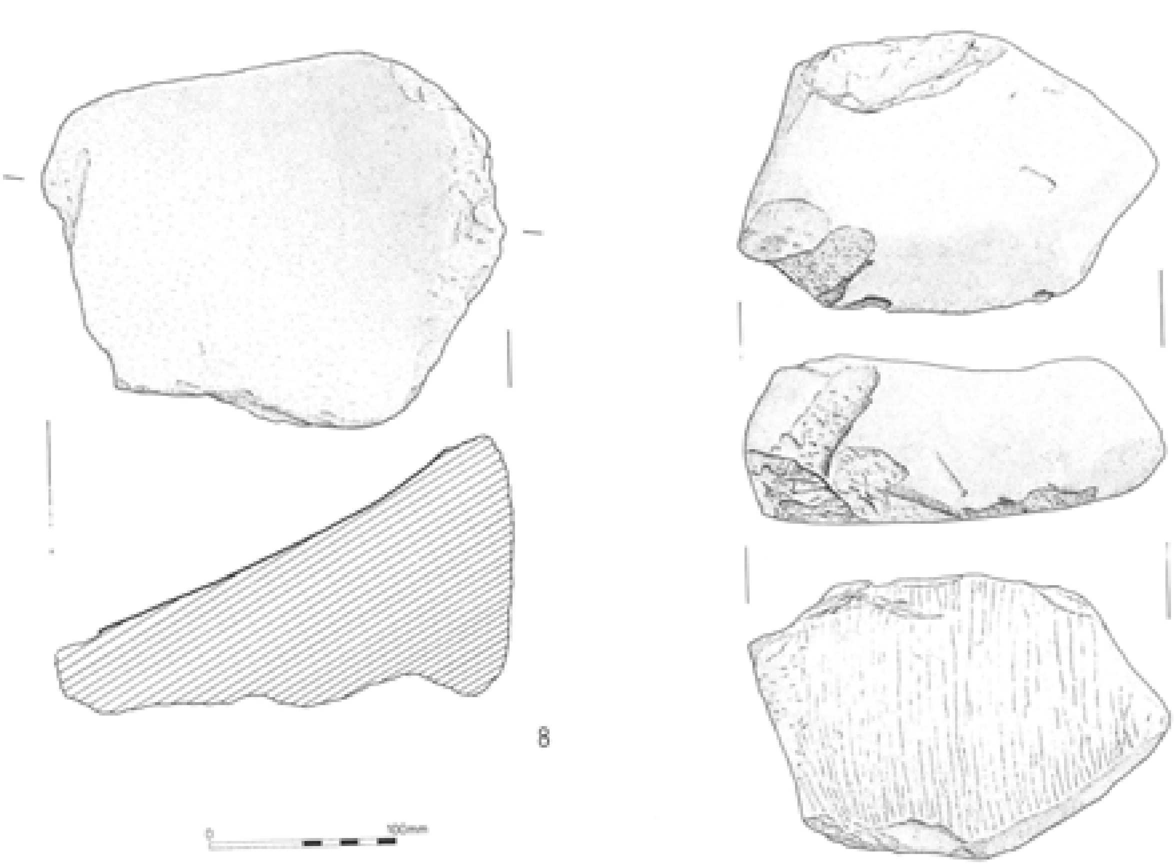
6 Other 167. Large fragment of very slightly dished (that is, almost unused) saddle quern. Large impact fractures at both ends. Pure quartzite. Found with Other 166 (the stones are shown *in situ* in Fig 58); enclosure ditch segment 13, layer 4, causeway M–section 228, grid 39427352.

7 Other 209. Complete cushion quern or pounder. Very lightly used. Quartzite with superficial iron staining. Found inverted at the bottom of a small waterlogged pit cut into the enclosure ditch edge at segment 1; F40, layer 1, grid 37787298.

Figure 234

8 Other 192. Fragment of very large and heavily used saddle quern with impact fractures on two edges. Pure quartzite, probably Upper Carboniferous. F713, layer 1, grid 38837367.

9 Other 95. Complete, heavily used, top stone (rubber); the quern (Fig 235) was placed on-edge (Fig 112) directly above this rubber, which lay at the bottom of the pit, with rubbing face down (Fig 113). Quartzite with 1mm, closely packed, quartz grains; the rubber exhibits a pink hue, possibly the result of fire. F711, layer 1, grid 38837362.



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9

Fig 234 Saddle quern (8) from pit F713 and a rubber (9) from pit F711

Figure 235

10 Other 94. Complete, heavily used, saddle quern; for circumstances of discovery see no 9 (above). Quartzite, with 1mm, closely packed, quartz grains. F711, layer 1, grid 38837362.

Discussion

Alan Dawn notes that the quartzites were probably of Upper Carboniferous age and probably Millstone Grit; in cases where the original surfaces were present, the parent rock is of glacial origin. All querns derived from Phase 1 contexts. The immediate locality does not yield stones of sufficient size to form querns such as nos 8 and 10, and it is probable that many were 'imported' from perhaps some distance.

Typologically the Etton assemblage contained no unusual forms. The assemblage included a mixture of saddle querns, cushion querns, and/or pounders that find many parallels at sites such as Windmill Hill and Briar Hill (Bamford 1985, 92–100; Smith 1965, 121–4).

The principal interest, however, lay in the various contexts of deposition. Only three querns or pounders were complete (nos 3, 7, and 10); of these, two (nos 7 and 10) were placed in small pits, one upside-down (7), the other on its side (10) – both deposits must be considered as ritual. The third was in a Phase 1 structured deposit in ditch segment 10.

The remaining querns all showed evidence for deliberate breakage, and although the pre-depositional damage sometimes makes it difficult to be certain, only one (no 8) of the broken querns had been allowed to wear thin. The two heavily worn querns or fragments were from small filled pits of the interior. Querns and fragments from the enclosure ditch (and the pit F40 within the ditch) were generally less heavily utilised; two (nos 6 and 7) were almost unused. This distinction could well be significant. It would appear that the intention behind the deposition and breakage of querns was to remove them from the domestic sphere. Similar patterns of breakage can be seen, among other Neolithic sites, at Briar Hill and Hurst Fen (Bamford 1985, figs 47–49; Clark *et al* 1960, 227). At Hazleton North it was possible to partially refit several of the broken querns (Saville 1990, fig 176).

It should be noted that the rubber (no 9) that had been placed beneath the complete quern in the pit F711 had possibly been burnt; the quern itself (no 10) appeared to be unaffected by fire. If the quern and rubber formed part of a pair during their domestic use (as their similar lithology, size, and wear patterns suggest), it would be unusual to find one burnt and the other unburnt; such damage would normally take place in situations where both stones would be together (for example, close to the hearth, or when a house burnt down). Many of the structured objects at Etton showed

Fig 235 Stone saddle quern from pit F711; found with no 9 (Fig 234)

fire damage that has been attributed to pyres or other ritual activity. The burnt rubber from pit F711 is probably best explained in this way too.

Other indications of ritual associated with the querns included the careful positioning of the quern and rubber (nos 9 and 10), one directly above the other, in pit F711; the simulated pairing of the rubber and quern fragment in segment 13 (Fig 58; nos 5 and 6); and the vertical arrangement of the quern fragment in segment 9 (Fig 41; no 2). The arrangement of the rubber and quern fragment (5 and 6) in the ground was intended to suggest that the two stones formed part of a functional pair (like, for example, 9 and 10); the rubber was larger than the quern (the reverse is usually the case), and both exhibited different degrees of wear. The colour and surface texture of the two stones were also different (their lithology, too, differed slightly). The evidence therefore suggests that the two stones did not originally form part of a functional pair, despite their arrangement together in the ground.

Polished stone axes and associated artefacts

by Mark Edmonds (incorporating petrological identifications by Fiona Roe)

Introduction

Excavations at Etton resulted in the recovery of 24 ground stone artefacts. This total comprised complete stone axes, large fragments of axes or adzes, reworked

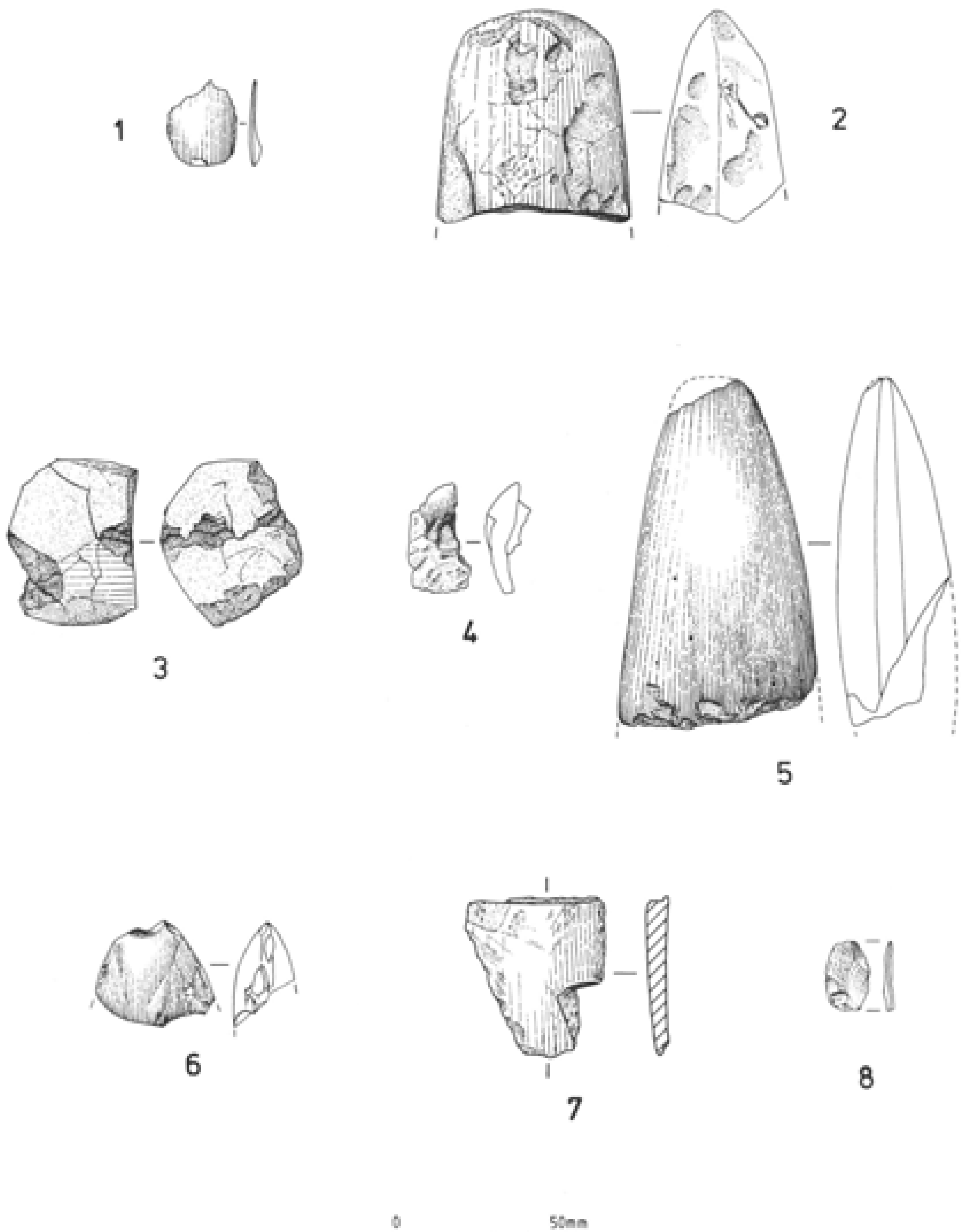

Fig 236 Polished stone implements from the enclosure ditch (1–6, 8) and buried soil (7)

pieces, and smaller fragments and flakes generated during use or reworking. These individual pieces are described below, followed by a broader discussion concerning the context and possible significance of the stone axes from the site.

Figure 236

1 Other 1. Small flake from a ground stone axe or adze of augite granophyre (Group VII). The distal end of the flake appears to have been broken, perhaps during removal, and with the exception of a small scar emanating from the platform, the dorsal surface is entirely ground. The acute angle and presence of polish on the platform indicate that this flake was detached when the cutting edge of the axe or adze was struck against another surface.
Weight: 2g; length: 26mm; thickness: 2mm; width: 21mm. Ditch segment 1, sections 4–5, layer 0, Phase 2(?).

2 Other 2. Butt end of large, heavily burnt ground stone implement made from augite granophyre (Group VII). No faceting can be detected on either the butt or the sides of this piece, and the flake scars that can be seen on both surfaces

reflect removals undertaken prior to grinding, which have not been wholly eradicated. The abrupt transverse break across the end of this piece is unlikely to reflect damage sustained during use.
Weight: 180g; length: 63mm; thickness: 36mm; width: 59mm. Implement Petrology Group number: Cam 176 R225. Ditch segment 1, sections 4–5, layer 0, Phase 2(?).

3 Other 4 and 6. Conjoining fragments of a heavily burnt ground stone implement made from augite granophyre (Group VII). Traces of grinding/polishing can be seen on *c* 20% of the surface, together with a series of scars and fracture lines emanating from a number of different directions. It is difficult to see the characteristics of this piece as indicative of damage/breakage sustained during use. Rather, these two conjoining fragments suggest the more extensive reworking/deliberate breakage of a large ground stone axe or adze.
Measurements given here are for the two conjoined pieces: weight: 110g; length: 52mm; thickness: 38mm; width: 42mm. Implement Petrology Group number: Cam 177 R226. Ditch segment 1, sections 4–5, layer 0, Phase 2(?).

4 Other 5. Small, angular fragment of ground stone implement that has been subjected to burning. The fragment retains traces of grinding on *c* 20% of its surface, and in raw material terms is macroscopically similar to Other 4 and 6, both of which are augite granophyre (Group VII).
Weight: 7g; length: 34mm; thickness: 12mm; width: 16mm. Ditch segment 1, sections 4–5, layer 0, grid 37837293, Phase 2(?).

5 Other 26. Lower half of a green-grey medium-grained stone axe with pronounced side facets and a damaged tapering butt. With the exception of the flake scars on the butt and along the line of the transverse break, the axe is completely ground, and the side facets are both regular and clearly defined. The scars marking the transverse break are generally consistent with the fracture patterns that may occur during use. The surface created by this transverse break has subsequently been used as a simple platform for the attempted removal of flakes down the long axis of the axe. Microscopic examination indicates that this basic igneous rock is an altered quartz dolerite, which cannot, at present, be attributed to a known source.
Weight: 302g; length: 107mm; width at transverse break: 60mm; width at butt: 30mm. Implement Petrology Group number: Cam 178 R227. Ditch segment 1, sections 10–11, Phase 2.

6 Other 33. Butt of a ground stone axe or adze that bears a strong macroscopic resemblance to Group VI epidotised tuff. Small flake scars emanate from both the butt and the sides of this fragment and cut through areas of grinding and polishing. This suggests that the original artefact may have been subjected to a limited amount of reworking. Irregular grinding facets can be seen on both of the principal faces of this piece.
Weight: 21g; length: 30mm; thickness: 21mm; width: 33mm. Ditch segment 1, causeway A–section 1, layer 3, Phase 1C.

7 Other 56. Broken flake of an augite granophyre (Group VII) ground axe or adze, with a pronounced step termination and an angular hinge/step fracture on one side. Small, abrupt flake scars distributed along one edge of the flake may reflect utilisation damage.
Weight: 28g; length: 48.5mm; thickness: 7mm; width: 38mm. Implement Petrology Group number: Cam 179 R228. Buried soil, grid 37767333.

8 Other 62. Small flake from a ground and polished implement, retaining traces of grinding on *c* 40% of its dorsal surface. The remainder of the dorsal surface is covered by elements of flake scars, which emanate from three principal directions. This suggests that the flake was detached from a larger ground stone tool that had either sustained extensive damage during use, or had been subjected to reflaking/reworking. The character and source of the raw material remain unclear.
Weight: 1g; length: 21mm; thickness: 3mm; width: 13mm. Ditch segment 5, causeway E–section 54, layer 3, Phase 1A.

Figure 237

9 Other 63. A small, completely ground axe made on fine-grained green-grey stone, and displaying rounded side facets, a bevelled cutting edge, and a tapered and faceted butt. On macroscopic grounds, the raw material appears to be an epidotised tuff (Group VI), which has its principal source in the central fells of the Lake District. Indirect support for this attribution is provided by the fact that the morphology of the artefact is closely comparable with Manby's 'variant' Group VI forms (Manby 1979).
Whilst the flake scars on the cutting edge are entirely consistent with damage sustained during use, several features on this artefact suggest that its present form was the result of reworking a larger axe or adze. For example, the faceting that can be seen on the butt of the axe creates an irregular termination to the side facets, suggesting that they probably extended further. Moreover, the side facets themselves appear to have been 'rounded off' and reduced in width. In addition, the area adjacent to the butt slopes down at a steeper angle to that established by the general line of the axe. This suggests that an attempt was made to create both a butt facet and a relatively smooth tapered end to the axe.
Taken together, these characteristics indicate that what had once been a significantly larger axe with side facets was subsequently reworked to create a smaller form. Whether or not this was a response to breakage, or simply the result of a more continuous process of reworking, remains unclear. What is interesting, however, is that these signs of reworking are most pronounced in the area of the butt, reflecting a concern with re-establishing the general tapered outline of the axe as a whole. There is little evidence to suggest any marked reworking or reshaping of the cutting edge.
Weight: 160g; length: 79mm; thickness at centre: 25mm; width at cutting edge: 60mm; width at butt: 33mm. Capping fill of F263, grid 38517417, Phase 1.

10 Other 64. Fragment of the central portion of a large ground stone axe or adze, with abrupt transverse breaks at either end, which can be assigned on macroscopic grounds to Group VI. Although the majority of the area on one face of this piece retains its ground and polished surface, the other bears a number of flake scars emanating from a 'platform' formed by the transverse breakage of the original implement. These scars reflect the reworking or further reduction of a broken axe or adze.
Weight: 78g; length: 41mm; thickness: 20mm; width: 52mm. Ditch segment 5, sections 119–126, layer 1, Phase 1 or 2.

11 Other 68. Fragment from the butt of a large ground stone axe or adze made from augite granophyre (Group VII). The butt retains a large facet and deep hinge scars that may be the result of an earlier fracture, whilst the flake scars that emanate from the sides of the piece cut through the diminutive side facets. Taken together, these features suggest that the piece may reflect the breakage of a larger axe or adze during reworking, rather than during use.
Weight: 138g; length: 69mm; thickness: 38mm; width: 56mm. Implement Petrology Group number: Cam 180 R229. Ditch segment 6, sections 169–171, layer 1, Phase 2.

12 Other 82. Flake from a ground or polished stone implement retaining evidence for grinding on *c* 35% of its dorsal

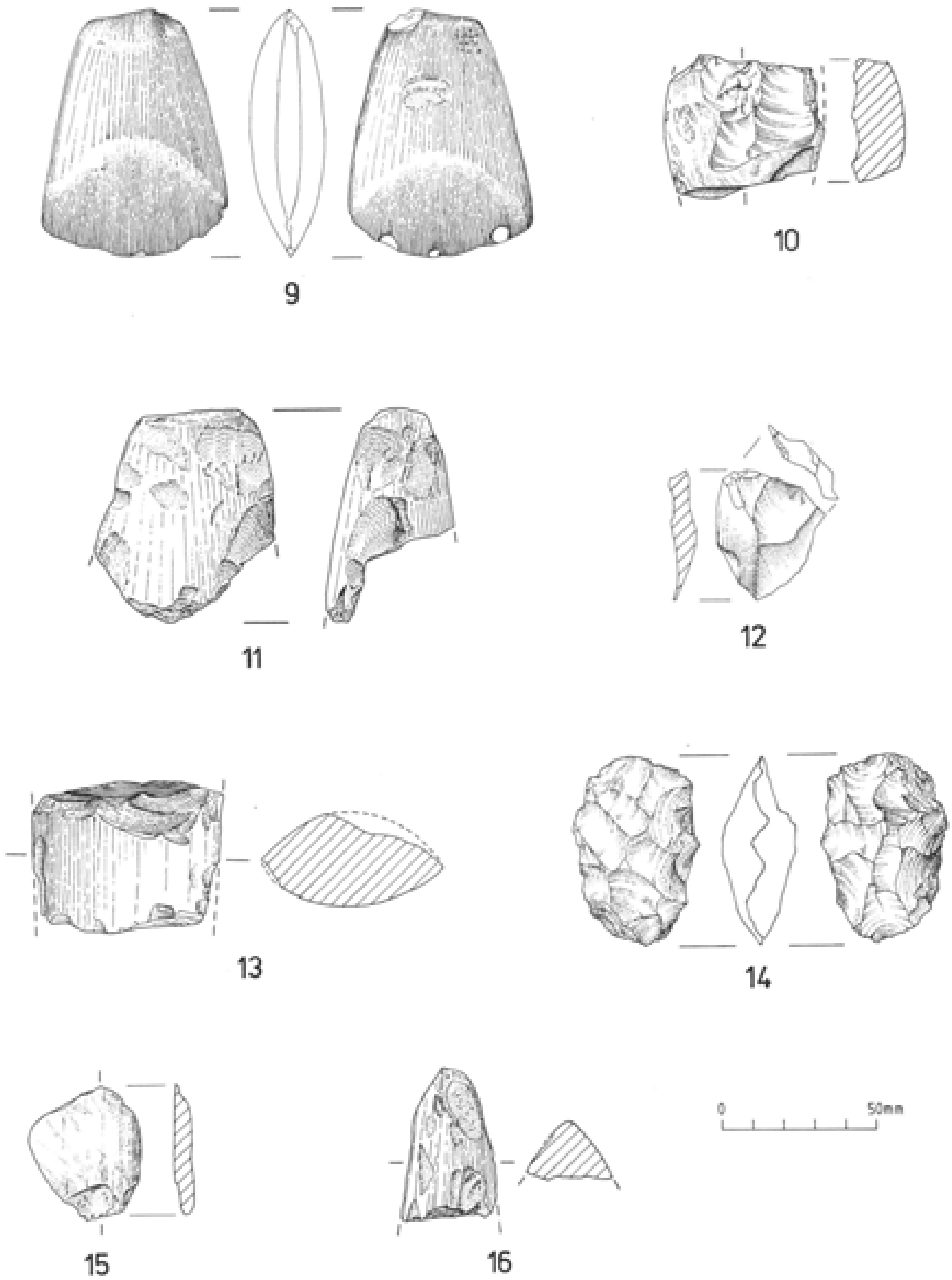

Fig 237 Polished stone implements from F263 pit (9), enclosure ditch (10–12, 14, 15), buried soil (13), and F857 pit (16)

surface. The remainder of the dorsal surface is covered by flake scars emanating from one principal direction. The large platform on this flake displays marked faceting and is set at an angle of 90° relative to the dorsal surface. These characteristics make it unlikely that this flake was detached during the use of the original implement. Rather, it is more probable that it was generated during the use of a broken axe or adze as some form of core. Indeed, the closest technological parallel for this piece would be a flake removed during the rejuvenation of a core platform. The character and source of the raw material remain unclear.

Weight: 11g; length: 38mm; thickness: 7mm; width: 33mm. Ditch segment 7, sections 190–192, layer 1, grid 38957423, Phase 2.

13 Other 85. Fragment from the central section of a large ground stone axe or adze that is macroscopically similar in composition to epidotised tuff (Group VI). Evidence for grinding/polishing can be seen on both of the principal faces, together with flake scars that emanate from the abrupt transverse breaks at each end of the fragment. One side facet is visible, and this appears to have been used as a ridge along which a flake has been removed via a blow struck from the end of the fragment. As with no 10 (above), it is difficult to explain the characteristics of this piece as a reflection of damage sustained during use. Rather, the patterns suggest treatment that involved the deliberate breakage/reworking of a larger ground stone axe or adze.
Weight: 118g; length: 43mm; thickness: 34.5mm; width: 60mm. Below buried soil, on gravel surface, grid 39057412.

14 Other 86. Small bifacially flaked implement, which on macroscopic grounds is likely to be an epidotised tuff (Group VI). No traces of grinding or polishing are present anywhere on the surface of this artefact. However, given that flake scars emanating from many directions cover both surfaces, it is possible that this piece reflects the extensive reworking of a larger ground stone implement. This possibility finds indirect support in the slightly irregular cross-section and sinuous line of the edges of this artefact. There is little evidence to suggest that flaking was characterised by any emphasis upon careful platform preparation, or by a concern with the creation of close symmetry in either section or plan.
Weight: 58g; length: 59.5mm; thickness: 24mm; width: 38.5mm. Ditch segment 7, sections 189–190, layer 1, grid 38957422, Phase 2.

15 Other 88. Flake from a ground stone axe or adze of indeterminate, fine grained tuff. The flake retains evidence for grinding across *c* 85% of its dorsal surface and terminates in a pronounced hinge fracture.
Weight: 13g; length: 40mm; thickness: 5.5mm; width: 34mm. Ditch segment 8, causeway H–section 199, layer 1, grid 39007420, Phase 2.

16 Other 89. Fragment from the side of the butt end of a ground stone axe or adze made from augite granophyre (Group VII). The small flake scars on the proximal end of the flake cut through the ground/polished surface and are likely to reflect the reflaking or damage of the original implement prior to the removal of this piece.
Weight: 38g; length: 47mm; thickness: 25mm; width: 22mm. Implement Petrology Group number: Cam 181 R230. F857, small filled pit, layer 1, grid 39117336, possibly Phase 1

Figure 238

17 Other 104. Small flake of indeterminate tuff, retaining evidence for grinding and polishing on its (bevelled) dorsal surface. It does not appear to have been detached from a cutting edge during use.
Weight: 0.65g; length: 14mm; thickness: 1.5mm; width: 7mm. F795, small filled pit, layer 1, grid 38947406, Phase 1.

18 Other 120. Fragment of a large ground stone axe or adze made from augite granophyre (Group VII). No side facets are present on this piece, and the character of the fractures at either end is difficult to explain as the outcome of breakage during use. These fractures suggest that heavy blows were either struck from both ends, or that the implement sustained the visible damage through being struck whilst on some form of anvil. Two flakes have been removed from the platform created by one of these fractures. Small areas of grinding can be seen in the centre of the fragment. These overlie the major longitudinal scars and may reflect an attempt to reduce the mass of the implement after it was originally broken.
Weight: 418g: length: 91mm; thickness: 33mm; width: 73mm. Implement Petrology Group number: Cam 182 R232. F866, small filled pit, layer 1, grid 39157348, probably Phase 1.

19 Other 148. Small flake superficially similar to Group VI epidotised tuff from a large ground stone axe or adze. Evidence for grinding can be seen on *c* 75% of the dorsal surface of this flake, and on the side facet that forms part of the flake platform. In technological terms, this flake is similar to thinning removals struck from the sides of large bifacial tools during the later stages of production. However, given the presence of grinding traces, it is likely that this flake reflects the delivery of a blow to the side of an axe after its initial manufacture. Given the direction from which the flake has evidently been struck, it is unlikely that this piece was detached during use.
Weight: 11g; length: 36mm; thickness: 6mm; width: 53mm. Ditch segment 7, sections 177–179, layer 2, grid 38807428, Phase 2.

20 Other 151. Fragment of a heavily burnt and reworked ground stone axe or adze with steeply tapering profile and evident side facets, but lacking both a cutting edge and a butt. Given that a number of flake scars emanate from both ends of this piece, it seems that reworking/flake removal was undertaken after the original axe had been broken. Moreover, the character of these scars makes it unlikely that reflaking was undertaken in order to restore a cutting edge. Rather, they appear to reflect either the use of an axe fragment as a core, or the deliberate breaking and further reduction of an axe through the removal of small, angular flakes. Many of these small removals – particularly those detached from the butt – would have terminated in substantial hinge and step fractures. The possibility of deliberate breakage gains support from the fact that the original transverse fracture is very abrupt. Fractures of this nature can be generated during use. However, they may also be created where a sharp and forceful blow is applied to the face (rather than the edge) of an axe. Macroscopic identification suggests that this grey-green, fine-grained piece is a volcanic stone similar in composition to Group VI epidotised tuff. Since these materials may lose the properties of conchoidal fracture when subjected to intense heat, it seems likely that this fragment was burnt after the original tool had been both broken and reworked.
Weight: 61g; length: 49mm; thickness at transverse break: 27mm; width at transverse break: 32mm. Ditch segment 13, section 239–causeway N, layer 4, grid 39457340, Phase 1B.

21 Other 132. Flake from a ground or polished stone implement retaining evidence for grinding on *c* 85% of its dorsal surface. The fracture lines on this flake suggest that it was removed from the parent artefact through a blow struck directly onto the side facet, which is visible on the dorsal surface. As such, it is unlikely that this removal can be attributed to damage from use. Rather, the flake may reflect the reworking of a large axe, and the patterning here would be consistent with the reflaking of a broken axe or adze to create a new cutting edge. The character and source of the raw material remain unclear, although given the green-grey colour and fine-grained nature of the stone, it may be related to the epidotised tuffs of Group VI.
Weight: 13g; length: 45mm; thickness: 9mm; width: 24mm. Ditch segment 6. sections 169–171, layer 2, grid 38747431, Phase 1C.

22 Other 181. Broad flake detached from the cutting edge of a fine-grained stone axe, retaining traces of grinding on both principal faces and limited flake scars along the cutting edge. As with these latter scars, the general characteristics of this piece are consistent with patterns of damage sustained when the cutting edge of an axe is struck against another surface and serves as a narrow platform. Microscopic identification

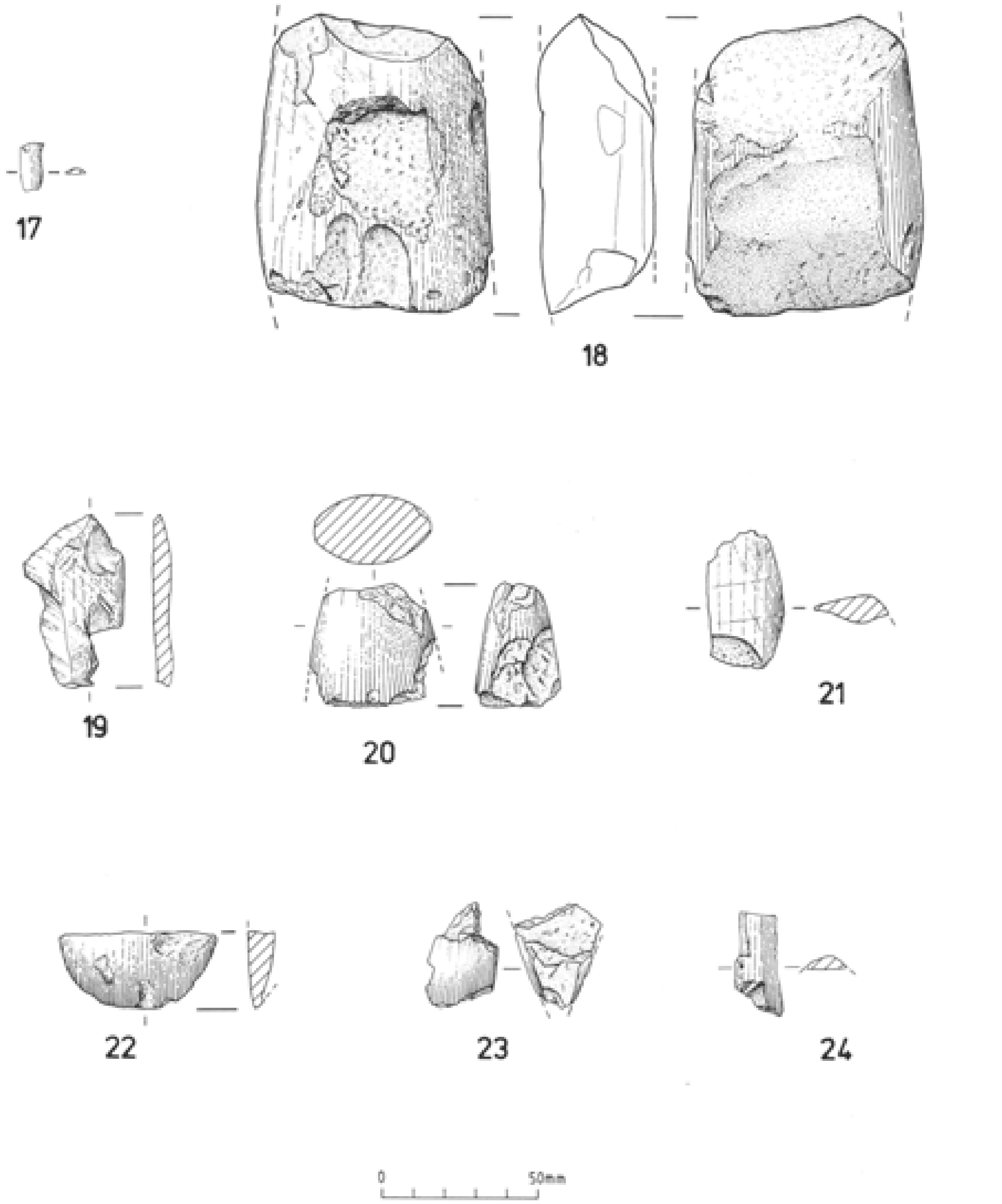

Fig 238 Polished stone implements from F795 pit (17), F866 pit (18), enclosure ditch (19–21), F1054 pit (22, 23), and F839 scoop (24)

indicates that the raw material used in the production of this axe was a Group VII augite granophyre.
Weight: 12g; length: 24mm; thickness: 8mm; width: 50mm. Implement Petrology Group number: Cam 183 R232. F1054, large pit, grid 39137326, Phase 2.

23 Other 205. Fragment of a speckled grey-green igneous stone axe similar in composition to the augite granophyre source (Group VII). The presence of areas of polish on both faces and the sharply tapering profile of this piece suggest that it represents part of the cutting edge of a larger stone axe. In addition, flake scars emanating from the major transverse fracture plane indicate that this fragment was subjected to a limited amount of bifacial reworking after the original tool had been broken. This reworking would have resulted in the removal of a series of small hinge and step terminated flakes. On the basis of the present evidence, it is difficult to determine whether or not the damage and scarring that emanate from the opposite (cutting) edge of this fragment were created prior to the original breaking of the axe.
Weight: 18g; length: 34mm; width: 22mm; thickness: 23mm. Surface of large pit F1054, Phase 2.

24 Other 208. Broken flake from ground stone implement, retaining traces of grinding and polishing over much of its dorsal surface. This polished surface represents part of the

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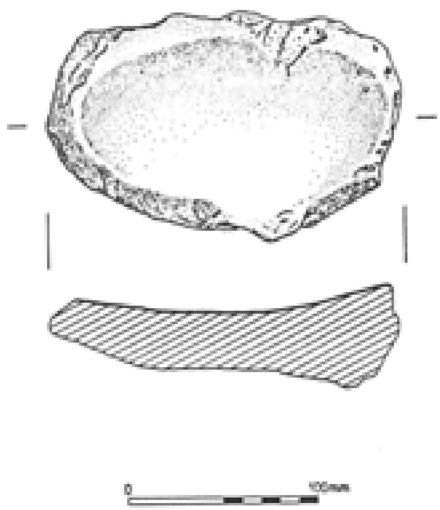


Fig 239 *Polissoir found in pit F786*

side facet of an axe or adze that runs parallel to the long axis of the flake. The direction of flake scars on the surface of this fragment suggests that it was not detached during the use of the original artefact, but during the reworking of an axe as a core. The green-grey colour and fine-grained composition of the raw material suggest that it may be a volcanic tuff similar in character to Group VI.
Weight: 3.2g; length: 33mm; thickness: 5mm; width: 12mm. F839, scoop, grid 39107387, Phase 1(?).

Figure 239

25 Other 83. Polissoir made on a large, fine-grained quartzitic pebble, which is similar in composition to the quartzites found in the local till. The sides of the piece retain vertical flake scars indicative of rough flaking prior to the creation of the grinding/polishing surface. These scars are apparent on all sides and across the base of the piece, creating the appearance of an irregular 'levallois' core. The grinding surface is highly polished and retains traces of what appears to be ochre towards the centre. Polissoirs are rare finds from secure Neolithic contexts, although examples have been found at two enclosures – Abingdon and the Trundle.
Weight: 1448g; length: 186mm; thickness: 41mm; width: 115mm. F786, grid 38957388, Phase 1.

Discussion

Contexts

The 25 ground and polished stone artefacts from Etton derive from the following contexts (and see Fig 109):

Buried soil and subsoil	2	
Enclosure ditch, Phase 2	11	
Enclosure ditch, Phase 1C	2	
Enclosure ditch, Phase 1B	1	
Enclosure ditch, Phase 1A	1	
Enclosure ditch, Phase 1 or 2	1	
Small filled pits, Phase	14	(includes the polissoir)
Large pits, Phase 2	2	
Scoops, possibly Phase 1	1	

The ground stone artefacts from Etton add an important dimension to our understanding of the purposes that the site may have served. The variety of contexts suggests that the axes may have served a variety of purposes.

Non-local axes and enclosures

At the most general of levels, the presence of non-local axes at Etton is in keeping with a tradition of association seen at similar sites throughout southern and central England (Edmonds 1993; Healey and Robertson-Mackay 1983). Complete or fragmentary stone axes have been recovered during excavations at a number of enclosures, so much so that their distribution appears weighted towards sites in this general category (Bradley 1982). This association may be – in part at least – a product of the historical emphasis placed upon enclosures rather than open sites. However, the links are strong enough to warrant some discussion.

Although closely dated instances are relatively scarce, this association between non-local axes and enclosures appears to have developed in the late fourth and early third millennia BC – a time when stone axes from a number of western sources were circulating over increasingly large areas (Clough and Cummins 1979; 1988; Smith 1979). In particular, axes from north Wales (Group VII), Cumbria (Group VI), and Cornwall (Group I) are well represented in eastern England. These trends are reflected at Etton itself, where the assemblage was dominated by axes and axe fragments of Groups VI and VII. Like the overall scale of axe dispersal patterns, this link with enclosures has been taken as evidence for the existence of large-scale trading networks, and even for the bulk movement of axes. It has also been suggested that enclosures provided a context for the close supervision of trade by elite groups living within their bounds. Recent research suggests that these models may require reassessment (Bradley and Edmonds 1993; Evans 1988c; Thomas 1991; Whittle 1988b).

Role of enclosures

In addition to the problems that attend the interpretation of dispersal patterns, it seems unlikely that many enclosures actually provided a context for permanent settlement – elite or otherwise. Activity at many sites appears to have been episodic, and it is possible that different communities may have come together to build and use enclosures in the context of broader routines of seasonal movement. Indeed, the act of building may have been a corporate endeavour, defining a common cultural focus for dispersed and fragmented groups. It will be argued later (Chapter 16) that these characteristics suggest that many enclosures served as demarcated (and perhaps even liminal) contexts that were physically and conceptually distinct from the world of day-to-day practice. At certain times, passage across the threshold of these sites may have constituted a movement between arenas of value – from the everyday world of dispersed communities to the more socially charged atmosphere that attended encounters with others. In short, many enclosures seem to have provided a bounded arena within which a variety of important meetings, transactions, and rites of passage were undertaken on a periodic basis.

Exchange of axes

Given these observations, a rather different relationship between enclosures and the circulation of axes can be proposed. There can be little doubt that the vast majority of stone and flint axes were used for a variety of practical tasks. Indeed, patterns of edge damage and secondary flaking on several pieces from Etton reflect the 'wear and tear' of tool use and maintenance. At the same time, however, many axes may have possessed a significance that extended beyond simple questions of utility. Because of their association with certain tasks or divisions of labour, they may also have served as markers of identity – elements of the gear habitually used and carried by particular categories of person. It may have been these associations, rather than any mechanical or practical qualities, that stimulated the use of axes as media for exchange. Here it is useful to consider some of the themes that animate the circulation of goods in non-capitalist societies. Where identities are closely tied to the possession and use of things, the transfer of an object may create bonds between people that persist long after the moment of transaction has passed. Put simply, gifts may remain inalienable. With its passage from one context or person to another, the exchanged object may acquire a history that refers not only to the past and present order of social relations, but also to future ties and obligations. Exchange is thus an important medium through which debts and obligations are built up and social positions negotiated over time. In other words, we can think of the circulation of objects as a practice that is central to the classification of people.

This capacity for exchanged objects to carry histories and project social relations into the future may have been enhanced by conventions regarding the times and places at which appropriate responses could have been made and obligations discharged or reworked. Furthermore, the circulation of objects within local regimes of value may have required a transformation or reworking of their associations when they were introduced from outside. Here again, these transitions may have been undertaken in demarcated places and at specified times. Given these potentials, the location of many enclosures, the episodic character of their use, and their association with rites of passage may all have contributed to their suitability as contexts within which a variety of exchanges could be conducted. Undertaken within a demarcated spatial and temporal context, the circulation of axes may have been keyed into the reproduction of relations of affiliation and authority between dispersed groups.

Deposition of axes

Although enclosures seem to have provided a context in which a variety of transactions was undertaken, an important question remains to be addressed. These sites may have played their part in structuring the circulation of axes, livestock, and perhaps even people. But why is it that complete or fragmentary axes are actually found within their boundaries?

Clues as to the significance of these deposits can be gained from the character and context of the axes themselves. In certain cases, axes may occur on particular sites as residues from episodes of production. Alongside the working of cores and the use of a variety of tools, the production of axes, laurel leaves, and perhaps arrowheads seems to have been emphasised at a number of enclosures. Indeed, at Maiden Castle, the production of flint axes was emphasised within the enclosure, using raw material that outcropped on site (Sharples 1991, 34). Like acquisition through exchange, the 'embedding' of production in other socially charged events may have been particularly important where the resulting artefacts served as markers of identity as well as practical tools. This argument has its attractions, but it is difficult to sustain at Etton. Although the 'biface' (Fig 237, no 14) and several of the smaller fragments attest to the reworking of non-local axes, there is no strong evidence for production *per se*. The only other exception to this pattern takes the form of the polissoir (Fig 239), which was a 'capping' deposit from the top of a small filled pit. The recovery of polissoirs from Abingdon and the Trundle and the recognition of 'axe-polishing grooves' at West Kennet long barrow indicate that the finishing of certain axes may have occasionally been undertaken in the context of other important events. However, it is unclear how far this accounts for the presence and treatment of the example described above.

A second possibility is that the non-local axes found on enclosures reflect chance loss or breakage during use. At Etton, the construction and periodic use of the site and, in particular, the working of the wood that grew in the western arc may have occasioned the use of axes. Under these circumstances, it may be that some of the flakes detached from cutting edges reflect these practical roles. Equally, patterns of flaking on other pieces could be taken as evidence that some axe fragments were reused for the production of flakes. Both arguments are persuasive, but here again, it can be suggested that they are not sufficient to account for either the character or the context of the assemblage as a whole. Only one small fragment (Fig 236, no 8) derived from primary contexts within the woodworking area. If the assemblage was simply the product of axe use, we might expect a much closer association between individual fragments and those areas within which activities such as woodworking were concentrated. Since this is demonstrably not the case, we need to consider other themes.

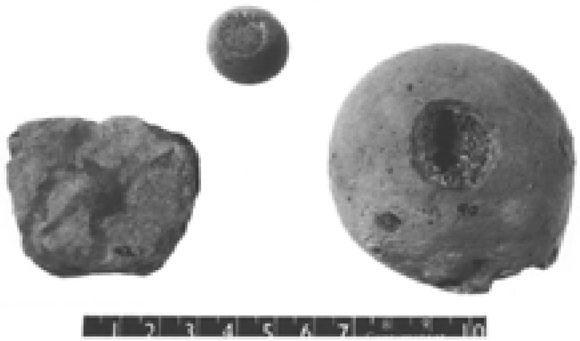


Fig 240 Three worked stones – Other nos 92 (left), 100 (centre), and 90 (right) – from the enclosure ditch. Photograph courtesy of the Trustees of The British Museum

This brings us to the idea that certain axes and axe fragments may have been selected and deposited with some formality. Like the complete axe (Fig 237, no 9) recovered from the top of a small filled pit in the interior, it is possible that some of the fragmentary pieces retrieved from the ditches were also deliberately deposited as material 'statements' (Chapter 16, p 369). These patterns of selective deposition find echoes on other sites. Complete, burnt, and broken axes have been recovered from pits on a number of causewayed enclosures, including Maiden Castle and Hambledon Hill (Mercer 1980, 23; Wheeler 1943, 164–71). In the latter case, it was suggested that these pits may have been associated with the exposure or defleshing of the dead. Deposits in ditches have also been identified at a number of sites. At Haddenham, for example, a Group VII axe was placed at the base of the enclosure ditch in association with human cranial fragments.

Although the identification of formal deposition is not without its problems, it is possible to speculate upon some of the issues that these 'statements' may have addressed. Some axes may have been deposited to reaffirm the traditional importance of enclosures as places in which it was appropriate to conduct certain forms of exchange. Like the residues of feasts, the laying down of these deposits may have drawn the attention of participants and spectators to the social and historical significance of particular activities.

In other cases, acts of deposition may have been tied to more specific themes, and we can begin by recalling that causewayed enclosures provided contexts within which important rites of passage were undertaken. One of the more consistent themes to emerge from recent research is the idea that many enclosures witnessed activities associated with the treatment of the dead. Bodies may have been exposed or otherwise defleshed at these sites as a precondition for their inclusion in tombs or their dispersal in other contexts (Edmonds 1993). These protracted mortuary rites may have been directed towards the reinterpretation of particular people as members of the ancestral community, or towards the containment of other forces that attended the death of specific individuals. Funerals and other ancestral rites may also have been occasions at which it was necessary to renew or redefine broader lines of kinship and affiliation. The importance of these bonds may have been strengthened by their celebration at enclosures.

Axes as markers of identity

Here it is important to return to the idea that axes (amongst other categories of material culture) may have played an important role as markers of identity. Carried, used, and circulated over time, they may have been closely identified with specific people and with particular networks of social relations. If many enclosures served as contexts in which dealings with the dead could be undertaken, then items that signified certain ideas about social identity may have been as important as the body itself. Rather than being a simple reflection of elite settlement or trade, the reworking, destruction, and/or deposition of axes may have been closely tied to the transformation of the social individual on death. In this regard, it is interesting that many of the axe fragments at Etton display fracture patterns that are difficult to understand as the results of use, and that many appear to have been burnt (nos 2–4, 20). Although it is difficult to test, it may be that these artefacts were harnessed, broken, and/or burnt within important rites of passage. No doubt some of the residues of these events were discarded or dispersed with little formality. However, it is likely that others may have been collected on the completion of certain rites and deposited with some deliberation. Placed in the earth and in association with other cultural materials, their presence may have helped to sustain the associations of the site and a sense of continuity for specific social groups.

Worked stones

Figure 240

1 Other 92. Small limestone flag with pecked linear decoration. Length 48mm, width 39mm. Enclosure ditch segment 8, between causeway H and section 199, layer 2, grid 39027420.

2 Other 100. Small round stone, diameter 20mm; pecked circular depression. Enclosure ditch segment 9, causeway I–section 203, layer 2, grid 39097411, 6.8m OD, Phase 1C.

3 Other 90. Round stone, probably a pitted fossil echinoid, 61mm diameter, 'socket' depth 3–4mm. Context as Other 92, but grid 39017420, 6.7m OD, Phase 1C; see also Figures 34 and 35.

Discussion

The two round stones with pecked circular indentations are thought to be skeuomorphic representations of human skulls. The larger stone (Other 90) was

Fig 241 Fired clay objects: 1, possible support from Phase 1 pit F871; 2–4, possible fertility offerings, ditch segment 7

found *in situ* within a structured deposit that included a fragment of human skull. The small decorated flag of limestone (Other 92) was found in the same structured deposit. The structured or arranged deposit of the smaller stone (Other 100) was not recognised in the field, but its level was almost the same as Other 90, and so a similar context is indicated.

Fired clay

by Ian Kinnes and Francis Pryor

Figure 241

1 Other 69. Support, possibly for salt evaporation dish (cf Gurney 1980; Pryor 1980, fig 13). Height 120mm, width 98mm, thickness 60mm. F871 pit, layer 1, grid 38637431.

2 Other 79. Fragment of a possible phallic-shaped object or a weight: irregular cylinder with central longitudinal circular perforation; on one side longitudinal grooves adjacent to zone of incised chevrons; smoothed, some remanent fingertip impressions; hard-fired; sparse crushed ?calcite inclusions; one end damaged. Length 82mm; diameter 55mm (average); perforation diameter 4–8mm. Enclosure ditch segment 7, sections 187–189, layer 2, grid 38937423, 6.9m OD.

3 Other 81. Spherical object – hemispherical fragment; possible perforation trace on broken face; smoothed; hard fired; small to medium flint inclusions. Diameter 73mm. Enclosure ditch segment 7, sections 187–189, layer 2, grid 38947424, 6.9m OD.

4 Other 79. Block fragment with parts of two faces meeting at right angles; on larger face a T-shaped arrangement of heavy punctate impressions; on the other face a deep linear impression between two punctate impressions; roughly smoothed; small to medium flint inclusions, some burnt. Length 81mm. Found with Other 69, above enclosure ditch segment 7, sections 187–189, layer 2, grid 38937423, 6.9m OD.

Discussion

Fired clay objects are very rarely encountered in earlier Neolithic contexts in Britain. The four illustrated objects (Fig 241) were found in two different and separate features. The possible support, no 1, resembles Bronze and Iron Age salt evaporation dish supports, but there is no evidence for abrasion or contact with the ground or a container at either end. This is unusual, as the 'firing' of most salt evaporation dishes happens when the object is actually used. The firing is consequently of uneven quality, whereas that of the Etton object is excellent and even. The finish, too, is far finer than that normally encountered on salt evaporation dish supports. Taken together, despite its superficial resemblance, it is possible that this support-like object is not a support at all. It is well made and fired. At present its practical use (if any) is uncertain. It was found in a shallow pit in causeway F, beneath the Phase 1C extension of the enclosure ditch. This context was affected by water action, but there can be little doubt that the pit could not post-date the main, Phase 1, use of the enclosure ditch. An Iron or Bronze Age date must be ruled out absolutely. The location within the most important entrance causeway would suggest that the object had some ritual use.

The three smaller fired clay objects were found in segment 7, in Phase 1 (probably 1A) contexts. They were found during the rapid excavation that was undertaken to determine the stratigraphic succession of the enclosure ditch, so their association in the ground was not noted in detail. They most probably formed part of a group. Whatever the status of the Grimes Graves ritual find (Piggott 1954, 42), the Etton group would appear to have features in common with it. The perforated object (no 2) is broken, but what remains is phallic. The spherical object is also broken, but its original shape is in no doubt. The decorated piece cannot readily be described. Carved phalli are known from other earlier Neolithic contexts (ibid, fig 14), and the group of three objects from ditch segment 7 should therefore probably be seen as a structured deposit associated with birth or fertility.

8 The human bone

by Miranda Armour-Chelu

Introduction

No complete or partial human skeletons were found at Etton. The loose human bone, which is listed below, was recovered from the enclosure ditch only. The listing is followed by a discussion of the taphonomy of the pieces.

Enclosure ditch

The bone for segments 1, 3, 10, and 12 was identified by Miranda Armour-Chelu, for segments 8 and 13 by Miranda Armour-Chelu and Christine Osborne, and for segments 10 and 14 by Christine Osborne.

Segment 1

Bone 330. Causeway A–section 1, layer 2, Phase 1C. One left femur. Distal epiphysis broken, proximal epiphysis almost completely destroyed by gnawing.

Bone 453. Sections 5–6, layer 2, Phase 1A. One left humerus. Proximal shaft and epiphysis missing, distal epiphysis present but gnawed, probably by domestic dog.

Bone 454. Sections 5–6, layer 2, Phase 1A. Left scapula, adult.

Bone 455. Sections 5–6, layer 2, Phase 1A. Right scapula, incomplete, adult.

Bone 459. Sections 5–6, layer 2, Phase 1A. Femoral head. Epiphysis only.

Segment 3

Bone 5267. Sections 35–39, layer 3, Phase 1A. One left femur. Distal portion missing, proximal epiphysis gnawed.

Segment 6

Bone 9932. Near butt end at causeway G, Phase 1B. Cranium (Fig 24, E).

Segment 8

Bone 10351. Causeway H–section 199, layer 2, Phase 1C. Skull fragment (Fig 33, inset).

Segment 10

Bone 10518. Causeway K–section 207, layer 2, Phase 1B. The frontal bone of a skull that is cracked and broken. The supra-orbital ridges are moderate in size (Fig 45).

Segment 12

Bone 14337. Causeway L–section 116, layer 4, Phase 1B. Left tibia, with broken shaft. Pale buff colour.

Segment 13

Bone 13721. Causeway M–section 228, layer 6, Phase 1B. One left femur. Proximal and distal portion missing. Slight gnawing at proximal end.

Bone 13768. Causeway M–section 228, layer 6, Phase 1B. Fragments of skull including the following dentition:

	8 7 6 5 4 3 2 1	1 2 3 4 5 6 7 8	
R			L

Bone 14256. Causeway M–section 228, layer 4, Phase 1B. The right parietal of a skull.

Segment 14

Bone 16349. Sections 241–245, layer not recorded, probably Phase 1C/2. Fragments of the frontal bone of a skull. The supra-orbital ridges are small in size.

Taphonomy

A total of 15 human bones was examined, from Phase 1 deposits of ditch segments 1, 3, 6, 8, 10, 12, 13, and 14.

Six human bones were identified from Phases 1A and 1C of ditch segment 1: four from Phase 1A, sections 5–6 (a right and left scapula, two left humeri, and the proximal epiphysis of a femur), and one left femur from between causeway A and section 1 (Phase 1C). The human remains from Phase 1A of ditch segment 1 were stained dark brown and were not impregnated with minerals, whereas the femur from Phase 1C was a pale buff colour and was impregnated with minerals. Two humeri, one femur, and a scapula were in a fragmentary condition, and all breaks appear to have occurred in antiquity. Both humeri were broken through the proximal shaft, and in one specimen the distal shaft and epiphysis were missing. The distal portion of the femur from Phase 1C was absent. Three elements (two humeri and a femur) showed evidence for carnivore gnawing, probably caused by domestic dog or red fox.

A left femur (Fig 242) was from segment 3, between sections 35 and 39 (Phase 1A); this bone was not impregnated with minerals and was stained a deep brown colour. In antiquity the femur had been broken through the distal portion of the shaft. The femur had a slightly battered appearance, with some shallow scrapes present upon the shaft of the bone. These marks are consistent with transport, trampling damage, or movement within the substrate. The proximal epiphysis showed evidence of canid gnawing. The condition of this bone contrasts markedly with the faunal remains recovered from this phase, which were well preserved (see Chapter 9). Only one other bone from this level was gnawed, a neonatal cattle metacarpal from segment 3, between causeway C and section 35, layer 3.

Fig 242 Human femur (Bone 5267) from enclosure ditch segment 3, layer 3; on the right is a detail of the canid gnawing

Another further left human femur was from segment 13, at the butt end between causeway M and section 228, in layer 6. The femur was a pale buff colour and was impregnated with minerals. The proximal and distal epiphyses of this specimen were missing, and these breaks occurred in antiquity. The proximal shaft showed evidence of canid gnawing.

The broken and battered appearance of the human bones suggests that they suffered some mistreatment prior to burial in the enclosure ditch. All the human remains show evidence of damage caused by exposure to an abrasive environment, and this probably occurred in an open-air or surface context. This interpretation is supported by the high frequency of canid gnawed bones (50%), which suggests that human remains were available for scavenging by carnivores, although both dogs and foxes are capable of exhuming buried carcasses. Transport of the assemblage is implicated by the absence of articulated bones and bias towards larger elements.

The human bone was poorly preserved when compared with the faunal remains excavated from Phase 1, and especially those of Phase 1A. This suggests that the human bones had a different depositional history from the other taxa recovered from the enclosure ditch. The pattern of damage sustained by the human bone could be consistent with the excarnation of corpses prior to burial.

Discussion

The human bone assemblage from Etton is of interest for many reasons. First, the absence of skeletons, whether complete, partial, or reassembled, must be noted. Even articulated bones were not encountered (a possible pair of scapulae were, however, noted in segment 1, at the baulk of section 5). No small bones such as phalanges were found (although this could partially be explained by the methods of recovery); instead the bones from the enclosure ditch were of large size and would have been highly visible. Loose bones have been found at other causewayed enclosures (such as Mercer 1980, 52; Robertson-Mackay 1987, 59), but the clear distinction between their abraded, often gnawed state, and that of the animal bone from the same deposit has never been previously noted.

It is suggested that the human bone from within the ditch had a very different taphonomic history from the animal bone that it apparently accompanied. It is possible that the human bone derived from bodies that were undergoing excarnation, somewhere within the enclosure; the smaller bones were either lost or else they were discarded in favour of the larger, more visible bones that were added to and incorporated within the structured deposits of the enclosure ditch.

9 The animal bone

by Miranda Armour-Chelu

Introduction

This report describes the results of the analyses of 6205 bones recovered from the Phase 1 and 2 Neolithic levels. The majority of the bones were from the enclosure ditch deposits (3843 bones), and a further 2361 bones were from features within the interior. Thirteen taxa were identified; in order of abundance they were cattle, pig, sheep, red deer, aurochs, goat, roe deer, red fox, otter, dog, wolf, horse, and common toad.

Excavation and recovery

The bones from the upper levels of the ditch were usually recovered with forks and shovels, whereas those from the primary levels were carefully excavated using plasterers' leaves and wooden spatulae. Recording techniques in the field included plotting all bone to within a 1m grid, and the level of each specimen was surveyed to Ordnance Datum.

A control of the proportion of bones lost during excavation was made by taking a two-bucket sample of soil from each context within each ditch segment. These samples were processed through a wet sieve machine fitted with a 500 screen; the number of bones recovered from this operation was very low, suggesting good overall retrieval of the faunal sample.

Measurements

All bone measurements were taken in millimetres after von den Driesch (1976). Some additional measurements were taken to determine the sex of domestic sheep innominates following the method proposed by Armitage (1977). All measurements are listed in Microfiche tables 49 to 77.

Taphonomic modifications

Introduction

Most bones recovered from British archaeological sites dating to the Holocene are derived from food refuse, analyses of which have been used extensively for studies of past subsistence. The problems associated with the interpretation of these assemblages are twofold. Firstly, they may contain bones collected by non-human predators and scavengers, as well as the remains of animals that died of natural causes at the site (Barber 1988). Secondly, the value of faunal assemblages retrieved from non-domestic sites for palaeodietary studies is questionable, although this has often been attempted in the absence of more suitable material. Most faunal assemblages recovered from Middle to Late Neolithic sites in southern England and the Midlands are derived from ceremonial or funerary monuments and have been variously interpreted as domestic food refuse, food offerings, feasting debris, and sacred earth or fertility deposits (see Case 1969; Richards and Thomas 1984; Smith 1971; Thorpe 1984). These studies have important implications for understanding the social fabric and order of Neolithic society, but are beset by the problems of identifying which agent or activity was responsible for producing the assemblages (Kinnes 1988).

Taphonomic studies of faunal assemblages recovered from archaeological deposits are of value for the understanding of site formation processes and interpreting past human behaviour (Gifford 1980). Any alteration of bone from its original fresh state is a record of events that have occurred since the animal's death, and these modifications can sometimes be attributed to specific causal agents. The processing of animals for food and as a source of raw materials can be deduced from the presence of butchery marks, and organised bone disposal may be apparent from analyses of contextual, spatial, and taphonomic data sets. Patterns of bone disposal by humans may alter according to the status attached to individual animals, certain taxa, or to animals that are associated with specific events. This is exemplified by the custom of burying dogs separately from domestic refuse, which has been identified at several Neolithic sites such as Easton Down (Jackson 1935), Maiden Castle (Watson 1943), and Windmill Hill (Grigson 1965). Bones may also acquire special status if associated with important events such as marriage or death.

Modifications caused by physical processes may be indicative of past human activities. Bones left upon the surface of a site will be exposed to diurnal and seasonal fluctuations in temperature and moisture that cause bone breakdown and loss (Behrensmeyer 1978). Conversely, the bones of animals that are rapidly interred after death, either by human or natural agencies, are protected from the damaging effects of scavenging and subaerial weathering. These bones may survive for many millennia provided that the local burial environment is favourable to preservation.

Bones from the upper levels of the site were more fragmented than those recovered from the earliest levels, and this is indicated by the number of elements that could be identified to taxon. Of the Phase 1A assemblage from the enclosure ditch, 75% could be identified to taxon, as opposed to 58% from Phase 1B, 55% from Phase 1C, and 52% from Phase 2. The degree to which the bones were fragmented could be attributed to several agencies, and these could not readily be separated. Some of the breakage occurred at the time of excavation, due to the difficulties of recovering the bones

Table 54 Taphonomic modifications to bone from the enclosure ditch

Phase		*root etched*		*gnawed*		*burnt*	
	totals	numbers	%	numbers	%	numbers	%
1A	943	4	<1	27	3	3	<1
1B	1182	146	12	45	4	4	<1
1C	1423	96	7	57	4	27	2
2	296	29	10	14	5	3	1

Table 55 Numbers of canid gnawed bones from the enclosure ditch

Phase	*ditch segment*														
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*totals*
1A	–	–	1	1	2	–	–	–	–	16	1	1	1	2	25
1B	7	–	1	–	–	2	–	–	–	12	–	17	7	–	46
1C	26	1	1	–	–	2	3	3	2	14	3	1	1	–	57
2	–	–	–	–	–	–	6	–	–	–	–	5	3	–	14

buried directly below the alluvial deposits. It also seems likely that some material was crushed by the weight of earthmoving machinery that periodically drove over the site. Damage caused by fluctuating water table levels was responsible for the disintegration of elements from Phase 1C and Phase 2, causing further fragmentation of the assemblage.

Butchery

All bones were examined for evidence of butchery, and 3% of the assemblage bore evidence of cutmarks or chopmarks. The bones retrieved from the upper levels of the ditch were often poorly preserved compared with those from the early phases, and some loss of butchery evidence may have occurred.

Burning

A total of 1542 bones was burnt. Burnt bone was concentrated in the small filled pits of Phase 1, although 37 burnt bones were found scattered throughout the ditch deposits (Table 54). Shipman *et al* (1984) have shown that the colour of bone changes during combustion according to the temperature attained. The sequence of colour changes from black to blue, grey, and finally white; bluish-grey to white tints indicate that the bone was incinerated at high temperatures. The colour of all burnt bone was recorded, and the results show that it was subjected to temperatures ranging from between 200 and 600°C.

Root etching

The term 'root etching' is used to describe the distinctive pattern of linear markings that is sometimes found upon the surface of bones. These marks usually have a rounded profile and often coalesce to form a dendritic pattern. These are thought to be produced by the action of acids released from plant roots as they come into contact with bone, but it seems possible that microflora living in the rhizosphere may also be implicated.

A total of 275 bones from the enclosure ditch were root etched, and a further 343 bones from Phase 2 pit deposits were also damaged by this process. It is of interest that less than 1% of bones from Phase 1A were root etched compared to 12% from Phase 1B. This could indicate a lack of plant growth in Phase 1A. It seems possible that vegetation growth might have been inhibited by the waterlogged conditions, but this cannot be conclusively demonstrated for two reasons. Firstly, root exudates may be dispersed by water action, and bones from wet environments may be unaffected by this process (N W Simmonds personal communication). Secondly, it has not been established whether the root exudates of all plant taxa produce root etching on bone. Shipman (1981) has shown that cereals can produce these modifications, but this has not been demonstrated for other plant groups.

Vegetation growth is indicated by root-etched bones in Phases 1B, 1C, and 2; concentrations of such bones were recorded from ditch segments 1 and 13 (Phase 1B), ditch segments 1 and 11 (Phase 1C), and ditch segment 13 (Phase 2).

Canid gnawing

A total of 4% of the bones from the enclosure ditch had been gnawed by carnivores (Table 54), and the damage sustained was consistent with that caused by domestic dog. Only a small number of bones from Phase 1 was gnawed (128 elements), which were found to be unevenly distributed throughout the deposits (Table 55).

Table 56 Location (*) of structured deposits of bone from the Phase 1 enclosure ditch

ditch segment	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
Phase 1A														
part skeleton	*	–	*	*	–	–	–	–	–	*	–	*	*	–
rib/vertebra	*	–	–	–	–	*	–	–	*	*	–	–	–	–
neonatal	*	*	*	–	–	–	–	–	–	*	–	–	–	–
skull	–	–	–	–	–	–	*	–	–	–	–	–	–	–
Phase 1B														
part skeleton	–	–	–	–	–	–	–	–	–	–	–	–	*	–
rib/vertebra	–	–	–	–	–	–	*	–	–	–	–	–	–	–
neonatal	–	–	–	–	–	–	–	–	–	–	–	–	*	–
skull	–	–	–	–	–	–	–	–	–	–	–	*	–	–
Phase 1C														
part skeleton	–	–	–	–	–	–	–	–	–	–	–	–	–	–
rib/vertebra	–	–	–	–	–	–	–	–	–	–	–	–	–	–
neonatal	–	–	–	–	–	–	–	–	–	–	–	–	–	–
skull	–	–	–	–	–	–	–	–	–	*	–	*	–	–

The frequency of gnawed bone from ditch segment 10 was far higher than that recorded from any other ditch segment and accounted for 32% of all gnawed bone from Phase 1 of the enclosure ditch. All gnawed bones from ditch segment 10, Phases 1A and 1B, were derived from the butt end at causeway K. An unusually high number of gnawed bones was also recorded from ditch segment 1, Phase 1C (26 bones), and from ditch segment 12, Phase 1B (17 bones).

No evidence of gnawing was apparent from bones derived from 'structured deposits', which could suggest that they were not accessible to domestic dogs or other scavenging carnivores.

Water action

Bones from the upper levels (Phases 1C and 2) of the enclosure ditch were a pale buff colour, mineralised, and generally poorly preserved. The outer cortical surface of the bones had a flaky appearance, and split line cracks were observed on several different elements, especially cattle metapodials (see Tappen 1969). This pattern of damage is similar to that caused by subaerial weathering (Behrensmeyer 1978), but it is not certain whether the same processes were responsible for producing the modifications observed at Etton. Sedimentological analyses undertaken by Charles French (Chapter 12) indicate that in many instances, especially in the eastern arc, the causewayed ditch was backfilled soon after excavation, and the remains were rapidly buried. It seems probable that the pattern of bone loss observed in the upper levels of the causewayed enclosure is linked to groundwater effects, including the seasonal fluctuations in groundwater levels and periodic flooding events. A small number of bones (11) from ditch segment 3, between section 33 and causeway C (layer 1), were very smooth and rounded at the articular ends. This pattern of damage is consistent with fluvial abrasion and transport, and it seems plausible that these bones were transported during a flood or shift in the stream channel.

Bones from the primary ditch deposits were stained a deep brown colour, unmineralised, and well preserved. These bones were buried in waterlogged deposits rich in organic matter, and these factors were responsible for discolouring the bones.

Enclosure ditch

It was apparent from the onset of the excavations that the faunal assemblage was atypical of bone refuse derived from domestic activity. The recovery of skulls, groups of ribs and vertebrae, and partial skeletons from the enclosure ditch may be seen as evidence of 'structured deposition', which has been linked to feasting or other non-utilitarian events (Richards and Thomas 1984).

Most of the structured deposits were retrieved from Phase 1A, but some were also present in Phases 1B and 1C. Table 56 gives a summary of the structured deposits from the enclosure ditch.

Four categories of bone deposit were identified according to taphonomic criteria and spatial and contextual information collected in the field. The four categories of bone deposit were partial skeletons, groups of ribs and/or vertebrae, neonatal bones, and skulls.

Partial skeletons

The majority of bones identified as pig or sheep from Phase 1 were derived from groups of bones comprising one or more individuals and are described as 'partial skeletons' throughout this report. Partial skeletons were usually placed as spatially discrete units within

Table 57 Numbers of bones from the Phase 1A enclosure ditch

ditch segment	*cattle*	*pig*	*sheep*	*goat*	*red deer*	*roe deer*	*fox*	*large ungulate*	*small ungulate*	*total*
1	166	21	63	4	–	–	–	28	2	284
2	7	2	1	–	–	–	–	–	–	10
3	12	2	30	–	–	–	–	–	–	44
4	2	53	48	1	–	–	–	4	21	129
5	23	1	–	–	1	–	–	7	–	32
6	3	–	4	–	–	–	–	7	2	16
7	5	–	–	–	–	–	5	5	–	15
8	–	–	–	–	–	–	–	–	–	–
9	4	10	–	–	–	1	–	1	2	18
10	43	66	5	–	–	–	–	86	6	206
11	10	1	–	–	–	–	–	3	1	15
12	47	3	8	–	–	–	–	36	3	97
13	–	–	–	–	–	–	–	–	–	–
14	6	–	–	–	–	–	–	–	–	6
totals	328	159	159	5	1	1	5	179	37	872
%	38	18	18	<1	<1	<1	<1	20	4	100

ditch segment butt-end deposits, although the partial skeleton of a pig was recovered from ditch segment 10 between sections 206 and 207A (Phase 1A). The taphonomic analyses of these remains indicate that the skeletons were disarticulated and defleshed before burial. There was no evidence of canid gnawing, and all the bones were well preserved. This suggests that these bones were buried soon after the death of the animals.

Groups of ribs and/or vertebrae

Groups of ribs and vertebrae derived from the same individual were identified from enclosure ditch segments, including butt-end deposits. Most were derived from cattle (four groups), but one group of sheep vertebrae and a group of pig ribs were also identified from ditch segment 6 (sections 172–176) and ditch segment 9 (sections 203–204).

Neonatal bones

Neonatal bones of cattle were recovered from Phases 1A and 1B, ditch segments 1, 2, 3, 10, and 13. All were recovered from butt-end deposits, except those from ditch segment 1 (a radius, ulna, and first phalange), which were recovered from sections 5–6, layer 3.

The neonatal bones were derived from animals that died at birth, with the exception of two bones from ditch segment 10 (a right radius found between section 207 and causeway K, layer 19, and a left humerus found between causeway J and section 205, layer 15), which were approximately one month old at the time of death.

Skulls

A further feature of the assemblage was the deposition of skulls, either singly or in pairs. Six skulls were identified from Phases 1 and 2 of the causewayed enclosure ditch. These included the skull of a fox from Phase 1A, two skulls of aurochs (wild cattle) from Phase 2, and two skulls of domestic cattle and a roe deer skull from Phase 1C.

Quantification by phase

The presence of structured deposits within faunal assemblages poses difficulties for calculations of the relative abundance of the taxa represented at the site. Animals represented by partial skeletons gain an inflated importance compared to those represented by single elements. It is also apparent that the contents of each ditch segment may have had individual significance (see Chapter 2), so that analyses of the bones by phase alone could lead to misleading conclusions. In this report the assemblage was analysed collectively by phase, and the bones from each ditch segment phase are also described separately so that variations in the faunal record can be appraised independently.

Phase 1A

A total of 872 bones was recorded from Phase 1A of the causewayed enclosure ditch (Table 57). Cattle bones accounted for 38% of the assemblage, and sheep and pig bones each accounted for 18% of the assemblage. Five bones of goat were identified from ditch segments 1 and 4. Wild species were poorly represented in this phase. The skull, atlas, axis, and two cervical vertebrae of a red fox were recovered from the butt end of ditch segment 7, a roe deer metatarsal was recovered from the butt end of ditch segment 9, and red deer was present in segment 5. Artefacts manufactured from red deer antler and worked antler waste were recorded from ditch segments 5, 6, 7, and 10, but these have been excluded from calculations of species abundance.

A further 214 bones could not be identified to taxon, and these accounted for 24% of the assemblage. They were either assigned to the 'large ungulate size' or 'small ungulate size' category. Bones described as large ungulate size were probably derived from domestic cattle, but the possibility that

Table 58 Numbers of bones from the Phase 1B enclosure ditch

ditch segment	*cattle*	*pig*	*sheep*	*goat*	*aurochs*	*large ungulate*	*small ungulate*	*total*
1	212	33	14	1	1	231	77	569
2	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–
4	–	–	–	–	–	–	–	–
5	–	–	–	–	–	–	–	–
6	6	–	–	–	–	8	2	16
7	13	2	–	–	–	2	–	17
8	7	4	1	–	–	7	–	19
9	4	1	3	–	–	–	6	14
10	25	9	2	–	–	16	5	57
11	4	1	–	–	–	2	–	7
12	91	10	3	–	–	45	4	153
13	95	66	121	–	–	66	43	391
14	5	–	–	–	–	2	–	7
totals	462	126	144	1	1	379	137	1250
%	36	10	12	<1	<1	30	11	100

Table 59 Numbers of bones from the Phase 1C enclosure ditch

ditch segment	*cattle*	*sheep*	*pig*	*roe deer*	*red deer*	*aurochs*	*wild boar*	*fox*	*large ungulate*	*small ungulate*	*total*
1	317	27	63	2	2	1	1	4	278	79	774
2	42	3	9	–	–	–	–	–	16	7	77
3	13	2	–	–	–	–	–	–	–	1	16
4	–	–	–	–	–	–	–	–	–	–	–
5	–	–	–	–	–	–	–	–	–	–	–
6	13	–	–	–	–	–	–	–	7	1	21
7	8	2	1	–	–	–	–	–	7	2	20
8	7	1	4	–	–	–	–	–	7	–	19
9	35	1	3	–	–	–	–	–	28	3	70
10	87	4	21	–	–	1	–	–	76	6	195
11	47	2	5	–	–	–	–	–	81	8	143
12	33	–	3	1	–	–	–	–	23	3	63
13	18	1	1	–	–	–	–	–	5	–	25
14	–	–	–	–	–	–	–	–	–	–	–
totals	620	43	110	3	2	2	1	4	528	110	1423
%	44	3	8	<1	<1	<1	<1	<1	37	8	100

a few unidentifiable fragments of aurochs or well-grown red deer were present in this assemblage cannot be ruled out. A total of 177 bone fragments was assigned to the large ungulate size category, and if it is assumed that almost all were derived from domestic cattle, then this taxa were more abundant than Table 57 would suggest. If the bones from the large ungulate size category are combined with those elements identified as cattle, then cattle accounted for approximately 58% of the assemblage. Bones described as 'small ungulate size' are mainly derived from medium to small-bodied ungulates such as sheep, goat, or pig.

Phase 1B

A total of 1250 bones was examined from Phase 1B of the causewayed enclosure ditch (Table 58). Cattle show a small decrease in abundance to 36% of all bones identified to taxon (66% if these are combined with fragments assigned to the large ungulate size category). Sheep and pig also decline in importance, the majority of elements identified from these two taxa being derived from five partial skeletons in ditch segment 13.

Phase 1C

A total of 1423 bones was recovered from Phase 1C of the enclosure ditch (Table 59). Cattle increase to 44% of bones recovered from this phase, whereas pig and sheep accounted for 8% and 3% respectively.

Phase 2

A small assemblage of bones (299 elements) was recovered from Phase 2 deposits of the enclosure ditch (Table 60). Cattle account for 42% of the assemblage, but rise to 85% if these elements are combined with fragments assigned to the large ungulate size category. Pig and sheep account for 8% and 1% of the assemblage respectively, and the mandible of a dog was recovered from the butt end of segment 13, by causeway M, layer 2.

Table 60 Numbers of bones from the Phase 2 enclosure ditch

ditch segment	*cattle*	*sheep*	*pig*	*dog*	*aurochs*	*large ungulate*	*small ungulate*	*total*
1	–	–	–	–	–	–	–	–
2	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–
4	–	–	–	–	–	–	–	–
5	14	–	1	–	–	17		35
6	3	–	–	–	1	–	–	4
7	60	2	6	–	–	66	1	135
8	–	–	–	–	–	–	–	–
9	5	–	1	–	–	5	–	11
10	–	–	–	–	–	–	–	–
11	10	–	5	–	1	23	1	40
12	13	–	3	–	3	12	8	39
13	20	–	9	1	–	4	1	35
14	–	–	–	–	–	–	–	–
totals	125	2	25	1	5	127	14	299
%	42	1	8	<1	<1	43	5	100

Segment 1

Phase 1A

A total of 284 bones was recovered from this phase: cattle (57%), sheep (23%), pig (8%), and goat (1%). Thirty bones (11%) could not be identified to species.

A partial sheep skeleton (56 elements) was retrieved from the butt end at causeway A, and the following body parts were present: mandible, vertebrae, pelvis, ribs, and fore and hind limbs. This animal died at approximately three years according to the degree of wear on the mandibular teeth and state of fusion of the bones (Grant 1982; Silver 1969). This animal was sexed as female according to the criteria proposed by Armitage (1977). Cutmarks were recorded from 15 elements of the partial sheep skeleton and could be correlated with disarticulation and defleshing activities: transverse cutmarks were found at the articular ends of the humeri, radii, femur, calcaneum, scapho-cuboid, and three ribs; further cutmarks were observed upon the left acetabulum and neck of the right innominate, indicating that these bones were disarticulated before deposition. Shallow, diagonal cutmarks were recorded from the shaft of the right humerus, suggesting that the meat was defleshed from the bone. Cutmarks were also observed on the dorsal spine of two thoracic vertebrae, consistent with the removal of the tenderloin from the spinal column (Binford 1981, 110–13, 137, fig 4.21, table 4.04).

A group of 20 cattle ribs (10 left and right elements) was from sections 5–6, layer 3. They were derived from a juvenile animal that had died within the first year of life. Four ribs bore cutmarks immediately below the tubercle on the medial side, and cutmarks were observed at the distal end of a further two ribs. These cutmarks were probably produced by disarticulating the ribs from the sternum and vertebral column.

A second collection of cattle ribs was recovered from a butt-end deposit between section 16 and causeway B (layer 3) (Fig 16); they were associated with six lumbar vertebrae that are presumed to have derived from the same individual. This animal died at approximately six months, and cutmarks were recorded from the tubercles of the ribs, indicating that these elements had been disarticulated before burial.

Phase 1B

A total of 569 bones was from this phase, the majority derived from cattle (212 bones), followed by pig (33 bones), sheep (14 bones), goat (1 bone), and one metacarpal of aurochs. A further 231 bones were identified as large ungulate size and 77 as small ungulate size.

Phase 1C

This phase produced 774 bones: cattle (317 bones), pig (63 bones), sheep (27 bones), and 9 elements of fox, wild boar, aurochs, and red and roe deer. It seems likely that the four elements of fox (a mandible, canine, ulna, and metacarpal) identified from section 10–11, layer 1, were from a single individual. Roe deer was represented by two shed antlers from sections 13–14, layer 0.

Segment 2

Phase 1A

Ten bones were from this phase, comprising seven elements of cattle, two of pig, and one sheep bone. Of these, one neonatal cattle tibia was present in a butt-end deposit between section 25 and causeway B (layer 3), and two neonatal cattle bones (an atlas vertebra and a tibia) were from the butt-end deposit between section 28 and causeway C (layer 4).

Phase 1C

There were 77 bones from this phase: cattle (42 bones), pig (9 bones), and sheep (3 bones). A further 23 elements could not be identified to taxon.

Segment 3

Phase 1A

From this phase were recorded 44 bones: 30 of sheep, 12 of cattle, and 2 of pig.

A partial sheep skeleton comprising 26 elements had been placed at the butt end between section 35 and causeway

C (layer 3). The maxilla, mandible, ribs, and fore and hind limb elements were present. The age of the animal was assessed from the degree of wear upon the mandibular teeth, mandibular wear stage 37 (MWS=37; Grant 1975) and from fusion of the long bones; it was concluded that this sheep died at between three and four years of age. The mandible of a lamb that died within the first month of birth was found in association with this partial female skeleton. Cutmarks were visible upon the condyle of the left mandible and ulna indicating the disarticulation of these elements. The tibia and femur were fragmented, suggesting that they had been smashed to extract the marrow fat. This pattern of butchery for marrow fat extraction was atypical, and no other examples were noted from the partial skeletons.

Phase 1C

From this phase were 16 bones. The majority (81%) were cattle, the remainder from ovicaprids (12%) or small ungulates (7%).

Segment 4

Phase 1A

There were 129 bones from this phase, of which 53 were identified as pig (41%). Forty-eight bones were derived from sheep (38%), and cattle and goat were present (two and one elements respectively).

The majority of the pig (52 bones) and the sheep (48 bones) were recovered from a butt-end deposit at causeway E. The similarity between matching pairs of elements indicates that these bones were derived from three individuals. The bones were densely packed in the deposit, which suggests that all bones were collected up and buried on a single event. A minimum number of two pigs was represented; one of these was a juvenile, probably no more than three months old, and the second animal was quite mature, if not a little senile. The sheep died at approximately two years of age and could be sexed as female according to the morphology of the pubic bone.

Segment 5

Phase 1A

A total of 32 bones was from this phase, the majority of which were identified as cattle (23 bones), representing a minimum number of two animals. Pig was also present (one bone). Cutmarks were recorded upon four elements of cattle and was interpreted as evidence for disarticulation of the carcass prior to burial. A red deer antler crown was also found, as well as small fragments of antler, perhaps the residue of antler working.

Phase 2

There was a total of 35 bones from Phase 2, 14 of which were cattle, and 1 of pig; 20 bones could not be identified to taxon.

Segment 6

Phase 1A

Sixteen bones were from this phase, including four bones of sheep and three of cattle. A further nine elements could not be identified to taxon.

Three lumbar vertebrae and a sacrum of sheep/goat were from sections 172–176, layer 6. The epiphyses of the lumbar vertebrae had recently fused, indicating that this animal was almost mature at the time of death. There were no butchery marks on these bones, and it is thought that they were deposited as an articulated unit.

Phase 1B

Sixteen bones were present in Phase 1B: six cattle bones and a further ten elements that could not be identified to taxon.

Phase 1C

Twenty-one bones were recovered from Phase 1C. Thirteen were derived from cattle, and eight elements could not be identified to taxon.

Phase 2

Only four bones were recovered from this phase: three of cattle and one of aurochs.

Segment 7

Phase 1A

There were 15 bones from this phase. Ten bones (five of cattle and five of a large ungulate) were from sections 185–189, layers 8 and 11. The skull of a red fox and four articulated elements (atlas, axis, and two cervical vertebrae) lay at the centre of the butt end at causeway H.

Phase 1B

From this phase came 17 bones, the majority of which were identified as cattle (13 elements); there were also two pig bones.

A group of six cattle lumbar vertebrae and a sacrum were from sections 185–187, layer 5. All the epiphyses of these elements were fused, indicating that the animal was fully mature at death. No butchery marks were evident on these bones, and it seems that they were deposited as an articulated unit.

Phase 1C

A total of 20 bones was represented in this phase: cattle (8 bones), sheep (2 bones), pig (1 bone), and 9 bones that could not be identified to taxon.

Phase 2

This phase produced 135 bones: cattle (60 bones), sheep/goat (2 bones), pig (6 bones), and 67 bones that could not be identified to taxon.

Segment 8

Phase 1B

Nineteen bones were from Phase 1B, seven of which were identified as cattle, four as pig, and one as sheep. Seven bones were large ungulate size.

Phase 1C

A total of 19 bones was from this phase: cattle (seven bones), pig (four bones), sheep (one bone), and seven bones of large ungulate size.

Segment 9

Phase 1A

There were 18 bones from this phase. Ten were derived from a group of juvenile pig ribs, from sections 203–204, layer 4. All the ribs were from the left side of the body and were almost certainly derived from a single individual. Cutmarks were present upon the lateral aspect of five of these ribs, suggesting that the meat was defleshed from the bone prior to deposition.

A further four bones were identified as cattle, and three elements could not be identified to taxon. A roe deer metatarsal was from a possible butt-end deposit between section 204 and causeway J, layer 4. This was the only example of a wild animal bone from Phase 1A, apart from the red fox skull and vertebrae from ditch segment 7.

Phase 1B

Fourteen bones were present in this deposit: cattle (four bones), sheep, (three bones), pig (one bone), and a further six elements that were small ungulate size.

Phase 1C

Of the 70 bones from this phase, 35 were of cattle, 1 of sheep/goat, and 3 of pig; a further 28 elements were large ungulate size and 3 small ungulate size.

Phase 2

This phase produced just 11 bones, including 5 of cattle and 1 of pig; 5 bones could not be identified to taxon.

Segment 10

Phase 1A

A total of 206 bones was from this phase. There were 66 pig bones (32%), of which 39 were derived from the partial skeleton of a juvenile animal. Cattle were represented by 43 bones (21%), and 5 bones (2%) could be identified as sheep. A high percentage (45%) of the bones could not be identified to taxon, the majority (82 bones) being assigned to the large ungulate size category.

The partial skeleton of a juvenile pig was excavated from the bottom of the ditch between sections 206 and 207A. Ribs and fore and hind limb elements were present, and the epiphyses of these bones were unfused, suggesting that this animal died between three and six months of age. Cutmarks were present upon the shaft of the innominate and the astragalus, which indicate that this animal was disarticulated prior to burial.

A minimum number of two pigs was present in the butt-end deposit between section 207 and causeway K, layer 19. The mean wear stage of one mandible was 23; the other was adult, with the permanent lower left third and fourth premolars in wear. Seven cattle vertebrae and a sacrum were recovered from the same butt-end deposit, probably derived from a single individual. The vertebral epiphyses were unfused at death, but the vertebrae had attained approximately adult proportions, suggesting that this animal died during the sub-adult phase of life. Cutmarks were present on the spine of one of the thoracic vertebrae and upon the ventral side of the sacrum. The butchery evidence suggests that the sacrum was disarticulated from the innominate bone and that meat was defleshed from the vertebrae.

Phase 1B

This phase yielded 57 bones: cattle (25 bones), pig (9 bones), sheep (2 bones), and 21 elements that could not be identified to taxon.

Phase 1C

There were 195 bones in this phase: cattle (87 bones), pig (21 bones), sheep (4 bones), aurochs (1 bone), and 82 bones that could not be identified to taxon.

Two skulls of domestic cattle were from sections 206–207, layer 16. They were in very fragmentary condition, but were complete when buried. Both skulls were derived from mature animals, and the permanent dentition was present and in wear.

Segment 11

Phase 1A

Fifteen bones were from this phase: cattle (ten bones), pig (one bone), and four bones that could not be identified to taxon.

Phase 1B

Seven bones were identified from this phase – four of cattle, one of pig, and two of large ungulate size.

Phase 1C

A total of 143 bones was from Phase 1C: cattle (47 bones), pig (5 bones), sheep (2 bones), and 89 bones that could not be identified to taxon.

Phase 2

From this phase came 40 bones, including cattle (10 bones), pig (5 bones), and the scapula of an aurochs from sections 208–209, layer 2.

Segment 12

Phase 1A

A total of 97 bones was present in this phase: cattle (47 bones), sheep (8 bones), pig (3 bones), and 39 elements that could not be identified to taxon.

A small group of sheep vertebrae and a left and right mandible (six elements) were from a butt-end deposit between section 227 and causeway M, layer 6. The degree of tooth wear and bone epiphysial fusion data are consistent with an animal that died during the sub-adult phase of life, and these bones could have derived from the same individual. The mean wear stage of the mandibular molars was 23,

Fig 243 Defleshing marks upon a sheep humerus from a butt-end deposit at causeway M, ditch segment 13, layer 4

suggesting that this animal died between 18 months and two years of age (Grant 1982).

Phase 1B

This phase produced 155 bones, the majority being derived from cattle (91 bones); ten bones of pig and three of sheep were also identified.

Phase 1C

From this phase were 63 bones, the majority of which were from cattle (33 bones); pig was represented by three elements. The skull of a mature roe deer came from the butt end, between section 227 and causeway M, layer 4.

Phase 2

Thirty-nine bones were from this phase, of which 13 were of cattle and 3 of pig. Two skulls and a radius of aurochs were found in a pit in sections 222–226 (layer 4). The skulls were in a rather fragmentary condition but were clearly complete when deposited. One skull was extremely large with massive horncores, whereas the second skull was from a smaller individual (Fig 50). The difference in size between these two skulls indicates that they were derived from a male and female aurochs.

Segment 13

Phase 1B

The butt end between causeway M and section 228 (layers 4–7) contained a dense concentration of bones, which were assigned to Phases 1A and 1B during excavation. It seems possible that some mixing of elements from each phase may have occurred, and so they have all been assigned to Phase 1B.

A total of 391 bones was from this phase: sheep (121 bones), cattle (95 bones), pig (66 bones), and 105 elements that could not be identified to taxon.

Because the deposits of bone were so densely packed in this segment of the ditch, it was not possible to differentiate between the skeletons of individual animals during excavation. In subsequent analysis, however, it became clear that there were two partial skeletons derived from very juvenile animals; the stage of the mandibular tooth eruption showed that they died at the same stage of physical development. In two right mandibles, the deciduous, fourth premolar could be assigned to wear stage 4, and the first molar was just erupting through the crypt. These animals died at approximately 3 months of age. The epiphyses of the vertebrae and fore and hind limb elements were unfused, which is consistent with the degree of wear observed from the mandibular teeth. One older individual was also present in the deposit. The lower third molar was in the process of erupting through the crypt, indicating that this individual died at approximately 18 months of age.

Eleven sheep bones were from the butt-end deposit at causeway M, layer 7, including one thoracic vertebra, six lumbar vertebrae, and a left innominate bone, probably derived from a single individual. This animal was mature at the time of death and was sexed as male/castrate according to the morphology of the pubic bone. Cutmarks were present upon the shaft of the innominate and along the dorsal spine of the thoracic vertebra, indicating that the meat had been defleshed from the bone.

A total of 92 sheep bones was also recovered from the butt end, between section 228 and causeway M, in layers 4 and 6. The remains of at least two partial sheep skeletons were identified from these deposits. One animal died between three and four years of age (MWS=36), and the second individual died at approximately three years of age (MWS=31). The older individual was sexed as female according to the morphology of a fragmentary skull and horncore. Cutmarks were observed on the following elements: atlas and cervical vertebra, humeri, scapula, and ribs. These cutmarks indicate that both these sheep were disarticulated and defleshed before burial. Figure 243 shows defleshing marks from the shaft of a sheep humerus (from the butt-end deposit at causeway M, layer 4). Four neonatal bones of cattle (first phalange, second phalange, tibia, metapodial) were recovered from the same deposit, layer 6.

Fourteen elements of sheep were found in the other butt end, between section 239 and causeway N, layers 6 and 7; these bones included two thoracic vertebrae and five lumbar vertebrae, all probably derived from the same individual. The cranial epiphyses of the vertebrae were just beginning to fuse,

Table 61 Numbers of bones from Phase 1 and 2 pits

	cattle	*sheep*	*pig*	*horse*	*aurochs*	*otter*	*roe deer*	*toad*	*large ungulate*	*small ungulate*	*unidentified*	*totals*
numbers	293	10	131	1	7	1	1	1	506	450	915	2316
%	12.66	0.43	5.66	0.04	0.30	0.04	0.04	0.04	21.85	19.43	39.51	100.00

whereas the caudal epiphyses were unfused, indicating that this animal was approaching maturity at the time of death.

Phase 1C

For this phase, 25 bones were recorded: 18 of cattle, 1 of sheep, 1 of pig, and 5 of large ungulate size.

Phase 2

There were 35 bones from this phase: 20 of cattle, 9 pig, 1 dog, 4 of large ungulate size, and 1 of small ungulate size.

Segment 14

Phase 1A

Six cattle bones came from this phase.

Phase 1B

Seven elements came from this phase, five of which were cattle.

Interior features

For the purposes of this study, it has been decided to consider bones from the small filled pits of Phases 1 and 2 together (Table 61), in order to provide an assemblage of suitable size. A total of 2316 bones was recovered from the interior pits: cattle accounted for 12.66% of the assemblage, pig 5.66%, sheep 0.43%, and 11 elements from wild taxa were identified. Sheep were very poorly represented, which parallels the high percentage (39.51%) that could not be assigned to taxon. However, this percentage is inflated by the large proportion of unidentified bone fragments from pits F8 and F1054.

There are several interesting aspects of the faunal assemblage from the small filled pits. Many the bones that could not be identified to taxon were assigned to large ungulate or small ungulate size. The results of this exercise showed that 50% of the pits contained the bones of at least two species, because bones of both size categories were represented. All skeletal elements were present in the assemblage, including non-meatbearing bones such as teeth and the distal extremities of limb bones.

Some elements showed evidence for root etching and gnawing, while a large number were burnt. Several small filled pits containing large quantities of burnt bone were found on the eastern side of the enclosure. Originally these pits were thought to contain cremated human remains, but closer scrutiny showed that none of the bones could be positively identified as human. Only a small proportion of the bones from the pits could be identified to taxon; the difficulties of identifying the bone could be attributed to the fact that a large proportion (93%) of the material had been cremated, which causes shrinkage and distortion of the bone. The material was also highly comminuted, with many fragments measuring less than 5mm in length. This strongly suggests that the fragments were pounded or ground up prior to burial (Gejvall 1969).

Around 85% of bones from the small filled pits was burnt white, which indicates that they were combusted at a high temperature between 200 and 600°. If this burning had been *in situ*, it would have caused changes in soil colour, but none was observed. Some pits contained a mixture of burnt and unburnt bone; if burning had taken place *in situ*, then all the bones would most likely show some evidence of burning. Transport of the burnt bone is also implicated by the composition of the assemblage. The numbers of burnt bones from these pits were occasionally quite high, but the fragments were very small and seem to represent little more than a scoop of burnt material. This suggests that the bones were burnt elsewhere and then transported for burial within the pits. The source of this material could well be the large burnt area identified from the magnetic susceptibility survey (Fig 104, S; Chapter 3).

Many burnt bones (29%) were recovered from pit F8. Most bones from this pit were identified as cattle (41%) or were assigned to the large ungulate size category (57%). These bones were very comminuted, but most body parts were present in the assemblage, which could be consistent with the deposition of a cremated carcass. Pit F14 (246 bones) was atypical in that bones of pig accounted for 69% of all bones in this assemblage.

One pit (F40) was anomalous, perhaps because of its unusually wet location close to the edge of ditch segment 1 (Fig 14). It did not contain any burnt bone, but twiggy material was preserved along with one bone identified as common toad, *Bufo bufo*. This bone was well preserved, and it is possible that it derived from an animal that died at the site under natural circumstances.

Pit F385 was adjacent to an area of small filled pits and was of special interest. The skull of a horse was recovered from the base of the pit, and this was overlain by a pick manufactured from red deer antler (Fig 119). Unfortunately, the dating of the pick and antler has been problematic, and it is unlikely that it can be dated successfully because of the presence of some unidentified contaminant within the bone (British Museum Research Laboratory, personal communication). Nevertheless, the

Table 62 Cattle epiphysial fusion data

fusing group	*total in fusing group*	*fused*	*% fused*
early	67	48	72
intermediate	79	38	48
late	47	20	43

position of the pit and its contents suggest a Late Neolithic date, although the possibility that it might be Early Bronze Age cannot be ruled out.

Ageing

Cattle

Nine complete mandibles of cattle were recovered from Phase 1 enclosure ditch deposits. Eleven third molars and seven lower fourth deciduous premolars of cattle were recovered as isolated specimens in the buried soil. The evidence from the deciduous lower fourth premolars showed that one individual had died at approximately one month of age. The degree of wear upon the occlusal surface of the other six premolars was consistent with animals that had died between four and six months of age. The mean wear stage of the complete mandibles ranged between 37 and 43, suggesting that these animals were fully mature at the time of death. Seven of the loose third molars had attained wear stage G, which indicates that they had died in the third or fourth year of life; the remaining four molars ranged between wear stage F and K and were derived from slightly older individuals (see Grant 1982). The evidence for the pattern of culling from this sample is probably biased in favour of older individuals, as the mandibles from this age group are more robust.

Table 62 gives the proportions of fused and unfused cattle bones in the assemblage. Bones from the early fusing group includes material from animals that had died between 0 to 10 months (see O'Connor 1984, 8–9, 18, table 4). The early fusing group also contained a small proportion of perinatal animals. These bones were from animals that almost certainly died within a month of birth, which was established by comparing this material with the bones of a Chillingham calf that died at birth. The evidence from the state of fusion of the cattle bones suggests that some 43% of the animals survived to four years of age. This estimate is slightly lower than that obtained from the analyses of the tooth wear data, for which biases in preservation are probably responsible.

Sheep

Eight partial skeletons of sheep were identified, seven of which died between approximately 18 months and 4 years of age. These sheep would have yielded a good-quality meat, but the ewes were culled before the period of maximum productivity. In modern agricultural systems ewes are maintained until the end of their useful reproductive life and would be slaughtered between six and seven years of age.

Table 63 Pig epiphysial fusion data

fusing group	*total in fusing group*	*fused*	*% fused*
early	15	7	47
intermediate a	14	10	71
intermediate b	6	4	67
late	9	4	44

Pig

A total of 16 mandibles identified as pig from the enclosure ditch could be aged according to the scheme proposed by Grant (1975): seven of these mandibles were from animals that had died during the first year of life – the first or second molar was present, but the third molar had not erupted. Seven individuals died while the third molar was erupting or just in wear, indicating that they were culled at approximately 17 to 23 months of age (Silver 1969). Two mandibles were derived from mature animals where the mean wear stage of the mandibular teeth was at least 44 at the time of death. Grant (1975) suggests that pig mandibles with a mean wear stage of 45 to 47 would be approximately seven or eight years old.

Table 63 shows the proportion of fused elements from the assemblage of pig bones. These data show that there was some culling of young piglets and of animals that died at approximately two years of age, but a number of individuals (44%) survived to at least three years of age; these may have been sows that were maintained for breeding purposes.

The permanent fourth premolar and molars were present within the maxilla of the horse skull excavated from pit F385. These teeth were compared with the collection of horse teeth of known age housed within the Osteology Room at the Natural History Museum. The degree of attrition upon the occlusal surface of the tooth row was closely comparable to that of a pony which died at 14 years of age, suggesting that the horse from Etton died at approximately the same age.

Sex of the animals

Twenty-seven cattle humeri and metacarpals were sexed by plotting the distal width against the distal depth. The results showed that the majority – a ratio 7:1 – could be sexed as female. It was also possible to sex seven pelves according to the criteria proposed by Armitage (1977), which showed that five of the seven innominates were derived from bulls or castrates.

Table 64 Comparison of withers height of Neolithic sheep from southern England

site	*element*	*numbers*	*range (mm)*
Etton	radius	3	45–58
Maiden Castle[1]	radius	2	60–62
Windmill Hill[2]	radius	3	42–57

1 Armour-Chelu 1991; 2 Grigson 1965

Four of the sheep innominates could be sexed as female and one as male or castrate (ibid).

Size of the animals

The distal width of cattle metacarpals (nine specimens) was found to range between 52 and 62mm, which is similar to the range of 54–59mm recorded from a sample of eight cattle metacarpals at Windmill Hill (Grigson 1965).

The withers height of cattle and sheep was reconstructed according to the formula devised by Teichert (1975). The withers height of cattle was reconstructed from three complete elements (one radius and two metatarsals), and the values obtained ranged between 1.15 and 1.23m.

The measurements of the sheep bones (Table 64) show that they were derived from small-bodied gracile animals of similar dimensions to those recorded from the modern Soay sheep of St Kilda (Clutton-Brock *et al* 1990). Table 64 shows a comparison of withers height of sheep from southern England. The sample from Etton was drawn from radii derived from partial skeletons of female sheep; they are of a similar size to those recovered from Windmill Hill (Grigson 1965).

Pathological material

All of the pathological bones were from cattle (20 elements). Symptoms consistent with those caused by osteoarthritis were identified from 18 elements (scapulae, pelves, and femora), and it seems possible that some of these specimens may be linked to the use of cattle for traction (Armour-Chelu and Clutton-Brock 1985).

Two other pathological bones were identified: an ossified haematoma from a cattle metatarsal and one cattle mandibular condyle that showed evidence of boney regrowth, suggestive of some infectious arthropathy.

Summary and discussion

One of the primary objectives of analyses of faunal assemblages recovered from archaeological sites is to reconstruct past subsistence strategies and to describe the local environment of the site where possible. The evidence from Etton suggests that a significant proportion of the assemblage was derived from non-domestic contexts and may have little palaeoeconomic or palaeoenvironmental significance.

Cattle

Cattle accounted for 40% of elements from the enclosure ditch, and bones of this taxon were present in all phases. The percentages of cattle bones were as follows: Phase 1A, 38%; Phase 1B, 36%; Phase 1C, 44%; and Phase 2, 42%. If these percentages are combined with the fragments assigned to the large ungulate size category, then this taxon far exceeded all others in importance.

Cattle bones show a different distribution pattern compared to that of sheep or pig. Firstly, cattle bones were not selected for deposition as partial skeletons, but more groups of vertebrae and/or ribs, skulls, and neonatal remains of this taxon were found. The number of cattle bones identified from the structured deposits was small, however, and in most respects the assemblage resembled domestic refuse. Small deviations from faunal assemblages created by domestic activities were apparent from the pattern of butchery and disposal of these remains. There was a disproportionately high number of meat-yielding elements, which were placed as long linear deposits in several ditch sections. These deposits were similar to those described from Windmill Hill by Smith (1965, 20) and could represent feasting debris.

Sheep

Sheep accounted for 9% of the faunal assemblage from the enclosure ditch. In Phase 1A, sheep comprised 18% of the assemblage, but decreased to 12% in Phase 1B, 3% in Phase 1C, and only two elements of this taxon were identified from Phase 2.

Sheep tend to be rather poorly represented on Neolithic sites in north-west Europe. Clason (1967, 78, 204) has suggested that sheep could only be established in areas where the primary woodland had been cleared. Analyses of the faunal assemblages from the causewayed enclosure at Windmill Hill (Jope 1965), the long cairn at Hazleton North (Levitan 1990), and the early Neolithic pit group at Hemp Knoll, Avebury (Grigson 1980), have shown that the percentage of sheep remains fluctuates considerably according to context. Sheep were relatively scarce from the pre-enclosure levels at Windmill Hill (12.5%), but increase to 25% in the primary ditch deposits and then decline to 14% in the Late Neolithic/Early Bronze Age levels (Jope 1965). Sheep accounted for 50% of the rather small assemblage (67 elements) from Hemp Knoll, and as pointed out by Grigson (1980), their numbers may be inflated at the site by the presence of a partial skeleton. Levitan (1990) reported that sheep were the most commonly occurring taxon from the burial chamber at Hazleton North, but were very sparsely represented in the area of the forecourt, where bones of cattle predominated.

The relative decline in the percentage of sheep remains found at Etton and Windmill Hill cannot be correlated with changes in vegetation or land use (see Chapter 11; Smith 1965, 142–5), but may reflect a shift in the pattern of deposition at these sites. The butt-end deposits at Etton contained six partial sheep skeletons in Phase 1A and two partial sheep skeletons in Phase 1B. These accounted for 16% and 8% of the assemblage respectively, and the majority of all bones identified as sheep from the site (70%) were contained within these deposits. This indicates that sheep were selected for burial in ditch butt-end deposits and suggests perhaps that they were highly prized.

Pig

A total of 420 elements of pig (11%) was identified from the enclosure ditch, and 6% of these bones were derived from partial skeletons excavated from Phases 1A and 1B.

Partial skeletons

The pattern of deposition of the partial skeletons of sheep and pig appeared very similar. The numbers of elements identified from each partial skeleton ranged between 6 and 56, which is only a small proportion of the bones originally present in the skeletons of these taxa. A sheep has approximately 240 skeletal elements, and pigs have slightly more. Elements from all parts of the body were present in these deposits, which suggests that there was no cultural screening of 'waste parts'. The presence of non-meat bearing bones, such as metapodials and phalanges, suggests that cultural appraisals of what constitutes a choice cut or waste was not important.

The taphonomic study of the partial skeletons indicates that these remains were rapidly buried, probably soon after the carcass was dismembered and the bones defleshed. No evidence of gnawing was apparent from these bones, which could suggest that they were not accessible to domestic dogs or other scavenging carnivores. It seems possible that these partial skeletons either represented buried food offerings or feasting debris.

Findings of partial or complete skeletons have been reported from a number of causewayed enclosures (Cram 1982; Jackson 1934; Mercer 1980, 31; Smith 1965, 20). There appears to be some variability in the processing of these carcasses. The skeletons of pig and goat recovered from Windmill Hill (Smith 1965, 142–8) and the sheep from Abingdon (Cram 1982) do not seem to have been butchered, and almost all skeletal elements were present. Conversely, the partial skeleton of a roe deer from Whitehawk (Jackson 1934) had been dismembered, which parallels the evidence from Etton. It is tempting to suggest that the more complete, unbutchered skeletons from Abingdon and Windmill Hill represent offerings or the remains of animals that were not consumed, whereas the dismembered and defleshed bones from Whitehawk and Etton are evidence for feasting.

Horse

The recovery of a horse skull from a possible Phase 2 pit, F385, is of special interest because this taxon is very poorly represented on Neolithic sites in the British Isles.

It seems that the wild horse became extinct in the British Isles during the Early Mesolithic period, as the latest radiocarbon dates for this taxon have been derived from Seamer Carr, Yorkshire, 9950–8430 cal BC (BM-2350, 9790 ± 180 BP) and from the Darent Gravels, 9130–8660 cal BC (BM-1619, 9770 ± 80 BP) (Clutton-Brock 1986; Kromer and Becker 1993). The absence of any securely dated remains of wild horse beyond this point would suggest that it had become extinct in the British Isles by approximately 9000 BP.

The scarcity of finds of horse from Middle to Late Neolithic contexts requires some explanation as to their origin and breeding status during this period. One of the problems of determining the distribution of domesticated horses in Europe during the Neolithic period is that it is difficult to distinguish between domesticated and wild populations using morphological attributes. One of the standard features associated with animals that are undergoing the early stages of domestication is that there is a reduction in size, but the early domestic horses cannot be distinguished using this criterion.

One explanation that could account for the apparent lack of morphological change and scarcity of finds of horse is that they were not controlled to the same degree as other common livestock. Wild horses were still extant in eastern Europe during the Neolithic, and it seems possible that juvenile animals could have been captured and tamed from these populations. Horses obtained by these means would be morphologically indistinguishable from truly wild horses. It is also possible that these captive animals were not used for breeding, and that the stock of horses was constantly replenished from wild herds.

This hypothesis must remain speculative until further finds of horse are recovered and dated from western Europe, but if true, then one can imagine that the possession of a horse would confer great status to the community or individual who owned it. If there were no breeding populations of horses in Britain during the Neolithic, then the few animals found there must have been imported from the continent. They were probably a highly prized status symbol, and like other symbols of power were exchanged or traded over considerable distances.

Wild animals

The number of wild animal bones identified from Phases 1 and 2 of the site was very low (34 elements), 20 of which were derived from Phase 1 contexts. It has been suggested that wild animals were excluded from certain non-domestic contexts during the

Fig 244 Antler comb from enclosure ditch segment 7, near causeway H (Phase 1A), after conservation. Photograph by courtesy of the Trustees of The British Museum

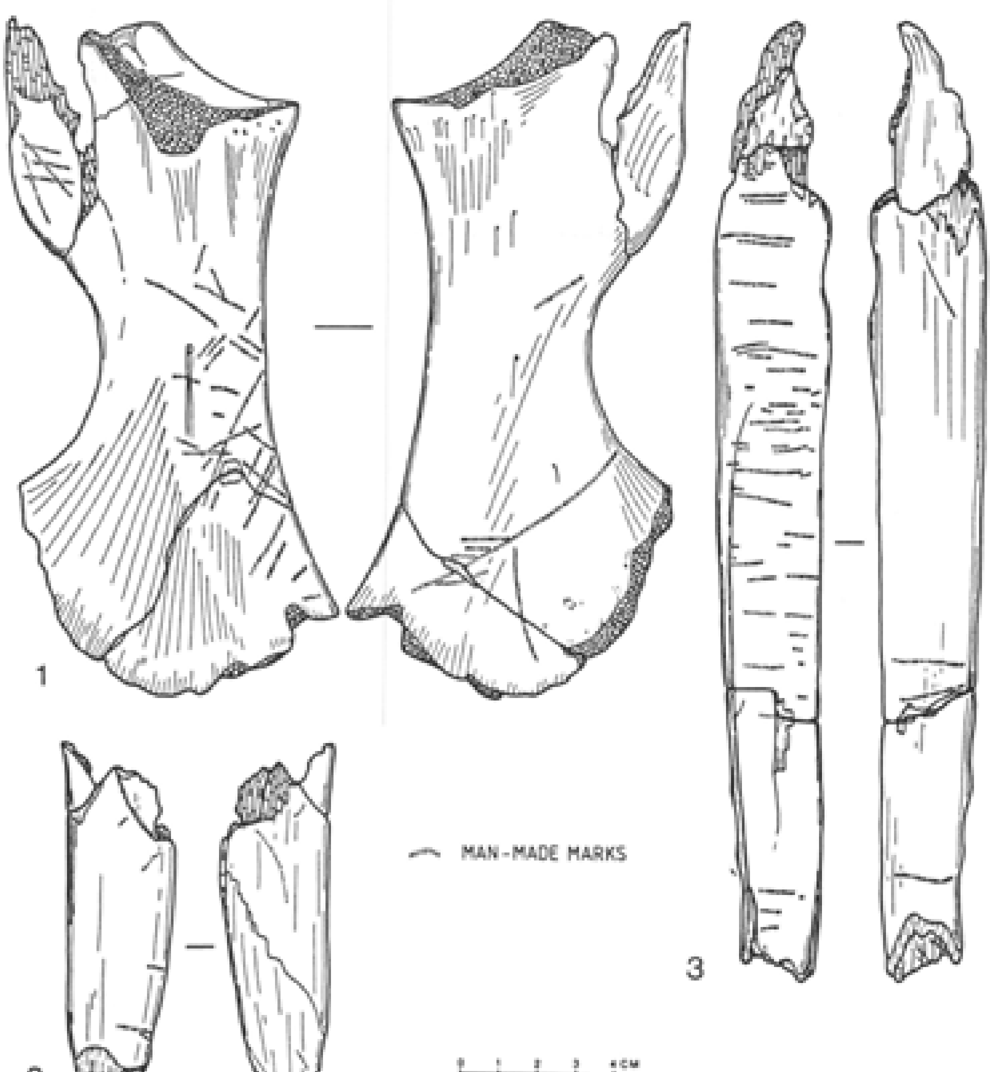


Fig 245 Modified bone from the enclosure ditch: 1, Bone 10675; 2, Bone 10672; 3, Bone 11557

Fig 246 Cattle rib with scored lines – a possible tally stick; from ditch segment 3, layer 3

Fig 247 Cattle scapula (Bone 10825) with scored lines, from ditch segment 9, layer 3

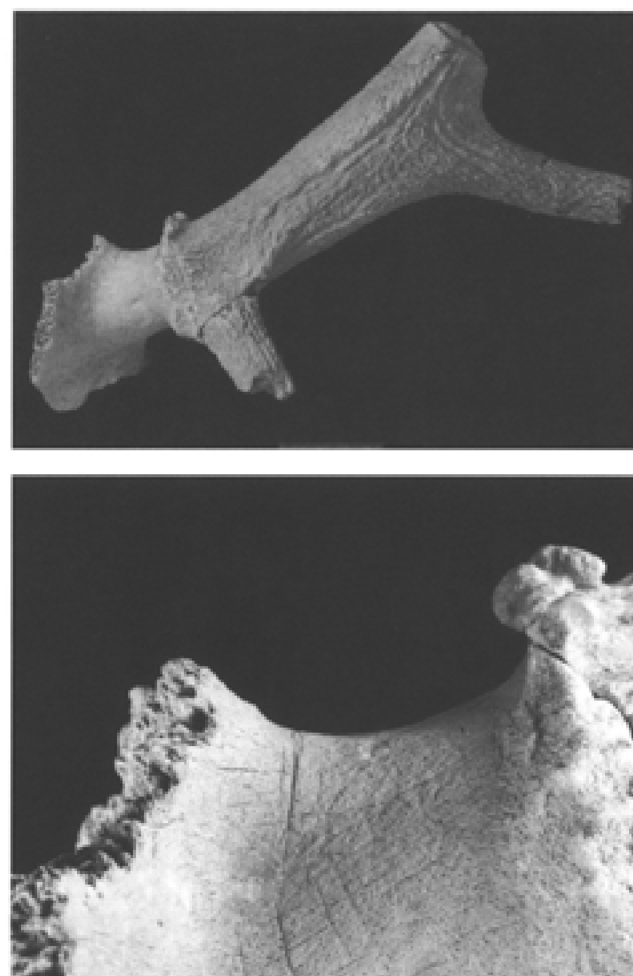


Fig 248 Worked roe deer antler from ditch segment 10, layer 5, showing (below) skinning marks

Neolithic (Thomas 1991, 21–8), and some evidence from Etton supports this opinion. Seven of the 11 elements derived from wild animals in Phases 1A and 1B are from deposits of skulls and associated vertebrae, and two shed antlers and a skull of a roe deer were also recovered from Phase 1C of the enclosure ditch. This assemblage cannot be considered typical of animals hunted for food (although skulls may be brought back as trophies), and it seems probable that some special significance was attached to these bones.

Remains of wild animals could have been divorced from their original significance (wild animal and source of food in a domestic context) to other spheres of influence, such as a symbol of hunting prowess or for their medicinal/magical properties.

A further 11 elements of wild taxa were identified from Phase 2 contexts – five bones of aurochs were from the enclosure ditch, and three bones of aurochs, roe deer, and otter were found in pits. Most of the Phase 2 bones (seven elements) of wild taxa consisted of post-cranial elements, five of which bore evidence for butchery. This assemblage is more typical of that derived from animals that were hunted and subsequently processed for food.

If the assemblages of wild taxa from Phases 1 and 2 are genuinely distinct, then this could suggest a shift in the use of the site through time or a change in attitudes towards the inclusion of wild animal remains in non-domestic contexts.

Deposition

The analyses of the faunal assemblage indicate that there was clear segregation of bone refuse according to various criteria. The faunal assemblage from Phase 1 interior pits contrasts with that from the enclosure ditch in terms of fragmentation, condition, and pattern of deposition. The significance of the cremated animal remains from Phase 1 pits can only be very speculative, but they may be more closely linked to activities that celebrate or revere the ancestors than deposits from the causewayed ditch. Thorpe (1984) has suggested that the transition between earthly existence and the spirit world is dangerous and must be accompanied by ritual acts of cleansing. Cremation can be seen as a means whereby humans can achieve that transformation, and perhaps animals were also cremated as part of this ritual. It is interesting that the majority of bones from the interior of the monument (Phase 1) were cremated; this area could have been perceived as the most sacred part of the site and the domain of the ancestors. It was bounded by the enclosure ditch, which contained deposits marking important life events, such as birth, marriage, and death.

Worked bone and antler

Antler comb

Antler comb (red deer), length 157mm, width at centre 42mm; length of teeth *c* 62mm. The comb (Fig 244) had been compressed in the ground and required conservation, but it showed clear evidence for wear, including broken teeth and rounded tooth tips. Decoration consisted of axial grooves extending from the base of each tooth to the (surviving) end of the shaft or handle. From enclosure ditch segment 7, between causeway H and section 189, layer 8 (for location see Fig 30). Phase 1A. Bone 10138.

Antler combs were recognised as an important component of the 'Windmill Hill Culture' by Piggott (1954, 83). They were particularly common at the type site and at Abingdon. The latter revealed ten combs, most of which showed signs of wear – which in some instances was intense (Case and Whittle 1982, 43). At Windmill Hill, 12 – possibly 13 – complete or fragmentary combs were found, and many showed evidence for wear and breakage; some were also unfinished (Smith 1965, 127). The grooved decoration of the Etton example compares closely with a short-toothed comb from Windmill Hill (ibid, fig 53, A1). A stub-toothed antler comb was also found at Maiden Castle (Wheeler 1943, 181). The clear and repeated evidence for wear and polish has led to the suggestion that Neolithic antler combs were used for the dressing of skins or hides (Case and Whittle 1982, 43; Piggott 1954, 83).

Artefacts manufactured from red deer antler and worked antler waste were also recorded from Phase 1A ditch segments 5, 6, 7, and 10. Further information on the worked bone and antler is in the archive at The British Museum.

Modified bone and antler

Six items from the enlosure ditch showed evidence for deliberate modification. Two cattle bones with unusual marks or scratches were found in ditch segment 9 (Phase 1C). Bone 10675, an innominate, had been firmly scratched or scored with irregular diagonal lines that do not appear to have been caused by the process of meat removal (Fig 245, no 1); their purpose must remain unclear. Bone 10672, the tip of a rib, had been marked with two firm transverse scratches (Fig 245, no 2); these marks may be compared with another cattle rib, possibly from segment 9 – it was found in a tertiary context and was probably residual. The parallel transverse scored marks suggest that this was a 'tally stick' (Fig 245, no 3). Another cattle rib had deep, roughly parallel, scored lines, also reminiscent of a tally stick (Fig 246); it was found in segment 3, layer 3 (Phase 1C).

Layer 3 of segment 9 also produced a heavily utilised cattle scapula (Fig 247) with a number of scored lines not usually found on so-called scapula 'shovels'. Finally, layer 5 of segment 10 (Phase 1B) revealed a worked red deer antler with clear skinning marks around the base (Fig 248). Antler working was an important activity at Windmill Hill (Smith 1965, fig 53) and seems also to have been of some significance at Etton.

10 Plant macrofossil remains

by Sandra Nye and Rob Scaife

Introduction

This chapter examines the seed and charcoal data resulting from the macrobotanical analysis of a range of excavated contexts. Where possible, the discussion follows the perceived phasing identified from the artefact chronology and radiocarbon measurements.

The waterlogged sediment fills of the enclosure ditch and interior features provided an environment ideally suited to the preservation of organic remains and, in particular, plant macrofossils. Furthermore, the age range of the different contexts provided an opportunity to examine the changing flora of the Neolithic and later phases. Although waterlogged seeds form the most important macrofossil elements examined, substantial quantities of charcoal were also present in a number of contexts. This material has also been identified where possible and provides information on the character of locally available woodland, scrub, and possibly hedgerows.

Methodology

A systematic strategy was undertaken to obtain samples for plant macrofossil analysis. All the principal contexts from the enclosure ditch and interior features were sampled. Standard 2kg samples were wet sieved using 1.7mm, 500 , and 250 sieves. The organic material in the larger two fractions was concentrated by allowing the heavier gravel and sand to settle out as the sieves were gently agitated in water. The seeds and other plant macrofossils were then sorted wet from the flot using a low power stereo microscope. Critical identifications were made by comparison with modern comparative seed material of one of the authors (SN) and that of Dr James Greig (Birmingham University). Identification was carried out to the lowest taxonomic level allowed by the state of preservation. The resulting data from this analysis are presented in table form, with order and taxonomy following that of Stace 1991. Large total numbers of seeds of one taxa have been entered in the tables as 100.

The pre-Neolithic channel

Excavation of the enclosure ditch in segment 1 revealed organic peat deposits that were initially attributed to the Early Neolithic phase. Subsequent dating and environmental analyses (insects and pollen) now indicate that this organic sequence is attributable to the fills of a Late Devensian and Early Holocene river channel that was later utilised in the construction of the Neolithic enclosure ditch. Thus, the seed data (Table 65) pertain to the environment of deposition during

Table 65 Plant species in the Early Holocene channel below ditch segment 1

taxa	*samples*					
	sections 3–4, layer 6	sections 3–4, layer 6	sections 10–11, layer 6	sections 10–11, layer 6	sections 10–11, layer 6	sections 7–8, layer 6, *c* 6.4–6.6m
Sambucus cf *nigra*	–	1	–	–	–	–
Polygonum aviculare	–	1	–	–	–	–
Asteraceae indet	–	–	–	1	–	–
Cirsium cf *palustre*	–	1	–	1	–	–
Epilobium sp	–	–	–	1	–	–
Juncus sp	–	–	–	1	–	–
Lamiaceae sp	–	–	2	1	–	–
Lycopus europaeus	4	–	8	2	–	–
Mentha sp	1	–	1	3	2	–
Poaceae sp	–	–	–	1	–	1
Prunus sp	2	–	–	–	–	–
Rubus cf *idaeus*	–	3	–	–	–	–
Rubus fruticosus	1	22	–	–	–	–
Potentilla sp	2	1	–	1	1	2
Ranunculus a/r/b	–	–	–	–	–	2
Urtica dioica	–	48	3	3	–	–
cf *Artemisia* sp	–	–	–	1	–	–
Alismataceae	–	–	1	–	–	–
Carex sp (trigonal)	16	–	–	48	100	74
Carex sp (digonal)	2	1	–	–	–	5
Hippuris vulgaris	1	–	1	4	2	1
Menyanthes trifoliata	2	–	1	5	2	1
Potentilla palustris	2	–	–	6	–	–
Ranunculus flammula	–	–	–	1	–	–
Ranunculus subgenus *batrachium*	5	–	1	1	–	–
Schoenoplectus lacustris	6	–	–	24	16	26

Table 66 Plant taxa from the Phase 1A enclosure ditch

taxa	*samples*																					
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
Ranunculus subgenus *batrachium*	75	2	1	–	–	–	100	141	25	15	–	1	–	–	–	3	–	1	5	2	54	–
Ranunculus flammula	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Ranunculus a/r/b	–	1	–	–	–	–	–	15	6	3	6	–	16	–	–	3	–	1	5	7	–	–
Thalictrum flavum	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Chelidonium majus	–	–	–	–	–	–	8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Urtica dioica	100	23	–	–	–	–	100	13	74	24	5	65	155	–	–	5	–	5	29	3	11	84
Alnus	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	5	–	–
Corylus avellana (nut)	1	–	–	–	–	–	–	–	–	–	2	1	2	–	–	–	–	–	4	100	–	–
Atriplex sp	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	2	–	–
Chenopodium sp	–	–	–	–	–	–	–	–	–	1	1	1	1	–	–	2	–	–	2	–	–	1
Moehringia trinervia	11	–	–	–	–	–	8	–	–	–	–	3	1	–	–	–	–	–	–	–	–	–
Stellaria media	–	–	–	–	–	–	–	–	9	1	2	100	3	–	–	2	–	1	6	2	1	–
Stellaria cf *media*	20	–	–	–	–	–	10	23	–	2	–	–	–	–	–	–	–	–	–	–	–	–
Stellaria graminea	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
Stellaria cf *holostea*	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Stellaria alsine	–	–	–	–	–	–	–	–	–	1	–	4	–	–	–	–	–	–	–	–	–	–
Myosoton aquaticum	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–
Polygonum sp	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	1	–	–	–	2	–	–
Persicaria maculosa	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	2	–	–	1
Fallopia convolvulus	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Polygonum aviculare	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–
Rumex sp	24	–	–	–	–	–	14	34	10	9	7	–	3	–	1	–	–	–	8	–	–	–
Hypericum cf *maculatum*	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	5	–
Rorippa nasturtium-officinale	3	–	–	–	–	–	1	10	31	2	7	–	–	–	–	–	–	–	–	–	–	–
Rubus sp	–	–	–	–	–	–	–	5	–	–	8	40	11	–	–	2	–	1	–	4	–	–
Rubus fruticosus	7	–	–	–	–	–	10	–	9	–	–	–	–	–	–	–	–	–	6	–	–	–
Potentilla sp	–	–	5	–	–	–	–	–	1	–	–	–	1	–	–	–	1	1	–	–	4	–
Potentilla erecta	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
Potentilla palustris	–	–	42	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Rosa sp	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
Prunus spinosa	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	1	–	2	–	–
Prunus padus	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Agrimonia eupatoria	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–
Epilobium	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Apiaceae indet	–	–	–	–	3	–	–	–	–	–	–	–	1	–	–	1	–	–	1	–	–	–
Sium latifolium	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	7	–	–	–	–	–
Aphanes sp	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–
cf *Aegopodium*	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Oenanthe sp	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–
cf *Apium inundatum*	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Torilis	–	–	–	–	–	–	–	–	–	–	–	2	1	–	–	–	–	–	–	1	–	–
Menyanthes trifoliata	–	–	77	–	6	2	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Lamiaceae sp	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Galeopsis sp	1	1	–	–	–	–	–	26	–	–	–	2	1	–	–	–	–	–	2	–	–	–
Glechoma hederacea	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Prunella sp	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	1	–	–	–

Stachys sp	–	–	–	–	–	–	1	1	1	–	–	3	1	–	–	–	–	–	–	–	–	–
Mentha sp	7	2	12	–	1	1	1	1	1	–	–	–	2	–	–	–	–	1	7	9	–	–
Lycopus europaeus	10	2	52	–	15	2	66	–	1	–	–	–	1	–	–	1	–	1	–	–	–	–
Hippuris vulgaris	–	–	29	–	5	–	–	–	–	–	–	–	–	–	–	–	6	–	–	–	–	–
Scrophularia nodosa	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–
Euphrasia sp	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Sambucus sp	14	–	–	–	–	–	14	–	2	–	–	–	1	–	–	–	–	–	–	–	–	12
Asteraceae indet	–	–	–	–	–	–	–	9	–	–	1	1	–	–	–	1	–	–	–	–	–	–
Cirsium sp	4	–	–	–	–	–	1	4	–	–	–	5	1	–	–	–	–	–	–	–	–	–
Cirsium palustre	–	–	2	–	–	–	4	–	–	1	–	–	4	–	–	–	–	–	–	–	–	–
Cirsium arvense	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–
Lapsana communis	1	–	–	–	–	–	–	4	–	–	–	4	–	–	–	–	–	1	–	–	–	–
Sonchus asper	–	–	–	–	–	–	–	–	–	–	–	4	–	–	–	–	–	–	–	–	–	–
Taraxacum sp	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
cf *Bidens*	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–	–	–	–	–	–	–	–
Alismataceae	100	–	–	–	–	–	9	–	–	–	–	–	–	–	–	–	4	–	–	–	–	–
Potamogeton sp	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	4	–	1	–	–	–
Juncus sp	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Luzula sp	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cyperaceae	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1	–	–
Eleocharis sp	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Schoenoplectus lacustris	–	1	–	–	62	16	1	–	–	–	–	–	–	–	–	–	24	1	–	–	–	–
Cladium mariscus	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Carex sp (trigonal)	–	7	100	–	30	58	–	–	–	–	–	–	1	–	–	1	108	1	1	4	–	–
Carex sp (digonal)	–	–	–	–	1	6	–	–	–	–	–	–	1	–	–	–	–	1	1	–	–	–
Carex cf *panicea*	–	–	43	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Poaceae sp	–	2	–	–	1	–	4	3	–	–	4	8	17	–	–	1	–	–	3	2	2	–
Cereale	3	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	3	–	2	–	–
Triticum sp	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–
Chara oospores	–	23	–	–	1	–	–	–	–	–	–	–	–	–	–	–	30	1	–	–	–	–

key to samples:

segment 1
A, sections 5–6, layer 2; B, sections 5–6, layer 3 (0.90–0.95m depth); C, sections 5–6, layer 4; D, sections 5–6, layer 6; E, sections 5–6, layer 6; F, sections 5–6, layer 6; G, sections 2–3, layer 8 (0.70–0.75m depth)

segment 2
L, causeway B–section 28, layer 4

segment 3
H, section 35, layer 3 (6.50–6.60m OD); I, section 35, layer 3 (6.50–6.60m OD); J, section 40, layer 3 (6.5–6.6m OD)

segment 4
K, causeway D–section 41, layer 3 (6.4–6.5m OD)

segment 5
M, sections 59–60, layer 4 (6.55m OD); N, sections 59–60, layer 4; O, sections 74–75, layer 2 (6.9m)D); P, sections 90–94, layer 3 (6.87m OD); Q, sections 107–112, layer 3; R, sections 107–112, layer 3 (0.50–0.55m depth); S, sections 146–151, layer 2 (0.50–0.60m depth); T, sections 146–151, layer 3 (0.65–0.75m depth); U, sections 154–156, layer 2 (6.6m OD)

segment 13
V, causeway M–section 228, layer 5 (1.05m depth)

the early part of the Holocene, the Early Mesolithic, during the period *c* 10,000 to 8,000 BP (see Chapters 11 and 13).

A total of 26 seed taxa was identified from layer 6, largely comprising the marsh/wetland flora growing on-site in the channel. Cyperaceae were dominant, with large numbers of seeds of *Carex* spp and *Schoenoplectus lacustris*. In addition there was a diverse range of taxa that were likely to be growing in wet conditions in, or along, the edges of the channel. These comprised Alismataceae (*Alisma plantago-aquatica*), *Cirsium* cf *palustre*, *Lycopus europaeus*, *Hippuris vulgaris*, *Menyanthes trifoliata*, *Potentilla palustris*, *Ranunculus flammula*, and *Ranunculus* subgenus *Batrachium*. These are all indicative of a muddy substrate or shallow standing water (seasonal) habitat. Other taxa recorded may also be referable to this habitat, but identification has not been possible to species. *Hippuris vulgaris* is an interesting and, at first sight, unusual record. It has, however, a widespread distribution in Scandinavia and has been recorded in the Quaternary from sites of Devensian age and throughout all phases of the Holocene (Godwin 1975, 214).

Plants of locally drier habitats were not well represented, but comprised some elements that may be attributed to disturbed ground: *Polygonum aviculare*, cf *Artemisia* sp, and substantial numbers of *Urtica dioica* in sections 3–4, layer 6. Trees and shrubs were similarly few, with occasional records of *Sambucus* cf *nigra*, *Prunus* sp, and *Rubus* spp. This impoverished record is probably the result of taphonomic processes, which also emphasised the significance of locally growing plants. However, given the pollen data (Chapter 11) and insect data (Chapter 14), which suggest a Late Devensian and Early Holocene age for these fills, the absence of wind-transported *Betula* is 'unusual'.

The seed data from this context thus indicate an open environment such as would have existed during the Late Devensian cold stage or Early Holocene (pre-Boreal), with a typical range of marsh taxa colonising the stream channel. These data are commensurate with coleopteran and pollen analyses of the lower peats and sediments of this river/stream palaeochannel (Chapters 11 and 14).

The Neolithic

Seeds were obtained from the fills of the enclosure ditch from Phases 1A and 1B and from interior features of Phases 1 and 2. While the plant assemblages were essentially similar, being dominated by wetland taxa reflecting the waterlogged habitats of the enclosure ditch, some elements suggest differing habitats, especially between the wetter ditch and the interior features (predominantly pits).

Enclosure ditch: Phase 1A

The Middle Neolithic contexts in the basal fills of the enclosure ditch produced a diverse range of plants, largely herbs – 76 taxa recorded in 22 samples (Table 66). As indicated by the waterlogged preservation of the seeds, the local water table was high during this Middle Neolithic phase. This is similarly reflected in the floral components of the macrofossil assemblages. The presence especially of *Ranunculus* subgenus *Batrachium*, in some samples in very substantial numbers (>100), and *Myosoton aquaticum*, *Potamogeton* sp, and *Chara* oospores is a clear indication of areas of standing water in at least some areas of the enclosure ditch.

In addition to these aquatics, there was a diverse assemblage of marsh/waterside taxa favouring very wet or muddy habitats, such as might be found on the margins of the enclosure ditch. This dominant autochthonous group comprised *Ranunculus flammula*, *Myosoton aquaticum*, *Rorippa nasturtium-officinale* (especially segment 3, layer 3), *Potentilla palustris*, *Oenanthe* sp (sporadic), *Menyanthes trifoliata* (especially segment 1, layer 4), *Lycopus europaeus*, *Hippuris vulgaris*, *Scrophularia nodosa*, *Cirsium palustre*, *Alisma plantago-aquatica*, and Cyperaceae – including *Carex* spp (abundant in segment 1, layers 4 and 6), *Cladium mariscus*, and *Schoenoplectus lacustris* (abundant in segment 1, sections 5–6, layer 6, and in segment 5, sections 107–112, layer 3).

The seed assemblages are, therefore, seen to be dominated by vegetation growing in, or immediately adjacent to, the enclosure ditch. Minor representation of dryland plants is seen as due to taphonomy, with only such local elements being represented unless introduced by, for example, human or animal influences. When compared with the pollen (Chapter 11) and insect data (Chapter 14), it can be seen that the environment of deposition is confirmed by all studies. The general open/non-wooded character of the causewayed enclosure during this phase is, however, more clearly seen in the pollen and insect data, with the presence of ruderal herb pollen taxa and cereals, as well as pasture and dung beetles. In spite of the charcoals and *Corylus avellana* nuts from the interior feature context F505 (see below), there was little evidence of woodland or scrub during this period.

Interior pit F505: Phase 1A/1B

A single, Middle Neolithic pit (F505/563) containing Mildenhall pottery also produced large numbers of waterlogged seeds (Table 67). Four broadly sequential samples were examined from the base of the pit upwards. Unlike the outer enclosure ditch, the plant taxa were predominantly ones of dry ground, largely comprising ruderals. The assemblage was not especially diverse and was dominated by very large numbers of *Urtica dioica*, especially in the higher levels (around 0.50m). Apart from *Corylus avellana* nuts, the remaining seed types were represented in small numbers and are ruderals. These include *Atriplex* sp, *Chenopodium* sp, *Stellaria media*, *Montia fontana*, *Polygonum aviculare*,

Table 67 Plant taxa from the Phase 1A/1B interior pit F505/563

taxa	*samples*			
	0.5m depth	>0.5m depth	0.65–0.70m depth	0.75–0.80m depth
Ranunculus a/r/b	–	–	–	1
Urtica dioica	47	100	19	37
Corylus avellana (nut)	–	1	8	100
Atriplex sp	–	1	3	–
Chenopodium sp	–	–	1	3
Montia fontana spp *chrondosperma*	–	3	12	19
Stellaria media	–	3	10	10
Stellaria cf *media*	1	–	–	–
Polygonum lapathifolium	–	–	1	1
Polygonum aviculare	–	–	–	5
Rumex sp	–	–	4	6
Rubus sp	4	3	–	–
Rubus fruticosus	–	–	6	1
Potentilla sp	–	4	1	1
Prunella sp	–	7	1	–
Stachys sp	–	–	1	1
Veronica arvensis	–	–	1	–
Cirsium sp	–	–	1	–
Carex sp (trigonal)	–	1	–	–
Poaceae sp	–	6	–	–

Polygonum lapathifolium, *Veronica arvensis*, and other more catholic types or taxa not identifiable to a lower taxonomic level; these are, therefore, not attributable to specific habitats. There were no wet ground/fen-type elements apart from a single *Carex* nutlet. Similarly, there were no cereals or cultivated plants present. Shrubs were represented by *Rubus fruticosus* and by especially large numbers of *Corylus avellana* nuts and fragments lying in the base of the pit.

The occurrence of *Corylus avellana* nuts poses the interesting possibility that they were the remains of food, with the waste shells being disposed of in the pit. Alternatively, they are evidence of local, open scrub woodland, which was cleared from the site during this period. The presence of charcoal in Phase 1A features (enclosure ditch and interior features) shows that there was (presumably local) hazel woodland or scrub that was perhaps coppiced/managed. The fact that the nuts were waterlogged, rather than charred, suggests that they may have come from local growth and that hazel wood was also collected from the site for fuel. However, the enclosure ditch fills described above and also attributed to this phase did not produce such evidence of local woodland. Without further data this question remains unanswered.

The waterlogged preservation of the seeds in the pit shows that the groundwater table was high. However, the virtual absence of wetland plant taxa here, but which were numerous and diverse in the enclosure ditch, suggests that the longevity of this feature was not great enough to support such marsh-type communities. Whether rapidly filled or not, the range of ruderal/weed taxa is evidence of the openness of the immediate local environment, but possibly with hazel and bramble scrub present.

Enclosure ditch: Phase 1B

The Middle Neolithic Phase 1B fills of the enclosure ditch produced five samples containing quantities of waterlogged seeds (Table 68). As with Phase 1A samples, the overwhelming predominance of taxa derived from damp or aquatic habitats, especially segment 1, sections 13–14, layer 2, and segment 1, sections 11–12, layer 2. These comprised very substantial numbers of *Ranunculus* subgenus *Batrachium* type, *Myosoton aquaticum*, *Rorippa nasturtium-aquaticum*, *Lycopus europaeus*, Alismataceae, and *Potamogeton* sp (only in sections 13–14). *Chara* oospores were abundant in sections 11–12. *Carex* nutlets were, however, fewer than in earlier contexts.

This assemblage suggests that the ditch contained areas of standing water, with some degree of seasonal stability allowing the continuance of taxa such as *Potamogeton* sp and *Ranunculus* (*Batrachium* types). There was also clear representation of plants growing marginal to these areas and/or in muddier parts of the enclosure ditch. These data concur with the environments shown by insects in these contexts (Chapter 14).

In addition to these marsh/poor fen aquatic types was a range of ruderal taxa. This contrasts with the almost absence of such types from the Phase 1A enclosure ditch fill. *Urtica dioica* was most important and was present in substantial numbers in all contexts examined.

Table 68 Plant taxa from the Phase 1B enclosure ditch

taxa	*samples*				
	segment 10, sections 206–, 207A, layer 16	segment 11, causeway K–section 208A, layer 6	segment 1, sections 13–14, layer 2, 0.65–0.70m depth	segment 1, sections 13–14, layer 2	segment 1, sections 11–12, layer 2
Ranunculus sp	–	–	–	–	–
Ranunculus subgenus *batrachium* type	–	–	76	100	100
Ranunculus a/r/b	1	–	–	–	–
Papaver sp	–	–	1	6	1
Urtica dioica	100	26	117	100	100
Alnus glutinosa	–	–	–	–	11
Atriplex sp	–	4	–	–	–
Chenopodiaceae	–	20	–	–	–
Chenopodium sp	4	2	2	3	–
Moehringia trinervia	–	–	1	7	–
Stellaria media	–	2	–	–	–
Stellaria cf *media*	–	–	1	–	2
Stellaria graminea	–	–	1	–	1
Stellaria cf *holostea*	–	–	1	3	–
Myosoton aquaticum	–	–	–	18	15
Polygonum sp	–	9	–	–	–
Polygonum aviculare	–	–	1	–	–
Rumex sp	–	–	8	–	–
Brassicaceae indet	–	–	–	1	6
Rorippa nasturtium-aquaticum	–	–	16	–	9
Rubus fruticosus	1	1	–	–	7
Potentilla sp	2	8	2	4	–
Prunus spinosa	–	–	4	–	–
Epilobium sp	–	–	1	–	–
Aphanes sp	–	–	–	1	–
cf *Aegopodium*	–	–	–	1	–
Lamiaceae sp	–	–	–	2	–
Galeopsis sp	–	1	–	1	–
Galeopsis tetrahit	–	1	–	–	–
Glechoma hederacea	–	–	–	2	–
Prunella sp	–	–	1	1	1
Stachys sp	1	–	–	4	–
Mentha sp	–	–	1	3	11
Lycopus europaeus	–	–	–	42	41
Euphrasia sp	–	–	–	3	–
Sambucus sp	2	2	–	1	1
Asteraceae indet	–	–	–	1	–
Arctium minus	–	–	–	–	1
Cirsium palustre	–	–	1	4	3
Lapsana communis	–	–	–	3	–
Alismataceae	–	–	13	37	67
Potamogeton sp	–	–	–	19	–
Juncus sp	–	–	–	1	1
Carex sp (trigonal)	–	–	–	2	–
Carex sp (digonal)	–	–	1	2	–
Poaceae sp	–	–	8	12	–
Chara oospores	–	–	–	–	53

Also recorded was a relatively diverse range of weeds, although in small numbers, including *Papaver* sp, (CH *Ranunculus acris/repens/bulbosus* sp) *Atriplex* sp, Chenopodiaceae, *Stellaria* spp, *Polygonum aviculare*, *Rumex* sp, and *Lapsana communis*. Other taxa not fully identifiable to species or genus and/or of catholic types (such as *Galeopsis tetrahit*) may also be referable to waste ground habitats. This aspect of the seed assemblage is interesting in that it contrasts with Phase 1A, which contained few such ruderals. It is, nevertheless, similar to the interior pit F505 of Phase 1A/1B.

It is difficult to assess the true vegetational character of the adjacent dryland of the enclosure interior because the 'on-site'/autochthonous wetland types dominated the assemblage, with apparently only small numbers of herbs from further afield being preserved. While *Urtica dioica* has been attributed to disturbed ground and human activity, it is also considered that it may have been dominant in the ditch in nitrogen/phosphate-rich areas of animal disturbance. Considering that seeds from more than a few metres distant are usually poorly represented, it is also possible and likely that grassland or pasture may also have been present

Table 69 Plant taxa from Phase 1C pits F975 and F981

taxa	*samples*			
	F981, layer 4	F981, layer 4	F975, layer 1	F975, layer 1
Ranunculus sp	5	–	–	–
Urtica dioica	55	58	1	–
Alnus glutinosa	1	–	–	–
Corylus avellana (nuts)	1	–	–	–
Stellaria media	4	–	–	–
Polygonum aviculare	–	1	–	–
Rumex sp	5	–	–	–
Rubus sp	22	28	–	–
Potentilla sp	15	9	–	–
Rosa sp	1	–	–	–
Heracleum sphondylium	1	–	–	–
Torilis sp	1	–	–	–
Glechoma sp	1	–	–	–
Prunella sp	1	–	–	–
Stachys sp	1	–	–	–
Sambucus	–	2	100	100
Cladium mariscus	–	–	–	–
Carex sp (trigonal)	1	–	–	–
Poaceae sp	3	–	3	–

(Poaceae, *Ranunculus a/r/b*, *Prunella*). Robinson (Chapter 14) has similarly pointed to the importance of taxa with pasture and dung.

Later Phase 1: the interior features

The seed assemblages (Table 69) were not as diverse as those from the earlier Phase 1A and 1B contexts. They were, however, interesting in view of substantially greater numbers of seeds of scrub *Rosa* sp and *Rubus* sp cf *fruticosus* (in pit/well F981) and *Sambucus* (in pit F975). Other dominants included *Urtica dioica* (in F981), and a small range of ruderal types was present. There were no important wetland taxa in these two assemblages.

The greater numbers of *Rubus*, *Rosa*, and *Sambucus* from these contexts (plus one *Corylus avellana* nut fragment) might be suggestive of scrub regeneration consequent on abandonment or reduced human activity on the site. Certainly, *Sambucus nigra* is highly characteristic of growth/regeneration in areas of abandoned human activity. This matches the archaeological evidence. It might, however, be considered that these elements reflect colonisation of the ditches/pits from which the seeds were recovered. This accords with the absence of fen-type/aquatic taxa, implying that the bases of these pits were relatively dry.

Phase 2: Grooved Ware/Fengate Ware contexts

Late Neolithic pits containing Grooved Ware (F871, F1054) and ditches and a pit/well containing Fengate pottery (F986, enclosure ditch segment 1, sections 5–6) displayed a diverse assemblage of seeds, but in relatively small numbers (Table 70). Unlike the earlier Phase 1A and 1B (Middle Neolithic), these later contexts had far smaller numbers of wetland plants than were present in the outer enclosure. Only tentative evidence of a marginally damp environment was present, with sporadic occurrences of *Ranunculus* subgenus *Batrachium*, *Ranunculus flammula*, *Rorippa nasturtium-aquaticum*, *Lycopus europaeus*, and Cyperaceae (*Carex* and *Eleocharis*). The assemblage, however, differs from the dry land terrestrial weed types from the slightly earlier Phase 1C contexts, in that there appear to be fewer of the shrub taxa noted.

Fengate contexts: F986, layers 3 and 6; ditch segment 6, sections 172–176, layer 6. The dominant, most prevalent taxa were *Urtica dioica*, *Chenopodium* sp (F986, layer 6), *Ranunculus* sp, *Rumex* sp, and *Hyoscyamus niger*. There were sporadic, individual occurrences of other types, notably *Persicaria maculosa* and *Fallopia convolvulus*. These weeds are clearly attributable to disturbed ground. Other taxa included *Hyoscyamus niger* (possibly indicating animal dung or dung heaps), *Montia fontana* spp *chrondrosperma* (reflecting typically damper, sandy, slightly acidic soils), and *Urtica dioica*, which may have been growing in nitrogenous soils resulting from human settlement or animal-enriched soils.

Grooved Ware contexts: F1054, layer 8, and F871, layer 1. These pits are notable for the relatively large numbers of weed (ruderal) taxa recovered. Ubiquitous *Urtica dioica* was present, with substantial numbers of *Polygonum lapathifolium* and *Maculosa persicaria*, *Rumex* sp, and possibly *Ranunculus a/r/b* types, *Sonchus* sp *asper*, and *Papaver* sp. These again are indicative of waste ground habitats close to areas of settlement.

Table 70 Plant taxa from Phase 2 Grooved Ware and Fengate contexts

taxa	*samples*									
	F986, layer 6, >0.95m	F986, layer 3, 0.65–0.70m	ditch segment 6, sections 172–176, 6.83m OD, layer 6	ditch segment 1, sections 5–6 layer 1	F1054, layer 8, 0.40–0.50m	F871, layer 1, 6.5m OD	F871, layer 1, 6.6m OD	F871, layer 1, 6.7m OD	F871, layer 1, 6.8m OD	F871, layer 1, 6.9m OD
Ranunculus sp	–	–	55	–	–	–	–	–	–	–
Ranunculus subgenus *batrachium* type	–	–	–	1	1	6	2	1	–	–
Ranunculus flammula type	–	–	–	–	–	3	1	–	–	–
Ranunculus a/r/b	–	–	5	–	–	23	5	–	1	–
Papaver sp	–	–	–	–	–	1	–	–	–	–
Urtica dioica	4	–	28	–	38	6	10	–	–	–
Corylus avellana (nuts)	–	–	1	–	4	1	1	–	–	–
Atriplex sp	–	–	–	–	–	–	6	–	–	–
Chenopodiaceae	–	–	4	–	–	1	5	–	–	–
Chenopodium sp	35	2	–	–	–	2	2	–	–	–
Montia fontana spp *chrondosperma*	–	–	1	–	–	1	1	–	–	–
Moehringia trinervia	–	–	2	–	–	–	–	–	–	–
Stellaria sp	–	2	–	–	–	–	–	–	–	–
Stellaria media	–	3	3	–	1	15	7	5	–	–
Stellaria cf *media*	–	–	–	–	–	2	–	–	–	–
Stellaria graminea	–	2	1	–	–	–	1	3	–	–
Polygonum sp	–	1	–	–	–	–	1	–	–	–
Polygonum lapathifolium type	–	–	–	–	–	–	–	31	–	–
Persicaria maculosa	3	–	–	–	–	71	25	–	–	–
Fallopia convolvulus	2	–	–	–	–	–	–	–	–	–
Polygonum aviculare	–	2	–	–	–	8	5	–	–	–
Rumex sp	–	3	17	–	–	22	12	16	–	–
Brassicaceae indet	–	–	–	–	–	1	9	–	–	–
Rorippa nasturtium-aquaticum	–	–	8	–	–	5	8	2	–	–
Rubus sp	–	–	2	–	–	–	–	4	–	–
Rubus sp (spine)	–	–	–	–	–	–	–	5	–	–
Rubus fruticosus	–	–	–	–	2	4	3	–	–	–
Potentilla sp	–	–	2	–	–	–	–	1	–	–
Epilobium sp	–	–	5	–	–	–	–	–	–	–
Apiaceae indet	–	1	–	–	–	–	–	–	–	–
Heracleum sphondylium	–	–	–	–	1	–	–	–	–	–
Torilis sp	–	–	1	–	–	–	–	–	–	–
Hyoscyamus niger	–	–	5	–	1	3	–	–	–	–
Galeopsis sp	–	–	1	–	–	1	–	–	–	–
Stachys sp	–	–	–	–	–	–	–	–	1	–
Mentha sp	–	–	1	–	–	2	1	2	–	–
Lycopus europaeus	–	–	4	–	–	1	1	–	–	–
Plantago major	–	–	1	–	–	1	–	–	–	–
Veronica arvensis	–	–	1	–	–	2	–	–	–	–
Sambucus cf *nigra*	–	–	–	–	–	4	3	11	–	11
Asteraceae indet	2	–	–	–	1	1	8	–	–	–
Cirsium palustre	–	–	1	–	–	–	–	–	–	–
Sonchus sp	–	–	3	–	–	–	–	–	–	–
Sonchus cf *asper*	–	2	–	–	–	3	–	–	–	–
cf *Bidens*	–	–	–	–	–	–	–	6	–	–
Cyperaceae	–	–	3	–	–	–	–	–	–	–
Eleocharis sp	–	–	–	–	–	9	6	–	–	–
Carex sp (trigonal)	1	–	7	–	–	4	16	–	–	–
Carex sp (digonal)	–	–	–	–	–	1	–	–	–	–
Poaceae sp	–	–	2	–	6	6	–	–	–	–
Cereale	–	–	–	–	–	3	–	–	–	–

Attention has been drawn to the importance of *Rubus*, *Rosa*, and especially *Sambucus* in Phase 1C, possibly indicating local scrub colonisation – these types are less well represented, although small numbers of *Corylus avellana* nuts, *Rubus fruticosus*, and *Sambucus* cf *nigra* were present (the latter especially in pit F871, layer 1, between 6.7m and 6.9m OD). F871, layer 1 (6.5m), is one of the few contexts that have yielded any remains of cereals at the site (cf *Triticum*).

It is difficult to ascertain with any certainty the range of local habitats present from these seed assemblages. Certainly, the range of ruderals implies areas of

Table 71 Charcoal from Phase 1A/1B

taxa	*samples*																									
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
cf *Prunus*	–	–	–	–	–	–	–	–	–	*	–	–	–	–	–	–	–	–	–	–	–	–	*	–	–	–
Prunus type	–	–	*	–	–	*	–	–	*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
cf Pomoideae	–	–	–	–	–	–	*	–	–	–	*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pomoideae	–	–	–	–	–	–	–	–	–	–	–	–	–	*	–	–	–	*	–	–	–	–	–	–	–	–
Corylus nut fragments	–	*	–	–	–	–	–	–	–	–	–	–	–	–	24	–	–	–	–	–	–	–	–	*	–	–
Alnus	–	–	–	–	–	*	–	–	*	–	–	–	*	–	–	–	*	–	–	–	–	–	–	*	–	–
Quercus	*	–	*	–	–	–	–	–	–	–	–	–	*	*	–	*	*	–	–	*	*	–	*	*	–	–
Salix/ Populus	–	–	–	–	–	–	–	–	*	*	–	–	*	–	–	–	*	*	–	–	*	–	*	*	*	–
Fraxinus	–	–	–	–	*	*	–	–	–	–	–	–	–	–	–	–	–	–	*	*	–	–	*	–	–	–
Betula/Corylus/Alnus	–	–	*	–	–	*	–	–	*	–	–	–	–	–	–	*	–	–	*	–	–	–	–	–	–	*
indeterminate	*	–	–	–	–	*	–	*	–	–	*	*	–	–	–	*	*	*	–	–	–	*	*	–	–	–
weight (g)	–	0.1	37.0	0.7	–	9.4	1.5	0.8	17.0	10.0	4.2	–	13.0	–	2.1	–	–	–	3.3	3.4	0.5	4.5	–	–	0.7	1.0

key to samples:

A, pit F931, layer 1; B, pit F933, layer 1; C, pit/well F981, layer 2; D, pit/well F981, layer 4; E, F1037, layer 1; F, F1062, layer 1; G, F233, layer 1; H, F239, layer 1; I, F240, layer 1; J, F241, layer 1; K, F334, layer 1; L, F465; M, F711, layer 1; N, F624, layer 1 (0.18m depth); O, F749, layer 1; P, F797; Q, F857, layer 1; R, F858, layer 1; S, F866, layer 1; T, F866, layer 2; U, F881; V, F882, layer 1; W, F912, layer 1; X, F922, layer 1; Y, enclosure ditch segment 14, sections 141–245, layer 4; Z, enclosure ditch segment 13, sections 234–238, layer 6

* present

Table 72 Charcoal from Phase 1 (undifferentiated)

taxa	*samples*										
	F275, layer 1	F370, layer 1	F386, layer 1, >0.14m	F503, layer 1, >0.02m	F504, layer 1, >0.04m	F622, layer 1	F832, layer 1	F861, layer 1, >0.05m 0.04m	F867, layer 1, 0.02–	F977, layer 1,	F1034, layer 1
cf *Prunus* type	–	–	–	*	–	*	–	–	–	–	–
Prunus spinosa	–	–	*	–	–	–	–	–	–	–	–
Corylus nut fragments	–	–	–	–	–	–	–	–	–	–	*
Alnus	–	–	*	–	–	–	–	–	–	–	–
cf *Quercus*	–	–	*	–	–	–	–	*	*	–	–
cf *Fraxinus*	–	*	–	–	–	–	–	–	–	–	–
Salix/Populus	–	–	–	–	*	*	–	–	–	–	–
cf *Salix/Populus*	*	–	–	–	–	–	–	–	–	–	*
indeterminate	–	–	–	–	–	–	*	–	–	*	–
weight (g)	2.4	–	–	0.8	–	–	0.1	–	–	1.7	0.6

* present

disturbed ground. This could be the result of human activity, including occupation and arable agriculture (evidenced from *Triticum* caryopses) or from other activities of a more unusual character – perhaps ceremonial activities or meetings. A number of contexts in Phases 1C and 2 have produced seeds of shrubs that undoubtedly came from scrub. Given the possible uses of the pits (see Chapter 16) and the large amounts of charcoal in some contexts, it has been considered that these shrub types were introduced from outer areas away from the enclosure. However, the absence of charred seeds of these types negates this. It is also plausible and highly likely that these taxa derive from hedgerows.

The charcoals

Substantial quantities of charcoal were recovered from a large number of primary enclosure ditch and pit contexts. These fragments were sorted from residues examined for seeds and identified where possible to the lowest taxonomic level. In such studies structural morphological similarities negate definitive identification of some taxa to generic level and/or with difficulty. *Populus/Salix* and *Alnus/Corylus/Betula* are particularly problematic. Quantification of fragmentary charcoal was deemed unnecessary, and only presence/absence data have been presented (Tables 71–75).

The presence, nevertheless, of charcoal is part of the botanical database, along with pollen and seeds; each provides data pertinent to general environmental reconstruction. In the case of charcoals, the data have a twofold potential: evidence of wood and shrub taxa that grew on or within the region, and the use of wood as a natural resource by the Neolithic communities. It is possible that cremation pyres may have been constructed from local wood and burnt in settlements nearby, and the pyre residue removed and placed within small pits in the causewayed enclosure. A second possibility is that the wood for the pyre was obtained near or even within the enclosure area and that the ceremony was carried out on site.

Charcoal was extracted from contexts dating to Phases 1A, 1B, 1C, and 2. Some data were obtained for contexts not securely dated (Table 72).

The results indicate the prevalence of small, scrub woodland trees and shrubs and a limited range of large trees. Many of the former might be attributed to growth in areas of scrub or in hedgerows; for example, *Prunus* type, *Crataegus monogyna*, *Pomoidea*, and possibly *Betula* and *Corylus avellana*. Only *Quercus* and *Fraxinus* represent larger/dominant woodland taxa. As might be expected from the proven waterlogged character of many of the larger pits and the enclosure ditch (especially during the earlier phases), wetland/fen carr-type taxa/trees were present, with *Alnus*, *Rhamnus*, and *Salix/Populus* (likely here to be *Salix*). Thus, woodland, scrub/hedgerow, and wetland fen types are evidenced in the charcoal record.

Table 73 Charcoal from Phases 1C and 2

taxa	*samples*																	
	F14, layer 1	F14, layer 2	F447, layer 1, >0.05m	F925, layer 1	F925, layer 1	F926, layer 1	F986, layer 1	F986, layer 2	F986, layer 6	F1032, layer 1	F1052, layer 1	F1054, layer 6, 0.40–0.45m	F1054, layer 8, 0.60–0.65m	F1054, layer 8, 0.65–0.70m	F1023, layer 1	F1023, layer 1	F821, layer 1	F975, layer 1 0.35m
cf *Rhamnus*	–	–	–	–	–	–	*	*	–	–	–	–	–	–	–	–	–	–
cf *Prunus* type	–	–	–	–	–	–	–	–	–	–	–	*	–	–	*	–	–	–
Prunus type	–	–	–	–	–	–	*	–	–	*	–	–	–	–	–	*	–	–
cf Pomoideae	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*	–	–
Pomoideae	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*	–	–	–
Betula	–	–	–	–	–	–	*	–	–	–	*	–	–	–	–	–	*	–
Corylus avellana	–	*	–	–	–	–	–	–	–	*	–	–	–	–	–	*	–	–
Corylus nut fragments	–	–	–	–	*	*	–	–	–	–	–	–	*	–	–	–	–	–
Alnus	–	–	–	–	–	–	–	–	–	*	–	–	–	–	–	*	*	*
cf *Alnus*	–	–	–	–	–	–	–	–	–	*	–	–	–	–	–	–	–	*
Betula/Alnus/Corylus	–	–	–	–	–	–	–	*	–	–	*	–	–	–	*	*	*	*
cf *Quercus*	*	–	*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*
Quercus	–	–	–	–	–	–	–	–	–	–	*	*	–	–	–	–	–	–
cf *Fraxinus*	–	–	–	–	–	–	–	–	–	–	–	*	–	–	–	–	–	–
Fraxinus	–	*	–	–	*	–	*	*	–	*	*	–	*	*	–	–	–	–
Salix/Populus	–	–	–	–	–	–	–	*	*	*	*	*	–	–	–	–	*	–
indeterminate	–	–	–	*	–	*	–	–	–	–	–	–	–	–	–	–	–	*
weight (g)	–	9.8	–	0.4	2.6	<0.1	23.0	3.2	3.0	25.0	10.0	6.4	0.5	5.4	10.0	0.6	3.1	11.7

* present

Table 74 Charcoal from the Phase 1C enclosure ditch

taxa	*samples*						
	segment 7, section 189–causeway H, layer 3	segment 12, sections 222–226, layer 4	segment 11, section 209–causeway L, layer 3	segment 11, section 209–causeway L, layer 3	segment 13, causeway M–section 228, layer 3	segment 7, sections 187–189, layer 2	segment 10, causeway J–section 205
cf *Prunus* type	–	–	*	–	–	–	–
Corylus avellana	–	*	–	–	*	–	–
Betula/Alnus/Corylus	*	*	*	–	–	–	–
cf *Quercus*	–	*	*	–	*	–	–
cf *Fraxinus*	–	–	–	*	–	–	–
Fraxinus	–	–	–	*	–	–	–
Salix/Populus	*	–	*	–	–	*	*
indeterminate	–	–	–	–	–	*	*
weight (g)	10.5	10.7	4.7	0.6	6.1	0.9	1.8

* present

Table 75 Charcoal from the Phase 2 enclosure ditch

taxa	*samples*		
	segment 1, sections 10–11, layer 1	segment 5, sections 125–127	segment 10, F994, layer 2
cf *Prunus* type	*	–	–
Corylus avellana	–	*	–
cf *Quercus*	*	–	–
Quercus	–	–	*
Salix/Populus	–	–	*
indeterminate	*	–	–
weight (g)	3.4	–	3.3

* present

11 Pollen analyses

by Rob Scaife

Introduction

In recent years the pollen analyses of peat deposits in the Fenland region have provided a detailed insight into the character of the later Holocene vegetation changes of the region (Scaife 1993b; 1994; Waller 1994). In some cases, these analyses have included the study of the peats and the underlying buried land surface, as at Crowtree and Oakhurst Farms (Scaife 1993a; 1993b). With the exception of palynological studies of the Flag Fen Bronze Age platform (Scaife 1992 and in preparation), these studies have not been undertaken in close relation to excavated archaeological sites and contexts. It was thus anticipated that pollen analyses of the Neolithic and Bronze Age soils and sediments excavated at Etton would provide information relating to the prehistoric environment in such close proximity to the causewayed enclosure.

The ditches of the Etton enclosure characteristically show evidence for different phases of recutting and filling. The deposits in the ditch were fortuitously subject to waterlogging by the relatively high groundwater table, and consequently, there was fine preservation of organic materials in the lowest ditch levels. The local drainage, however, caused the desiccation of the sediments in the upper ditch contexts. This was unfortunate, since it was these levels that related to the Neolithic and perhaps later occupation. As a consequence, well-preserved pollen was found in organic deposits at the base of the ditch sections but became progressively degraded in the upper contexts. It is now thought that these basal levels dated to a much earlier period of open landscape than previously suggested – that is, perhaps during the Late Devensian period. Some initial results of these analyses have been previously presented (Scaife 1983; 1985a; 1985b). These published data were based on the study of one stratigraphical section from basal deposits beneath the enclosure ditch segment 1, layer 6, between sections 7 and 8; these stream deposits predated the lowest (layer 5) infilling of the Phase 1A Neolithic ditch (Table 4). This chapter presents in full the results of this analysis and its reinterpretation, as well as subsequent comparative analyses of other ditch fill samples.

Methodology

Samples for pollen analysis were taken from the peats and sediments that were previously attributed to Phase 1. These are, however, now thought to derive from a pre-Neolithic stream channel in ditch segment 1. Samples were also taken from the lowest Neolithic deposits of segment 1 (Phase 1A). The former levels appeared to represent an open herbaceous environment that existed during the Late Devensian cold stage (possibly dating to the Loch Lomond readvance). The latter samples (Phase 1A) came from the organic fill of the ditch that had been cut into these earlier organogenic deposits. Unfortunately, only a single sample (at the base of the sediments) was found to contain pollen, due to drainage and resultant oxidation of the pollen and spores. Samples were also taken from a well-preserved and inverted turf found in the enclosure ditch segment 11 (at section 208A, in Phase 1B contexts). Although pollen appeared to be present in the pit fills, the very substantial quantities of charcoal present negated any detailed study.

Standard procedures were used for the extraction of the pollen and spores (Moore and Webb 1978). This included NaOH deflocculation, HF for removal of silica, and Erdtman's acetolysis for removal of cellulose. The concentrated pollen and spores were stained with safranin and mounted in glycerol jelly. Identification and counts of the microfossils were made using a Zeiss microscope with phase contrast facilities. For the purposes of interpretation, the pollen data have been calculated as a percentage of total pollen including wetland taxa. Spores (Monolete Filicales) were calculated as a percentage of total pollen plus spores. The data are presented in standard pollen diagram form (Figs 249–251).

Peat-filled channel

Four series of samples were taken for analysis from the peat-filled channel in enclosure ditch segment 1:

Ten samples from layer 6 between sections 7 and 8 (1982 excavations).

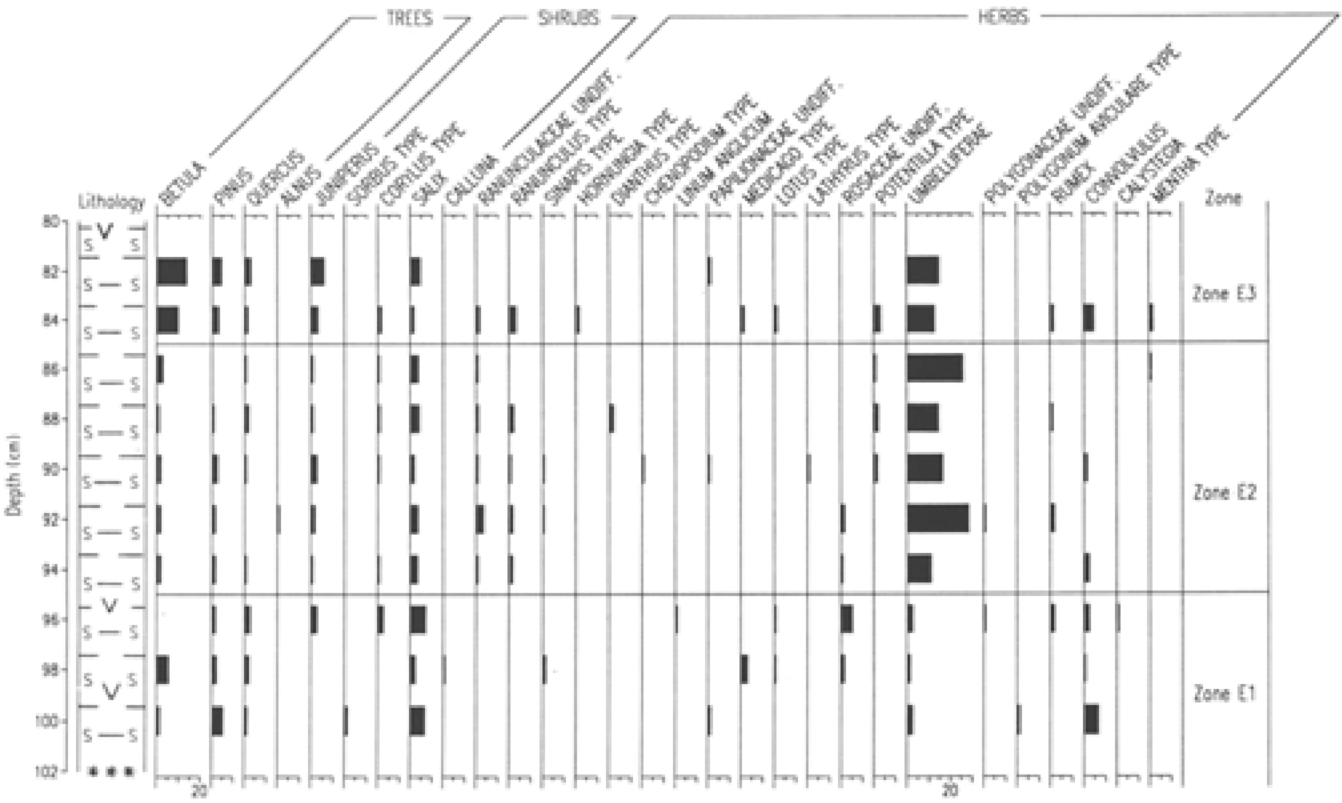
Spot samples from the same context.

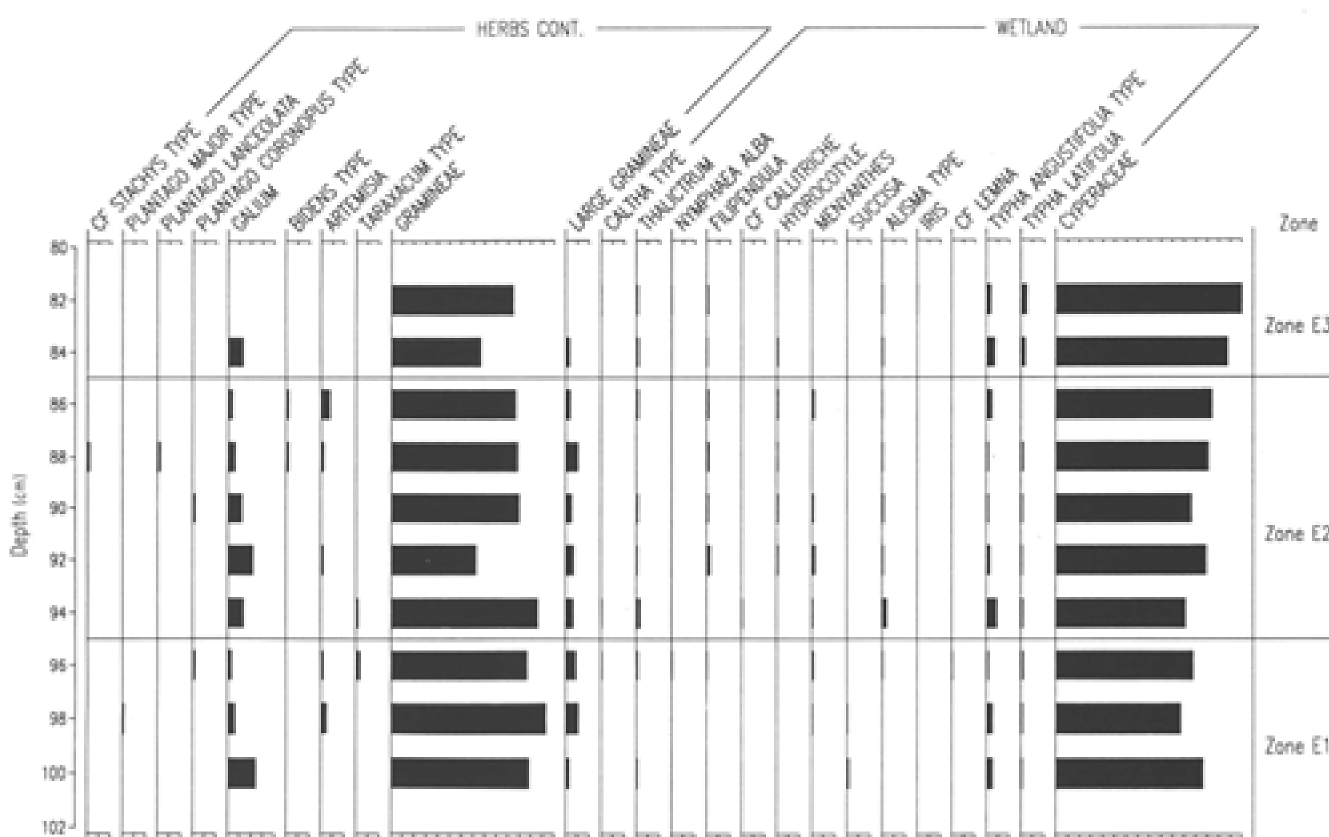
Four samples from the base of the trial trench through the enclosure ditch at section 6 (1981 excavations).

Spot samples of the peat-filled channel between sections 5 and 6 (1982 excavations).

These sediments comprised predominantly black to brown, highly humified, fen-type peat, having little structure other than monocotyledonous root fragments and wood. Identifiable fragments of the latter were examined by Maisie Taylor and consisted predominantly of *Alnus* roots, possibly derived from Phase 1 coppice stools (see Chapter 4).

The two best-sampled series (1 and 3) are described in more detail below.


TREES
SHRUBS
HERBS
Lithology
BETULA
PINUS
QUERCUS
ALNUS
JUNIPERUS
SORBUS TYPE
CORYLUS TYPE
SALIX
CALLUNA
RANUNCULACEAE UNDIFF.
RANUNCULUS TYPE
SINAPIS TYPE
HORNUNGIA TYPE
DIANTHUS TYPE
CHENOPODIUM TYPE
LINUM ANGLICUM
PAPILIONACEAE UNDIFF.
MEDICAGO TYPE
LOTUS TYPE
LATHYRUS TYPE
ROSACEAE UNDIFF.
POTENTILLA TYPE
UMBELLIFERAE
POLYGONACEAE UNDIFF.
POLYGONUM AVICULARE TYPE
RUMEX
CONVOLVULUS
CALYSTEGIA
MENTHA TYPE
Zone
Zone E3
Zone E2
Zone E1
Depth (cm)


HERBS CONT.
WETLAND
CF STACHYS TYPE
PLANTAGO MAJOR TYPE
PLANTAGO LANCEOLATA
PLANTAGO CORONOPUS TYPE
GALIUM
BIDENS TYPE
ARTEMISIA
TARAXACUM TYPE
GRAMINEAE
LARGE GRAMINEAE
CALTHA TYPE
THALICTRUM
NYMPHAEA ALBA
FILIPENDULA
CF CALLITRICHE
HYDROCOTYLE
MENYANTHES
SUCCISA
ALISMA TYPE
IRIS
CF LEMNA
TYPHA ANGUSTIFOLIA TYPE
TYPHA LATIFOLIA
CYPERACEAE
Zone
Zone E3
Zone E2
Zone E1
Depth (cm)

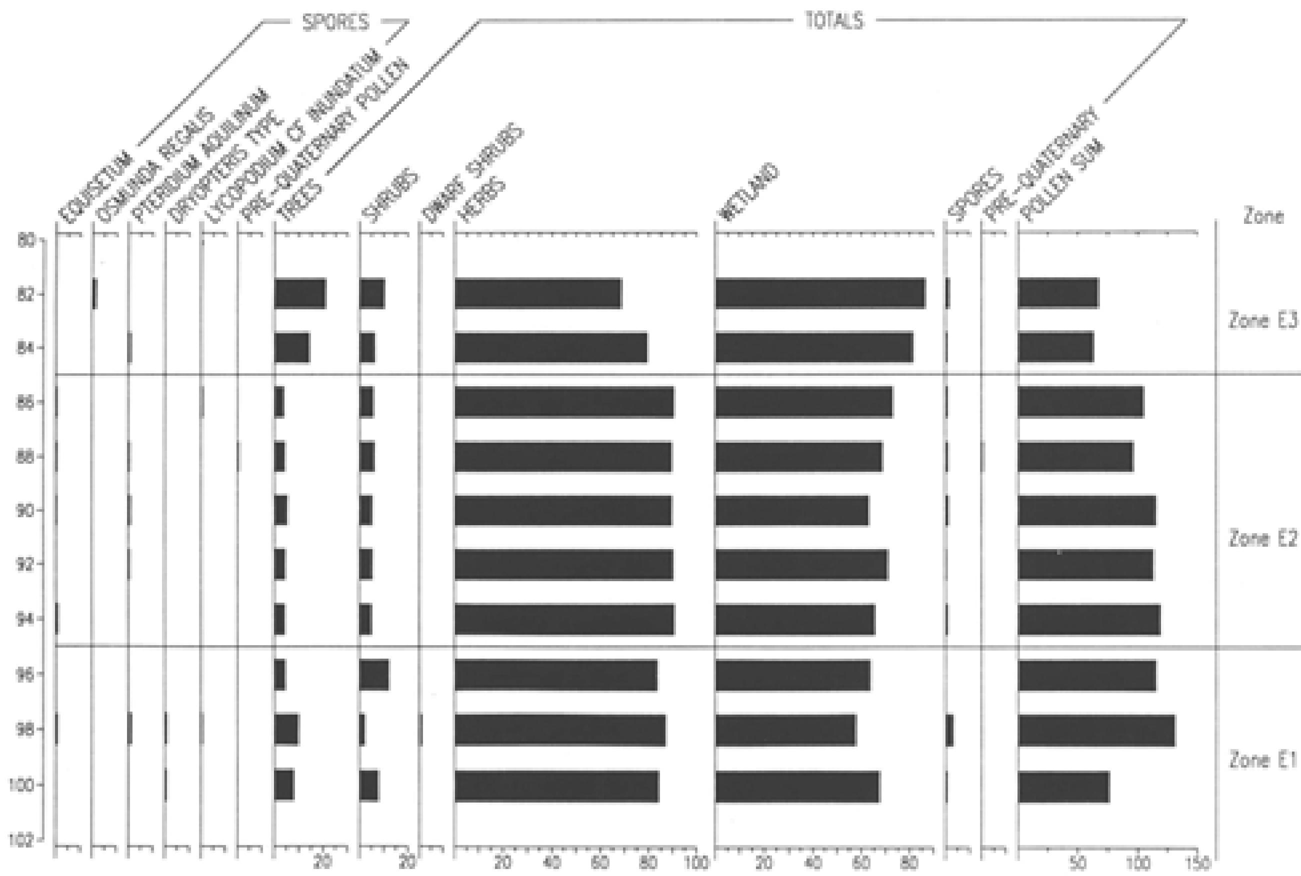


*Fig 249 (above and opposite) Sample series 1: pollen from basal peats, ditch segment 1, layer 6, between sections 7 and 8 (grid 37747302). Symbols in lithology column: V, wood; S, rootlets; ___ , peat; * * * , gravel*

Sample series 1

This represented the most complete section analysed for pollen and spanned the sequence of basal ditch peats. The results of this analysis are given in pollen diagram form in Figure 249. The ten levels of this sequence have been divided into three pollen assemblage zones. From the base of the sequence at 1.02m, these zones are characterised as follows:

Pollen zone E1: 1.02–0.95m. This zone was characterised by slightly higher arboreal pollen values than in the ensuing zone E2, lower values of Umbelliferae, and higher percentages of wetland taxa. Pollen was dominated by Gramineae (to 65% total pollen). Arboreal and shrub pollen taxa included *Betula*, *Pinus*, *Quercus*, and *Salix*, with sporadic occurrences of other taxa. Large Gramineae pollen was present; these were not from cereal crops but from non-cultivated grass, the taxa having similarly large pollen grains (>45). Marginal aquatic taxa included *Typha angustifolia* type, which includes *Sparganium* and *Typha angustifolia*.

Pollen zone E2: 0.95–0.85m. This zone was characterised by a marked expansion of *Juniperus*, Umbelliferae, Rubiaceae, *Filipendula*, *Hydrocotyle*, and *Alisma* type. The dominant taxa remained Gramineae and Cyperaceae, but with Umbelliferae attaining 30% of total pollen and Rubiaceae 15%.

Pollen zone E3: 0.85–0.80m. The top two levels showed an expansion of arboreal pollen (*Betula*, *Pinus*, *Quercus*, and *Juniperus*). *Typha angustifolia* type, *Typha latifolia*, and Cyperaceae increased. Gramineae and Cyperaceae remained the most important taxa.

Table 76 gives the results of a 'spot' test sample obtained from the same section. These data illustrate broadly similar characteristics to those described above, being dominated by pollen of herbs but with few tree and shrub taxa.

The pollen succession

Tree pollen was largely absent in this sequence, showing that at the time of formation of this organic deposit, the local vegetation and landscape were largely open. The generally low values of tree and shrub pollen correspond with the dominance of herb pollen. There was evidence (discussed below) from the wetland taxa that the flora growing in the upper part of this peat formation (0.82–0.86m) was one typical of shallow water conditions. The fen vegetation taxa that are recorded represent growth within what is now thought to have been a Late Devensian stream channel. Cyperaceae and Gramineae were the dominant taxa throughout and may relate to one or more plant communities. Monocotyledonous rootlet fragments were present in

Table 76 Spot sample of pollen from basal peats, enclosure ditch segment 1, layer 6, between sections 7 and 8 (sample series 2)

	numbers	%
Betula	3	0.6
Pinus	2	0.4
Quercus	3	0.6
Alnus	1	0.2
Fraxinus	2	0.4
Salix	13	2.6
Ranunculus type	2	0.4
Sinapis type	1	0.2
Spergula type	1	0.2
Trifolium type	1	0.2
Rosaceae undiff	1	0.2
Umbelliferae	11	2.2
Menyanthes	3	0.6
Convolvulus	1	0.2
Mentha type	3	0.4
Plantago lanceolata	3	0.4
Rubiaceae	8	1.6
Artemisia	1	0.2
Sparganium type	10	2.0
Cyperaceae	240	48.0
Gramineae	178	35.6
Cereal type	10	2.0
unidentified	1	0.2
degraded/unidentified	1	0.2
Pteridium	2	0.4

the peat stratigraphy, and as such it would seem that sedges and perhaps grasses were almost totally responsible for the organic fill of this ditch under waterlogged and anaerobic conditions.

From 0.95 to 0.82m (pollen zones E2 and E3) Umbelliferae were of importance (to 25% total pollen). Taxonomic differentiation to species or even generic level was not possible with this taxon, but quantities present similarly suggest an autochthonous component contributing to the pollen spectra. Plant macrofossil analysis (Chapter 10) did not, however, show any abundance of Umbelliferae that would allow possible correlation. This is not unexpected, since the seeds and the pollen may only be deposited and preserved on, or close to, the site of growth.

From 0.87m upwards there was a clear increase in aquatic and marginal aquatic taxa. These included *Typha angustifolia*/*Sparganium* type, *Typha latifolia*, *Thalictrum*, *Filipendula*, *Hydrocotyle*, *Menyanthes*, *Iris*, *Alisma* type, *Callitriche*, and *Nymphaea alba*. Many of these taxa have also been recorded from their seed remains (Chapter 10) and suggest a wetland fen habitat, with at least some stages of open shallow water at various stages of the channel's history and development.

The relative increase in abundance of some arboreal taxa at the top of the profile (pollen zone E3 is of note. This is somewhat problematic to interpret, because the quantities of pollen were still relatively small. *Betula* attained 14% of total pollen, which may be taken as some indication of birch scrub colonisation. However, *Betula* being of anemophilous nature (wind pollinated) produces large numbers of pollen grains and is probably over-represented in importance (Andersen 1970). Pollen rain studies show that extensive birch scrub could be expected to result in a much greater presence of its pollen than is found in this sequence. *Pinus* also showed a minor increase and is a likely result of an increased long-distance transport component. The changing character of the peat-filled channel, noted above, to one of open fen/water would probably explain the presence of pollen taxa that had been transported over long distances.

Undoubtedly, the most significant factor of these pollen spectra is the diverse assemblages of herbs that were present. Initially, these were attributed to anthropogenic plant communities (ruderals and segetals) resulting from human disturbances and cultivation (Scaife 1983). The characteristics of such anthropogenic plant communities bear a strong resemblance to those of the Late Devensian (late glacial zones I–III) with numerous herb taxa present that only reappear in the Holocene as a consequence of anthropogenic opening of the woodland environment (Godwin 1975). Reappraisal of these peats and the pollen assemblage, in conjunction with the evidence from the coleopteran assemblages (Chapter 14), now shows that the basal sediments of the ditch are attributable to the Late Devensian. The pollen assemblages present were characteristic of those found in other Late Devensian sequences, but typical late glacial indicator taxa were absent – for example, *Polemonium*, *Armeria*, *Helianthemum* (Godwin 1975).

Dating

Although radiocarbon dating was not available, it is postulated that the pollen and sediment sequence spanned the end of the Windermere interstadial (Allerød, Zone II), the Loch Lomond stadial advance (Younger Dryas Zone III), and the initial and transition phase into the Holocene at *c* 10,000 BP (Godwin's pollen zone III/IV boundary). Thus, the basal level (0.97–1.02m) contained somewhat higher values of tree and shrub pollen (*Betula*, *Pinus*, and *Salix*) that are indicative of some local scrub woodland growth during the warmer Windermere interstadial phase. Subsequently, there was a decrease in these taxa and a corresponding increase in herbaceous types. This indicates an increase in herbaceous plant communities that became prevalent as a result of deteriorating climatic conditions in this cold phase (*c* 11,000–10,000 BP).

It is likely that the pollen taxa are representative of a diverse range of heliophilous plant communities growing in a variety of different habitats. These included tall herb, short turf, stoney ground, and wet flush habitats. At a depth of 0.85m there was again an increase in tree and shrub pollen, including *Betula*,

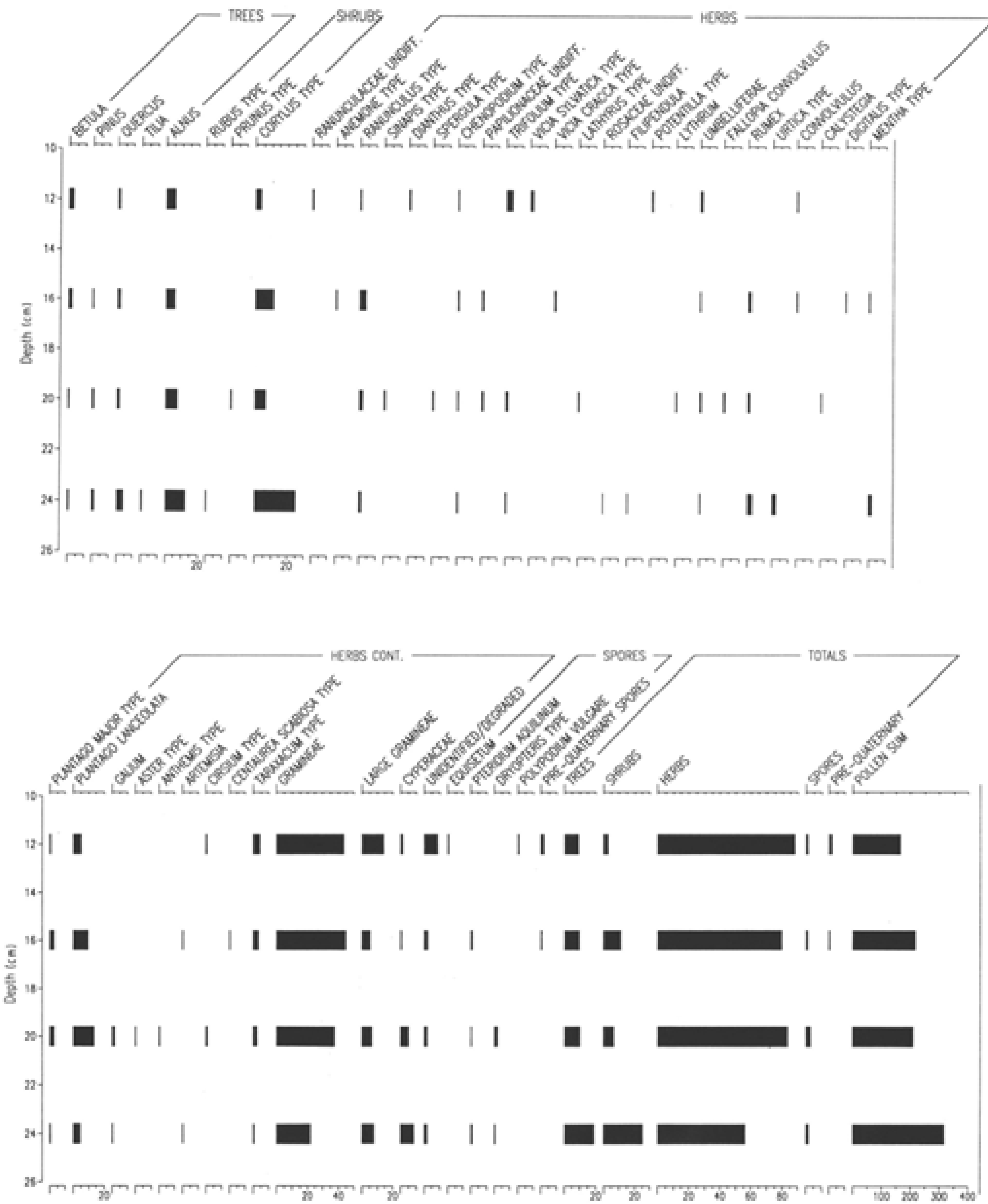


Fig 250 Sample series 3: pollen from basal peats, enclosure ditch segment 1, at section 6

Pinus, and some *Quercus*. Of note also is the increase in *Juniperus*; the latter is characteristic of the transition from Late Devensian to Holocene, when it was able to flower more freely and expand its area of growth as temperatures became warmer (Iversen 1960). Its expansion was also facilitated by its growth locally during the preceding cold stage, evidence for which is provided by its consistent presence in the lower levels of the sequence. It appears, therefore, that the top of these basal peats marked the period at *c* 10,000 BP of the establishment of Early Holocene juniper scrub and birch woodland. Pine may also have been present locally at this time in small numbers, but it seems more likely that we are here seeing pollen transported from some distance away; the seemingly progressive increase may simply reflect its approach closer to the region. This may also explain the sporadic occurrences of other deciduous woodland elements that were identified.

Sample series 3

This sequence comprised four test samples that were taken by Dr Charles French from the enclosure ditch during the preliminary archaeological survey of 1981. The sequence was taken throughout peats of similar character to those of sample series 1. Results of this analysis have been included because they exhibit different and interesting information from that described above. These pollen data are presented in Figure 250 and Table 77; as before, pollen was calculated as percentage of total pollen and spores as percentage of total pollen (TP) plus spores. Pollen zonation was not carried out since only four levels were available for analysis.

The arboreal pollen of this sequence was notably different to that of pollen zones (E1–3) of sample series 1. The basal level at 0.24m exhibited relatively higher values of *Quercus* (5% of total pollen), *Alnus* (13% of total pollen), and *Corylus avellana* type (27% of total pollen). Some *Tilia* was also recorded. These percentages declined in the ensuing levels (0.20–0.12m). The dominant pollen taxon throughout this sequence was, however, Gramineae, which had an average percentage value of 46% of total pollen. Cereal-type pollen was also present in all four levels in relatively high values (5–15% of total pollen), but with higher values in the top and bottom samples. Pollen of ruderal taxa was similarly important, with *Plantago lanceolata* and *Plantago major* type (includes *Plantago media*) being notably important (to 15% and 3% of total pollen respectively). Pollen of aquatic and rooting marginal aquatic herbs was present and contrasts with other pollen sequences from the causewayed enclosure ditch.

Table 77 Pollen from basal peats, enclosure ditch segment 1, sections 6 (sample series 3)

	numbers	%
Betula	7	2.2
Pinus	3	0.9
Fraxinus	1	0.3
Sorbus stype	1	0.3
Corylus avellana type	1	0.3
Salix	3	0.9
Ranunculus type	1	0.3
Hornungia type	1	0.3
Ononis type	1	0.3
Astragalus type	1	0.3
Rosaceae undiff	1	0.3
Filipendula	2	0.6
Umbelliferae undiff	30	9.2
Hydrocotyle	1	0.3
Rumex	3	0.9
Menyanthes	5	1.3
Plantago lanceolata	1	0.3
Artemisia	1	0.3
Alisma type	8	2.5
Cyperaceae	123	37.8
Gramineae	102	31.3
Cereal type	13	4.0
degraded	2	0.3
pre-Quaternary	2	0.6
Pteridium aquilinum	2	0.6

Discussion

It has been noted above that this sequence of samples was taken from pre-Phase 1 organic ditch deposits of similar character to those of sample series 1. It is clear, however, that the basal pollen spectrum represented here differed substantially from the peats of sample series 1 and later levels of the present profile. It appears that this sequence, initially attributed to the pre-Phase 1 organic fills, of a later and Holocene date. These vegetation characteristics are analogous to Mesolithic and Neolithic pollen spectra analysed at Crowtree and Oakhurst Farm (Scaife 1993a), and it is thought that this pollen sequence spanned a later period of transition between woodland and open agricultural land (as evidenced by the high values of ruderals and cereal sp). It is possible, therefore, that the pollen evidence from these contexts marked the impact of Neolithic colonisation and impact on the local landscape.

It is concluded that the basal level of this sequence showed evidence of oak, alder, lime, and hazel woodland, which was growing in the region of the causewayed enclosure on the drier, well-drained soils. The alder probably derived from alder carr fen communities that fringed the edges of the adjacent wetland. The substantial values of pollen from ruderals and cereals indicate that, after clearance, there were substantial areas of open agricultural land and/or waste land.

Samples of Phase 1 date

Two series of samples containing pollen of Phase 1 date were examined. The first (sample series A) was from waterlogged levels of the enclosure ditch segment 1, between sections 5–6, layer 4. The second (sample

Table 78 Pollen from sample 10 (of sample series A), enclosure ditch segment 1, layer 4, section 6 (Phase 1A)

	numbers	%
Betula	7	1.1
Pinus	2	0.3
Quercus	1	0.2
Fraxinus	1	0.2
Salix	3	0.5
Ranunculaceae	1	0.2
Ranunculus type	1	0.2
Hornungia type	2	0.3
Papilionaceae	1	0.2
Umbelliferae	20	3.1
Hydrocotyle type	3	0.5
Rumex	4	0.6
Convolvulus	2	0.3
Plantago coronopus type	1	0.2
Rubiaceae undiff	3	0.5
Succisa	1	0.2
Artemisia	1	0.2
Alisma type	1	0.2
Sparganium type	1	1.7
Typha latifolia	1	0.2
Cyperaceae	503	78.0
Gramineae	66	10.2
Cereal type	3	0.5
unidentified/degraded	1	0.2
Dryopteris type	5	0.8
Pteridium aquilinum	3	0.5

series B) was from a probable turf from ditch segment 11, layer 7, at section 208A. The former probably dated to Phase 1A, the latter to Phase 1B.

Sample series A

This pollen sequence came from a sub-sample (sample 10 – Table 78) from the basal deposits of a much longer sequence through organic fills attributed to Phase 1A. Pollen was only present in this one sub-sample and was poorly preserved. This is thought to be due to the drying and oxidisation of the sediments. Charcoal was also present in quantity in this sequence. The results of pollen analysis are given in Table 78. Pollen of Cyperaceae (78%) and Gramineae (10%) were dominant; wetland taxa were well represented with *Hydrocotyle*, *Alisma* type, *Succisa pratensis*, *Typha angustifolia*/*Sparganium* type, *Typha latifolia*, and perhaps other types (such as Umbelliferae) whose pollen morphology does not allow identification to a lower taxonomic level. Arboreal and shrub pollen was scarce, with only minimal representation of *Betula*, *Pinus*, *Quercus*, and *Fraxinus*.

It is unfortunate that the higher levels of this profile failed to produce preserved pollen, since this main phase of ditch filling was contemporaneous with the Neolithic activities taking place within the causewayed enclosure. The pollen spectrum was, however, useful, since it shows that the landscape was largely cleared of woodland during the early phases of occupation, at least in the proximity of the enclosure. It is most probable that the few tree pollen grains came from longer distance sources. The dominant characteristic of this pollen spectrum was, again, the preponderance of aquatic and marginal aquatic plant taxa. From this, it is again concluded that the ditch of the enclosure was in large part filled with shallow rooting aquatic vegetation. This is similarly evidenced by the insect assemblages (Chapter 14) and is indicative of a constantly high groundwater table on the fringes of the fen proper.

Sample series B

Introduction

A well-preserved and inverted turf found in ditch segment 11, layer 7, at section 208A, was sampled for pollen analysis and soil micromorphological study (see Chapter 12). It could be expected that such analyses might show the character of the vegetation and environment in the drier environments of the interior of the Neolithic enclosure. This would provide a comparative control for the data obtained from the waterlogged sediments of the enclosure ditches, which suffered the problem of over-representation of pollen from the local wetland plant taxa.

A well-defined humic (Ah) layer representing the upper part of a Neolithic soil profile was sampled contiguously at 10mm intervals. The underlying mineral subsoil (although lying uppermost in the section) was sampled at 20mm contiguous intervals. Pollen was extracted using techniques described above, but with the addition of micro-mesh sieving (10) for removal of fine silica.

Pollen was found to be scarce and badly preserved in all levels analysed, with a maximum of 33,000 grains per ml at 0.20m and a minimum of 700 grains per ml at 0.22m. As can be seen from the pollen diagram (Fig 251), there were very strong indications that the pollen spectra were skewed in favour of those types that have more robust exines and were thus more readily preserved in these less than satisfactory conditions. This differential destruction undoubtedly resulted from repeated wetting and drying of the ditch fill in which the turf was placed. It should be noted that the higher Phase 1 and 2 horizons were devoid of identifiable pollen. It was therefore felt that useful data might be obtained from analysis of the pollen that actually survived in the turf.

Results

Pollen counts for five levels were made, and the results are presented in Figure 251. It is clear from this analysis that tree pollen was relatively unimportant in relation to herbaceous taxa. The basal levels of the soil

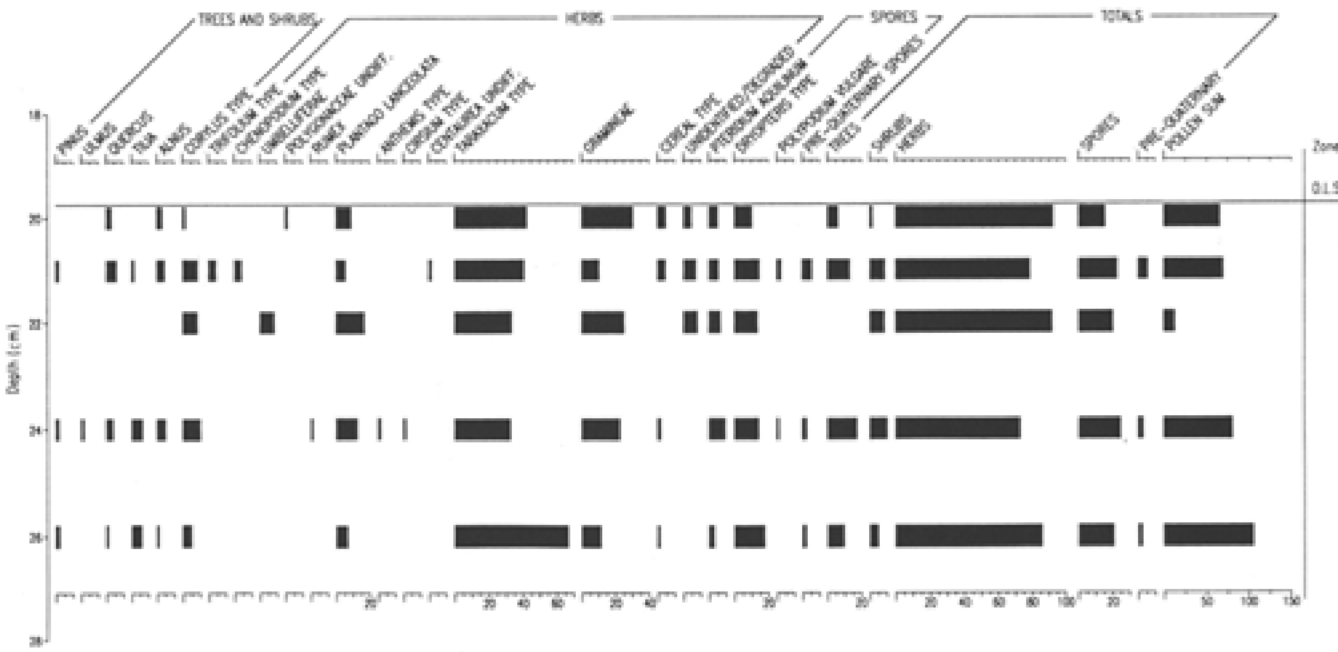


Fig 251 Sample series B: pollen from the inverted turf, segment 11, layer 7, at section 20&A. Note that the pollen spectra have been inverted from the way that the turf was deposited (upside-down). OLS is Old Land Surface

(0.20–0.22m) contained somewhat higher percentages of arboreal pollen, which comprised *Quercus* and *Tilia*. It is likely that these types (especially the *Tilia*) were residual pollen elements from an earlier pedological phase and therefore represented the earlier vegetation of the site. Thus, it might be postulated that mixed deciduous woodland with *Tilia* and *Quercus* was present prior to its clearance during the Early Neolithic. This would confirm the evidence obtained from sample series 3 (see above), which similarly indicated that such a woodland existed during the period immediately prior to Neolithic activities in the region – most probably during the mid-Holocene (Flandrian II; Atlantic period).

Herb pollen was dominated by Compositae types (those with robust exines noted above) and especially Liguliflorae (*Taraxacum* type). In addition other segetal and ruderal taxa were present, comprising *Plantago lanceolata*, *Rumex*, Polygonaceae, and cereal-type pollen. These records confirm the plant macrofossil analyses and the pollen records that cereals were being grown and/or used in or adjacent to the enclosure during the Early Neolithic. It must, however, be recognised that such pollen type may also be liberated and dispersed from crop processing activities (such as winnowing), animal feed, bedding, and animal dung (Scaife 1988). It is, therefore, not possible from such a small and poorly preserved pollen assemblage to state if the area from which the turf was taken was one of pasture (since Gramineae and *Plantago lanceolata* were also equally represented), with pollen input from one of the above sources, or if the soils were arable agricultural, with direct pollen input from local cereal cultivation.

In conclusion, it can be stated that this well-defined turf, in spite of having very poorly preserved pollen, provided some evidence that woodland prior to Neolithic interference comprised oak, lime, and hazel. Herb pollen taxa were dominant with ruderals and segetals. This indicates that woodland clearance and subsequent agricultural activity took place; however, despite the presence of cereal-type pollen, it is not possible to state with any certainty whether this activity was arable or pastoral.

Vegetation changes

It is evident that the sediments of the enclosure ditch comprised deposits laid down in a natural stream channel during the Late Devensian cold stage and during the Neolithic, subsequent to the utilisation of this stream channel for construction of the enclosure ditch. Thus, there is a range of environments represented by the pollen spectra from these ditch profiles. This, however, produces only a partial view of the Holocene environmental changes at Etton, and recourse must be made to existing analyses that provide a basis for the interpretation of wider environmental changes.

Those basal sediments that were originally attributed to Phase 1 of the Neolithic occupation provided clear evidence for an open environment during the latter stages of the last cold phase (Devensian). The vegetation comprised markedly heliophilous plant communities of mixed ecotypes (for example, short turf, tall herb, stoney ground/outwash areas), ranging from dwarf shrubs to herbaceous communities growing in differing areas of soil type and aspect. Although there is substantial evidence for such open vegetation from earlier periods in the cold stage from this region (Bell 1969), it has also in the past been thought that the late glacial environment was possibly dominated by birch and/or pine woodland. The present study shows that this was probably not the case. It is clear from the pollen analysis of sample series 1 (the basal peat in segment 1, between sections 7 and 8) that the open landscape of the Late Devensian Zone III (Younger Dryas/Loch Lomond re-advance) was colonised initially by juniper scrub that may have already been present in perhaps prostrate form (Iversen 1960); subsequently this environment was colonised by tree birch and pine. Colonisation by these arboreal taxa at *c* 10,000 BP would have caused the progressive removal by competition of the more heliophilous elements of the Late Devensian flora.

The ensuing pre-Boreal and Boreal periods (Flandrian chronozone I/Early Mesolithic) were not represented here, but it is known from other work in the region that pine and hazel followed by oak and elm became the dominant woodland components (Birks *et al* 1975; Birks 1989; Godwin 1975; Waller 1994). Soil and peat pollen sequences obtained from Oakhurst and Crowtree Farm (Scaife 1993a) illustrated that the climax vegetation of the region on drier soils during the Middle Holocene (Atlantic; Flandrian chronozone II; Godwin's pollen zone VIIa) comprised largely oak, elm, and hazel woodland, but with a substantial element of lime that was possibly dominant in some areas. Wetland fen areas adjacent to Etton were dominated by sedge fen and alder carr woodland. Such vegetation is perhaps represented in the samples from series 3 (basal peats in segment 1, between sections 5 and 6), and it was into this environment that Neolithic communities made inroads.

It would appear that clearance of woodland on the better-drained parts of the Etton site led to a return to an open environment. The vegetation of the Middle Neolithic use (Phase 1) of the enclosure ditch (which included an inverted turf) was characterised by herbs that were typical of waste ground and arable land. It is suggested that arable and possibly pastoral activity was taking place in close proximity and possibly within the area of the enclosure (the area outside the enclosure was predominantly wetland fen).

The sediments, seeds, and pollen illustrate clearly that the enclosure ditch was colonised by wetland fen herbs throughout both the early stream channel phase (Late Devensian) and the much later Neolithic recutting of the channel for construction of the enclosure ditch. This provides evidence that the local groundwater table was high.

12 Soils and sediments

by Charles French

The first part of this chapter is devoted to the enclosure ditch fills and the second part to soils of the interior. All the detailed descriptions are in Appendix 2.

The enclosure ditch deposits

Introduction

The nature of the deposits infilling the enclosure ditch was generally consistent from one segment to another within the eastern and western halves of the enclosure, respectively. The western portion comprised ditch segments 1–5, the remainder (6–14) belonged in the eastern part, the dividing causeway being F. The division was not particularly clear cut, due to water action and other factors; accordingly, the eastern part of segment 5 and the western part of segment 6 may be seen as a 15m-wide transitional zone between the two halves (this zone extended approximately between sections 156 and 166 – Fig 11).

The scope of the soil study was as follows: in the western arc, sediments in ditch profiles within segment 1 (between sections 5 and 6 and between causeway A and section 1) were analysed for particle size; two other profiles (segment 5 at sections 119 and 139) provided representative spot samples of the main types of ditch sediments, which were subjected to micromorphological analysis (after Bullock *et al* 1985 and Murphy 1986). Stream channel or ditch material and a natural deposit in the base of the ditch were also examined micromorphologically (in section 112 of segment 5: Fig 252).

Turning to the eastern arc, several unexplained types of infilling were examined micromorphologically: a possible complete turf in the base of section 208A (segment 11), turf or topsoil material in section 201 (segment 8), and some 'ash-like' material in section 234 (segment 13). Particle size analysis of the ditch infills was not undertaken, because so much of the infilling of the eastern arc consisted of sand and gravel.

The infilling processes

The infilling sequence and processes of the eastern arc of the enclosure ditch were internally consistent, but were significantly different from those of the western arc. The most important difference was the apparent absence of any primary waterlogged deposits in the former. There were only two instances where wood was preserved (except for the occasional piece of bark or root): both were large, later Neolithic (Phase 2) pits, set deep into enclosure ditch segments 6 (at section 176) and 12 (between sections 222 and 226)). One reason for this clear distinction could be that the two halves were dug or used at different times of the year (that is, summer versus winter; wet versus dry). Alternatively, the eastern arc could have been cleaned out meticulously after use. It is also possible that the activities practised in or around the two halves of the enclosure ditch were dissimilar and have left contrasting archaeological evidence.

The second important difference was the common occurrence of sand and gravel in most sections of the eastern arc of the ditch. This deliberately backfilled material often comprised up to one-half to two-thirds (by volume) of the total infilling of the ditch; in some cases it could fully fill both the first cutting (Phase 1A) and the first recutting (Phase 1B) of the enclosure ditch. Former topsoil was also sometimes found as backfilling material in Phases 1A and 1B contexts.

The third distinction was that the two recuts of the enclosure ditch (Phases 1B and 1C) were readily traceable in both plan and section along all the segments of the eastern arc. By contrast, although recuts were often observed in transverse sections in the western arc, they were rarely traceable in plan or longitudinal section for more than a few metres at the most.

Finally, although not strictly a stratigraphic or sedimentary point, it should be noted that most of the structured deposits were found within the first and second recuts of the ditch (Phases 1B and 1C), rather than along the bottom of the primary ditch (Phase 1A); the recuts were generally dug into sand and gravel backfill deposits.

The eastern arc

Phase 1A

The infilling material of this phase equated with the primary filling of the first cut (or recut) of the eastern arc of the enclosure ditch. The primary filling was mainly composed of varying mixtures of sand, gravel and loamy sand, which often exhibited lensing (for example, Fig 73, A–C, layer 4). This material was probably deliberate backfilling of the ditch with a mixture of the original upcast subsoil and soil excavated when the ditch was first cut. Although there was no other extant evidence of a bank associated with the enclosure ditch, this material and the indirect evidence of better soil preservation beneath the presumed line of the bank (when contrasted with the rest of the interior of the enclosure) pointed to the existence of a former bank on either, or both, sides of the enclosure ditch. This backfill material infilled from one-third to two-thirds of the ditch profile, and it was into this material that the later phase ditch recuts were dug.

Quite often the backfilling material contained either individual turves or lenses of turves, one of which is examined micromorphologically (see below). Complete turves were observed in sections 204 (segment 9), 207 (segment 10), 208A and 209 (segment 11), 216, 221, and 227 (segment 12), and 238 (segment 13) (Figs 73–75). The completeness of these turves suggests that they were cut from the line of the ditch and stacked to one side for a brief period, possibly no longer than one or two years, before they were thrown back into the ditch. The general absence of primary 'silting' (by fine material) in these contexts provides further evidence that the ditch was left open for a relatively brief period after its initial cutting.

Phase 1B

The infilling material of this phase occurs in the first major recut of the enclosure ditch. This recut was visible in every section of each segment between segment 7 (section 184) and segment 14. At least four infilling processes were at work in this phase. Seven sections contained sand and gravel infilling, probably again a result of the deliberate backfilling of the ditch. Six sections (189, 201, 203, 204, 206, and 221) in segments 7–10 and 12 (Figs 72–74) contained a reddish-brown homogeneous silt loam, which was a redeposition (by deliberate backfilling) of former topsoil or A horizon material. In particular, this material appeared to 'line' the outside and inside edges and butt ends of the ditch.

Five sections contained naturally accumulating silt loam, such as in section 200 of segment 8 (Fig 72). Four sections contained a mixture of deposits, either turves and naturally accumulating sandy loam, as in sections 207 and 208A of segments 10 and 11 (Fig 73), or sand and gravel backfill with naturally accumulating sandy/silt loam, as in sections 234 and 250 of segments 13 and 14 (Fig 75). This variety of infilling processes suggests a certain amount of disturbance of the ditch, with some sections being left open to weather naturally, some being completely backfilled, and others being filled by combinations of the two.

Phase 1C

The second major recutting of the enclosure ditch was shallow, narrow, and steep sided. It was positioned more or less down the centre of the previous ditch. It was cut from the level of the upper secondary filling through the mixed backfilled and naturally infilled deposits of Phase 1B. Discrete clusters of animal bone were placed along the centre line of this recut. The infilling of the Phase 1C ditch segments was predominantly sandy/silt loam with a few scattered gravel pebbles; this material accumulated naturally, by erosion, and there was little evidence for deliberate backfilling.

Phase 2

The ditch was abandoned by this phase, and its course was marked by a shallow linear depression. It infilled gradually with silty (clay) loam and sandy (clay) loam; further southwards from the area influenced by the stream channels, the tertiary ditch filling became less silty and clayey.

Phase 2 witnessed the digging of several isolated large pits within the former causewayed enclosure ditch. In one example, a large pit (F953) was cut through the now infilled ditch deposits in segment 6, down to and below the former base of the ditch (Fig 71, B); the base of this pit was waterlogged and contained wood pieces. Another shallower pit was cut in segment 13 (at section 238); this pit was largely infilled with ash deposits (Fig 75, C; see also below).

The western arc

The two ditch sections examined in detail in the western arc were sections 1 and 5, located in segment 1.

Primary infilling

The textural composition of the western arc of the causewayed enclosure ditch suggests a completely different environment of deposition from the eastern arc, at least in the primary and secondary fills. The composition of the primary fill was characterised by abundant fine silt and clay with common gravel pebbles. This is indicative of a mixture of fast and slow water movement, combined with organic accumulation, which probably reflects alternating periods of flooding and standing water. The insect fauna was suggestive of clear, shallow, standing water in the ditch (Chapter 14). In addition, the ditch contained quantities of worked roundwood and wood debris, which may suggest the repeated clearance of small trees from the vicinity, possibly after brief periods when the ditch was not maintained (see Chapter 4).

Secondary infilling

The secondary filling of the ditch suggested continued mixed water conditions. The high gravel and medium sand element of the filling indicates erosion of the ditch sides by moving water, which in turn implies the flooding of the area. There were numerous non-apical fragments of freshwater and land molluscs in the secondary filling (Chapter 13). This water contained silt and clay (that is, locally derived colluvium), which then became trapped within the ditch and settled out of suspension. This is the most plausible explanation for the curious mixture of fine and coarse material in the secondary ditch filling. Indeed, the insect analysis of this secondary filling suggested that still, but clear, water conditions prevailed for part of the year in the ditch (Chapter 14).

Some ditch profiles (such as section 1) showed evidence for a shallow recutting of the ditch, which was followed by a gradual natural accumulation of material. The whole sequence may have suffered some degree of compaction due to deposition of the overlying alluvium and the recent humification of organic matter in the ditch fill. In addition, several sections (such as Fig 60, B)

Table 79 The four statistical measures for the sand fraction in sections 1 and 5 of enclosure ditch segment 1; all depths are below the top of the section

sample (depth in metres)	mean size	standard deviation (or degree of sorting)	skewness	kurtosis
section 1 tertiary fill				
0–0.10	1.71	0.12	0.12	1.38
0.10–0.20	1.73	0.12	0.15	1.27
0.20–0.30	1.73	0.13	0.08	1.36
Phase 1B recut				
0.35–0.45	1.61	0.04	0.05	1.25
0.45–0.55	1.58	0.04	0.03	1.27
0.55–0.65	1.73	0.07	0.08	1.28
0.70–0.80	1.76	0.06	0.05	1.19
0.80–0.90	1.58	0.04	0.10	1.34
Phase 1A ditch				
0.25–0.35	1.22	0.11	0.08	1.22
0.35–0.45	1.78	0.15	0.16	1.12
section 5 Phase 1A ditch				
1.40–1.50	1.41	0.15	0.10	1.45
1.50–1.60	1.38	0.06	0.08	1.30
1.60–1.70	1.35	0.24	1.02	1.37

revealed numerous (up to six) ditch recuts within the secondary filling (all of Phases 1B to 1C), but which could not be traced within the ditch deposits themselves.

Occasionally, recuts were defined within the wood deposits of the secondary filling – for example, between sections 10 and 13 (Fig 106). Together, this slight evidence of frequent recutting of the ditch gave an indication of the repeated cleaning out of the ditch during Phase 1.

Sand and silt fractions

Four statistical measures were calculated for the sand and silt fractions using the particle size analysis results (Tables 79, 80). The results were generally similar. The sand fraction was well sorted, only slightly skewed and leptokurtic. These statistical measures reflected the dominance of the medium sand fraction and suggest some transport of this fraction both by saltation and in suspension in a shallow water environment (Inman 1949). The silt fraction on the other hand was poorly sorted, slightly skewed, and platykurtic to mesokurtic. These characteristics probably reflected the mixture of ditch infilling forces (such as variable water conditions from stagnant to flowing), the consequent greater or lesser erosion of the ditch sides and the internal bank, and possibly the introduction of waterborne material from further afield.

Bank

What was initially believed to be the internal bank revetment or core (F35) on the inside edge of the enclosure ditch was in fact buried soil material (Fig 61). It was composed of a porous, gravel-free loam to clay loam that exhibited a slightly amorphous blocky ped structure. This well-preserved soil was probably once capped by sand/gravel upcast from the ditch, which formed the interior bank of the enclosure ditch. The bank did survive on the eastern (interior) side of F35 as an irregular sand and gravel dump, known as F36 (Fig 61).

In some ditch sections (such as Fig 60, B) there was evidence for the truncation and redeposition of bank and previous topsoil material. For example, layer 8 lensed out from the former bank F36 and over the ditch (Fig 61, B). Its composition was similar to the overlying Bw/g horizon, although it exhibited more oxidation mottling and had a less well-formed soil structure. This could be an indication that the initial deposition of alluvium may have caused some truncation and lateral spreading of the bank material.

Waterlogging

The lower third of the enclosure ditch probably remained more or less permanently waterlogged due to the high local groundwater table; this waterlogging was enhanced by the sealing action of the overlying alluvium. There has probably been less evapo-transpiration due to less capillary withdrawal through the fine matrix of the alluvium. Results from the water level monitoring project at Etton (French and Taylor 1985) indicated that the ambient winter water table was generally above the level of the ditch base by up to *c* 0.25m, and

Table 80 The four statistical measures for the silt fraction in sections 1 and 5 of enclosure ditch segment 1; all depths are below the top of the section

sample (depth in metres)	mean size	standard deviation (or degree of sorting)	skewness	kurtosis
section 1 tertiary fill				
0–0.10	7.55	1.33	0.63	1.11
0.10–0.20	6.13	1.12	0.46	0.69
0.20–0.30	6.10	1.33	0.21	0.91
Phase 1B recut				
0.35–0.45	7.40	1.44	0.33	0.74
0.45–0.55	6.53	1.73	0.07	1.22
0.55–0.65	5.90	1.20	0.36	0.76
0.70–0.80	6.21	1.19	0.15	0.87
0.80–0.90	6.18	1.45	0.16	1.18
Phase 1A ditch				
0.25–0.35	6.85	1.38	0.42	1.06
0.35–0.45	7.36	1.35	0.43	0.85
section 5 Phase 1A ditch				
1.40–1.50	6.60	1.11	0.11	0.90
1.50–1.60	6.78	1.42	0.05	1.12
1.60–1.70	6.71	1.36	0.15	0.96

in the summer was at or below the base of the ditch. This lower water table probably came about after the first proper drainage of the field in which the enclosure was situated. This happened at the time the Maxey Cut was enlarged in 1953 – and lasted until the summer of 1984. Prior to 1953, the ditch must have been more or less permanently waterlogged, and doubtless to a greater depth than recently.

Since pumping began, prior to gravel extraction in the summer of 1984, the groundwater table has fallen by over 2m, and has remained at that level ever since (ibid). An immediately observable consequence of this dewatering was the deterioration of the wood found in segments of the northern and western arcs of the enclosure ditch.

Most of the north-western sector of the enclosure ditch (segment 5) was influenced by contemporary stream channels nearby, which formed a large northwards meander around the north-western edge of the site. Four ditch sections and the micromorphology of their fillings are described below, under the western arc.

Micromorphological analyses of the enclosure ditch

Introduction

For the purposes of this discussion the ditch will be treated in two arcs separated by causeway F: the one to the east, the other to the west. The soil micromorphology methods used are described in Pryor and French 1985, 313–14; see also Murphy 1986 and Bullock *et al* 1985. Detailed descriptions are given in Appendix 2.

The eastern arc

Three contexts were examined in thin section: the deposit of ash in a Late Neolithic pit, the possible turf/topsoil material in segment 11, and the possible backfilled topsoil of segment 8.

The ash lens in segment 13

This ash lens was within a Late Neolithic (Phase 2) pit, which cut into the filling of enclosure ditch segment 13 at section 234 (Fig 75). It was composed of three main fabrics in a heterogeneous mixture. Approximately one-third of the groundmass was dominated by calcite intermixed with frequent flecks of charcoal, which is indicative of wood ash. About 15% of the groundmass was composed of relatively dense silt loam with very fine flecks of charcoal, amorphous organic matter, and intercalated illuvial material (alluvium). This material was similar to the lower A horizon soil material found within the interior of the causewayed enclosure. The remaining half of the groundmass was comprised of a mixture of both of these fabrics and had a distinctly 'dirty' appearance.

Together these fabrics suggest the remains of redeposited 'camp-fire' ash and scraped-up topsoil, which had been deliberately dumped into a pit cut into the (by now disused) enclosure ditch. It would appear that this material had derived from the general area of the floodplain, given the sample's alluvial clay content; it is quite possible that the source was within the enclosure itself.

A possible turf in segment 11

Possible turf/topsoil material was found in the dumped backfill of many segments of the enclosure ditch. One such turf in segment 11 at section 208A was examined (Fig 73, E, layer 7)

The principal fabric was dominated by organic matter of various types, much of which was highly ferruginised, and contained some faunal excrements. This fabric was probably indicative of former upper A or Ah horizon or turf material. The minor additional fabric was again like the lower A horizon material found within the interior of the causewayed enclosure, which was characterised by fine intercalated alluvial clay. The Ah horizon had also been receiving a minor alluvial content in the form of the clay aggregates and papules. At least one of these papules appeared to be an eroded fragment of a former argillic horizon, as it contained limpid and dusty clay.

The heterogeneous mixture of both fabrics and the minor alluvial additions suggest that the turf and topsoil had been receiving freshwater-transported fine material prior to the cutting of the turf. There is every possibility that this turf was cut from the line of the causewayed enclosure ditch, was stacked separately nearby, and was later thrown back into the ditch (together with sand and gravel) after its first phase of use. The intact and faunally active nature of this turf suggests that it could not have been stacked alongside the ditch or in the near vicinity for very long – possibly for no more than a year.

The strong sesquioxide impregnation of much of the turf may be due to its subsequent deposition in the enclosure ditch where it would have been subject to seasonal fluctuations in the groundwater table.

The silt loam 'lining' in segment 8

Later recuts of the ditch were often dug into possible backfilled topsoil, for example, segment 8 at section 201 (not illustrated). Examination of this layer in thin section indicates that it exhibited a very similar microfabric to the ten thin sections of the buried soil within the interior of the enclosure. There is little doubt that this material was also indicative of lower A horizon material. This soil was relatively homogeneous and organic, and contained much intercalated dusty clay. These intercalations of impure clay resulted from the slaking of fine material of a bare soil and its translocation down the soil profile; this is indicative of the addition of fine alluvial material to the soil prior to its deliberate incorporation in the secondary ditch fill. As this impure clay was not impregnated with sesquioxides, this slaking of alluvial material occurred prior to its incorporation in the ditch and prior to the soil's removal from the line of the enclosure ditch. The soil also contained a few alluvially derived rolled clay aggregates.

The soil was also slightly disturbed. It was relatively porous, and there were loose discontinuous infills of fine fabric material in the channels. This phenomenon was also observed in profiles of other *in situ* buried soils, but in the present case the slides exhibited relatively large quantities of very fine gravel (2–18mm in diameter; *c* 30% of the total fabric) in a poorly sorted, heterogeneous mix with the main fabric. These features suggest a mixture of lower A horizon soil with gravel derived from the subsoil.

It has already been noted that this soil material was commonly impregnated with sesquioxides, particularly towards the base of the deposit. This impregnation was a secondary process, resulting from fluctuations in the local groundwater table.

The western arc

Four ditch sections were examined in segment 5: the upper fills in sections 119, 139, and 112 (where the enclosure ditch and stream channel deposits intersected), as well as a 'varved' deposit in the base of the enclosure ditch at section 112. Ditch segment 5 was the longest and in many ways most complex segment, as it had been considerably affected by nearby stream channels.

Section 119

Section 119 is not illustrated, but Figure 69 shows the other side of the narrow baulk, section 118. Section 119 of segment 5 displayed the following stratigraphic sequence (depths are below the surface at 6.95m OD):

Layer 1: (0–0.43m) silt loam with scattered gravel pebbles, and oxidation mottling. 10YR 5/2–5/6.

Layer 2: (0.43–0.59m) oxidised silt loam with scattered gravel pebbles. Merged with (?)stream channel in the secondary filling. 10YR 4/4.

Layer 3: (0.59–0.71m) organic silt loam with even gravel mix, some rooting and a few lumps of concreted sand/gravel. Cut stream channel primary filling. 10YR 4/2.

The tertiary filling

The tertiary filling of the ditch in section 119 reflected a variety of influences more or less similar to those of section 139 (Fig 70, A), discussed below.

The abundance of calcitic crystals suggests that calcium-rich groundwater oxidised at the surface of the infilling ditch. This feature, plus the common sesquioxide impregnation of about one-third of the groundmass, suggests that the groundwater table must have been much higher than at the present day, at least seasonally.

The remainder of the fabric, a heterogeneous loam to silty clay loam, may represent eroded ('colluvial') material from the immediate surroundings of the enclosure ditch. Indeed, the rare fragments of limpid and dusty clay were probably derived from the erosion of the adjacent palaeosol (an argillic brown earth). Also, fabric (2) with its abundant intercalations of non-laminated dusty clay had a very similar morphology to the Bt fabric of the buried soil within the interior. Rolled clay aggregates were present in the ditch filling, which are indicative of alluvially transported and deposited material (this was also observed in the palaeosol in the interior of the enclosure). These aggregates probably found their way into the ditch by seasonal freshwater flooding of the site.

Some organic matter must have accumulated in the ditch while it was filling in, as is suggested by the few faunal excrements that were observed. Their presence also implies that the upper ditch filling was at least partially waterlogged when it was infilling, and that the lack of macrobotanical remains was a relatively recent feature resulting from the drying out (oxidation) of the upper ditch deposits.

No soil formation was evident above the tertiary filling of the ditch. Beyond the influence of the stream channel(s) in the north-western arc of the enclosure ditch, alluvial silty clays accumulated directly on the tertiary fill.

The secondary filling

Although the secondary ditch filling was composed of several fabrics in a heterogeneous mix, much like the tertiary filling, there were many differences. On the other hand, the primary ditch filling (layer 3) was similar to the secondary filling (layer 2), except for greater organic and gravel contents.

The secondary ditch filling was very organic and included a variety of *in situ* and derived material, both natural and associated with people's activities. The excellent organic preservation must have been due to waterlogged conditions at the time of inclusion. The lower ditch filling must also have been subject to drying out (perhaps seasonally) during its accumulation. This was indicated by the calcitic/ferruginous replacement (pseudomorphs) of organic matter such as stems and roots. Also, the formation of calcitic crystals in fabric (a) is suggestive of the oxidation of base-rich groundwater at, or just above, the groundwater table of the time. During these relatively drier periods, the soil fauna must have been very active to account for their frequent faecal remains. Nevertheless, the drier periods must have been relatively short lived to account for the good macrobotanical and bone preservation.

The high proportion of silt and clay in the ditch filling is indicative of the settling out of fine material held in suspension in water in the ditch. As explained above for the tertiary fill, some of this fine material was probably alluvium (eroded soil material from upstream).

Although not visible in thin section, the lower ditch filling contained many (*c* 30–50% by weight) small and fine gravel pebbles, as well as medium sand. These sediments were probably derived from ditch edge scour of the terrace subsoil.

The time required for the formation of the primary and secondary fills is less easy to assess than for the subsequent tertiary fill. The evidence would suggest that the processes might have extended over two Etton phases, or even longer. It should be emphasised that we are only witnessing accumulation that occurred after the last time that the ditch was cleaned out. To account for the intense faunal activity that was seen in thin section, one must envisage that the infilling deposits remained open for part of the year at least, in between periods of high groundwater and the influx of alluvium. Although there was no evidence of deliberate backfilling with bank or soil material in this sector, much of the wood was deliberately thrown (or placed) into the ditch. It is perhaps appropriate to think in terms of a small section of modern fen drainage dyke left unmaintained for 10–20 years.

Section 139

Section 139 of segment 5 (Fig 70, A) displayed the following stratigraphic sequence (depths are below the surface at 7.55m OD):

Layer 1: (0.80–1.02m) sandy clay loam with oxidation mottling and a few gravel pebbles. Cut stream channel. 10 YR4/2–5/6.

Layer 2: (1.02–1.30m) silty/sandy loam with oxidation mottling and even fine gravel mix, some rooting, and a large 'boulder' of concreted sand/gravel. Cut stream channel. 10YR 5/2.

Tertiary filling

The tertiary filling (layer 1) of the causewayed enclosure ditch contained material indicative of a variety of infilling influences. The abundance of calcitic crystals suggests that calcium-rich water was 'welling-up' from the base-rich terrace deposits and oxidising at the surface of the infilling ditch. Consequently, the local groundwater table must have been high for much of the year, and the ditch profile must have been more or less completely waterlogged. These conditions must have pertained in the later Neolithic period on archaeological evidence. Consequently, the oxidation of this upper ditch filling must have occurred more recently, possibly as late as post-1953 when the land ceased to be seasonal pasture and became permanent arable.

The clay-rich fabrics (c) and (d) may represent eroded soil material from the immediate vicinity, which was transported as colluvial material in freshwater; once trapped in the depression caused by the ditch, the fine material settled out of suspension. The freshwater also carried what appeared to be fragments of eroded

Bt or argillic horizon material (for example, the fragments of limpid clay). This soil material probably derived from soils that developed under stable forest conditions prior to the later Neolithic. From previous work immediately upstream at Maxey and Barnack/Bainton (see French 1985a), such argillic brown earth soils were being cleared and perhaps cultivated by the Late Neolithic. At Etton Woodgate (Pryor *et al* 1985), later Neolithic/Early Bronze Age stream channels were being infilled with colluvial material eroded from soils immediately upstream and to the west, probably from Maxey island. Rolled clay aggregates in the ditch filling were similar to those found incorporated in the buried soil within the interior of the enclosure, and are indicative of 'old' alluvial material. Thus there is little doubt that soil erosion, transport, and deposition downstream as colluvium and/or alluvium were occurring by the later Middle Neolithic. This process would have been initiated by the opening up of the earlier Holocene forested landscape; it would also have been exacerbated by early arable cultivation, increased run-off, and rising groundwater levels – which were a continuing feature of this part of the western fen edge throughout later prehistory.

The relatively minor sand and gravel contents of the tertiary ditch filling are probably indicative of more immediate erosion. The freshwater action responsible for infilling the ditch must have caused a certain amount of ditch edge erosion or scouring, thereby contributing to the coarse fraction of the ditch fill.

The 'loose' heterogeneous nature of the tertiary ditch filling suggests that it filled relatively quickly. In particular, the heterogeneous fabric mix indicates either that habitat conditions were unsuitable for the soil fauna, or that there was insufficient time for a thorough homogenisation of the various soil fabrics. The 'loose' porous nature of the infill is also suggestive of relatively rapid infilling processes, with little time for consolidation and compaction. Certainly in the north-western arc of the enclosure ditch, the colluvially infilled stream channel material both merged with the tertiary ditch fill and (in some cases) partially truncated the tertiary filling; it also overlay the ditch line itself. Colluvial deposition – also seen at Etton Woodgate (ibid) – was the most probable mechanism responsible for sealing the enclosure ditch fills. It would have altered the soil development process, and was associated with gleying and seasonal waterlogging, processes that probably began at some time during the later Neolithic period.

Section 112

Section 112 in segment 5 displayed the following stratigraphic sequence (depths are below the surface at 6.95m OD):

Layer 1: (0–0.25m) silt loam with oxidation mottling and scattered gravel pebbles. Merged with stream channel. 10YR 5/3–5/6.

Layer 2: (0.25–0.35m) oxidised silt loam with a few gravel pebbles. Cut stream channel. 10YR 5/8.

Layer 3: (0.35–0.40m) silt loam (reduced) and roots in centre, with even gravel mix on each side. Cut stream channel. 10YR 4/2.

(0.40–1.00m) varved deposit (natural feature).

Tertiary filling

The tertiary fill of the ditch (layer 1) as it merged with the secondary filling of the stream channel in section 112 was analysed in thin section. It was composed of a 'loose', heterogeneous, poorly sorted mixture of four fabrics. It resembled the secondary filling of the enclosure ditch in section 119 and the tertiary filling of section 139.

Fabrics i and ii comprised *c* 70% of the groundmass of the stream/ditch fill. Both were silt loams, with high proportions of silt and clay. The only real difference between the two fabrics is that fabric ii contained much more organic matter. The unsorted and fine nature of both fabrics suggests that they had been transported by water action and settled out of suspension in still water conditions. Essentially, these two fabrics were colluvial material, probably derived from eroded soil material from higher ground upstream to the west.

Fabric iii was dominated by calcite. This was present mainly in the form of intercalations within the groundmass and was composed of micritic and sparite sized crystals. Although the origins of the calcitic pedofeatures are poorly understood, calcitic intercalations are only found in strongly hydromorphic or gleyed soil horizons (Bullock *et al* 1985). The micritic calcite probably mainly derives from the upwelling of groundwater from the underlying base-rich sand and gravel terrace subsoil, whereas the coarser, sparite calcite crystals may indicate transported, rolled material in floodwaters. Further support for this comes from the underlying subsoil hollow in this section, which was infilled with varved deposits of calcium crystals and organic matter.

The combination of abundant amorphous calcium carbonate and ferruginised plant tissues and roots/stems is also indicative of a high, but fluctuating local groundwater table.

The upper filling of the stream and enclosure ditch would have been subject to considerable fluctuation of the groundwater table; it may also have been affected by freshwater carrying eroded fine material. The ditch/stream environment would have alternated between shallow, still, rank water and slowly moving, deeper water. Water depth probably ranged between *c* 0.10 and 0.50m throughout the season (a conservative estimate).

The 'varved' deposit

Four spot samples from the *c* 0.60m thick 'varved' or laminated deposit in the base of section 112 of the

Fig 252 Laminated stream deposits below enclosure ditch segment 5, in section 112. The enclosure ditch deposits are above and to the right of the label. Scale 0.15m

ditch (Fig 252) were taken for micromorphological analysis. The results of the examination of two of the samples in thin section are described below.

This deposit was a dense formation of calcitic crystals with impregnations and intercalations of silt and organic matter. A numerous and active soil fauna was at work in this deposit, as witnessed by the frequent excrements.

This unique deposit at Etton was probably the result of a natural spring in the terrace deposits 'welling up' base-rich water in a natural hollow in the terrace subsoil. The dense calcitic crystal formation was caused by oxidation of this base-rich water under hydromorphic conditions. The spring may have formed a small shallow pool, rich in plant/organic matter accumulation, which probably represented a *Carex* mire type deposit (Mark Robinson personal communication).

This feature lay beneath the enclosure ditch and may have been partially truncated by it. The lens of gravel (subsequently iron panned) overlying the spring may have been deliberately thrown down into the base of the freshly cut ditch to consolidate the ditch bottom over this natural spring/hollow.

Particle size analysis of the enclosure ditch soils

Although the enclosure ditch had in places been recut many times – for example, up to five times in sections 7–8 of segment 1 – the following two profile descriptions are representative of the types of infilling found within the south-western arc of the enclosure ditch (Table 81). The sections in segment 1 were not subject to interference by the contemporary meandering stream channels.

Section 1

The following stratigraphy was revealed (Fig 59, A). Depths are below the surface at 6.90m OD:

Layer 0: (0–0.10m) sandy loam with scattered gravel pebbles. 10YR 4/2; (0.10–0.35m) sandy clay loam with scattered gravel pebbles. 10YR 4/2; (0.35–0.45m): sandy loam with some gravel. 10YR 5/6.

Layer 2: (0.45–0.55m) sandy loam with a high gravel content (60%). 10YR 5/6.

Table 81 Percentages of clay, silt, sand, and gravel in sections 1 and 5 of enclosure ditch segment 1

sample (depth in metres)	% clay	% silt	% sand	% gravel
section 1 tertiary fill				
0–0.10	10.00	35.00	55.00	3.70
0.10–0.20	28.75	11.25	60.00	4.00
0.20–0.30	28.75	11.25	60.00	1.10
Phase 1B recut				
0.35–0.45	11.25	20.00	68.75	13.70
0.45–0.55	–	36.25	63.75	60.40
0.55–0.65	22.50	13.75	63.75	12.90
0.70–0.80	26.25	15.00	58.75	6.25
0.80–0.90	25.00	13.75	61.25	7.60
Phase 1A ditch				
0.25–0.35	8.75	27.50	63.75	8.10
0.35–0.45	7.50	20.00	62.50	2.60
section 5 Phase 1A ditch				
1.40–1.50	12.50	18.75	68.75	44.40
1.50–1.60	8.75	17.50	73.75	71.60
1.60–1.70	3.75	28.75	67.50	80.00

Layer 3: (0.55–0.65m) sandy clay loam with ochreous mottling and scattered gravel pebbles. 10YR 5/1–5/6.

Layer 7/8: (0.65–0.80m) sandy clay loam with ochreous mottling and scattered gravel pebbles; contained wood and charcoal. 10YR 4/1–5/6.

Layer 8: (0.80–0.90m) sandy clay loam with scattered gravel pebbles; contained wood and charcoal. 10YR 2/1.

The infilling above the 0.35m depth may represent a final, shallow recutting of the ditch. The infilling from 0.35 to 0.90m represents a deepening or recutting of the butt end of the enclosure ditch. The original ditch was shallower (0–0.55m) towards its butt end and partially survived on the interior edge of the recut between the butt at causeway A and section 5 (Fig 106). There was no internal bank in the vicinity of the ditch butt and causeway.

Section 5

The following stratigraphy was revealed (Fig 60, A). Depths are below the surface at 7.90m OD:

Layer 8: (1.00–1.12m) sandy loam with a few scattered gravel pebbles. 10YR 4/2.

Layer 1: (1.12–1.20m) sandy loam to loam with even gravel mix. 10YR 4/2.

Layer 2/3: (1.20–1.50m) sandy/silt loam with even gravel mix (44%). 10YR 5/6.

Layer 4/5: (1.50–1.70m) sandy loam with ochreous mottling and even gravel mix (71–80%), which contained wood and charcoal. 10YR 4/1–5/6.

(1.70–1.90m) (in section 6 only): black reed peat. 10YR 2/1.

The basal peat filling occurred in two channels at the base of section 6 (Fig 60, B); it was originally interpreted as the primary filling of the original, but incomplete, enclosure ditch (Pryor *et al* 1985). It is now, however, seen to predate the Neolithic period, and its depositional context was not of anthropogenic origin. The pollen analysis and insect analysis of this peat deposit are discussed in Chapters 11 and 14.

The overlying, partially waterlogged, sandy/silt loam and gravel with abundant wood and charcoal (layers 2 and 4) were characteristic of the infilling of the first complete enclosure ditch. Layers 3 and 5 were of similar composition, but represented a recutting of the ditch during this phase of infilling. Layer 1 was the natural tertiary infilling of the enclosure ditch. This now infilled ditch profile was partially covered by an oxidised sandy loam and gravel layer (8), which lensed out across the ditch; it is thought to be the truncated and eroded upper portion of the internal bank. The whole profile was sealed by *c* 1.25m of alluvium.

Summary

Eastern arc

The sequence of infilling and recutting of the eastern arc enclosure ditch may be summarised:

Phase 1A

1 Turf was first stripped from the line of the ditch, some of which was probably stacked separately on either side or both sides.

2 Topsoil (as distinct from turf) was also removed from the line of the ditch. Some of it possibly formed a low bank on both sides of the ditch, and some may also have been piled separately from the turves and the sand and gravel subsoil upcast.
3 Sand and gravel from the ditch may have formed a bank on one or both sides of the ditch; it may have been piled separately from the topsoil and turves. All of these banks probably took the form of low, irregular dumps.
4 After a brief period of being open (possibly no more than one year to judge by the near-absence of primary silting and weathering), the ditch was partially backfilled to about half its depth with turves, sand, and gravel.

Phase 1B

5 After an indeterminate period, the ditch was subject to a major recut. This involved digging what was in effect a new ditch almost to the depth of the original Phase 1A ditch; it was, however, narrower and of an open V-shaped profile. Structured or placed deposits were found on the bottom of this recut.
6 This recut was subject to a variety of infilling processes, including natural erosion and accumulation, together with deliberate backfilling with turves, sand, gravel, and topsoil. It is probable that this recut remained open for longer than the Phase 1A ditch.
7 The partially infilled ditch of Phase 1B was then recut in several places. These recuts (or re-recuts) were often off-centre and would extend into Phase 1A deposits; they were also generally shallower and in shorter lengths than previously. These recuts also contained structured deposits along their bottoms and were infilled by a variety of processes similar to those observed in the initial Phase 1B recut.

Phase 1C

8 The final recut was a distinct but shallow segmented ditch, which cut down the centre line of each segment. Its infilling was characterised by clusters and spreads of animal bones that were distributed along its length. The bones may have been lightly covered with soil, as they were generally in fresh condition. Otherwise the ditch was allowed to fill in by natural means.

Phase 2

9 This phase saw the excavation of several large pits that were cut at irregular intervals into the former ditch from the top of the upper secondary filling.

Subsequent phases

10 The remaining shallow ditch filled in naturally; an important part of these processes was the seasonal addition of silty clay alluvium.
11 Throughout its history of infilling, and indeed subsequently, the ditch was subject both to a fluctuating groundwater table and seasonal freshwater flooding.

The western arc

The following sequence of events is envisaged as being responsible for the infilling of the western arc enclosure ditch:

Digging of the ditch

1 In segment 1, from section 5 to 10, a former stream channel initially existed where the enclosure ditch was (perhaps deliberately?) to be excavated. The surviving basal fill of this relict stream was composed of peat. This ombrogeneous mire had developed in an open reed fen environment.
2 The entire western arc enclosure ditch was dug. This ditch witnessed the main phase (or phases) of archaeological activity, associated with the use of the causewayed enclosure. The following sequence must have taken place after the last time that the ditch was cleaned out – essentially at the end of the primary ditch phase (Phase 1A). Most of the archaeologically visible activities took place in the phases of the main recuts (Phases 1B and 1C).

Primary and secondary infilling (Phases 1A and 1B)

3 Selected 'structured' deposits were put on the clean (recut) ditch bottom, probably in very shallow, still, clear water conditions. This depositional environment is corroborated by the insect evidence (Chapter 14).
4 Organic matter began to accumulate naturally in the fluctuating depths of stagnant water, and small alder coppice stools occasionally grew on the lower sides of the ditch. Woodworking debris accumulated on the ditch bottom, together with animal bones, fragments of pottery, and so on.
5 This material was intermixed with silts and clays that were carried in suspension in seasonal floodwaters. This alluvium (and indeed colluvium) was probably derived from clearance and cultivation immediately upstream (on Maxey 'island'). Also included in this washed-in soil were fragments of eroded argillic brown earth, but which had developed in dry ground conditions beneath the earlier Holocene mixed deciduous forest by the onset of the Neolithic period. Remnants of such soils have been found *in situ* upstream at Maxey and Etton Woodgate.
6 Freshwater derived from overbank flooding and/or a high local groundwater table was also responsible for some erosion of the ditch sides, which were only partly protected by vegetation. Evidence for this erosion was provided by sands and gravel in

the lower infilling. Erosion probably mainly took place on a seasonal basis in late winter or early spring.

7 Throughout this period the local groundwater table fluctuated seasonally. Base-rich groundwater welled up from the gravel terrace subsoil and was responsible for the formation and accumulation of amorphous calcium carbonate and calcite crystals, especially where the enclosure ditch was affected by the stream channels (segment 5).

8 Evidence for seasonal waterlogging and intermittent drying out took four forms: first, the formation of calcite crystals throughout the ditch filling (resulting from the oxidation of base-rich groundwater); second, the ferruginisation of much of the ditch infilling material, caused by the oxidation of iron and manganese carried in the groundwater in solution; third, the presence in the soil of calcitic or ferruginous replacements (or pseudomorphs) of organic matter; and, finally, the oxidation mottling of the secondary filling.

Tertiary infilling (Phases 1C and 2)

9 Similar mechanisms to stages 5–8 above and sources of infilling material were responsible for the observed composition of the tertiary ditch filling.

10 There was, however, a much greater alluvial or colluvial contribution to the sediments. This is again probably due to the intensification of clearance and cultivation activities immediately upstream on Maxey 'island'. A second, contemporary, contributing factor was the stream channel or channels that intersected with the north-western sector of the enclosure ditch. Their influence may have been seasonal, but it gave rise to a more rapid and less compacted, silt-dominated and clay-dominated ditch infilling.

Later events (Phases 3–4)

11 Throughout later prehistoric times the area around the causewayed enclosure continued to receive seasonal, freshwater-transported fine material (alluvium); these periods of alluviation alternated with relatively drier ground conditions.

12 Throughout later prehistory, and prior to the beginning of the major period of alluvial aggradation, alternating wet and dry conditions must have caused the biological oxidation and destruction of much of the organic material in the upper, tertiary, filling of the ditch. The same processes also affected the buried soil over the interior of the monument.

13 During the later Roman period, deposition of the overlying silty clay alluvium began. This may also be seen as a repeated, seasonal, event. It was primarily caused by further deforestation and more intensive arable cultivation on higher ground, upstream in the Welland valley. This process continued until 1953 when the Maxey Cut, a modern flood-relief channel, was enlarged. These works stopped annual flooding in the area, and made possible the conversion of spring and summer grazing to all-year-round arable land.

Modern developments

14 From 1953 until the summer of 1984, the gradual drying out of the upper secondary ditch deposits began.

15 In the summer of 1984 adjacent quarrying operations intensified the dewatering of the region around the causewayed enclosure. An early effect of this was the sudden drying out of the lower secondary and primary ditch fillings; this caused serious damage to the archaeological deposits.

Buried soils of the interior

Introduction

Thirteen series of samples (profiles A–H and J–N) of the buried soil were taken and analysed in thin section after the methods of Murphy (1986) and Bullock *et al* (1985). The detailed micromorphological descriptions are found in Appendix 2.

All but one of these series of samples (profile D) was taken from within the interior of the causewayed enclosure. Particle size analysis of the present-day soil profile and of the buried soil at sample locations A and B confirmed that the palaeosol was composed of clay loam to sandy loam with varying amounts of gravel pebbles (Table 82). It also exhibited a weakly developed, sub-angular blocky ped structure.

As the soil characteristics and their interpretation were so similar, all 13 buried soil profiles from the enclosure site will be discussed together below. The profile of the present-day soil will be considered first, followed by a discussion of the buried soil. A summary of the characteristics and interpretation of the buried soil is given in Tables 82 and 89).

The modern soil profile

The modern soil profile consisted of *c* 0.80–1.20m depth of alluvium, and its composition is given in Table 83 (see also Fig 59, A).

The pH values ranged from 6.8 to 7.6 (Table 84) and increased towards the base of the profile.

The cumulative frequency particle size curves in each sample exhibited some characteristics of note (Table 85). The ploughed alluvial topsoil (0–0.30m) was a trimodal loam containing almost equal proportions of clay, fine silt, and medium sand. The underlying gleyed alluvial silt loam (0.30–1.00m) was dominated by the fine silt fraction, although it tended to become coarser with depth. This may be a direct

Table 82 The main pedological characteristics of the buried soil at profiles A–H and J–N

	characteristics						
profile	*heterogeneity*	*soil disturbance*	*organic content*	*silt/clay intercalations*	*clay coatings*	*silt/clay aggregates*	*sesquioxide impregnation of fabric*
A	homogeneous	very slight – void infills of fine fabric	frequent	very few	very rare limpid	–	75%
B	partially homogeneous	slight to common – mixed fabrics	frequent to few	many to abundant	very rare laminated dusty	very few	50–90%
C	relatively well-homogenised	very slight – void infills of fine fabric	few	abundant to very abundant	occasional limpid; rare laminated dusty	few	<50%
D	heterogeneous, becomes homogeneous with depth	slight – mixed fabrics in upper profile only	few	abundant to very abundant	very rare laminated dusty	very few	25–50%
E	homogeneous	none; but foreign fabric present as papules	few	abundant	very rare limpid; rare laminated dusty	very few	20–50%
F	homogeneous	very slight – void infills of fine fabric	few to frequent	abundant	rare laminated dusty	very few	40–75%
G	heterogeneous	common – mix of soil fabrics; void infills of fine fabric	few	abundant to occasional	very rare laminated dusty	very few	50–90%
H	relatively homogeneous to homogeneous	slight – void infills of fine fabric	few to frequent	abundant	–	few	25–50%
J–N	homogeneous	very slight to slight (except J) – void infills of fine fabric	few	abundant	–	few	<50%

Table 83 Stratigraphy and composition of the modern soil profile (see also Fig 59)

depth below 8.0m OD	*horizon*	*description*
0–0.30	Ap	gravel-free loam with a fine regular blocky tilth. 10YR 3/3. Even merging boundary
0.30–1.00	Bg	gravel-free, gleyed, alluvial silt loam to silty clay loam with moderately developed sub-angular blocky structure. 10YR 4/3–2.5Y5/2. Merging boundary
1.00–1.40	Bw/g	sandy clay loam to sandy loam with ochreous mottling, some gravel, and a weakly developed sub-angular blocky structure. 10YR 5/4–7.5YR5/4. Merging boundary
1.40–1.50	B/C	loamy sand and gravel or weathered subsoil. 10YR 6/8
1.50+	C	sand and gravel of the Welland Second Terrace. 10YR 8/2–7/6

function of the environment of deposition, with the sediments becoming finer as the water flow slowed down. Although this area is mapped as being of the Fladbury thin phase (Burton 1981), it is probably more indicative of the thick phase, as the alluvium was generally greater than 0.80m in thickness.

The underlying weathered and gleyed B horizon (1.00–1.40m) displayed a bimodal distribution, with a dominant medium sand peak and a somewhat subordinate medium/fine silt fraction. The frequency curves of this horizon were similar to the B horizon developed on the sand/gravel terrace subsoil around Maxey. The high

Table 84 Percentages of clay, silt, sand, and gravel, and pH values in the modern soil profile adjacent to the enclosure ditch at section 5

depth (m)	*% clay*	*% silt*	*% sand*	*% gravel*	*pH*
0.10–0.20	22.50	48.75	28.75	–	6.80
0.30–0.40	26.70	66.75	6.55	–	–
0.50–0.60	6.90	76.2	6.90	–	6.70
0.70–0.80	3.45	73.80	22.75	–	–
0.90–1.00	7.50	57.67	34.87	0.20	7.20
1.00–1.10	7.50	31.25	61.25	5.40	–
1.10–1.20	5.00	37.50	57.50	5.60	–
1.30–1.40	5.00	31.25	63.75	28.60	7.60

Table 85 The four statistical measures for the sand and silt fractions of the modern soil profile adjacent to the enclosure ditch at section 5

depth (m)	*mean size*	*standard deviation (or degree of sorting)*	*skewness*	*kurtosis*
sand				
0.10–0.20	1.73	0.08	0.22	1.19
0.30–0.40	–	–	–	–
0.50–0.60	–	–	–	–
0.70–0.80	1.73	0.11	0.15	1.39
0.90–1.00	1.61	0.08	0.09	1.37
1.00–1.10	1.80	0.15	0.33	1.02
1.10–1.20	1.58	0.06	0.05	1.47
1.30–1.40	1.81	0.10	0.12	1.22
silt				
0.10–0.20	7.33	1.46	0.25	0.99
0.30–0.40	7.56	1.53	0.36	1.11
0.50–0.60	7.25	1.19	0.60	1.15
0.70–0.80	7.06	1.59	0.40	0.98
0.90–1.00	7.00	1.33	0.33	1.02
1.00–1.10	6.70	1.11	5.70	0.68
1.10–1.20	6.78	1.32	0.40	0.98
1.30–1.40	6.80	1.36	0.23	0.90

Table 86 The percentages of clay, silt, sand, and gravel, and pH values of the buried soil

	% clay	*% silt*	*% sand*	*% gravel*	*pH*
profile A (section 6)					
sample 1	7.50	35.00	57.50	–	6.90
sample 2	36.25	21.25	42.50	–	–
profile B (section 1)					
sample 1	22.50	30.00	47.50	2.20	7.00
sample 2	33.75	16.25	50.00	1.90	–
sample 3	37.50	18.75	43.75	1.80	7.20
sample 4	25.00	22.50	52.50	4.40	–

silt content (*c* 31.0–37.5%) (Tables 86, 87) suggests a considerable alluvial influence to the upper part of this horizon. The extreme positive skewness of the silt fraction at 1.00–1.10m (Table 84) may indicate an influx of finer material and signal the change of influences from a naturally developing soil to the inundation and deposition of freshwater-borne silts.

Within the causewayed enclosure the buried soil was preserved to an approximate depth of up to 0.30m by the deposition of alluvium. There were indications

Table 87 The four statistical measures for the sand and silt fractions of the buried soil

	mean size	*standard deviation (or degree of sorting)*	*skewness*	*kurtosis*
sand				
profile A (section 6)				
sample1	1.18	0.45	0.04	0.99
sample 2	1.91	0.29	0.37	1.36
profile B (section 1)				
sample 1	1.53	0.07	0.08	1.70
sample 2	1.58	7.57	0.01	1.63
sample 3	1.41	0.09	0.16	1.77
sample 4	1.38	0.19	0.16	1.57
silt				
profile A (section 6)				
sample 1	6.80	1.35	0.19	0.78
sample 2	6.81	1.17	0.17	0.72
profile B (section 1)				
sample 1	7.60	1.37	0.59	1.25
sample 2	6.70	1.00	0.05	0.56
sample 3	6.71	1.24	0.53	0.85
sample 4	7.28	1.04	0.69	0.60

of a stone line at the base of the buried upper A horizon (Fig 59, A). This and the micromorphological analysis (see below) indicate that the upper part of the A horizon may have been somewhat runcated and/or transformed by alluvial processes.

The buried soil, which is mainly lower A and B horizon material, was composed of clay loam to sandy clay loam (10YR 3/2), with a few scattered gravel pebbles (Table 82). It exhibited an apedal to weakly developed sub-angular blocky ped structure. It had a bimodal frequency curve with medium sand and fine silt/clay peaks. The sorting characteristics suggest the influence of water and the translocation of clay from above, both probably associated with a fluctuating groundwater table, seasonal flooding, and alluvial processes. These features were confirmed by the micromorphological analyses (below). The buried soil became coarser with depth and rested on a *c* 0.10m depth of weathered sand/gravel terrace subsoil.

Discussion of the micromorphological analyses

In the field, the buried soil generally exhibited two horizons: an upper (*c* 0.10–0.20m thick) silt to sandy loam (10YR 4/3) with a weakly developed, sub-angular blocky ped structure and scattered gravel pebbles (*c* 2–20mm in size); and a lower (*c* 0.10m thick) apedal sandy loam to loamy sand (10YR 5/6) with even gravel mix (*c* 2–40mm in size). The profile rested on the sands and gravels of the Welland Second Terrace and was overlain by *c* 0.80–1.20m of silty clay alluvium (10YR 4/3). Contiguous series of samples were taken from the buried soil at various random locations from within the interior of the enclosure (profiles A–C, E–H, J–N) and at one location outside the enclosure ditch (profile D).

As may be seen in Table 88, various soil horizons were represented in various profiles. Nevertheless, the horizons present and the observed soil characteristics gave a consistent series of results. The following discussion will describe the soil horizons and their development in consecutive order from the top to the base of the soil profile. Following this, some general observations will be made on recurrent features found within the soil profile.

The lower A horizon

A soil fabric characteristic of lower A horizon material occurred in all but one (E) of the 13 profiles examined. This horizon was characterised by a relative abundance of organic matter (both in the form of plant cell tissue, amorphous organic matter, and very fine flecks of charcoal), the presence of faunal excrements, and the relative absence of illuviated clay.

Clays

Various types of clays were present in very small quantities in the lower A horizon material and became slightly more abundant in the underlying horizons.

Table 88 Soil horizons present (*) in each sample profile

	profile (with sample number)											
soil horizon	A	B1	B2	B3	C1	C2	D1	D2	D3	E1	E2	F1
lower A	*	*	*	–	*	*	*	–	–	–	–	*
upper B	–	–	–	–	–	–	*	–	–	–	–	–
Bw	–	*	–	–	–	–	*	–	–	–	–	–
Bwt	–	–	*	–	–	–	*	*	–	*	–	–
Bt	–	–	–	*	–	–	*	–	–	–	*	–
Btg	–	–	–	–	–	–	*	–	–	–	–	–

soil horizon	F2	G1	G2	H1	H2	J1	J2	K1	L1	M1	N1
lower A	*	*	*	*	*	*	*	*	*	*	*
upper B	–	–	–	–	–	–	–	–	–	–	–
Bw	–	–	–	–	–	–	–	–	–	–	–
Bwt	–	–	–	–	–	–	–	–	–	–	–
Bt	–	–	–	–	–	–	–	–	–	–	–
Btg	–	*	*	–	–	–	–	–	–	–	–

The very rare occurrence of limpid clay, or pure, uniform clay without inclusions, that is found within the groundmass of only a few of the profiles examined is believed to be indicative of clay translocation under stable wooded conditions (Bullock and Murphy 1979; Federoff 1968; Macphail 1986; 1987). This minor presence may indicate either the general lack of woodland in the immediate area in the Neolithic and/or that subsequent leaching and soil disturbance have had a detrimental effect on the survival of the micro-fabric.

The rare laminated dusty clay coatings, which were composed of oriented clay containing micro-particles or impure clay containing contrasted particles of fine silt-size, are probably indicative of clearance. The non-laminated dusty clay coatings, which were composed of impure clay containing silt particles and very fine flecks of organic matter, are indicative of clearance and soil disturbance (Courty and Fedoroff 1982; Fedoroff 1968; Macphail 1986; 1987; Macphail *et al* 1987). As none of these coatings were impregnated with sesquioxides, clay illuviation must have occurred prior to any gleying of this soil. Consequently, these illuvial features may be indicative of the initial clearance of the area, prior to seasonal waterlogging and the deposition of intercalated and later alluvium. The pollen, insect, and macrobotanical evidence also suggests that the immediate area around Etton was largely devoid of established woodland by the time of the construction of the causewayed enclosure (see Chapters 10, 11, and 14).

Despite the relatively rare occurrence of illuviated clay in the lower A horizon, there was an abundant intrusive element of illuvial dusty clay acting as intercalations within the groundmass and as dense incomplete infills or 'linings' of the voids. These intercalations suggest that this soil was subject to the addition and within-soil mass movement of silt and clay fines. This intrusive material was probably alluvium. As this alluvial material was not fully homogenised with the *in situ* lower A fabric, it suggests that the soil fauna had insufficient time to rework the soil material and that the influx of alluvial material was repeated frequently (see below).

Wet and dry conditions

The replacement of organic matter by amorphous oxidised iron, the sesquioxide impregnation of the bulk of the fine fabric, and the presence of abundant silt/clay intercalations all point to alternating wet and dry conditions influencing the lower A horizon. The ferruginisation of the plant material and the faunal excrements suggest that these conditions were a post-burial feature of this buried soil.

Bank material

Of the 13 profiles examined, profile A was the best-preserved and most complete example of prehistoric soil. It was located on the immediate interior edge of the enclosure ditch, adjacent to sections 5 and 6 (grid 36547305). There is every possibility that the better preservation was a consequence of the soil being buried and protected by ditch upcast or bank material, which had since largely eroded away and/or was deliberately redeposited in the enclosure ditch.

The mixed lower A and B soil horizons

In three profiles (B, D, and G), the uppermost surviving soil horizon was composed of a heterogeneous, poorly sorted mixture of two different soil fabrics, lower A and either upper or lower B horizon material. A similar but more homogeneous mix of these same two soil fabrics also occurred in profile F.

Profile B

The buried soil in profile B, for example, exhibited a poorly sorted, heterogeneous micro-fabric showing two different soil fabrics, which had been strongly influenced by Neolithic activity and post-burial pedogenic phenomena. There was also evidence of within-soil mass movement, which infilled much of the void space.

The *in situ* fabric 1 comprised *c* 50–80% of the groundmass. The relative abundance of clay coatings suggests that this fabric was lower B horizon or Bw material. The bulk of the coatings were dusty/'dirty' coatings, which are a result of the translocation of impure clay under increasingly unstable conditions, probably through forest disturbance, clearance, and possibly cultivation/anthropogenic disturbance (Courty and Fedoroff 1982; Macphail *et al* 1987; Slager and van de Wetering 1977). The abundance of very fine charcoal intimately bound with the fine fabric is indicative of these practices and of human occupation generally. Rarely, the dusty, impure clay coatings exhibited laminations, which are suggestive of successive phases of soil disturbance.

The *in situ* fabric 1 was intermixed with a second fabric (2), which comprised *c* 20–50% of the groundmass. This fabric was dominated by the silt and clay fractions and contained abundant amorphous organic matter and very fine charcoal. It was probably lower A horizon material. As this more organic lower A fabric was not fully homogenised with the lower B fabric, it suggests that the soil fauna did not have sufficient time prior to burial to rework the soil material, and that a rapid deposition occurred. It is possible that the soil disturbance and intermixing of the fabrics were caused by several factors. Uprooting and tree-throw, deliberately and immediately backfilled by man (Richard Macphail personal communication), could have caused this, or equally the digging and backfilling of the numerous small interior features within the life of the causewayed enclosure may have been responsible.

Soil fabrics 1 and 2 had both been subject to amorphous sesquioxide impregnation. Most of the groundmass and the amorphous organic matter were ferruginised to a greater or lesser extent. This evidence suggests that this soil was subject to alternating wet and dry conditions, presumably representing seasonal waterlogging throughout its life since clearance had occurred.

Profile D

Two partially homogenised fabrics were evident in profile D, which was located on the external edge of the enclosure ditch near section 139. They are indicative of upper B (fabric 1) and lower A (fabric 2) horizon material. As this soil rested on lower B horizon material (see below), the upper B horizon fabric was probably the *in situ* soil. The sesquioxide-impregnated lower A horizon material had been physically incorporated with this soil, but it had not been reworked by the soil fauna to any great extent.

The A horizon material that was removed from the proposed line of the enclosure ditch may have been incorporated in the soil outside the monument by trampling. Alternatively, the organic fabric may have been the result of ditch cleaning. There is also the possibility that ditch upcast formed an amorphous, archaeologically undetectable, bank on the outside of the enclosure ditch and sealed this mixture of soil fabrics from further reworking.

Both soil fabrics contained abundant to very abundant dusty clay intercalations within the groundmass and as partial void infills, which were not impregnated with sesquioxides. As observed throughout the buried soil profiles on site, this is indicative of the addition of an alluvial component to the soil. Thus the prehistoric soil was potentially subject to alluvial influences prior to the cutting of the Middle Neolithic enclosure ditch, as well as during and after the lifetime of the enclosure.

Profile F

In profile F, as in profile D, two soil fabrics were evident, but they had been relatively well homogenised by the soil fauna. The dominant fabric was again indicative of an organic lower A horizon, There was a minor second fabric of upper B/Bw horizon material, characterised by a relative absence of organic matter and a few illuviated clay coatings, as well as considerable sesquioxidic impregnation. Despite the relative homogeneity of the two fabrics, there had clearly been some soil disturbance and some biological reworking of both soil fabrics.

Profile G

In profile G, there were again two main fabrics in an heterogeneous mix. Organic lower A horizon material was mixed with a second fabric that was dominated by fine material, clay coatings, and sesquioxidic impregnation. This fabric was probably lower B (gleyed argillic or Btg horizon) material. This Btg fabric became the predominant fabric in the lower half of the buried soil. This gleyed, argillic horizon was poorly mixed with lesser amounts of a second fabric that was composed of lower A horizon material, similar to the predominant fabric in the upper half of the buried soil. Both the heterogeneity and mixing of these different soil fabrics again suggest some soil disturbance.

The argillic or Bt horizon

Argillic or Bt horizon material was observed in four profiles (B, D, E, and G), and was especially well developed in profile E. In this case the fabric of the whole profile was suggestive of an argillic brown earth soil (Avery 1980; McKeague 1983). This horizon became better developed and more gleyed with depth. The abundance and variety of textural coatings are indicative of this type of illuvial horizon.

Unlike some of the other buried soil profiles examined (B and D), the soil fabric in profile E was not a heterogeneous mixture of different soil materials and soil horizons. This suggests that this particular sample location was not as disturbed by prehistoric anthropogenic activities as elsewhere on site.

Several types of illuvial material were evident in profile E. The relatively rare limpid and laminated dusty clay coatings suggest that there was only limited illuviation of fine material prior to soil disturbance. This may reflect the picture given by the pollen analysis that the area of the site and the immediate surroundings was largely open ground by the Middle Neolithic period (see Chapter 11). Both these types of clay illuviation are only thought to occur beneath stable forested conditions (Fisher 1982; Macphail 1987; Slager and van de Wetering 1977).

The more common, non-laminated dusty clay coatings may indicate that what forest had been growing here was subsequently opened up (Macphail 1985; Slager and van de Wetering 1977). Tree clearance causes soil disturbance and hence damage to the soil ped structure – thus mobilising 'coarse' fine material – and leads to the illuviation of 'impure' clay. This mechanism, at least in part, may explain the relative abundance of impure illuvial clay as well as the often observed evidence of soil disturbance and heterogeneity.

Much of the lower B or Bt horizon, particularly in profiles D, E, and G, was impregnated with sesquioxides, up to about one-half of the groundmass, giving rise to a gleyed argillic horizon. As for the other soil horizons examined, alternating wet and dry conditions pertained, most probably on a seasonal basis. As the limpid clay and most of the dusty clay coatings were not impregnated with sesquioxides, some clay illuviation must have occurred prior to the onset of consistent seasonally wet conditions.

General soil characteristics

Clay intercalation and alluviation

The complete prehistoric soil profile, and in particular the lower A and upper B horizons, received abundant amounts of non-laminated dusty clay as intercalations within the groundmass of the soil fabric and as partial void infills. This is indicative of within-soil movement of fine material (both silt and clay). It is suggested that this represents the addition of a considerable alluvial component to the soil, well before the main period of alluviation on the site that began in the later Roman period.

The abundance of these dusty clay intercalations suggests that the ground surface was bare and became muddy and saturated for at least part of the year. This in turn led to the slaking of the fine material, its translocation down the profile, and its redeposition as intercalations within the groundmass of the lower horizons. Furthermore, the intercalated silt/clay was not fully mixed with the *in situ* soil fabric, whichever horizon was affected. This suggests that the soil fauna had insufficient time to rework the soil material and that the influx of alluvial material was repeated frequently and at certain times of the year, most probably in late winter, spring, and late autumn. Moreover, similar intercalated material was found within the fill of the enclosure ditch. Thus, the interior of the causewayed enclosure must have been extremely wet and muddy during these times of year.

Sand-size rolled clay aggregates were consistently present throughout the prehistoric soil and were intimately bound with the fine fabric. These clay aggregates were also found in the fills of the enclosure ditch. Their origin must be seen as eroded soil or 'old' alluvial material that had been transported downstream by freshwater and then redeposited, reworked, and reincorporated within this soil by biological/faunal mixing. The erosion processes that generated this material may range from stream channel scour to clearance and cultivation of alluvial soils and sediments.

In addition, there were several eroded fragments of palaeo-argillic horizon material, presumably eroded and transported downstream in seasonal freshwater floodwaters. The relative abundance of oriented and laminated clay in these relict nodules suggests that Bt horizons and argillic brown earths were developing under stable forested conditions elsewhere in the lower Welland valley, upstream and to the west. Well-developed argillic horizons have been observed at the nearby sites of Maxey and Barnack (French 1985a, 205–14; 1985b, 287–9).

Soil disturbance and truncation

Anthropogenic disturbance

Of the 13 profiles examined, 10 (A–D, G, H, K–N) exhibited signs of soil disturbance. For example, in profile C irregular fragments of fine fabric were found in some channels. This indicates that there may have been some mechanical disturbance of the soil, although this is only suggestive of anthropogenic disturbance generally, rather than ploughing specifically. In profile B, the abundance of fine charcoal intimately bound with the fine fabric, as well as the general background scatter of fine charcoal in all the profiles, is indicative of human occupation generally.

Occasionally, as in profile B, the rare laminations of impure clay coatings are suggestive of successive phases of soil disturbance. In profile G, there were zones within the lower A horizon fabric that were relatively more porous, and small amounts of this same fabric were found as loose, discontinuous aggregates in the voids. In addition in the same profile, there were a few medium to coarse, sand-size, sub-rounded fragments of a second intrusive fabric (or the underlying gleyed argillic horizon), which was not fully intermixed with the main fabric. All these features suggest anthropogenic disturbance of the soil.

The heterogeneous nature of at least three profiles (B, D, and G) combined with the evidence of soil disturbance in the ten profiles above suggests that much of the prehistoric soil often suffered quite deep disturbance. A variety of anthropogenic activities could have caused this disturbance. Tree uprooting and tree-throw, with the resulting holes being deliberately and immediately backfilled (Richard Macphail personal communication), could have caused this, or equally the digging and backfilling of both the enclosure ditch and the multitude of small interior features within the lifespan of the enclosure. Thus the buried soil, both within the interior and outside the enclosure, evidently suffered some truncation, removing at least the upper A horizon and occasionally the lower A horizon as well.

Erosion

Although it cannot be proved conclusively, freshwater flooding and erosion coincident with the deposition of the overlying alluvium were probably the main agents responsible for soil disturbance. Undoubtedly, deforestation, soil disturbance, repeated seasonal flooding, and the deposition of 'fresh' and unstructured soil/sediment, all aggravated by the use of the interior of the enclosure, would have made the soil more susceptible to erosion than a stable, vegetated, and flood-free soil. Removal of vegetation certainly enhances erosion by overland flow (Morgan 1979). Moreover, the concentrated flow of water has greater erosive power, and it is generally believed that most erosion occurs during events of moderate frequency and magnitude. It is therefore possible that the erosion of the upper part of the A horizon at Etton occurred during a number of years of relatively severe seasonal flooding on an extensive scale.

This event (or events) may have been associated with changes in the meandering courses of the river. It may also have been associated with the probable intensification of clearance and arable cultivation on higher ground upstream, as well as with the coincident intensification of alluvial aggradation during the later Roman and Saxon/early medieval periods (French 1990). In fact, the processes of erosion were probably the same as those responsible for the subsequent continued deposition of the silty clay alluvium that blankets this part of the lower Welland valley. It is also possible that some of the 'missing' upper A horizon material became incorporated within the accumulating alluvium and was soon rendered unrecognisable by the homogenising processes of soil faunal mixing, aggradation of silt and clay, and soil water fluctuations.

Colluviation

In addition, and on a much more minor scale, there may have been some localised colluviation. The silty clay with abundant clay intercalations and coatings that is found within the tertiary fill of the western arc of the enclosure ditch bore a distinct similarity to the Bw horizon fabric of the buried soil within the interior of the enclosure. This strongly suggests that there was some localised erosion of the prehistoric soil as colluvium when the ditch was still open during the Late Neolithic/Early Bronze Age.

Gleying

Most soil horizons within the interior of the enclosure and all types of ditch infill exhibited varying signs of alternating wet and dry conditions, as well as more permanent gleying. Common indicators of this were the replacement of organic matter by oxidised iron, the sesquioxide impregnation of the bulk of the fine fabric, which increased with soil depth, and the presence of intercalated fines within the groundmass and voids. Nevertheless, there was little sesquioxide impregnation of the clay coatings within the Bt or argillic horizon, which suggests that the main period of clay illuviation occurred well before any waterlogging and coincident gleying. Also, the ferruginisation of most of the plant material suggests that the wet/dry conditions were a post-burial feature of this buried soil. Considered together, there was probably a combination of a high but seasonally fluctuating groundwater table along with seasonal additions of shallow floodwaters, both throughout and subsequent to the main use of the enclosure in the Middle/later Neolithic.

Discussion and conclusions

The major environmental events and processes are discussed below and are summarised in Table 89.

The buried soil both within and outside the causewayed enclosure was generally well preserved and had suffered only relatively minor but variable amounts of soil erosion and truncation. The buried soil ranged in type from a brown earth to a relatively poorly developed argillic brown earth. From the 13 profiles analysed in thin section, there was sufficient evidence to reconstruct the complete profile of the palaeosol.

A horizon

Although no upper A horizon material was evident *in situ*, it is probable that it had suffered both erosion and incorporation with the overlying alluvium during the main period of alluvial aggradation during late Roman and historical times. Nonetheless, only one profile (E) exhibited no lower A horizon material. The lower A horizon was characterised by a relatively high amorphous organic matter content, very fine flecks of

Table 89 Major environmental events and their relative dates

event		*date*
1	development of an argillic brown earth	pre-Middle Neolithic
2	tree clearance and soil disturbance; tree throw, possible tillage, human activities	prior to and contemporary with the Middle/Late Neolithic use of the enclosure
3	major alluvial addition to open ground on a seasonal basis	Middle Neolithic to Roman period
4	soil truncation removing the upper A horizon, resulting from severe freshwater flooding	later Roman
5	associated with the onset of major alluvial aggradation, which buried prehistoric soil	later Roman to 1953
6	gleying and sesquioxide impregnation of buried soil resulting from rising groundwater table and seasonal flooding	from Middle Neolithic to the present

charcoal, and a fabric dominated by very fine sand, silt, and clay. In particular, much of the fine fraction or impure (or silty) clay occurred as intercalations within the groundmass and as partial infills of the voids. This intercalated impure clay is believed to result from the slaking of saturated bare soil that had a high additional alluvial content and from its translocation and redeposition lower down the soil profile. This depositional process had begun prior to the gleying and sesquioxide impregnation of the soil profile.

B horizon

Upper B horizon material was only evident in one profile, D, in the uppermost sample. Here it was the dominant fabric in a heterogeneous mix with lower A horizon material. It was characterised by a more dense, slightly coarser, more sandy textured fabric with relatively few textural pedofeatures.

Lower B horizon material, ranging from Bw to Bw/t to Bt to Btg horizon materials, was observed in profiles B, C, D, E, F, and G. In all these cases it was found in a greater or lesser heterogeneous mix with lower A horizon material. The lower B horizon material exhibited characteristics of an illuvial or argillic Bt horizon (Avery 1980; McKeague 1983). It was never particularly well developed and had suffered varying amounts of gleying. These characteristics included minor organic matter and relatively abundant translocated clay, mainly in the form of non-laminated dusty clay coatings within the groundmass and voids – rarely as laminated dusty clay coatings. These coatings were a result of the translocation of 'impure' clay down through the profile under increasingly unstable conditions, probably through forest clearance and disturbance (Courty and Fedoroff 1982; Macphail *et al* 1987; Slager and van de Wetering 1977).

The abundance of very fine charcoal intimately bound with the fine fabric in many profiles (such as B) is also indicative of clearance and disturbance – and possibly anthropogenic disturbance (Courty and Fedoroff 1982; Macphail *et al* 1987; Slager and van de Wetering 1977). Occasionally, successive phases of soil disturbance were indicated by the laminated dusty clay coatings.

Although limpid clay only occurred very rarely in the argillic horizon, this soil had probably developed under relatively stable forested conditions well before the first Neolithic use of this part of the lower Welland valley. Indeed, there was pollen evidence (see Chapter 11) that some limited oak, hazel, alder, and lime woodland existed in the near vicinity when the enclosure first began to be constructed, but by the later Middle Neolithic period the area was generally open. Nevertheless, this soil contained no 'cast-iron' evidence of previous well-developed forest cover. It is possible that no limpid Bt fabric (of a natural undisturbed argillic brown earth developed under woodland) existed or had sufficient time to develop, or perhaps clearance and soil disturbance had thoroughly reworked the soil. As woodland clearance is known to be destructive of Bt horizon fabrics (Macphail 1985), the latter may be the best explanation.

Buried soil

The palaeosol exhibited indications of soil disturbance in three main forms. The most common form was the mixture of lower A and lower B horizon fabrics, especially in the upper part of the surviving profile (such as in profiles B, C, D, F, and G). Also, several profiles (such as C, F, G, K, and L) exhibited fragments of the fine fraction fabric as loose, discontinuous infills of the void space. Rarely, rounded sand-size fragments of argillic horizon material were found within the lower A horizon (such as profile G), and in one case in the otherwise undisturbed profile E, possible palaeo-argillic fragments were found as papules in the Bt horizon. In one other instance, in profile L, limpid clay occurred as very small fragments in the groundmass. All of these features are indicative of the mechanical disturbance of the soil.

Mechanical disturbance of the soil was observable in all but two profiles (E and J) and may have resulted from a number of causes. The interior of the causewayed enclosure had seen much human activity (which survived in the form of hundreds of small pits), and this may have caused considerable mixing of the existing soil horizons. The mixture of soil horizons observed by the enclosure ditch in profiles B (inside) and D (outside) could indicate the digging of the ditch, trampling on the edge of the ditch, or deliberate backfilling of the ditch. Earlier tree-root throw may have also been a contributing factor. Indeed, several probable tree-throw hollows (clearance hollows) have been observed on site and in the near vicinity, and hundreds of tree-throw hollows have been recorded in similar river terrace localities, such as at Irthlingborough in the Nene valley and at the Drayton Cursus, near Abingdon (Richard Macphail personal communication).

Furthermore, the relative concentration of textural pedofeatures within the argillic horizon, mainly dusty/impure clay coatings and infills, is unrelated to the translocation of clay (lessivage) under woodland. Instead, the proposition must be examined that these features were caused by limited tillage of the soil. With this type of mechanical damage, not just fine clay is mobilised, but all of the fine fraction (including all sizes of clays, silt-size material, and organic matter fragments, as well as charcoal) may be translocated over short distances in the soil (Jongerius 1970; 1983). Romans and Robertson (1983b) have shown that cultivation disrupts the soil at different depths depending upon the implement used: near the soil surface for hoeing and at *c* 0.12m for arding. It is just possible that the Etton soil may have been ard cultivated very occasionally. Nevertheless, the main problem with any continuing prehistoric arable agricultural activities within the enclosure would have been the seasonal freshwater flooding and the high local groundwater table. Also, the impure coatings were not sufficiently 'dirty' (that is, containing very fine charcoal, silt, and organic matter) to indicate any prolonged phase of tillage within the enclosure.

Evidence of Neolithic agriculture can be cited from a number of sites in England and Scotland (Macphail *et al* 1987) and tends to be much more 'concrete' than the evidence found at Etton. For example, at Hazelton long cairn (Macphail 1985) and the Kilham long barrow (I Cornwall thin section and Richard Macphail personal communication; Evans 1972, 277; Macphail 1985), dusty and impure clay coatings suggested ard ploughing of shallow soils. At Hazleton, localised shifting agriculture may have occurred, and it is suggested that only small plots were employed. At Kilham, there was also corroborative soil pollen evidence for cultivation (Dimbleby and Evans 1974); conclusive evidence for this was lacking at Etton, despite the presence of cereal pollen in the enclosure ditch (see Chapter 11).

Although molluscan evidence at Windmill Hill indicated that the causewayed enclosure was set in an open woodland environment (Evans 1972, 242–8), the mixing of organic matter and charcoal in the soil matrix and the mixing of calcitic dusty textural coatings within the pre-burial soil suggest cultivation (Macphail 1985, appendix 6H). Cultivation may also have affected the buried soils beneath the Nutbane and Willerby Wold long barrows (ibid, appendices 6C and 6H). In Scotland, 'slash and burn' cultivation probably affected the soil beneath the cairns at Daladies, Angus, whereas at Strathallan it appears that a longer period of continuous cultivation affected the soil more strongly (Romans and Robertson 1975; 1983a; 1983b).

Gleying and waterlogging

There was a considerable amount of evidence at Etton that since the formation of the argillic horizon, the soil had been subject to gleying and repeated seasonal waterlogging. The evidence for this took the form of abundant intercalations of dusty (or impure) clay and the abundant impregnation of the fine soil fabric with amorphous sesquioxides, often obscuring up to *c* 75% of the fine fabric, particularly towards the base of the soil profile. Also, the pollen, insect, and macrobotanical evidence suggests the existence of open, freshwater fen conditions in the immediate vicinity of the enclosure. Finally, the stream channels that merged with the north-western arc of the enclosure ditch are known to have been active during and after the use of the enclosure ditch (see pp 351 and 356).

Alluviation and colluviation

It has already been noted that there was a major alluvial component incorporated within the prehistoric soil prior to its burial, particularly in the lower A horizon. Also, a few to occasional rolled aggregates of clay, silt, and/or organic matter occurred in every thin section examined, intimately mixed with the fine fabric of the soil. In addition, the contemporary stream channels/ tertiary ditch fills contained clay-rich soil fabrics as well as eroded fragments of Bt or argillic horizon material, which indicate the transport and deposition of colluvial/alluvial material in freshwater. Indeed, the lower B horizon fabric of the buried soil bore remarkable similarities to the silty clay fabric of the tertiary fill of the enclosure ditch, and may have been subject to localised colluviation. This evidence, combined with the soil micromorphological evidence for deforestation and cultivation by the later Neolithic period at the Maxey henge complex immediately upstream (French 1985a), strongly suggests that the clearance and cultivation of higher ground upstream to the west had initiated soil erosion and transport downstream in the water system. This resulted in the seasonal deposition of both colluvial and alluvial material within an active floodplain, carried in freshwater floodwater, over the area of the causewayed enclosure and adjacent former stream channels. This phenomenon has also been observed in thin section at the nearly contemporary adjacent site of Etton Woodgate (French 1985a; 1990).

Although this alluvial component was not particularly well mixed with the pre-existing *in situ* soil by the soil fauna, this process must have occurred on and off on a seasonal basis over a lengthy period of time. Indeed, artefactual evidence from the buried soil within the monument indicates that it may have been an exposed land surface for as long as *c* 2000 years after the use of the enclosure ditch. Most of the buried soil suffered some truncation, generally removing the upper A horizon and in places the lower A horizon unless otherwise protected. This amount of soil erosion was probably caused by a number of successive years of relatively severe freshwater flooding on an extensive scale. Localised colluviation within the causewayed enclosure ditch was probably also caused by human activities going on within and/or on the edge of the ditch, repeated freshwater flooding, as was the incorporation of alluvium within the soil in the interior of the enclosure.

The increasing intensification of clearance and cultivation and the consequent increase in soil erosion, movement, and redeposition culminated in the subsequent initiation of the deposition of the thick overlying deposits of silty clay alluvium at Etton and over much of the surrounding floodplain. It is estimated, on the basis of comparative studies, that the alluviation occurred over a period of *c* 2000 years, and there may have been *c* 0.6mm per year of alluvial aggradation. This must be regarded as a minimum value as it is unknown how much material had been removed by subsequent erosion, and how long and how continuous was the alluvial process.

This period of major alluviation is believed to have begun in the later Roman period and continued on a seasonal basis until the enlargement of the Maxey Cut in 1953 put an end to the seasonal flooding of this area of the lower Welland valley. Although there is no way of accurately dating the onset of this major period of alluviation, there were no post-late Roman features sealed beneath the alluvium at Etton and the adjacent sites of Etton Woodgate and the Glinton-Northborough bypass (French and Pryor forthcoming). Indeed, much corroborative evidence exists for the advent of widespread alluviation ascribed to the later Roman period, such as in the lower Nene valley/fen edge at Fengate (Pryor 1984a, 232) and in the upper Thames valley (Lambrick and Robinson 1979, 140).

13 Molluscs from the enclosure ditch

by Charles French

Introduction

The molluscan analysis of the causewayed enclosure ditches in Sussex (Thomas 1982) inspired a special effort to recover molluscs from the enclosure ditch at Etton. Unfortunately, these efforts were unsuccessful, despite the fact that numerous shattered fragments of freshwater and land molluscs were observed in the ditch fillings while excavations were in progress. Despite repeated attempts to recover shells, both in the laboratory (following Evans 1972, 44–5) and during the wet-sieving programme for macrobotanical and artefactual samples, insufficient numbers of shells were recovered (Table 90). Thus, all but one context (between section 199 and causeway H in ditch segment 8) produced snail assemblages that were inadequate samples on which to base any ecological interpretation.

Four bulk spot samples (*c* 12kg each) were taken from the lower secondary fill of the phase 1A enclosure ditch in sections 5–6, 11–12, 15–16, and 16–17. Three other sections were also spot sampled (*c* 2kg each): section 199–causeway H and sections 205–207A, in the upper secondary fill of the phase 1C linear recuts of the enclosure ditch, and sections 205–207A, taken from the upper secondary fill of a Phase 2 pit cut into the enclosure ditch. In each case, and in particular in section 199 to causeway H, the molluscs appeared to be coincident with discrete clusters of archaeological material, mainly in the form of animal bone, and may be indicative of material brought to the ditch from elsewhere.

As *c* 50kg of the primary and lower secondary (waterlogged) layers in each ditch section were wet sieved, it was possible to keep a constant check for the presence/absence of molluscs. Thus it was reassuring to observe that no other ditch contexts containing significant numbers of molluscs were missed.

Results

The Phase 1A ditch

The few molluscs (3 to 26 in number) that were present in the Phase 1A ditch deposits in the south-western sector of the enclosure ditch suggest the following very tentative points of interpretation. The few freshwater slum (*Lymnaea truncatula*) and marsh species (*Carychium minimum*, *Succinea putris*, *Zonitoides nitidus*) suggest that the ditches were wet, but subject to drying out, and marshy (see also Chapters 10, 12, and 14).

Table 90 Absolute numbers of molluscs in sections of the enclosure ditch

	sections 5–6, layer 3	*sections 11–12, layer 3*	*sections 15–16, layer 2*	*sections 16–17, layer 3*	*causeway H–section 199, layer 2*	*sections 205–206, layer 2*	*sections 205–207, layer 7*
Aplexa hypnorum (L.)	–	–	–	–	99	2	8
Lymnaea truncatula (Müller)	2	1	–	–	–	2	2
Lymnaea stagnalis (L.)	–	–	–	–	–	4	–
Lymnaea peregra (Müller)	–	–	–	–	3	–	–
Carychium minimum (Müller)	1	–	–	–	–	–	–
Carychium tridentatum (Risso)	–	1	–	–	29	–	–
Succinea putris (L.)	1	–	4	–	7	–	–
Succinea oblonga (Draparnaud)	–	–	–	–	10	–	–
Succinea/Oxyloma spp	–	1	–	–	15	–	–
Cochlicopa lubrica (Müller)	–	1	–	–	–	–	–
Cochlicopa spp	–	–	–	–	4	–	–
Vertigo pygmaea (Draparnaud)	1	–	–	–	–	–	–
Vallonia costata (Müller)	2	5	–	2	9	2	2
Vallonia pulchella (Müller)	–	–	–	–	3	4	12
Punctum pygmaeum (Draparnaud)	1	–	–	–	–	–	–
Discus rotundatus (Müller)	3	7	–	–	5	–	–
Nesovitrea hammonis (Strom)	2	–	–	–	–	–	1
Aegopinella nitidula (Drap)	–	–	–	–	23	–	–
Oxychilus cellarius (Müller)	–	4	–	–	1	–	–
Zonitoides nitidus (Müller)	2	3	1	1	–	–	–
Deroceras spp	–	–	–	–	1	–	–
Clausilia bidentata (Strom)	2	–	–	–	–	–	–
Trichia hispida (L.)	1	3	–	–	10	–	2
Cepaea hortensis (Müller)	–	–	–	–	–	4	–
Cepaea spp	–	–	–	–	8	4	–
Sphaerium corneum (L.)	1	–	–	–	–	–	–
Pisidium milium Held	3	–	–	–	–	–	–
Pisidium spp	–	–	–	–	4	–	–
weight (kg)	12	12	12	12	2	2	2

They may be the only *in situ* species present. The more common terrestrial species were either damp tolerant (*Vallonia costata*, *Cochlicopa lubrica*), shade loving (*Carychium tridentatum*, *Discus rotundatus*), catholic (*Punctum pygmaeum*, *Nesovitrea hammonis*, *Trichia hispida*), rupestral (*Clausilia bidentata*), or open-country species (*Vertigo pygmaea*, *Vallonia costata*). It is possible that most if not all of these species did not live in the ditch, but found their way into the ditch by virtue of being attached to pieces of wood and leaves that were thrown into and/or accumulated in the ditch, and/or were carried into the ditch by water action (see Chapter 12). Nevertheless, the species that were present may suggest that the immediately surrounding environment was relatively diverse and mature, with possibly some scrub and open-country elements. But this interpretation cannot be stretched any further.

The general absence of molluscs was probably mainly a product of the nature of the infilling deposits and the way in which these were deposited in the ditches. The few shells that were recovered only occurred in the waterlogged organic, lower layers of the Phase 1A ditch segments. As the groundwater was calcareous, shells should have been preserved, so other reasons for the poor recovery of snails must be invoked. Many of these shells, especially the land molluscs, had very abraded surfaces, which suggests that they may have been rolled down the sides and along the bottom of the ditches in run-off or floodwaters. Also, it is possible that these shells had already lain on the surrounding land surface for some time. In addition, the repeated cleaning out of the ditch as well as its recutting would have contributed to the poor preservation of shells.

The molluscs that were seen to exist in the intermittently waterlogged secondary layers of the Phase 1A and 1B ditches were very fragmented and virtually unrecoverable. This may be due to phases of relatively rapid erosion by water, and/or the effects of the addition of colluvial/alluvial material to the ditch fills. Both may have caused the grinding up of the shells, both derived and *in situ* specimens, in the gravelly infilling matrix. Molluscs were not preserved in the underlying Phase 1 peat layer, because the organic acids and dense reed vegetation probably made the habitat unsuitable for molluscan life. The buried soil also contained no surviving molluscs, but in this case it was a result of neutral soil conditions and the absence of permanent waterlogging.

The Phase 1C ditch

Of three other molluscan samples taken, only one in layer 2 between section 199 and causeway H contained sufficient numbers of shells to allow interpretation with any degree of confidence (Table 91).

The snails were found in the upper secondary fill of the Phase 1C recut, or the latest middle Neolithic recut of the enclosure ditch. The infill from which the molluscs were recovered was a sandy/silt loam and gravel.

Table 91 Relative percentages of molluscs in each ecological group in enclosure ditch segment 8, layer 2, between causeway H and section 199 (total numbers 231)

ecological group	%
freshwater	
slum/ditch	42.85
catholic	1.40
moving water	–
Pisidium spp	1.75
total	46.00
marsh	13.85
land	
shade-loving	25.10
catholic	9.95
open country	5.10
total	40.15

The assemblage was dominated by freshwater species (*c* 46%) associated with a marsh element (*c* 14%). In particular, one freshwater species predominated, *Aplexa hypnorum* (*c* 43%), which is a locally distributed species found in ponds and ditches (Beedham 1972, 88). The only other freshwater species present was *Lymnaea peregra*, which can tolerate a wide variety of freshwater environments. The absence of a greater variety of freshwater species suggests that the ditch was not open to wider freshwater influences, rather only to localised standing groundwater within the partially infilled ditch. The presence of the few marsh species provided corroborative evidence.

The terrestrial species comprised *c* 40% of the assemblage and appeared to be dominated by the shade-loving species (*c* 25%). Nevertheless, none of the species present were obligatory woodland species. The two main species present, *Carychium tridentatum* (*c* 12.5%) and *Aegopinella nitidula* (*c* 10%), are generally found in leaf litter and/or at the base of leaves in ungrazed, or tall and unkempt, grassland (Evans 1972, 136, 190). Considered with the few open-country snails present (*c* 5%), the ditch habitat appears to have been unmaintained and marshy, but set in open surroundings.

Although this assemblage was from a Phase 1C recut of the enclosure ditch, it generally resembled the impression gained from the molluscs found in the earlier Phase 1A ditch in sections 5–6 and 11–12.

The other two samples taken from the enclosure ditch in sections 205–207 contained only a few molluscs. One sample occurred in the Phase 1C recut of the enclosure ditch and the other in a Phase 2 pit. Both appear to have been incorporated with material that was deliberately put into the ditch/pit, and therefore probably bore no relevance to the former environment in the ditch and its immediate vicinity. Indeed, the few freshwater slum and open-country species recovered add little to further the above conclusions.

Conclusions

The recovery and analysis of molluscs from the enclosure ditch were both deficient and disappointing. Although snails may well have lived in the ditch and within the enclosure itself, the combination of a fluctuating groundwater table, seasonal flooding, the deposition of colluvium/alluvium, and the erosion, recutting, and cleaning out of the enclosure ditch, as well as general human activities within the enclosure, may well have contributed to the poor preservation of the snail population that was once undoubtedly present. There is the strong possibility that the few clusters of complete and identifiable shells found their way into the ditch either with organic debris and/or with deposits of archaeological material that had originated elsewhere.

14 Insect assemblages

by Mark Robinson

Introduction

Initial excavations (in 1981) revealed well-preserved waterlogged organic material in the enclosure ditch bottom. A waterlogged causewayed enclosure obviously had major environmental archaeological implications, and extensive sampling was undertaken for a wide range of biological remains including insects. A preliminary investigation of the entomological samples gave promising results, and so English Heritage decided to fund full-scale analysis at the University Museum, Oxford.

Sampling

Bulk samples from the enclosure ditch segments and the deeper interior features were taken specifically for insect remains during the excavations by Charles French. Corresponding samples were taken from these contexts for botanical analysis.

Summary details of the samples from which insect remains were recovered are given in Table 92. Insect remains did not survive in most ditch segments of the eastern arc (from those samples taken from segments 10–13) and were absent from most of the interior features (from those samples taken from F986, F975, and F1062).

Laboratory procedure

A sub-sample of 1kg from each sample was washed over onto a stack of sieves down to an aperture of 0.2mm, and the fraction retained by the sieves was sorted for insect remains. The remainder of each sample was then broken up and washed onto a 0.2mm sieve. The sieve contents were then drained, mixed with paraffin, and cold water added to produce a flotant containing most of the insect fragments. This flot was strained on a 0.2mm sieve, washed in hot water, and stored in 70% ethanol. The insects were then identified with reference to the Hope Entomological Collections in the University Museum, Oxford.

Results

The results have been listed in Tables 93 and 94, giving the minimum number of individuals represented by the fragments of each species for each sample. The nomenclature follows the Royal Entomological Society's revised checklist of British insects (Kloet and Hincks 1964–78). Along with the identifications is given a short description of the habitat or food of each species.

Table 92 Insect sample details

Phase	*feature type*	*context*	*weight analysed (kg)*	*sample description*
Early Holocene	channel cut by enclosure ditch	segment 1, sections 5–6	7.0	dark brown fine peat with many Cyperaceae nuts
		segment 1, sections 10–11	3.0	dark brown fine peat with many Cyperaceae nuts
1A	Middle Neolithic enclosure ditch	segment 1, sections 2–3	6.0	grey gravelly organic clay loam with some wood and charcoal
		segment 3 at section 35	3.5	dark brown organic loam with coarse gravel
		segment 4, causeway D to section 41	2.8	dark brown organic clay loam with wood and some gravel
1A/1B	Middle Neolithic stream/ lower enclosure ditch	segment 5 at section 125	6.0	laminated dark grey organic clay and brown organic sand with much woody debris
1B	Middle Neolithic pit F505 in interior	0.75–0.85m	6.0	dark brown organic gravelly clay loam
		0.65–0.75m	6.0	grey organic loam
2	later Neolithic recut of enclosure ditch	segment 6, sections 172–176, 6.5–6.6m OD	6.0	dark grey organic clay
		segment 6, sections 172–176, 6.3–6.4m OD	6.0	grey-brown somewhat gravelly organic loam
		segment 6, sections 174–177	6.0	dark grey organic clay

Table 93 Coleoptera: minimum number of individuals and habitat or food

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*total Neolithic*	*habitat or food*
Carabidae													
Carabus granulatus L.	–	–	1	–	–	–	–	–	–	–	–	1	T – often near water, in rotten trees
C violaceus L.	–	–	–	–	–	1	–	–	–	–	–	1	T – often woodland
Nebria brevicollis (F)	–	–	1	1	–	–	–	–	–	–	1	3	W, G, D
Elaphrus riparius (L.)	–	–	–	–	1	–	–	–	–	–	–	1	M, B – at water's edge
Dyschirius globosus (Hbst)	1	–	2	–	1	1	–	–	–	1	–	5	T – moist gravel, M
Clivina collaris (Hbst) or *fossor* (L.)	–	–	–	–	–	–	2	1	–	–	1	4	moist T, often under dung
Trechus secalis (Pk)	–	–	1	–	–	–	–	–	–	–	–	1	moist G and W, B
Bembidion lampros (Hbst)	–	–	–	–	–	–	1	–	–	1	1	3	G and D – dry open soil (W)
B lampros (Hbst) or *properans* Step	–	–	–	–	–	–	–	–	1	–	–	1	G, D, B, (W)
B cf *varium* (Ol)	–	–	–	–	–	1	–	–	–	–	–	1	B, M – mostly clay, sparse vegetation
B gilvipes Sturm	–	–	–	–	–	1	–	–	–	–	–	1	(W), B also wet meadowland
B cf *assimile* Gyl	–	–	–	–	–	1	–	–	–	–	–	1	B, M – well vegetated and close to water
B clarki Daw	6	–	–	–	–	–	–	–	–	–	–	–	W – at edge of water, B
B doris (Pz)	–	–	–	–	–	2	–	–	–	–	–	2	B, M
B biguttatum (F)	–	–	1	–	–	–	–	–	1	–	–	2	B, G, and W, usually near water
B guttula (F)	–	–	2	1	–	–	–	–	1	1	–	5	M, G, and W – moist
Bembidion sp	1	–	–	–	–	–	–	–	–	–	–	–	mostly in wet or marshy places
Pterostichus gracilis (Dej)	–	–	–	–	–	1	–	–	–	–	–	1	G and W – wet, M
P cf *gracilis* (Dej)	–	–	1	–	–	–	1	–	–	–	–	2	G and W – wet, M
P melanarius (Ill)	–	–	–	–	–	–	–	–	–	1	–	1	D, G, (W)
P minor (Gyl)	–	–	1	–	–	1	–	–	–	–	–	2	M and B – both wooded and open
P nigrita (Pk)	–	–	–	–	–	1	–	–	–	–	–	1	M, B
P vernalis (Pz)	–	–	–	–	1	–	–	–	–	–	–	1	D, G, and (W) – moist, often near water
P cupreus (L.) or *versicolor* (Sturm)	–	–	1	–	1	–	–	1	–	1	–	4	G, (D, W)
Calathus fuscipes (Gz)	–	–	–	–	–	1	1	1	1	1	2	7	W, D, and G – often in meadowland
C melanocephalus (L.)	–	–	1	1	–	–	–	–	–	–	–	2	G, D
Agonum gracile Sturm	2	–	–	–	–	–	–	–	–	–	–	–	M, B, W – damp and shady
A marginatum (L.)	–	–	–	–	–	1	–	1	–	–	–	2	M, B, and G – usually wet
A muelleri (Hbst)	–	–	–	–	1	–	–	–	–	1	–	2	M, G, D, (W)
A thoreyi Dej	1	–	–	–	–	–	–	–	–	–	–	–	M, B – especially in reedswamps
A viduum (Pz)	–	–	1	–	–	1	–	–	–	–	–	2	B – rich vegetation, (W)
Amara sp	–	–	–	–	1	–	1	–	–	1	2	5	T
Harpalus rufipes (Deg)	–	–	–	–	–	–	–	–	–	–	1	1	D – often cultivated, (G)
H cf *obscurus* (F) or *sabulicola* (Pz)	–	–	–	–	–	–	–	1	–	–	–	1	T – dry
H S Ophonus sp	–	–	–	–	–	–	–	–	–	–	1	1	T – mostly dry and open
Stenolophus mixtus (Hbst)	–	–	–	–	–	–	–	–	–	–	2	2	M, B – muddy and vegetated
Acupalpus consputus (Duft)	–	–	–	–	1	–	–	–	–	–	–	1	B – shaded
Chlaenius nigricornis (F) or *nitidulus* (Schr)	–	–	–	–	–	–	–	–	1	–	1	2	B – sometimes on mud or under reed debris
Lebia chlorocephala (Hofseg)	–	–	–	–	–	–	–	–	1	–	–	1	G – larvae mostly on *Hypericum*-feeding chrysomelids
L cruxminor L.	1	–	–	–	–	–	–	–	–	–	–	–	G
Dromius linearis (Ol)	–	–	–	–	–	–	1	–	–	1	1	3	G, (M)
Dytiscidae													
Hydroporus sp	–	–	–	1	1	1	–	–	1	1	3	8	A
Agabus bipustulatus (L.)	–	–	–	1	1	1	–	–	1	1	1	6	A – still water, ponds, puddles, and ditches
Agabus sp (not *bipustulatus*)	–	–	1	1	2	–	–	–	–	–	1	5	A
Colymbetes fuscus (L.)	–	–	1	–	1	–	–	–	–	–	1	3	A – still water, ponds, and ditches with much vegetation
Dytiscus sp	–	–	–	–	–	–	–	–	–	–	1	1	A
Gyrinidae													
Gyrinus sp	1	–	–	–	1	–	–	–	–	–	–	1	A
Hydrophilidae													
Georissus crenulatus (Ros)	–	–	–	–	–	1	–	–	–	–	–	1	B, M, (A) – in mud
Hydrochus sp	–	–	1	1	–	–	–	–	–	–	–	2	A – mostly stagnant
Helophorus aquaticus (L.) or *grandis* Ill	1	–	1	–	1	–	–	–	1	–	1	4	A – puddles, ponds, rarely flowing water
H flavipes (F) or *obscurus* Muls	–	–	–	–	1	–	–	–	–	–	–	1	A

Table 93 ***Continued***

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*total Neolithic*	*habitat or food*
Helophorus spp (*brevipalpis* size)	–	–	1	3	11	3	–	1	14	4	22	59	A – but readily leave water
Sphaeridium bipustulatum F	–	–	1	–	–	–	–	–	–	–	–	1	F, V, C
S lunatum F or *scarabaeoides* (L)	–	–	–	–	–	–	–	–	–	1	–	1	F – especially cow dung, (C, V)
Cercyon cf *convexiusculus* Step	5	–	–	–	–	–	–	–	–	–	–	–	V – on damp ground under plant debris
C haemorrhoidalis (F)	–	–	–	–	–	–	3	–	–	–	–	3	F, V
C pygmaeus Ill	–	–	–	–	–	–	–	–	–	1	–	1	mostly F
C tristis (Ill)	–	–	1	–	–	1	–	–	–	–	2	4	M, B – on damp ground under plant detritus
Cercyon spp	–	–	–	–	–	1	–	–	–	1	–	2	F, V, C, some species on wet mud
Megasternum obscurum (Marsh)	–	–	3	1	2	1	2	2	–	2	4	17	F, V, C
Cryptopleurum minutum (F)	–	–	–	–	–	–	–	–	–	–	1	1	F, V, C
cf *Paracymus scutellaris* (Rose)	1	–	–	–	–	–	–	–	–	–	–	–	A – acid
Hydrobius fuscipes (L)	1	–	1	–	1	–	–	–	1	–	2	5	A – stagnant water, often with detritus bottom
Anacaena bipustulata (Marsh) or *limbata* (F)	–	–	–	–	–	–	–	–	1	–	1	2	G and W in wet places, V, A
Laccobius sp	–	–	–	–	1	–	–	–	–	–	–	1	A
Histeridae													
Paralister sp	–	–	–	–	–	–	1	–	–	–	–	1	F, V, C
Hydraenidae													
Ochthebius bicolor Germ	2	–	–	–	1	–	–	–	–	–	–	1	mud and decaying vegetation at water's edge, A
O cf *bicolor* Germ	–	–	–	–	–	3	–	–	1	–	2	6	mud and decaying vegetation at water's edge, A
O minimus (F)	–	–	6	6	5	3	–	–	1	2	10	33	A – often stagnant
O cf *minimus* (F)	2	–	23	15	20	7	4	7	9	11	18	114	A – often stagnant
Hydraena cf *nigrita* Germ	–	–	–	–	1	–	–	–	–	–	–	1	A – flowing
H cf *riparia* Kug	1	–	–	–	1	1	–	–	–	–	–	2	A
H testacea Curt	–	–	1	–	–	–	–	1	1	–	–	3	A – usually stagnant
Hydraena sp	–	–	–	–	–	–	1	–	–	–	–	1	A
Limnebius papposus Muls	–	–	1	1	–	–	–	–	1	–	3	6	A, B – mud at water's edge
Ptiliidae													
Ptiliidae gen et sp indet (not *Ptenidium*)	–	–	–	–	–	2	–	–	–	–	–	2	V, M, (T, F)
Leiodidae													
Agathidium seminulum (L)	–	–	1	–	–	–	–	–	–	–	–	1	V – dead leaves, rotten wood, etc
Choleva or *Catops* sp	–	–	1	–	–	1	–	–	–	–	–	2	V – often leaf litter or fungi in woods, C, (G)
Colon sp	1	–	–	–	–	–	–	–	–	–	–	–	including under bark, grassy places near trees, leaf litter
Silphidae													
Silpha atrata L	–	–	–	–	–	1	–	–	–	–	–	1	mostly under bark or in rotten wood (G, D, V)
S tristis Ill	–	–	–	2	–	–	–	–	1	–	1	4	especially C, also G, D, W
Scydmaenidae													
Scydmaenidae gen et sp indet	–	–	–	–	–	–	–	1	–	–	–	1	T, V
Staphylinidae													
Micropeplus fulvus Er	–	–	–	1	–	1	–	–	1	–	1	4	V, G, (B – on mud)
Olophrum fuscum (Grav) or *piceum* (Gyl)	–	–	–	–	–	–	–	–	1	–	–	1	M – often under dead vegetation
Lesteva longoelytrata (Gz)	–	–	–	–	–	2	–	–	–	–	–	2	B – often at water's edge, M
Lesteva sp	–	–	–	1	–	–	–	–	–	1	–	2	B – often at water's edge, M
Omalium sp	–	–	–	–	–	–	–	1	–	–	–	1	V – all sorts, C, F, T
Carpelimus bilineatus Step	–	–	–	–	–	–	–	–	–	1	–	1	B – on wet mud (G, V, and F on wet soils

Table 93 ***Continued***

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*total Neolithic*	*habitat or food*
C cf *impressus* (Bois)	–	–	–	–	–	3	–	–	–	–	–	3	V
Platystethus arenarius (Fouc)	–	–	–	–	–	–	1	–	–	1	–	2	F, V
P cornutus gp	–	–	1	–	1	2	1	5	1	–	1	12	M and B – often on mud, (V, F)
P nitens (Sahl)	–	–	–	–	–	1	–	–	–	–	–	1	F, V, B
P nodifrons (Man)	–	–	–	–	–	–	–	–	1	–	–	1	V
Anotylus nitidulus (Grav)	–	–	1	1	–	–	1	3	–	–	–	6	V, F, C, (M)
A rugosus (F)	5	–	2	1	1	1	1	1	–	1	–	8	V, F, C, (also G, D)
A sculpturatus gp	–	–	–	–	–	–	2	4	–	1	2	9	V, F, C, (also G, D)
A cf *tetracarinatus* (Block)	–	–	–	–	–	–	1	–	–	–	–	1	V, F, C, (also G, D)
Stenus spp	10	1	3	1	–	4	1	1	1	3	2	16	T, M
Lathrobium sp	–	–	1	–	–	2	1	–	–	–	–	4	T, V, (C)
Rugilus rufipes Germ	–	–	–	–	1	–	–	–	–	–	–	1	V
Rugilus sp	–	–	–	–	–	–	–	–	1	–	–	1	V, (G)
Gyrohypnus angustatus Step	–	–	–	–	–	1	–	–	–	–	–	1	V – sometimes at water's edge
Xantholinus jarrigei Coif or *tricolor* (F)	–	–	–	–	1	–	–	–	–	–	–	1	V
X linearis (Ol)	–	–	–	1	–	–	–	–	–	–	–	1	W, G, V, (F, C)
X longiventris Heer	–	–	1	1	–	–	–	–	–	–	–	2	W, G, V, (F, C)
X linearis (Ol) or *longiventris* Heer	–	–	–	–	–	1	1	–	–	–	1	3	W, G, V, (F, C)
Philonthus spp	–	–	1	–	3	1	3	1	–	1	3	13	F, V, C, (T)
Gabrius sp	1	–	–	–	–	–	1	–	–	–	1	2	W, G, F, V, C
Staphylinus caesareus Ced or *dimidiaticornis* Gem	–	–	–	–	–	–	1	–	–	–	–	1	T
Tachyporus sp	–	–	1	–	–	1	1	–	1	–	1	5	T
Tachinus sp	–	–	2	–	–	1	–	1	–	1	1	6	T
Aleocharinae gen et sp indet	2	–	4	3	1	3	3	1	3	4	1	23	T, F, C, V
Geotrupidae													
Geotrupes sp	–	–	1	–	1	1	2	1	1	1	2	10	F
Scarabaeidae													
Colobopterus erraticus (L)	–	–	–	1	–	–	–	1	–	–	–	2	F, (C)
C haemorrhoidalis (L)	–	–	–	–	–	–	–	–	–	–	1	1	F
Aphodius ater (Deg)	–	–	1	–	–	–	–	–	–	–	–	1	F, V
A foetidus (Hbst)	–	–	1	–	–	–	2	1	–	–	–	4	F, V
A cf *foetidus* (Hbst)	–	–	–	–	–	1	–	2	–	–	1	4	F, V
A granarius (L)	–	–	–	1	–	–	9	12	–	–	2	24	F, V
A porcus (F)	–	–	–	–	–	–	1	–	1	–	–	2	F – in *Geotrupes* burrows
A cf *pusillus* (Hbst)	–	–	–	–	–	–	–	–	–	1	–	1	F V
A cf *sphacelatus* (Pz)	–	–	4	1	1	–	6	1	2	2	2	19	F, V, C
Aphodius spp	–	–	1	1	2	1	2	–	–	1	–	8	mostly F
Oxyomus sylvestris (Scop)	–	–	–	–	–	1	–	–	1	–	1	3	F – mostly as dung heaps, V, C
Onthophagus cf *nuchicornis* (L)	–	–	–	–	–	–	–	–	–	–	1	1	F
O ovatus (L) (= *joannae* Golj)	–	–	–	1	1	–	1	–	1	–	2	6	F, C, V
O cf *similis* (Scrib)	–	–	–	–	–	–	–	–	–	–	1	1	F
O taurus (Sch)	–	–	–	–	–	–	–	1	–	–	–	1	F
Onthophagus sp (not *ovatus*)	–	–	1	1	–	–	1	–	1	2	–	6	F, (C)
Hoplia philanthus (Fues)	–	–	–	–	1	–	–	–	–	–	–	1	larvae on roots in permanent grassland
Phyllopertha horticola (L)	–	–	1	1	–	1	1	–	1	1	1	7	larvae on roots in permanent grassland
Cetonia aurata (L)	–	–	–	–	–	–	1	1	–	–	–	2	V – compost (very rotten wood)
Dascillidae													
Dascillus cervinus (L)	–	–	1	–	–	–	–	–	–	–	1	2	on flowers and bushes
Dryopidae													
Dryops sp	1	–	–	–	–	2	–	–	–	–	–	2	B, A, and M in or close to water, (V)
Elateridae													
Agrypnus murinus (L)	–	–	–	–	–	1	–	–	–	2	1	4	G
Melanotus erythropus (Gm)	–	–	–	–	1	–	–	1	–	–	–	2	rotten wood
Athous hirtus (Hbst)	–	–	–	–	1	1	–	–	–	1	–	3	W, G – especially meadowland, larvae, especially on the roots of grasses, also trees and shrubs
Agriotes sp	–	–	1	–	–	–	–	1	–	1	1	4	larvae mostly on roots of grassland plants

Table 93 ***Continued***

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*total Neolithic*	*habitat or food*
Throscidae													
Trixagus caranifrons (de B)	–	–	–	–	–	1	–	–	–	–	–	1	W
Cantharidae													
Rhagonycha fulva (Scop)	–	–	–	–	–	–	–	–	–	–	1	1	adults often on flowers of herbs and shrubs
Anobiidae													
Grynobius planus (F)	–	–	1	–	–	–	1	–	–	–	–	2	dead hardwood
Nitidulidae													
Brachypterus sp	–	–	2	1	2	–	–	–	–	–	1	6	*Urtica* sp
Meligethes sp	–	–	–	–	–	2	–	–	1	–	–	3	herbs and trees – mostly on flowers
Epuraea sp	–	–	–	–	–	–	–	–	–	1	–	1	on flowers, under bark, at sap, in fungi
Omosita colon (L)	–	–	–	–	–	–	1	–	–	–	–	1	C – dry
Cryptophagidae													
Cryptophagidae gen et sp indet (not Atomariinae)	–	–	1	–	–	–	–	–	–	–	–	1	V – of all sorts, T
Atomaria sp	7	–	–	–	–	1	1	–	–	2	1	5	V, T, (F)
Phalacridae													
Stilbus oblongus (Er)	1	–	–	–	–	–	–	–	–	–	–	–	*Typha latifolia*
Stilbus sp	–	–	–	–	–	1	–	–	–	–	–	1	in dry grass, hay, and on *Typha* sp
Corylophidae													
Corylophus cassidoides (Marsh)	–	–	–	–	–	1	–	–	–	–	–	1	V – especially decaying reeds
Orthoperus sp	–	–	1	–	–	4	–	–	–	–	–	5	V
Coccinellidae													
Coccidula sp	–	–	–	–	–	1	–	–	–	–	–	1	aphids of marsh and aquatic plants
Propylea quattuordecimpunctata (L)	–	–	–	–	–	–	–	–	–	–	1	1	T
Lathridiidae													
Lathridius minutus gp	–	–	–	–	–	–	–	–	1	–	1	2	V, also manure, (C, G, W)
Enicmus transversus (Ol)	1	–	–	–	–	–	–	1	–	–	–	1	V, (G, W)
Corticariinae gen et sp indet	1	–	1	–	–	–	1	–	–	–	–	2	mostly V
Scraptiidae													
Anaspis sp	–	–	1	–	–	–	–	–	–	–	1	2	adults on blossom especially shrubs
Chrysomelidae													
Donacia impressa Pk	2	1	–	–	–	–	–	–	–	–	–	–	*Schoenoplectus lacustris* (L) Pal
D obscura Gyl	3	–	–	–	–	–	–	–	–	–	–	–	various Cyperaceae
Donacia sp	–	–	–	–	–	–	–	1	–	–	–	1	various reedswamp monocotyledons
Plateumaris sericea (L)	3	–	–	–	–	–	–	–	–	–	–	–	*Iris pseudacorus* L and *Carex* spp
P affinis (Kz) or *sericea* (L)	5	1	–	–	–	–	–	–	–	–	–	–	*Iris pseudacorus* L and Cyperaceae
Chrysolina cf *graminis* (L)	–	–	–	–	–	–	–	–	–	–	1	1	Labiatae, often in marshes
C polita (L)	–	–	1	–	–	1	–	–	1	1	1	5	*Rumex* and *Polygonum* spp
Gastrophysa cf *polygoni* (L)	–	–	–	1	–	–	1	–	–	–	–	2	*Rumex* and *Polygonum* spp
G viridula (Deg)	–	–	1	–	1	–	–	–	–	–	1	3	*Rumex* and *Polygonum* spp
Phaedon sp (not *tumidulus*)	1	–	–	–	1	–	–	–	–	–	1	2	various herbs
Hydrothassa glabra (Hbst)	–	–	1	–	–	–	–	–	–	1	–	2	*Ranunculus* spp
Prasocuris phellandrii (L)	4	–	–	–	–	1	–	–	–	–	–	1	aquatic Umbelliferae
Agelastica alni (L)	–	–	1	–	–	2	–	–	–	–	–	3	*Alnus glutinosa* (L) Gaert
Phyllotreta nigripes (F)	–	–	–	–	–	–	2	1	1	–	1	5	Cruciferae and *Reseda* sp
P cf *ochripes* (Curt)	-	–	–	–	–	–	–	–	1	1	–	2	Cruciferae and *Reseda* sp
P vittula Redt	–	–	1	–	–	1	–	–	–	–	4	6	Cruciferae and *Reseda* sp
Longitarsus spp	–	–	2	1	–	1	1	1	1	1	3	11	various herbs

Table 93 ***Continued***

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*total Neolithic*	*habitat or food*
Altica sp	–	–	–	–	–	1	–	–	–	–	–	1	includes *Corylus*, *Salix*, *Rumex*, and *Epilobium* spp
Crepidodera ferruginea (Scop)	–	–	–	1	–	–	–	–	–	1	–	2	various herbs
Chalcoides sp	–	–	–	–	–	–	–	–	1	–	–	1	*Salix* and *Populus* spp
Chaetocnema concinna (Marsh)	–	–	1	1	2	–	–	1	1	1	2	9	Polygonaceae especially *P aviculare* agg
Chaetocnema sp (not *concinna*)	–	–	–	–	–	–	–	1	–	1	1	3	various herbs
Psylliodes sp	–	–	1	–	–	1	–	–	1	–	3	6	various herbs
Apionidae													
Apion spp	–	–	1	–	1	–	1	–	1	1	2	7	various herbs
Curculionidae													
Phyllobius sp	–	–	1	–	–	–	–	–	–	–	–	1	trees, grasses and *Urtica* sp
Sciaphilus asperatus (Bons)	–	–	–	–	–	–	–	–	–	–	1	1	woodland herbs especially *Primula vulgaris* L and *Sanicula* sp
Barynotus sp	–	–	–	–	–	1	–	–	–	–	–	1	T
Sitona cf *suturalis* Step	–	–	1	–	–	–	–	–	1	1	1	4	Papilionaceae especially *Trifolium* sp
Sitona sp	–	–	–	1	–	1	–	–	–	–	–	2	Papilionaceae especially *Trifolium* sp
Hypera punctata (F)	–	–	1	–	–	–	–	–	–	–	–	1	Papilionaceae especially *Trifolium* sp
Tanysphyrus lemnae (Pk)	–	–	–	–	1	–	–	–	–	–	–	1	*Lemna* spp
Rhyncolus lignarius (Marsh)	–	–	–	–	–	–	–	1	–	–	–	1	sapwood of various hardwoods
Acalles turbatus Boh	–	–	–	–	–	1	–	–	–	1	–	2	dead *Crataegus* and *Corylus* especially in hedges
Bagous sp	2	–	1	–	–	1	–	–	–	–	–	2	aquatic plants
Notaris acridulus (L)	–	–	1	1	–	4	–	–	1	–	1	8	marsh and aquatic plants
N aethiops (F)	2	–	–	–	–	–	–	–	–	–	–	–	*Sparganium erectum*
Cidnorhinus quadrimaculatus (L)	–	–	–	–	–	1	–	–	–	1	–	2	*Urtica* spp
Ceuthorhynchinae gen et sp indet	–	–	–	1	1	1	1	1	–	1	2	8	various herbs
Limnobaris pilistriata (Step)	7	–	–	–	–	–	–	–	–	–	–	–	larvae especially *Schoenoplectus* sp, adults Cyperaceae and *Juncus* spp
Anthonomus cf *rubi* (Hbst)	–	–	–	–	–	–	–	–	–	1	–	1	*Fragaria* and *Rubus* spp
Anthonomus sp	–	–	–	–	–	–	–	–	1	–	–	1	mostly rosaceous trees and shrubs
Miccotrogus picirostris (F)	–	–	–	–	1	–	–	–	–	–	–	1	*Trifolium* spp
Mecinus pyraster (Hbst)	–	–	1	–	–	–	1	–	–	–	1	3	*Plantago lanceolata* L and *P media* L
Gymnetron pascuorum (Gyl)	–	–	–	–	–	–	–	–	1	–	1	2	*P lanceolata* L
G beccabungae (L) or *veronicae* (Germ)	3	1	–	–	–	–	–	–	–	–	–	–	marsh and aquatic *Veronica* spp
Rhynchaenus quercus (L)	–	–	1	–	1	1	–	–	–	–	1	4	*Quercus* leaves
Scolytidae													
Scolytus intricatus (Ratz)	–	–	–	1	–	–	–	1	–	–	–	2	mainly young *Quercus* but also other hardwoods
S rugulosus Müll	–	–	1	–	–	–	–	–	2	1	3	7	rosaceous trees and shrubs
Lymantor coryli (Per)	–	–	–	–	–	–	–	1	–	–	–	1	mostly dry dead branches and twigs of *Corylus avellana* L
Xyleborus saxesini (Ratz)	–	–	–	–	–	1	–	–	–	–	–	1	dead wood
totals	88	4	111	61	85	104	74	67	73	76	155	806	

key to contexts

a, ditch segment1, sections 5–6, pre-Neolithic; b, ditch segment1, sections10–11, pre-Neolithic; c, ditch segment1, sections 2–3; d, ditch segment 3 at section 35; e, segment 4, causeway D to section 41; f, segment 5 at section125; g, pit F505, 0.75–0.85m; h, pit F505, 0.65–0.75m; i, ditch segment 6 at section172, 5–6.6m OD; j, ditch segment 6 at section172, 6.3–6.4m OD; k, ditch segment 6 at section1

abbreviations (habitat or food)

A, aquatic; B, bankside/water's edge; C, carrion; D, disturbed/bare ground; F, dung; G, grassland; M, marsh; T, terrestrial and occurring in several habitats; V, decaying plant remains; W, woodland or scrub. Less normal habitats are given in parentheses

Table 94 Other insects: minimum number of individuals and habitat or food

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*total Neolithic*	*habitat or food*
Dermaptera													
Forficula auricularia L.	–	–	–	–	1	–	–	–	–	–	–	1	T
Hemiptera													
Pentoma rufipes (L.)	–	–	–	–	–	1	–	–	–	–	–	1	deciduous trees, especially *Quercus* sp
Lygaeidae gen et sp indet	–	–	1	–	–	–	–	–	–	–	–	1	T
Scolopostethus sp	–	–	–	–	1	–	–	–	–	–	–	1	T
Anthocorinae gen et sp indet	–	–	2	–	–	–	–	–	–	–	–	2	T
Saldula S *Saldula* sp	–	–	–	1	–	–	–	–	–	–	2	3	M and B – at water's edge
Saldidae gen et sp indet	1	–	–	–	–	–	–	–	–	–	–	–	mostly M and B
Gerris sp	–	–	–	–	2	–	–	–	–	–	–	2	A – on water's surface
Aphrophora sp	–	–	1	–	–	–	–	–	–	–	1	2	trees and shrubs
Philaenus or *Neophilaenus* sp	–	–	1	–	–	–	–	–	–	–	1	2	various plants
Aphrodes bicinctus (Schr)	–	–	2	–	1	–	–	–	–	–	1	4	grasses
A flavostriatus (Don)	–	–	–	–	–	–	–	–	–	–	1	1	grasses
Aphrodes sp	–	–	–	–	–	–	–	–	–	–	1	1	grasses
Aphidoidea gen et sp indet	–	–	–	–	1	–	–	–	1	–	1	3	–
Homoptera gen et sp indet	1	–	1	–	1	–	–	–	2	–	3	7	–
Trichoptera													
Trichoptera gen et sp indet – larva	1	–	–	–	2	1	–	–	–	–	2	5	A
Trichoptera gen et sp indet – larval case	–	–	2	–	2	1	–	–	2	1	2	10	A
Hymenoptera													
Myrmica rubra (L.) or *ruginodis* Nyl – worker	–	–	–	–	–	–	–	–	–	–	1	1	T
M scabrinodis gp – worker	–	–	–	–	–	–	–	–	–	–	1	1	T
Lasius niger gp – worker	–	–	–	–	–	–	–	–	1	–	–	1	in soils or under stones
Lasius sp (not *fuliginosus*) – female	–	–	–	–	–	–	–	–	–	–	1	1	T
Hymenoptera gen et sp indet	5	–	1	–	1	3	–	–	3	–	4	12	T
Diptera													
Bibionidae gen et sp indet	–	–	–	1	5	–	–	–	–	–	–	6	V
Diptera gen et sp indet – adult	–	–	–	–	–	–	–	–	2	–	3	5	–
Diptera gen et sp indet – puparium	–	–	–	–	–	–	1	–	1	–	–	2	–

key to contexts

a, ditch segment 1, sections 5–6, pre-Neolithic; b, ditch segment 1, sections 10–11, pre-Neolithic; c, ditch segment 1, sections 2–3; d, ditch segment 3 at section 35; e, segment 4, causeway D to section 41; f, segment 5 at section 125; g, pit F505, 0.75–0.85m; h, pit F505, 0.65–0.75m; i, ditch segment 6 at section 172, 6.5–6.6m OD; j, ditch segment 6 at section 172, 6.3–6.4m OD; k, ditch segment 6 at section 1

abbreviations (habitat or food)

A, aquatic; B, bankside/water's edge; M, marsh; T, terrestrial and occurring in several habitats; V, decaying plant remains. Less normal habitats are given in parentheses

A wide range of sources has been used for ecological information about the Coleoptera. The main references are as follows: Balfour-Browne (1940/1950/1958), Donisthorpe (1939), Fowler (1887–1913), Freude *et al* (1964–83), Hoffmann (1950–8), Horion (1941–67), Joy (1932), and the Royal Entomological Society (1953–86). Other references are given in Lambrick and Robinson (1979, 89, 100) and Robinson (1983).

Food and habitat information for Heteroptera is from Southwood and Leston (1959), Homoptera from Le Quesne (1965), and Formicidae mostly from Boulton and Collingwood (1975).

Analysis of the data

In order to facilitate the interpretation of the results, the Coleoptera have been divided into species groupings following Robinson (1981, 279–82; 1983, 33–9). They have been displayed as a percentage of the minimum number of individuals of terrestrial Coleoptera in each assemblage, excluding aquatic species, in Figure 253 and Table 95. The beetles have been classified as follows:

1 Dytiscidae, *Hydrobius fusciper*, *Gyrinus* sp, *Anacaena* sp, *Georissus crenulatus*, *Laccobius* sp, *Hydrochus* sp, Hydraenidae, *Helophorus* spp, *Dryops* sp, cf *Paracymus scutellaris*.

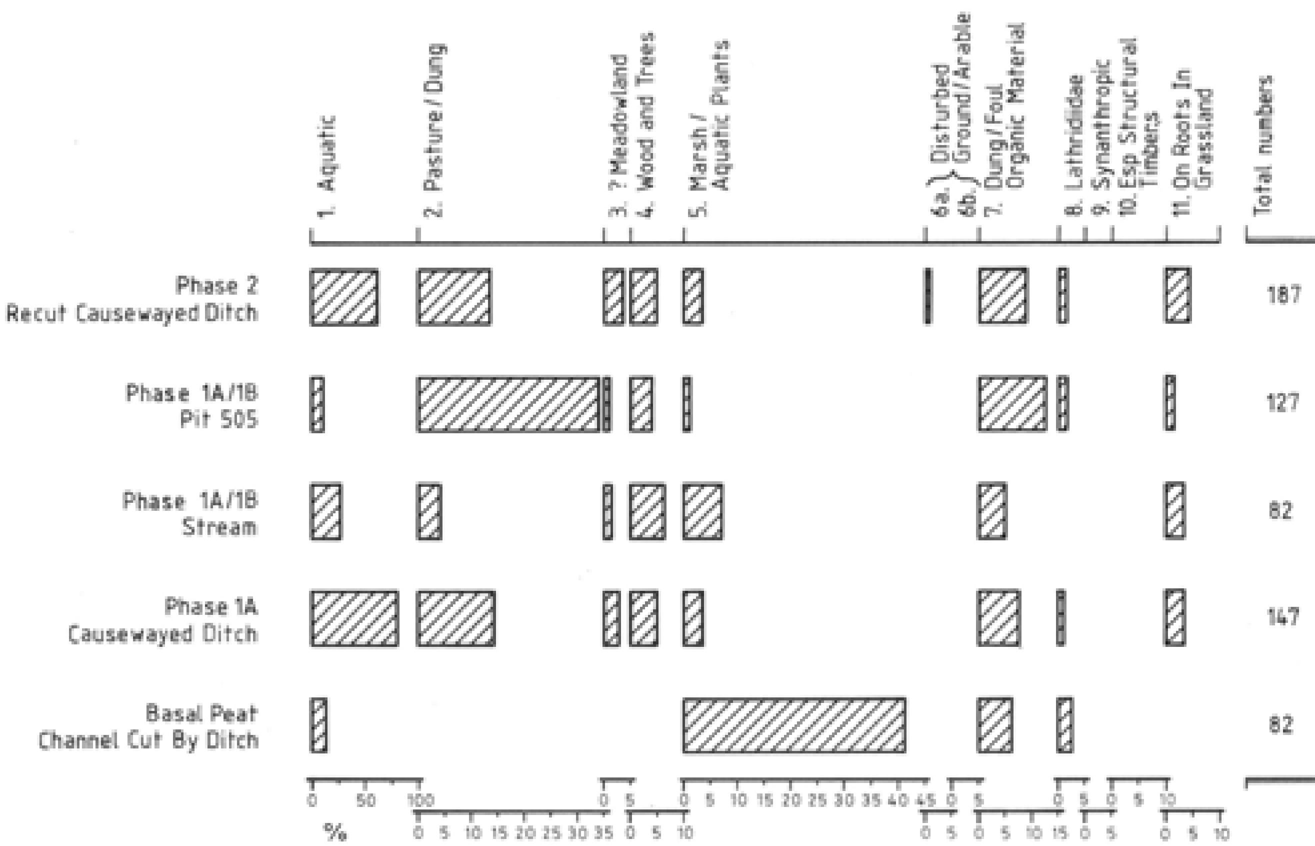


Fig 253 Species groups (I–II) of Coleoptera, expressed as a percentage of total terrestrial Coleoptera, with aquatics excluded. Not all the terrestrial Coleoptera have been classified into species groups

Table 95 Species groups of Coleoptera (see pp 345–7 for further details of the habitat groups)

		percentage (for total Neolithic samples)
1	aquatic	49.8
2	pasture/dung	16.9
3	?meadowland	2.4
4	wood and trees	4.8
5	marsh/aquatic plants	3.3
6a	general disturbed ground/arable	0.2
6b	sandy/dry disturbed ground/arable	–
7	dung/foul organic material	8.7
8	Lathridiidae	0.9
9	synanthropic	–
10	especially structural timbers	–
11	on roots in grassland	3.5
12	unclassified	40.9

total number of terrestrial individuals = 538

2 *Geotrypes* sp, *Aphodius* spp, *Colobopterus* spp, *Onthophagus* spp.

3 *Apion* spp, *Sitona* spp.

4 *Melanotus erythropus*, *Rhyncolus lignarius*, *Grynobius planus*, *Acalles turbatus*, *Agelastica alni*, *Rhynchaenus quercus*, *Chalcoides* sp, Scolytidae.

5 *Donacia* spp, *Tanysphyrus lemnae*, *Plateumaris* spp, *Bagous* sp, *Chrysolina graminis*, *Notaris* spp, *Chrysolina polita*, *Limnobaris pilistriata*, *Prasocuris phellandrii*, *Gymnetron beccabungae* or *veronicae*.

6a *Harpalus rufipes*.

6b Absent.

7 *Cercyon* spp, *Platystethus arenarius*, *Megasturnum obscurum*, *Anotylus rugosus*, *Cryptoplerum minutum*, *Anotilus sculpturatus*.

8 Lathridiidae.

9 and 10 Absent.

11 *Hoplia philanthus*, *Athous hirtus*, *Phyllopertha horticola*, *Agriotes* sp, *Agrypnus murinus*.

12 The remaining Coleoptera not included in 1–11.

The Early Holocene deposits

The insects from the organic deposits in the peat-filled channel cut by the south-west end of the causewayed ditch (basal peat, segment 1, between sections 5 and 10) comprised a fauna of dense reedswamp. Almost all the insect remains were from species that could have lived among the vegetation growing in the shallow water and wet mud or peat that filled the depression in the top of the Pleistocene gravels. Few if any of the insects were derived from dry ground. Although the insect remains were of local origin, the absence of a full terrestrial fauna suggests that the area of reedswamp was extensive, at least some tens of metres across.

The proportion of aquatic insects was relatively low, perhaps as a result of the density of the vegetation. However, the fauna included various small water beetles such as *Ochthebius bicolon*. All can live under stagnant conditions.

A high proportion of the insects were beetles that feed on emergent reedswamp vegetation. They included *Donacia impressa*, which feeds on *Schoenoplectus lacustris*, *Notaris aethiops* on *Sparganium erectum*, *Plateumaris sericea* on *Carex* spp and *Iris pseudacorus*, and *Prasocuris phellandrii* on aquatic Umbelliferae. Another of the beetles, *Stilbus oblongus*, is associated with *Typha latifolia*, perhaps feeding on fungal smuts. The macroscopic plant remains were dominated by seeds from these tall reedswamp species.

The ground beetles (Carabidae) from the deposits were species of marsh and waterside habitats. They included *Bembidion clarki*, which occurs in moist well-vegetated places, and *Agonum thoreyi*, which occurs on damp clay soil near water, normally with dense *Typha*, *Phragmites*, and so on (Lindroth 1974, 85). The beetles of decaying plant material also occur in such habitats – for example, *Cercyon convexiusculus* lives in waterside accumulation of plant detritus.

Tree-feeding and shrub-feeding insects were entirely absent. The scarabaeoid dung beetles, which feed on the dung of larger herbivores such as domestic animals, were also absent. One of the beetles, *Notaris aethiops*, now has a northerly, mostly Scottish, distribution in the British Isles (Fowler 1891, 270) and does not occur in the region at present. The fauna was probably reflecting the relatively open conditions of the very Early Holocene when climatic amelioration had only just begun.

The Neolithic environment

The Neolithic organic deposits investigated had all accumulated under water. The samples contained an aquatic component that lived in the water as the sediments were forming. However, the majority of the insects were terrestrial species, which had probably fallen or had inadvertently flown into the water. The organic deposits could be divided into three categories: the enclosure ditch (segment 1 between sections 2 and 3; segment 3 at section 35; segment 4 between causeway D and section 41; and two samples from section 6 between sections 172 and 174 and between sections 174 and 177), the stream channel that coalesced with enclosure ditch segment 5 (at section 125), and a pit by causeway F (F505). They each had somewhat different aquatic faunas and also had different catchments for terrestrial insects.

The different catchments of the three categories of deposits means that it is possible to contrast the general environmental conditions with those of the enclosure. This factor of catchment area probably accounts for most of the differences between the terrestrial insect assemblages rather than their chronology.

Enclosure ditch

The enclosure ditch segments contained aquatic faunas dominated by *Ochthebius minimus* and *Helophorus* cf *brevipalpis*. These small water beetles tend to live in relatively small bodies of stagmant water, as would be expected in the ditch segments. The remainder of the aquatic faunas from the ditch also occur in such habitats. Some of these beetles, such as *Colymbetes fuscus*, normally live in water with rich aquatic vegetation. However, the flora of the ditch segments was very different from that of the Early Holocene peat channel. There was probably some submerged vegetation, and the presence of the beetle *Tanysphyrus lemnae* suggests the surface of the water to have been covered with *Lemna* sp.

The remainder of the insects in the ditch segments were derived from the surrounding landscape. The catchment would have included both the interior and exterior of the enclosure. However, the closed nature of the ditch segments resulted in the majority of the fauna being insects of relatively local origin.

Stream channel

The aquatic fauna of the stream channel was similar to that of the ditch segments. The absence of flowing water insects suggests the stream to have been almost stagnant for most of the year. The Coleoptera that feed on aquatic plants suggest emergent vegetation in the stream, with, for example, aquatic Umbelliferae such as *Oenanthe* sp indicated by *Prasocuris phellandrii*.

A much higher proportion of the beetles was of terrestrial origin than in the enclosure ditch assemblages (Fig 253). The catchment for the insect remains would have comprised a strip of land running upstream from the deposit. It would have been very much larger than the catchment of the ditch segments, and the insects would predominantly be reflecting conditions outside the enclosure.

Pit F505

The pit F505 in the interior only contained a sparse aquatic insect fauna, and there was no evidence from the insect remains that aquatic plants grew in it. The terrestrial insect remains from the pit would mostly have been derived from the interior of the enclosure. All seem to have entered the deposit through various natural agencies. The deposits did not contain a substantial decomposer fauna of the sort that could either have been living among refuse discarded in the pit or living in organic debris in the pit above the water table.

Woodland and scrub

Just under 5% of the terrestrial Coleoptera from the Neolithic samples fell into species group 4, wood and tree-dependent species. The highest percentage of this group was recorded from the stream channel, whereas the lowest value was from pit F505 by causeway F (Fig 253). Many of the other Coleoptera lived in woodland communities, but were not restricted to them.

The more host specific of the tree and shrub-feeding Coleoptera included *Agelastica alni* – *Alnus glutinosa* (alder leaves); *Chalcoides* sp – *Salix* and *Populus* (willow and poplar leaves); *Rhynchaenus quercus* – *Quercus* spp (oak leaves); *Scolytus rugulosus* – bark of Rosaceous trees and shrubs (such as hawthorn and sloe); and *Lymantor coryli* – mostly *Corylus avellana* (hazel twigs and branches). *Agelastica alni* is now probably extinct in Britain (Harde 1984, 280) and was perhaps dependent on large areas of alder woodland rather than isolated groups of trees.

It is difficult to extrapolate the extent and distribution of different categories of woodland and scrub from these results. However, the contrast between the assemblages from the pit and the stream hints that the immediate environs of the enclosure were more open than the general landscape. It is possible that apart from some bushes that had become established around the perimeter of the ditches (see Chapter 10), the enclosure and its surrounds were kept fully cleared.

The percentage of wood and tree-dependent Coleoptera might suggest that the background landscape had somewhere between one-quarter and one-half tree and shrub cover, but any such estimate is very approximate. Alder woodland was probably extensive on the floodplain of the stream (which comprised an area of relict channels of the River Welland), while oak and hazel perhaps grew on higher areas of gravel. The insect faunas did not contain the distinctive old woodland element of beetles that are associated with over-mature trees and decaying wood in undisturbed woodland. Many of these beetles are now very rare or extinct in Britain, but they have been recorded from some other Neolithic sites such as Runnymede Bridge (Robinson 1991). The browsing of domestic animals had perhaps favoured the development of thorn scrub including hawthorn and sloe around any woodland. It is possible that thorny shrubs had colonised some of the areas that had been cleared of trees.

Grassland and the open environment

Grassland was a major habitat in the vicinity of the enclosure. Scarabaeidae and Elateridae with larvae that feed underground on roots in grassland (species group 11) comprised 3.5% of the terrestrial Coleoptera.

The most abundant of these was the chafer *Phyllopertha horticola*. The phytophagous Coleoptera give an indication of the grassland herbs: *Hydrothassa glabra*, *Ranunculus* spp (buttercups), *Sitona suturalis*, *Vica cracca* and *Lathyrus pratensis* (vetches), *Mecinus pyraster*, *Plantago lanceolata* and *Plantago media* (plantains), *Gymnetron pascuorum*, and *Plantago lanceolata* (ribwort plantain).

The various clover- and vetch-feeding weevils of species group 3 that are favoured by hay meadow conditions were not particularly abundant. However, scarabaeoid dung beetles of species group 2 comprised almost 17% of the terrestrial Coleoptera from the Neolithic samples. They feed on dung, particularly from domestic herbivorous mammals, in the form of droppings on the ground. It is clear that grassland used as pasture for domestic animals was an important aspect of the landscape around the site.

There was a striking difference between the abundance of these dung beetles from pit F505, almost 34% of the terrestrial Coleoptera, and their paucity from the stream channel, under 4%. The enclosure ditch segments gave intermediate values (Fig 253). The concentration of dung beetles in the pit was far higher than would be expected if it had simply been situated amidst pastureland supporting stock at its ordinary carrying capacity. These results suggest that the enclosure was used for corralling domestic animals. Perhaps animals allowed to graze and browse the surrounding area during the day were herded into the enclosure at night to prevent them from straying. The relatively low percentage of dung beetles from the stream channel suggests that the grazing pressure on the landscape was not particularly heavy.

The most numerous dung beetles from the samples were *Aphodius granarius* and *Aphodius* cf *sphacelatus*, but there was also a significant presence of members of the genus *Onthophagus*. One of the latter, *Onthopagus taurus*, represented by an elytron in the sample from pit F505 (Phase 1A/1B), is now extinct in Britain (Jessup 1986, 26). Unfortunately, it is not possible to establish from the scarabaeoid dung beetles which species of domestic animals were kept at the site. However, among the other beetles associated with dung (particularly some members of the Hydrophilidae and Staphylinidae) was the hydrophilid *Sphaeridium lunatum* or *scarabaeoides*, which most usually occurs in cattle dung.

The insects did not provide much evidence for disturbed ground or arable. Some of the Chrysomelidae can be common on annual weeds – for example, *Chaetocnema concinna* on *Polygonum aviculare* and *Phyllotreta nigripes* on various cruciferous weeds, but they also have other hosts. Two of the beetles are restricted to *Urtica* spp: *Brachypterus* sp and *Cidnorhinus quadrimaculatus*. Polygonaceae, probably *Rumex* sp, are indicated by *Gastrophysa viridula*. Annual weeds probably grew on some of the more frequently disturbed areas in the enclosure, while stinging nettles (*Urtica dioica*) and docks (*Rumex* spp) were probably established on the ditch sides and in any neglected places. It is possible that cultivation plots were present, but the insects cannot confirm their presence.

The Carabidae and Staphylinidae included many species that occur in open habitats. Some – such as *Lebia chlorocephala* – are grassland species, whereas a few – for example *Harpalus rufipes* – tend to favour weedy disturbed ground. The majority, however, such as *Calathus fuscipes*, occur in both. The Carabidae of disturbed ground/arable that comprise species group 6 were virtually absent. A variety of soil conditions is indicated by the Carabidae, ranging from light, dry, soil favoured by *Harpalus obscurus* or *sabulicola* through to moist soil as suggested by *Pterostichus vernalis*. They probably reflect the range of variation on the main body of the gravel terrace.

Marsh

The Neolithic samples contained a significant element of marshland Coleoptera. Some of these beetles – for example, the staphylinids of the *Platystethus cornutus* group – were probably living on mud at the margin of the features in which the deposits accumulated. Others, however, had probably been derived from more extensive marshy areas in the relict channels of the River Welland to the north and west of the site alongside the stream channel. They included *Elaphrus cupreus*, *Chalenius* sp, and various species of *Bembidion*. Some, such as *Bembidion* cf *assimile*, usually live close to water in well-vegetated places, while others, such as *Chlaenius* sp, can be found under reed debris. *Acupalpus consputus* favours shaded places with leaf litter near water and had perhaps come from the area of alder woodland. One of the weevils present in most of the sample, *Notaris acridulus*, feeds on various plants in marshy pasture, and it is probable that grazing also extended onto the wet area. Not surprisingly, the sample from the stream channel contained the highest proportion of beetles from marsh habitats.

Other habitats

The insect remains do not provide any evidence for human habitation or activities other than the management of domestic animals on the site. The synanthropic beetles of species group 9 and the woodworm beetles *Anobium punctatum* and *Lyctus linearis* that comprise species group 10 were absent.

The percentage of beetles that occur in dung/foul organic material (species group 7) was insufficient to indicate accumulations of refuse. The highest percentage of these beetles was recorded from pit F505. However, the members of this group from the pit, such as *Megasturnum obscurum* and *Anotylus sculpturatus* gp, all readily live in dung in the field as well as in such habitats as manure heaps. Their abundance corresponded with the high percentage of scarabaeoid dung beetles (Fig 253, species group 2). The beetles from species group 7 in some of the other deposits included *Cercyon tristis*, which lives under plant detritus in marsh and waterside habitats. Most of the members of this group were probably living in the droppings of domestic animals or in naturally occurring accumulations of plant debris alongside the ditches and the stream.

The Lathridiidae of species group 8, which live in such habitats as haystack refuse and mouldy straw, as well as in dead vegetation and grass tussocks, were sparsely represented and do not suggest human activity.

Chronological change

It has already been noted that most of the differences between the insect assemblages could be attributed to the location and types of the deposits rather than implying any chronological change in the environment of the site. Indeed, the insect faunas from the Phase 1A enclosure ditch and the Phase 2 recut enclosure ditch showed many similarities (Fig 253).

The only difference of possible significance was between the woodland and tree-dependent Coleoptera of Phases 1 and 2. The percentage of these beetles does not change much between the phases, but the composition of the fauna does. In Phase 1, the majority of the more host-specific of these beetles fed on *Quercus* and *Alnus*. The most abundant of this group of beetles from Phase 2 was *Scolytus rugulosus*, which is associated with rosaceous trees and shrubs. This perhaps reflects a change towards more thorn scrub in the catchment at the expense of woodland.

Discussion

The Neolithic insect fauna suggests an environment of grazed grassland set against a background of woodland. While there was probably marsh alongside the stream channel, a large part of the catchment for insects seems to have been relatively well drained.

The insects provide clear evidence that one of the uses to which the enclosure was put was the corralling of stock. However, it is not possible to establish whether this was part of the ceremonial function of the site or was related to pastoral activities by occupants of the enclosure.

The majority of insect assemblages of Neolithic date that have been studied so far have either been from extensive wetlands, such as the Somerset Levels (Girling 1984), or from closed woodland (Girling 1982). The only other comparable Neolithic assemblage is that from channel deposits adjacent to the River Thames at Runnymede Bridge (Robinson 1991). The landscape at Runnymede was more heavily wooded, and the fauna contained a characteristic 'old woodland' element that was absent from Etton. However, both sites had a substantial component of open grassland species, particularly dung beetles.

The dung beetle faunas at Etton and Runnymede Bridge showed some similarity; in both cases, the scarab dung beetle *Onthophagus nutans*, which is now extinct in Britain, was present. *Aphodius contaminatus*, a familiar member of more recent dung beetle faunas, was absent from both sites. At both sites there was extensive alder woodland along watercourses, which supported the alder leaf beetle *Agelastica alni*, another species now extinct in Britain. *Agelastica alni* has been identified from Late Bronze Age deposits at Flag Fen (Robinson 1992), showing that suitable habitats for this beetle remained in the region after the Neolithic.

15 Radiocarbon dating

by Janet Ambers

Introduction

Samples of bone and roundwood from a variety of contexts (see Table 96) were analysed for 14C content at The British Museum laboratory, using liquid scintillation counting and the methods described in Ambers and Bowman (1994). The laboratory maintains a programme of continual quality assurance procedures (details of which are given in Ambers and Bowman 1994), with additional participation in international intercomparisons. These checks indicate that there are no laboratory offsets and serve to justify the precision claimed, as further demonstrated by the results of the recent IAEA-organised interlaboratory comparison (Rozanski *et al* 1992) and the third international radiocarbon intercomparison (personal communication from the organising committee).

In the case of the bone samples, only well-preserved protein extracts (produced as described in Ambers and Bowman 1994) were used for dating, thus avoiding any of the potential contamination problems discussed in Gillespie (1989). The bones were identified by Miranda Armour-Chelu. The wood samples supplied were not large enough for cellulose extraction, but were acid treated to remove humic contamination. The wood was not identified to species, but all samples were roundwood fragments.

All of the samples were selected to closely date their contexts; neither bone nor wood samples have inherent problems of initial age, and none showed evidence of use or exposure for any appreciable time prior to deposition in their findspots. The calibrated results should therefore faithfully reflect the date of the fills from which they came.

Results

The results of the tests are given in Table 96, quoted in the form recommended by Stuiver and Polach (1977), in uncalibrated years BP (before 1950), corrected for isotopic variation (measured or estimated as shown in the table). Calibrations listed were generated from the curves of Pearson *et al* (1986) and of Pearson and Stuiver (1986), as calculated using revision 2.0 of the University of Washington Quaternary Laboratory Radiocarbon Calibration Program (CALIB; published in Stuiver and Reimer 1987) and the probabilistic method of calibration. Calibrated date ranges are quoted in the form recommended by Mook (1986), with

Table 96 Radiocarbon dates

British Museum number	*reference*	*context*	*species*	*$\delta^{13}C$*	*radiocarbon result*	*possible calibrated age range(s) 68% probability*	*(calendar years BC): 95% probability*
BM-2723	26	basal fill of ditch segment 5	tibia, *Bos taurus*	−23.6‰	4730 ± 90*	3630 to 3560 or 3545 to 3495 or 3475 to 3375	3775 to 3755 or 3705 to 3335 or 3220 to 3190 or 3150 to 3145
BM-2724	23	basal fill of ditch segment 11	innominate, *Bos taurus*	−21.0‰ estimated	4920 ± 70*	3790 to 3635	3945 to 3850 or 3820 to 3615 or 3580 to 3530
BM-2765	22	basal fill of ditch segment 1	tibia, *Sus domesticus*	−21.4‰	4960 ± 90*	3940 to 3870 or 3820 to 3680 or 3660 to 3645	3980 to 3620 or 3575 to 3535
BM-2889	3766/7366	close to butt end of ditch segment 3	roundwood	−27.6‰	4840 ± 50*	3700 to 3620 or 3575 to 3535	3780 to 3740 or 3710 to 3510 or 3385 to 3385
BM-2890	3780/7297	basal fill of ditch segment 1	roundwood	−28.7‰	4820 ± 45*	3690 to 3620 or 3575 to 3530	3775 to 3765 or 3705 to 3505 or 3400 to 3385
BM-2891	3878/7428	basal fill of pit F953 cut into ditch ditch segment 6	roundwood	−26.0‰	3680 ± 35**	2135 to 2030	2195 to 2160 or 2145 to 1970
BM-2899	3778/7298	pit F40 cut into side of ditch segment 1	roundwood	−27.1‰	4370 ± 50*	3040 to 2915	3300 to 3240 or 3195 to 3165 or 3110 to 2900

curves used: * Pearson and Stuiver 1986; ** Pearson *et al* 1986 the end points rounded outwards to five years. An effect of this is to overestimate slightly the date range for the given confidence level.

Calibrated ranges for the results are also shown diagrammatically in Figures 254 and 255. Figure 254 shows the one- and two-sigma age ranges as lines, while Figure 255 shows the full probability distribution of possible calendar age. A fuller explanation of this method of display is described in Kinnes *et al* (1991).

The uncalibrated figures for the samples from the enclosure ditch (BM-2723, -2724, -2765, -2889, and -2890) form a very tight group and are, in fact, statistically indistinguishable (2 value of 4.7), although as there is no clear evidence of contemporaneity on archaeological grounds, there is no justification for combining the figures.

The remaining two analyses, for two pits, clearly do not fall into this group, although BM-2899, from pit F40 in ditch segment 1, does overlap with the latest figure (BM-2723) at the 98% confidence level. BM-2891 is, however, widely separated from all of the other results.

The dates for the enclosure ditch fall comfortably within the expected range for British causewayed enclosures and suggest that Etton is one of the earlier examples of this class of monument:

BM-2723. 4730 ± 90. $\delta^{13}C$= 23.6‰
Collagen from bone, ref 26 (tibia, *Bos taurus*); from the Phase 1A basal fill of ditch segment 5.

BM-2724. 4920 ± 70‰
Collagen from bone, ref 23 (innominate, *Bos taurus*); from the Phase 1A basal fill of enclosure ditch segment 1. Fractionation correction estimated at 21.05%.

BM-2765. 4960 ± 90. $\delta^{13}C$= 21.4‰
Collagen from bone, ref 22 (tibia, *Sus domesticus*); from the Phase 1A basal fill of enclosure ditch segment 1.

BM-2889. 4840 ± 50. $\delta^{13}C$= 27.6‰
Roundwood, ref 3766/7336, from Phase 1A deposit of material in enclosure ditch segment 3, layer 3, between section 35 and causeway C.

BM-2890. 4820 ± 45. $\delta^{13}C$= 28.7‰
Roundwood, ref 3780/7297, from layer 3 of enclosure ditch segment 1, between sections 5 and 6, Phase 1A.

BM-2891. 3680 ± 35. $\delta^{13}C$= 26.0‰
Roundwood, ref 3878/7428, from Phase 2 basal fill (layer 6) of a large pit F953 cut into enclosure ditch segment 6, sections 174–176.

BM-2899. 4370 ±50. $\delta^{13}C$= 27.1‰
Roundwood, ref 3778/7298, from F40, layer 1, Phase 1C, pit cut into side of enclosure ditch segment 1.

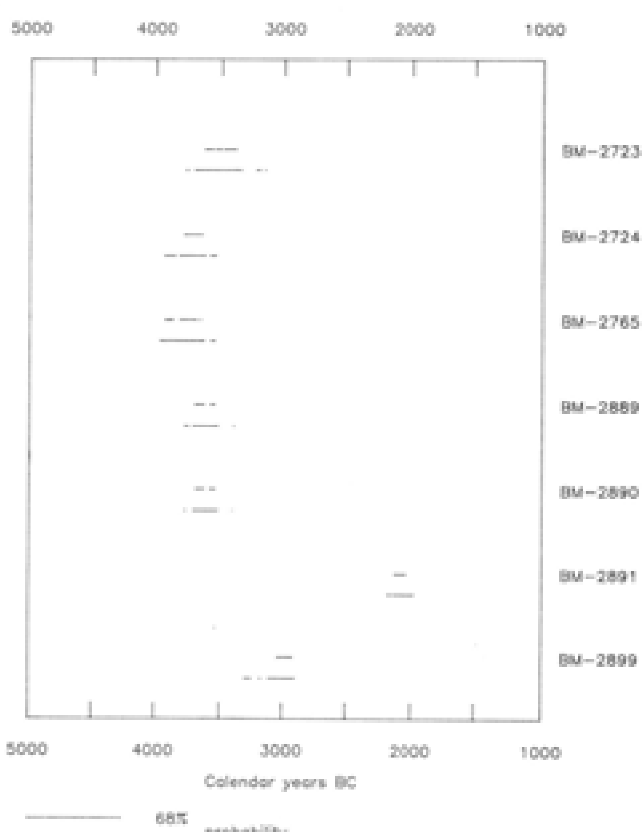


Fig 254 Calibrated age ranges for the radiocarbon results shown as simple lines for summed 68% and 95% confidence limits

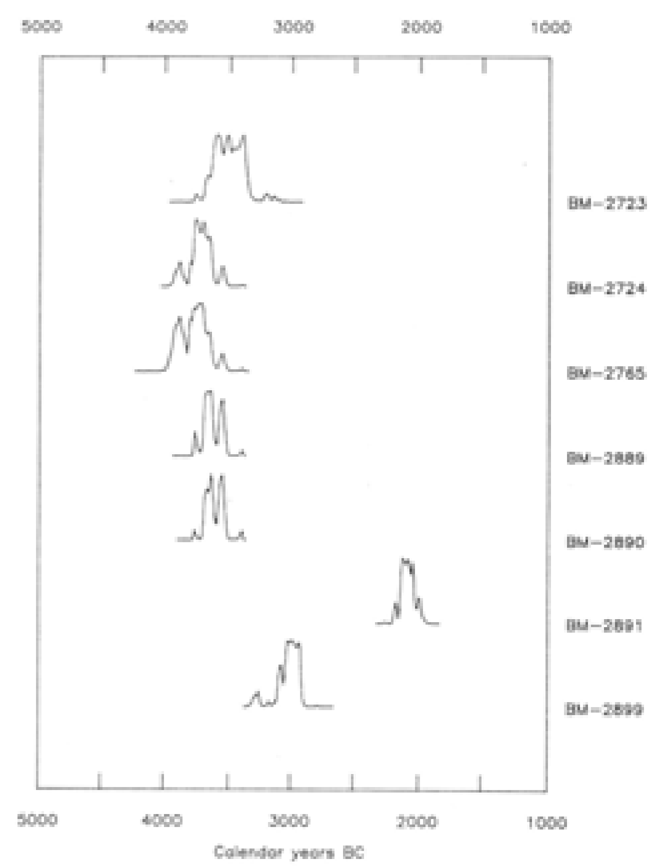


Fig 255 Calibrated age ranges for the radiocarbon results given as probability distributions

16 Synthesis and discussion

Introduction

This chapter attempts to explain how and why Etton was constructed and used. We begin with a discussion of the environmental setting of the enclosure, followed by its growth and development, including a review of the evidence for the timing of the site's use (and in particular whether it was continuous, episodic, or seasonal). The discussion of the enclosure's spatial organisation focuses not only upon the interior, but also on the micro-level patterning of deposits within the various segments of the enclosure ditch. Having defined what might have taken place at Etton, we consider the role of the causewayed enclosure within contemporary society. The chapter concludes with some observations on the site's wider affinities.

The environmental setting

Peat-filled stream channel

Despite conditions that favoured the survival of wood, bark, and bone, pollen was not well preserved in all but the very lowest levels of the enclosure ditch (Chapter 11). The principal exception was a pre-Neolithic peat-filled stream channel of Late Devensian age. Ten thousand years ago, the landscape around the area to be occupied by the causewayed enclosure was open and comprised a wide variety of herbaceous plants (Chapter 11, sample series 1).

Further samples from a higher level of the pre-enclosure peat channel (sample series 3) show the earliest impact of Neolithic communities upon what had since become a wooded environment: the tree cover declined, and there was an increase in plants associated with disturbed ground. Cereal pollen was present throughout in significant quantities.

Phase 1 enclosure ditch

It should be stressed at the outset that the site chosen for the causewayed enclosure was low-lying, subject periodically to flooding, and was close to an existing stream channel. These factors must have been apparent to those who constructed the monument.

Samples from waterlogged Phase 1 deposits in the enclosure ditch (sample series A) revealed disappointing quantities of pollen. However, the evidence showed that the country around the enclosure was now open and largely treeless, but there were probably areas of woodland in the vicinity. The lower parts of the enclosure ditch contained shallow rooting aquatic vegetation and a complementary mollusc and insect fauna (Chapters 13 and 14). Etton, being situated within a cleared landscape, contrasts with sites such as Windmill Hill, which were located within woodland (Whittle 1993, 40).

The diversity of shrub species identified by Maisie Taylor (Chapter 4) in primary contexts of the ditch is consistent with the type of flora that might occur after forest/woodland clearance.

A well-preserved inverted turf was found in segment 11 in backfill dating to Phase 1A. Soil micromorphological analyses have demonstrated that the turf, which was probably cut during the initial digging of the ditch, could not have lain on the surface for an extended period – perhaps less than a year (see Chapter 12). The turf had been subject to freshwater flooding prior to its cutting. Pollen from the turf (sample series B) had been adversely affected by fluctuating water levels within the ditch, but it was possible to conclude that the area had probably contained woodland in the period immediately prior to the Neolithic (as suggested by Scaife's sample series 3). Pollen from the main, Phase 1, episode of construction and 'use' was of grass and herbs typical of waste ground and arable land.

Taken together, the environmental data suggest that the enclosure was sited in an area that was subject to freshwater flooding. The country around the enclosure had been cleared of trees for some period prior to the construction of the enclosure. There was wet fen in the close vicinity. Cereals were being grown or processed nearby, perhaps even within the enclosure, but more probably on the higher, flood-free gravel land of Maxey 'island' immediately beyond the stream channel that bounded the enclosure to the north-west (Fig 5). There was evidence for grassland and pasture. The stream channel became increasingly active throughout the life of the enclosure and had encroached into ditch segments 5 and 6 during Phase 1.

Phasing and chronology

Summary

A brief summary of the various phases of development is necessary before we begin the discussion. More detailed data, upon which the discussions are based, are given in Chapters 2 and 3.

Phase 1: Middle Neolithic. Sub-divided into three phases, 1A–1C. Phase 1 saw the construction, main use, and modification of the causewayed enclosure. Pottery styles: Mildenhall and Fengate.
Phase 1A: initial cutting of the enclosure ditch.
Phase 1B: major episodes of recutting. In this phase a large gateway structure was in causeway F. There was some evidence that the interior was divided into two halves.
Phase 1C: causeway F was narrowed; the main north–south division of the enclosure was enlarged and formalised.

Phase 2: Late Neolithic. This phase can be divided into earlier and later parts. The former saw desultory 'use' of the Phase 1 enclosure ditch; during the later part a ditch of the Etton cursus was dug diagonally across the enclosure. Pottery styles: Peterborough (earlier) and Grooved Ware (later).

Phase 3: Bronze Age. A scatter of Beaker and Early Bronze Age pits was placed in areas that had been important in Phase 1. Pottery styles: 'domestic' earlier Bronze Age and Beaker.

Phase 4: Iron Age. Pottery styles: a few plain body-sherds.

Phase 5: Roman. Pottery styles: mainly products of the Nene Valley potteries. Phases 4 and 5 saw the laying out and modification of livestock paddocks that can be related to an Iron Age and Romano-British farm located on the Maxey East Field (Pryor and French 1985, 239–44).

Phasing between segments

The outline phases, given above, were based upon stratigraphy and artefact typology. The three sub-phases (A–C) of Phase 1 could only be distinguished stratigraphically within the enclosure ditch, although spatial considerations allowed certain non-linear features to be tentatively assigned to specific sub-phases. Even within the segments of the enclosure ditch, it was often very difficult to correlate episodes of recutting between different segments. There was also a danger of circular argument: shallow, very narrow recuts were a feature of Phase 1C, and therefore any narrow recut would be assigned to that phase – whereas it might actually belong within Phase 1B. The presence of causeways made accurate stratigraphic correlation between individual segments impossible.

It was possible to attempt a quite detailed phasing within the eastern arc segments (6–14), largely because the ditch infilling contained backfilled material and because cut lines could be observed with some clarity. On the western side of the enclosure, the ditch segments generally remained open and accumulated fillings that were characterised by silty clays and organic detritus. Recuts could be seen in segments 1 and 2, and it was possible to correlate with some confidence the sequence in segment 1 with those to the east. The segments of the straight, southern, side of the enclosure ditch, now hidden beneath the bank of Maxey Cut, will probably be found to contain fillings with characteristics of both arcs.

Ceramic evidence

The ceramic evidence (see Chapter 5 and Appendix 1) indicates that the vast majority of small filled pits contained pottery of the two styles that were characteristic of Phase 1: Fengate and Mildenhall wares. Very few indeed contained Peterborough or later pottery.

Radiocarbon dating

Five radiocarbon samples from Phase 1A contexts within basal deposits of the enclosure ditch formed a very tight – indeed statistically indistinguishable – group centred around the second quarter of the fourth millennium cal BC (Table 96; Fig 254). Such a close group of dates might be taken to indicate that Phase 1A was of quite short duration. A sample of small twigs from the pit F40, which was cut into the side of ditch segment 1 and contained a complete quern or pounder, gave a result that was significantly later than the group of five just discussed (Table 96: BM-2899). This pit most probably dated to Phase 1.

The five determinations from primary contexts are entirely in agreement with those from other causewayed enclosures and sites that have produced Mildenhall style pottery in East Anglia and the East Midlands (for example, Orsett, Briar Hill, Spong Hill, and Haddenham). The determination from the Phase 2 pit F953 in segment 6 (BM-2891), which produced four wooden bowls and unabraded Peterborough sherds, would seem to be unacceptably late, both in the context of Peterborough material elsewhere (Kinnes and Gibson forthcoming) and in terms of the development of the site as it is presently understood.

Recutting

The relatively short duration of Phase 1A was tentatively indicated by the closely grouped results of five radiocarbon samples, but other evidence supported the hypothesis. The lower ditch deposits showed some evidence for recutting, but not on the scale, for example, of Briar Hill (Bamford 1985, 7–36). The maximium number of recuts that could be seen in a single section was around seven or eight, but more normally three or less (see Chapter 12, pp 311–12).

The wood deposits in segments 1 to 6 were excavated with very great care, and clear horizontal evidence for recutting was only observed in segments 1 and 2 (for example, Fig 130). It was very rare for wood to have been disturbed or cut through by subsequent recuts; typically, entire ditch deposits were homogeneous (such as Figs 128, 135, 139). When the lowest deposits had been removed, it was very unusual to find that the bottom of the ditch was corrugated or ridged through recutting.

Structured deposits

Similarly, the linear deposits of structured or arranged material in the eastern arc of the enclosure ditch were entire. Although it was common to find one linear deposit on top of another, there was no reason to suppose that the former had been placed in the ground after a long interval. 'Standstill' horizons, accompanied by appreciable soil growth, were not found in deposits of Phase 1.

Pottery was only occasionally disturbed by recutting, and while it is entirely possible – indeed probable – that quantities of spoil from recuts were removed from the site, the structured material that was exposed in the excavations was generally speaking 'clean' – there was no substantial background 'noise' provided by intermixed and redeposited items from earlier deposits. In this regard Etton differed markedly from settlement sites, such as Fengate.

Short period of use

The evidence suggests that following its laying out and construction, the enclosure was 'used' relatively intensively, but for a short period – centred around the second quarter of the fourth millennium BC. Perhaps Phases 1A and 1B lasted less than one or two centuries. Thereafter 'use' continued to be episodic, but possibly increasingly so. The Phase 2 pits in the enclosure ditch perhaps represent a brief renewal of activity over a millennium after the site's original construction.

Phases 1A–1B

Consideration of these phases is best begun by treating the features of the interior (Fig 103); we will then move to the enclosure ditch.

Type of features

Despite a most careful search, using conventional field-walking together with geophysical and geochemical techniques, no evidence was found in the buried soil for floors or small domestic hearths. Only one probable structure (Structure 1 at causeway B) was identified with any certainty (Fig 106); some evidence suggests that this building was constructed in Phase 1C, relatively late in the enclosure's life.

The remaining pits, small filled pits, and possible postholes of Phase 1 date were spread across the interior and showed no patterns that could possibly be considered house-like. This situation cannot be attributed to post-depositional factors, such as ploughing, because the interior was protected beneath alluvium, and conditions for preservation were excellent. It can therefore be stated with confidence that Etton produced no direct evidence for settlement during Phase 1. The vast majority of the features must accordingly have played a role in the religious, funerary, or ceremonial activities that other evidence suggests formed the principal purposes of the enclosure.

Small filled pits

Function

Before any discussion of the development of the causewayed enclosure itself is attempted, it is necessary to discuss the role of the pits briefly. In Chapter 3, the features of the interior were divided into four arbitrary groups, of which pits of one sort or another (Groups 1 and 3) formed by far and away the most numerous class (Table 6). Group 3 consisted of small filled pits. In the field, this group was clearly defined: they often had dark, charcoal-rich or charcoal-stained filling, but the natural gravel into which they were cut was rarely, if ever, burnt.

The small filled pits often contained flint implements and by-products that Middleton (Chapter 6) considers resulted from flint knapping (or were a selection of such material); many of these flints were burnt (p 255). The finds also included pottery and bone that were often (but by no means always) burnt; the pits themselves were fairly uniform in size (Table 8). They were dubbed 'cremations' during the excavation (a term that has been retained in the archive).

Some of these pits were very shallow, and it was not possible to be certain that they were indeed small filled pits in the sense defined in this report. Many must orginally have been little more than shallow scoops in the topsoil. Traditionally such features have been interpreted as 'rubbish pits', but this explanation must be considered improbable here, for the simple reason that there was no evidence for long-term settlement within or near the enclosure. Some of the finds from the pits were of high status and were placed there in a manner that indicates ritual. There were also repeated resonances with the filling of the pits and the deliberately placed ritual deposits in the enclosure ditch. Indeed, in one instance a group of four small filled pits had been positioned and concealed within the filling of the enclosure ditch itself (Fig 44).

It would not be possible to analyse or to discuss the internal organisation of the enclosure further without suggesting a tentative explanation of the role of small filled pits. If their role was merely to dispose of refuse, then it is difficult to explain why two fresh conjoining flint flakes were found in the fillings of two close, but quite separate, small filled pits (F238 and F240, p 220). A functional explanation would suggest that it would be simpler to dig a large hole for rubbish and then to fill it over time, perhaps covering each layer of refuse with soil. The careful digging and filling of a series of small holes make little practical sense.

A better explanation may lie in our original field description of these features as 'cremations'. This shorthand description arose because the fillings were so distinctively charcoal stained and often contained fragments of calcined bone, which subsequent examination has shown to be animal, not human (Chapter 9, p 282). The simple 'cremation' hypothesis is clearly not appropriate. The small filled pits and the material filling them were by no means identical; they cannot be compared, for example, with the cremations of a Deverel-Rimbury cemetery, where the urns, the pits, and the burnt material are generally uniform in size and composition (such as Erith and Longworth 1960).

It is suggested that each pit represented a separate and distinct 'event' in which a range of cultural material was placed in the earth – sometimes capped by a distinct artefact. Despite most careful excavation it was not possible to demonstrate that the material which formed the bulk of a Phase 1 pit's filling had been placed or arranged in the ground, in the manner of certain deposits within the enclosure ditch itself. The cultural material was tipped in, and its surface was perhaps smoothed out in order to receive the capping artefact. The object that capped the filled-in pit lay immediately below the base of the buried soil that appeared to seal it; this might suggest that the very top of the pit had been subsequently backfilled with turf (perhaps inverted to form a short-term marker) or with topsoil.

The material that formed the bulk of a pit's filling could have derived from a number of sources. Some of these may have been connected with rites that took place at Etton, others from further afield. It is probable that the pits and the material within them represented a variety of rites and activities, but the careful positioning of a single, personal object (such as a polished stone axe or a quartzite polissoir) at the top of fillings of certain pits might suggest that the pits represented the funerary rites of an individual person. Such an explanation would help to account for why pits never intercut: to do so would be to infringe an individual's identity.

Distribution

Before we consider the placing of 'small filled pits' over the interior, it must be emphasised that they cannot be related directly to the stratigraphically defined subphases of Phase 1, because they have been dated to Phase 1 by artefact typology alone. They have been plotted on the plan of Phase 1A–1B, for convenience, and to show their relationship to the gateway in causeway F (Fig 103). A proportion of these features probably dated to Phase 1C.

The distribution of small filled pits (Fig 103) echoes that of non-linear Phase 1 features in general (see Fig 102). If fence lines and one group of possible Phase 1 features of doubtful status (see p 100) are discounted, it could be argued that the vast majority of the remaining pits or putative postholes were the truncated remains of ritual features, similar or identical to small filled pits. It cannot be argued that some features suffered from grossly more serious post-depositional damage than that suffered by others; this would suggest that certain small filled pits were very much smaller than others, some barely penetrating below the topsoil. Even at Etton, though, where conditions of preservation were excellent, it would seem that interior features that have survived were possibly a small selection of the original total. Indeed, some pit fillings may have had cappings of objects and turf projecting above the ground surface – such as the quern placed above a rubber in pit F711.

Despite these biases of sampling and selection, the distribution of small filled pits is instructive. The first aspect of the distribution of small filled pits, and indeed all other non-linear features of Phases 1–3 at Etton, is that they never intercut (see Fig 102). This has already been used as an argument to suggest that Phase 1 was relatively short-lived. Having said that, a big distinction exists between the avoidance of pre-existing features that were cut a year or two previously, and those that were dug a century earlier. Indeed, the few Phase 2 and 3 pits all managed to avoid cutting through earlier features. This could suggest that the communities possessed real or mental maps of features within the enclosure, which were updated on a regular basis; it also implies continuity of ideology over perhaps three or four centuries.

It is possible, of course, that the pits of Phases 2 and 3 avoided earlier features by chance, being so few in number. This cannot be proved or disproved on the available evidence. It is perhaps significant, however, that the later pits, with the exception of the remarkable horse head and red deer antler pit, F385 (Fig 118), are distributed in areas where there were clusters of Phase 1 pits (Fig 117). This would indicate at least a degree of awareness of earlier practices, if not knowledge of the precise location of individual features.

The case for 'mutual avoidance' for the pits of Phase 1 can be argued on simple distributional grounds. The sheer numbers suggest that people were aware of where earlier features lay. One way in which intercutting was avoided could have been by the designation of specific areas of ground for specific rites at certain times. For example, if the tight group of small filled pits shown in Figure 107 was indeed dug and filled at approximately the same time (as the conjoining flints indicate), then it is possible that the area occupied by the pits, rather than the individual pits themselves, was marked in some way. Perhaps turf, soil, or subsoil that was removed during the initial excavation of the pits was used to provide surface markers. Such markers would survive for a considerable period of time, but have left no discernible archaeological trace.

The distribution of pits in the vicinity of ditch segments 6–9 was of interest. The general distribution plan of this area, showing features of all phases, may be taken as a very approximate guide to the number of pits that could have been present in the Neolithic (Fig 89). It seems improbable that more than perhaps 2–3% of the undated features would be earlier or later. There seems to have been quite a distinct interior 'edge' to the distribution some 22–23m south-south-west of, and parallel to, the enclosure ditch. Furthermore, the distribution of pits close to each segment could be seen to have a separate and different character – the pits near segment 6 were scarce, there was a cluster close to segment 7, those near segment 8 were separated from it by a void and were dispersed, and those near segment 9 were smaller, closer together, and not separated from the ditch by a void. The 'void' or 'voids' (if segment 6 is included) might indicate the presence of an internal bank, but this would appear to be a most improbable explanation in the case of segment 6, where the ground was particularly low-lying.

The plan of more securely dated Phase 1 pits (Fig 103) shows a similar if less detailed distribution. The pits show the same 'centrifugal tendency', and there are clusters near segments 7, 8, and perhaps 9. The plan also shows some evidence for possible radial divisions separating the various clusters; that between the pits near segments 8 and 9 is particularly pronounced.

Taken together, the evidence very tentatively suggests that the presence of the ditch segments affected the concentration, distribution, and perhaps the 'character' of pits nearby in the interior. In short, it is suggested that the pits and individual ditch segments could have been associated with each other in some way.

The area immediately inside the widest causeway, F, was probably a place of great importance. It commanded both halves of the enclosure (Fig 102) and was the site of a large timber gateway structure in the first part of Phase 1. To the south and east of the gateway was a reserved area free of small filled pits. A small group was located immediately south-west of the timber gateway. These may have been concealed behind the gateway and/or the major north–south dividing fence.

Postholes

With only one exception (posthole F251), none of the pits or postholes of Groups 1 or 2 provided clear stratigraphic evidence for a post. The putative postholes of the two north–south fence lines of Phase 1 were all very shallow and slight; they were considered to be postholes on the basis of their small diameters, regular spacing, and alignment. The distinction, therefore, between pit and posthole is at best very subjective. Indeed, posthole F251 was a small filled pit in every respect (its location, size, depth, and filling material), other than the fact that it had once clearly held a post (Fig 92).

Fence line

The interior in Phases 1A and 1B was probably divided by a north–south fence that could be traced almost to the centre of the site. The southern end terminated at two small filled pits (F366 and F478). The fence was aligned on a larger than average 'small filled pit' (F624), 20m to the south, which might have provided a central focus for activities during this phase.

Pyres

The magnetic susceptibility survey revealed a most striking area of high readings around ditch segments 10–12 (Fig 79). The sheer extent of the area would suggest that fires were used perhaps intermittently throughout Phase 1. It is suggested that these fires may have been pyres or ritual bonfires. The enclosure ditch segments also had high readings and were found to contain significant deposits of burnt material. It is possible that many of the small filled pits found on the eastern part of the enclosure had been filled with pyre-like material generated in this area.

It will be suggested below that the area of intense burning near ditch segments 10–12 was possibly associated with funerary activities. However, it should also be noted that all the burnt bone found in the small filled pits, and indeed within ditch segments near the 'pyre' area, was not human, but animal (see Chapter 9). This would suggest that the pyres did not serve a simple funerary purpose, as a means of disposing of human remains. Miranda Armour-Chelu points out (Chapter 8) that the taphonomic evidence indicates that human bodies were probably excarnated by exposure; this process may (or may not) have taken place at Etton. The 'pyres' therefore served a subtly different purpose, perhaps more commemorative than funerary *sensu stricto*. The amount of fat present in animal bodies might help to account for the great heat generated by these 'pyres' (Adrian Challands personal communication).

Livestock

In contrast to the magnetic susceptibility survey, the soil phosphate survey, after image processing (Figs 84, 85), showed a distinct phosphate concentration across the western, and more particularly the south-western, side of the enclosure. It is of course always possible that this could relate to the use of the site in Phases 4 and 5, but by these later phases the lower-lying parts of the enclosure (which were mainly towards the west) would have been wet, and one would normally expect that livestock would be penned or grazed on the higher land of Maxey 'island' further north-west. If the phosphate concentration represents the penning or grazing of livestock, then an early date – probably in Phase 1 – would be indicated. We have seen in Chapter 3 that the even pattern of phosphate enhancement is not what would be expected from a settlement or farmyard. The available evidence, therefore, would suggest that livestock may have been allowed to graze over parts of the western half of the enclosure – probably in Phase 1. This evidence for the keeping of livestock accords well with the insect data, which provided clear indications – dung beetles – that livestock were kept in the vicinity (Chapter 14). The insect samples were taken from segment 1, close to the area of enhanced phosphate levels.

The livestock could have been brought to the enclosure from outside, where they were penned, perhaps prior to ritual slaughter. The phosphate enhancement is such, however, that it is more probable that at least some stock was kept at Etton for longer periods.

Enclosure ditch

Laying out and construction

The initial, Phase 1A, laying out and construction of the enclosure ditch are tentatively considered to have been a single 'event'. There are, however, significant reasons to believe that the circumstances surrounding this 'event' may have been been more complex. It has been noted that the lower, Phase 1, deposits of the eastern and western arcs differed (see Chapter 2). In particular, attention was drawn to the sands and gravels that characterised the eastern ditch segments; these contrasted with the finer-grained deposits (and organic material) that occured in similar contexts to the west. If the entire ditch had been excavated in a simple, single, event then it is necessary to explain this contrast. The simplest explanation is that, as part of the initial 'event', the segments of the eastern half were dug, some artefacts and bone deposits inserted, and then the segments immediately backfilled to a high level, such that organic material was not able to accumulate within them. By contrast, segments of the western arc were allowed to remain open.

These so-called 'structured' or 'arranged' deposits of the enclosure ditch consisted of individual or grouped artefacts and/or ecofacts that were placed in the ground for no manifestly utilitarian purpose. Such deposits are thought to have been of ritual or symbolic importance (Richards and Thomas 1984; Thomas 1991, 56–77).

Four hypotheses that might explain the different nature of the deposits in the eastern and western arcs of the enclosure ditch have been offered (p 67). The most attractive hypothesis is that the initial 'event' was essentially a 'marking out' of the enclosure, which may, or may not, have also involved the digging of the eastern arc of ditch segments. The western arc may have been dug out or deepened later, perhaps in the wetter season of the same year. This hypothesis, or a variant of it, envisages a distinction between the two halves of the enclosure from its initial laying out.

Causeways

Not all causeways were of equal significance. Causeway F, for example, was far more important that the rest, if only briefly. In Phases 1A–1B it was very wide, and at its centre was a substantial timber gateway (Fig 103). A fence line ran south from the west timber slot F360 of the gateway to the centre of the enclosure (and possibly beyond). The fence line ended at two small filled pits.

The approaches to the gateway at causeway F were delimited by a fence and a screen (pp 100–101), both of which provided a funnel-like access to the gateway from the south-east.

Two other probable entrance causeways existed – at causeways B and M. That at causeway B had a possible guardhouse (Structure 1), although more likely of Phase 1C date. Causeway M was notably wider than other causeways, except causeway F. There was no concentration of small filled pits immediately inside causeways F and M; a sufficiently large area could not be exposed inside causeway B.

The presence of entrance causeways to east, north, and west begs the question whether there was another to the south. The evidence, however, lies hidden beneath the northern bank of the Maxey Cut. A slight increase in feature density, and especially that of small filled pits, hinted at the presence of another focus, but perhaps the two best arguments in favour of a southerly entrance are that the symmetry of the site demands it to be there and that recent work (French *et al* 1992) has shown that there was a much larger area of dry land available to the south than had previously been believed. Furthermore, it is known that the enclosure ditch does not penetrate south of the Maxey Cut bank; this means that the southerly course of the ditch was relatively straight, giving the enclosure plan a flattened, squat appearance (see Fig 4). This southern, straight, side of the enclosure could have been the original main focus.

An entrance causeway in the centre of this straight length of segmented ditch would have provided, in effect, a facade that gave onto a large area of dry land within the stream meander. Such a facade would find a close Fenland parallel at Haddenham (Hall *et al* 1987, 186–91). Whatever the situation to the south, causeway F must have been the main access to the land surrounded by the stream channel meander. If, as we will suggest below, the whole area within the meander was important to contemporary communities, then the enclosure was placed at a significant spot on its periphery, where access from Maxey 'island' was across a narrow stretch of the relict stream course (the same route was also chosen in Iron Age and Roman times).

Waterlogged segments

The phasing of any causewayed enclosure ditch is always rendered hazardous by the presence of causeways, which prevent any direct stratigraphic linking. At Etton, the problem was made worse by the presence of the very wide entrance causeway F and by the differential effects of waterlogging. The three ditch segments 3–5 did not show evidence for recutting, nor indeed was there evidence for deliberate backfilling; the stream channel had encroached shortly after their initial cutting. These particularly wet segments supported coppice stools and shrubs along their sides and bottoms, and recutting would not have been particularly straightforward. It is probably best, therefore, to regard them as having remained open (and very wet) throughout Phase 1.

Recutting and backfilling

Ditch segments 1 and 2 showed clear evidence for recutting, and there was less obvious evidence for backfilling than in the eastern arc. The general succession of deposits in these two segments could not be reliably correlated with the better- defined sub-phases of the eastern arc. The only possible exception to this was ditch segment 1 at causeway A, where there was slight evidence for an early (possibly pre-Phase 1?) and wider causeway. This was followed, in Phase 1A proper, by a fresh cut that narrowed the possible original causeway; this later causeway was marked by a butt-end deposit of a complete bowl upon a birch bark mat. Even in this instance, there was no narrow Phase 1C recut above the Phase 1B layers.

The segments of the eastern arc all showed clear evidence for backfilling (see also Chapter 12). The presence of causeways made it impossible to prove positively, but it is suggested that the initial (Phase 1A) marking out and digging of the ditch may have taken place at the same time. This probably took place as a single 'event' and would have involved people from many different communities. Indeed, although the evidence was less clear cut from the westerly arc, it would seem probable that the entire ditch circuit was dug out at this time. Only the segments of the easterly arc were, however, backfilled – and this probably took place very shortly after the initial excavation.

The backfilling of structured deposits seems to have evolved throughout Phases 1A–1C, in the eastern arc. The lowest, Phase 1A, deposits were all deeply backfilled; indeed, most segments had no structured deposits at all – just quantities of infilling sand and gravel. It is impossible to be at all certain, but this backfilled material may have occupied approximately two-thirds of the original depth of the ditch (Charles French personal communication). The course of the ditch would have been clearly visible. The structured deposits of Phase 1B were also backfilled, but generally with less clean gravel; in certain instances (such as segments 10–14) we can be reasonably certain that this backfilling was not to the ditch top.

Earlier accounts of causewayed enclosures made reference to 'gang labour' in their construction (such as Piggott 1954, 244). The purpose of the ditch was seen as a quarry from which material could be won to construct a continuous causewayed bank. More recently, it has become clear that the ditch segments may also have played a role in their own right (for example, Evans 1988b). The concept of Neolithic workmen implicit in earlier accounts must be replaced by a broader definition of gang labour in which appropriate, probably prescribed and selected, members of separate communities worked not only upon the digging of a ditch segment, but also upon the placing of special offerings within it and, in many cases (especially in Phases 1A and 1B), their immediate or rapid backfilling. Soil micromorphological analysis has demonstrated that the inverted turf from a Phase 1A context in ditch segment 11 could not have lain on the surface for more than a year (Chapter 12, pp 311–12). This suggests rapid backfilling.

Butt-end deposits

It has been suggested (Edmonds 1993, 111) that butt-end deposits were placed near causeways so that they could be seen (or remembered) by those who passed through the causeway. This can be demonstrated at Etton, where the three principal entrance causeways, B, F, and M, were all marked by such 'offerings' (although the incursion of the stream channel and the cutting of the large Phase 2 pit F953 removed any butt-end deposit in segment 6 at causeway F). Other causeways were also marked in this way. This might possibly suggest that while the entrance causeways were the main entranceways into the enclosure, certain of the segmental causeways were also used in this way, but perhaps by specified groups of people at specific occasions.

Structured deposits

In the eastern arc special ritual deposits or 'offerings' were placed upon the clean gravel bottom of the ditch: these included complete pottery vessels, human and animal skulls, animal bones, and antler. These deposits were, however, confined to segments 6 and 7 alone. All the other segments of the eastern arc had been backfilled in Phase 1A with the gravel and topsoil that had just been excavated from them. It is, of course, possible that any 'offerings' of Phase 1A date in segments 8–14 were of organic material that did not survive. However, these levels were sufficiently deep to argue against this: some trace of the organic material would probably have survived. It is suggested that the first cutting of the ditch was of the entire circuit and was only accompanied by structured deposits in the ditch segments that were close to the principal northern entrance causeway F (5, 6, and 7). Perhaps these special deposits were placed in the ground to focus attention on certain areas.

The initial laying out of the enclosure must have been a very significant event to the communities that took part, as it defined an area that would have great ritual significance for many generations to come. It was an act of construction and a symbol of shared beliefs.

The Phase 1A structured deposits in the eastern arc segments 6 and 7 were characterised by a series of 'statements', usually arranged in a linear pattern along the ditch bottom. These statements consisted of groups of material or single prominent items, that were separated by gaps (such as Fig 30). In structured deposits within the ditches of long barrows, Julian Thomas has described the principle behind such arrangements as 'segregation within association ...

certain materials occur together repeatedly but are kept separate from each other within the long barrow ditches' (Thomas 1991, 68).

In certain instances, the deposits at Etton were covered over by sand or gravel. It was assumed during excavation that the individual 'statements' within the linear arrangement of material were contemporary and that the entire deposit was placed in the ground during a single event. In retrospect, however, this need not have been the case. Perhaps the separating gaps may indicate the passage of time between individual events. Very careful excavation of an appropriate deposit in the future might reveal longitudinal discontinuities in the backfilling – which would indicate that the various 'statements' were placed in the ground during separate events. Whatever the situation in Phase 1A, it can be argued with more confidence that the linear deposits of Phase 1C appear, by their continuous arrangement, to have been placed in the ground in a single event.

In Phase 1B the individual statements became smaller. Ditch butt ends were, however, still marked by prominent items, such as the cattle scapula of segment 9 (Fig 39, Bone 10825). The change in emphasis from individual statements towards the linear deposit as a whole may perhaps be seen in the placing of smashed quern fragments in such a way as to divide the ditch into two (segment 13) or three (segment 9) equal-sized portions. We will shortly see that in Phase 1C the tendency towards integrated linear deposits became more fully developed.

Pyre-like material

Three ditch segments contained deposits of burnt material that included ash, charcoal, and burnt bone. It is, of course, entirely possible that this material merely derived from domestic hearths or camp fires. However, similar burnt deposits were a consistent feature of the filling of small filled pits, and the analysis of the animal bone (Chapter 9) suggests that sometimes very high temperatures were involved. The magnetic susceptibility survey (Chapter 3) also suggests that the fires close to the eastern ditch segments were very hot indeed. The pattern, moreover, of magnetic susceptibility readings does not suggest that camp fires were lit at random across the enclosure: the greatest area of enhancement was concentrated close to segments 10–13 (Fig 79). The temperature of the fires and their spatial arrangement suggest a non-domestic function. The complete absence of cremated human bone suggests that these fires were not used for that purpose, but that animal bodies may have been burnt within them (see Chapter 9, p 282). For these reasons the term 'pyre-like material' is used to describe these burnt deposits.

The earliest deposit of pyre-like material (Phase 1A or 1B) was in segment 6, at causeway G; in this instance the pyre-like material lay on the gravel side and bottom of the ditch, and it had clearly been tipped in from the interior.

Perhaps the most remarkable pyre-like deposit occurred in segment 10 in Phase 1B; it filled and covered four small pits (which in plan resembled miniature ditch segments) along the interior edge of the main ditch (Fig 44). These pits contained unburnt structured deposits of animal bone in a matrix heavily stained by charcoal. Two other pyre-like deposits were found in segment 11, also along the inner edge of the ditch; these probably dated to Phase 1C.

It should be noted that, with the exception of the deposit in segment 6, all the pyre-like material from the enclosure ditch occurred close to the area of the interior with very high magnetic susceptibility readings (Fig 79). Attention should also be drawn to the contrast between the low magnetic susceptibility readings of segments 8 and 9 and the very high readings of the ditch segments to the south-east. There seems no good reason to suppose that this was caused by post-depositional effects, such as weathering or erosion. The abrupt change must therefore be due to cultural factors. Exclusion formed an important part in the decisions that lay behind the acts of deposition: flint and pottery were almost absent from segments 3–5, wood was not found in segments 7–14, and pyre-like material was not allowed to spread north of causeway J.

Phase 1C

Enclosure ditch

In Phase 1C (Fig 115) the western arc segments 3–5 remained open, and causeway C was probably blocked; similarly, the entrance causeway F was narrowed by the digging of a shallow easterly extension of segment 5. Segments 1 and 2 were recut several times, but as we have already noted, these recuts cannot reliably be ascribed to any particular sub-phase of Phase 1.

It is suggested that the linear deposits of Phase 1C represented a development of a long-established tradition in which the act of deposition (and the material that was deposited) became increasingly stylised and abstracted through time. In the eastern arc, the Phase 1C deposits were even more narrowly linear than those of Phase 1B. This was clearly seen in segment 9 (Fig 37). The deposits were often tightly packed into a narrow recut and were rarely deeply backfilled (Chapter 12, p 311). Superficially, it would appear that clear individual 'statements' had entirely vanished by Phase 1C, but on the other hand it is possible that the grammar of their expression had become very subtle: instead of using actual skulls, or skull-sized and skull-shaped ceramic vessels, the structured deposits of this sub-phase employed skeuomorphs – for example, small (segment 8) or even tiny (segment 9) round stones (Fig 240). Apart from the round stone, the butt-end deposit in segment 8 at causeway H contained tightly packed deposits in a short length (less than 1m) of recut; this material must have contained a number of specific symbolic references. Similarly, the unusual fired clay objects (Fig 241) found during the rapid stratigraphic assessment excavation of segment 7 almost certainly derived from a closely similar style of structured deposit.

The arrangement of Phase 1C deposits was linear, and large statements were avoided; significant butt-end deposits did, however, remain in the repertoire – the larger of the two round stones (segment 8) and human cranium fragments were found at butt ends in segments 8 and 10.

By Phase 1C the backfilling was very slight; indeed, in segment 11 these latest deposits appear to have been placed in the ditch without significant recutting; in effect they 'capped' the earlier Phase 1B backfill.

Interior

If it was not always straightforward to disentangle the deposits of Phases 1B and 1C in the enclosure ditch, the same also applied to the features of the interior.

Causeway F gateway

Important stratigraphic relationships occurred in the region of entrance causeway F. The narrowing of that entranceway and the abandonment of the Phase 1A/1B gateway were the principal innovations of the new phase. A new ditch, F313, terminated at the western side of the newly narrowed causeway. It cut through the backfilled Phase 1A/1B pit, F505/563, which it is thought served to mark or reemphasise the original north-east butt end of ditch segment 5. In Phase 1C the largely waterlogged, open ditch segment 5 had its butt end extended to meet up with F313 and also to narrow causeway F.

Ditch F313

From causeway F, ditch F313 ran south-west, and during the excavation it was thought that it simply bypassed the long enclosure ditch segment, 5, which, together with segments 3 and 4, was not recut in Phases 1B or 1C. There are two possible interpretations of the role of the V-shaped ditch F313. The simplest suggests that it was excavated after the abandonment of segment 5 to rising water levels; it therefore served as a new north-western boundary ditch to the enclosure. This explanation has the merit of simplicity, but it leaves a number of questions unanswered. Why, for example, was it considered necessary to extend the apparently abandoned enclosure ditch segment 5, so blocking the western side of the original, very wide entrance causeway F? Why did the V-shaped ditch F313 not curve outwards to join causeway E? And why did it not physically join up with the enclosure ditch to the south-west (as it probably did in causeway F)?

An explanation may lie in the relationship of the ditch F313 and the cluster of small filled pits immediately to the south-east, by causeway F (shown on Fig 103). These pits were undoubtedly respected by ditch F313. To the west of F313 was an area of high magnetic susceptibility readings (H on Fig 78), but virtually no features. It seems, therefore, that ditch F313 was indeed a boundary, separating an area of burning and an area of small filled pits.

If F313 was a simple replacement of the main enclosure ditch, it is difficult to see why it was not treated like the rest of the enclosure ditch in Phase 1C: in other words, it should have been segmented, have been subject to recutting, and filled with linear structured deposits and/or butt-end 'offerings'. Very small segmented ditches were found at Briar Hill (Bamford 1985, pl 3). The ditch F313 did not appear to have been backfilled or recut, and no bones or artefacts were deposited directly in it; the very few that were found were most probably residual. Its phasing was, however, firmly fixed by its relationship to the backfilled pit, F563 (which it cut) and to the Phase 2 cursus ditch, F318 (which cut it).

It is much to be regretted that we were not able to observe precisely where (and how) the ditch F313 terminated in the south-west. All the evidence, however, indicates that it must have stopped well short of the enclosure ditch, perhaps a few metres north-east of causeway C. This would be consistent with the fact that segments 3 and 4 were not recut in Phase 1C, but remained open. It might also help to explain why causeway C was blocked by a short length of ditch, probably in Phase 1C (Fig 106). This arrangement would have allowed access into a long, thin enclosure bounded by ditch segments 3–5 and by ditch F313. The entrance was probably at the south-west, possibly controlled by a guardhouse (Structure 1). Access from the main entranceway (at causeway F) was blocked off by the eastwards extension of segment 5.

North–south boundaries

A new north–south ditch (F363) was dug from the western side of the narrowed causeway F towards the centre of the enclosure. It ran more-or-less parallel to the earlier fence line (see Fig 103), but was extended further south by a fence; there was an entranceway or gap between the ditch and the southerly fence.

It was noted in Chapter 3 that many of the ditches, gullies, and postholes that made up the various land divisions or boundaries of Phase 1 were very slight, and it is difficult to suppose that they served any practical function, in the sense of a stockyard or field boundary. The southerly fence line of Phase 1C, moreover, appears to have been constructed from panels of some sort (p 107). It is suggested that these boundaries were for appearance: they screened and hid different parts of the site; they were not intended physically to prevent unwonted access. A more recent analogy might be the rood screen of medieval churches.

Small filled pits

Finally, it must again be noted that the 'small filled pits' shown on the plan of Phases 1A/1B (Fig 103) can only be dated with any assurance to Phase 1. Many, perhaps even a majority, could well have been dug and filled in Phase 1C. By the same token, the 'pyres' near segments 10–12 were probably lit on numerous occasions throughout Phase 1 (the pattern of magnetic enhancement in this area is consistent with the lighting of several fires, on different occasions, rather than the construction of a single massive fire – Adrian Challands personal communication). The wide entrance causeway M did not appear to have been narrowed or significantly altered at any time in Phase 1. It was suggested in Chapter 3 that this causeway was used to provide access to the area of high magnetic susceptibility and small filled pits. If the fires and the pits were indeed associated with funerary or commemorative rituals, then causeway M could have been used as a specialised entranceway associated with such rites.

Phases 2 and 3

There were notably fewer features of Phases 2 and 3 than of Phase 1 (Figs 117, 121; Table 6). Some of the features of possible Phase 1 (Table 7) could belong to the later phases, but quite a high proportion came from an area where it was not possible to be certain whether the features were indeed the result of human action. The remaining possible Phase 1 features were all from areas that were rich in 'possible/probable' and 'probable' Phase 1 features (see Table 7). Taken together, the evidence would suggest that the sharp decline in feature numbers between Phases 1 and 2 was real.

Earlier Phase 2 features

The features of Phase 2 fell into an earlier and a later group. The earlier features included five large pits that were cut into the upper levels of the enclosure ditch. They contained quantities of animal bone and, in certain instances, structured deposits (including two aurochs skulls). They were probably originally dug a few years after the end of Phase 1C. On the western side of the enclosure, segment 1 (sections 3 and 8) revealed at least two pits of this phase that were much smaller than the large pits of the eastern segment; they did not contain structured or arranged deposits.

Later Phase 2 features

The later features of Phase 2 included the cursus ditch and two large pits near its south-east butt end, one of which produced sherds of Grooved Ware. A remarkable pit (F385) that contained a horse skull and a red deer antler pick can also possibly be dated to this later phase.

The southern cursus ditch F318 terminated within the enclosure, and although the causewayed enclosure is half-in and half-out of the cursus, it was bisected by the southern cursus ditch with some precision. This would indicate that the course of the ditch segments of the earlier enclosure was still clearly visible towards the latter part of Phase 2. A closely similar relationship between causewayed enclosure and cursus – also in a very flat, low-lying landscape – can be seen at Fornham All Saints, Suffolk (Palmer 1976, fig 20). The centre of the cursus ditch at Etton was marked by a clearly defined gap or entranceway. These two phenomena – the central gap and the bisection of the enclosure interior – recall the layout of the Phase 1 enclosure closely. The difference lies, of course, in the diagonal orientation of the cursus ditch, relative to the main north–south division of Phase 1.

Phase 3 features

There were even fewer features of Phase 3 than Phase 2, and their dating was often even more tentative. A few small filled pits of this late date were located in the same areas as those of Phase 1, and the continued lack of accidental intercutting must again be noted. By this period the area within and around the enclosure was becoming increasingly wet, and it is probable that this led to its eventual abandonment.

The nature of the occupation

Settlement evidence

With very few exceptions (such as Evans 1988b), excavated causewayed enclosures in Britain have produced material, usually 'occupation debris', which has been interpreted as providing substantial evidence for settlement (for example, Bamford 1985; Dixon 1988). In some instances, as at Crickley Hill, settlement may well have played a significant role. Indeed, settlement was originally thought to have been an important element at Etton: the ditch produced quantities of animal bone, woodchips, and other evidence that was interpreted in the field as being straightforward 'occupation debris' (Pryor 1988a). Post-excavation analysis, however, has shown that such a simple explanation is no longer adequate; furthermore, excavation of the interior has revealed no evidence for structures that can be associated with permanent or long-term occupation. In certain cases (such as Guilbert 1975), lack of clear evidence for buildings can be attributed to post-depositional factors, but at Etton, the conditions for preservation were excellent.

We will discuss the 'occupation debris' shortly, but first we must consider the archaeological remains – the direct evidence for occupation – that would normally be found in places of ancient human habitation: the postholes, hearths, house platforms, gullies, waterholes and so on. The interim report (Pryor 1988b) was written before large areas of the interior had been excavated. Since then there has been a detailed review of the available data, and the conclusion is almost beyond doubt: at Etton the direct evidence for permanent or extended settlement was almost entirely lacking. Any settlement was probably more ephemeral; indeed, the earlier terminology for this class of monument, the causewayed 'camps', may well prove in cases such as Etton to have been more accurate than was once believed.

Further, perhaps conclusive, evidence to support the hypothesis that Etton was not a site of long-term domestic settlement is provided by the insect data, which 'do not provide any evidence for human habitation or activities other than the management of domestic animals on the site' (Chapter 14).

Seasonal occupation

Etton must always have been wet in winter and subject to flooding in times of heavy rainfall. Direct arguments for seasonality are fraught with problems, but common sense would dictate that large numbers of people could not have stayed at Etton for any length of time during the winter, as large areas of the enclosure and most of the ditch would have been very wet. Indeed, our own excavations had to be abandoned several times during wet weather before the quarry dewatered the adjacent field.

The recutting and filling of the enclosure ditch must indicate episodic use of the site, most probably during the drier months of the year. If, as will be argued, part of the site was used between late summer and spring, this use must have been opportunistic and very much dependent on the wetness of the individual season. It seems most improbable that large gatherings could have taken place at Etton during the wetter parts of the year (late autumn to early spring). It should also be stressed that there was no evidence to suggest that the episodic gatherings necessarily took place every year.

In certain instances (such as its initial laying out and construction), the main use of the enclosure may have involved quite large assemblies. If the main use of the enclosure had to take place in the drier months of the year, there was no actual evidence to support regular seasonal meetings. The feasting involved the consumption of whole animals, and there would have been sufficient food for quite large gatherings; it is also probable that such wholesale consumption may have attended an autumn slaughter (Miranda Armour-Chelu personal communication). Similarly, a significant proportion of the roundwood had been cut down in the late summer or autumn (Chapter 4, p 159). We may therefore safely conclude that the 'use' of the enclosure was episodic, and that each episode of use was sufficiently brief so as not to require the construction of permanent houses. Taken together, the evidence would suggest that after a possible initial period of large-scale construction work, the episodic gatherings were of perhaps variable, but generally short, duration.

Animal bones

The study of the animal bone from the enclosure ditch showed that it was not a typical domestic assemblage (Chapter 9). Accordingly, it was approached from a spatial point of view, and special emphasis was given to a segment-by-segment analysis of the many structured bone deposits. As at other causewayed enclosures, cattle dominated the assemblage, and wild species were notably rare. Sheep declined in importance after Phase 1A, where they had represented 18% of the assemblage. Eight partial sheep skeletons were assembled into butt-end deposits in Phases 1A and 1B, and it is suggested that sheep were highly prized.

Taphonomic studies showed that the partial skeletons of sheep and pig had been buried rapidly, 'soon after the carcass was dismembered and the bones defleshed' (p 285). There was no consistent pattern in which meat bones were selected, or non-meat bones thrown out. The deposition of partial skeletons was probably associated with feasting; indeed, Whittle (1993, 46) has suggested that competitive feasting may have been one of the activities that took place at Windmill Hill; such feasting may be linked with social differentiation. These concepts can equally well be applied to the Etton bone material. Perhaps social differentiation might be indicated by the positioning of certain small filled pits, which were screened from public view immediately south-west of the main entrance causeway, F (see p 100–101).

Cattle bones were treated very differently to the sheep and pigs: they were not deposited within the ditch as partial skeletons, and there was evidence for selection in favour of meat bones. Cattle bones were often found arranged within linear spreads, but only in segments of the eastern arc. Again, feasting is indicated, but perhaps the cattle bones in the linear spreads represent feasting of a different type to that represented by the partially assembled skeletons of pig and sheep, which are found in both arcs of the enclosure ditch. Many bones of cattle, sheep, and pig were found within structured deposits that did not suggest feeding; presumably these represented the residue of smaller-scale meals. It will be tentatively suggested below (p 367) that many of the rites commemorated within deposits of the eastern arc were to do with kin-group ceremonies.

Human bones

Etton, unlike Etton Woodgate on the other side of the stream channel, did not reveal a single human burial. Given the extent of the excavations, it is probably safe to conclude that none were ever there. There were, however, numerous human bones: many – especially skull bones – were placed in prominent positions within the structured deposits of Phase 1 (such as Figs 25 and 45). Death therefore played an important part in the rituals that took place at Etton, but the site does not appear to have acted as the final resting place of deceased individuals. In this regard it was quite distinctly different from long barrows (Thomas 1991, 103–25). It should instead be regarded as a place of transition – a bounded, 'safe' area where individuals could begin their journey to the next world.

Unexpected evidence for the treatment of human bone was provided by a taphnomic study (Chapter 8). This study showed clear evidence that unlike most of the Phase 1A and 1B animal bone from structured deposits, which was fresh and unabraded, the human bone showed evidence for abrasion and canid gnawing. It is suggested that this damage could be the result of exposing bodies – for the purpose perhaps of excarnation – within the enclosure.

Worked flints

The evidence provided by the worked flints was difficult to interpret in a straightforward manner (see Chapter 6). Taking the buried soil first, there was evidence for the 'background' scatter of Bronze Age flints that is so characteristic of the lower Welland and Nene valleys (Pryor 1982). Middleton (Chapter 6) suggests that knapping did take place at Etton, but the absence of by-product concentrations within the buried soil might indicate that any accumulations of knapping debris were cleared up and perhaps redeposited elsewhere. The overall concentration of flints in the buried soil was quite homogeneous (Fig 77), but too low to indicate prolonged *in situ* occupation. More flints were in the buried soil of the western half than the eastern half of the enclosure.

The Phase 1 flint assemblage included many of the items usually associated with causewayed enclosures: arrowheads, laurel leaves, and serrated flakes. A high proportion (55.2%) of the arrowheads were complete. Flints from small filled pits of Phase 1 included a preponderance of finely made implements, particularly serrated flakes and arrowheads, with fewer cores and utilised or waste flakes. It is also interesting that no flint axe fragments were recovered from primary contexts in ditch segments 1–5, where there was abundant evidence for woodworking.

The western arc of the enclosure ditch produced very few flints indeed from Phase 1 contexts (Fig 12), which contrasts with distribution in the buried soil. The contrast is so marked that it is possible to suggest that flint was deliberately excluded from the ditch. Low quantities were also recovered from Phases 1A and 1B in the eastern arc, and exclusion is again a possibility.

There was a marked increase in flint concentrations within Phases 1C and 2 in the eastern arc, especially within the north-east quadrant; flints in those segments were found within the linear structured deposits (as in Fig 33). The seemingly sudden appearance of flint in enclosure ditch deposits in Phases 1C and 2 could possibly be explained in terms of settlement (Robert Middleton personal communication), but this hypothesis is not compatible with the deliberately arranged narrow linear deposits of Phase 1C and those deposits within at least two of the large Phase 2 pits (in segments 6 and 12).

There was no evidence for *in situ* flint knapping within the enclosure ditch of Phases 1A and 1B, as has been observed in the primary fill of long barrow ditches elsewhere (for example, Pollard 1993, fig 10). However, a marked concentration of by-products was observed in secondary contexts in segment 14 at causeway O (Fig 230).

A distributional study of the flints by the present author (Chapter 6, pp 251–5) emphasised the contrast beween the quantities of flints recovered from the eastern and western arcs. There seemed to be little consistent coincidence between the ratios of implement and by-product occurrences, and it was suggested that the flint assemblage (or assemblages) was the result of selection from a number of different original sources in antiquity. We still do not, however, understand the selection criteria.

The detailed distribution patterns of the eastern arc (Fig 231) shows that flints had been deposited in the ditch in an uneven manner. Certain areas, such as the butt ends of segments 12 and 13 at the entrance causeway M, were favoured and contained many finished artefacts, including smashed axe fragments. Ditch segment 7, on the other hand, contained very few flints and would appear to have been deliberately avoided. That butt ends were favoured as foci for flint deposition was also observed at Staines (Robertson-Mackay 1987).

Burnt flint showed a particularly uneven pattern of distribution, with pronounced concentrations in segments 9–11 and at causeways M and O. The concentration of burnt flint in segments 9–11 is very similar to the pattern of high magnetic susceptibilty readings over segments 10–12 (N on Fig 79).

These patterns of distribution in Phases 1C and 2 do not indicate that the flints from the upper levels of the enclosure ditch derived from casual discard during the enclosure's hypothetical use as a settlement. Rather, they indicate that patterns of selection and deposition, which were doubtless associated with ritual and ceremonial, continued largely unaltered until the very latest phase of the site's use.

Pottery

The pottery showed many similarities with the flint in both its deposition and distribution. The contrast between the eastern and western arcs is somewhat less marked, but the vast majority of unabraded sherds derived from segments of the eastern arc. There does not appear to have been so clear a distinction between Phases 1A/1B and 1C/2, but the later phase deposits produced far more pottery than did those of Phases 1A and 1B.

A particular point of significance was the continuity of depositional practice between Phases 1 and 2 in the eastern arc. Pottery in the Fengate style was mainly found in Phase 2 deposits, but some did occur in Phase 1C. Unabraded Mildenhall pottery was largely confined to Phase 1 contexts. In other words, the style of the pottery changed, but the use of the site and the depositional practices did not. There was, moreover, no evidence for any break between Phases 1 and 2. This might possibly suggest that the criteria that lay behind the selection of, and the change in, a ceramic style may not have had any connection with the rituals that took place at Etton.

The vast majority of pottery from Phase 1 contexts in the enclosure ditch and in small filled pits was fresh and unabraded (Ian Kinnes personal communication). This suggests that it was deposited in the ground without much delay; it was not redeposited or 'secondary' refuse, as defined by Schiffer (1976, 30–1). There was also evidence for selection: there was a far greater proportion of rim and decorated sherds, as against plain bodysherds, than might be expected from a randomly selected assemblage (Ian Kinnes personal communication).

Pottery formed an integral part of all structured deposits within the eastern arc. Individual complete vessels (such as M3 and M79) or large sherds (such as M102) formed butt-end deposits, but in contrast to the pattern observed in the bone, wood, and flint, no heaps or major concentrations of pottery were encountered. It might therefore be very tentatively suggested that individual vessels had significance in themselves – in their own right. By contrast, sherds as a defined category may not have been important. The identity of each vessel was probably defined by its decoration. This may perhaps help to account for the selection of decorated sherds in favour of plain bodysherds.

Wood

The evidence for woodworking within primary deposits of the enclosure ditch was undoubtedly one of the most remarkable discoveries of the project. This material was subjected to detailed statistical analysis, and it was concluded that the woodworking debris represented far more than just the routine clearing out of a ditch.

While the excavations were under way, it was considered that the wood and woodworking debris resulted from the periodic cleaning out of shrubby growth that had accumulated within the increasingly waterlogged ditch segments of the western arc. Some of the debris could indeed have derived from such work, but there were indications that other activities could also have taken place. These could have been associated with other ceremonies that were taking place in the interior, or they could have had significance in their own right.

The data presented in Chapter 4 make it clear that different activities were probably taking place in or near to different segments, and that in certain cases more than one activity took place within the same segment of ditch. Most of the activities involved the cutting, trimming, or secondary working of smaller, wattle-sized, roundwood. Most, if not all, of these rods were derived from coppice stools, many of which actually grew in the ditch. Being wet-loving species, these alder coppice stools thrived in the wet conditions.

The waterlogged conditions seen in ditch segment 5, with the merging of the nearby stream, favoured the working of birch bark and the growing of coppiced alder. After just two or three years growth in wet conditions, experience at Flag Fen has shown that coppiced stools of willow would be so large that there would be little room in the ditch for much else. It would certainly be far easier to remove the rods from the ditch and work on them on the drier ground of the interior. The wattle was entirely removed from the ditch and would have provided material to be used in rites that took place within the enclosure: screens, fence panels, biers, faggots, and so on.

Large timber was notably absent, except for one small oak plank in segment 5 (Fig 158), and another, much decayed plank, from beneath two aurochs skulls within a Phase 2 pit in segment 12. Ditch segment 5 produced a high proportion of tangentially aligned woodchips and pieces of debris that could have derived from the working down of larger roundwood. It also produced many pieces of very thick, corky bark from fully mature trees. This bark may have been brought to Etton as a product in its own right (perhaps for tanning), or else it derived from timber trees that were either worked or stored in (or near) ditch segment 5.

The other evidence for large, squared timbers came from the two timber slots of the Phase 1A gateway and the single post within the pit F251. Both were located close by segment 5. Despite this indirect evidence for the possible working of timber in segment 5, the absence of timber by-products has to be explained. The only explanation must be that if timber was worked at Etton, all debris was ritually cleared up and perhaps consumed within the fiercely hot fires that are discussed in Chapter 3 (p 77).

The wood study provided evidence for the manufacture of wooden bowls from alder coppice stools and for the manufacture or working of thin birch bark sheets and vegetable-fibre twine, both of which require beating and soaking. It is possible, depending on the date and phasing of ditch segment 2 (see pp 24–5), that the woodworking and woodland crafts practised at Etton became more specialised as time passed – as seen in the twine and birch bark sheet.

The role of the causewayed enclosure

Etton was undoubtedly a site of ritual significance. The question that now concerns us is the nature of that significance: why was Etton important, and what went on there? And why were there differences between the east and west halves of the enclosure?

Liminal places

Until recently the prevailing view of causewayed enclosures owed much to their (superficial) similarity to hillforts. Indeed, many are known within hillfort interiors. They were viewed as 'central places' where, for example, people met for markets and exchange (Smith 1971). More recently, greater emphasis has been on the significance of liminality (Thomas 1991, 36). Later sites such as Flag Fen can be shown to have been located at the edge of territories, rather than at their centre (Bradley 1990, 172).

A similar change of emphasis now affects our understanding of the Neolithic. Research by Whittle and others in the Avebury region has shown that Windmill Hill was located in wooded countryside, unlike contemporary barrows, which were sited in the open. The barrows were located closer to areas of settlement, whereas the enclosures were placed 'in more wooded, perhaps peripheral locations' (Whittle *et al* 1993, 231).

Causewayed enclosures are now seen as liminal places, and not as central places (Edmonds 1993). The Etton enclosure was actually located on marginal land that was subject to intermittent flooding (see Chapter 11). The site was physically marginal, but socially liminal. To be liminal is not, however, to be insignificant: causewayed enclosures played an essential role both at the inter- and intra-community level.

Environmental conditions

It could not have come as a surprise to fen-edge communities (whose survival depended upon an understanding of the practical implications of groundwater hydraulics) that the ditch segments of the western arc were partially waterlogged – probably from the outset of Phase 1. They must surely have been aware that the enclosure could have been readily situated a few metres further east on slightly higher ground, out of reach of the stream channel – in which case the ditch segments of the western arc would have been much drier.

One must conclude that the monument was therefore deliberately sited with the intention of providing a waterlogged environment along the bottom of ditch segments 1–5. It cannot be argued that these western ditch segments were originally treated like those to the east. Nor can it be argued that the working of wood and bark and the other activities within the western arc were merely the response to the onset of unexpectedly wetter conditions. The physical difference (that is, the wetness) of the ditch segments of the east and west was not an accident, and by the same token the different activities that took place in each half were not merely responses to two distinct environmental circumstances. It is suggested that the environmental conditions that pertained in the two arcs of the enclosure ditch were predetermined in order to accommodate the ritual activities that were to take place within the enclosure. In other words, the environmental conditions within the ditch segments – and indeed the entire enclosure – were ultimately selected to provide a suitable setting for the ritual activities.

Gang labour and gatherings

Etton was a special place to the communities who visited it, and the activities that took place there must have had extra significance. This would have applied to even humdrum, workaday tasks such as woodworking, coppicing, or beating of birch bark. These activities may have played a 'supporting' role to the more important social ceremonies that involved large numbers of people – the so-called 'gang labour' required to excavate or recut ditch segments. The labour required to dig the ditch segments (and their recuts) must have been considerable, and it is probable that these ceremonies were attended by large numbers of people.

The important social events that doubtless formed a major part of the principal gatherings probably took place in the late summer or early autumn, when ground conditions were dry and when crops had been gathered in. This is the time of year when agricultural communities have both the time and the surplus resources to come together with other communities to resolve disputes, to compete for social ranking, and to celebrate rites of passage. These were probably the main meetings that took place at Etton.

It is suggested that the gatherings at Etton probably involved large numbers of people, perhaps from several communities. In Phase 1A the 'audience' would probably have been sufficiently large to lay out and construct the entire circuit of the enclosure ditch. In Phase 1B perhaps only one or two segments were reopened at any one time, but the operation was nonetheless quite labour intensive, and many people would have been required.

It could also be suggested that the internal structure of the enclosure was well suited to accommodate such gatherings. The main body of the population, together with their livestock, could have camped in the western half, and perhaps also outside the enclosure (but within the area defined by the meander of the stream). This land could be described as 'public' land, where feasting, ritual slaughter, and exchange of livestock took place. The eastern half of the enclosure, on the other hand, was reserved for more private or kin-group ceremonies.

The recognition that the two halves of the interior could have been the setting of both public and private ceremonies at regular gatherings recalls the earlier suggestions of Smith (1971), discussed above; indeed, the original description of these sites as 'camps' may prove to have been accurate. Certainly, the lack of evidence for permanent settlement can only be explained in this way. But the demonstration that both public and private aspects of social gatherings were integrated within a 'camp' of a temporary domestic nature within a liminal site is new. In short, Etton has illustrated the complexity inherent in prehistoric ceremonial.

Decrease in numbers

Processes of stylisation, abstraction, and formalisation continued throughout Phase 1 and into Phase 2. It is likely that these changes in ritual practice were accompanied by a change in the 'audience' being addressed.

By Phase 1C the ritual 'tasks' – very narrow, shallow recuts with minimal backfilling – were altogether smaller in scale, and it is possible that the audience was smaller, too. The decrease in numbers attending the episodic ceremonies was accompanied by a more formal arrangement of the interior space and by the symbolic restriction of the principal entrance causeways, F and B. It is suggested that the smaller groups that attended the later events of Phase 1 were a selection from the broader community – some of whom may perhaps have been more specialised in ritual affairs.

Visual impact

Etton was an important place, and people probably took pains to make it appear impressive. The site lacks the obvious visual impact of Crickley Hill, Hambledon Hill, or Windmill Hill, but the flat, wet landscape of the fen edge can produce visual splendours of its own. Apart from the sinuous sheets of water that skirted the enclosure to the north, visually one of the most spectacular aspects of Etton would have been the Phase 1A timber gateway and the water-filled ditch segments of the western arc, with their luxuriant growth of coppices, whose young winter and spring wood is very brightly coloured in hues of yellow, green, and even red. Many gardeners today plant coppice or pollard willows close to water so that their reflection will heighten the effect of their brightly coloured stems (Gray and Frankl 1984, fig 54; Johnson 1992, 18; Lloyd 1987, 62). The lush, reflected, growth of coppices within and outside the enclosure ditch would have provided a very striking boundary effect around the edge of the site.

A concentration of bird cherry (*Prunus avium*) wood in enclosure ditch segment 5, close to the northern entrance causeway, is of possible interest in this regard. Bird cherry grows very fast, and its fragrant white blossom is particularly striking in the spring; dark fruits ripen in the late summer and are much sought after by birds (Phillips 1978, 173). The tree, or trees, could have been deliberately used to enhance the appearance of this important part of the site.

Structured deposits

Display may have played an important role in some of the major social events that took place at Etton. The structured deposits, and especially those of Phase 1A, made a strong visual impact during the recent excavations (such as Figs 31, 55), but we viewed the various components of the arrangements as mere objects, being ignorant of their original symbolic meaning. Their impact in antiquity must have been enormous.

The recent discovery of art on the sides of a causewayed ditch at Flagstones House, Dorset, provides vivid illustration of the element of spectacle that must have been important to the many people attending the episodic gatherings (Woodward 1988). The ditch sides at Etton may also have been decorated, but not, for obvious reasons, by carving. It is also possible that there was a competitive element in the size or impact of the various ceremonies that took place within different segments of the ditch.

The structured deposits of Phase 1A were arranged down the centre of the ditch, which provided a suitable setting in which the rites could be enacted. The 'gang' or the community who had excavated the ditch doubtless viewed the rites from the spoil heaps around its perimeter. The excavation provided a theatrical setting – the deposits (which were clearly defined, large, and visible) were well suited to what was essentially a 'performance' (such as Fig 31).

Western enclosure

Wetness of ditch

The fact that the western segments were wet was no accident. It is suggested above that this was deliberately planned from the outset.

Structured deposits

The ditch segments of the western arc contained 'offerings', 'placed' items, or groups of items, especially of animal bone, but they did not yield the closely integrated and articulated structured deposits that were so prominent a feature of the eastern arc (see Chapter 2). The deposits of the western arc were essentially 'one-off' placements of material in the ground; apart from the bowl on a birch bark mat in segment 1, the offerings stood alone: they were not arranged in the ground with other objects. Even the animal bone deposits, particularly the partially assembled skeletons, were mutually exclusive and can perhaps be seen as a series of distinct events. The evidence provided by the structured deposits does suggest that the activities that took place there were of ritual significance – as witnessed by the wood, the animal bone, and butt-end deposits. The symbolic deposits within the western arc ditch repeated themes seen in the eastern arc, such as human bone, evidence for feasting, and an emphasis upon butt-end deposits.

In short, the structured deposits of the western arc showed no evidence for articulation or integration with each other. There was also no evidence, in contrast to the deposits of the eastern arc, for formalisation or evolution through time. This may, however, be misleading: perhaps change may be identified in the increasing formality with which space within the western half of the enclosure was organised.

Interior layout

The parts of the interior that sloped gently down to the longest ditch segment (5) did undoubtedly become increasingly wet (due to stream encroachment) in the latter part of Phase 1. These wetter ground conditions could have been the catalyst that led to the construction of the V-shaped ditch, F313 (Fig 115). It has been suggested that this ditch was a 'bypass' or substitute for segment 5, which had become very wet by Phase 1C. If that were indeed the case, then the ditch F313 was not treated like other parts of the enclosure ditch.

It has also been suggested that the ditch F313 may not have been a replacement for ditch segment 5. Instead, it marked off a long, thin enclosure within the main enclosure. By Phase 1C this enclosure could only have been approached by way of causeway B and its associated 'guardhouse'; also by this phase, segments 1–4 would have been waterlogged for a large part of the year, and most of segment 5 had actually coalesced with the nearby stream. The spatial arrangement of the western half of the enclosure became more formalised, and access was deliberately restricted.

The area between ditch F313 and segment 5 would have been sufficiently dry for the digging of pits in Phases 1A and 1B; however, it was uncharacteristically devoid of features (Fig 86). It would appear that this 'void' was deliberate and was perhaps associated with activities that took place within or near enclosure ditch segments 4 and 5. The rarity of small filled pits around the internal periphery of the western side of the enclosure may help to explain why the two halves of the enclosure were so different.

This area also produced magnetic susceptibility survey evidence for bonfires (see Fig 78). It should be noted, however, that close examination of the ground in the region of these hypothetical bonfires did not produce corroborating evidence for heat (Charles French personal communication). Whether or not the 'bonfires' detected in the survey ever actually existed, the lack of definite small filled pits requires explanation. The few features that were present were slight and of very doubtful significance. If the ground in the region was sufficiently dry to dig the enclosure ditch, there are no physical reasons why the area alongside the ditch was used for the digging of pits: the area around causeway F was equally wet, yet it was densely covered with features.

Association with rites elsewhere

Perhaps most of the activities in the western enclosure were episodic and were closely associated with rites that took place elsewhere within the enclosure: the provision of wattle for screens, larger wood for fuel, birch bark sheets for containers or mats, and stool wood for wooden bowls. The western half of the enclosure also housed or provided animals for slaughter.

It is difficult to suggest a simple, all-embracing explanation to account for the multifarious activities represented by features and deposits of the western half of the enclosure. As we have seen, themes are common to both halves, and both halves were used episodically. The episodic activities that are represented by deposits in the western arc can be seen to be closely embedded within important social events that took place within the enclosure – many of which were represented by the structured ditch deposits and small filled pits of the eastern half of the enclosure. The major social events that took place in the enclosure were supported by other, perhaps more specialised, events that took place in the western half.

Additional roles

There was some evidence, briefly reviewed in Chapter 4 (p 159), that the ditch segments of the western arc may have been used more frequently and also at different times of the year than those to the east. In other words, the western half of the enclosure seems to have served some additional roles, perhaps to do with the day-to-day activities that find expression within the less rigidly arranged, usually unrelated, 'one-off' structured deposits that were placed in the muds of the open ditch. There is also evidence that this ditch was not allowed to become choked with undergrowth and may have been kept clear of surplus vegetation for most of the year. Perhaps the multiple recutting (without backfilling) of segments 1 and 2 represented this tradition being continued into Phase 2.

This pattern of use suggests that the western half of the enclosure witnessed more than the occasional, large seasonal gathering. It would also help to explain why it was considered necessary to build the only permanent structure – the 'guardhouse' (which would have required regular maintenace) – inside causeway B. The presence of a permanent 'guardhouse' might indicate a need for a more extended – perhaps custodial – presence in the western half of the enclosure (if not elsewhere).

Small filled pits

Digging and filling

The small filled pits of Phase 1 were essentially of similar size and contained broadly similar fillings, which were tipped in and showed no obvious signs of careful arrangement, other than the occasional positioning of a valued object near the top. This might indicate that these pits, like the ditch segments, were dug in one operation, and the filling added as a separate operation. When the buried soil was first exposed, we expected to see clear evidence for pits and other features, but this was largely lacking, so it would seem probable that once filled and possibly capped with a single large artefact, the pit was then 'topped out' with soil or turf. As a final gesture (for which no evidence exists either way), the clean gravel from the body of the pit (which was now replaced by tipped-in material) was placed on the surface as a vivid, white marker.

Distribution

Small filled pits can be seen to cluster around individual ditch segments. This is most clearly seen around the eastern arc segments 7–9 (Fig 103). Small filled pits also extended across the centre of the enclosure and were commonly found on the western side. Indeed, the largest, most dense, concentration lay immediately south-west of the timber gateway at causeway F. It has been suggested that the latter group lay in an important area, close to the main gateway. The possibility exists that the organising principles which lay behind the arrangement of features within the enclosure were more complex than the simple east–west divide might suggest. Was there a distinction, for example, between the core or centre of the enclosure and the periphery? Were the small filled pits nearer to the centre of the enclosure also of enhanced importance? Certainly the pit F711 that contained the large saddle quern (Fig 111) was a remarkable deposit, positioned near the centre of the site.

Kin-group significance

Certain small filled pits could have been associated with funerary or commemorative rites. The structured deposits filling ditch segments of the eastern arc included pyre-like material, skulls, skull fragments, pottery, and stone skull skeuomorphs. The grouping of small filled pits alongside these particular ditch segments might well indicate a connection between the two. If the symbolic indications have been correctly 'read', then it may be suggested that the association of ditch segments and small filled pits had specific kin-group significance.

The integration of the structured deposits within the individual ditch segments was in sharp contrast to the carefully maintained isolation of the small filled pits in their vicinity. It is tempting to suggest that the integration of the one represents the ties that bound the individual kin groups together, whereas the separateness of the other is a reflection of individual identities.

The ditch segments of the western arc are less straightforward to interpret, but specific kin-group associations do not appear to have been present there.

Markers

A few small filled pits continued to be dug in Phase 2 in areas of the enclosure that had been used for this purpose in Phase 1 (Fig 117). As none of these later pits cut into pits of Phase 1, it would seem possible that they were all marked and maintained – a process that could not have lasted for less than perhaps three or four centuries. It is also possible, however, that the marking and maintenance could have been in people's minds – the locations of pits being passed from one generation to another, orally, within each kin group, for fear of disturbing an ancestor's soul.

Rites of passage

The complexity and variety of deposits found suggest that the ceremonies which took place episodically were varied, but 'rites of passage' probably played a major role at Etton, as at other causewayed enclosures (Chapter 7, p 270; Edmonds 1993; Thomas 1991, 105). In anthropological terms, these rites would have been considered very dangerous: the transition between life and the afterlife, for example, was a period of danger, and the rites of passage associated with this journey were best performed within a safe place, appropriately prescribed and recognised by all the communities in the region who shared the same beliefs (Edmonds 1993).

The best evidence for such rites was provided by the backfilled ditch deposits and small filled pits of the eastern enclosure. The vast majority of evidence is for rites that were probably to do with death and the transition to the next world. The ditch did, however, produce evidence for three fired clay fertility objects from ditch segment 7 (Fig 241). This find is important because it provides firm evidence that the enclosure was not used for one ritual purpose alone.

If birth and death were celebrated at Etton, it is reasonable to suppose that the other main rites of passage – puberty and marriage – were celebrated there also. The careful integration and articulation of the structured deposits within segments of the eastern arc suggest that they and their associated small filled pits formed the principal focus for important social ceremonies. The area of possible pyres north of causeway M must also have played a major role in these rites. The ditch segments of the western arc were undoubtedly used for ceremonial purposes too, but their role was rather different.

Interior division

The interior of the enclosure was divided into two halves, east and west, by a fence line in Phases 1A and 1B, and by a shallow ditch and fence line in Phase 1C. When phosphate data were image processed, they showed a clear distinction between east and west (Fig 84). Magnetic susceptibility, however, was less clear cut, but showed that many large fires had been lit in the extreme east around ditch segments 10–12.

There was also a clear break in the distribution of pottery at the entrance causeway F, whereby ditch segments to the east produced far more pottery in (unexpectedly) larger sherds. The bias in the distribution of flints was even more marked (compare Figs 230 and 231).

Although clear distinctions existed between the two halves of the enclosure, this contrast was by no means all-embracing. As if for emphasis, there was a large gap in the partition fence or screen at the centre of the site, so access between the two halves could take place. The east–west division of the interior was perhaps deliberately blurred by this large gap.

The east–west division was plainly of fundamental importance. The dividing up of the interior by means of a central boundary, the V-shaped ditch F313, and the possible 'guardhouse' (Structure 1) became more formalised as time advanced. These increasingly formalised spatial boundaries probably reflected significant ideological distinctions.

Gateways

High-status areas

The higher status afforded by proximity to an 'entrance causeway' can be explained by the high visibility that such a location possessed. At the very least, attention would have been drawn to the nearby features and deposits. By the same token, the erection of screens in areas of considerable activity, such as the main gateway at causeway F, would symbolically shield the very highest groups from the eyes of the community. It would have been well known that they were there, but their presence nonetheless was concealed; the principle was that of the hidden 'Holy of Holies'.

Entrance causeway F

The very robust timber gateway at causeway F was probably the single most imposing structure of the interior. People passing through it would have been reminded of the status of a particular group.

In Phases 1A and 1B the main entranceway was at causeway F, and it does not appear to have served a specialised function; indeed, it may have been possible to bypass the gateway altogether and to enter the enclosure on either side of it.

In Phase 1C there seems to have been a focusing of roles. The main entrance causeway F was narrowed, and the gateway was demolished and its foundations filled in. The access into the long, thin enclosure (defined by ditch segment 5 and the V-shaped ditch F313) from causeway F was deliberately blocked off. A possibly high-status group of small filled pits was now screened from the east by the construction of a north–south ditch, F363; this group was also bounded to the north-west by the ditch F313. It could therefore only be reached via the centre of the enclosure.

By Phase 1C the erstwhile main entrance causeway F had therefore effectively been demoted; in this phase it only provided access to the north-eastern part of the enclosure; this was an area entirely given over to small filled pits, which, it is suggested, were associated with the funerary or commemorative rites of kin groups. It would appear that people in Phase 1C passed through causeway F for specialised, funerary, and kin-group reasons alone.

Entrance causeways B and M

Although there seems to have been a major northerly focus (that to the south is hidden), two other entrance causeways can also be postulated.

Access to the ditch segments of the western arc shifted from causeway F to causeway B in Phase 1C. Causeway C may have been blocked in this phase to re-emphasise the change. Similarly, the 'guardhouse' (Structure 1) could have been constructed in this period. Access to the enclosure alongside segment 5 (and possibly segment 4) could have been controlled by the presence of this guardhouse, which could also have monitored access through the possible entrance causeway B. In Phase 1C the guardhouse would have controlled access to the western half of the enclosure from the outside.

Entrance causeway B may also have served another role. We have already noted that the phosphate survey provided some grounds to suppose that this south-western part of the enclosure may have been used to graze livestock. The evidence suggests that this was not a permanent or long-term arrangement. If that were indeed the case, the animals would most conveniently have entered the enclosure via entrance causeway B. Right-angled wood, perhaps the result of hedge cutting, was not frequently encountered, but its distribution was centred on ditch segments close to causeway B – segments 2 and 3, with outliers in 1B and 4A (Chapter 4). The hedge or hedges could have formed part of stock-management measures.

Entrance causeway M was close to an area of very high magnetic susceptiblity enhancement (near segments 10–12), which it is suggested resulted from symbolic funerary or commemorative pyres. It therefore served a specialised purpose throughout Phase 1 and perhaps later, as witnessed by the ritual deposit in the Phase 2 pit cutting segment 12 (Fig 49).

The overall arrangement of the enclosure has familiar echoes: the entrance causeways were aligned on the cardinal points of the compass and respected the rising and setting of the sun. However, the symbolism of the orientation is unexpected: entrance causeway B, which served the side of the enclosure devoted to activities associated with daily work and with supporting the main ritual events, faced the setting sun; whereas the side of the enclosure given over to rites of passage that undoubtedly included death faced the rising sun. The emphasis of the latter was perhaps upon the transition to the next state of being – the afterlife: a new dawn. There is nothing new in the association of death with sunrise in the earlier Neolithic. Many of the passage graves of the River Boyne in Ireland are aligned towards the east: for example, Loughcrew (Herity and Eogan 1977, 63), New Grange (O'Kelly *et al* 1983, 3), and Knowth (Eogan 1984, 5).

The main entranceway F was halfway between the rising and setting sun and also involved the crossing of a substantial and at times very wet stream bed. The enclosure was thus kept physically apart from the normal day-to-day world of the communities who used it.

Querns and axes

Querns

The presence of so many querns (see Chapter 7) at a site and in a region where the cultivation of cereals must, at best, have been difficult, is instructive. Etton was not a settlement site, and the evidence of querns should not be taken too literally: flour was not necessarily a staple part of the diet of local communities. The querns could have been statements about how things ought to appear and not how they actually were (Hodder 1982, 9–11). It would certainly be hard to find a less probable grain-producing site than Hurst Fen, yet it also produced many complete and broken querns. The presence of querns at Etton and Hurst Fen probably had little to do with the processing of grain at all, and we should beware of making possibly false economic assumptions (Evans 1988a). The concept of the 'kit' or 'cult package' may also apply in this instance (Shennan 1986).

The preparation and consumption of food are a time when people come together, and the equipment used to prepare that food can assume importance. Certain querns and pottery vessels could well have symbolised the domestic routines and tasks that help to bind communities together. The querns do appear to have been important symbols. They were found mainly in the eastern half of the enclosure, within the interior and in the enclosure ditch (Fig 114).

Some quern fragments appear to have been used to divide up or partition certain structured deposits (such as Figs 39 and 57). In another, a complete rubber was placed on top of a broken saddle quern within a structured deposit (Fig 58). With the exception of the large heavily used complete quern from F711, which was buried on its edge directly above its rubber, none of the Etton querns or fragments showed evidence for excessive wear. They were by no means worn out, yet they had been ritually destroyed. As potential 'emblems' of a way of living, the presence of smashed querns may have had broader symbolic connotations.

Axes

It has been observed that the distribution of flint axes notably avoided primary contexts within ditch segments 1–5, where there was nevertheless plentiful direct evidence for the chopping of wood (see Chapter 6). The same also applied to the distribution of polished stone axes (Fig 109), where only one small flake (Fig 236, no 8) was found in a primary enclosure ditch context, in an area where woodworking was known to have been carried out. The flake showed evidence for damage probably caused during normal use as an axe.

Some of the stone axes carry scars that undoubtedly derived from ordinary use, but many had also been damaged in other, less ordinary ways: there was evidence for smashing and for flaking, and many examples were burnt. The vast majority (11) of the 16 stone axes from the enclosure ditch were from Phase 2 contexts, and the remainder came from Phase 1. The only complete, albeit much modified, polished stone axe came from F263, a small filled pit of Phase 1 (Fig 237, no 9); three other axes and a fine quartzitic polissoir were also from small filled pits, probably of this phase. The variety of contexts suggests that the axes served a variety of roles.

Many axes were undoubtedly used for chopping wood, and edge damage proves this, but with the one exception from a primary ditch context, it would appear that the axes and fragments ultimately came to be deposited either in secondary ditch contexts or within contexts associated with ceremonial or ritual.

Edmonds suggests (Chapter 7, pp 267–8) that polished stone axes may have played an important role as markers of an individual's identity: 'Rather than being a simple reflection of elite settlement or trade, the reworking, destruction and/or deposition of axes may have been closely tied to the transformation of the social individual on death. In this regard, it is interesting that many of the axe fragments at Etton display fracture patterns that are difficult to understand as the results of use, and that many appear to have been burnt. Although it is difficult to test, it may be that these artefacts were harnessed, broken, and/or burnt within important rites of passage.'

East and west: differences and similarities

The two arcs of segmented ditch formed a single enclosure, and so their symbolic unity cannot be doubted. The differences must therefore reflect different aspects of the same phenomenon – the same pattern of 'segregation within association' (Thomas 1991, 68) that we have already seen on a much smaller scale within certain of the structured deposits.

Symbolic meanings

If the degree of internal articulation and integration of the structured deposits was a significant difference between the two halves of the enclosure ditch, the individual elements themselves showed distinct, if subtle differences. One example will illustrate the distinction between superficially similar deposits on either side of the enclosure. The example used to illustrate the difference between structured or arranged deposits on either side of the enclosure is the position in the ground of the complete Mildenhall bowls from segments 1 and 6.

The bowl (Fig 175, M3) from segment 1 was arranged right-side up on a birch bark mat at the southern butt end, close by causeway A. No other placed or arranged artefacts were found nearby, but there were quantities of animal bone and wood. By contrast, one complete pot in segment 7 (M79) was inverted and had been placed close to the inverted head of a fox, which was the butt-end deposit. In the other direction along the axis of ditch segment 6 was an antler comb (Fig 244) and another pot (M78), but right-side up (Figs 30, 31). In this instance the inverted round-based vessel from segment 7 can be seen as a transform of a human skull (which it closely resembled in the ground); as such, it may have represented death, or rather the end of a particular human life. It was deposited in the place that was appropriate to the kinship group of the person that it symbolised.

The pot from segment 1 was the right (correct) way up and had, moreover, been placed upon a birch bark mat, presumably as in daily life. This vessel could not possibly have represented a human cranium. We cannot be certain what it did represent, but it is perhaps reasonable to suppose that it had to do either with the vessel itself or its content. Given this interpretation, it is quite possible for two closely similar Mildenhall bowls to have been given very different symbolic meanings. The distinction does not lie necessarily in the pot itself, nor in its form, but in its position in the ground and in its wider depositional context (east versus west).

If it can be argued that the actual position in the ground of closely similar objects altered their symbolic meaning, then it might also be suggested that superficially dissimilar objects could have been arranged in the ground to represent a common symbolic objective. We have noted a tendency for the structured deposits to become more linear and more compact from Phase 1A to Phase 1C. In Phase 1A, human heads were represented by a complete skull or a skull-sized pot; by Phase 1C the skull fragments were smaller (such as segments 8 and 10), and it has been suggested that two small round stones with pecked sockets (a possible skeuomorph of the *foramen magnum*), from segments 8 and 9, may represent human crania. These, however, are very crude analogies, based upon obvious symbols – the original situation was most probably far more complex and subtle.

Similarities

The distinction between the east and west halves of the enclosure would seem at first glance to have been clear cut, but it would be misleading to give the impression that it was absolute. Small filled pits, for example, were found in both halves of the interior. Human bone was also found in ditch segments of the western half, but not within carefully arranged deposits.

The animal bone distribution shows that there were partial pig and sheep skeletons within ditch deposits on both sides of the enclosure, and cattle bones were also found in both halves, although the narrow linear deposits of Phases 1B and 1C were confined to the eastern arc.

Organising principles

We have seen that it is possible to identify a number of organising principles that lay behind the use of space within the enclosure and its encircling ditch. There was a focus upon the three (and probably four) entrance causeways, and in Phases 1A and 1B special emphasis was given to the northern entrance F and its associated gateway. Small filled pits were generally distributed around the peripery of the monument, but the centre was also marked by a large quernstone (in pit F711) and a gap in the central fence line. These organising principles were, it is suggested, of less significance than the clear distinction between the east and west halves of the interior and the enclosure ditch.

Later developments

Structured deposits

As time advanced, the ditch recuts became less deep, with the ditch filling up with a succession of sometimes backfilled structured deposits. The recuts became smaller, and the material within them more tightly packed and linear (such as Fig 37). The Phase 1C linear deposits represented a development of a long-established tradition in which the act of deposition became increasingly stylised and abstracted through time.

Sometimes the scale of the display was reduced to such an extent that its recognition became difficult (as in Fig 26). These later displays integrated the ditch with the deposit: the ditch ceased to provide a setting for an essentially theatrical event. By Phase 1C the scooping out of the narrow, recut ditch and the deposition of the linear spread of material probably took place at one and the same time. The rites that surrounded the deposition of these more stylised, small-scale, and integrated structured deposits were perhaps viewed by a very much more restricted audience than the large numbers who must have witnessed the 'performances' of the early years of Phase 1. It is perhaps possible to see a similar process in operation within features of the interior (see above).

Pits

Despite increasing wetness, Etton was not suddenly abandoned. During Phase 2 certain pits were dug to a specific size in order to receive particular 'offerings'. The enclosure ditch was 'redug' in the form of several large pits; one such pit cut ditch segment 12 and included a very striking deposit of two aurochs skulls (male and female) carefully arranged upon an oak plank (Fig 49). In many respects, this deposit represents a culmination of depositional and display practices that had evolved throughout Phase 1.

Interior pits dug in Phase 2 to receive particular offerings included pit F385 with the horse skull and antler pick (Fig 120). Similarly, material from the Grooved Ware pit, F14, appears to have been arranged with alternating, if informal, layers of flint, pottery, and animal bone (almost entirely pig). The material within these later pits was 'arranged' rather like the structured deposits of the Phase 1A enclosure ditch. These later pits and their carefully positioned offerings formed part of a display that was associated with a particular ritual event.

Interior organisation

While the act of deposition was becoming increasingly abstract and stylised, so the organisation of space within the enclosure itself was growing more formal: the interior was partitioned, and two of the three entrance causeways were restricted – causeway F was drastically narrowed, and causeway B was provided with a 'guardhouse'.

By Phase 1C, there could not have been many parts of the interior surface that were not marked in some way to represent a concealed small filled pit (Fig 102). At the close of Phase 1C, Etton would not have provided a suitable venue for a large social gathering, if the existence of earlier features was still respected. As we have seen, no two pits intercut, so this would appear to be a tenable hypothesis.

Cursus

The termination of the Etton cursus at the earlier Etton causewayed enclosure and the placing of the southerly cursus ditch directly across the centre of the enclosure (with a gap near its centre) reinforce the impression that Late Neolithic and earlier Bronze Age communities continued to respect the site, even if the precise pattern of its internal arrangement had become slightly muddled. Indeed, it will be suggested below that the causewayed enclosure formed the focus for many later developments within the 'ritual landscape'.

Other sites

It has been frequently suggested (for example, Pryor 1984b) that the smaller henge, ring-ditch, and 'hengiform' monuments of the later Neolithic developed out of causewayed enclosures. Etton was by no means a late causewayed enclosure, and its main period of use lay squarely within the Middle Neolithic. However, it is not suggested here that Etton as an entire monument gave rise to the earlier hengiform and ring-ditch sites that occur so frequently around the southern flanks of Maxey island. Instead, processes that were underway throughout Phase 1 and into Phase 2 made it possible to construct smaller, specialised ritual sites. These processes were twofold: abstraction and formalisation within the sphere of ritual practice, and selection within the 'audiences' that attended the rites. No longer were large numbers of people required to attend the ceremonies that took place at the smaller, later sites that cluster around the Etton enclosure.

One of the more complex multi-ringed sites (Fig 4: EL2) lay, as we have seen in Chapter 1, about 200m from the stream channel, north-east of the causewayed enclosure. It yielded conjoining sherds of an Ebbsfleet-type vessel that was found in primary contexts. Typologically this vessel can be dated approximately to the mid-third millennium BC (Ian Kinnes personal communication). This date is broadly contemporary with Etton's Phase 2, and so a degree of overlap is clearly indicated. The multi-ringed site EL2 was undoubtedly 'use episodically, and many features recall Etton, such as offerings of antler, broken pottery, a fine polished flint axe, and rapid backfilling. Elaborate, structured deposits were, however, notably absent, as was any evidence for feasting.

Some of the hengiform sites excavated at Maxey were tiny: the Class I henge at Site 69 (which yielded a well-known decorated antler 'baton') was encircled by a ditch, whose maximum external diameter was *c* 6m (Simpson 1981, fig 3). This surely indicates that by the later Neolithic in the lower Welland valley the undertaking of ritual or ceremonial rites had become highly specialised, and the size of the 'audience' was reflected by the size of the site. It was no longer considered necessary to make a strong visual impact. Very different processes were also in operation elsewhere in Britain (Pryor 1984b; Whittle 1993).

Etton within the evolving landscape

Introduction

Members of the Fenland Project have excavated and surveyed Bronze Age, Iron Age, and Romano-British sites in the Lincolnshire parts of the lower Welland valley (French 1994; Hayes and Lane 1992; Lane 1992; 1993). In addition, large-scale excavations have been carried out in the Maxey Quarry since completion of the Etton Project fieldwork in 1987; this work was carried out in conjunction with a rescue project along the line of the A15 Glinton bypass. Results from the latter two projects have been combined together into a detailed landscape study that is intended to complement the present volume (French and Pryor forthcoming). In view of the work that will appear shortly, the following accounts will be confined to aspects of the landscape that can be linked closely to Etton.

The natural landscape of the Etton–Maxey region has been discussed in Chapters 1 (pp 1–5) and 11; it has also been discussed in a number of recent publications (for a summary with references, see French and Pryor 1992). A more detailed discussion of the Etton landscape will appear shortly (French and Pryor forthcoming). The enclosure lies in the lower Welland valley, close to the edge of the Fens. The countryside is essentially a flat, low-lying plain. It is traversed by sinuous watercourses of the braided Welland system. The meander that partially surrounds Etton on its northern and western sides effectively cut off the site from the higher, drier Maxey island. A large area of floodplain land would have existed to the south-west, south, and south-east of the causewayed enclosure. The land, while not permanently waterlogged, was by any standards wet.

We may conclude that the enclosure at Etton was not placed at the centre of any naturally occurring topographic feature; it lay on the northern apex of a meander within a floodplain, whereas it could easily have been positioned on flood-free ground at Maxey, about 100m to the north. This location suggests actual, physical, liminality. It is in marked contrast to the location of the features of the Maxey henge complex, and indeed Maxey church, both of which lie near the centre of Maxey 'island' (Fig 2).

The Neolithic and Bronze Age landscape

New identity

It has been suggested that the off-centre positioning of Etton and other causewayed enclosures within prominent features of the landscape was significant (Pryor 1995). If the natural landscape features – in the present case, the large meander defined by the stream channels – were places of importance dating back to the Mesolithic, then the positioning of an overtly Neolithic enclosure within them could be explained; it would be similar to the 'validation' argument put forward by Thorpe and Richards (1988) in respect of Beaker reuse of earlier henge monuments.

The material found at causewayed enclosures is very Neolithic: polished stone axes, decorated pottery, quernstones, and an animal bone inventory with few wild animals and dominated by cattle (Thomas 1991, 35). A new identity was being asserted, but in locations that communities probably already recognised as significant.

Settlement sites

The settlement areas that went with the causewayed enclosure and with the later Neolithic and Bronze Age funerary and ritual features are difficult to identify with precision, but recent research has indicated a number of possibilities. These, however, can only be identified in areas buried beneath alluvium; generally speaking, the evidence is too slight to survive any ploughing.

The site at Etton Woodgate was located on the Maxey side of the stream courses, some 80m west of the causewayed enclosure. It was excavated under salvage conditions and consisted of a dense concentration of small pits and postholes, together with spreads of cultural material and a very substantial, waterlogged L-shaped linear ditch (Pryor *et al* 1985, fig 3). The ditch ran parallel to the stream side and was broken by an entranceway at the point closest to the causewayed enclosure; the pits and postholes were grouped around this entranceway, and they included, perhaps significantly, a crouched burial in one of the pits. The pottery consisted of earlier Neolithic plain bowls and blade-based flints. The south-westerly end of the ditch was never satisfactorily traced, but that to the north-north-east was very sharp and abrupt. There was no evidence that the site was enclosed on its other two sides.

The second phase at Etton Woodgate was of Beaker date. It consisted of a very large pit or water-hole that, like the earlier ditch, contained quantities of wood and charcoal. Around the pit, and sealing the tertiary fill of the earlier ditch alongside it, was a thick accumulation of midden-like cultural material that included large quantities of charcoal. This material seems to have been contemporary with the Beaker pit. A crouched burial was found 'sealing' the upper filling of the large pit.

The dating of Etton Woodgate largely depends on the identification of pottery, much of which is Beaker, but lower levels of the the ditch produced sherds of earlier Neolithic pottery (Gdaniec forthcoming). The small pits or postholes were thought possibly to represent a rectilinear structure of some sort; flints from these features were also blade based and broadly Middle Neolithic in character (Middleton forthcoming). If this was indeed a contemporary settlement, then it was very small. The presence of the ditch, with its entranceway and sharp north-easterly butt end, hints at a connection with the causewayed enclosure, as does the small filled pit containing a crouched burial. The nature of this connection is not certain, but it would be very unwise to regard Etton Woodgate as a simple, domestic site. Perhaps it would be more appropriate to suggest a relationship akin to that of Hambledon and Stepleton (Mercer 1980, fig 9).

A large C-shaped ditch (site EL3) was located nearly 200m north-west of the enclosure, on the flanks of Maxey 'island' (Fig 4). It was not possible to date this feature, but its location and infilling suggested a Neolithic/Bronze Age date. It was placed close to ring ditches EL2 and EL4 and may well have been associated with them. There is no evidence to suggest that site EL3 served a domestic purpose.

Better evidence for domestic occupation was recovered by Charles French during excavation ahead of the construction of the new A15 Glinton bypass whose north–south route passes just 500m east of the enclosure. This site was, however, significantly later; it produced Grooved Ware, a possible field boundary ditch, and a thick spread of occupation material (French and

Pryor forthcoming). It was only possible to excavate the width of the proposed new road, and it is quite possible that earlier material could still be found in this area. As yet, no *bona fide* Middle Neolithic settlement sites have been located, but they probably do exist beneath the alluvium of the stream channels.

The evidence for actual settlement sites in much of earlier Neolithic lowland Britain is notoriously sparse (Thomas 1991, 15). It is possible that it might resemble that found at Storey's Bar Road, Fengate – a thin scatter of hollows and very few finds (Pryor 1978, 11–68). The structures (if they existed) at Storey's Bar Road have left few archaeological traces, and the supposed Neolithic 'house' at Fengate is now firmly assigned a funerary role (Pryor 1993). It is most improbable that this type of evidence could be identified in the trenched (usually 2%) sample that is typical of site assessment in current British rescue archaeology. Nor would such features be revealed by aerial photography or geophysical survey. In most instances, too, they would be removed by ploughing. Potential sites would have alluvial or colluvial cover and would be in areas of known Neolithic activity; in these cases it should be assumed that the evidence might be there, and it should be looked for at an appropriately large scale.

Ritual landscape

The causewayed enclosure at Etton was the earliest identifiable element of what was eventually to become a major 'ritual landscape' (RCHM 1960, fig 6). Although some ritual sites must surely lie hidden beneath alluvium on lower-lying ground, the main concentration of ring ditches, henges, and other sites is at Maxey on the flood-free gravel soils of the 'island'. This is prime well-drained land and cannot be considered marginal in any practical respect. There is, moreover, good evidence from Neolithic soils buried beneath banks and barrows that the land in this area was subject to cultivation (Pryor and French 1985, 284–97). So the ritual landscape and the domestic landscape coexisted on the same tract of land (Pryor 1995).

The Neolithic and Bronze Age sites of the Maxey area have already been discussed in detail (Pryor and French 1985), and those closer to Etton will shortly be more fully reviewed within the complexity of their environmental contexts (French and Pryor forthcoming). It remains now to consider the role of Etton in the establishment and growth of the subsequent landscape. We have noted that Etton was positioned on wet, marginal land, and yet it is possible to argue that it provided the focus for the development of the later prehistoric 'ritual landscape'. It has been suggested that the digging and filling of archaeological features associated with the causewayed enclosure (in Phases 1 and 2) marked a period of use in which the area delimited by the ditch was established repeatedly as a place of importance. After this phase of active use and establishment, the site was not abandoned nor forgotten, but rather its place within the landscape continued to be respected. It may also be the case that the meander, on whose periphery the enclosure was located, had been a place of importance for very much longer (Pryor 1995).

Groundwater levels continued to rise throughout Phases 1 and 2, and in the later Neolithic and earlier Bronze Age Etton would have ceased being a place that could have been visited regularly. At about this time the henge monuments were constructed on Maxey 'island'. Some (and possibly the earliest) were placed directly across the stream channels on the 'island' fringes, close to the causewayed enclosure. These have been referred to as 'satellite' ring-ditch sites, and possible reasons for their development have been discussed. The main 'henge-complex', however, was placed at some distance from Etton, on the higher, flood-free land of Maxey 'island' proper. This complex and the Etton site were linked by the Maxey cursus (Fig 3), which may be seen as a symbolic means of transferring the ideological importance of the old site to its successors on the higher ground (ibid). The course, and indeed the role, of the Etton cursus lies concealed beneath alluvium. However, the fact that two cursuses on similar (but slightly different) alignments met and terminated at the site of the causewayed enclosure surely shows that the older monument had not been forgotten. Its significance probably lingered on well into the Bronze Age. A very similar pattern of coincidence can be seen at Fornham All Saints, Suffolk (Palmer 1976, fig 20).

The Iron Age and Roman landscape

The ditched paddocks and droveways of Phases 4 and 5 (Iron Age and Roman) were on a north–south alignment. Two ditches passed out of the excavated area, to the north, through the much earlier main northern entrance causeway F. At least one of these ditches can clearly be seen on aerial photographs (Fig 6). It continues in a north-north-east direction, on a significantly different alignment to the broad rig of the medieval fields above it, towards a series of ditched yards of a probable Romano-British farmstead, some 800m north of the causewayed enclosure.

The later Iron Age and Romano-British landscape of the southern flanks of Maxey 'island' is characterised by a series of major north–south linear ditches that probably marked the limits of individual farm holdings or were major internal boundaries. It would appear that the farmstead excavated on the Maxey East Field (Pryor and French 1985, 59–112) was located within this system, but significantly further west.

The farmers who grazed Etton in the Late Iron Age and Roman period probably occupied the farmstead 800m due north of the causewayed enclosure. The ditched yards of this farmstead (now quarried away) were partially hidden beneath alluvium, but yard or enclosure ditches (with Romano-British pottery) were observed during a watching brief at the ballast level (Charles French personal communication). It is possible that the settlement north of Etton was broadly similar to that at Maxey, if slightly smaller. The Maxey East Field farm was relatively poor and subsistence based; its easterly neighbour was probably very similar. Both farms would probably have had access to the seasonally renewed grazing of the broad floodplain of the relict and other stream channels that can be seen on aerial photographs on either side of the Maxey Cut (Fig 5).

The wider affinities of Etton

Introduction

The role that Etton may have played within the Neolithic period has so far been assessed within the contexts provided by the changing prehistoric landscapes of the western fen edge. Hurst Fen in the south-eastern Fens is the farthest we have ventured from the Peterborough area. The discussion of the changing activities that took place in and around the enclosure has been based entirely on data revealed by excavations at Etton and Maxey; the results may be regarded by some as speculative, but they do have the merit of being based on long-term (and very detailed) research into a developing prehistoric landscape. When we move outside the immediate study area and compare Etton with monuments that are superficially similar, we necessarily remove the comparative site from its landscape context. There are obvious dangers in this process.

Causewayed enclosures have been considered in a number of recent reviews (Burgess *et al* 1988; Mercer 1990; Palmer 1976; Wilson 1975), but the definitive published accounts of the two large-scale excavations of well-preserved sites in Britain (Hambledon Hill and Crickley Hill) are still in preparation. It is therefore not possible to compare the general internal layout of Etton, as it has been outlined in this report, with other sites in Britain. Instead our attention will have to be confined to individual aspects of the site, and again, there are obvious dangers in such an approach.

We will start this review of evidence from comparable sites with a quotation from an interim report on Haddenham by Christoper Evans (1988b, 136) that could have been written as a succinct research design for the Etton project:

> We cannot hope to understand the nature of [causewayed] enclosures...if we continue to regard the causewayed ditches as no more than a distinctive form of quarrying to provide material for the construction of elusive bank systems.

Individual deposits

We have seen that at Etton most artefacts and ecofacts from primary (Phases 1 and 2) levels in the eastern arc were placed in the ground for a purpose. Similar material in the western arc was sometimes positioned in the ditch bottom, but in other instances it found its way into the ground as a direct or indirect result of ritual and other activities that took place in or near the ditch. Put another way, it is very much more difficult to ascribe a precise origin for the primary deposits in the western half of the enclosure ditch.

Funerary evidence

As at Haddenham, where the evidence was less abundant, it could be suggested that the majority of the structured deposits were to do with death. Evidence for craft-group activities is very much more subtle and would be hard to recognise on sites where organic preservation was poor. We will therefore concentrate on the funerary evidence.

The symbolic linking of life and the afterlife in the Neolithic has frequently been seen in the resemblance of certain long barrows to the rectangular houses that occurred in the earlier Neolithic of the Continent (as in Whittle 1988a, 46–7). Given the significance of death within the rituals that took place at Etton and elsewhere, it is still rather surprising that the interior of these sites has not produced evidence for 'houses of the dead', however temporary.

It follows that causewayed enclosures were not meant to be permanent resting places for the spirits of the dead. Rather, they were transitional places between the world of the living and that of the dead (Edmonds 1993). We should therefore expect to find evidence for both states of being. Evidence, or rather symbolic expression, of the world of living is provided by the 'domestic debris' that has so bedevilled study of causewayed enclosures. Evidence for the world of the dead seems to focus upon the means of transition between the two – funerary or commemorative pyres have a particular importance in this regard.

At Etton the principal structured deposits usually ran down the centre of the ditch, which was precisely where longitudinal baulks would have been left had we adopted the Briar Hill pattern of opposed quadrant excavation, discussed further below. At Briar Hill, where preservation conditions were very much worse than at Etton, no obviously structured deposits were found, but a single quite substantial pyre of 'cremation' deposit was found within one ditch segment filling (Bamford 1985, 32). This deposit was placed upon a platform and was backfilled. The excavator noted that many of the higher levels of ditch filling in many segments contained distinct lenses of burnt or ashy material, which was considered to be settlement debris (ibid, 36). If the Neolithic use of Briar Hill was entirely domestic, then the Bronze Age cremation cemetery (ibid, 47) must signal a sudden change of use. However, the deposits from the ditch and interior at Briar Hill were entirely consistent with Etton, such as smashed and burnt quernstones, polished axe fragments, and polissoirs. The similarities are too many to require detailed reiteration, but the 'settlement debris' hypothesis advanced for Briar Hill begins to seem increasingly improbable.

The limited excavations at Haddenham produced 'definite evidence for mortuary activities ... within the causewayed enclosure' (Evans 1988b, 136). One particular piece of evidence has significance for Etton, described aptly by Evans as 'ditch works' (ibid, 134); indeed, the term could provide a subtitle for the present volume. A complex sequence of recutting and backfilling resembled Etton in the field. The segment south of the entrance (Ditch D) had an enlarged mound of gravel running along its bottom; set into the crown of this mound was the butt end of a broken Group VI polished axe, surrounded by broken fragments of human skull. Other finds, burnt and unburnt, were reminiscent of Etton. Evans noted that the gravel mound resembled a miniature barrow, with the axe deposit at one end.

In certain instances it is possible that elongated or oval segments of enclosure ditch may have played a role as a symbolic representation of a long barrow. Certainly, butt-end deposits, which were such a feature at Etton, find an echo in long barrows in the concentration of funerary ceremonial around the forecourt; similarly, the burial chamber itself is usually at one end of the mound.

Hambledon Hill produced a ditch deposit very reminiscent of the Haddenham 'ditch works'; it consisted of a long mound of organic material that had been carefully arranged along the central axis of the ditch, in primary contexts (Mercer 1980, fig 17). At Etton a closely similar feature was found in ditch segment 9. It consisted of turf and topsoil arranged in a linear fashion (Fig 73, B, layer 5); significantly, perhaps, it was not associated with structured arrangements of artefacts or bones. The phasing is not altogether clear, but it was undoubtedly the second episode of ditch 'use' and can probably be dated to phase 1B.

Human skulls and animal bones

It is probably not very instructive to search the literature of causewayed enclosures and draw every parallel for the various deposits encountered at Etton. One or two very striking similarities should, however, be mentioned. Most obviously attention should be drawn to the occurrence of human skulls at Hambledon Hill, in contexts that exactly parallel Etton (ibid, fig 18). Inverted pots at ditch butt ends, thought by the excavator to symbolise human heads, were found at the large Danish causewayed enclosure at Sarup (Andersen 1988).

Hambledon Hill also revealed linear spreads of material that find ready parallels within phase 1C contexts at Etton (Mercer 1988, fig 22). Similar deposits were also noted at Windmill Hill, again in later contexts (Smith 1965, pl v). Recent excavations at Windmill Hill have provided striking parallels with Etton, including dumps of disarticulated bone, 'placed' deposits at terminals, and animal bone in dense, narrow, linear arrangements, relatively high in the ditch section (Whittle 1993, fig 7). The tradition of placing quantities of animal bone in linear arrangements within ditches is not confined to Britain alone: the Etton bone deposits can be closely paralleled on the Continent (for example, Whittle 1988a, fig 3.30).

Daily tasks

The western arc of the enclosure produced waterlogged evidence for woodworking, and while there may be no direct parallel for this particular activity, ordinary domestic or working tasks were carried out at other causewayed enclosures. The best example of this (Mark Edmonds personal communication) is the flint-mining area within the Hanford Spur at Hambledon Hill (Mercer 1988, pl 5.iii).

Domestic debris

Isobel Smith believed that Windmill Hill was a settlement and that the material found in the ditches was domestic debris. Indeed, this seems to have been the view of most British authors (with the notable exception of Roger Mercer) who have published the results of causewayed enclosure excavations. Most agree that the settlements were special in some way (meeting places, defensive sites, or whatever), but the material found in the ditches, and indeed elsewhere, has usually been written off as 'debris'.

Querns

In Gloucestershire there are some striking parallels in the so-called 'midden' deposits at Hazleton North. In this instance, querns were broken up, and due to the high quality of the excavation, it was possible to map the pattern of conjoining fragments. Fragments from the same querns occurred across the midden, as if they had been deliberately spread around (Saville 1990, fig 175). The damage was assumed to have taken place as part of domestic activities, but the excavator was clearly not convinced by this hypothesis; he very tentatively suggests their reuse as hearthstones (ibid, 178).

The midden at Hazleton North recalls many of the structured deposits at Etton, and the presence of human bone within the other 'refuse' is of interest. The Hazleton midden predated the cairn, and if it be accepted as a ritual deposit, then it would extend the otherwise quite short life of the main monument considerably. In the light of Etton it can be argued that the deliberate smashing of quernstones formed an important part of Neolithic funerary or commemorative rites.

Small filled pits

Small filled pits, often carefully packed with high-status objects, together with charcoal, pottery, flints, and animal bone, were commonly found at Hambledon Hill (Mercer 1980). Although the surface had been eroded, the sample excavated (approximately 10%) produced evidence for some 92 pits (Mercer 1990, 52). Both Briar Hill and Haddenham were adversely affected by plough damage (Bamford 1985, 6; Evans 1988b).

Excavations at Orsett, Essex, provided massive evidence for pits and postholes, the vast majority of which were undated; only a few could be reliably dated to the Neolithic, and there was a substantial Iron Age, Saxon, and later presence on the site (Hedges and Buckley 1978, fig 23). Serious post-deposition damage can therefore be discounted. However, inspection of the plan of undated features (ibid, fig 23, D) shows a clear 'reserved area' (very similar to that within causeway M at Etton) behind the only complete, undisturbed causeway exposed in the excavation. In view of the Etton evidence, it is possible to suggest that many of the undated pits that respected the reserved area could be Neolithic in date.

It is probably fair to say that small filled pits were a ubiquitous feature of causewayed enclosures in Britain, and almost wherever they are absent, a case can be made for post-depositional erosion. Little will be gained by reviewing the evidence for them in any detail; for an excellent overview see Thomas (1991, 59). The pits all share the same morphological characteristics: steep sides, flat or rounded bases, and usually deliberately filled in with various broken or complete artefacts and ecofacts. Charcoal and burning also feature prominently. Excavators often note high-status items found at or near the surface of the infilling (Andersen 1988, pl 18.viii).

Ditch segments – separate or entire use?

Digging and recutting

It has been suggested that the enclosure ditch at Etton was laid out and excavated in one operation. The eastern arc was then backfilled, and the western arc remained open. Thereafter 'use' of the ditch was episodic, but probably never involved a recut of the entire circuit. It is suggested that the ditch was originally dug in segments, because its use was henceforward to be segmentary.

At Haddenham it would appear that the initial 'marking out' phase saw the excavation of a string of pits that were subsequently laterally enlarged to become segments of ditch. The initial digging of the pits might be a reflection of the huge size of the area enclosed, and it probably took place during the same event; there does not seem, at this stage, to be clear evidence that the subsequent enlargement necessarily took place at the same time, as suggested for Briar Hill (Bamford 1985, 129–35). This interpretation is, however, open to question.

The principal problem with any attempt to decide stratigraphically whether ditch segments were dug as a single episode is the presence of undug causeways. At Briar Hill it was assumed *a priori* that the latest recut in each segment was contemporary, and that previous phases of use could be extrapolated from this final episode. Everything depended on that initial assumption, which still cannot be demonstrated.

It cannot be demonstrated that all segments of causewayed enclosure ditches were necessarily recut and reused at the same time, during the same event, after their initial digging out. Simplicity of explanation suggests that the causeways served a purpose, which was to separate one segment of ditch (if indeed that is what it was) from another. If the ditch segments were thus carefully kept apart, it seems illogical to argue that they were all used and reused at precisely the same time.

An exception might be found in those monuments that show clear evidence for massive enlargement, contraction, or remodelling; in these instances, the new boundaries of the modified enclosure would have required validation by members of the various communities who were to 'use' them. This can, perhaps, be seen in the arrangement of ditches at Briar Hill, where the two outer circuits formed one monument and the much smaller inner ditch – the so-called 'spiral arm' – another (Kinnes and Thorpe 1986); Fornham All Saints is another example from eastern England (Palmer 1976, 186).

The 'entire circuit' versus 'individual segment' or 'small numbers of segments' argument would be of little significance (other than perhaps chronological) were it not for the implications it has for the numbers of people involved at any one time. In effect, the 'entire circuit' view of enclosure use implies, firstly, that most enclosures were in use for a very much shorter time than other archaeological evidence would indicate. Secondly, the huge numbers of people involved at each recutting of the entire circuit must have come from numerous communities across a wide area. This pattern of use certainly does not accord with the results of the Etton excavation. It also shows no evidence for change over time.

The Late Neolithic practice in the British lowlands was to have numerous small monuments that were used episodically (Pryor 1984b). If use of the enclosure (after the initial laying out) was in individual or small groups of segments, it is not necessary to suggest that small causewayed enclosures were the transitional stage between regular-sized causewayed enclosures and henges.

Conjoining finds

Conjoining flints or potsherds would be informative in deciding the issue of contemporaneity, but only if material could be conjoined between contemporary deposits in each segment of the entire ditch. This has never been demonstrated at any site. At Briar Hill, pottery was found to conjoin not only between different features, but also between different layers within the same feature; this indicates problems of residuality that would make it very difficult to establish precise contemporaneity by conjoins alone (Bamford 1985, 101).

Conjoining sherds were also found in different ditch segments at Windmill Hill, and it was concluded that 'all three rings of ditches, or at least some segments in all three, were open simultaneously' (Smith 1965, 14).

Even if the material was domestic in origin, the evidence from conjoining flints or sherds might (if they were freshly buried) or might not (if they derived from a midden) be significant. The fact is we do not know whether the material we are considering was brought in from outside, or (in the case of meat) was consumed within the enclosure. Some of the material may have been from pyres lit within the enclosure, or from fires at settlements many miles away. The condition and contexts of conjoining material should always be noted (the conjoining flints from a group of small filled pits at Etton, for example, were exceptionally fresh, and the fillings of the pits were identical).

Causeways

The Etton enclosure was entered via three and possibly four entrance causeways, of which causeway F was probably the most important (at least in the very first instance). By and large British causewayed enclosures have not provided much clear evidence for entranceways, although sometimes the scale (and the subtlety) of excavation required to demonstrate such arrangements has been lacking.

Causeways are frequently treated as being of equal significance – as 'segmental causeways', in the terms of the present report. Yet all the enclosures had originally to be entered! At Offham Hill, Peter Drewett (1977, 211) drew a distinction between entrance and constructional causeways (the latter being the equivalent of 'segmental' in this report); none of the Offham entrance causeways produced evidence for gateways. Locally, Briar Hill produced evidence for a westward-facing entranceway through both outer ditch circuits; the excavator also postulated another (perhaps less convincing) entranceway some 60m to the south (Bamford 1985, 7).

Isobel Smith (1965, 5) has suggested that the Windmill Hill enclosure could have been entered via the causeway between Inner Ditches XVI and VII. There was a corresponding gap in the Middle Ditch, but not in the Outer Ditch. Smith notes that this possible entranceway was strangely situated, being on the north-west side of the enclosure, where the ditch segments were closest and the slope steepest. The steepness of the slope would have added to the visual impact and, perhaps more importantly, to the difficulty of reaching the enclosure. At Etton the main entranceway (causeway F) was reached via a stream bed, which was undoubtedly deliberate – perhaps to make access harder and to make the site appear even more remote from the everyday world.

Comparable sites

Hurst Fen

It is worth noting that Hurst Fen was probably not a straightforward settlement site (Clark *et al* 1960). It was located on a small island surrounded by fen and was characterised by numerous small filled pits, very few of which intercut. It also produced large fragments of pottery and numerous broken querns, despite its unlikely location with regard to agriculture. In the light of Etton, it would perhaps be best to consider Hurst Fen as another potentially important enclosure whose principal role was probably similar to Etton.

At this juncture it should be noted that there are dangers in interpreting single strands of evidence too literally (such as that provided by querns) when attempts are made to reconstruct aspects of the palaeoeconomy (such as Evans 1988a).

Staines

The closest parallel to Etton is probably the double-ditched causewayed enclosure at Staines, Surrey (Robertson-Mackay 1987). Like Etton, Staines was situated on gravel and was partially alluviated. Like Etton, too, it was located close to a stream and was at the edge of a prominent landscape feature – a long 'island' formed by two rivulets, both tributaries of the Thames. A large proportion of the site was excavated and to a very high standard. It was suggested in the report that the material recovered was of settlement origin, but with the advantage of hindsight it is possible to suggest that ritual may have played a very prominent role there.

The very location of Staines was remarkably low-lying and liable to flooding. Although the survival of features in the interior was not quite up to the Etton standard, the numerous pits recall the Etton small filled pits. There was no convincing trace of any indubitable Neolithic house. The principal feature that unites Etton with Staines is, however, the clear demarcation of the interior into two distinct halves, separated by a possibly Neolithic straight ditch (ibid, fig 12). Indeed, the excavator pointed out the close resemblance of the two sites in the report (ibid, 51). The features of the interior at Staines were concentrated in the north-west part of the enclosure.

The excavator considered that the two interrupted ditches at Staines had been carefully laid out and constructed at the same time. He also noted a tendency for finds to cluster around the butt ends of ditches (ibid, 35, also figs 27, 29 and others). The description of the distribution of material in the ditches finds close parallels with Etton: 'Separate dumps or accumulation of material were observed in the ditches, of animal bone, pottery and in one instance of burnt flint. These often consisted mainly of one category of material, but not exclusively so.' (ibid, 34). The segregation of different categories of 'domestic rubbish' suggests that the deposits in question were probably, in the terminology of the present report, 'structured'.

Sections through the Staines ditches leave little doubt that the ditches were recut; indeed, this was retrospectively recognised by the excavator. It would also appear very probable that the deposits were backfilled with soil and gravel; one section in particular (ibid, pl 4a) contained so much gravel that such an explanation seems almost beyond question. As at Etton, Middle Neolithic pottery was found in the highest levels of the Staines ditch, which would again indicate that the natural processes of infilling were hastened in some way.

The presence of human bone at Staines has already been mentioned in Chapter 8, but the two skulls, pottery, and other material in the outer ditch strongly recall an Etton structured deposit (ibid, fig 10). The loose human bone from Staines also consisted of large, very visible pieces.

Roberston-Mackay was able to define a series of entrance causeways, and it is perhaps tempting to suggest that roughly aligned paired causeways (perhaps divided into narrower causeways by the later insertion of ditch segments) to the north recall the main entrance causeway F at Etton (ibid, fig 11). The possibly Neolithic central gully appears to line up on this posited entrance.

The report contains important distribution plans of various categories of artefacts. Perhaps the most interesting is that for burnt flint. As at Etton, burnt material was found in the ditch at Staines, but there was no evidence for *in situ* burning. However, the distribution of burnt flint in the interior showed a series of discrete concentrations that recall the distribution of high magnetic susceptibility readings at Etton (Fig 79). Concentrations of burnt flint at Staines close to the eastern part of the enclosure ditch recall Etton strongly (ibid, fig 36).

The parallels between the Etton and Staines enclosures are frequent and very striking indeed, given the distance that separates them. The similarities have only been lightly touched on here and would merit a detailed study. They range from the similarity of location, the evidence for bipartite division of the interior, down to the occurrence of smashed quern fragments (ibid, 118). Robertson-Mackay, while acknowledging the site's settlement role, did however have significant doubts about that being the entire explanation. Having recorded that the interior may have comprised a series of zones with different activities, he notes (ibid, 60):

> Evidence of this kind, even imperfectly preserved and partially recovered, is unusual for neolithic settlements in general and for enclosures in particular. So little is known about the character of finds deposition that even the innocuous label 'domestic' may be tendentious.

Indeed, in the final evaluation (ibid, 126) the excavator notes that:

> It may be wrong … to infer … that the Staines enclosure was exclusively or even predominantly domestic or settlement-orientated in character or role.

It is a tribute to the excavator that it has proved possible retrospectively to find so many detailed resemblances between two sites that were excavated 20 years apart.

Haddenham

By far the most significant recent local excavation has been that at Haddenham, and although the excavators were only able to expose two relatively small areas (by Etton standards), their discoveries were very important (Evans 1988b). The Haddenham region is so far the only region that has produced data comparable with the Nene/Welland region, and it is very much hoped that the excellent work already undertaken in the southern Fens can be continued, but at a larger scale, so that meaningful parallels can be drawn between the two areas. David Hall (1992a, 436) has rightly pointed out that no two micro-regions of the Fens are the same, but we still cannot quantify or qualify his statement with any precision. The sites, moreover, are rapidly drying out.

The enclosure at Haddenham had a well-developed 'facade', and the recent excavations yielded clear indications for at least two entranceways. The presence of a timber palisade and the very large size of the area it enclosed (8.5ha) suggest that Haddenham was a site of special importance (Evans 1988b; Hall *et al* 1987). Its location within a large area of flat, low-lying plain on the southern fen edge recalls Etton, but the sheer size and 'monumentality' of Haddenham suggest an altogether grander role. Evans (1988b, 137) has convincingly argued that Haddenham was laid out in a coherent manner that responded to, or reflected, subtle changes in topography. He has pointed to evidence for the straight alignment of fronts or frontages, which may highlight areas of special importance. At Etton, the only straight length of ditch (between segments 8 and 13) was the focus of funerary activity, but when viewed from outside the enclosure it cannot possibly be considered as 'monumental' in the Haddenham sense.

Crickley Hill

The enclosure at Crickley Hill is well known for its massive entrance and substantial roadway, and it was undoubtedly a far grander and higher-status site than Etton. Despite this, there are certain points in common, in particular the use of fire during the process of backfilling a recut. Within the butt ends of the ditch, on either side of the entranceway, were deposits of butchered animal bone ('structured' or 'arranged', using the terminlogy of this report) beneath stone cappings (Dixon 1988, 81).

Maiden Castle

The recent excavations at Maiden Castle (Sharples 1991) have provided some unexpectedly close parallels for Etton. The two sites, and their landscapes, could not be more different, yet Maiden Castle was sited on the edge of cleared land, in a location that was both liminal and visible. Only very small areas of Neolithic enclosure ditch could be examined, and it is therefore not surprising that the depositional patterns observed at Etton were not identified. Certain observations made in the report do, however, suggest that the Maiden Castle ditch could have been infilled in a very similar manner.

The first phase at Maiden Castle consisted of clean backfill with no artefacts or bone – other than the body of a child and much charcoal. It is suggested that about 200 years later the role of the site changed: so-called midden deposits, consisting of truly vast quantities of pottery, flint, and animal bone, were placed in the ditch upper levels and were promptly buried beneath backfill. The material that comprised this 'rubbish' was in large, fresh fragments. The parallels between this succession and Etton Phases 1A and 1B/1C seem too close to discount. The animal bone assemblage was entirely typical of any British causewayed enclosure – mainly cattle, but with very few wild species. The high concentration of high-value Cornish gabbroic pottery indicates the status of the site, and its inclusion within 'rubbish' might be considered unusual. It could be argued that such high-value material would most probably have been 'disposed of' – perhaps returned to the earth – in an appropriately special manner.

Given the evidence from Etton, it could be argued that the role of Neolithic Maiden Castle never significantly changed: the child with the charcoal in the lowest backfill and the higher 'midden' levels, also placed within backfill, can be seen as forming part of the same tradition of ritual use. In the terminology employed in this report, these were 'kin-group' structured deposits, in which there was evidence both for individual 'statements' and (in later phases) for more integrated, midden-like arrangements of material.

Other enclosures

Etton was a small, very roughly circular enclosure defined by a single circuit of segmented ditch, and Christopher Evans (1988b) has already discussed its regional parallels in some detail. He regards its size and shape as broadly typical of other enclosures from the south-east Midlands. Little will be gained by a repetition of his review, but the low-lying situation of many local causewayed enclosures is, perhaps, significant in view of their possible social and topographical marginality.

Other very similar sites are known from the region, but all have more than one circuit of ditches, and none has yet been excavated, although a small trench into the ditch of the Southwick site produced sherds of Mildenhall pottery (John Hadman personal communication). The four closest are at Uffington and Barholm, in the Lincolnshire Welland valley, and Southwick and Tansor, in the Northamptonshire Nene valley (Palmer 1976, nos 7–9 and 38). The two examples from the Nene valley may form a pair, although the precise status of Tansor is still in some doubt; the Southwick site is partially buried beneath alluvium. Both Welland valley enclosures are on flat, low-lying ground in situations broadly comparable with Etton. They are also small (1.33 and 2.54ha each).

The closest parallel, morphologically speaking, was discovered slightly outside the Fenland area and later than Palmer's (1976) overview; it is at Roughton, in north-central Norfolk. Again, the site is in a low-lying position in the Wensum valley, and there is evidence for a palisade inside the ditch over part of its circuit. Its area (1.22ha) is closely comparable with Etton (Edwards 1978; Evans 1988b, fig 7.5).

The enclosure at Great Wilbraham is on higher ground, overlooking the fen edge; it is enclosed by two rings of segmented ditch, and its area (2.54ha) is closely comparable with Etton; recent excavations yielded Mildenhall pottery (Ian Kinnes personal communication).

If Haddenham was a site of higher status than Etton, which seems quite reasonable, Etton was not without its symbolic expression of power or authority. The Phase 1A gateway that was set back from the main entranceway at causeway F was a very striking feature; it can be closely paralleled at a number of Michelsberg causewayed camps in Germany (Richard Bradley personal communication) and in France. The example at Maizy-sur-Aisne, France, is also on a river floodplain and is almost identical in location, size, and shape to the Etton gateway (Dubouloz *et al* 1988, fig 11.9). In view of the close similarity of the Etton gateway and continental timber gateways, it seems very difficult to suppose that carpenters at Etton were unaware of what was happening on the Continent.

Conclusion

It is possible that in this report we have placed too much emphasis on the role Etton may have played within the local landscape. We have examined and reexamined the interrelationship of features within the enclosure, in an effort to define principles of organisation. Perhaps the interpretations, based on internal evidence, have been stretched too far. This, however, has been a reaction against the long archaeological tradition of comparing site-to-site, often over great distances and regardless of landscape or context.

We have placed extra emphasis on the detailed reconstruction and analysis of structured or arranged deposits. We have also used stratigraphy to understand not just when the ditch was used, but more importantly how it was used. Sadly, in certain instances, we have also had to curtail our studies just when they were beginning to become interesting – or this report would have assumed huge proportions. A more detailed study of the contents of small filled pits, for example, would undoubtedly reveal important information on the associations of certain high-status objects, such as the polished stone axes, the quernstones, and the quartzite polissoir. More research into taphonomy, not just of the bone material, but of the pottery, flint, and other artefacts, will certainly produce further insights.

It is usual in archaeology to use cultural material to reconstruct a site's role in the past. At Etton, however, it was not the cultural material that defined the role of the enclosure, but vice versa. Its location suggests that Etton had been important long before the Neolithic period. Even by the mid-fourth millennium BC the place had acquired history and traditions that had their origins within earlier hunter-gatherer communities. It is very sad that it no longer exists.

Appendix 1 Summary of archaeological features

The following features are listed in numerical order from 1 to 1062. The interpretation of the features is that made during excavation. In the text, features are cited with a prefix (for example, F1, F1062). For linear features, the grid reference usually relates to a central point or the point where the feature was clearly visible. Some feature numbers were not used, and some features were found on excavation to be natural in origin. Others were destroyed before excavation, although many of them were likely to have been of natural origin.

Abbreviations

BA	Bronze Age	IA	Iron Age	Neo	Neolithic
E	Ebbsfleet	LN	Late Neolithic	ph	posthole
EBA	Early Bronze Age	LNEBA	Late Neolithic/Early Bronze Age	PR	Peterborough
FG	Fengate Ware			RB	Romano-British
GW	Grooved Ware	M	Mildenhall	SFP	small filled pit

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
1	–	ditch	Neo	M, FG, E, PR, GW, Beaker	causewayed enclosure ditch
2	–	–	–	–	not used/natural
3	37837309	pit	Neo?	–	–
4, 5	–	–	–	–	not used/natural
6	37847310	soil	Neo	FG	–
7	37767323	pit	Neo?	–	–
8	37767318	SFP	Neo?	–	–
9	37747327	scoop	Neo?	–	part of Structure 1?
10	37707329	gully	Neo?	–	–
11	–	–	–	–	not used/natural
12	37927308	pit	Neo?	–	–
13	37917307	ph	Neo?	–	–
14	37887299	pit/ph	LN	GW	–
15	37897298	pit/ph	Neo?	–	–
16	37897297	pit/ph	Neo?	–	–
17–19	–	–	–	–	not used/natural
20	37787299	pit/ph	–	–	in enclosure ditch section 7
21	37777303	soil	Neo?	–	–
22–27	–	–	–	–	not used/natural
28	37937298	pit	LN	GW	–
29	–	–	–	–	not used/natural
30	37937311	SFP	EBA	Beaker	–
31	37937311	pit/ph	Neo?	–	–
32	37797305	hearth?	Neo	–	irregular soil discolouration
33	–	–	–	–	not used/natural
34	37807305	'floor'	Neo?	–	–
35	37777306	hollow	Neo?	–	buried soil
36	37797306	hollow	Neo?	–	buried soil
37	37787306	soil	Neo?	–	–
38, 39	–	–	–	–	not used/natural
40	37787298	pit	Neo	–	waterlogged; stone pounder
41	37737326	gully	Neo	–	part of Structure 1
42	37737327	gully	Neo	M	part of Structure 1
43	37757328	ph	Neo	–	part of Structure 1
44	37777321	scoop	Neo	–	part of Structure 1
45	37717327	gully	Neo	–	part of Structure 1
46	37747326	gully	Neo	–	part of Structure 1
47	37747326	ph	Neo	–	part of Structure 1
48	37747324	gully	Neo	–	part of Structure 1
49	37737326	ph	Neo	–	part of Structure 1
50	37737327	ph	Neo	–	part of Structure 1
51	37917298	ph	Neo	–	–

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
52–59	–	–	–	–	not used/natural
60	37697295	ph	Neo	–	part of Structure 1
61	37687332	pit	Neo	–	shallow
62	37677332	pit	Neo	–	shallow
63–65	–	–	–	–	not used/natural
66	37737331	pit	Neo?	–	–
67–69	–	–	–	–	not used/natural
70	37977390	hearth?	Neo?	–	irregular soil discolouration
71	37987391	hearth?	Neo?	–	irregular soil discolouration
72	38017399	hearth?	Neo?	–	irregular soil discolouration
73–201	–	–	–	–	not used/natural
202	38177388	pit/ph	Neo?	–	–
203–206	–	–	–	–	not used/natural
207	38267398	pit/ph	Neo?	–	–
208	38267399	pit/ph	Neo?		
209	–	–	–	–	not used/natural
210	38287407	pit/ph	Neo?	–	–
211–213	–	–	–	–	not used/natural
214	38357400	pit/ph	Neo?	–	–
215	38327409	ph	Neo?	–	–
216	38327409	ph	Neo?	–	–
217–221	–	–	–	–	not used/natural
222	38367413	ph	Neo	–	–
223	38357413	ph	Neo?	–	–
224	38397403	well	IA	IA	no lining
225	38427401	ph	Neo?	–	–
226	–	–	–	–	not used/natural
227	38447401	pit/ph	Neo?	–	possible SFP
228	38457401	SFP	Neo	M	backfilling evidence
229	38447401	SFP	Neo?	–	backfilling evidence
230	38447402	SFP	Neo?	–	backfilling evidence; possible Neo bodysherds
231	38457403	SFP	Neo?	–	backfilling evidence; possible Neo bodysherds
232	38447405	ph	Neo?	–	possible SFP; possible Neo pot
233	38447405	SFP	Neo	M	backfilling evidence
234	–	–	–	–	not used/natural
235	38477408	ph	Neo?	–	–
236	38477404	pit	Neo	FG	possible SFP
237	38497408	SFP	Neo	M, FG	backfilling evidence
238	38467409	SFP	Neo	FG	backfilling evidence
239	38487410	SFP	Neo	M	evidence for backfilling
240	38447411	SFP	Neo?	–	backfilling evidence; possible Neo bodysherds
241	38457412	SFP	Neo	M	backfilling evidence
242	38487411	SFP	Neo	FG	backfilling evidence
243	38427412	pit	Neo?	–	possible SFP; possible Neo pot
244	38447413	SFP	Neo	M	–
245	38467414	pit	Neo?	–	possible SFP
246	38507414	pit	LNEBA	–	possible SFP; possible Neo pot
247	38427417	pit	Neo	M	possible SFP
248–250	–	–	–	–	not used/natural
251	38497417	ph	Neo	M	marker or 'totem' posthole
252	–	–	–	–	not used/natural
253	38537410	ph	Neo?	–	–
254	38547411	pit/ph	Neo?	–	–
255	–	–	–	–	not used/natural
256	38557411	pit/ph	Neo?	–	–
257	38547413	pit/ph	Neo?	–	–
258	38557405	pit/ph	Neo?	–	–
259	38317414	scoop	Neo?	–	–
260	38527414	ph	Neo?	–	possible Neo bodysherds

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
261	38547414	pit	?BA	–	dated by flints
262	38557414	ph	Neo?	–	–
263	38517417	SFP	Neo?	–	backfilling evidence; possible Neo bodysherds
264	38527418	pit	Neo?	–	possible SFP
265	38507410	pit/ph	Neo?	–	possible Neo bodysherds
266	38517418	pit	Neo?	–	possible SFP; possible Neo pot
267	38507418	pit	Neo?	–	possible SFP; possible Neo pot
268	38507418	pit	Neo?	–	possible SFP; possible Neo pot
269	–	–	–	–	not used/natural
270	38527404	well?	LNEBA	–	possible Neo pot
271	38557408	pit/ph	Neo?	–	–
272	38547409	pit/ph	Neo?	–	–
273	38557402	pit/ph	Neo?	–	–
274	38607400	scoop	LNEBA	Neo?	–
275	38557397	pit/ph	Neo	–	dated by flints
276	38507399	well	LNEBA?	–	no lining
277	38567394	pit/ph	Neo	–	dated by flints
278	–	–	–	–	not used/natural
279	38587390	pit/ph	LNEBA	–	possible Neo/BA bodysherds
280	38517391	pit/ph	Neo?	–	–
281	38547391	pit	LBA/EIA	–	jar in pit; see Chapter 5, U12
282, 283	–	–	–	–	not used/natural
284	38427396	pit/ph	Neo?	–	possible Neo bodysherds
285	38227384	pit	Neo	M	possible SFP
286	38187383	SFP	Neo?	–	backfilling evidence; possible Neo pot
287	38187377	pit/ph	Neo?	–	–
288	–	–	–	–	–
289	38587375	pit	Neo	M	–
290	–	–	–	–	not used/natural
291	38377370	pit	Neo?	–	possible SFP; possible Neo pot
292	38347349	pit	Neo?	–	possible Neo bodysherds
293	38277358	SFP	Neo	M	backfilling evidence
294	38317336	pit	Neo	M	possible SFP
295	38317337	pit	Neo?	–	possible SFP; possible Neo pot
296	38287339	pit	Neo	M	probable SFP; pot crammed in
297	38277339	pit/ph	Neo?	–	–
298	–	–	–	–	–
299	38267341	pit/ph	Neo?	–	–
300	–	–	–	–	–
301	38227342	SFP	Neo?	–	backfilling evidence; possible Neo pot
302	–	–	–	–	not used/natural
303	38197342	pit/ph	Neo?	–	–
304	–	–	–	–	not used/natural
305	38267337	pit/ph	Neo?	–	–
306	–	–	–	–	not used/natural
307	38357335	pit/ph	Neo	–	dated by flints
308	–	–	–	–	not used/natural
309	38387329	pit/ph	Neo?	–	–
310	–	–	–	–	not used/natural
311	38337328	pit/ph	Neo?	–	–
312	–	–	–	–	not used/natural
313	38307395	ditch	Neo	M	V-shaped
314	38177384	SFP	Neo	M	backfilling evidence
315, 316	–	–	–	–	not used/natural
317	38517382	ditch	RB	samian	field/paddock boundary
318	38477382	cursus ditch	Neo/BA	M	Mildenhall pot residual?
319	–	–	–	–	not used/natural
320	38267387	pit/ph	Neo?	–	–
321	38277387	SFP	Neo	M	backfilling evidence
322	38227387	pit	Neo?	–	possible SFP

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
323	–	–	–	–	not used/natural
324	38207380	SFP	Neo?	–	disturbed (extends to B soil)
325, 326	–	–	–	–	not used/natural
327	38287375	pit	Neo?	–	possible SFP; possible Neo pot
328	38317377	pit/ph	Neo?	–	–
329	38337377	pit/ph	Neo?	–	–
330, 331	–	–	–	–	not used/natural
332	38277346	–	Neo	M	isolated find (no feature)
333	38287345	pit/ph	Neo?	–	–
334	38277345	pit/ph	Neo	M	possible SFP
335–339	–	–	–	–	not used/natural
340	38247366	pit/ph	Neo?	–	–
341	38227367	pit/ph	Neo?	–	–
342	38267356	pit/ph	Neo?	–	–
343	38267355	pit/ph	Neo?	–	–
344	38287356	pit/ph	Neo?	–	–
345	–	–	–	–	not used/natural
346	38227355	pit/ph	Neo?	–	–
347	38227355	pit/ph	Neo?	–	–
348	38257349	pit/ph	Neo?	–	–
349	38257340	scoop	Neo?	–	–
350	38217348	pit/ph	Neo?	–	–
351	38207349	pit/ph	Neo?	–	–
352	38197348	pit/ph	Neo?	–	possible Neo bodysherds
353	38217413	stream	pre-Neo	–	stream channel cut by F1 ditch
354, 355	–	–	–	–	not used/natural
356	38347394	pit/ph	Neo?	–	–
357	–	–	–	–	not used/natural
358	38397395	pit/ph	Neo?	–	–
359	38407399	pit/ph	Neo?	–	–
360	38547419	timber slot	Neo	–	possible Neo pot; gateway
361	38527400	ditch	IA	–	north–south field boundary ditch
362	–	–	–	–	not used/natural
363	38587400	ditch	Neo	M	main Neo north–south division of interior
364	38547380	pit/ph	Neo?	–	–
365	38537379	pit/ph	Neo?	–	–
366	38547378	pit/ph	Neo?	–	possible SFP; much charcoal
367–369	–	–	–	–	not used/natural
370	38647367	pit/ph	Neo?	–	possible SFP; bone
371	38667364	pit/ph	Neo	M	possible SFP
372	38677359	pit/ph	Neo	M	possible SFP
373	38637362	pit/ph	Neo?	–	–
374	–	–	–	–	not used/natural
375	38647359	pit/ph	Neo?	–	possible Neo bodysherds
376	–	–	–	–	not used/natural
377	38647391	pit/ph	Neo?	–	possible Neo bodysherds
378	38637389	pit/ph	Neo?	–	–
379	38657384	pit/ph	Neo	–	dated by flints
380	38587385	pit/ph	Neo	–	dated by flints
381	38557387	pit/ph	Neo?	–	–
382	38547387	pit/ph	Neo?	–	possible Neo bodysherds
383	38547382	scoop	Neo?	–	possible Neo bodysherds
384	38517386	scoop	Neo?	–	–
385	38467386	pit	Neo?	–	horse skull and antler pick
386	38407389	pit/ph	Neo?	–	possible Neo bodysherds
387	38397382	pit/ph	Neo?	–	–
388	38357382	pit/ph	Neo?	–	–
389	38347385	pit/ph	Neo?	–	–
390	38347387	pit/ph	Neo?	–	–

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
391	38347389	pit/ph	Neo?	–	–
392	–	–	–	–	not used/natural
393	38307382	pit/ph	Neo?	–	–
394	38347373	pit/ph	Neo?	–	possible Neo bodysherds
395	38347378	SFP	Neo?	–	possible SFP; possible Neo pot
396	38377376	pit/ph	Neo?	–	–
397	38377375	pit/ph	Neo?	–	–
398	38387374	pit/ph	Neo	M	–
399	38397375	pit/ph	Neo?	–	possible Neo bodysherds
400, 401	–	–	–	–	not used/natural
402	38417377	pit/ph	Neo?	–	–
403	38437376	pit/ph	Neo?	–	–
404	38437374	pit/ph	Neo?	–	–
405	–	–	–	–	not used/natural
406	38457374	pit/ph	Neo?	–	–
407	38487371	pit/ph	Neo?	–	–
408	38557372	ph	Neo?	–	fence post (with features 420–422, 451, 453, 456–457, 487, 489–493)
409	38587371	gully	Neo?	–	possible Neo bodysherds
410, 411	–	–	–	–	not used/natural
412	38707367	pit/ph	Neo?	–	–
413–416	–	–	–	–	not used/natural
417	38567365	pit/ph	Neo?	–	–
418	38577362	pit/ph	Neo?	–	–
419	38587361	pit/ph	Neo?	–	possible SFP; possible Neo pot
420	38547362	gully	Neo?	–	part of fence
421	38547365	ph	Neo?	–	part of fence
422	38547366	ph	Neo?	–	part of fence
423	–	–	–	–	not used/natural
424	38477366	pit/ph	Neo?	–	possible Neo bodysherds
425	38487368	pit/ph	Neo?		
426	38457367	pit/ph	Neo?	–	possible Neo bodysherds
427–429	–	–	–	–	not used/natural
430	38397368	pit/ph	Neo?	–	possible Neo bodysherds
431	–	–	–	–	not used/natural
432	38327356	pit/ph	Neo	M	possible SFP
433–439	–	–	–	–	not used/natural
440	38397355	pit/ph	Neo?	–	–
441	38397355	pit/ph	Neo?	–	–
442	38407354	pit/ph	Neo?	–	–
443	38417355	pit/ph	Neo?	–	–
444, 445	–	–	–	–	not used/natural
446	38437356	pit/ph	Neo?	–	–
447	38437360	pit	Neo	GW	possible SFP
448, 449	–	–	–	–	not used/natural
450	38497359	pit/ph	Neo?	–	–
451	38557352	ph	Neo?	–	part of fence; possible Neo pot
452	–	–	–	–	not used/natural
453	38547353	ph	Neo?	–	part of fence
454, 455	–	–	–	–	not used/natural
456	38557357	ph	Neo?	–	part of fence
457	38547359	ph	Neo?	–	part of fence
458, 459	–	–	–	–	not used/natural
460	38597356	pit/ph	Neo?	–	–
461, 462	–	–	–	–	not used/natural
463	38597354	pit/ph	Neo?	–	–
464	38597352	pit/ph	Neo?	–	–
465	38597352	pit/ph	Neo?	–	–
466	38607356	pit/ph	Neo?	–	–
467	–	–	–	–	not used/natural
468	38607355	pit/ph	Neo?	–	–
469	38527402	ditch	RB	RB	also residual Mildenhall pottery

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
470	38577414	gully	LNEBA	–	dated by flints
471	38547411	pit/ph	Neo?	–	dated by flints
472, 473	–	–	–	–	not used/natural
474	38587410	scoop	Neo	M	amorphous scoop; pot residual?
475	–	–	–	–	not used/natural
476	38587387	pit	Neo?	–	possibly backfilled
477	–	–	–	–	not used/natural
478	38567379	pit	Neo	M	possible SFP
479	38557378	hearth scoop	Neo?	–	fire at south end of F363
480	–	–	–	–	not used/natural
481	38607379	pit/ph	Neo?	–	possible Neo bodysherds
482	38607381	pit/ph	Neo?	–	–
483	38587378	hollow	Neo	M	possible trample in entranceway
484	38587379	pit/ph	Neo?	–	possible Neo bodysherds
485	–	–	–	–	not used/natural
486	38577380	pit/ph	Neo?	–	–
487	38547370	ph	Neo?	–	part of fence
488	38587359	pit/ph	Neo?	–	–
489	38557348	ph	Neo?	–	part of fence
490	38557347	ph	Neo?	–	part of fence
491	38557343	ph	Neo?	–	part of fence
492	38557342	ph	Neo?	–	part of fence
493	38557340	ph	Neo?	–	part of fence
494, 495	–	–	–	–	not used/natural
496	38577342	pit/ph	Neo?	–	–
497	–	–	–	–	not used/natural
498	38547328	pit/ph	Neo	–	dated by flints
499	38607340	ditch	RB	RB	very straight east–west ditch
500	38597339	ph	RB?	–	continuation of F499?
501	38587339	ph	RB?	–	continuation of F499?
502	38577339	ph	RB?	–	continuation of F499?
503	38517420	SFP	Neo?	–	backfilling evidence; possible Neo pot
504	38527422	hollow	Neo	M	possibly backfilled
505	38447429	pit	Neo	M	defines west edge of causeway F? Large pit includes 563
506	38527423	pit/ph	Neo?	–	–
507	38647363	pit	Neo	M	possible SFP
508	38617356	pit/ph	Neo?	–	possible Neo bodysherds
509	38617356	pit/ph	Neo?	–	–
510	38627356	pit/ph	Neo?	–	–
511	38627356	pit/ph	Neo?	–	–
512	38617355	pit/ph	Neo?	–	–
513	38617355	pit/ph	Neo?	–	–
514	38647354	pit/ph	Neo?	–	–
515	38657353	pit/ph	Neo?	–	possible Neo bodysherds
516	38657356	pit/ph	Neo?	–	–
517	38637353	pit/ph	Neo?	–	–
518	38617352	pit/ph	Neo?	–	–
519	38637352	pit/ph	Neo?	–	–
520	38647351	pit/ph	Neo?	–	–
521	38657351	pit/ph	Neo?	–	possible Neo bodysherds
522	38617351	pit/ph	Neo?	–	–
523	38677350	pit/ph	Neo?	–	–
524	38697350	pit/ph	Neo?	–	possible Neo bodysherds
525	38697350	pit/ph	Neo?	–	–
526	38697351	pit/ph	Neo?	–	–
527	38697350	pit/ph	Neo?	–	–
528	38707351	pit/ph	Neo	–	dated by flints
529	38717350	pit/ph	Neo?	–	–
530	38757348	pit/ph	Neo?	–	–
531	–	–	–	–	not used/natural

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
532	38707348	pit/ph	Neo?	–	–
533	38707348	pit/ph	Neo?	–	–
534	38697348	pit/ph	Neo?	–	–
535	38687349	pit/ph	Neo?	–	–
536	38687349	pit/ph	Neo?	–	–
537	38687348	pit/ph	Neo?	–	–
538, 539	–	–	–	–	not used/natural
540	38587346	pit/ph	Neo?	–	–
541	38587347	pit/ph	Neo?	–	–
542	38617346	pit/ph	Neo?	–	possible Neo bodysherds
543	38617343	pit/ph	Neo?	–	–
544	38617343	pit/ph	Neo?	–	–
545	38607340	gully	RB?	–	–
546	38637344	pit/ph	Neo?	–	–
547	38637343	gully	Neo?	–	–
548	38647343	pit	Neo?	–	–
549	38637341	pit/ph	Neo?	–	–
550	38647341	pit/ph	Neo?	–	–
551	38627340	pit/ph	Neo?	–	–
552	38607340	pit/ph	Neo?	–	–
553, 554	–	–	–	–	not used/natural
555	38717341	pit/ph	Neo?	–	–
556	38727341	pit/ph	Neo?	–	–
557	38727346	pit/ph	Neo?	–	–
558	38407423	pit	Neo	–	dated by flints; waterlogged
559	38427420	pit/ph	Neo?	–	–
560	38427421	pit/ph	Neo?	–	–
561	38417421	pit/ph	Neo?	–	–
562	38437421	pit/ph	Neo?	–	–
563	38467421	pit	Neo	M	part of large pit: see F505
564	38567351	pit/ph	Neo?	–	–
565	38417419	pit/ph	Neo?	–	–
566	38407420	pit/ph	Neo?	–	–
567	–	–	–	–	not used/natural
568	38467422	scoop	Neo?	–	–
569	–	–	–	–	not used/natural
570	38447402	SFP	Neo	–	possibly backfilled; Neo flints; pot
571	38237380	pit/ph	Neo?	–	–
572	38257383	pit	Neo?	–	possible Neo bodysherds
573, 574	–	–	–	–	not used/natural
575	38217346	pit/ph	Neo?	–	–
576	38217346	pit/ph	Neo?	–	–
577	38277342	pit/ph	Neo?	–	–
578	38297340	pit/ph	Neo?	–	–
579	38287346	pit/ph	Neo?	–	–
580	38357349	pit/ph	Neo?	–	–
581–584	–	–	–	–	not used/natural
585	38147328	pit/ph	Neo?	–	–
586	38367349	pit/ph	Neo?	–	possible Neo bodysherds
587, 588	–	–	–	–	not used/natural
589	38367345	pit/ph	Neo?	–	–
590	38157331	scoop	Neo?	–	–
591	38327339	pit/ph	Neo?	–	–
592	–	–	–	–	not used/natural
593	38217337	pit/ph	Neo?	–	–
594	38337347	pit/ph	Neo?	–	–
595	38327350	pit/ph	Neo?	–	possible Neo bodysherds
596	38397353	pit/ph	Neo?	–	–
597, 598	–	–	–	–	not used/natural
599	38507355	pit/ph	Neo?	–	–
600	38497345	pit/ph	Neo?	–	–
601	38497346	pit/ph	Neo?	–	–

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
602	38477345	pit/ph	Neo?	–	–
603, 604	–	–	–	–	not used/natural
605	38477336	gully	RB?	–	relates to F499?
606	38517341	pit/ph	Neo?	–	–
607	38517338	pit/ph	Neo?	–	–
608–613	–	–	–	–	not used/natural
614	38637331	pit/ph	Neo?	–	–
619	38537347	pit/ph	Neo?	–	–
620, 621	–	–	–	–	not used/natural
622	38517348	pit/ph	Neo	–	dated by flints
623	38537361	pit/ph	Neo?	–	–
624	38527363	pit	Neo	M	possible SFP
625	–	–	–	–	not used/natural
626	38527338	pit/ph	Neo?	–	–
627	38517346	pit/ph	Neo?	–	–
628	38627351	pit/ph	Neo?	–	–
629	38157422	pit/ph	Neo?	–	–
630	–	–	–	–	buried soil
631	38487426	pit/ph	Neo?	–	–
632	38817343	gully	RB?	–	associated with F499
633	38507426	pit/ph	undated	–	–
634	38507426	pit/ph	undated	–	–
635, 636	–	–	–	–	not used/natural
637	38527427	pit/ph	undated	–	–
638	38557429	ditch	Neo	M	possible extension to F1 ditch at cause way F
639	38527426	pit/ph	Neo	–	cut by Neo ditch F313
640	38517426	pit/ph	Neo?	–	–
641	38547432	ditch	BA/IA?	–	cut by RB ditch F469
642	38557432	ditch	BA/IA?	–	cuts F1 ditch west of causeway F
643	38597430	ditch	RB	–	same as F648
644	38637429	pit?	Neo	–	probably part of F1, with F798
645	38597420	timber	Neo	–	easterly gateway slot ditch
646	–	–	–	–	not used/natural
647	39087377	pit/ph	Neo?	–	–
648	38787418	ditch	RB	–	field boundary (cf F499)
649	38657420	pit/ph	Neo?	–	–
650	38687421	scoop	Neo	M	amorphous, very shallow
651, 652	–	–	–	–	not used/natural
653	38627414	gully	Neo?	–	–
654	38657408	SFP	Neo	M	backfilling evidence
655	38667393	pit/ph	Neo?	–	–
656, 657	–	–	–	–	not used/natural
658	38657391	pit/ph	Neo?	–	–
659	38677390	pit/ph	Neo?	–	possible Neo bodysherds
660	38767390	pit?	Neo	–	destroyed; possible SFP; Neo pot
661–663	–	–	–	–	destroyed by quarry before excavation
664	38757374	pit?	Neo	–	destroyed; possible SFP; leaf arrowhead
665–668	–	–	–	–	destroyed by quarry before excavation
669	38727362	ph	Neo?	–	in gap in cursus ditch F318
670	38757364	pit/ph	Neo?	–	–
671	–	–	–	–	not used/natural
672	38727368	pit/ph	Neo?	–	–
673	38707369	SFP	Neo?	–	backfilling evidence
674	–	–	–	–	not used/natural
675	38737370	pit/ph	Neo?	–	possible Neo bodysherds
676	38757370	pit/ph	Neo?	–	–
677	38727372	pit/ph	Neo?	–	–
678	38717374	pit/ph	Neo?	–	–
679	38727374	SFP	Neo?	–	backfilling evidence
680	38757378	pit/ph	Neo?	–	–

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
681	38717383	pit/ph	Neo	M	–
682	38737383	hollow	Neo	M	natural feature?
683	38707387	pit/ph	Neo?	–	–
684	38717387	pit/ph	Neo?	–	–
685	38777387	scoop	Neo?	–	–
686	–	–	–	–	not used/natural
687	38767392	pit/ph	Neo?	–	possible Neo bodysherds
688	–	–	–	–	not used/natural
689	38717402	pit/ph	Neo?	–	–
690	38737409	SFP	EBA	EBA	–
691	–	–	–	–	not used/natural
692	38747413	pit/ph	Neo?	–	–
693	–	–	–	–	not used/natural
694	38787416	pit/ph	Neo?	–	possible Neo bodysherds
695	38737420	pit	Neo?	–	possible SFP; possible Neo pot
696	–	–	–	–	not used/natural
697	38737424	gully	Neo	M, FG	defines east edge of causeway F?
698	38747426	SFP	Neo	M	backfilling evidence; much pottery
699	38777421	ditch	IA?	–	cuts F1 ditch tertiary filling
700–705	–	–	–	–	destroyed by quarry before excavation
706	–	–	–	–	not used/natural
707	38877359	pit/ph	Neo?	–	–
708	38837358	pit/ph	Neo?	–	possible Neo bodysherds
709	–	–	–	–	not used/natural
710	38817362	pit	Neo	–	associated with F711
711	38837362	SFP	Neo	M	quern above rubber
712	38877363	pit/ph	Neo?	–	possible Neo bodysherds
713	38827367	pit	Neo	M	four layers; water-hole?
714, 715	–	–	–	–	not used/natural
716	38837368	pit/ph	Neo?	–	–
717	38877368	pit/ph	Neo?	–	–
718	38857368	pit/ph	Neo?	–	possible Neo bodysherds
719	–	–	–	–	not used/natural
720	38867370	pit/ph	Neo?	–	–
721	38887370	pit/ph	Neo?	–	–
722	38847379	pit/ph	Neo?	–	–
723	38847380	pit/ph	Neo?	–	–
724	38847386	pit/ph	Neo?	–	–
725	38857386	pit/ph	Neo?	–	possible Neo bodysherds
726	38867386	pit/ph	Neo?	–	–
727	38887387	pit/ph	Neo?	–	possible Neo bodysherds
728	38817387	pit/ph	Neo?	–	possible Neo bodysherds
729	–	–	–	–	not used/natural
730	38817393	SFP	Neo?	–	possible Neo bodysherds
731	38877398	pit/ph	Neo?	–	possible Neo bodysherds
732	38817400	pit/ph	Neo?	–	possible Neo bodysherds
733	38827400	pit/ph	Neo?	–	possible Neo bodysherds
734	38877403	SFP	Neo	M	backfilled
735	38887404	pit/ph	Neo?	–	possible Neo bodysherds
736	38847405	SFP	Neo?	–	possible Neo bodysherds
737	–	–	–	–	not used/natural
738	38827407	pit/ph	Neo?	–	possible Neo bodysherds
739	38827408	SFP	Neo?	–	possible Neo bodysherds
740	38787410	pit/ph	Neo?	–	possible Neo bodysherds
741	38877410	pit/ph	Neo?	–	possible Neo bodysherds
742	–	–	–	–	not used/natural
743	38847413	pit/ph	Neo?	–	possible Neo bodysherds
744	38887414	SFP	Neo?	–	possible Neo bodysherds
745	38877415	SFP	Neo?	–	possible Neo bodysherds
746	38867417	SFP	Neo	M	backfilling evidence
747	38877418	SFP	Neo	FG	backfilling evidence
748	38837417	SFP	Neo?	–	possible Neo bodysherds

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
749	38847418	SFP	Neo	M	backfilling evidence
750	38877420	?SFP	Neo?	–	doubtful SFP
751–758	–	–	–	–	destroyed by quarry before excavation
759, 760	–	–	–	–	not used/natural
761	38987359	SFP	Neo	M	backfilling evidence
762	38917360	pit/ph	Neo?	–	–
763	38937363	pit/ph	Neo	M	possible SFP
764	–	–	–	–	not used/natural
765	38907365	pit/ph	Neo?	–	–
766	38927365	pit/ph	Neo?	–	–
767	38927365	pit/ph	BA	EBA	–
768	38957365	pit/ph	Neo?	–	–
769	–	–	–	–	not used/natural
770	38927366	pit/ph	Neo?	–	–
771	38937366	pit/ph	Neo?	–	–
772	38937367	pit	Neo	M	possible well; four layers; backfilling evidence
773	38957367	pit/ph	Neo?	–	–
774	–	–	–	–	not used/natural
775	38917374	pit/ph	Neo	M	–
776	38987376	pit/ph	Neo?	–	possible Neo bodysherds
777	38987379	pit/ph	LNEBA	Beaker	–
778	38947380	pit/ph	Neo?	–	–
779	38937383	pit/ph	Neo?	–	–
780	38957384	SFP	Neo?	–	possible Neo bodysherds
781	38947385	pit/ph	Neo?	–	–
782, 783	–	–	–	–	not used/natural
784	38937386	pit/ph	Neo?	–	–
785	–	–	–	–	not used/natural
786	38957388	SFP	Neo?	–	–
787	38937388	pit/ph	Neo?	–	–
788	–	–	–	–	not used/natural
789	38967390	pit/ph	Neo?	–	possible Neo bodysherds
790	38937396	pit/ph	Neo	–	dated by flint
791	38907400	SFP	Neo?	–	possible Neo bodysherds
792	38937403	SFP	Neo	M	backfilling evidence
793	38997404	pit/ph	Neo?	–	–
794	38907405	pit/ph	Neo?	–	possible Neo bodysherds
795	38947406	SFP	Neo	M	backfilling evidence
796	38997408	pit/ph	Neo	M, GW	possible SFP
797	38977409	SFP	Neo	M	backfilling evidence
798	38647431	ditch	Neo	–	same as F1 ditch (at causeway F)
799	38917409	pit/ph	Neo?	–	–
800	38967410	SFP	Neo	M	backfilling evidence
801	–	–	–	–	not used/natural
802	38987411	pit/ph	Neo	M	possible SFP
803	38957413	SFP	Neo?	–	–
804	38927412	pit/ph	Neo?	–	–
805	38907419	pit/ph	Neo?	–	possible Neo bodysherds
806	38937419	pit/ph	Neo?	–	–
807–809	–	–	–	–	not used/natural
810–816	–	–	–	–	destroyed by quarry before excavation
817	39027348	pit/ph	Neo?	–	–
818	39037353	pit/ph	Neo	M	possible SFP?
819	39067357	pit/ph	Neo?	–	–
820	39027359	SFP	Neo?	–	possible Neo bodysherds
821	39027364	pit/ph	Neo	FG	possible SFP
822	39037366	pit/ph	Neo?	–	–
823	39037366	pit/ph	Neo?	–	–
824	39027367	pit/ph	Neo?	–	–
825	39017367	pit/ph	Neo?	–	–
826	39007368	pit/ph	Neo?	–	possible Neo bodysherds

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
827	39047376	pit/ph	Neo?	–	–
828	39057376	pit/ph	Neo?	–	possible Neo bodysherds
829, 830	–	–	–	–	not used/natural
831	39017380	pit/ph	Neo?	–	–
832	39027381	SFP	Neo?	–	–
833	39047384	pit	BA?	–	–
834	38977389	pit/ph	Neo?	–	–
835	39057386	pit/ph	Neo?	–	–
836	39097385	SFP	Neo?	–	–
837	39107387	scoop	Neo	M	possible 'floor'
838	–	–	–	–	same as 837
839	39107387	scoop	Neo	M	part of F837
840	39037393	gully	Neo?	–	possible Neo bodysherds
841	39017395	pit	EBA	Beaker	–
842	39007396	SFP	Neo?	–	possible Neo bodysherds
843	39067395	SFP	Neo?	–	–
844	39107400	SFP	Neo?	–	–
845	39017401	pit/ph	Neo?	–	–
846	39047401	pit/ph	Neo?	–	–
847	39047403	pit/ph	Neo?	–	–
848	39067404	pit/ph	Neo	FG	possible SFP
849	39037405	pit/ph	Neo?	–	–
850	39067404	pit/ph	Neo?	–	–
851	39097402	SFP	Neo	M	backfilling evidence
852	39087403	pit/ph	Neo?	–	–
853	39037404	pit/ph	Neo?	–	–
854–856	–	–	–	–	not used/natural
857	39117336	SFP	Neo?	–	possible Neo bodysherds
858	39127335	pit	Neo?	–	possible Neo bodysherds
859	–	–	–	–	not used/natural
860	39187334	pit/ph	Neo?	–	–
861	39157340	pit/ph	Neo?	–	–
862–864	–	–	–	–	destroyed by quarry before excavation
865	39197345	pit/ph	Neo?	–	–
866	39157348	SFP	Neo?	–	possible Neo bodysherds; probable Mildenhall
867	39147349	pit/ph	Neo?	–	–
868	39137352	pit/ph	Neo?	–	–
869, 870	–	–	–	–	not used/natural
871	38637438	pit	Neo	–	cut by F1 ditch, segment 6, at causeway F
872	–	–	–	–	not used/natural
873	39177363	pit/ph	Neo?	–	–
874	39197365	pit/ph	Neo	M	–
875	39137365	pit/ph	Neo?	–	–
876	39207372	pit/ph	Neo?	–	–
877	39137372	pit/ph	Neo?	–	–
878	39137374	pit/ph	Neo?	–	–
879	39177374	pit/ph	Neo?	–	–
880	–	–	–	–	not used/natural
881	39167379	pit/ph	Neo?	–	possible Neo bodysherds
882	39187382	pit/ph	Neo	M	probable SFP
883, 884	–	–	–	–	not used/natural
885	39167386	pit/ph	Neo?	–	–
886–891	–	–	–	–	not used/natural
892	39107386	pit/ph	Neo?	–	–
893, 894	–	–	–	–	not used/natural
895	39127389	pit/ph	Neo?	–	–
896	39157389	pit/ph	Neo?	–	–
897	39167389	pit/ph	Neo?	–	–
898	39167389	pit/ph	Neo?	–	–
899	39127391	pit/ph	Neo?	–	–
900	39147390	SFP	Neo	M	backfilling evidence

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
901	39167391	pit/ph	Neo?	–	–
902	39167391	pit/ph	Neo?	–	–
903	39167391	pit/ph	Neo?	–	–
904	39177390	pit/ph	Neo?	–	possible Neo bodysherds
905	39157393	pit/ph	Neo?	–	–
906	39157395	pit/ph	Neo?	–	–
907	39167397	pit/ph	Neo?	–	–
908	39127398	pit/ph	Neo?	–	–
909	39107404	pit/ph	Neo?	–	–
910	39127405	pit/ph	Neo?	–	–
911	39217336	pit/ph	Neo?	–	–
912	39237336	pit/ph	Neo?	–	possible Neo bodysherds
913–916	–	–	–	–	not used/natural
917	39257341	scoop	Neo	M	?natural hollow
918, 919	–	–	–	–	destroyed by quarry before excavation
920	39207344	SFP	Neo?	–	backfilling evidence
921	39217344	SFP	Neo?	–	backfilling evidence
922	39257346	SFP	Neo	M	backfilling evidence
923, 924	–	–	–	–	not used/natural
925	39257355	SFP	Neo	GW	backfilling evidence
926	39267358	SFP	Neo	GW	backfilling evidence
927	39227365	SFP	Neo?	–	backfilling evidence
928	39267367	pit/ph	Neo?	–	–
929	39287369	pit/ph	Neo?	–	possible Neo bodysherds
930	–	–	–	–	not used/natural
931	39247373	SFP	Neo?	–	possible Neo bodysherds
932	39247373	pit	Neo?	–	–
933	39277374	pit	Neo	M, FG	probable SFP
934	39227380	SFP	Neo?	–	possible Neo bodysherds
935	39207387	pit/ph	Neo?	–	–
936	39207390	pit/ph	Neo?	–	–
937, 938	–	–	–	–	not used/natural
939	39297337	pit/ph	Neo?	–	–
940	39337344	scoop	Neo	FG	soil in natural hollow
941	39307347	SFP	Neo?	–	possible Neo bodysherds
942	39317347	SFP	Neo	M	backfilling evidence
943	39347348	scoop	Neo	M	?natural hollow
944	39297363	SFP	Neo	M	backfilling evidence
945	39307365	SFP	Neo	M	backfilling evidence
946	39317365	pit/ph	Neo?	–	–
947	39327365	pit/ph	Neo?	–	–
948	39337365	pit/ph	Neo?	–	possible Neo bodysherds
949	39317366	pit/ph	Neo?	–	–
950	39317366	pit/ph	Neo?	–	–
951	39337366	pit/ph	Neo?	–	–
952	39307377	pit/ph	Neo?	–	–
953	38787427	pit	Neo	–	in ditch F1, segment 6, Phase 2; wooden bowls
954–956	–	–	–	–	not used/natural
957	38937353	pit/ph	Neo?	–	possible Neo bodysherds
958, 959	–	–	–	–	destroyed by quarry before excavation
960	39057361	SFP	Neo?	–	possible Neo bodysherds
961	38817429	pit/ph	Neo?	–	possible Neo bodysherds
962	38847427	SFP	Neo	–	in ditch F1, segment 6, at causeway G
963–974	–	–	–	–	not used/natural
975	39107341	pit/ph	Neo	FG	possible SFP
976	38807416	scoop	Neo	M	possible floor/natural scoop
977	38027383	hearth	Neo?	–	spread of burnt material
978	38037383	scoop	Neo?	–	–
979	39147390	pit/ph	Neo?	–	–
980	–	–	–	–	not used/natural
981	38147377	pit/ph	Neo	M	five layers;

Feature number	Grid ref	Site interpretation	Approx date	Diagnostic pottery	Notes
		well			backfilled?
982	38167376	pit/ph	Neo?	–	–
983	38717376	pit/ph	Neo?	–	–
984	–	–	–	–	not used/natural
985	38097346	SFP	Neo?	–	much charcoal
986	38127347	pit/ well	Neo	FG	–
987	38017380	pit/ well	Neo?	–	–
988	39087404	pit/ph	Neo?	–	–
989	38177375	pit/ph	Neo?	–	–
990	–	–	–	–	not used/natural
991	37987380	pit	Neo?	–	–
992	–	–	–	–	not used/natural
993	38057379	pit/ph	Neo?	–	–
994	39197397	'pyre'	Neo	M	burnt pyre material in ditch F1, segment 10
995–999	–	–	–	–	not used/natural
1000–1014	–	–	–	–	destroyed by quarry before excavation
1015	39387333	SFP	Neo	–	dated by flint; possible Neo pot
1016	39397333	SFP	Neo	–	possible Neo pot
1017–1020	–	–	–	–	destroyed by quarry before excavation
1021	38537327	SFP	Neo?	–	possible Neo bodysherds
1022	–	–	–	–	not used/natural
1023	38567325	pit/ph	Neo	PR	–
1024, 1025	–	–	–	–	not used/natural
1026	38657303	SFP	Neo?	–	possible Neo bodysherds
1027	38667304	SFP	Neo?	–	–
1028, 1029	–	–	–	–	not used/natural
1030	38487398	SFP	Neo?	–	–
1031	38487299	pit/ph	Neo?	–	–
1032	38517301	pit	Neo	PR, GW	carefully backfilled; probable SFP
1033	–	–	–	–	not used/natural
1034	38547300	pit	Neo?	–	possible Neo bodysherds
1035	–	–	–	–	not used/natural
1036	38577304	SFP	Neo?	–	possible Neo bodysherds
1037	38467298	SFP	Neo?	–	possible Neo bodysherds
1038	38467298	pit/ph	Neo?	–	–
1039	38447295	SFP	Neo?	–	–
1040	38437295	scoop	Neo	–	two axe fragments; natural feature
1041	38247297	pit/ph	Neo?	–	–
1042	38247298	pit/ph	Neo?	–	–
1043	38247296	pit/ph	Neo?	–	–
1044	–	–	–	–	not used/natural
1045	38227298	pit/ph	Neo?	–	–
1046	38197298	pit/ph	Neo?	–	possible Neo bodysherds
1047	38007294	pit/ph	Neo?	–	–
1048	38027299	pit/ph	Neo?	–	possible Neo bodysherds
1049	38097294	pit/ph	Neo?	–	–
1050	38167395	pit/ph	Neo	M	possible SFP
1051	38147312	pit	Neo?	–	possible Neo bodysherds
1052	38557323	pit	Neo?	–	possible Neo bodysherds
1053	–	–	–	–	not used/natural
1054	39137326	pit	Neo	GW	very large pit (with F1060)
1055	39217334	pit	Neo	M	possible SFP
1056	39207336	pit	Neo	M	probable SFP
1057	38807367	pit	Neo?	–	–
1058	39417344	pit/ph	Neo?	–	–
1059	–	–	–	–	not used/natural
1060	39167325	pit	Neo	GW	very large pit (with F1054)
1061	–	–	–	–	not used/natural
1062	39087344	pit	Neo?	–	possible Neo bodysherds

Appendix 2 Detailed soil micromorphological descriptions

by Charles French

Introduction

The detailed descriptions in this appendix are arranged following the layout of Chapter 12, to which they refer. The appendix is in two parts – the enclosure ditch fill deposits and the interior soils.

Enclosure ditch deposits of the eastern arc

The ash lens in segment 13

The ash lens was within a Late Neolithic (Phase 2) pit, which cut into the filling of enclosure ditch segment 13 at section 234 (Fig 75).

Structure: apedal; heterogeneous; *Porosity: Fabric 1: c* 5% vughs and *c* 5% channels, description as for fabric 3; *Fabric 2:* very few (<5%) vughs, sub-rounded, 75–150µm, smooth to weakly serrated, random, unoriented; *c* 20% channels, elongate, 50–75µm wide, 400–600µm long, smooth to weakly serrated, walls partially accommodated, random, unoriented; *Fabric 3: c* 10% vughs, irregular to sub-rounded, 100–200µm, smooth to weakly serrated, random, unoriented; *c* ten channels, irregular, 100–200µm wide, 400–800µm long, smooth to weakly serrated, random, unoriented; *Mineral components: Fabric 1:* limit 100µm; coarse/fine ratio 10/90; coarse fraction: fine (5%) and *medium (5%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: *c* 90% amorphous calcite crystals (wood ash); *c* 35% of groundmass; *Fabric 2:* limit 100µm; coarse/fine fraction 15–30/70–85; coarse fraction: fine (5–10%) and medium (10–20%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine (15%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 50% silt and 20% clay; dark brown (PPL), orange (RL); very weakly speckled; *c* 15% of groundmass; *Fabric 3:* mixture of fabrics 1 and 2; limit 100µm; coarse/fine ratio 10–30/70–90; coarse fraction: fine (5–10%) and medium (5–20%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: 30–50% amorphous calcite crystals; very fine (10%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 20% silt and 10% clay; greyish-white and reddish-orange (PPL), grey and orange (RL); very weakly speckled; *c* 50% of groundmass; *Organic component:* common (*c* 50%); frequent (*c* 15%) ferruginised organic plant tissue/roots; frequent (*c* 15%) very fine flecks of charcoal in groundmass, especially in fabric 1 and to a lesser extent in fabrics 2 and 3; few (*c* 5% charcoal lens in fabric 1), *c* 25–75µm thick, horizontal; few (<2%) fragments of carbonised wood, 2–6mm; few (*c* 10%) amorphous organic matter in fabric 2; *Groundmass: Fabric 1:* dense crystallitic; *Fabrics 2 and 3:* related: porphyric; coarse: undifferentiated; fine: porphyric; *Pedofeatures:Fabric:* three main fabrics; also rare (<1%) fragments of argillic horizon, sub-rounded, *c* 150–250µm; *Crystalline:* few (<2%) crystals, porphyrotopic, as dense infillings of voids; in fabric 1: amorphous calcitic crystals, micrite (<4µm) to microsparite (*c* 4–20µm), generally dense, continuous; *Amorphous:* frequent ferruginous impregnation of organic matter (as above); very few (<1%) large sesquioxide nodules, up to 5mm; few (<5%) sesquioxide nodules in groundmass of fabrics 2 and 3, *c* 100–200µm; fabric 2 heavily impregnated with amorphous sesquioxides; very few (<2%) fragments of bone, 75–100µm thick, 2–5mm long; *Textural:* many (*c* 10%) non-laminated dusty clay as intercalations within groundmass of fabrics 2 and 3, yellow (XPL), weak to moderate birefringence.

A possible turf in segment 11

A possible turf was found in the base of section 208A in segment 11 (Fig 73, E).

Structure: apedal; poorly sorted but relatively homogeneous; *Porosity: c* 25%; mainly vughs (*c* 15–20%), irregular to sub-rounded, smooth to weakly serrated, 100–500µm and 1–2mm, random, unoriented; few channels (*c* 5–10%), irregular to elongate, 50–150µm wide, 1–3mm long, smooth to weakly serrated, walls partially accommodated; a few are parallel and horizontal in orientation, and the remainder are random and unoriented; *Mineral components: Fabric 1:* limit 100µm; coarse/fine ratio 30/70; coarse fraction: medium (20%) and fine (10%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine (20%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; 30% silt, 20% clay; speckled; brown to light brown (PPL), light yellowish-brown (RL); *c* >95% of the groundmass; *Fabric 2:* limit 100µm; coarse/fine ratio 10/90; coarse fraction: fine (10%) quartz, sub-rounded to sub-angular, 100–150µm, random, unoriented; fine fraction: very fine (10%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 40% silt, 40% clay; speckled; brown (PPL), yellowish-orange (RL); *c* <5% of groundmass; *Organic component: c* 25–30%; few (*c* 5–10%) plant tissues with cell structure evident, generally ferruginised, red (PPL), black (CPL); frequent (*c* 20%) very fine and fine flecks of charcoal in groundmass, intimately bound with both fabrics, but much denser in main fabric 1, 25–75µm and <25µm; amorphous organic matter obscures most of fine fraction of fabric 1, in zones of greater and lesser density; *Groundmass:* related: open porphyric; coarse: undifferentiated; fine: stipple speckled; *Pedofeatures: Textural:* in fabric 1 very rare (<1%) limpid clay in groundmass and as coatings of grains, gold to reddish-gold (XPL), strong to moderate birefringence; rare (2%) very thin, weakly developed, non-laminated dusty clay coatings of grains and groundmass, orangey-yellow (XPL); very rare (<1%) sub-rounded fragments of non-laminated dusty clay, *c* 50µm, orangey-red (XPL), moderate to strong birefringence; occasional (2–5%) non-laminated dusty clay as intercalations within groundmass, yellow (XPL); in fabric 2 very abundant (*c* 20–30%) intercalated, non-laminated dusty clay in groundmass, moderate birefringence, yellow to orangey-yellow (XPL); *Excrements:* few (<5%), rounded, black (PPL), pellets, <50µm, in loose aggregates within groundmass of fabric 1; *Fabric:* two s as above; 2 is minor component, but in heterogeneous mix with 1; *Amorphous:* few (*c* 5%) sesquioxide nodules, sub-rounded, 50–150µm; finer nodules are intimately bound with fine fraction; very few (*c* 2%) partial to complete void infills with calcitic crystals, micrite to microsparite

(<25μm); two small papules, *c* 1 × 1mm and 1 × 3mm, sub-angular, composed of fine sand (25%) and silt/clay (75%); one large papule of another , *c* 2.5–4mm, sub-rounded, composed of very fine sand (50%), silt (30%), and clay (20%), and contains many (10%) very fine sand-size fragments of non-laminated dusty clay and rare (2%) fragments of limpid clay; very few (<2%) rolled clay aggregates, rounded to sub-rounded, 100–200μm, orangey-red (XPL), moderate birefringence; the lowermost quarter of the slide comprises a sesquioxide impregnated mass of fine sand (50%) and silt/clay (50%), and ferruginised organic matter (*c* 20% of groundmass).

The silt loam 'lining' in segment 8

A thin silt loam 'lining' was observed in many of the ditch segments of the eastern arc. The sample selected for analysis came from segment 8, at section 201, in its upper half (*c* 10–70mm below top of section). The micromorphological description of the reddened (2.5YR 5/4) silt loam 'lining' is as follows:

Structure: homogeneous; *Porosity: c* 30%; *c* 20% intrapedal vughs, sub-rounded to irregular, smooth to weakly serrated, 100–300μm, random, unoriented; *c* 10% intrapedal channels, elongate to irregular, smooth to weakly serrated, 50–200μm wide, 1–4mm long, walls partially accommodated, random, unoriented; *Mineral components:* limit 100μm; coarse/fine ratio 25/75; coarse fraction: fine (5%) and medium (20%) quartz, sub-rounded to sub-angular, 100–250μm, random, unoriented; fine fraction: very fine (10%) quartz, sub-rounded to sub-angular, 50–100μm, random, unoriented; 40% silt and 25% clay; dark golden brown (PPL), orangey-brown (RL); very weakly speckled; *Organic component: c* 12%; *c* 10% amorphous organic matter in groundmass; <2% very fine flecks of charcoal in groundmass; *Groundmass:* fine: mosaic speckled to weakly granostriated; coarse: undifferentiated; related: porphyric; *Pedofeatures: Textural:* many to abundant (10–15%) non-laminated dusty coatings of grains and as intercalations within groundmass and voids, weak to moderate birefringence; *Fabric:* fine fabric occasionally occurs as loose discontinuous infills of channels; *Amorphous:* few (*c* 10%) silt/clay aggregates, rounded to sub-rounded, 50–100μm; few (*c* 10%) sesquioxide nodules, sub-rounded, up to 3–4mm; common (*c* 25–50%) sesquioxide impregnation of groundmass.

The micromorphology of the lower half of this layer (*c* 80–130mm) was similar to the upper half. The only difference between the samples is that the lower sample contained less amorphous organic matter and exhibited dominant (*c* 0–75%) impregnation of the groundmass with amorphous sesquioxides.

Enclosure ditch deposits of the western arc

Section 119 tertiary filling

The micromorphological description of the tertiary filling (layer 1) of enclosure ditch segment 5 at section 119 is as follows:

Structure: apedal; heterogeneous; *Porosity: c* 20%; abundant (*c* 15%) vughs, rounded to sub-rounded to sub-angular, smooth to weakly serrated, 100–300μm, random, unoriented; few (*c* 5%) channels, elongate to irregular, smooth to weakly serrate, unaccommodated, 50–150μm wide, 200–2000μm and 2–5mm long, weakly oriented, often parallel horizontal and rarely parallel vertical; *Mineral components:* limit 50μm; coarse/fine ratio 30/70; coarse fraction: medium (*c* 15%) and fine (*c* 15%) quartz, sub-rounded to sub-angular, moderately well sorted; 150–300μm; fine fraction: *c* 30% silt; *c* 40% clay; golden brown (PPL), light brown to medium brown (RL); weakly speckled; *Organic component:* <2 %; very few tissue residues, largely decomposed, in groundmass, *c* 50–100μm; very few clay-impregnated pseudomorphs of plant roots/stems; very minor presence of amorphous organic fine material in groundmass; *Groundmass:* coarse fraction: *Fabric:* undifferentiated to porous crystallitic, *c* 15% of groundmass; fine fraction: fabric 1 granostriated, random to weakly reticulate, weak to moderate striations, discontinuous, fine to medium (20–50μm) thick, 50–300μm long, *c* 15% of groundmass; related distribution: fabrics 2 and 3 porphyric, undifferentiated, *c* 70% of groundmass; *Pedofeatures: Fabric:* three types. *Fabric 1:* calcitic crystals (*c* 30%) with fine sand (*c* 10%), silt (*c* 30%), and clay (*c* 30%), *c* 30% of groundmass; *Fabric 2:* sand (*c* 30%) plus silty clay (*c* 70%), *c* 40% of groundmass; *Fabric 3:* sesquioxide-impregnated sand and silty clay (as for fabric 2), *c* 30% of groundmass; *Textural:* abundant (*c* 10–15%) intercalations of non-laminated dusty (silty) clay of voids and groundmass; rare (*c* 1%) channel infill with limpid clay; very rare (<1%) limpid clay as elongated fragments in the groundmass, moderate birefringence; very rare (*c* 1%) laminated dusty clay coatings of groundmass, voids, and grains, moderate birefringence; rare (*c* 2%) non-laminated dusty clay coating of grains and of voids of partial and complete infills; *Excrements:* rare (2%) dense void infills with rounded faecal pellets, 40–60μm, obscured by amorphous organic matter; *Amorphous: c* 30% of groundmass sesquioxide impregnated; few (*c* 5%) rolled clay aggregates, rarely with organic matter, rounded to sub-rounded, 50–75μm, within groundmass; few (*c* 5 %) sesquioxide nodules, sub-rounded, 50–250μm.

Section 119 secondary filling

The micromorphological description of the secondary filling (layer 2) of ditch segment 5 at section 119 is as follows:

Structure: apedal; heterogeneous; *Porosity: c* 30%; mainly vughs (25%), rounded to sub-rounded, 50–200μm, 2–4mm; and a few channels (5%), smooth to weakly serrate, 100–500μm, 2–4mm; *Mineral components:* limit 50μm; coarse/fine ratio 30/70 for fabric b; coarse fraction: very fine (5%), fine (10%), and medium (20%), sub-rounded to sub-angular quartz, 50–300μm, moderately well sorted; fine fraction: 30% silt; 40% clay; dark reddish-brown (PPL), reddish-brown (RL); speckled; *Organic component:* abundant (*c* 30–50%; frequent (*c* 10–15%) tissue fragments, often with cell structure preserved; much amorphous organic staining of fabric b; frequent calcitic and/or ferruginised pseudomorphs of roots/stems/wood fragments; few (2%) charcoal fragments, 50–100μm; *Groundmass:* speckled fine fraction in fabric b; weak to moderate birefringence; related: undifferentiated; *Pedofeatures: Fabric:* two fabrics. *Fabric a:* calcitic crystals (40–60%) mixed with equal proportions of silt (20–30%) and clay (20–30%); *Fabric b:* very organic, much ferruginised, sand (20%)/silt (40%)/clay (40%); *Excrements:* many (*c* 15–20%) red and black, rounded faecal pellets, loose continuous to dense continuous, often in 'lines' as channel infills; *Crystalline:* calcitic impregnations/infills acting as pseudomorphs of organic matter; calcitic infills/intergrowths of void space, later partly ferruginised; few (<5%) calcitic nodules, sub-rounded to elongate, 3–6mm, composed of variable amounts of calcitic crystals and fine quartz grains, later partly ferruginised; *Textural:* very rare (<1%) fragments of limpid clay, 50–100µm; rare (2%) laminated, fine dusty coatings as infills in stems and roots; occasional (<5%) diffuse, laminated dusty coatings of groundmass; occasional (<5%) hypo-coatings/intercalations of grains and groundmass; *Amorphous:* very few (2%) sesquioxide nodules, 50–100µm; much ferruginous impregnation of groundmass of fabric b, and to a lesser extent of fabric a.

Section 139 tertiary filling

The micromorphological description of the tertiary filling in enclosure ditch segment 5, section 139 (Fig 70, layer 1), is as follows:

Structure: apedal; heterogeneous; *Porosity:* *c* 30–60%; mainly vughs (25–55%), sub-rounded to irregular, smooth to weakly serrated, 50µm–3mm; few channels (5%), smooth to weakly serrated, 50–300µm; *Mineral component:* limit 50µm; coarse/fine ratio for fabric c and d 25/75; coarse fraction: very fine (5%), fine (10%), and medium (10%) sub-rounded to sub-angular quartz, 50–250µm, moderately well sorted; fine fraction: 30% silt, 45% clay; golden to amber (PPL), golden brown (RL); speckled; *Organic components:* *c* 5–10%; amorphous organic matter in fabrics c and d mainly; few to many fine flecks of charcoal in groundmass, 20–50µm; very few large flecks of charcoal, 100–300µm; *Groundmass: Fabrics a and b:* dense crystallitic, weak to moderate birefringence; *Fabric c:* few granostriated, 20–50µm thick; stipple to mosaic striated, moderate to high birefringence; *Fabric d:* stipple to mosaic striated, moderate to high birefringence; *Pedofeatures: Fabric:* four fabrics. *Fabric a:* calcitic crystals with *c* 30% yellow (PPL) clay; *Fabric b:* calcitic crystals; *Fabric c:* reddish (PPL) silty clay with medium quartz; *Fabric d:* organic/sesquioxide impregnated, reddish-brown (PPL) silty clay with fine and medium quartz; *Textural:* occasional to many (*c* 5–10%) fragments/aggregates of limpid clay, rounded to sub-rounded, intimately bound with groundmass in fabrics a and b; very rare (*c* 1%) laminated dusty coatings of groundmass; occasional (*c* 5%) fine, non-laminated dusty coatings of grains and voids; occasional (*c* 5%) non-laminated dusty clay intercalations within groundmass and voids; *Crystalline:* dense calcitic crystals in fabrics a and b; *Amorphous:* few (2%) rolled clay aggregates, 50–100µm; few sesquioxide nodules, 1–8mm; sesquioxide impregnation mainly of fabric d.

Section 112 tertiary filling

The micromorphological description of the tertiary filling (layer 1) of enclosure ditch segment 5, as it merged with the secondary filling of the stream channel in section 112, is as follows:

Structure: apedal; heterogeneous; *Porosity:* *c* 30%; *c* 20% channels, irregular, smooth to weakly serrate, 50–300µm wide, up to 5mm long, random, unoriented; *c* 10% vughs, irregular, smooth to weakly serrate, 50–300µm, random, unoriented; *Mineral components:* four fabrics. *Fabric i:* limit 100µm; coarse/fine ratio 20/80; coarse fraction: medium (10%) and fine (10%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine (30%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 50% silt and 30% clay; dark reddish-brown (PPL), yellowish-brown (RL); very weakly speckled; *c* 40% of groundmass; *Fabric ii:* limit 100µm; coarse/fine ratio 20/80; coarse and fine fabrics as for fabric i, except obscured by amorphous ferruginised organic matter and with plant tissues, *c* 20% amorphous calcitic crystals, 40% silt, and 20% clay; *c* 30% of groundmass; *Fabric iii:* limit 100µm; coarse/fine ratio 20/80; coarse fraction: medium (20%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 20% silt; pale greyish-brown (PPL), light yellowish-brown (RL); 55% amorphous calcium carbonate crystals; *c* 20% of groundmass; *Fabric iv:* very fine gravel, rounded to sub-rounded, 2–6mm, *c* 10% of groundmass; *Organic component:* *c* 30%; mainly (*c* 20%) very fine charcoal; *c* 5% root/stem pseudomorphs with amorphous calcitic crystals and ferruginised fine material; <5% ferruginised plant tissue; *Groundmass:* fine: crystallitic (fabric iii) to mosaic speckled to reticulate striated (fabrics i and ii); coarse: monic; related: chitonic (fabrics i, ii, and iii); undifferentiated (fabric iv); *Pedofeatures: Excrements:* *c* 2% rounded, black pellets, *c* 50µm, within groundmass and in channels and vughs; *Fabrics:* four poorly sorted fabrics as above; *Textural:* occasional (*c* 5%) non-laminated dusty clay as intercalations in groundmass and coatings of grains in fabric i; occasional (2–5%) limpid clay in groundmass, especially in fabric i, weak to moderate birefringence, yellow (XPL); rare (2%) limpid coatings of grains and voids, weak to moderate birefringence, yellow (XPL); very rare (1%) laminated impure clay fragments, sub-rounded to sub-angular, in voids, dark orangey-red (XPL), <50µm; *Crystalline:* areas (*c* 5–80%) of fine micro-crystals of calcite, micritic, <4µm; areas (*c* 5%) of coarser crystals of calcite, sparite, *c* 50–250µm, rounded to sub-rounded, as single crystals or in loose to dense aggregates with micritic crystals; *Amorphous:* ferruginous impregnation of fabrics i and ii, up to 50% of both fabrics.

The 'varved' deposit in section 112, sample 3

Four spot samples from the *c* 0.60m thick 'varved' or laminated deposit in the base of enclosure ditch segment 5 (Fig 252) were taken for micromorphological analysis. The results of sample 3 are described below:

Fabric: three fabrics, all with roughly horizontal, layered appearance; *Fabric a:* dense calcitic crystal formation, greyish-white (PPL); *Fabric b:* organic matter fragments (30%)/excrements (30%) with calcitic crystal formation (40%), greyish-white to brown and black (PPL); *Fabric c:* organic matter fragments (20%)/excrements (20%)/fine silt (20%) intermixed with calcitic crystals (40%), greyish-white to dark brown and black (PPL); *Organic components:* *c* 20–30%; calcitic replacement or pseudomorphs of stems/roots; ferruginised replacements/pseudomorphs of stems/roots; frequent organic tissue fragments with cell structure evident; *Pedofeatures: Excrements:* frequent (20–30%) rounded, black, loose discontinuous pellets, 20–25µm; *Textural:* rare (2%) ferruginised, laminated dusty clay impregnation of organic matter.

The 'varved' deposit in section 112, sample 4

Fabric: two fabrics, both with horizontal, layered/laminated appearance; *Fabric a:* dense calcitic crystal formation, greyish-white (PPL); separated by organic lenses, brown (PPL); *Fabric b:* organic matter (35%), with silt (5%) intermixed with calcitic crystals (60%), greyish-white to brown (PPL); *Organic component:* similar to sample 3 above.

Buried soil from the interior

Introduction

Thirteen series of samples (profiles A–H and J–N) of the buried soil were taken and analysed in thin section, all but one (series D) from the interior of the causewayed enclosure. The detailed micromorphological descriptions of all 13 profiles are given below.

Sample series A

A feature (F35) that was initially believed to be a bank on the interior edge of enclosure ditch segment 1 between sections 1 and 5 (Fig 61, A–D) was spot sampled and analysed in thin section and by particle size (grid 36547305). The soil (*c* 0.25m thick) was a gravel-free loam to clay loam (5YR 3/3), which exhibited a weakly developed blocky ped structure.

This sample location exhibited the best-preserved and most complete profile of the prehistoric soil within the causewayed enclosure. There is every possibility that this was a consequence of the soil being buried and protected by ditch upcast or bank material, which has since largely eroded away (see Chapter 12).

The micromorphological description of F35 is as follows:

Structure: homogeneous; *Porosity:* *c* 25%; *c* 20% intrapedal vughs, rounded to sub-rounded, smooth to weakly serrated, 200–400µm, random, unoriented; *c* 5% intrapedal channels, irregular, smooth to weakly serrated, 25–150µm wide, 1–10mm long, random, unoriented; *Mineral components:* limit 100µm; coarse/fine ratio 20/80; coarse fraction: medium (10%) and fine (10%) quartz grains, sub-rounded to sub-angular, 100–250µm, random, unoriented; very few (<1%) opaque minerals and mica grains present; fine fraction: very fine (20%) quartz grains, sub-rounded to sub-angular, 50–100µm, random, unoriented; *c* 35% silt and *c* 25% clay; reddish to golden brown (PPL), yellowish-red (RL); weakly speckled; *Organic component:* *c* 30%; mainly (*c* 20%) amorphous organic matter in groundmass; *c* 5–8% fine, rounded, and angular flecks of charcoal throughout groundmass, <50µm; few (<2%) large fragments of plant tissue replaced by iron, 50–1000µm; *Groundmass:* fine: undifferentiated (obscured by sesquioxides and organic matter) to mosaic speckled; coarse: open porphyric; related: porphyric; *Pedofeatures: Textural:* very abundant (*c* 25%) non-laminated dusty clay as intercalations within the groundmass and as dense incomplete infills or 'linings' of voids, moderate birefringence, gold to amber (XPL); very rare (<1%) limpid clay in groundmass; *Fabric:* very few (<2%) channel infills of fine quartz grains, silt/clay and amorphous organic matter, loose, discontinuous; *Excrements:* few (*c* 2%) ferruginised, sub-rounded pellets, 25–75µm, as loose, discontinuous infills of vughs; *Amorphous:* abundant ferruginous impregnation of fine fabric and organic matter, up to *c* 75% of fine fabric.

Sample series B

Sample series B consisted of three contiguous samples taken from the buried soil *c* 10m within the interior of the enclosure opposite section 1 of the enclosure ditch (grid 36327296).

In the field, the buried soil exhibited two horizons: an upper (*c* 0.20m thick) silt to sandy loam (10YR 4/3), with a weakly developed, sub-angular blocky ped structure and with scattered gravel pebbles (*c* 2–20mm in size); and a lower (*c* 0.10m thick) apedal sandy loam to loamy sand (10YR 5/6) with even gravel mix (*c* 2–40mm). The profile rested on the upper surface of the sands and gravels of the Welland First Terrace, and was overlain by *c* 1.00m of silty clay alluvium (10YR 4/3). Samples 1 and 2 were taken from the upper horizon, and sample 3 from the lower horizon of the buried soil.

Upper half of upper horizon

The micromorphological description of the upper half (*c* 40–100mm) of the upper horizon is as follows:

Structure: heterogeneous to partially homogeneous; poorly sorted; *Porosity:* *c* 20–30%; *c* 20% intrapedal channels, elongate, 50–200µm wide, 200–800µm long, smooth to weakly serrated, random, unoriented; *c* 5% intrapedal channels, elongate, 0.5–2mm wide, 10–20mm long, smooth to weakly serrated, random, unoriented; *c* 5–10% intrapedal vughs, rounded to sub-rounded, 100–300µm, smooth to weakly serrated, random, unoriented; *Mineral components: Fabric 1:* limit 100µm; coarse/fine ratio 40/60; coarse fraction: fine (10%) and medium (30%) quartz grains, sub-rounded to sub-angular, 100–300µm, random, unoriented; few (<1%) opaque mineral grains present; fine fraction: very fine (10%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 25% silt and 25% clay; reddish to golden brown (PPL), reddish-brown (RL); speckled; *c* 50% of groundmass; *Fabric 2:* limit 100µm; coarse/fine ratio 20/80; coarse fraction: fine (20%) quartz, 150–200µm, sub-rounded to sub-angular, random, unoriented; fine fraction: very fine (10%) quartz, 50–100µm, sub-rounded to sub-angular, random, unoriented; 40% silt and 30% clay; dark reddish-brown (PPL), greyish-yellow (RL); *c* 50% of groundmass; *Organic component:* *c* 20%; *c* 10–15% amorphous organic matter in groundmass, especially in fabric 2; *c* 5–8% fine flecks of charcoal throughout groundmass of both fabrics, but especially of fabric 2, 25–100µm; few (<2%) large flecks of charcoal, 2–4mm; *Groundmass:* fine: granostriated and parallel to reticulate striated in fabric 1, moderately birefringent, discontinuous, medium (20–200µm), 50–200µm long, moderately striated, *c* 50% of groundmass; undifferentiated in fabric 2; coarse: porphyric; related: porphyric; *Pedofeatures: Textural:* abundant (*c* 25%) non-laminated dusty coatings, with silt and very fine charcoal, as intercalations of groundmass and 'linings' of voids, moderate birefringence, yellow to amber (XPL); *Fabric:* two fabrics (as above); fabric 2 not fully homogenised with fabric 1; *Amorphous:* *c* 90% of fabric 2 and <50% of fabric 1 obscured by amorphous sesquioxide impregnation; very few (*c* 2%) sesquioxide nodules, sub-rounded, 50–400µm; very few (*c* 2%) rounded silt/clay aggregates with amorphous organic matter within groundmass, 50–100µm.

Lower half of upper horizon

The micromorphological description of the lower half (*c* 0.14–0.20m) of the upper horizon is as follows:

Structure: heterogeneous to partially homogeneous; *Porosity:* *c* 30%; many (*c* 20%) intrapedal, very fine (25–50µm) to medium (100–200µm), elongate, smooth to weakly serrated; few (*c* 10%) vughs, fine (100µm) to medium (300µm), rounded to sub-rounded, smooth to weakly serrated; *Mineral components: Fabric 1:* limit 100µm; coarse/fine fraction 35/55; coarse fraction: fine (10%) and medium (25%) quartz grains, sub-rounded to sub-angular, 100–300µm, random, unoriented; few (<1%) opaque mineral grains present; fine fraction: very fine (5%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 30% silt and 30% clay; amber to reddish-brown (PPL), golden brown (RL); speckled; *c* 80% of groundmass; *Fabric 2:* limit 100µm; coarse/fine fraction 20/80; fabric composition as for fabric 1 above; comprises amorphous zones of *c* 20% of groundmass of silty clay with fine organic matter and fine flecks of charcoal not fully homogenised with the surrounding fine fabric; *Organic component:* *c*<10%; mainly amorphous organic matter, much impregnated with sesquioxides, and abundant fine flecks of charcoal throughout groundmass; rare (<2%) large flecks of charcoal (0.5–2mm); *Groundmass:* fine: *Fabric 1:* granostriated, parallel to reticulate striated, moderately birefringent, discontinuous, medium (20–200µm) streaks, 50–200µm in length, moderately striated; *c* 60% of groundmass; *Fabric 2:* undifferentiated; coarse: porphyric; related: porphyric; *Pedofeatures: Textural:* rare (<1%) laminated, dusty clay coatings of grains; very abundant (*c* 25%) non-laminated dusty/dirty clay with silt and fine charcoal, as intercalations of groundmass and 'linings' of void space, moderate birefringence, yellow to amber (XPL); *Amorphous:* few (2%) sesquioxide nodules, 50–100µm; amorphous sesquioxide impregnation of most of the groundmass, especially of fabric 2); few (*c* 2%) rolled clay aggregates with organic matter, 50–100µm.

Lower horizon

The micromorphological description of the lower horizon (*c* 0.24–0.30m) is as follows:

Structure: heterogeneous to homogeneous; *Porosity:* *c* 20%; mainly (15%) intrapedal vughs, sub-rounded to irregular, smooth to weakly serrated, 50–300µm, random, unoriented; few (5%) intrapedal channels, elongate to irregular, smooth to weakly serrated, 50–200µm wide, 0.5–2mm long, random, unoriented; *Mineral components:* limit 100µm; coarse/fine ratio 60/40; coarse fraction: fine (20%) and medium (40%) quartz, sub-rounded to sub-angular, 100–300µm, random, unoriented; very few (<1%) opaque minerals present; very few (<1%) fine (2–6mm) sub-angular gravel pebbles; fine fraction: very fine (10%) quartz, 50–100µm, sub-rounded to sub-angular, random, unoriented; 15% silt and 15% clay; reddish-brown (PPL), golden brown (RL); *Organic components:* *c* 5–10%; mainly amorphous organic matter in groundmass; *Groundmass:* fine: partly undifferentiated, partly granostriated to mosaic speckled, weak birefringence, weakly striated, *c* 40% of groundmass; coarse: porphyric; related: porphyric; *Pedofeatures: Textural:* abundant (*c* 15%) non-laminated dusty/dirty clay as intercalations of groundmass 'linings' of voids and coatings of grains, moderate birefringence, yellow to amber to yellowish-orange (XPL); very rare (<1%) laminated dusty coatings of groundmass; *Fabric:* few (<5%) zones of more organic fine fabric not fully homogenised with groundmass; *Amorphous:* few (*c* 5–8%) sesquioxide nodules, 50–100µm and 2–5mm; very few (<2%) rolled clay with organic matter aggregates, 50–100µm; sesquioxide impregnation of most of groundmass.

Sample series C

Sample series C consisted of two contiguous samples taken from the buried soil on the western side of the enclosure interior (grid 38007330). Unlike sample series B, the buried soil exhibited only one horizon: a *c* 0.16m thick silt to sandy loam (10YR 4/3) with a weakly developed sub-angular blocky ped structure and scattered gravel pebbles.

Upper half

The micromorphological description of the upper half of the buried soil (*c* 20–90mm) is as follows:

Structure: relatively well homogenised; *Porosity:* *c* 20%; mainly (*c* 10%) intrapedal channels, smooth to weakly serrated, *c* 0.5–2mm wide, *c* 10–25mm long, random, unoriented; few (*c* 6%) intrapedal channels, smooth to weakly serrated, 1–10mm long, 100–400µm wide, random, unoriented; few (*c* 4%) intrapedal vughs, rounded to sub-rounded, smooth to weakly serrated, 100–200µm and 0.5–2mm, random, unoriented; *Mineral components: Fabric 1:* limit 100µm; coarse/fine ratio 25/75; coarse fraction: fine (10%) and medium (15%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; very few fine gravel pebbles, 4–10mm; fine fraction: very fine (10%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 35% silt, 30% clay; golden/amber brown (PPL), reddish-brown (RL); speckled; *c* 70% of groundmass; *Fabric 2:* limit 100µm; coarse/fine ratio: 10/90; coarse fraction: medium (10%) quartz, sub-rounded to sub-angular, 200–250µm, random, unoriented; fine fraction: very fine (10%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 20% silt and 60% clay; dark to orangey-red (PPL), yellowish-orange (RL); speckled; *c* 30% of groundmass; *Organic component:* *c* 10%; mainly amorphous organic matter in groundmass; few (2%) very fine flecks of charcoal in groundmass; very rare (1%) coarse flecks of charcoal, 50–100µm; *Groundmass:* fine: granostriated, fine to medium (20–100µm); parallel to reticulate striated, discontinuous, moderate to high birefringence, fine to medium (20–100µm) streaks, 50–400µm in length, moderately striated, *c* 60% of groundmass; coarse: porphyric; related: porphyric; *Pedofeatures: Textural:* very abundant (*c* 25%) non-laminated dusty clay as intercalations of groundmass, moderate birefringence, yellow to amber (XPL); *Fabric:* very few (2%) irregular, discontinuous 'aggregates' of fine fabric in channel; *Amorphous:* few (10%) sesquioxide nodules, 50–200µm and 2–8mm; sesquioxide impregnation of up to *c* 50% of fine fabric; few (10%) rolled clay aggregates, 25–50µm, intimately bound with the fine fabric.

Lower half

The micromorphological description of the lower half of the buried soil (*c* 0.10–0.16m) at this location is as follows:

Structure: partially homogenised; poorly sorted; *Porosity:* *c* 30%; intrapedal channels (*c* 15%), elongate to irregular, smooth to weakly serrated, 50–400µm wide, 1–10mm long, random, unoriented; intrapedal vughs (*c* 15%), sub-rounded, smooth to weakly serrated, 50–200µm, random, unoriented; *Mineral components: Fabric 1*: limit 100µm; coarse/fine ratio

40/60; coarse fraction: fine (20%) and medium (20%) quartz, sub-rounded to sub-angular, 100–300µm, random, unoriented; very few (<1%) medium (10–20mm), angular gravel pebbles; fine fraction: very fine (10%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 25% silt and 25% clay; reddish-golden brown (PPL), reddish-brown (RL); speckled; *Fabric 2:* limit 100µm; coarse/fine ratio 10/90; coarse fraction: medium (10%) quartz, sub-rounded to sub-angular, 200–250µm, random, unoriented; fine fraction: very fine (10%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 20% silt and 60% clay; dark to orangey-red (PPL), yellowish-orange (RL); speckled; *c* 40% of groundmass; *Organic components:* *c* 5–10%; very few (<5%) fine flecks of charcoal in groundmass; few (5%) amorphous organic matter in groundmass; *Groundmass:* fine: granostriated, thin to medium (20–100µm), and random striated to mosaic speckled, discontinuous, moderate to high birefringence, fine to medium (20–100µm), 50–200µm long, moderately striated, *c* 40% of groundmass; coarse: porphyric to undifferentiated; related: porphyric; *Pedofeatures: Textural:* occasional (*c* 2–5%) limpid clay in groundmass; very abundant (*c* 25%) non-laminated dusty clay as intercalations in groundmass, moderate birefringence, yellow to amber to yellowish-orange (XPL); *Fabric:* very few (<1%) relic nodules/fragments of impure clay with silt and organic matter, rounded to sub-rounded, 100–200µm; *Amorphous:* frequent (*c* 15%) sesquioxide nodules intimately bound with fine fraction, mainly in fabric 1, 50–300µm, 0.5–12mm; sesquioxide impregnation of most of groundmass; few to frequent (10–15%) rolled clay aggregates containing silt and fine organic matter, 50–100µm, intimately bound with fine fabric, mainly in fabric 1.

Sample series D

Sample series D consisted of three contiguous samples taken from the buried soil outside and to the north of enclosure ditch segment 5 and the stream channel at section 139 (grid 38337425). The buried soil here was a *c*0.25m thick silt to sandy loam (10YR 4/3) with a weakly developed sub-angular blocky ped structure and scattered gravel pebbles.

Upper third

The micromorphological description of the upper third of the buried soil (*c* 0–60mm) is as follows:

Structure: heterogeneous; *Porosity:* *c* 10%; few (5%) intrapedal channels, elongate to irregular, smooth to weakly serrate, 100–500µm wide, 0.5–8mm long, random, unoriented; few (5%) intrapedal vughs, sub-rounded to irregular, smooth to weakly serrated, 0.5–2mm, random, unoriented; *Mineral components: Fabric 1:* limit 100µm; coarse/fine ratio 40/60; coarse fraction: fine (25%) and medium (15%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine quartz (10%), sub-rounded to sub-angular, 50–100µm, random, unoriented; 30% silt and 20% clay; gold to reddish-brown (PPL), reddish-brown (RL); speckled; *c* 70–80% of groundmass; *Fabric 2:* limit 100µm; coarse/fine ratio 40/60; coarse fraction: fine (10%) and medium (30%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine (20%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 20% silt and 20% clay; brown (PPL), light yellowish-brown (RL); very weakly speckled; *c* 20–30% of groundmass; *Organic components:* *c* 5% in fabric 1; mainly amorphous organic matter and very fine flecks of charcoal in groundmass; *c* 20% in fabric 2; frequent (10–15%) fine flecks of charcoal in groundmass, 50–100µm, and very fine flecks in clay coatings and groundmass, 20–50µm; few (5–10%) zones of amorphous organic matter; *Groundmass:* fine: *Fabric 1:* mosaic speckled, *c* 50% of groundmass; *Fabric 2:* granostriated, fine to medium (20–100µm); random striated, discontinuous, moderate to high birefringence, fine to medium (20–100µm), 50–200µm long, weak to moderately striated, *c* 50% of groundmass; coarse: porphyric, both fabrics; related: porphyric, both fabrics; *Pedofeatures: Textural:* abundant (*c* 15–20%) non-laminated dusty clay, as intercalations of groundmass and 'linings' of voids, moderate birefringence, yellow (XPL) in fabric 1, amber (XPL) in fabric 2; *Fabric:* two fabrics as above; fabric 2 contains much fine amorphous organic matter, very fine flecks of charcoal and much amorphous sesquioxide impregnation; also occasionally (*c* 2–5%) occurs as loose, discontinuous infills in channels; *Amorphous:* few (*c* 5%) rolled clay aggregates, 50–100µm; much of fabric 2 is sesquioxide impregnated.

Middle third

The micromorphological description of the middle third of the buried soil (*c* 80–160mm) is as follows:

Structure: apedal; homogeneous; *Porosity:* *c* 30%; mainly vughs (25%), sub-rounded to irregular, smooth to weakly serrated, 50–300µm, random, unoriented; few (5%) channels, elongate to irregular, smooth to weakly serrated, 300–500µm and 0.5–2mm wide, 300–500µm long, random, unoriented; *Mineral components:* limit 100µm; coarse/fine ratio 35/65; coarse fraction: fine (5%) and medium (30%) quartz, sub-rounded to sub-angular, 100–300µm, random, unoriented; fine fraction: very fine (5%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 25% silt and 35% clay; yellow to golden reddish-brown (PPL), golden brown (RL); speckled; *Organic component:* <5%; some fine amorphous organic matter; very few flecks of fine charcoal in groundmass; *Groundmass:* fine: granostriated to random to reticulate striated, discontinuous, moderate to high birefringence, fine to medium streaks (20–100µm), 50–300µm long, weak to moderately striated, *c* 30% of groundmass; *Pedofeatures: Textural:* abundant to very abundant (*c* 20–25%) non-laminated dusty clay, as intercalations of groundmass and as 'linings' of voids, moderate birefringence, yellow to amber (XPL); very rare (<1%) laminated dusty coatings of grains and groundmass; *Amorphous:* zones of sesquioxide/manganese impregnation of groundmass, up to *c* 25% of groundmass; very few (2%) sesquioxide nodules, 50–100µm; very few (<5%) rolled clay aggregates, 50–100µm.

Lower third

The micromorphological description of the lower third of the buried soil (*c* 0.18–0.25m) is as follows:

Structure: apedal; homogeneous; *Porosity:* *c* 20%; few (5%) channels, smooth to weakly serrated, 50–400µm wide, 0.2–4mm long, random, unoriented; mainly vughs (15%), sub-rounded to irregular, smooth to weakly serrated, 50–300µm, random, unoriented; *Mineral components:* limit 100µm; coarse/fine ratio 35/65; coarse fraction: fine (5%) and medium (30%) quartz, sub-rounded to sub-angular, 50–100μm, random, unoriented; fine fraction: very fine quartz (5%), sub-rounded to sub-angular, 50–100μm, random, unoriented; 25% silt and 35% clay; golden to reddish-brown (PPL), reddish-brown (RL); speckled; *Organic component:* <2%; little amorphous organic matter in groundmass; very few fine flecks of charcoal in groundmass, 20–50μm; *Groundmass:* fine: stipple to mosaic speckled to granostriated, 20–50μm thick; coarse: porphyric; related: porphyric; *Pedofeatures: Textural:* abundant (20%) non-laminated dusty clay, as intercalations of groundmass and 'linings' of voids, moderate birefringence, yellow to amber to yellowish-orange (XPL); *Amorphous:* very few (2%) sesquioxide nodules, 50–100μm, sub-rounded; much sesquioxide impregnation of groundmass, up to *c* 50%; very few (2%) rolled clay aggregates in groundmass, 50–100μm.

Sample series E

Sample series E consisted of two contiguous samples taken from the buried soil within the interior of the causewayed enclosure at *c* grid 38757335. The palaeosol was a *c* 0.15m thick loam (10YR 4/3) with a weakly developed sub-angular blocky ped structure and scattered gravel pebbles.

Upper half

The micromorphological description of the upper half of the buried soil (*c* 0–80mm) is as follows:

Structure: apedal to weakly developed sub-angular blocky; homogeneous; *Porosity: c* 30%; frequent intrapedal vughs (*c* 25%), sub-rounded to sub-angular to irregular, smooth to weakly serrated, 50–300μm, random, unoriented; few (*c* 5%) intrapedal channels, smooth to weakly serrated, elongated, walls unaccommodated, 50–300μm wide, 0.2–4mm long, random, unoriented; *Mineral components:* limit 100μm; coarse/fine ratio 30/70; coarse fraction: medium (20%) and fine (10%) quartz, sub-rounded to sub-angular, 100–300μm, random, unoriented; fine fraction: very fine (5%) quartz, sub-rounded to sub-angular, 50–100μm, random, unoriented; 30% silt and 35% clay; golden brown (PPL), light yellowish-brown to brown (RL); moderately speckled; *Organic component:* <2%; little amorphous organic matter in groundmass; very few very fine flecks of charcoal in groundmass; *Groundmass:* fine: mosaic speckled, *c* 40% of groundmass; granostriated and random to weakly reticulate striated, discontinuous, fine to medium (20–50μm) thick, 100–300μm long, weak to moderately striated, *c* 30% of groundmass; coarse: undifferentiated; related: porphyric; *Pedofeatures: Textural:* very rare (<1%) limpid coatings in groundmass, red/yellow (XPL), weak to moderate birefringence; very rare (<1%) laminated dusty coatings of grains, reddish-yellow (XPL), moderate birefringence; abundant (*c* 20%) non-laminated dusty clay, as intercalations of groundmass and 'linings' of voids, moderate birefringence, yellow to amber (XPL); *Amorphous:* few (5–10%) sesquioxide nodules, rounded to sub-rounded, 50–250μm, 1–3mm; zones of sesquioxide impregnation of groundmass (*c* 20–50%); very few (2%) aggregates of clay and organic matter, rounded to sub-rounded, 50–150μm; one clay nodule, 150μm, rounded, composed of micro-laminated limpid and speckled (dusty) clay, red to reddish-black (PPL), diffuse to sharp extinction; *Fabric:* three large papules of different fabric; 12 × 13mm, 8 × 10mm, and 3 × 6mm in diameter; rounded to sub-rounded, composed of fine quartz (60%), silt (20%), and clay (20%), with fines heavily impregnated with sesquioxides; with abundant (15–20%) textural features: rare (2%) strongly oriented limpid clay in groundmass; abundant (10–15%) laminated dusty clay coatings in groundmass, diffuse to sharp extinction; and occasional (5%) non-laminated dusty clay of grains and groundmass.

Lower half

The micromorphological description of the lower half of the buried soil (*c* 80–150mm) is as follows:

Structure: apedal; homogeneous; *Porosity: c* 20%; frequent (*c* 18%) vughs, rounded to sub-rounded to irregular, smooth to weakly serrated, 50–300μm, random, unoriented; very few (<2%) channels, elongate, smooth to weakly serrated, walls unaccommodated, 50–150μm wide and 100–500μm long, random, unoriented; *Mineral components:* limit 100μm; coarse/fine ratio 30/70; coarse fraction: medium (20%) and fine (10%) quartz, sub-rounded to sub-angular, 100–300μm, random, unoriented; fine fraction: very fine (5%) quartz, sub-rounded to sub-angular, 50–100μm, random, unoriented; 30% silt and 35% clay; golden/reddish-brown (PPL), light to medium brown (RL); moderately speckled; *Organic component:* <2%; little amorphous organic matter in groundmass; very few fine flecks of charcoal in groundmass, 50–150μm; *Groundmass:* fine: mosaic speckled, *c* 20% of groundmass; granostriated, random to very weakly reticulate striated, discontinuous, fine to medium (20–50μm) thick, 100–300μm long, weakly striated, <20% of groundmass; coarse: undifferentiated; related: porphyric; *Pedofeatures: Textural:* rare (*c* 2%) limpid clay in groundmass and of voids as partial infills, red and reddish-yellow (XPL), weak to moderate birefringence, sharp extinction; rare (*c* 2%) laminated dusty clay in groundmass and voids, yellow (XPL), moderate birefringence, diffuse to sharp extinction; abundant *c* 20%) non-laminated dusty clay, as intercalations of groundmass and 'linings' of voids, moderate birefringence, yellow to amber (XPL); *Amorphous:* very few (<2%) sesquioxide nodules, rounded to sub-rounded, 150–300μm; common zones of sesquioxide impregnation of groundmass and walls of voids, *c* 50% of groundmass; very few (2%) rolled aggregates of silt and clay, and clay and organic matter, in groundmass, rounded to sub-rounded, 50–150μm; *Fabric:* one large nodule, sub-rounded, 500–1000μm, composed of juxtaposed fragments of laminated and non-laminated dusty clay (*c* 60%), 20–50μm wide, 50–100μm long, *c* 40% very fine and fine quartz, sub-rounded to sub-angular; one papule within groundmass, sub-rounded, 250 × 400μm, composed of very fine quartz (*c* 50%), silt (*c* 30%), and clay (*c* 20%), with abundant textural coatings: many (10%) non-laminated and laminated (10%) dusty clay coatings of groundmass, *c* 25% sesquioxide impregnation of fine fabric, and fine fraction exhibits random to reticulate-striated groundmass.

Sample series F

Sample series F consisted of two contiguous samples taken from the buried soil within the enclosure at *c* grid 38707390. The buried soil was a *c* 0.13m thick silty clay loam (10YR 4/3) with a weakly/moderately developed sub-angular blocky ped structure and scattered gravel pebbles.

Upper half

The micromorphological description of the upper half of the buried soil (*c* 10–80mm) is as follows:

Structure: homogeneous; *Porosity:* *c* 25–30%; *c* 15% intrapedal vughs, sub-rounded to irregular, 50–300µm, smooth, random, unoriented; *c* 15% intrapedal channels, elongate to irregular, smooth to weakly serrated, 50–800µm wide, up to *c* 20mm long, random, unoriented; *Mineral components: Fabric 1:* limit 100µm; coarse/fine ratio 30/70; coarse fraction: medium (20%) and fine (10%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine (20%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 30% silt and 20% clay; brown to dark brown (PPL), dark yellowish-brown (RL); very weakly speckled; *c* 70% of groundmass; *Fabric 2:* limit 100µm; coarse/fine ratio 20/80; coarse fraction: medium (10%) and fine (10%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine (10%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 40% silt and 30% clay; amber brown (PPL), yellowish-brown (RL); weakly speckled; *c* 30% of groundmass; *Organic component:* *c* 20%; <20% amorphous organic matter within fine fabric of fabric 1; <1% very fine flecks of charcoal in groundmass; *Groundmass:* fine: mosaic speckled and weakly granostriated to very weakly reticulate striated, *c* 25–50µm wide, *c* 45° to soil surface; coarse: undifferentiated; related: porphyric; *Pedofeatures: Textural:* rare (2%) laminated dusty clay in voids, mainly in fabric 2; abundant (*c* 20%) non-laminated dusty clay, as intercalations of groundmass and 'linings' of voids, weak to moderate birefringence, dark yellow (XPL), in fabrics 1 and 2; *Fabric:* very few (1%) aggregates of fine fabric as partial, discontinuous infills in channels; *Amorphous:* few (<5%) rounded sesquioxide nodules, 50–100µm; very few (<1%) rolled silt/clay aggregates, 50–100µm, reddish-black (XPL); common zones (up to 40% of groundmass) of amorphous sesquioxide impregnation.

Lower half

The micromorphological description of the lower half of the buried soil (*c* 90–130mm) is as follows:

Structure: homogeneous; *Porosity:* *c* 25–30%; *c* 15–20% intrapedal vughs, sub-rounded to irregular, smooth, 50–500µm, random, unoriented; *c* 10% intrapedal channels, elongate to irregular, smooth to weakly serrated, 50–200µm wide, 1–8mm long, partially accommodated, random, unoriented; *Mineral components: Fabric 1:* limit 100µm; coarse/fine fraction 30/70; coarse fraction: medium (20%) and fine (10%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine (10%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 30% silt and 30% clay; amber brown (PPL), light yellowish-brown (RL); very weakly speckled; *c* 80% of groundmass; *Fabric 2:* as for first sample description above; *c* 20% of groundmass; *Organic component:* *c* 10%; <10% amorphous organic matter in the groundmass; very few (<1%) very fine flecks of charcoal in groundmass; *Groundmass:* fine: mosaic speckled; coarse: undifferentiated; related: open porphyric; *Pedofeatures: Textural:* abundant (*c* 20%) non-laminated dusty clay, as intercalations of groundmass and 'linings' of voids, moderate birefringence, yellow to amber (XPL); *Amorphous:* few (*c* 2–5%) sesquioxide nodules, rounded, 50–150µm, rarely 1–2mm; very few (<2%) silt/clay aggregates, rounded to sub-rounded, 50–75µm, reddish-black (XPL); zones (up to 75% of groundmass) of amorphous sesquioxide impregnation.

Sample series G

Sample series G consisted of two contiguous samples from the buried soil within the interior of the enclosure at *c* grid 38757365. The buried soil was a *c* 0.14m thick silty clay loam (10YR 4/3) with scattered gravel pebbles.

Upper half

The micromorphological description of the upper half of the buried soil (*c* 10–70mm) is as follows:

Structure: slightly heterogeneous; *Porosity:* *c* 15%; *c* 7% intrapedal vughs, sub-rounded to rounded, smooth to weakly serrated, 50–250µm, random, unoriented; *c* 8% intrapedal channels, irregular, smooth to weakly serrated, walls partially accommodated, 50–150µm and 0.5–1.5mm wide, 200–1000µm and 12mm long, random, unoriented; *Mineral components: Fabric 1:* limit 100µm; coarse/fine ratio 25/75; coarse fraction: medium (20%) and fine (5%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine (5%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 35% silt and 35% clay; reddish-brown (PPL), light yellowish-brown (RL); weakly speckled; *c* 95% of groundmass; *Fabric 2:* limit 100µm; coarse/fine ratio 5/95; coarse fraction: fine (5%) quartz, sub-rounded to sub-angular, 100–200µm, random, unoriented; fine fraction: very fine (10%) quartz, sub-rounded to sub-angular, 50-100µm, random, unoriented; 40% silt and 45% clay; dark brown (PPL), reddish orange (RL); weakly speckled; *c* 5% of groundmass; *Organic component:* *c* 10%; mainly (<10%) amorphous organic matter in the groundmass of fabric 1; very few (<1%) very fine flecks of charcoal in groundmass of fabric 1; *Groundmass:* fine: mosaic speckled; coarse: undifferentiated; related: open porphyric; *Pedofeatures: Textural:* abundant (*c* 20%) non-laminated dusty clay, as intercalations of groundmass, moderate birefringence, yellow to amber (XPL); *Fabric:* very few (*c* 2%) loose discontinuous aggregates of fine fabric of fabric 1 in voids; *Amorphous:* few (*c* 5%) rounded sesquioxide nodules, 50–150µm; very few (*c* 2%) rolled silt/clay aggregates; sesquioxide impregnation of *c* 50% of fabric 1 and *c* 75% of fabric 2.

Lower half

The micromorphological description of the lower half of the buried soil (*c* 80–140mm) is as follows:

Structure: heterogeneous; *Porosity:* *c* 20%; mainly intrapedal vughs, irregular, smooth, 50–250µm, random, unoriented; *Mineral components: Fabric 1:* limit 100µm; coarse/fine ratio 30/70; coarse fraction: fine (10%) and medium (20%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine (20%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 30% silt and 20% clay; dark brown (PPL), orangey-brown (RL); very weakly speckled; *c* 70% of groundmass; *Fabric 2:* limit 100µm; coarse/fine ratio 30/70; coarse fraction: medium (20%) and fine (10%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine (15%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 35% silt and 20% clay; pale to dark brown (PPL), yellowish-orange (RL); weakly speckled; *c* 30% of groundmass; *Organic component: c* 10%; mainly (*c* 8%) amorphous organic matter in groundmass; very few (*c* 2%) very fine flecks of charcoal in groundmass; *Groundmass:* fine: stipple to weakly mosaic speckled; coarse: undifferentiated; related: porphyric; *Pedofeatures: Textural:* rare to occasional (2–5%) non-laminated dusty clay, as intercalations of groundmass of both fabrics, and as <50µm fragments in fabric 1, moderate birefringence, yellow to amber (XPL); very rare (<1%) laminated dusty clay within groundmass of fabric 1; *Amorphous:* few (*c* 5%) rounded sesquioxide nodules, 50–200µm; few (*c* 5%) silt/clay aggregates, rounded, 50–100µm, reddish-black (XPL); *c* 90% of fine fabric impregnated with amorphous sesquioxides.

Sample series H

Sample series H consisted of two contiguous samples taken from the buried soil within the interior of the enclosure at *c* grid 39007390. The buried soil was a *c* 0.14m thick silty clay loam (10YR 4/3) with scattered gravel pebbles.

Upper half

The micromorphological description of the upper half of the buried soil (*c* 10–80mm) is as follows:

Structure: relatively homogeneous; *Porosity: c* 25%; *c* 15% intrapedal vughs, irregular, smooth to weakly serrated, 100–500µm, random, unoriented; *c* 10% intrapedal channels, elongate to irregular, 25–200µm wide, 0.5–8mm long, random, unoriented; *Mineral components:* limit 100µm; coarse/fine ratio 20/80; coarse fraction: fine (10%) and medium (10%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine (10%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 40% silt and 30% clay; brown (PPL), light yellowish-brown (RL); very weakly speckled; *Organic component: c* 15%; *c* 10% amorphous organic matter in groundmass; *c* 5% very fine flecks of charcoal in groundmass; *Groundmass:* fine: stipple/mosaic speckled to reticulate striated, striations *c* 25–50µm thick, weakly striated, *c* 10% of fine fabric, *c* 45° to soil surface; coarse: undifferentiated; related: open porphyric; *Pedofeatures: Textural:* abundant (*c* 20%) non-laminated dusty clay, mainly as intercalations of groundmass, weak to moderate birefringence, gold to amber (XPL); *Fabric:* few (*c* 2–5%) zones of fine fraction as loose, discontinuous aggregates in void space; *Amorphous:* few (*c* 5%) silt/clay aggregates, 50–100µm, rounded to sub-rounded, reddish-black (XPL); few (<5%) sesquioxide nodules, sub-rounded, 100–300µm; common zones of amorphous sesquioxide impregnation of groundmass, *c* 25–50% of groundmass.

Lower half

The micromorphological description of the lower half of the buried soil (*c* 90–140mm) is as follows:

Structure: homogeneous; *Porosity: c* 30%; *c* 20% intrapedal vughs, irregular to sub-rounded, 50–500µm, smooth to weakly serrated, random, unoriented; c 10% intrapedal channels, irregular, weakly serrated, 50–200µm wide, 500µm–4mm long, random, unoriented; *Mineral components:* limit 100µm; coarse/fine fraction 25/75; coarse fraction: fine (5%) and medium (20%) quartz, sub-rounded to sub-angular, 100–250µm, random, unoriented; fine fraction: very fine (15%) quartz, sub-rounded to sub-angular, 50–100µm, random, unoriented; 40% silt and 20% clay; brown (PPL), orangey-brown (RL); very weakly speckled; *Organic component: c* 15%; *c* 10% amorphous organic matter in groundmass; *c* 5% very fine flecks of charcoal in groundmass; very few (<1%) large, sub-angular flecks of charcoal, *c* 300–500µm; *Groundmass:* fine: mosaic speckled and reticulate striated, striations <50µm thick, weakly striated, *c* 20% of fine o fabric, *c* 45 to soil surface; *Pedofeatures: Textural:* abundant (15%) non-laminated dusty clay, as intercalations of groundmass, moderate birefringence, reddish-yellow (XPL); *Amorphous:* few (*c* 5%) silt/clay aggregates, rounded to sub-rounded, 50–200µm, incorporated within fine fraction; very few (*c* 2%) sesquioxide nodules, sub-rounded, 100–200µm; common (up to 50% of groundmass) zones of amorphous sesquioxide impregnation.

Sample series J–N

A further five sample series (J–N) were taken through the buried soil at five different positions within the interior of the enclosure. J was at grid 39207400, K at 38757335, L at 39907360, M at 38707420, and N at 39207370. They were analysed in thin section, and as all of these samples were similar in composition and micromorphological features to the profiles already described, only the variations in the descriptions will be described below.

In sample series J, the upper sample was identical to the upper sample of series H, except that it had a slightly denser fabric (*c* 20% porosity). The lower sample was identical to the lower sample of series H. Thus the palaeosol here was a relatively homogeneous, organic, lower A horizon.

Although sample series K was basically similar to the other profiles (H and J), this buried soil profile appeared to be slightly disturbed. There were a few (*c* 5%) loose discontinuous infills of fine/medium sand-size, sub-angular fragments of the fine fraction within the intrapedal channels and vughs. There was also much less (<25%) sesquioxide impregnation of the fine fabric.

The profile at sample series L was also similar to the above profiles (H, J, K), although it contained very rare (<1%) limpid clay fragments (<25µm) in the groundmass. As in sample series K, this sample of the buried soil also exhibited slight signs of disturbance in the form of loose, discontinuous infills of fine fabric in the voids.

The profiles at sample series M and N were also similar to the above profiles, and like the soil at profiles K and L they also exhibited signs of slight soil disturbance.

Appendix 3 Concordance lists of field pottery numbers and numbers used in the illustrations

compiled by Ian Kinnes and Francis Pryor

During the excavation of Etton, pottery sherds were assigned pot find numbers as they were cleaned and processed. During post-excavation analysis, the specialist report (see Chapter 5) used a separate numbering system according to the type of pottery (eg Mildenhall, Fengate). The latter numbering system was also applied to the selective pot drawings.

The following concordance lists will therefore enable the reader to correlate the pottery descriptions with the drawings.

Part 1 Field: Illustration numbers

field number	*illustration number*	*notes*
1	FG50	
3	M12	
7	U1	
16	M19	(includes 553, 624)
31	B1	(includes B2)
39	GW4	
43	B2	
44	B2	
50	M10	
53	GW13	(includes 300)
70	M131	
89	M3	
90	M3	
92	M1	(includes 2937)
97	GW5	(includes 4693)
98	GW21	
109	GW2	
111	GW3	
126	GW1	
130	M7	
131	M8	
144	B5	
147	B4	
148	B4	
153	B7	(includes 178)
155	M282	
219	M13	
235	FG20	
239	GW22	
240	M2	
246	M11	
248	M370	
255	GW19	
285	M26	
286	M371	
290	M31	
291	M30	
292	M28	
293	M28	
297	M27	
368	FG1+B672+B1611+B688	
384	M29	
412	M38	
442	FG41	
449	M245	
462	M38	(includes M39)
463	M37	
464	M18	
465	M18	
466	M18	
467	M21	
468	M22	
483	M15	
545	M16	
549	M14	
554	M17	
575	M35	
580	M34	
591	M33	
601	M36	
609	M25	
611	M24	
612	M24	
613	M24	
617	M32	
620	M41	
625	M42	
628	M23	
710	M40	
893	U9	
895	U10	
914	E1	
969	M47	
970	M291	
980	M413	
986	M285	
997	M293	
1004	M44	
1007	M43	
1010	M46	
1024	M45	
1025	M45	
1026	M49	
1040	M259	
1041	M261	(includes 1049)
1059	M260	
1067	M296	
1069	M295	
1078	M297	
1082	M270	
1123	M272	
1126	M274	
1129	M273	
1130	M277	
1137	M376	
1205	M284	
1206	M266	
1225	M292	
1243	M298	
1245	M58	
1248	M59	
1302	M301	
1303	M302	
1319	M286	
1335	FG54	
1345	FG52	
1360	M248	
1363	M249	
1369	M250	
1376	FG56	
1382	M251	
1386	FG57	
1402	M247	
1406	M246	
1431	M262	
1432	M262	
1438	M265	
1449	M283	
1513	M268	
1515	GW23	(includes 1518)
1622	FG53	
1527	M263	
1554	M51	
1557	M282	
1559	M56	(includes 1600)
1567	M52	
1570	M53	
1595	M287	
1601	M264	
1608	M294	
1616	M253	
1649	M254	
1656	M255	
1701	M278	
1711	M290	
1714	M289	
1727	M304	
1739	M305	

field number	*illustration number*	*notes*
1755	M279	
1764	M281	
1775	M57	
1776	B3	
1781	M417	
1814	M271	
1816	M300	
1838	M252	
1847	FG51	
1850	M303	
1855	M299	
1868	M269	
1869	M269	
1870	M269	
1895	M67	
1906	M280	
1909	M50	
1916	M54	
1923	M48	
1930	M55	
1932	M60	
1954	M307	
1956	B10	
1959	M352	
1981	M306	
1982	M306	
1983	M306	
1984	M306	
2009	M408	
2010	M407	
2012	M412	
2019	M68	(includes 2088)
2029	M414	
2032	M410	
2040	M406	
2048	M411	
2059	M62	
2070	M65	
2079	M66	
2092	PR1	
2101	FG2	
2110	PR3	(includes 2114)
2112	M70	(includes M72)
2119	M71	
2127	M63	
2142	M359	
2143	M356	
2152	M64	
2155	M67	
2164	FG4	
2171	M73	
2177	M61	
2182	M82	
2192	M80	
2199	U4	
2204	FG9	
2206	M69	
2214	E2	(includes PR2)
2220	M74	(includes 2224)
2228	M75	
2237	M76	
2241	M84	
2244	M83	
2246	M405	
2254	M86	
2255	FG3	
2277	M77	
2280	M95	(includes 2817)
2286	M87	
2288	M85	
2297	M88	
2306	M81	
2307	M79	
2308	M78	
2309	FG7	
2318	M99	
2323	M100	
2327	M114	
2339	GW7	
2340	GW7	
2341	GW7	
2345	GW10	(includes 2365–6)
2346	GW10	(includes 2365–6)
2347	GW10	(includes 2365–6)
2348	GW9	
2350	PR4	
2352	M90	
2360	M378	(includes M379)
2387	M123	
2390	FG5	
2392	E3	(includes FG6)
2397	M361	
2400	U3	
2418	M103	
2420	U2	
2429	M104	
2441	M105	
2442	M107	
2443	M106	
2460	M330	
2467	FG63	(includes FG64, 2471)
2482	M308	
2493	M333	
2516	FG11	
2517	GW11	
2519	FG10	(includes 2718)
2521	GW12	
2523	FG13	
2525	FG14	
2529	FG12	
2530	FG15	
2533	FG21	
2546	M96	
2566	M152	
2574	FG20	
2581	FG16	
2588	M130	
2594	M93	
2596	M120	
2626	M336	
2632	M111	
2634	M110	
2639	M108	(includes 3523)
2641	M109	
2644	M321	
2663	M126	
2671	PR60	
2674	M380	
2680	M335	
2686	M322	
2688	M334	
2694	M112	
2696	M113	
2701	M319	
2711	M375	
2713	U5	
2715	M144	
2717	FG17	
2725	FG58	
2728	M318	
2730	M317	
2749	M141	
2754	FG8	
2777	M348	
2778	M348	
2779	M348	
2789	M349	
2796	M117	(includes 2809)
2802	M116	
2806	M118	
2807	M115	
2810	M119	
2814	M94	
2830	M92	(includes 2844)
2831	M92	(includes 2844)
2833	M134	
2834	M133	
2835	PR7	
2836	M127	
2837	M135	
2841	PR8	
2866	M381	
2869	M391	
2870	M387	
2873	FG18	(includes 2787, 2884)
2880	FG22	
2881	FG22	
2882	FG22	
2907	M372	
2908	M372	
2923	M393	
2924	M377	
2926	M392	
2930	M102	
2936	M369	
2962	M97	
2963	M97	
2968	M132	
2974	M125	
2977	M101	
2979	M394	
2981	M383	
2987	M98	
2995	FG68	
2998	M329	
2999	M328	
3015	M320	

field number	*illustration number*	*notes*
3029	GW24	
3036	M312	
3040	M311	
3041	M403	
3049	M384	
3056	GW26	(includes 3059, 3069)
3063	GW25	
3094	M288	
3095	M382	
3119	EBA2	
3137	M351	
3208	M415	(includes M418)
3232	FG19	
3245	B9	
3246	M316	
3253	M389	
3282	GW27	
3296	FG65	
3310	M388	
3338	M353	
3353	M122	
3355	M350	
3358	M374	
3367	GW8	
3397	M390	(includes 3408)
3400	M385	
3416	FG66	
3417	FG67	
3422	M395	
3427	M309	(includes M310, M313, M314)
3432	FG61	
3435	M368	
3439	M326	
3444	FG69	
3467	M409	
3476	M419	
3479	M258	
3480	M257	
3481	M256	
3482	M256	
3484	M416	
3491	PR12	
3493	M404	
3501	M275	
3517	FG55	
3550	M373	
3558	U11	
3559	FG62	
3568	M213	
3569	M213	
3570	FG44	
3576	M212	
3581	M206	(includes 3586)
3583	M207	
3585	M208	
3588	M209	
3629	M211	
3634	M195	
3639	M200a	
3639	BA1	(includes EBA3 and M200a)
3644	M201	
3648	M202	
3655	GW17	
3659	M204	(includes 3661–3)
3660	M205	(includes 3664)
3666	M203	
3669	GW15	(includes 3778)
3677	GW14	
3681	GW13	
3683	M210	
3688	M183	
3689	FG38	
3690	FG39	
3693	U6	
3694	FG42	
3701	FG37	
3705	M184	
3711	FG40	
3712	FG41	
3727	M199	
3732	M196	
3741	M197	
3744	M200	
3749	M166	(includes 3871)
3768	GW16	
3772	FG34	
3781	FG33	
3785	PR5	(includes 3795)
3803	FG43	
3817	FG29	
3825	FG31	
3829	FG27	
3834	FG30	
3838	FG28	
3841	PR8	
3852	FG32	
3870	M169	
3878	M167	
3888	M168	
3889	M165	
3890	M170	
3891	FG26	
3895	M139	
3897	FG35	
3898	M140	
3901	M138	
3903	M186	
3904	M174	
3908	M192	
3909	M190	
3910	M193	
3913	M191	
3920	GW31	(includes 4511)
3924	M188	
3928	M187	
3960	FG36	
3975	M171	(includes M172)
3987	M173	
3997	M154	
4001	M156	
4002	M155	
4006	M137	
4015	M181	
4019	M179	
4025	M178	(includes 4027–8)
4026	M177	
4036	M182	
4058	M145	
4070	M147	
4083	M146	
4088	M149	(includes 4122)
4093	FG25	
4096	FG24	
4102	FG23	
4114	M157	
4125	M161	
4126	M162	
4133	M185	
4134	M150	
4148	FG48	
4149	FG48	
4150	FG48	
4151	FG48	
4152	FG48	(includes 4191)
4155	U7	
4161	M159	
4169	M158	
4180	M160	
4186	M214	
4187	E5	
4188	E5	
4190	FG47	
4207	M397	
4209	M401	
4211	GW38	
4123	GW41	
4214	GW40	
4223	M337	
4224	M339	
4225	M338	
4230	M346	
4239	GW36	(includes 4566)
4240	GW36	(includes 4566)
4242	GW37	
4245	FG46	
4246	M148	
4247	M148	
4248	M148	
4260	M227	
4264	E7	
4268	GW34	
4268a	GW33	
4276	M331	
4286	M136	
4288	M343	
4293	M341	
4294	M347	
4319	B8	
4323	M344	
4328	M345	
4331	M342	
4332	M231	
4340	M237	
4341	M235	(includes 4365)
4346	M323	(includes 4390)
4353	M238	

field number	*illustration number*	*notes*
4358	M234	
4359	M233	
4362	M239	
4370	PR9	(includes 4375)
4376	FG45	
4382	M228	
4383	M229	
4391	M242	
4392	M241	(includes 4400)
4401	M236	
4402	M230	
4403	GW35	(includes 4507)
4404	GW35	(includes 4507)
4408	M240	
4413	M218	
4424	M217	
4440	M222	(includes 4454)
4442	M121	
4443	M14	
4444	M122	
4448	M143	
4456	M220	
4457	M221	
4462	M215	
4463	M216	
4471	M226	
4472	M225	
4473	M315	
4477	M340	
4478	M340	
4483	EBA3	
4488	M244	
4506	M224	
4507	M402	(includes 4551)
4511	GW29	(includes GW30)
4512	M332	
4513	GW29	(includes GW30)
4514	GW29	(includes GW30)
4518	M367	
4520	PR10	
4524	PR11	
4534	M327	
4539	M323	
4544	M324	
4545	M325	
4548	M198	
4549	FG60	
4550	M400	
4552	M399	
4553	M399	
4558	M9	
4561	M4	
4563	M5	
4564	M6	
4567	GW39	
4577	M219	
4578	M223	
4581	M189	
4582	M194	
4627	M355	
4630	M354	
4640	M398	
4642	M363	
4646	M366	
4649	M364	
4654	M365	
4667	M151	(includes 4674–5)
4669	M360	(includes M362)
4671	M164	
4681	M357	
4694	M376	
4715	M128	
4716	GW6	
4718	E4	
4720	M89	
4721	M163	
4723	E5	
4736	GW30	

Part 2 Illustration: Field numbers

field number	*illustration number*	*notes*
B1	31	(includes B2)
B2	43	
B2	44	
B3	1776	
B4	147	
B4	148	
B5	144	
B7	153	(includes 178)
B8	4319	
B9	3245	
B10	1956	
E1	914	
E2	2214	(includes PR2)
E3	2392	(includes FG6)
E4	4718	
E5	4187	
E5	4188	
E5	4723	
E7	4264	
EBA1	3639	(includes EBA3 and M200a)
EBA2	3119	
EBA3	4483	
FG1+ B161	368	
FG2	2101	
FG3	2255	
FG4	2164	
FG5	2390	
FG7	2309	
FG8	2754	
FG9	2204	
FG10	2519	(includes 2718)
FG11	2516	
FG12	2529	
FG13	2523	
FG14	2525	
FG15	2530	
FG16	2581	
FG17	2717	
FG18	2873	(includes 2878, 2884)
FG19	3232	
FG20	235	
FG20	2574	
FG21	2533	
FG22	2880	
FG22	2881	
FG22	2882	
FG23	4102	
FG24	4096	
FG25	4093	
FG26	3891	
FG27	3829	
FG28	3838	
FG29	3817	
FG30	3834	
FG31	3825	
FG32	3852	
FG33	3781	
FG34	3772	
FG35	3897	
FG36	3960	
FG37	3701	
FG38	3689	
FG39	3690	
FG40	3711	
FG41	442	
FG41	3712	
FG42	3694	
FG43	3803	
FG44	3570	
FG45	4376	
FG46	4245	
FG47	4190	
FG48	4148	
FG48	4149	
FG48	4150	
FG48	4151	
FG48	4152	(includes 4191)
FG50	1	
FG51	1847	
FG52	1345	
FG53	1522	
FG54	1335	
FG55	3517	
FG56	1376	
FG57	1386	
FG58	2725	
FG59	3444	
FG60	4549	
FG61	3432	
FG62	3559	
FG63	2467	(includes FG64, 2471)
FG65	3296	
FG66	3416	
FG67	3417	
FG68	2995	
GW1	126	
GW2	109	
GW3	111	
GW4	39	
GW5	97	(includes 4693)
GW6	4716	
GW7	2339	
GW7	2340	
GW7	2341	
GW8	3367	
GW9	2348	
GW10	2345	(includes 2365–6)
GW10	2346	(includes 2365–6)
GW10	2347	(includes 2365–6)
GW11	2517	
GW12	2521	
GW13	53	(includes 300)
GW13	3681	
GW14	3677	
GW15	3669	(includes 3778)
GW16	3768	
GW17	3655	
GW19	255	
GW21	98	
GW22	239	
GW23	1515	(includes 1518)
GW24	3029	
GW25	3063	
GW26	3056	(includes 3059, 3069)
GW27	3282	
GW29	4511	(includes GW30)
GW29	4513	(includes GW30)
GW29	4514	(includes GW30)
GW30	4736	
GW31	3920	(includes 4511)
GW33	4268a	
GW34	4268	
GW35	4403	(includes 4507)
GW35	4404	(includes 4507)
GW36	4239	(includes 4566)
GW36	4240	(includes 4566)
GW37	4242	
GW38	4211	
GW39	4567	
GW40	4214	
GW41	4213	
M1	92	(includes 2937)
M2	240	
M3	89	
M3	90	
M4	4561	
M5	4563	
M6	4564	
M7	130	
M8	131	
M9	4558	
M10	50	
M11	246	
M12	3	
M13	219	
M14	549	
M14	4443	
M15	483	
M16	545	
M17	554	
M18	464	
M18	465	
M18	466	
M19	16	(includes 553,624)
M21	467	
M22	468	
M23	628	
M24	611	
M24	612	
M24	613	
M25	609	
M26	285	
M27	297	
M28	292	
M28	293	
M29	384	
M30	291	
M31	290	

field number	*illustration number*	*notes*
M32	617	
M33	591	
M34	580	
M35	575	(includes 578, 603, 607–8, 701)
M3	6	601
M37	463	
M38	412	
M38	462	(includes M39)
M40	710	
M41	620	
M42	625	
M43	1007	
M44	1004	
M45	1024	
M45	1025	
M46	1010	
M47	969	
M48	1923	
M49	1026	
M50	1909	
M51	1554	
M52	1567	
M53	1570	
M54	1916	
M55	1930	
M56	1559	(includes 1600)
M57	1775	
M58	1245	
M59	1248	
M60	1932	
M61	2177	
M62	2059	
M63	2127	
M64	2152	
M65	2070	
M66	2079	
M67	1895	
M68	2019	(includes 2088)
M69	2206	
M70	2112	(includes M72)
M71	2119	
M73	2171	
M74	2220	(includes 2224)
M75	2228	
M76	2237	
M77	2277	
M78	2308	
M79	2307	
M80	2192	
M81	2306	
M82	2182	
M83	2244	
M84	2241	
M85	2288	
M86	2254	
M87	2286	
M88	2297	
M89	4720	
M90	2352	
M9	22830	(includes 2844)
M92	2831	(includes 2844)
M93	2594	
M94	2814	
M95	2280	(includes 2817)
M96	2546	
M97	2962	
M97	2963	
M98	2987	
M99	2318	
M100	2323	
M101	2977	
M102	2930	
M103	2418	
M104	2429	
M105	2441	
M106	2443	
M107	2442	
M108	2639	(includes 3523)
M109	2641	
M110	2634	
M111	2632	
M112	2694	
M113	2696	
M114	2327	
M115	2807	
M116	2802	
M117	2796	(includes 2809)
M118	2806	
M119	2810	
M120	2596	
M121	4442	
M122	3353	
M122	4444	
M123	2387	
M125	2974	
M126	2663	
M127	2836	
M128	4715	
M130	2588	
M131	70	
M132	2968	
M133	2834	
M134	2833	
M135	2837	
M136	4286	
M137	4006	
M138	3901	
M139	3895	
M140	3898	
M141	2749	
M143	4448	
M144	2715	
M145	4058	
M146	4083	
M147	4070	
M148	4246	
M148	4247	
M148	4248	
M149	4088	(includes 4122)
M150	4134	
M151	4667	(includes 4674–5)
M152	2566	
M154	3997	
M155	4002	
M156	4001	
M157	4114	
M158	4169	
M159	4161	
M160	4180	
M161	4125	
M162	4126	
M163	4721	
M164	4671	
M165	3889	
M166	3749	(includes 3871)
M167	3878	
M168	3888	
M169	3870	
M170	3890	
M171	3975	(includes M172)
M173	3987	
M174	3904	
M177	4026	
M178	4025	(includes 4027–8)
M179	4019	
M181	4015	
M182	4036	
M183	3688	
M184	3705	
M185	4133	
M186	3903	
M187	3928	
M188	3924	
M189	4581	
M190	3909	
M191	3913	
M192	3908	
M193	3910	
M194	4582	
M195	3634	
M196	3732	
M197	3741	
M198	4548	
M199	3727	
M200	3744	
M200a	3639	
M201	3644	
M202	3648	
M203	3666	
M204	3659	(includes 3661–3)
M205	3660	(includes 3664)
M206	3581	(includes 3586)
M207	3583	
M208	3585	
M209	3588	
M210	3683	
M211	3629	
M212	3576	
M213	3568	
M213	3569	
M214	4186	
M215	4462	
M216	4463	
M217	4424	
M218	4413	
M219	4577	
M220	4456	
M221	4457	

field number	*illustration number*	*notes*
M222	4440	(includes 4454)
M223	4578	
M224	4506	
M224	4472	
M226	4471	
M227	4260	
M228	4382	
M229	4383	
M230	4402	
M231	4332	
M233	4359	
M234	4358	
M235	4341	(includes 4365)
M236	4401	
M237	4340	
M238	4353	
M239	4362	
M240	4408	
M241	4392	(includes 4400)
M242	4391	
M244	4488	
M245	449	
M246	1406	
M247	1402	
M248	1360	
M249	1363	
M250	1369	
M251	1382	
M252	1838	
M253	1616	
M254	1649	
M255	1656	
M256	3481	
M256	3482	
M257	3480	
M258	3479	
M259	1040	
M260	1059	
M261	1041	(includes 1049)
M262	1431	
M262	1432	
M263	1527	
M264	1601	
M265	1438	
M266	1206	
M268	1513	
M269	1868	
M269	1869	
M269	1870	
M270	1082	
M271	1814	
M272	1123	
M273	1129	
M274	1126	
M275	3501	
M277	1130	
M278	1701	
M279	1755	
M280	1906	
M281	1764	
M282	155	
M282	1557	
M283	1449	
M284	1205	
M285	986	
M286	1319	
M287	1595	
M288	3094	
M289	1714	
M290	1711	
M291	970	
M292	1225	
M293	997	
M294	1608	
M295	1069	
M296	1067	
M297	1078	
M298	1243	
M299	1855	
M300	1816	
M301	1302	
M302	1303	
M303	1850	
M304	1727	
M305	1739	
M306	1981	
M306	1982	
M306	1983	
M306	1984	
M307	1954	
M308	2482	
M309	3427	(includes M310, M313, M314)
M311	3040	
M312	3036	
M315	4473	
M316	3246	
M317	2730	
M318	2728	
M319	2701	
M320	3015	
M321	2644	
M322	2686	
M323	4346	(includes 4390)
M323	4539	
M324	4544	
M325	4545	
M326	3439	
M327	4534	
M328	2999	
M329	2998	
M330	2460	
M331	4276	
M332	4512	
M333	2493	
M334	2688	
M335	2680	
M336	2626	
M337	4223	
M338	4225	
M339	4224	
M340	4477	
M340	4478	
M341	4293	
M342	4331	
M343	4288	
M344	4323	
M345	4328	
M346	4230	
M347	4294	
M348	2777	
M348	2778	
M348	2779	
M349	2789	
M350	3355	
M351	3137	
M352	1959	
M353	3338	
M354	4630	
M355	4627	
M356	2143	
M357	4681	
M359	2142	
M360	4669	(includes M362)
M361	2397	
M363	4642	
M364	4649	
M365	4654	
M366	4646	
M367	4518	
M368	3435	
M369	2936	
M370	248	
M371	286	
M372	2907	
M372	2908	
M373	3550	
M374	3358	
M375	2711	
M376	1137	
M376	4694	
M377	2924	
M378	2360	(includes M379)
M380	2674	
M381	2866	
M382	3095	
M383	2981	
M384	3049	
M385	3400	
M387	2870	
M388	3310	
M389	3253	
M390	3397	(includes 3408)
M391	2869	
M392	2926	
M393	2923	
M394	2979	
M395	3422	
M397	4207	
M398	4640	
M399	4552	
M399	4553	
M400	4550	
M401	4209	
M402	4507	(includes 4551)
M403	3041	
M404	3493	
M405	2246	
M406	2040	

field number	*illustration number*	*notes*	*field number*	*illustration number*	*notes*	*field number*	*illustration number*	*notes*
M407	2010		M419	3476		PR12	3491	
M408	2009		PR1	2092		PR60	2671	
M409	3467		PR3	2110		U2	2420	
M410	2032		PR4	2350		U3	2400	
M411	2048		PR5	3785		U4	2199	
M412	2012		PR7	2835		U5	2713	
M413	980		PR8	2841		U6	3693	
M414	2029		PR8	3841		U7	4155	
M415	3208	(includes M418)	PR9	4370		U9	893	
M416	3484		PR10	4520		U10	895	
M417	1781		PR11	4524		U11	3558	

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Aerial view of the causewayed enclosure during excavation in 1987.
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